Establishing National Authorities for the CDM

A Guide for Developing Countries

Christiana Figueres, Editor

CSDA Center for Sustainable Development in the Americas

Climate Change Knowledge Network

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Institut International du Développement Durable

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The Center for Sustainable Development in the Americas is a private non-profit organization based in Washington D.C. since 1994. CSDA's mission is to promote innovative financing mechanisms which support sustainable development in Latin America and the Caribbean. CSDA focuses on the most daunting challenge facing Latin America: How can developing countries cover the cost of their transition to environmentally sustainable development? As governments and non-governmental institutions throughout the hemisphere struggle to answer that difficult question, CSDA has emerged as a leader and an ally. CSDA has worked in the climate change arena to establish strategic connections and further mechanisms which finance development in a manner which is environmentally, economically, socially sustainable.

The International Institute for Sustainable Development contributes to sustainable development by advancing policy recommendations on international trade and investment, economic policy, climate change, measurement and indicators, and natural resources management. By using Internet communications, we report on international negotiations and broker knowledge gained through collaborative projects with global partners, resulting in more rigorous research, capacity building in developing countries and better dialogue between North and South.

IISD's vision is better living for all—sustainably. Its mission is to champion innovation, enabling societies to live sustainably. IISD receives operating grant support from the Government of Canada, provided through the Canadian International Development Agency (CIDA) and Environment Canada, as well as the Province of Manitoba. The institute receives project funding from the Government of Canada, the Province of Manitoba, other national governments, United Nations agencies, foundations and the private sector. IISD is registered as a charitable organization in Canada and has 501(c)(3) status in the United States.

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This book is the result of an extraordinary effort on the part of Helena Olivas, Program Director of CSDA. Over a two-year period Ms. Olivas patiently wrote and re-wrote, as the ongoing negotiations influenced the evolving design of the CDM. She coordinated with a wide range of authors and institutions to produce a text which would cover all the relevant aspects of the CDM. This book would not have appeared without her drive and perseverance. CSDA is extremely grateful not only for her commitment to the production of this book, but for her support of developing countries as they face the challenge of climate change.

Foreword

The global challenge of climate change is established on the international agenda. Human activity is destabilizing the global climate and livelihoods that depend on it. The accumulation of heat-trapping gases in the atmosphere must be capped at a safe level. Adaptation to the changes that are already inevitable must be integrated in sustainable development programs, with special attention to the vulnerability of poor countries and poor people.

The United Nations has provided a framework for an effective and equitable global response to this challenge—the 1992 Convention—and the first building block of that response, the 1997 Kyoto Protocol. Yet the emission reduction targets in the Protocol, modest as they are in environmental terms, have generated economic resistance in industrialized countries and, notably, the rejection of the Protocol by the U.S.

The withdrawal of the largest emitter will undoubtedly weaken the initial impact of the Protocol. But the Protocol is more than a first set of targets. It also a method for approaching the collective task of limiting emissions, a set of mechanisms largely and paradoxically "made in the USA." The possibility of acquiring emission reductions offshore is a main feature of these mechanisms. The period ahead is one in which these mechanisms will be tested and improved. Hopefully, the parallel system that may be developed by the United States will also encourage recourse to "Kyoto-type" mechanisms by American corporations, thus contributing to the stock of experience and boosting global market demand for offshore emission reductions.

Among the Kyoto mechanisms, the most innovative is the Clean Development Mechanism, a latecomer to the Kyoto menu. Using the market as its motor, the CDM seeks to attract investment from industrialized countries in projects that promote emission avoidance and sustainable development in developing countries. The CDM not only generates marketable emission reduction certificates, but also encourages developing countries to move their economic development on to climate-friendly paths. There is much to be learned in order to make this new instrument work effectively. The climate change negotiators at Bonn and Marrakech in 2001, determined the initial rules and institutions. Now individual countries and corporations must learn by doing while the rules evolve.

One lesson learned already, from the pilot phase of "Activities Implemented Jointly," is host countries that established national oversight entities were remarkably more successful in developing and implementing projects than countries that had not done so. Embraced by the negotiators, this lesson is incorporated in the rules for the CDM. Setting up a "national authority" is now a compulsory requirement for all developing countries wishing to participate in the CDM.

A lesson still to be learned is that, given the market fundamentals buyers are faced with uncertainty about demand from the United States and a potentially large overhang of emission allowances in excess of needs ("hot air"), these national bodies will need to produce projects of high quality in order to gain market share. They may also find that there is a premium market for emission credits with a superior component of sustainable development. Socially responsible corporate investors may be attracted by projects that are demonstrably supportive of poverty alleviation.

This timely publication by the Center for Sustainable Development in the Americas and the International Institute for Sustainable Development, is a guide to the establishment of National Authorities that can successfully evaluate, approve and market CDM project proposals. It was prepared by a wide array of co-authors alongside the final phases of the negotiations and is now available to contribute to the prompt start of the CDM. Distilling the experiences of several Latin American countries, it contains a wealth of information, commentary and practical advice on the functioning of these bodies, including a step-by-step guide. It is a must read for all those, in developing countries and elsewhere, whose mission is to lay solid institutional foundations for benefiting from the CDM.

Michael Zammit Cutajar
Former Executive Secretary
United Nations Framework Convention on Climate Change

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Preface

Over the past eight years, the Center for Sustainable Development in the Americas (CSDA) has technically supported the efforts of many Latin American countries as they ventured into creating national programs for Activities Implemented Jointly (AIJ) and, more recently, Clean Development Mechanism (CDM) programs. These national programs were voluntary under the AIJ pilot phase, but the Marrakech Accords now stipulate that any developing country wishing to engage in the CDM must have a National Authority entrusted with the responsibility of evaluating and approving potential projects.

CSDA draws upon its rich experience in Latin America to produce this step-by-step guide for developing countries interested in establishing a National Authority. It is written from the perspective of developing countries and focuses primarily on the institution-building activities related to CDM.

Chapter 1 begins with a quick review of the science of climate change and the history of the international climate change negotiations. It then traces the evolution of the CDM from the AIJ pilot phase to its definition under the Kyoto Protocol and its regulation in the Marrakech Accords. 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 brings the focus of the book to the national level. It recounts the experiences that some Latin American countries have had as they have established different types of national AIJ or CDM offices and derives valuable lessons, which will be helpful to all developing countries. Chapter 4 itemizes the individual steps that have been found useful in the process of establishing a National Authority. Chapter 5 explains the regulatory functions that must be performed by a National Authority and the promotional 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.

There is no such thing as a correct approach to establishing a National Authority. There are many possibilities and each country will have to decide on the particular form of institutional development that is appropriate to national circumstances. However, as each country makes these decisions, the process can be informed by experiences of other countries that have gone before and by cross-cutting lessons which have already been learned. It is our firm conviction that the CDM can benefit developing countries if it is well implemented. It is our hope that this book will spur every individual developing country to make its own choices on how to maximize CDM benefits at a national level.

Christiana Figueres
Executive Director
Center for Sustainable Development in the Americas

1 Science and Policy

Jimena Eyzaguirre and Nicole Kalas, Center for Sustainable Development in the Americas (CSDA)

Introduction

The global climate is changing and evidence points to human activities as the cause. Due to extensive research and intricate climate models developed in recent years, we are beginning to understand the possible catastrophic implications of this change. We cannot predict with undisputed certainty the scale of the impacts and the speed at which this will occur. However, it is certain that industrialized countries, with their high levels of greenhouse gas emissions, carry the major part of historical responsibility. It is equally certain that developing countries will assume the major burden of the imminent negative impacts, due to their particular vulnerability in geographic location, as well as economic, political, social and environmental conditions.

The United Nations Framework Convention on Climate Change (UNFCCC) provides the outline of a global action plan to mitigate adverse effects on the atmosphere. The Kyoto Protocol was designed to further strengthen the provisions of the UNFCCC and introduced flexible mechanisms that would allow a reduction of greenhouse gas emissions in the most cost-effective, efficient and sustainable manner. Of these instruments, the Clean Development Mechanism (CDM) is of greatest interest to the developing world. It allows channeling foreign investment to these countries to promote sustainable development and abate greenhouse gas emissions while generating certified emission reduction units (CERs) that industrialized nations can apply towards meeting their own emission reduction targets.

This chapter provides an overview of the science of climate change and traces the history of the UNFCCC, the Kyoto Protocol and the CDM.

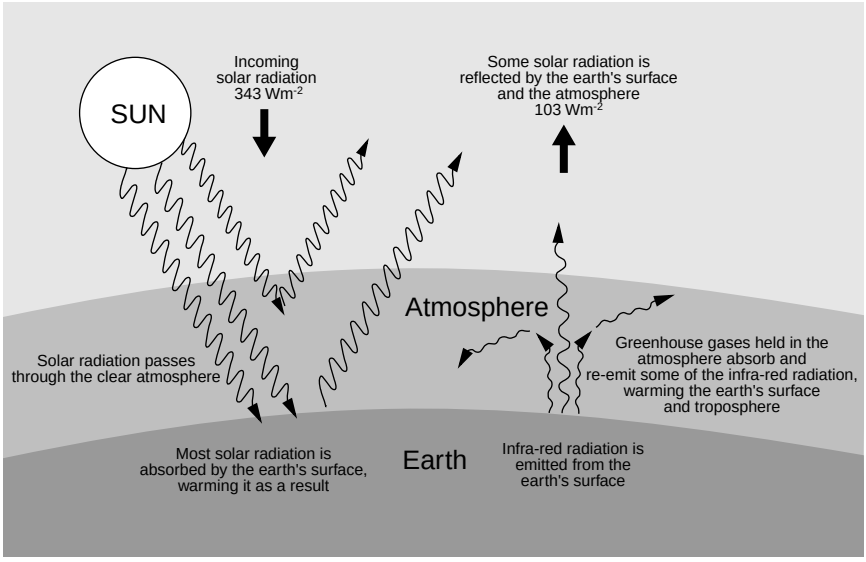
The Climate Change Challenge

Discovery of climate change

The atmosphere is a layer of gas above the earth's surface. It is approximately 50 kilometres thick and is composed of 78 per cent nitrogen (N_2); 21 per cent oxygen (O_2); and one per cent of other trace gases, including water vapour (H_2O); carbon dioxide (CO_2); methane (CH_4); nitrous oxide (N_2O); and ozone (O_3).[1] These gases, known as greenhouse gases, are responsible for the greenhouse effect, a phenomenon first recognized by the French scientist Jean-Baptiste Fourier in 1827.

The sun reaches the Earth's surface, mainly in the form of visible light. About 30 per cent of the energy coming from that light is immediately reflected back into space and of the 70 per cent absorbed, most of it penetrates the atmosphere. The atmospheric greenhouse gases then absorb the energy (Figure 1.1). This results in the warming of the Earth's surface. If this effect were not in place, the Earth would be about 33 degrees C cooler, making life on earth impossible.

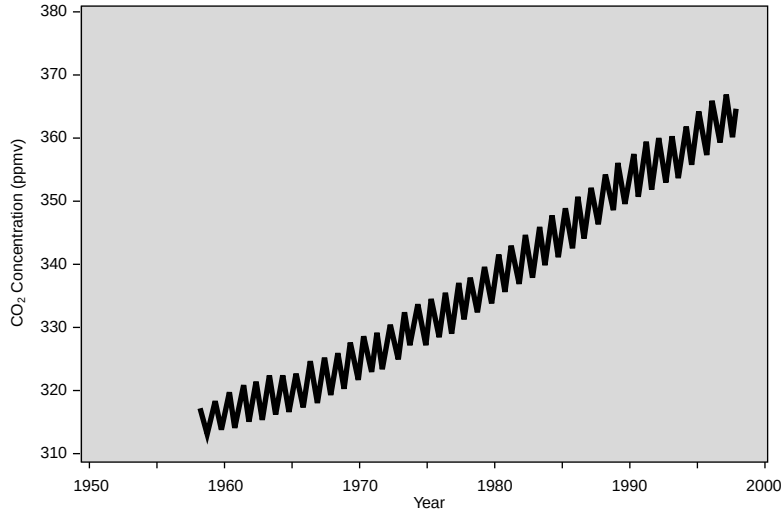
Figure 1.1: The Greenhouse Effect



Fourier's discovery was very important, however, it did not explain or show a correlation between atmospheric gases and changes in temperature. In the mid-1800s, Irish physicist John Tyndall made the observation that slight changes in the composition of the Earth's atmosphere could effect global climate changes: a decrease in atmospheric carbon dioxide concentrations could lead to the development of an ice age.[2] Other scientists such as Arrhenius (1896) and Callendar (1938) reinforced Tyndall's findings regarding the correlation between the compositions of gases in the Earth's atmosphere and changes in the Earth's temperature.

However, it was not until 1958 that actual atmospheric measurements were initiated. C.D. Keeling and T.P. Whorf, of the Scripps Institution of Oceanography, set up an atmospheric carbon dioxide (CO_2) monitoring station in Mauna Loa, Hawaii. The data collected, shown in Figure 1.2, depicts CO_2 concentrations from 1958 to 1998. As the data demonstrate, CO_2 concentrations have increased substantially and steadily since the industrial revolution.

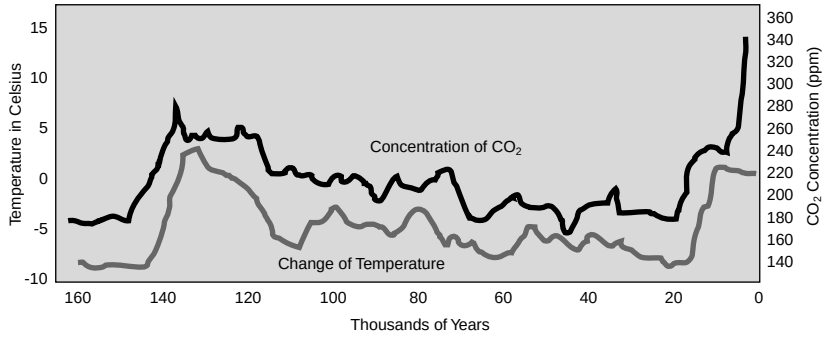
Figure 1.2: Rise in CO_2 Concentrations Over Time



Source: Dave Keeling and Tim Whorf (Scripps Institution of Oceanography)

Over the past 50 years the science of climate change has increasingly evolved as the field has gained more expertise and technological advances have produced historical data, such as the carbon content of ice sheets in the Arctic. Vostock's ice core data (Figure 1.3) reveal atmospheric CO_2 concentrations over the past 160,000 years and compare them to changes of temperature on the surface of the planet. The chart shows the close correlation between CO_2 concentration and changes in temperature. Increased concentrations of atmospheric greenhouse gases have contributed to an enhanced greenhouse effect.

Figure 1.3: Ice Core Data



Climate forcing mechanisms

Climate forcing mechanisms are factors that compel changes in climate. In general, we try to distinguish natural variations from anthropogenic—human caused—climate forcings.

Natural factors disturbing global climate include variations in the Earth's orbit, variations in solar energy output and volcanic activity which tends to cool the Earth's surface. While undeniably influencing the surface temperature, these natural variations and occurrences alone do not explain the global temperature record.[3]

Anthropogenic factors affecting global climate change include:

- **Industrial processes:** Industrial emissions accounted for 43 per cent of global carbon dioxide emissions in 1995. Industrial sector carbon emissions grew at a rate of 1.5 per cent per year between 1971 and 1995, slowing to 0.4 per cent per year since 1990.[4] Emissions are not the only negative impact of industrial processes; other concerns include industrial waste and depletion of natural resources.
- **Buildings:** The buildings sector, including commercial and residential GHG emissions related to energy efficiency, lighting, appliances, insulation, space heating and refrigeration, accounted for 31 per cent of global carbon dioxide emissions in 1995.[5] Emissions from this sector have increased at rate of 1.8 per cent per year since 1971.
- **Transportation:** The transportation sector has greatly expanded with industrialization and urbanization. The increase in vehicle circulation contributes not only to noise and local air pollution, but amounts to 22 per cent of global energy-related carbon dioxide emissions. Worldwide, emissions from this sector are growing at a rapid rate of approximately 2.5 per cent annually.
- **Land use changes and agriculture:** The increase in global population has led to the conversion of forests and grasslands into agricultural systems. Land use changes can disrupt the nature of the weather systems upon which the ecosystem depends. Since forested land evaporates more water and converts more carbon dioxide, oxygen and water than cleared land, deforestation causes changes in the hydrological cycle and increases in carbon dioxide emissions.[6] Agricultural practices such as rice cultivation, livestock raising and fertilizer use also contribute to the increase of atmospheric greenhouse gases. Land use change and agriculture accounted for only four per cent of global CO_2 emissions but over 20 per cent of global anthropogenic GHG emissions (mainly from CH_4 and N_2O) in 1995.[7]

These human activities generate approximately seven billion tonnes of carbon per year, 75 per cent of which were emitted by industrialized nations in 1995.[8]

Economic, technological and social trends, as well as global population will dictate future greenhouse gas emissions. However, given data collected thus far from experimental models and simulations, it is already clear that we can no longer afford to proceed along the business-as-usual emissions trend. The environmental, economic and social consequences of climate change are too dire to go unheeded.

Consequences of global warming

The latest scientific assessments predict a globally averaged surface warming of 1.4 degrees to 5.8 degrees C (2.2 to 10 degrees F) by 2100 relative to 1990, where warming would vary by region.[9] However, we are not only concerned with a rise in surface temperatures. Global warming unleashes a series of associated alterations in atmospheric and oceanic circulation and weather patterns which have grave consequences. Potential consequences of global warming include:

- **Rise in sea levels:** Experts believe the most dramatic response to an enhanced greenhouse effect will be the rise in sea levels. Warming affects the hydrosphere in many ways. Due to thermal expansion that occurs as water is heated, melting alpine glaciers and melting polar caps could cause sea levels to rise by 11 to 77 centimetres (0.27 to 2.64 feet) by 2100.[10] At the same time, increased ocean temperatures would produce changes in the interaction between the atmosphere and oceans, possibly resulting in changing wind patterns. As a consequence, coastlines worldwide will be affected, particularly those composed of unconsolidated sediments. Inhabitants of coastlines and low-lying areas may suffer from the effects of flooding, land subsidence and compaction, aquifer salinization, exposure to pollution, etc.[11] According to a study by the United Nations Environment Programme (UNEP), as of 1990 about half of the world's population lived in coastal areas[12] and stand to be either directly or indirectly affected by such sweeping changes. The models project a widespread increase in the risk of flooding for many human settlements from both increased heavy precipitation events and sea level rise.
- **Change in weather patterns:** The increase in global mean temperature produces regionally variable effects. Some studies indicate that warming would be greater at high latitudes than in the tropics during winter and fall seasons, although mid-latitude regions would experience more frequent summer dryness.[13] Wind and precipitation patterns are affected by changes in temperature. Warming could increase the frequency of tropical storms, which occur at sea temperatures greater than 22°C. In general, global warming is likely to increase the frequency and severity of extreme weather events such as storms and hurricanes, heat waves and droughts.

- **Human health:** Water management systems could be affected by warming temperatures. Periods of severe flooding or drought would create problems with irrigation, drainage and groundwater salinization. The models predict decreased water availability for populations in many water-scarce regions, particularly in the sub-tropics. Approximately 1.7 billion people, one-third of the world's population, currently live in countries that are water-stressed. This number is projected to increase to around five billion by 2025.[14]

  An increase in the number of people exposed to vectorborne (e.g., malaria) and waterborne (e.g., cholera) diseases, and an increase in heat stress mortality are also expected. This could lead to 50–80 million additional cases of malaria per year primarily in tropical, sub-tropical and less well-protected temperate zone populations. Some increases in non-vectorborne infectious diseases such as salmonellosis, cholera and giardiasis may also occur as a result of elevated temperatures and increased flooding.[15]

- **Decline in overall biodiversity:** Changes in mean global temperatures and consequent alterations in the hydrologic cycle threaten species of flora and fauna.[16] Some species might not be able to adapt to rapid changes in climate. Coastal areas, which contain diverse and productive ecosystems such as mangrove forests, coral reefs, salt marshes and wetlands, will be affected by rising sea levels and increases in ocean temperatures.

- **Implications for agriculture and food security:** Studies suggest that as little as 1 degree C of global warming could produce a 161-kilometre shift in temperature zones.[17] As a consequence there will be regional shifts in agricultural productivity. Of immense concern is the general reduction in potential crop yields in most tropical and sub-tropical regions. Under current conditions, as many as one billion people around the world are food deprived or starving.[18] The shift in agricultural belts expected from climate change will decrease food production where it is most needed, escalating food scarcity to unprecedented levels on earth. Loss of human lives will be most acute in the least developed countries.

History of the Negotiations

With mounting scientific evidence pointing towards the correlation between increased greenhouse gas emissions and a measurable warming of the earth's lower atmosphere, political concern with regard to the grave social and economic impacts of climate change began to grow. The World Meteorological Organization (WMO) had been conducting studies about the influence of CO_2 on the atmosphere since 1951[19] that incorporated technological advances, such as the emergence of satellite surveillance systems and approved radio communication into its research.

By the early 1970s it became clear, at least to the scientists involved, that not only were the concentrations of CO_2 steadily increasing, but also that the temperature of the lower atmosphere was rising. Research was directed towards the possible effects involved with such a warming. Alarmed, the UN convened an array of international conferences to discuss various aspects of the potentially severe implications of different climate variations and considered the possible consequences of human-induced climate change.

In 1976 the WMO suggested developing a comprehensive model of the atmosphere to estimate any effects of CO_2 levels on the climate. A 1979 report published by the U.S. National Academy of Sciences concluded that, "there was no good reason to doubt the calculations that a doubling of CO_2 concentrations would lead to a warming of 1.5 to 4.5 degrees Celsius, and that, on present trends, such a warming could occur during the 21st century."[20] In the same year, the WMO, other UN bodies, as well as the International Council of Scientific Union conducted the first World Climate Conference in Geneva, Switzerland. Its purpose was to review the existing knowledge of climatic change and variability, due both to natural and anthropogenic causes, and to assess possible future climate changes and their implications for human activities. The 400 scientists from over 50 countries concluded:

> "(…) we can say with some confidence that the burning of fossil fuels, deforestation and changes of land use have increased the amount of carbon dioxide in the atmosphere by about 15 per cent during the last century and it is at present increasing by about 0.4 per cent per year. It is likely that an increase will continue in the future. Carbon dioxide plays a fundamental role in determining the temperature of the Earth's atmosphere and it appears plausible that an increased amount of carbon dioxide in the atmosphere can contribute to a gradual warming of the lower atmosphere, especially at high latitudes. Patterns of change would be likely to affect the distribution of temperature, rainfall and other meteorological parameters, but the details of the changes are still poorly understood."[21]

The Council appealed to nations "to foresee and to prevent potential manmade changes in climate that might be adverse to the well-being of humanity." Oceanographer Roger Revelle, ecologist George Woodwell, geophysicist Gordon MacDonald and Charles D. Keeling, founder of the Mauna Loa carbon dioxide monitoring project, reported "man is setting in motion a series of events that seem certain to cause a significant warming of world climates unless mitigation steps are taken immediately."[22] For the most part, these warnings went unheeded, apart from mustering further conferences and extending the research into climate change.

In the 1980s, global mean temperatures were higher than in any previous decade since scientists started taking measurements in 1860. A series of unusual

weather conditions in 1988 caused global warming to move rapidly up the international agenda. This list included extended droughts in the United States, Russia and parts of Africa, unexpectedly violent floods in India, China, Brazil and Bangladesh as well as other areas of the African continent, deadly hurricanes in the Caribbean, a cyclone in New Zealand and a typhoon in the Philippines. The period became known as the "greenhouse decade"[23] as global warming became a "hot" issue on the political agenda. Up to this point climate change had been discussed primarily among climate experts, however the need for some framework convention dealing with preventive action on global warming became clear. Scientists began to call upon politicians to take action.

In November 1988, a World Congress on Climate and Development was held in Hamburg, Germany, and as a conclusion its participants called for the first time for CO_2 emissions "to be reduced by 30 per cent by the year 2000 and 50 per cent by 2015."[24] They also argued for unilateral action from industrialized nations to embark on the "process of change and for urgent strategies for reversing reforestation and beginning afforestation programs."[25] In the same year, the Governing Council of the UNEP met in Nairobi, Kenya and with the help of the WMO created an intergovernmental body to conduct ongoing studies of global warming. This body came to be known as the Intergovernmental Panel on Climate Change (IPCC).

The IPCC and the evolution of the COPs

The IPCC's mandate is to fully assess the state of existing scientific knowledge about the climate system and climate change, to look at the environmental, economic and social impacts of climate change, and to develop potential response strategies.[26] The Panel was divided into three working groups to consider the different aspects of its mandate. The role of Working Group I, the Science Group, was to conduct an "assessment of available scientific information on climate change." Working Group II, the Impact Group, was to survey the "environmental and socio-economic impacts of climate change." Finally, Working Group III, the Responses Group, was to develop the "formulation of response strategies."[27]

Since the beginning, most attention was focused on the results of Working Group I, which was expected to deliver the most comprehensively researched and peer-reviewed information regarding global warming thus far. To prompt political action, proof that climate change is a threat to be taken seriously was desperately needed. The IPCC First Assessment Report was published two years later and presented at the second World Climate Conference in 1990. The report shook up policy-makers and the general public and became the basis for negotiations on the Climate Change Convention.

During the World Climate Conference, the UN General Assembly was urged to establish formal negotiations towards a Framework Convention on Climate Change (FCCC). An Intergovernmental Negotiating Committee (INC) was

created and charged with the task of negotiating an FCCC, as well as associated protocols designed to counter climate change.

In the early 1990s a series of regional conferences in developing countries took place. In 1990 Central and South American delegations convened in Sao Paolo, Brazil. Out of this meeting came the Sao Paolo Declaration, which laid the primary responsibility with respect to global warming on industrialized countries and stated that any action taken by developing countries depended on full financial and technical support from the North.

The INC met for another six sessions to lay the groundwork for issues relating to binding commitments, arrangements for financial mechanisms, technical and monetary support to developing countries, as well as procedural and institutional matters.

Negotiators from 150 countries finalized the Convention in five sessions over a period of 15 months and the UNFCCC was presented for signature at the Earth Summit in Rio de Janeiro in 1992. The Convention was signed by 154 states plus the EC , and the UNFCCC entered into force on March 21, 1994, 90 days after the 50th signatory state actually ratified the document.

The ultimate objective of the Convention is to stabilize the concentration of atmospheric GHGs so as not to produce negative impacts on climate systems. Although climate science uncertainties currently prevent us from precisely defining a safe greenhouse gas concentration level, the most often referred to benchmark is 550 parts per million volume (ppmv). This target represents a doubling of atmospheric concentrations compared to pre-industrial levels. There is general agreement that the stabilization of concentrations should occur within a timeframe that allows ecosystems to adapt to climate change and does not threaten sustainable food production and economic development.[28]

The Convention is based on the principle of "common but differentiated responsibilities." The principle differentiates industrialized countries from developing countries, reflecting the fact that industrialized countries bear the historical responsibility for the growing concentration of GHGs and yet it is the developing countries which will be most harshly affected by the impacts of global warming. Thus, the UNFCCC distinguishes between those two groups of countries. Annex I of the Convention lists 41 countries, including industrialized countries and those with economies in transition. The remainder of the world's countries are not listed and fall under the Non-Annex I category. Under the Convention, Annex I countries agreed to bring their emission levels down to the 1990 levels, while Non-Annex I agreed to adopt GHG-reduction policies, contributing to climate change mitigation.

After its 11th session, the INC dissolved in 1995 and the Conference of the Parties (COP) became the Convention's ultimate authority. The first

Conference of the Parties took place in Berlin from March 28 to April 7, 1995. COP-1 determined that the voluntary reduction commitments contained in the UNFCCC were not being fulfilled by the industrialized countries, and even if they were, they would not be adequate to stabilize the concentrations of GHGs in the atmosphere. COP-1 thus adopted the Berlin Mandate. Under Decision 1, "[t]he Parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. Accordingly, the industrialized country Parties should take a more aggressive lead in combating climate change and the adverse effects thereof."[29]

In 1995, the IPCC published its Second Assessment Report (SAR), which soon became widely known for concluding "the balance of evidence suggests that there is a discernable human influence on global climate" and that the overall impact of this influence will be negative.[30] The report also confirmed the availability of "no-regrets options" and other cost effective strategies for combating climate change.

COP-3 was the most publicized climate change-related event since the Earth Summit in Rio, and some 10,000 delegates, observers and journalists participated in the December 1997 event in Kyoto, Japan. The result of this meeting was the Kyoto Protocol, which was adopted by consensus. When it goes into force, it will legally bind participating industrialized countries to reduce their aggregated greenhouse gas emissions, compared to a 1990 baseline, by the end of the first commitment period (2008–2012).

COP-4 was held in Buenos Aires in 1998, where the two-year "Plan of Action" was worked out with the goal of finalizing Kyoto Protocol by the year 2000. Not only were compliance issues and concrete policy measures still under discussion, but also the Protocol's mechanisms and institutional provisions. The Buenos Aires Plan of Action established a prompt beginning for the CDM, eventually leading to a start in the year 2000. The other two mechanisms, emissions trading and joint implementation, would start in the year 2008 at the beginning of the first commitment period.

COP-6 was held in The Hague in November 2000 and was intended as the deadline for Parties to finalize the details for the implementation of the Kyoto Protocol. However, Parties failed to come to a consensus on a range of issues including compliance, sinks in the CDM, Articles 3.3, 3.4 and supplementarity of the Kyoto mechanisms. A second session of COP-6 was planned for June 2001 in Bonn.

In July 2001, the IPCC published its Third Assessment Report (TAR). The findings of the TAR indicate that the previous assessments had been conservative. Armed with new forecasting models, scientists now predicted a warming of 1.4 to 5.8 degrees C between 1990 and 2100.[31] Most importantly, the TAR

concluded that the new scientific findings provided compelling evidence of the human footprint on recent global warming.

In March 2001, President George W. Bush announced that the Kyoto Protocol was "fatally flawed" because it did not address emissions emanating from developing countries and would be detrimental to the economic growth of the United States. As a consequence, the U.S. withdrew from the Protocol. Informed by the TAR, most other countries reacted by renewing their determination to finalize the negotiating text. At COP-6 Part II, Parties reached surprising consensus on most of the text of decisions relating to the Protocol.

COP-7 was held in Marrakech, Morocco, from October 29 to November 9, 2001. Delegations from over 170 countries came to final agreement on the package of decisions, which elaborate a finely drawn structure for the implementation of the Kyoto Protocol. The resulting "Marrakech Accords" completed the 1998 Buenos Aires Plan of Action and paved the way for ratification of the Protocol.

The Kyoto Protocol

The Kyoto Protocol reinforces the principle of "common but differentiated responsibilities." The countries listed under Annex I to the Convention appear under Annex B of the Protocol. Non-Annex I countries to the Convention are not listed in the Protocol and are referred to as the "Non-Annex B" countries. The Protocol commits those Annex B countries that ratify the Protocol to reduce GHGs emissions below 1990 levels by the first commitment period. Each Annex B country adopted a differentiated emission reduction commitment, however all emission reduction targets must be met within the end of the first commitment period with "demonstrable progress" to be proven by 2005. Carbon dioxide, CH_4 and N_2O are measured against a 1990 baseline and the other three gases with long atmospheric lifetimes (HFCs, PFCs and SF_6) can be measured against either a 1990 or 1995 baseline.

The Protocol will be legally binding when it enters into force. In order for it to become so, it must be signed and ratified by at least 55 countries, whose total emissions represent 55 per cent of the emissions of the Annex I countries in 1990. As this book goes to print, 84 Parties had signed and 54 Parties had ratified or acceded to the Protocol (on May 6, 2002). A list of those countries who have ratified is included in Appendix I. A continually updated list can be found at www.unfccc.int/resource/kpstats.pdf the UNFCCC's web site.

Despite the fact that the United States signed the Kyoto Protocol in December 1997, George W. Bush announced the U.S. withdrawal from the Protocol in March 2001. In February 2002, it announced an alternative plan to curb the growth of emissions based on carbon intensity. Although no formal timeline has been established, the European Union, Japan, Australia, New Zealand, Russia and Canada have expressed their firm intent to ratify the Protocol by

the World Summit on Sustainable Development to be held in Johannesburg from August 26 to September 4, 2002. Even without the United States, the Protocol will likely go into force. However, as the U.S. is responsible for 22 per cent of current global emissions, the Protocol will not have the intended environmental impact on global GHG emissions without their participation.

The reductions established under the Kyoto Protocol may only be achieved with a decisive effort on the part of industrialized countries. The high cost of the global emission reductions led to the negotiation and approval of various mechanisms that would allow industrialized countries to use cost effective international opportunities to reduce GHG emissions. Taking advantage of the fact that the GHGs are globally distributed and that the effect of emission or sequestration is the same no matter where it may take place, the Protocol authorizes three mechanisms of geographical flexibility that facilitate cost effective reductions:

- **Emissions Trading (ET) (Article 17):** Parties included in Annex B can purchase assigned amount units (AAUs) from other Annex B countries in order to fulfill their emissions reduction commitments. All emissions trading must be supplemental to domestic action.
- **Joint Implementation (JI) (Article 6):** In order to attain their reduction commitments, JI allows Annex B countries to purchase emissions reduction units (ERUs) resulting from emissions reducing or emissions avoiding project activities implemented by any other Annex B Party.
- **Clean Development Mechanism (CDM) (Article 12):** The CDM allows Annex B countries to acquire certified emissions reductions (CERs) resulting from project activities implemented in Non-Annex B countries. Annex B countries can use these CERs to partially comply with their reduction commitments.

The Evolution of the CDM

In 1991, Norway introduced the concept of "Joint Implementation" (JI) to the Intergovernmental Negotiating Committee (INC), then in operation. Though termed the same as one of the three flexibility mechanisms adopted later under of the Kyoto Protocol, Norway's proposal was much broader in definition and constituted a rather generic term for global emissions trading. Norway had recognized that due to differences in national circumstances, the costs of greenhouse gas mitigation and abatement varied significantly among countries. This observation led to the idea that it might be much more cost effective for two countries to form a partnership in their greenhouse gas reduction efforts.[32] In principle, they could share the benefits of implementing an emissions reduction project in the country where costs are the lowest. This is possible for a number of reasons:[33]

- The stable and delocalized nature of CO_2 is very compatible with the economic characteristics of a global trading market, which has been shown to work best for uniformly mixed gases.
- A large disparity of abatement costs across countries (ranging from under US$10 a tonne to over US$100 a tonne of CO_2) provides the economic impetus for a trading regime.
- The application of flexibility mechanisms at a global scale enhances participation and a potential for global cost savings, while achieving the stated emission targets.

The JI concept was consequently included in the UNFCCC. According to Article 4.2(a) Annex I "…[P]arties may implement such policies and measures jointly with other Parties and may assist other Parties in contributing to the achievement of the objective of the Convention[…]."[34] Criteria for selecting, monitoring and crediting appropriate JI projects were omitted from the original FCCC text.

During the negotiations leading up to COP-1, representatives of developing countries began to raise questions about JI. Some saw it as an attempt by industrialized countries to buy their way out of reduction commitments. The G-77 countries wondered whether credits for JI projects would be available before binding targets for domestic emissions reductions were established. Critics feared that by using JI projects to achieve low-cost greenhouse gas reduction potentials in developing countries, industrialized countries could avoid cost intensive investments at home and in this manner maintain their environmentally unsustainable lifestyle at home, reducing the incentive for structural change domestically. In addition, some developing countries were concerned that JI projects would exhaust the "cheap" reduction options, so that if emission reductions should be established for developing countries at a later date, the targets could only be achieved at higher costs.[35]

Costa Rica was the only developing country that embraced the concept without reservations and declared itself available for JI projects as early as 1994.

During COP-1, Costa Rica garnered consensus in the G-77 and China group for a compromise solution, which established the Activities Implemented Jointly (AIJ) pilot phase. The concept of JI was restructured, and to avoid confusion, the name of the new regime, upon Malaysia's suggestion, was changed from JI to AIJ.[36] In addition, a pilot phase was introduced that would promote "learning by doing" and boost cooperative international efforts to implement emissions reduction and carbon sequestration projects. During the pilot phase, set to last until the end of the decade, no internationally fungible credits were to be awarded for projects that either achieved emissions reductions or increased the uptake of greenhouse gases by natural sinks.

Between 1995 and 2000 many OECD countries, in particular the Scandinavian countries, the Netherlands, Switzerland and the United States actively supported the goals and principles of the AIJ. They established national AIJ offices, such as the U.S. Initiative on Joint Implementation (USIJI) and invested financial, technological and material resources in human and institutional capacity-building activities.[37] Although several developing countries experimented with the concept, Costa Rica once again took the lead, launching nine AIJ projects and introducing certified, tradable offsets (CTOs). Each CTO instrument represents an offset equivalent to one tonne of carbon emissions reduced or sequestered.

At COP-3 (Kyoto, 1997) the AIJ pilot phase was evaluated and many governments expressed a sense of dissatisfaction with its results. Only a small number of projects had been conducted due to a lack of incentives in the form of emission reduction credits. Projects were geographically concentrated in Latin America and Central and Eastern Europe, focused mainly on the renewable energy and forestry sectors.[38] Therefore the range and distribution of projects during this phase could not be considered representative. In addition, transaction costs were initially very high. Finally, the Parties could not come to a consensus about technical issues pertaining to the AIJ pilot phase, such as the development of project baselines, performance monitoring, evaluation, verification and certification of emissions reductions.

Nonetheless, the concept was not abandoned, but rather transformed once again. Brazil suggested the introduction of a penalty system that would subject industrialized countries to a fine if they failed to reach the proposed emissions targets. Industrialized countries would have to pay fines in proportion to the degree of noncompliance. The fines would then be channeled into a "Clean Development Fund" and used to support greenhouse gas emissions mitigation projects and adaptation measures in countries most adversely affected by climate change.[39] In general, industrialized countries, the United States in particular, were opposed to such a system and strongly advocated the JI with credits in developing countries. Costa Rica, acting as mediator, encouraged Brazil to change their proposal to a "Clean Development Mechanism" that would still finance adaptation, but otherwise function as a market-based measure to help meet the reduction commitments.[40] The proposal was backed by G-77 and China, and ultimately approved by the Plenary.

The Clean Development Mechanism was included under Article 12 of the Kyoto Protocol. Under the CDM, Annex I countries (including OECD and countries with economies in transition) will be able to use certified emissions reductions (CERs) from project activities in developing countries to contribute towards their compliance of national greenhouse gas emission reduction targets during the first budget period (2008–2012). Early crediting was approved to begin as early as 2000.

From the developing country perspective, the CDM offers the following opportunities:

- it can attract capital for projects that assist in the shift to a more prosperous, but less carbon-intensive economy;
- it encourages and permits the active participation of private and public sectors;
- it can be an effective tool of technology transfer if investment is channeled into projects that replace old and inefficient fossil fuel technology or create new industries in environmentally sustainable technologies; and
- it can help developing countries define investment priorities in projects that meet their sustainable development goals.

Designing the CDM was not an easy task. From 1997 to 2000, a wide array of stakeholders around the world developed proposals for the guidelines and modalities of the CDM. As the various proposals were widely discussed and carefully considered, convergence of opinions began to emerge. The Sixth Conference of the Parties, held in The Hague in November of 2000, marked the official start of the CDM. However, it was COP-7 that reached final agreement on the rules and regulations for the CDM and that elected the first members of the CDM executive board. The decision containing the CDM rules will be forwarded to the first session of the Conference of the Parties serving as the meeting of the Parties to the Protocol for official adoption.

Conclusion

The climate change dilemma has global ramifications, the consequences of which will be negative on balance. Human inputs are undeniable to the climate change phenomenon. Most importantly, the recent string of unusual weather patterns, thermal expansion of water, melting of alpine glaciers, rising mean global temperatures, etc., deems a business-as-usual approach clearly irresponsible.

The Framework Convention on Climate Change coming into force and the proposed commitments and GHG mitigation efforts put forth in the Kyoto Protocol symbolize growing acknowledgement of our unsustainable resource consumption. Developing countries can begin to contribute to the ultimate objective of the Convention through their active participation in the Clean Development Mechanism. The following chapter provides an overview of the operation of the CDM at the international level.

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2 The Operation of the CDM

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Introduction

The Clean Development Mechanism (CDM) was established under Article 12 of the Kyoto Protocol adopted by the Third Conference of the Parties to the Framework Convention on Climate Change on December 11, 1997. The CDM was defined with the purpose of "assisting Parties not included in Annex I to the Convention in achieving sustainable development and in contributing to the ultimate objective of the Convention and to assist Parties included in Annex I in achieving compliance with their quantified emission limitation and reduction commitments."[41]

The CDM is a cost effective means of promoting sustainable development in developing countries, while also achieving global climate change mitigation through a market-based instrument. It will offer flexibility to industrialized country private sector entities which are unable to cost effectively meet emission reduction targets domestically within a given commitment period due to high costs. At the same time, the arrangement will channel funds from Annex I entities toward projects in developing countries which offer the service of global decarbonization.[42]

This chapter is an overview of the structure and operation of the CDM at the international level. Chapters 3, 4 and 5 refer to the operation of the CDM at the national level, as may be envisioned within each of the participating developing countries.

The CDM and Sustainable Development

From the perspective of developing countries, the success of the CDM rests on the contribution it may make to national sustainable development goals. Certainly as the mechanism develops, there is great potential for such benefits. Article 12 states that emission reductions will have to prove real, measurable and long-term benefits for climate change mitigation and these reductions in emissions must be additional to any that would have occurred had the project not been carried out.

The additional funding channeled through the CDM could assist developing countries in reaching some of their economic, social, environmental and sustainable development objectives, such as cleaner air and water, improved land use, and in many cases, reduced dependence on imported fossil fuels. Social benefits such as rural development, employment and poverty alleviation are

also expected to result. In addition to catalyzing green investment priorities in developing countries, the CDM offers an opportunity to make simultaneous progress on climate, development and local environmental issues. For developing countries that might otherwise be preoccupied with immediate economic and environmental needs, the prospect of such benefits should provide a strong incentive to participate in the CDM.

The determination of whether projects indeed help host countries achieve sustainable development lies with the host country. Several attempts were made to find indicators for sustainable development throughout the negotiation process,[43] but general acceptance of any resulting indicators had obvious political ramifications and consensus was not reached. It is the host country's prerogative, therefore, to confirm whether a CDM project activity assists in achieving sustainable development.[44]

In the absence of internationally agreed upon sustainability criteria, it is critically important that each host country develop national sustainability measures that are transparent and widely disseminated. The responsibility is clearly on the shoulders of each host country to ensure that projects with no direct benefits or with negative benefits do not qualify for the CDM, even if they result in net GHG emission reductions.

Governance and Share of Proceeds

As defined in the Protocol, the CDM will be administered by two bodies: the COP/MOP and the executive board.

COP/MOP: The Conference of the Parties, serving as the Meeting of the Parties, is the supreme body of the CDM and is constituted by those countries that have ratified the Protocol. The COP/MOP will provide guidance to the executive board and elaborate modalities and procedures with the objective of ensuring transparency, efficiency and accountability. The COP/MOP will also review the regional distribution of designated operational entities, in order to promote an equitable distribution.

Executive board: The executive board will supervise the CDM and be fully accountable to the COP/MOP. It will be responsible for accrediting operational entities, defining modalities and procedures for the CDM, approving new methodologies and guidelines related to baselines, monitoring plans and project boundaries, and maintaining the CDM registry and database.

The executive board is comprised of 10 members from Parties to the Kyoto Protocol as follows: one member from each of the five United Nations regional groups, two other members from the Parties included in Annex I, two other members from the Parties not included in Annex I and one representative of the small island developing states, taking into account the current practice in the Bureau of the Conference of the Parties.[45]

Members are nominated by their respective geographic constituencies, have appropriate technical and policy expertise and have no participation in any aspect of a CDM project activity in order to avoid conflict of interests. The first members of the Board were elected at COP-7 in Marrakech.

The Protocol authorizes two fees in the CDM. The first is the administrative fee to cover the operational cost of the CDM. This will be charged as a share of the proceeds at a level as yet undefined. The second is the fee to assist developing country Parties that are particularly vulnerable to the adverse effects of climate change in meeting the costs of adaptation. This fee shall be charged at the level of two per cent of the certified emissions reductions issued for each CDM project.[46] An exception is made for projects in least developed country Parties, which are exempt from this fee.

Criteria for Participation

In order to participate in the CDM, there are certain eligibility criteria that countries must meet. All Parties must meet three basic requirements: voluntary participation in the CDM, the establishment of a National Authority for CDM purposes and ratification of the Kyoto Protocol.

In addition to the above requirements, industrialized countries must meet several further stipulations: establishment of the assigned amount under Article 3 of the Protocol, a national system for the estimation of greenhouse gases, a national registry, an annual inventory and an accounting system for the sale and purchase of emission reductions.

The Secretariat of the UNFCCC has been charged with maintaining a publicly accessible list of Parties that do not meet the participation requirements.

Project Characteristics

All CDM projects must result in a net GHG reduction. This result can be attained through the reduction of carbon dioxide emissions, as in the case of energy efficiency, renewable energy generation or through the sequestering of carbon, as in the case of improved land uses (afforestation and reforestation).

CDM projects are comprised of two parallel income flows. The first flow refers to the base project and is typical of any traditional investment in an electricity generation or forestry project. The project goes through the well known stages of prefeasibility, feasibility and development. In the case of power generation the main product is electricity, with reforestation the main product is wood. The base project must have a manageable level of risk and an acceptable internal rate of return, as the investment is typically undertaken by multilateral banks, private commercial banks, specialized funds or a combination thereof with cost recovery and profit in mind.

The second flow is the "carbon flow." The products of this flow are tonnes of carbon dioxide avoided or reduced in the case of energy projects or tonnes of carbon fixed in biomass in the case of land use projects.[47] Through the CDM project cycle described below, these reductions are converted into certified emission reductions (CERs). These CERs can be purchased by greenhouse gas emitting sources, such as thermal power generation companies in industrialized countries, to meet domestic emissions reductions requirements. The market price of CERs will fall in between the cost of production (including all transaction costs incurred in the CDM project cycle) and the maximum purchaser price. This price is not anticipated to exceed the cost of domestic reduction measures in industrialized countries. The sale of CERs can significantly increase the internal rate of return (IRR) of an entire project. In the case of projects with a healthy IRR on the traditional flow, the CER is an incentive to implement a more greenhouse gas efficient project. In the case of projects that are not quite commercially viable, the added input of financing for the resulting CERs could make them viable.

According to Article 12 of the Kyoto Protocol, a CDM project must be "real, measurable and additional." A project is considered additional if the anthropogenic emissions by sources are reduced below those that would have occurred in the absence of the registered CDM project.[48] In order to establish additionality, the project emissions must be compared to the emissions of a reasonable reference case, identified as the baseline. The baseline is established by the project participants according to approved methodologies on a project specific basis. The baseline can be derived from any of three approaches: existing actual or historical emissions, emissions from a technology that represents an economically attractive investment, or the average emissions of similar project activities undertaken in the previous five years under similar circumstances and whose performance is among the top 20 per cent of their category.[49]

CERs can only be issued for a crediting period starting after the date of registration of CDM project activity. The crediting period is selected by the project participants and is either a maximum of 10 years with no option of renewal or a maximum of seven years which may be renewed no more than twice. The first commitment spans the period 2008 to 2012. Projects starting as of January 1, 2000, may be eligible for the CDM if they have been submitted for registration before December 31, 2005.[50]

The CDM Project Cycle

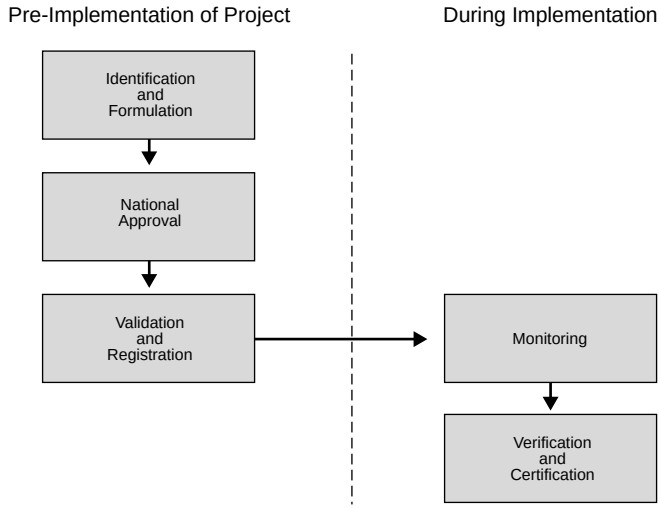
The carbon component of a mitigation project cannot acquire value in the international carbon market unless it is submitted to a verification process designed specifically to measure and audit the carbon component of the project.

According to the Marrakech Accords, the cycle of a CDM project has five fundamental stages: identification and formulation, national approval, validation

and registration, monitoring, and verification/certification. The first three are performed previous to the implementation of the project. The last two are performed during the lifetime of the project.

Project identification and formulation

Figure 2.1: The CDM Project Cycle



The first step in the CDM project cycle is the identification and formulation of potential CDM projects. Project formulation must follow the format established by the COP. The Project Design Document (PDD) includes a description of the project, a presentation of the baseline calculation, an explanation of how the project meets the additionality requirements, an environmental impact assessment, evidence of public participation and stakeholder comments as well as a monitoring plan. A sample format based on the official PDD requirements is included in Appendix IV.

From the project developer's point of view, it is advisable to elaborate the Project Design Document at the same time as the feasibility study of the project. This allows the developer to determine the impact of potential emission reduction sales on the feasibility of the project.

National approval

All countries wishing to participate in the CDM must develop a National Authority to evaluate and approve the projects. Although the international process has given general guidelines on baselines and additionality, each devel-

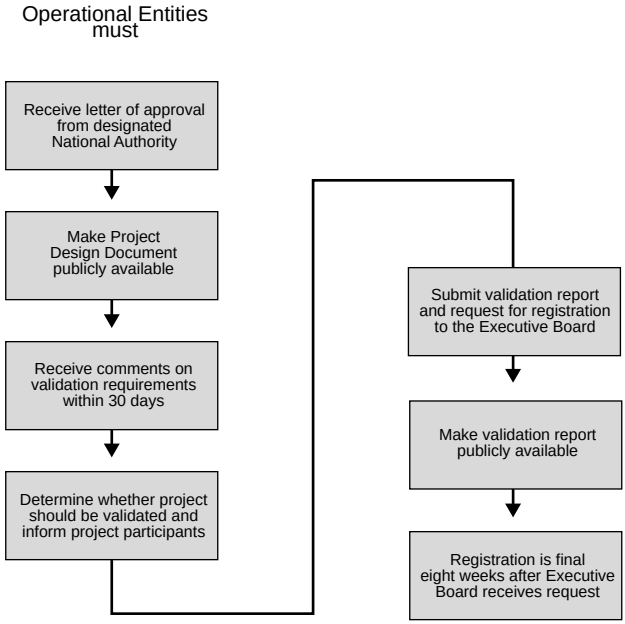
oping country has the responsibility to determine the national criteria for project approval. These criteria should comply with the requirements defined by the COP/MOP, but should also define the national requisites and priorities for sustainable development. It is important that the evaluation and approval process be transparent and efficient. The National CDM Authority then issues a certificate or letter indicating that the proposed project meets the sustainable development goals of that country. The CDM project cycle represents compounded transaction costs and should not be unnecessarily burdened with costs at the national evaluation level.

This guide is intended precisely as a tool for the development of this national approval entity in developing countries. The functions of the National Authority are presented in detail in Chapter 5.

Validation and registration

Validation is the process of independent evaluation of a project activity on the part of a designated operational entity. Registration is the formal acceptance by the executive board of a validated project as a CDM project activity.[51] Projects will be validated by the operational entities according to the internationally defined procedures.

Figure 2.2: Validation and Registration Procedures



Operational entities will be accredited by the executive board and designated by the COP/MOP. These operational entities will typically be current private companies such as auditing, accounting, consulting and law firms that are capable of conducting credible independent assessment of emission reductions. Accreditation criteria have been laid down by the executive board. Many companies aspiring to be accredited have already made public their intent of entering this new line of business. It is however critical to remember that operational entities can perform only one function in the cycle of any given CDM project: either validation/registration or verification/certification. Participation in both auditing steps would be a clear conflict of interest and is not allowed.

Monitoring

Monitoring is the systematic surveillance of the project's performance by measuring and recording performance-related indicators. A monitoring plan 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 should clearly identify responsibility and authority for registration, frequency of monitoring and measurement activities, and should determine the verification schedule for claimed emissions reductions. The monitoring plan should give enough information to satisfy the needs of future verifiers.

The monitoring plan must be based on an internationally recognized monitoring methodology and should provide for the collection of data necessary for estimating the baseline as well as the emissions within the project boundary. It should identify and measure all potential sources of leakage (emissions caused by the project but occurring outside the project boundary). The plan should establish quality assurance and control procedures and include training requirements to support the proposed monitoring activities.

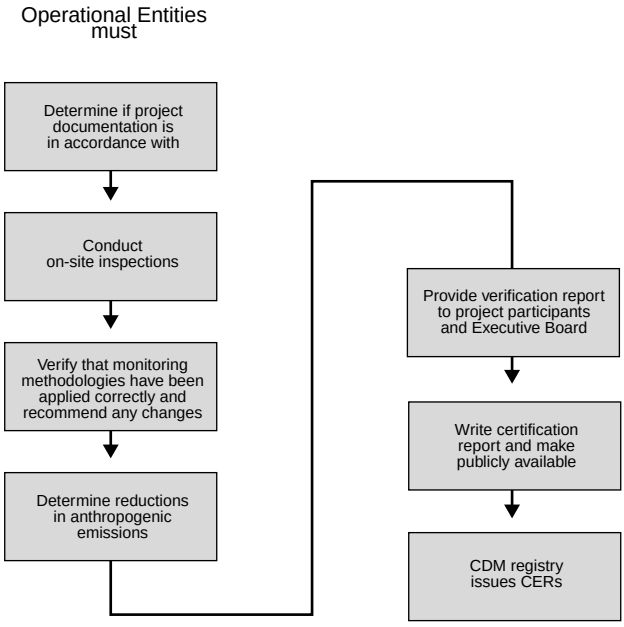
The monitoring plan can be established either internally by the project developer or externally by a specialized agent. Once defined however, the plan can be executed by the project developer and should be an integral part of the project's tracking system. The monitoring plan constitutes the basis of future verification.

Verification and certification

Verification is the independent, periodic review and *ex post* determination by the operational entity of the monitored reductions in emissions.[52] The independent verifier must make sure that the CERs have resulted according to the guidelines and conditions agreed upon in the initial validation of the CDM project. Certification is the written assurance by the operational entity that, during a specified time period, a project activity achieved the reductions as verified.[53]

The certification report constitutes a request for issuance of CERs. The issuance is performed by the executive board and is considered final 15 days after the date of receipt of the request for issuance. Upon being instructed by the executive board, the CDM registry issues the quantity of CERs. The amount corresponds to the share of proceeds for both the administrative and adaptation costs to the appropriate accounts in the CDM registry, and the remaining CERs to the registry of the project participants. The transaction is then complete.

Figure 2.3: Verification and Certification



Procedures for Small Scale Projects

The Marrakech Accords establish a fast track for small scale projects (renewables up to 15 MW, energy efficiency with a reduction of consumption either on the supply or the demand side of up to 15 gigawatt hours per year and other projects that both reduce emissions and emit less than 15 kilotonnes of CO_2 equivalent annually).[54] The executive board has been charged with defining modalities and procedures for the fast track, recommending them to COP-8 being held in New Delhi in October 2002. When those procedures are approved, the above described CDM project cycle will most likely be streamlined for qualifying small projects.

Conclusion

The international structure and operation of the CDM has been long in the making. It is evidently cumbersome, when compared to the more streamlined procedures for the other two flexibility mechanisms. However, the operational guidelines of the CDM are the result of protracted and contentious negotiations, which sought to balance the political implications of international emission reductions with the environmental benefit of reducing the cost of global reductions.

The CDM will likely be an instrument for all countries participating in the Kyoto Protocol. It is not yet clear how the new United States climate change policy will have international linkages to the Kyoto carbon market. The U.S. might create a national voluntary regime, under which some individual states could adopt regulatory emission limits and may include international offsetting. In such a case a parallel market for emission reductions might emerge from developing countries. In the meantime, what is clear is that the U.S. will continue to hold itself out of the Kyoto Protocol at least in the medium term, severely reducing the demand for international reductions through the CDM.[55]

Some have argued that without the U.S., the Protocol is reduced to a simple institutional building exercise. We would argue that the institutional building exercise is not simple. The complexity of operating the CDM as described in this chapter is not to be underestimated. Presuming that the CDM is a long-term instrument of the climate regime, the global investment made now is fundamental to the future success of the regime. A mechanism such as the CDM has never been attempted. It is clearly a case where we can only learn by doing, and where every mistake is a valuable lesson learned.

Endnotes

41 Kyoto Protocol UNFCC/CP/1997/L.7/add.1 December 10, 1997 Kyoto, Japan.

42 Although the term refers to the removal of carbon dioxide from the atmosphere, the concept includes the removal of all greenhouse gases.

43 Hassing, Paul and Matthew Mendis, An International Framework for CDM Transactions. Unpublished, March, 1999.

44 FCCC/Draft decision -/CP.6 (Article 12).

45 Marrakech Accords, Decision 17/CP.7, para 7.

46 Marrakech Accords, Decision 17/CP.7, para 15.

47 One metric tonne of carbon is equivalent to 3.67 metric tonnes of carbon dioxide. In order to make the argument more transparent we shall call both these products "carbon."

48 Marrakech Accords, Decision 17/CP.7, para 43.

49 Marrakech Accords, Decision 17/CP.7, para 48.

50 Marrakech Accords, Decision 17/CP.7, para 13.

51 Marrakech Accords, Decision 17/CP.7, para 35 and 36.

52 Marrakech Accords, Decision 17/CP.7, para 61.

53 Marrakech Accords, Decision 17/CP.7, para 61.

54 Marrakech Accords, Decision 17/CP.7, para 6.

55 The International Energy Agency in Paris has estimated that the net demand could oscillate from 205 million tonnes of carbon (oversupply) with maximum hot air in the system, to 2,305 million tonnes of carbon, according to the economic model used. Pershing, 2001.

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3 Evolution of National Authorities for the CDM

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Introduction

During the years leading up to the Seventh Conference of the Parties in November 2001, national Activities Implemented Jointly (AIJ) entities were created in several developing countries, mostly in Latin America. The institutional effort was undertaken on a voluntary basis and was considered to be beneficial to that country's participation in the international emissions reduction market.

This chapter follows the development of national AIJ/CDM entities throughout Latin America, the region where most National Authorities (or their predecessors) have been established. Some countries have already achieved the implementation of their national programs, but others are still in the process. Nonetheless, the Latin American experience in AIJ/CDM institutional development is exemplary and will contribute to future worldwide institutional progress. This chapter traces the history from the Costa Rican experience starting in 1994, to the efforts of Ecuador and Paraguay in 2000. Furthermore, it compares and contrasts the various types of national entities in the region and identifies the major challenges of CDM institutional development.

Historical Evolution of Latin American AIJ/CDM Entities

Costa Rica

Just as Costa Rica was the one developing country most willing to experiment with AIJ projects in the early stages, it was also the first developing country to develop the concept of a national AIJ/CDM entity. Already in 1994, Costa Rica legally consolidated the Costa Rican Office for Joint Implementation (OCIC) by Executive Decree. The OCIC was defined within the framework of the United Nations Framework Convention on Climate Change (UNFCCC) policies and criteria for the preparation, evaluation and approval of AIJ projects.

OCIC was envisioned and implemented by René Castro, the Minister of Energy and the Environment, with personal oversight and support from the President of Costa Rica, José María Figueres, as a component of their agenda on sustainable development and international trade. Stephen Petricone and Hannah Reilly, two then-recent graduates from Harvard's Kennedy School of Government, were brought to Costa Rica to work with key Costa Rican poli-

cy-makers in the Ministry of Energy and the Environment (MINAE), the Meteorological Institute, the National Parks (System) and Office of the Presidency to develop a national AIJ framework. On behalf of the President and Minister and with their direct input, the OCIC team worked over a period of 12 months to set the basis for an inclusive, effective and transparent entity.

As knowledge about AIJ grew within the country, the Costa Rican NGO community and private sector associations became interested in participating and the government recognized the need to more specifically define OCIC's legal status, the scope of its domestic responsibilities and to consolidate its role in Costa Rica's international climate change negotiations. In mid-1995 an agreement was signed among the public, private and NGO sectors, each agreeing to contribute resources to the continued development of the national entity. This co-operative agreement, organized and driven forward to completion by Dr. Franz Tattenbach of the Foundation for the Development of the Central Volcanic Mountain Range (FUNDECOR), formally gave birth to an expanded OCIC with a legal mandate. The agreement was signed by the Ministry of Environment and Energy, FUNDECOR, the Coalition of Development Initiatives (CINDE), Costa Rica's Association of Energy Producers (ACOPE) representing the private generators of renewable electricity, a private sector entity specialized in investment promotion and a non-governmental organization with recognized experience in sustainable forestry and forest economics.[56] Each party agreed to contribute toward the operation of OCIC, either in kind or financially:

- **Ministry of Energy and Environment:** This Ministry and other agencies under its supervision contributed office space and logistical support during the initial stages of the AIJ Program. It also leveraged funding from multilateral sources to pay for highly qualified consultants and co-sponsored local and international workshops. For several years the Ministry paid the salary of an energy and forestry expert and provided legal counsel through its legal department.
- **FUNDECOR:** A non-governmental organization created with USAID support to protect biodiversity in Costa Rica. It provided technical support and expertise during the infancy of the office and contributed by organizing workshops and promoting Costa Rican AIJ opportunities abroad. For several years, FUNDECOR contributed the services of the OCIC Executive Director.
- **CINDE:** A non-profit foundation dedicated to the promotion of Costa Rican exports and investment opportunities. It began by co-sponsoring conferences and offering promotional support and later increased its support significantly, contributing financial resources as well as housing the OCIC offices. CINDE also provided marketing expertise and contacts abroad.

- **ACOPE:** The association of private sector renewable energy generation. This association is a strategic partner of the OCIC and contributes in the development of energy projects at a technical and a political level. ACOPE works hand in hand with OCIC on the development of the OCIC's energy project portfolio.
- **Other private sector firms and organizations:** A number of companies have contributed to the efforts of the OCIC, most notably by co-sponsoring conferences or other training or promotional events. For example, during the June 1995 international JI conference in Costa Rica, a number of private firms and industry chambers contributed financial resources toward meals and receptions, along with staff to aid with logistics. As another example of private sector support, the Forestry Chamber helped organize a local workshop regarding possible JI opportunities in the Costa Rican forestry sector.
- **Other NGOs, scientific and academic organizations:** In addition to sponsoring specific projects, a number of NGOs, scientific and academic institutions have provided expertise and knowledge that has proven useful in the analysis of Costa Rica's national development priorities, as well as in the evaluation of specific projects. One example that clearly stands out is the Meteorological Institute, which developed Costa Rica's national inventory of GHG sinks and sources in coordination with UNEP.

In 1996, the OCIC was legally elevated to the rank of maximum de-concentration office within the Ministry of Environment and Energy. This decision allowed the program to have technical and administrative autonomy and also guaranteed all participating sectors a voice in climate change policy development. Moreover, the new classification served to more formally integrate OCIC and its policies with the diplomatic and technical teams. Since that classification occurred, OCIC became the focal point of the UNFCCC for Costa Rica.

Since OCIC's inception, a total of nine AIJ projects have been approved: four in the renewable energy sector, four in the conservation, reforestation and/or regeneration sectors, and one in the agricultural sector.

At a time when most countries were still trying to understand the more basic concepts of climate change, OCIC forged ahead with both effective institutional developments as well as innovative financial instruments. The Certifiable Tradable Offset (CTO) was defined as a specific number of units of GHGs certified by an internationally recognized third party, expressed in carbon equivalent units which have been reduced or sequestered by AIJ actions and for which all project implementation phases have been completed."[57] In that sense, the CTO is the clear precursor of the CER. Costa Rican CTOs have been reported to the UNFCCC and are intended to be fully transferable.

The Government of Costa Rica guarantees each CTO for a number of years according to the lifetime of the project. During the guarantee period, any CTO that is declared invalid as a result of the monitoring and/or external verification would be replaced. Tierras Morenas, a wind project generating 20 megawatts, is one example of an energy sector project that has produced CTOs approved by the U.S. Initiative on Joint Implementation.

At the beginning of 2002, Costa Rica ratified the Kyoto Protocol and OCIC underwent yet another transformation. In order to move toward sustainable financing, OCIC was transformed into a private association, funded by the entry fees and monthly dues paid by the Association Founders. Founding membership was offered to the national utility (ICE), the National Power and Light Company, the national forestry fund (FONAFIFO), the association of private electricity providers (ACOPE) and the Forestry Chamber. Membership is open to any other interested parties.

OCIC's exemplary success can be credited to several contributing factors: strong political leadership at the highest levels; a bold public platform integrating international markets and domestic sustainable development challenges; a high level of understanding of local and international climate change issues within the public and NGO sectors; clarity of legal and technical implementation; and a willingness to take bold negotiating positions at the international level. Most uniquely, the Costa Rican example serves to demonstrate that co-operation among different sectors of a country's institutional structure can be accomplished. Public, private and NGO sectors were able to find common ground for the implementation of a common goal. This coordination allowed the OCIC to develop rapidly and become self-sustainable.

Guatemala

In 1996, the Center for Sustainable Development in the Americas (CSDA) studied the experience of Costa Rica with the purpose of making some of the lessons learned available to other countries. In May of that year, at the request of the government of Guatemala and funded by USAID, CSDA organized the first ever workshop on AIJ institutional issues.[58] Representatives from governmental institutions, environmental organizations, education centres and the private sector attended the workshop. The week-long session set the basis for the creation of a national AIJ entity by defining project evaluation criteria, a clear approval procedure, a feasible structure and a legal framework. In addition, consensus was reached in designating FUNDESA, a private sector organization, as the site for the new entity.

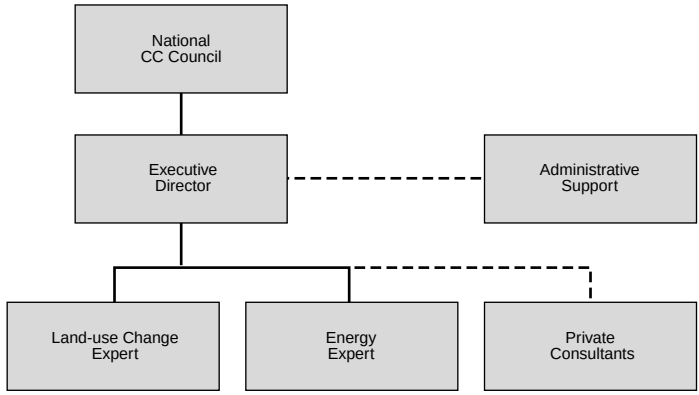
In June of that year a government decree creating the Guatemalan Office of Joint Implementation (OGIC) was drafted and submitted for review and approval. The draft lead to a prolonged competition for leadership among the Ministries of Energy, Agriculture and the Environment. All three governmental institutions vied for the authority of approving projects. After heated dis-

cussions, it was agreed that each Ministry would participate in the technical review of projects belonging to the respective sector and recommend their approval or denial. However, the final signature for host country approval would come from the Minister of the Environment. Under this agreement, the government decree was finally approved and published in June of 1997.

The Board of OGIC has representatives from the Ministry of Agriculture and Livestock, the Ministry of Energy and Mines, the National Environment Council (CONAMA), the universities, the Association of Volunteer Environmental Organizations (ASOREMA) and the private sector Development Foundation of Guatemala (FUNDESA).[59] At that time, CONAMA was the highest authority on environment in Guatemala. During 2001, that institution was transformed to Secretary of Environment and later the same year, it was elevated to the rank of Ministry. OGIC has a technical role and is responsible for promoting, evaluating and approving AIJ projects. However, the overall national climate change policy is entrusted to the National Climate Change Council, formed in July 1997. The Council is comprised of the same entities as the Board of OGIC plus the Ministry of Foreign Affairs and the National Institute of Meteorology, Seismology, Vulcanology and Hydrology and includes the organization's Executive Director.

Figure 3.1 shows the structure of the National Authority, reflecting the small number of staff members.

Figure 3.1: Structure of OGIC [60]



With few exceptions, most of the early AIJ national entities were conceived with a small group of staff to create the backbone of the organization. This was a result of the limited resources available and the immaturity of the carbon market.

In September 1999, Guatemala ratified the Kyoto Protocol and OGIC redoubled its efforts to participate in the international emission reductions market. Under the leadership of OGIC's first director Eduardo Dopazo, up to the year 2000 the Office had approved five projects (three renewable energy projects, one in the land use change sector and one in the agricultural sector).[61] The USIJI program has approved the three energy sector projects. OGIC was also actively involved in capacity building on AIJ/CDM issues both nationally and internationally.

In contrast to its Costa Rican counterpart, the government of Guatemala delegated the responsibility of implementing the AIJ/CDM related functions to the private sector, represented by FUNDESA. Although directly accountable to the intersectoral Board of OGIC, and ultimately to the Ministry of the Environment, OGIC continues to function as a private sector entity. During the first four years of operation FUNDESA housed and financed OGIC. OGIC also received funding support from other private entities.

In 1997 the World Bank and the Swiss government started a National Strategy Study Program, the purpose of which is "to provide the relevant national authorities and other stakeholders with an opportunity to develop and analyze options to better understand the issues and opportunities presented by potential international markets and other financing opportunities for greenhouse gas (GHG) offsets."[62] With the support of the Swiss government and the World Bank, Guatemala initiated the National Strategy Study during the first months of 2002, to revise and update the policy and institutional structure that enhance the country's opportunities in the CDM.

Enriched by the contrasting experiences of Costa Rica and Guatemala, in 1996 CSDA published *Implementing JI/AIJ: A Guide for Establishing Joint Implementation Programs*,[63] again with financial support from USAID. The Guide identified the range of legal, structural, operational and financial underpinnings in the creation of national AIJ entities. The Guide was published in English and Spanish and was widely distributed around the world. The current guide for *Establishing National Authorities for the CDM* is an effort to update the original manuscript with the latest international decisions on CDM.

During the following years, CSDA selected experienced people from both the Costa Rican and the Guatemalan offices to convey lessons learned to other countries in the region. Aware that there is no "cookie cutter" approach and that each country would have to decide on the particular form of institutional development, CSDA implemented a series of individual workshops in Bolivia, Chile, El Salvador, Honduras, Argentina, Nicaragua, Colombia and Panama between 1996 and 1999. As expected, the development of the different entities varied from country to country in terms of legal nature, timing of implementation, structure, staff make-up and inclusion of the various sectors.

In fact some countries decided not to proceed with the creation of a dedicated entity, but rather to incorporate the functions into an existing government agency.

Bolivia

CSDA organized an AIJ institutional building workshop in Bolivia in December 1996. As a result, Bolivia established a section within the Ministry of Sustainable Development, dedicated exclusively to climate change issues including AIJ. The National Climate Change Program (PCNN) is in charge of implementing technical commitments under the UNFCCC. In addition, there are two additional programs that address climate change: Interinstitutional Council on Climate Change (CICC) and the National Joint Implementation Program (PRONIC).[64]

PRONIC is a mixed institution with representatives from the private and the public sectors. It was established to address the AIJ pilot phase as well as the development of the CDM. While this program continues to lack funds and staff, it is legally formalized by the Ministry of Sustainable Development and Planning.

With the support of the NSS Program, Bolivia did a cost/benefit analysis of establishing a CDM National Authority in 2000. In the study, it was concluded that the current design of PRONIC would suffice to perform the National Authority's responsibilities in evaluating and approving CDM projects. However, PRONIC will need to seek funding in order to adequately staff the program and properly play its role.[65]

El Salvador

In 1996, the Salvador Foundation for Economic and Social Development (FUSADES) promoted the pilot phase for AIJ, with the purpose of identifying greenhouse gas emission reduction projects in the different sectors. The Commission for Sustainable Development (CODES) would then submit these projects to the U.S. Initiative on Joint Implementation (USIJI). In May 1997, the Ministry of Environment and Natural Resources (MARN) of El Salvador was established and took the leadership on AIJ issues. This new leadership and the ratification of the Kyoto Protocol in 1998, lead to activities for promoting the CDM nationally.

Initially, the Ministry of Environment was eager to take the lead for implementing a national program for the CDM, however, the development for such entity stalled. Later, discussions were initiated between the MARN and the private sector to encourage the private sector to take on the initiative. However, the private sector felt the initiative to establish a self-sustainable CDM entity through the sale of Certified Emission Reductions (CERs) was too risky, since the carbon market was yet to be developed.

Finally, in 2000, the government established two departments within the MARN, one for climate change and one for sustainable development. From these stemmed two divisions: the CDM division and the climate change division. The latter was responsible for addressing adaptation issues and the commitments under the UNFCCC. The CDM division established the first ever CDM program, known as Salvador Office for Clean Development (OSDEL).[66]

OSDEL received USIJI approval for the first climate-related industrial re-conversion project in the cement sector in 2000. OSDEL and the climate change division of the MARN have developed national criteria and guidelines for CDM projects and implemented various studies to determine the best strategies to develop mitigation carbon projects in the country.

With the support of the government of Finland and the World Bank, El Salvador is initiating the National Strategy Study during the first months of 2002.

Honduras

In 1997, Decree 007-97 provided the legal framework for the Honduras Joint Implementation Office (OICH). However, it was not until March 1998 that the Norwegian-financed Project for the Sustainable Promotion of Natural Resources (PAGS) hired a national expert, Sergio Zelaya, to design the entity and search for funding.

The proposed design[67] relied heavily on primary sources from the Costa Rican program and was informed by CSDA's previously published *Guide for Establishing Joint Implementation Programs*. Once the design was complete, OICH had to embark on a prolonged search for funding, which was finally provided by the Fund for Environmental Management Honduras-Canada. This funding allowed the OICH to become operational in November 1999.

OICH is a non-governmental organization that works closely with the public and private sector to promote carbon mitigation activities. It reports directly to the Ministry of Natural Resources and the Environment. Since its establishment, OICH has contributed to the development of a national market for CERs, facilitated the design and strategies of climate change, obtained funds for the implementation of eligible projects and developed procedures for the approval of CDM projects. Honduras ratified the Kyoto Protocol in May 2000 and OICH is now positioning itself as a regional training centre for the CDM.

Panama

In 1996 the Government of Panama requested support for the development of a national AIJ entity. In October 1997 a scoping mission funded by the GEF was implemented by CSDA and the World Bank to determine and analyze the progress of the institutionalization of an AIJ/CDM program. The mission

advised on the steps to be taken for the implementation of a national program, the purpose it would serve, the timing of its development and its design.

The National Authority for the Environment (ANAM) contracted CSDA to carry out the first series of capacity building workshops on the carbon market in April 1998. These workshops led to the creation of an entity that would allow Panama to participate in the CDM and determine the priorities of climate change related working areas. As requested by ANAM and private sector representatives interested in the CDM, CSDA held a second workshop in November 1998 to determine the guidelines for establishing the national CDM authority, which would be responsible for developing carbon market activities.

Under the able leadership of Mirei Endara, Minister of the Environment, the efforts lead to the creation of the Panamanian Foundation for Environmental Services (FUPASA) on June 1, 1999. FUPASA was made responsible for actively promoting environmentally sound GHG-reducing investment opportunities to potential investors in industrialized countries as well as evaluating, approving and marketing climate change mitigation projects. FUPASA was created with the possibility of undertaking other environmental services in the future.

Currently, ANAM provides FUPASA with one regular employee, the technical coordinator. Six positions are envisioned within FUPASA's structure: an Executive Director, a forestry expert, an energy expert and administrative, legal and financial assistants. The private sector covers the cost of office maintenance, supplies, legal and administrative support. FUPASA has applied to the Japanese government and USAID Panama for start-up funding and is awaiting responses. FUPASA will also seek financial support from the World Bank. As part of its long-term funding strategy, FUPASA became the first AIJ entity in Latin America to be established as a private, not-for-profit foundation, which will be able to receive tax-deductible contributions from Panamanian corporations and individuals.

Argentina

The Argentinean Office of Joint Implementation (OAIC) was created in 1998, as part of Argentina's pioneering stance on climate change. That year, Argentina hosted the Fourth Conference of the Parties. During that meeting, Argentina became the only developing country to announce its interest in voluntarily reducing GHG emissions in the 2008–2012 period under a particularly different approach than the one previously established for the Annex I countries. Soon after this announcement, presidential Decree #822/98 proclaimed the development of the OAIC.[68]

In 1999, a working group was established to design the structure, functions, evaluation criteria, etc., of OAIC. The working group included the Ministries

of Agriculture, Industry, Foreign Affairs, Energy and Natural Resources. NGOs and universities were invited to comment, but responses were limited. However, the establishment of the entity was rapidly accomplished as a result of strong government support.

OAIC was entrusted not only with the evaluation and approval of mitigation projects, but with the development of the national climate change policy.[69] OAIC was also the main force behind the development of the country's mitigation targets, based on several economic future scenarios.

The development and funding of the OAIC is purely governmental. It functions as a division of the Secretariat for Sustainable Development and Environmental Policy of the Ministry of Social Development and the Environment, and is physically housed there. However, one of OAIC's main concerns is to encourage civil society and the private sector to become active players, together with the government, in disseminating information on climate change in Argentina.

In 1999, the Argentinean province of Misiones requested the technical support of CSDA for the creation of a provincial level entity and the design of a conservation and reforestation project for the Green Corridor. With World Bank funding and in coordination with the Misiones Ministry of the Ecology, CSDA organized a series of training seminars, which again drew upon the experience of Costa Rica and Guatemala. The situation of Misiones was challenging in that it would have to comply with national level climate change policy, while still implementing provincial level priorities. The legal framework, structure and operational modalities for the Misiones Joint Implementation Unit were established and a reforestation and conservation project for the Misiones Green Corridor was designed. Unfortunately, a change in political leadership brought the efforts underway in Misiones to a halt and the economic demise of the country.

Colombia

Colombia was the first Latin American country to implement the NSS study, from May 1999 to April 2000. In order to develop a National Strategy for the implementation of a CDM entity, a governmental group was put together including the Ministry of Mines and Energy, the Institute of Meteorology and Environmental Studies and the Ministry of the Environment. The group received the technical support of CSDA. Based on a review of existing AIJ entities, an understanding of the functions of a national entity and a study of potential transaction costs, the group made a recommendation to create the Colombian Foundation for Greenhouse Gases Mitigation (CFGGM), a non-profit organization combining the public and the private sectors in order to best implement the assigned responsibilities.[70] The CFGGM would have a governing council made up of a total of two participants from the government, two from the private sector and one NGO representative. The goal of this entity

is to position Colombia among the top five countries in the region in the international market of CER sales.[71]

In 1999, Colombia submitted an application to the World Bank[72] for funding to support the development and design of the national entity. For the implementation of the entity, the government offered to cover the local costs of consulting services, including local transportation. The government also offered to finance some of the software costs and publication requirements. Although the design of this entity is complete, its implementation has not yet taken place.

Ecuador

Ecuador was one of the first developing countries to ratify the Climate Convention in 1993. From the beginning, the National Institute of Meteorology and Hydrology (INAMHI) was involved in addressing climate change issues, specifically in the analysis of Ecuador's vulnerability in the areas of climate and hydrological changes. Under its leadership, several studies were implemented: one funded by USAID, another funded by the Netherlands government for the coastal region, a third study about the incorporation of Ecuador in the international CC Train program and finally the initiation of the National Communications to the Secretariat.

In 1998, the Ministry of the Environment took a position of leadership in climate change issues, focusing on mitigation activities that the country could offer. In 1999, Ecuador was among the first countries to ratify the Kyoto Protocol. That same year it established the National Climate Committee (CNC). The CNC is presided by the Ministry of Environment and incorporates representatives from the Ministry of Energy and Mines, Ministry of Foreign Relations, Counsel of Productivity in the Coast and Mountain Areas, CEDENMA (NGO umbrella group), National Counsel of Universities and INAMHI. The role of the CNC is to promote education, capacity building and other programs that allow the country to benefit from the CDM.

With the change of government in 2000, the implementation of CDM activities was declared a priority by Juan Myer, the new Minister of the Environment. In June, by request of the Ministry and with USAID funding, CSDA held a multisectoral working session in Quito to define project eligibility criteria, evaluation procedures and legal framework for the establishment of a CDM National Authority. The most interesting outcome was the structure of the entity where for the first time a national program would have two bodies instead of one.

The Ministry of the Environment is the National Authority in charge of evaluating and approving CDM projects. A new Climate Change Unit (UCC) was created with the purpose of coordinating all climate change issues in the country. The UCC has the specific task of pre-evaluating and pre-approving

CDM projects. Upon recommendation of the UCC, projects are ultimately personally approved by the Minister of Environment.

In addition, a second and separate entity was created with the responsibility of disseminating information, building capacity and, at the request of project developers, preparing CDM projects for review. This entity, the Ecuadorian Corporation for the Clean Development Mechanism (CORDELIM) is conceived as a private corporation, although it will share its Board of Directors with the CNC. The separation of functions traditionally performed by one entity was the result of the desire to build project preparation capacity in one institution, while avoiding possible conflicts of interest. The CORDELIM is fully designed, however it is currently seeking funding for implementation.

Paraguay

Paraguay ratified the Kyoto Protocol in July 1999. In December of the same year, it created the National Commission for Joint Implementation (CNIC), through Executive Decree #6754.[73] The Commission is responsible for making national decisions on the flexibility mechanisms of the Kyoto Protocol. The CNIC is composed of the Ministries of Environment, Foreign Relations, Public Works and Communications, the Faculty of Agrarian Sciences, the College of Forestry Science Graduates and a representative of the environmental NGOs.

The government of Paraguay developed a national entity, The Paraguayan Office for Joint Implementation (OPIC), in February 2000. OPIC implements the mandate of the Executive Secretariat of the CNIC. The national entity was developed with great support from the national government and with some international assistance from the German Gesellschaft fur Technische Zusammenarbeit (GTZ), The Nature Conservancy (TNC) with funding from United States Agency for International Development (USAID), Corporación Andina de Fomento (CAF) and the United Nations Development Programme (UNDP). The entity is designed to implement activities at the technical, legal and institutional levels for the AIJ phase and the CDM.

In 2000, OPIC was the most staffed national entity in Latin America, including a total of nine members. An Executive Director, five technical experts (three in forestry and two in environmental impact and environmental law) and three administrative support staff members made up the entity. The funding for the staff and its activities came solely from the Paraguayan government.[74]

Nicaragua

Nicaragua ratified the Kyoto Protocol in November 1999. Since 1998, it has received funding for several activities related to implementing the Climate Change Convention and the Kyoto Protocol. Among the funding agencies were the government of Finland, the GEF and the UNDP, which have all been active in the development of the activities.

The Ministry of the Environment is in charge of promoting activities to address climate change issues. A proposal was submitted to the World Bank to design and implement a plan of action for addressing climate change nationally. The government is looking for funding to develop the national CDM authority, but this has not yet been established.

A Comparison of Key Features

Since the establishment of a National Authority for the CDM was not compulsory until November 2000, the national AIJ entities which were created during 1994–2000, were all of experimental nature. They varied widely in three main features: legal structure, sources of technical and financial support, and responsibilities with which they were entrusted.

The legal nature of these entities spans across the entire gamut of possible designs. Costa Rica has a mixed entity where private, public and NGO sectors participate equally. El Salvador, Argentina, Bolivia and Paraguay have entities that are fully governmental, in fact, simply a specialized section of the respective Environment Ministry. Guatemala has a private sector institution under the governance of a multisectoral board, Honduras a non-governmental organization and Panama a non-profit private organization. Finally, Ecuador has one private sector entity and one public sector entity.

The sources of funding also vary. El Salvador and Argentina seem to be the only entities fully funded by their national government. Bolivia, Colombia and Paraguay have supplemented government support with funding from multilateral institutions such as the World Bank, UNDP and CAF, as well as from bilateral development agencies of the United States and Germany. Honduras is fully funded by official development aid from abroad. Costa Rica and Guatemala have received funding from their local private sectors.

Finally, there are differences in the purposes for which the entities were created. Admittedly, the main driver of the original Latin American interest in climate change is the possibility of benefiting from the emerging market of mitigation projects. It was only after Hurricane Mitch that some of the countries in the region became increasingly concerned about vulnerability and adaptation issues. It therefore is not surprising that in some countries the entity created with the responsibility of promoting, evaluating and approving projects is at the same time charged with the development of national climate change policy. Such is the case of Costa Rica, Argentina, Guatemala, El Salvador and Panama. In other cases, the normative role has been separated from the evaluative role, by creating a multisectoral body to develop overall policy and oversee the project related entity. Examples can be found in Colombia, Paraguay and Bolivia. Ecuador is a unique case, in which the project related roles have been split into two entities of different legal nature.

No one approach is better than the other. Each country must design according to national needs and possibilities. Each Latin American country experimented with an approach that seemed appropriate and beneficial to the national circumstances. The major differences are summarized in the following table.

Table 3.1: Comparison of Latin American AIJ entities

Country	Official start-up date	Funding	Nature of entity	Role
Costa Rica	June 1994	National government, private sector, NGO, World Bank	Mixed (NGO, private, public)	Normative/ Evaluative
Guatemala	June 1997	USAID, private sector	Private	Normative/ Evaluative
Bolivia		National government, U.S. Country Studies	Public	
El Salvador	May 1998	National government	Public	Normative
Argentina	1998	National government	Public	Normative
Honduras	November 1999	Canadian government	NGO	Normative
Panama	January 2000	National government, USAID	Non-profit	Normative/ Evaluative
Paraguay	February 2000	National government, GTZ, TNC, CAF, UNDP	Public	
Colombia		World Bank, national government	Private	Evaluative
Ecuador	2000	National government, USAID, CAF	One public; one private	Evaluative

As the CDM international regime matures, each of the above countries will have to modify their AIJ entities to comply with the new prerequisites of CDM national authorities. However, during the AIJ pilot phase and with no guidance from the UNFCCC, each country created an entity that would best suit the particular national needs, under the conditions that were prevalent at the moment. Each one was able to learn from previous experiences in neighbouring countries, each one innovated the concept in order to maximize their potential. All these pioneering AIJ entities deserve highest recognition for having blazed a trail in uncharted territory. It was not an easy task.

Challenges of Institutionalization

After seven years of promoting the institutionalization of climate change mitigation efforts in developing countries, CSDA is in a position to identify some of the main challenges of this process. The lessons learned may be relevant to any country interested in developing a national CDM authority.

Awareness raising

In most cases, the process seems to have been a step-by-step approach, an organic process that has evolved over time. It is apparent that the very first step is one of fundamental awareness raising around both the threats of climate change and the opportunities provided by the financial mechanisms of the Kyoto Protocol. At this stage there is usually questioning of the merits of devoting time and effort to a global concern to which developing countries have not contributed much, versus devoting the same resources to pressing national issues, such as health, education and income.

It is clear that in developing countries national challenges have priority over global concerns. However, it is helpful to understand that the climate change regime is developing financial instruments which can further national goals while at the same time contribute to the global mitigation effort. Projects that may be considered under the CDM are typically projects that promote a healthy energy generation mix, increase energy efficiency, enhance the forest coverage and/or protect watersheds. In addition, many of these projects create employment and have ancillary environmental benefits above and beyond climate change mitigation.

The most difficult aspect of the awareness raising stage is managing expectations. In the attempt to spur interest in CDM activities, it is all too easy to fall into the temptation of overcoming the "CDM is irrelevant" attitude with a naive claim that CDM will solve all sustainable development shortcomings. It will not. CDM is one instrument to finance a certain subset of sustainability efforts, but it does not cover all sectors and is not the only financial instrument. If expectations are not managed from the beginning, one might later waste much precious time bringing the impact of the CDM back to realistic dimensions.

Political will

In some countries the political leadership has understood the relationship between climate change and national economic development. It is evident that in those countries where climate change mitigation has been made a priority, progress is made quicker. Long-term planning, vision and political will are critical to a successful implementation. Precisely because climate change is not a short-term issue, nor are the benefits of CDM participation evident immediately, it is all too easy to get sidetracked by more urgent short-term needs, leaving the important, but not urgent, issues to slide until later.

Sectoral coordination

Cross-sectoral coordination is indispensable. The very nature of this enterprise is multisectoral. While governments sign and negotiate the Climate Change Convention, most of the implementation will be performed by the private sector and NGOs often have the know-how. A total integration of these sectors is not possible in all countries, but a minimum of collaboration is absolutely necessary. Perhaps the most difficult issue is the role of the government. Given the fact that governments assume ultimate responsibility for complying with the Convention, there is a natural tendency for governments to assume full responsibility of CDM activities. In the final analysis, the export or sale of emission reductions is a national decision and requires government authorization. However, that does not necessarily mean that the government needs to incur all the costs or perform all the work related to project promotion and evaluation. As we have seen in the previous country descriptions, there are many ways to share the load. Most importantly, the lesson learned in this area is that it is critical to have public control measures to ensure the environmental integrity of the system, but these measures cannot be so restrictive that they would eradicate any private initiative to design and implement a project.

The second aspect of sectoral coordination is that which is necessary within the various sectors of the government itself. Typically, CDM activities can involve the Agriculture, Energy, Transportation, Environment and Foreign Affairs sectors of the government. It is understandable that one or more of these sectors will be interested in taking the lead on CDM activities. However it is critical to reach agreement on which sector will take the lead, while encouraging the participation of other sectors.

Champion

Perhaps the most important component of success has been the existence of a local champion. This champion could come from the governmental side, from an NGO or from the private sector. But a champion must be one who focuses exclusively on how to form the National Authority and make it work effectively. As we have seen, broad participation is important, but too many people with little direct responsibility will not be able to get the job done. It is only in those countries where a champion has emerged that the AIJ/CDM entity is actually functioning.

The champion needs to have a clear idea of what has to be done. He/she must have an indisputable convening power in order to be able to bring the different sector representatives together at appropriate times. And most importantly, the champion must be able to provide continuity to the process, particularly during times of change in the political leadership.

Imperfection

Finally, it is important to remember that climate change and its mitigation is a new challenge being faced by humanity. We have never done it before, hence we are all learning together how to do it. Some countries are further ahead in their efforts some are further behind, but unequivocally, every country is unique. We can learn from each other, but cannot "cut and paste" solutions. Everything must be adapted to the national reality. We cannot expect to make it perfect the first time; mistakes are only lessons learned and enrich the experience. The process is iterative and may have to be reinitiated with each cycle of political leadership. Do not expect to check off a to-do list and see a completed institution. Institutions grow and change; a National Authority for the CDM is no exception to that rule.

Conclusion

There is no one right approach to developing national CDM programs, but rather a number of approaches are possible and must respond to the needs and resources of each individual country. Under the AIJ pilot phase, countries did not have any guidelines on how to develop their national programs and hence learned freely from each other.

According to the Marrakech Accords, a country must establish a National Authority in order to participate in the CDM. Latin American countries have demonstrated pioneering leadership in the implementation of this type of national program. Their example is very helpful as other countries prepare to implement their own National Authority.

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4 Evolution of National Authorities

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Introduction

The National Authority (NA) for the CDM is the host country entity or body that evaluates potential CDM projects and provides written approval confirming that the project activity is voluntary, complies with national and international criteria and assists in achieving sustainable development of the host country.

While the establishment of an NA was not a requirement until the second session of COP-6,[75] the previous chapter recounts how several developing countries found it useful to create such entities under the AIJ pilot phase. Based on lessons learned in those countries, this chapter itemizes the main steps for establishing an NA. Decision-makers in each developing country may choose to implement some and not all, or may apply some of the steps at greater depth than others. What is offered here is the array of elements that have been identified over the years as building blocks. They must be implemented in ways that make sense in each individual country.

Initial Assessment

Prior to creating an NA, it is advisable to perform a quick assessment of the political and institutional feasibility of establishing a successful entity. The assessment can be based on two broad elements: the political environment for the CDM and the existent technical expertise.

Political environment

The initial assessment should consider the following basic elements:

- **Ratification of the Kyoto Protocol:** Participation in the CDM is voluntary. However, developing countries must have ratified the Kyoto Protocol in order to engage in CDM projects.
- **Political stability:** It is helpful to have a frank examination of the commitment to the CDM concept. Since CDM projects present long-term effects and opportunities, there is often opposition from a number of sources. This is especially true when the project involves public funds, where opponent groups may include climate change skeptics, environmentalists who oppose certain side effects of projects and activists that may feel that there are more urgent social or economic issues to be supported. If these groups can have a negative impact on the NA's implementation, the strategy must consider working with them in identifying how national needs can be met through the CDM.

- **Institutional rivalries:** Most countries already have some institutions taking the leadership in drafting the National Communication for the UNFCCC. These are usually scientific institutions that may become involved in the NA, but are not necessarily the ideal institutions to head it up. Given the various functions of the NA (see Chapter 5) it is advisable for it to have participation from various sectors. It is not uncommon to find institutional contention as the NA arises. There may be clear competition between institutions, which desire control over the new program. This rivalry may be acute if the program brings financial or status benefits to its staff members. Relevant institutions should be brought together to discuss common interests in the CDM.
- **Level of intersectoral communication:** Since CDM projects can include a variety of project types (transportation, industry, energy and forestry) the creation of the NA will be significantly affected by the level of communication and collaboration that exists amongst the sectors. If the collaboration of these sectors is not properly developed, resources and effort will have to be invested in improving the channels of communication.

Technical expertise

The initial assessment should also consider such technical aspects as:

- **General level of interest and understanding:** The level of understanding of the CDM varies greatly, even within geographic regions. Some countries have learned much from their participation in the pilot phase of Joint Implementation, but even they will have to update their NA to fit the CDM modalities defined by COP-7. Other countries have limited experience in developing an NA or CDM projects due to their reduced participation during the AIJ/JI pilot phase. Determine how much general awareness raising is necessary prior to building the institutional capacity.
- **Level of technical/scientific expertise in project development and evaluation:** Local technical skills and scientific expertise will determine the level of external capacity building needed for developing, appraising and approving projects. These skills need to be specific to GHG mitigation, sequestration, energy, transportation, industry and forestry. It should be determined which skills and expertise are already available and which skills need to be strengthened.
- **Availability of resources:** An initial assessment of possible funding for implementing an NA will be necessary. In order to do this, the different stakeholders interested in implementing the NA need to be identified, as well as their willingness to provide support such as funding, personnel, in-kind support, etc. Identify if there is a critical mass of support that would facilitate the establishment of the NA. NAs that start with some basic national support have a greater likelihood of attracting supplementary multilateral or bilateral funding.

Steps in Creating a National Authority

Once the initial assessment is accomplished and indicates favourable conditions for the NA, the institutional building effort itself will require considerable commitment from the interested stakeholders.

The following steps provide a general framework for establishing an NA for the CDM. These steps may occur in parallel or in a different order, but each will most likely need to be addressed at some point throughout the development and implementation of the NA. The steps for this process are the following:

- Define the NA's mission and objectives.
- Obtain official status.
- Review and establish national legal framework.
- Align program strategies with national sustainable development priorities.
- Attain broad stakeholder participation.
- Obtain financial and non-financial resources.
- Staff the NA.
- Establish relationships with the national focal point for climate change and other ministries.

Define the NA's mission and objectives

At a global level, the NA must contribute to the ultimate objective of the Convention and the Kyoto Protocol. At a national level, it should help meet national sustainable development goals. However, the mission of each NA should be defined as precisely as possible, according to the priorities of each country. While external consultants may provide input, each country is ultimately responsible for defining the agenda of the National Authority according to the country's development goals.

Obtain official status

Although different sectors may participate in the CDM, under the UNFCCC it is the government that makes the commitment to work toward the reduction of GHGs. Some countries have not yet ratified the Kyoto Protocol. In these countries, parties interested in the CDM may have to first promote governmental endorsement of the international accords. Even countries that have ratified both the UNFCCC and the Protocol may still need to invest in educating legislators, policy-makers and other decision-makers.

In addition to legislative approval of the FCCC and the Kyoto Protocol, it is critical to obtain official governmental sanction of the NA and to enlist the

support of key political figures such as the Ministers of Environment, Energy, Transportation, Natural Resources, Agriculture, Trade and Foreign Affairs. Official recognition may come in different forms, depending on the degree of knowledge and acceptance of the CDM and administrative and legal procedures of the country in question. Validation of the NA may come from the legislature, a presidential or ministerial decree or other similar legal instrument. However, it is important to realize that the approval of CDM projects implies allowing the export of emission rights. Therefore the NA must have the authority to grant this permit.

An agreement validating the NA will contain clear statements regarding its legal justification, authority, objectives, organizational structure, functions, priorities and procedures. In some cases, however, the NA is needed to help clarify the objectives and structure, especially during the start. Given this dilemma, it is important to point out that a document declaring the legal status of an NA need not necessarily declare the who, how, what and where of the new entity from the outset. At minimum, it should contain clear statements regarding the rationale for creating the NA, the legal authority it is granted and should provide guidelines for the process of consultation, discussion and consensus building, which will be used to develop a concrete action plan for the NA.

Review legal framework

The national legal framework will affect the success of an NA. Potential CDM investors will look for countries where the regulatory environment is most conducive to investment. For this reason, concurrent with efforts to create institutional capacity, those interested in seeing CDM move forward in their country should consider the relative strength of their incentives for investment. The following are some examples of issues where the legal and regulatory environment will be critical:

- **Investment:** Legislation regarding foreign participation in domestic companies, remission of profits earned abroad, foreign involvement in the energy, transportation or investment incentives in certain geographical regions.
- **Taxation:** Tax incentives for certain types of investment, taxes on remissions of earnings as well as import or export duties.
- **Energy:** Rules concerning foreign owned power generation, transmission or distribution facilities, incentives for clean energy projects and constraints on the length or type of concessions.
- **Environment and Natural Resources:** Pollution regulations, incentives or disincentives for investing in protected areas, endangered species provisions, forestry practices and constraints on logging, environmental impact studies, agrochemical regulations and rules concerning exploitation of water and waterways.

- **Urbanization and Land Development:** Zoning regulations, waste disposal regulations, ease or difficulty of obtaining construction permits and incentives for development in underdeveloped regions.

Depending upon the development priorities of the country in question, some of these laws may be very compatible with CDM investment. As with trade and investment in general, those nations with the most transparent rules and the most streamlined investment regimes will be in the best position to compete for CDM investment resources. So reviewing the national legal framework is a good strategy to strengthen possible CDM investment in the country.

Align NA strategies with national development priorities

The CDM is meant to contribute to national sustainable development. This should be seen not only as a prerequisite, but also as a real opportunity to channel resources towards the projects that are most likely to further national interests.

National criteria for CDM projects should be based on national sustainable development objectives. It is important to identify goals and policies already established for social and economic development in areas related to climate change, such as energy, land-use change, transportation, etc. Some foreign aid programs where this information may already have been examined are the National Action Plans, which have been elaborated in several developing countries with support of the U.S. Country Studies Program and the National Strategy Program of the World Bank.

At a national level, sustainable development programs or national environmental plans may already be in place in areas relevant to the CDM, such as forest policies and promoting renewable energy and clean technologies. The additional resources from the CDM should be used to promote priority projects. For example, countries with inadequate energy supply may want to encourage investment in energy projects, while nations with deforestation problems may prefer to invest in projects that lead to reforestation and/or afforestation.

Attain broad stakeholder participation

One of the most challenging aspects of implementing the NA is determining which sectors should have an active role. Some countries have centralized AIJ/CDM programs within the government. Other countries have achieved active participation from all sectors of society (civil, NGOs, private and public sector) and different sectors of the economy (industry, energy, agriculture and forestry).

The role of the government is clear. The FCCC and the Kyoto Protocol require governments to designate an NA to approve CDM projects and confirm that they assist in achieving sustainable development. Thus governments

will need to ensure that CDM activities are compatible with their sustainable development agenda. Governments will also be key in co-operating with the private sector to market the CDM proposals to prospective investors.

This does not mean that the government will need to dominate or exclude other groups from participating in the implementation of the NA. In fact, even where governments have the resources to implement the NA, it may still be advisable to include other groups in order to broaden the understanding of the concepts and benefits of the CDM among sectors.

The private sector can help ensure an emphasis on efficiency and the development of clear and simple rules. Including the participation of the private sector in the institutional building process encourages a less bureaucratic and more results-oriented approach in the procedures. Also, the private sector will be key in driving the CDM as investors seek cost efficient means of mitigating their GHG emissions.

The NGO community should also be incorporated in the development and implementation of the NA, since they can often bring a much needed environmental and social focus to the institutional agenda. NGOs are also often repositories of valuable scientific expertise and technical know-how in developing and evaluating projects.

The integration of the sectors is not easy. Some governments may enjoy a good working relationship with NGOs and the private sector, allowing them to distribute responsibilities and work together toward creating the NA. Other governments may have a more distant relationship among the different sectors, which makes it more difficult to work together toward a common goal. Furthermore, in some countries a single sector may be taking the lead on climate change and defining the design and implementation of the NA. In each country the approach needs to be tailored to the specific set of circumstances.

Obtain financial and non-financial resources

Obtaining funds for the NA will be crucial. The source of funds will greatly depend on the stakeholders involved. Some countries will be faced with public funding constraints, which limits the public contribution to the NA. One way to deal with this is to broaden the sources of in-kind support. Some examples of resources that may be required to implement the NA are:

- **Staffing:** Government agencies can donate the time of technical and administrative personnel, assigning them part-time or full-time to the NA. NGOs or private sector firms may donate assistance in the form of consulting hours for specific tasks or advisory roles.
- **Physical facilities:** Government institutions, industry chambers or private parties with an interest in the CDM may contribute idle or underutilized physical space for offices, as well as logistical support including computers, telephone lines, photocopiers and fax transmission services.

- **Technical and scientific expertise:** Many local and international NGOs offer their services in areas such as project development, monitoring, verification and overseas marketing. This support may be motivated by a series of factors, including the future of service contracts, a desire to further sustainable development or an interest in seeing CDM advance. This assistance may be complemented by scientific expertise contributed by universities or research institutions, which also hold a stake in future CDM activities.
- **Internal education and external promotion:** Trade promotion or export agencies may offer facilities for local workshops to promote CDM projects internationally, incorporating CDM as an additional product in their export or investment portfolios. Also, the Ministry of Foreign Relations may be able to educate the representatives abroad to actively promote CDM projects or at least refer interested parties to the right source of information. Private sector chambers can also play a promotional role.
- **Funds for operating budget and office equipment:** Host country governments can approach multilateral agencies, governments of Annex I countries and international NGOs for resources. As indicated in the Kyoto Protocol, Annex I countries should channel resources to Non-Annex I parties, thus helping both groups of countries to comply with the Protocol's commitments. Some agencies that have supported the establishment of AIJ programs include the World Bank, UNDP, GTZ and USAID.
- **Transportation:** Government agencies could use existing vehicles for occasional field visits and to transport visiting officials or consultants, if this is allowed.
- **Management/Leadership:** This issue can be the most controversial and challenging issue in bringing together resources for an NA. It is challenging to find qualified personnel to assume leadership in a new field such as the CDM and it is difficult to resolve internal struggles for the leadership of an institution that is perceived to grow with prestige and international exposure.

Staff the NA

The question on how to staff the NA will depend on the structure that is adopted, the diversity of organizations involved and the resources available (see Chapter 3 for examples). Following are some of the issues to consider when staffing:

- **Permanent vs. Ad Hoc:** After the original start-up phase, should the office operate year-round or should it convene only to evaluate and approve projects? A permanent staff offers more continuity to the CDM effort and ensures ongoing monitoring of CDM trends and opportunities around the world. In terms of international project marketing and

coordination with potential project funders or developers or other international agencies, a permanent staff would also guarantee more efficient response time. On the other hand, an ad hoc organization would probably save on short-term operating costs.

- **Full-time vs. part-time dedication of personnel:** Will personnel be on loan from their organizations or will they become full-time staffers with a permanent position in the NA? There are potential advantages and drawbacks to each alternative. Dedicated staffers have more independence but constitute more of a financial burden. Part-time personnel divide their time between their home organization and the NA. They have the advantage of remaining in tune with their home organization and the sector they represent, a benefit to the NA. However, they lack independence and may even encounter ethical dilemmas if the goals of the two organizations come into conflict. In addition, it may be more difficult to control the hours and quality of work of part-time personnel.
- **Technical/scientific vs. policy/administrative:** Should the NA be made up mostly of technical staff, who will be able to evaluate project baselines and determine adequacy of carbon accounting methodologies or should the NA stress policy and strategic issues such as how to market national projects? Undoubtedly, both types of professionals will be needed. The challenge becomes determining the right balance of both types, considering that most NAs will be unable to hold large groups of staff. Another challenge is to determine the right balance of technical personnel for different sectors of the economy that are prone to be involved in CDM project development, such as the forestry, agriculture, energy and transportation sectors.
- **Build local expertise or hire international experts:** Bringing international experts to build the NA team can be a fast way to bring quick and efficient results, however it will usually be more costly. In addition, it is important to remember that international experts will often lack local perspective and may not be able to propose, develop or implement strategies and solutions that are appropriate to the local setting.
- **Relationship with existing climate change or meteorology institutions:** Since some of these scientific agencies may already be involved with inventories of emissions and carbon sinks, it is vital to coordinate with them. The question of whether these types of organizations should be absorbed by the NA, or vice versa, is really a matter of the mandate of the existing agencies. If they were created solely to measure GHG emissions, they may be small and new enough to become a part of the new NA. If however, they are long-standing institutions with a number of other tasks, it may be preferable to invite them to participate in the formation and continued activity of the NA.

Establish relationships with Ministries

The NA needs to have open communication with the government agencies of the sectors relevant to the CDM. The technical review of projects can often involve the Ministry of the corresponding sector (Energy, Natural Resources or Environment). The national approval of CDM projects will likely involve the Ministry of Foreign Affairs and/or the Environment, since these are often the Ministries which are the focal point for the UNFCCC. Staff members of these entities traditionally represent their countries at the climate change negotiations and it is advisable for the NA to have a constructive working relationship with the national negotiators.

Conclusion

The elements identified in this chapter are the generic building blocks in the establishment of an NA. However, there is no one best approach to establishing the NA in every country. Based on national realities, each country must decide which elements to implement and how to implement them. What is critical is that the institution established have the capacity to act as an effective NA, performing the functions that will allow the country to be competitive in the international emission reduction market. Those functions are laid out in Chapter 5.

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5 The Functions of a National Authority

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Introduction

The participation of any developing country in the CDM requires the designation of a National Authority (NA) for the CDM. National circumstances vary from one country to another, so the legal nature and structure chosen for the NA will vary, as has been discussed in Chapter 3.

However, there are two types of functions which an NA can perform: regulatory and promotional. The mandatory regulatory function centres on the evaluation and approval process and includes the annual reporting of activities. This regulatory function is a prerequisite for the project validation and certification process and must be performed by all NAs in order to comply with international regulations. In addition, the NA may choose to also perform some optional promotional functions centred on capacity building and marketing. These optional functions have no international regulation and can be designed unilaterally to fit the country's needs. As discussed in Chapter 3, some Latin American NAs have chosen to perform both types of functions and others have chosen to delegate the two types of functions to two different entities. This chapter itemizes the functions to be performed by the NA, irrespective of the structure(s) chosen to perform the functions.

Evaluation and Approval

Evaluation and approval of CDM projects is the centrepiece of the regulatory function of the NA. The evaluation and approval process must assess whether potential projects contribute to sustainable development in the host country. The evaluation should also assess whether projects will result in real, measurable and long-term benefits related to mitigation of climate change.

There are several coinciding purposes of the evaluation and approval process:

- To increase the probability of approved projects eventually being successfully validated and certified as CDM projects.
- To create incentives for specific project types or for priority sectors.
- To reduce the perceived and real risks of national and foreign investors in developing and implementing carbon mitigation projects.

Finally and most importantly, the evaluation and approval process is the main filter that allows a country to ensure that projects being implemented within its territory pursue the objectives of the CDM in a manner congruent with relevant national policies, strategies and priorities. It is, therefore, advisable for the NA to develop a process of evaluation and approval that makes effective use of this primary instrument of national regulation.

The evaluation and approval process can be designed in four steps: 1) adopt international criteria 2) develop national criteria 3) establish national procedures for the evaluation and approval of projects and 4) establish guidelines for the presentation of projects.

Adopt international criteria

The first and foremost requirement of an NA is to become thoroughly familiar with the criteria adopted internationally for CDM projects and adopt these as the starting point for the evaluation.

As discussed in earlier chapters of this book, Article 12 of the Kyoto Protocol stipulates three principal eligibility criteria for CDM projects:

- Projects must assist Non-Annex I Parties "in achieving *sustainable development* and contributing to the ultimate objective of the Convention."
- Projects must result in "real, measurable and long-term benefits related to the mitigation of climate change."
- Projects must result in "reductions in emissions that are additional to any that would occur in the absence of the certified project activity."

The Bonn and Marrakech Agreements further elaborate criteria that must be met by potential CDM projects. These international criteria focus mainly on technical aspects of the carbon mitigation activities of the project and are meant to secure that the expected benefits related to the mitigation of climate change are real, measurable and additional. Table 5.1 outlines some of the key international elements that should be assessed as part of the national evaluation process.

Table 5.1: Key international criteria

Eligibility of project type:

- Consistency with UNFCCC decisions.

Additionality:

- Preparation of a quantitative baseline assessment.
- Inclusion of a qualitative description and justification of baseline scenario.

Measurability:

- Quantification of impacts of project interventions on carbon stocks and flows (difference between baseline and project scenario).

- Projections of and accounting principles for emissions reductions projections and the carbon offsets generated and accumulated over the project's lifetime.
- Accounting provisions for dealing with permanence and reversibility of project interventions.

Externalities:

- Provisions for management of leakage.
- Provisions for management of other risks related to carbon stocks and flows.

Securing carbon benefits:

- Monitoring plan assessment.
- Suitable provisions in the monitoring plan for preparing and facilitating periodic verification and final certification of emission reductions.

Develop national criteria

A second and equally important goal of the national evaluation and approval process is to assess and confirm a project's contribution to national sustainable development. It is the host country's prerogative to confirm whether a project activity assists in achieving sustainable development. Therefore, the country should develop national criteria and respective information requirements to ensure a coherent, justifiable and transparent assessment in accordance with the national interpretation of sustainable development. Furthermore, a country's interpretation of the linkages between global mitigation efforts and its national developmental priorities as well as its intention of making use of the national potential in carbon offset opportunities, may be reflected in specific national policies and decisions related to the CDM.

Basic elements that may help assess the sustainable development contribution of a project are included in Table 5.2. The NA can choose the particular subset of elements, which are most relevant.

Table 5.2: Key national elements which should be evaluated

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1. **Compliance with relevant policy and regulatory regimes**

   National scope:

   - Compatibility with national sustainable development objectives including economic, ecological and social dimensions.
   - Congruence with the national climate policy and/or carbon offset strategy.

- Eligibility of the project proposal according to a positive or negative list of eligible CDM activities, technologies and/or sectors, eventually adopted by the host country.

Sectoral scope:

- Compliance with related political and legal framework.
- Environmental impact assessment in accordance with procedures as required by the relevant sector.

Local scope:

- Compatibility with local priorities, as stated in local development agendas.
- Comments by local stakeholders directly and indirectly involved with the project.

2. Financial Review

- Review if project is dealing with a negative cost' mitigation option and, if so, describing barriers that have impeded the project from being implemented.
- Excluding the use of official development aid for project funding.
- Overview of financing structure.

3. Technical and institutional feasibility

Management capacity

- Description of the institutional arrangements and each institution's participation in the implementation of the project.
- Previous experience and performance in the field.

Infrastructure and technical capacity

- Local availability of qualified human resources.
- Local availability of adequate institutional resources.

Transfer of technology and know-how

- Description of the implications for local institutional enhancement.
- Description of the implications for national capacity building.
- Description of technology transfer.

4. Special consideration of other environmental and developmental impacts

Additional environmental, socio-economic, technical and institutional benefits (and costs) that are considered relevant.

In deciding which of these criteria are to be adopted, the host country should consider the direct relationship between requirements and transaction costs. The more requirements are imposed on project developers, the higher the preparation costs. In a carbon market where the CDM already has many prerequisites that make it a more costly mechanism than Joint Implementation, it behooves each country to balance information requirements necessary for quality control with rising preparation costs.

During the AIJ pilot phase several countries developed national criteria for the evaluation of mitigation projects. These criteria will now have to be updated to the CDM requirements, but as a reference point, several of these national criteria sets are included in Appendix II.

Establish guidelines for the presentation of projects

In order to be presented for third party validation and verification, all projects must be drafted in the format of a Project Design Document (PDD). The PDD includes all the international criteria, which must be met by a CDM project. However, in order to elicit the information required to assess national criteria, an NA may choose to either add some sections to the PDD or to design an additional document format for the information on the national criteria. Either way, the guidelines for the presentation of projects need to be consistent and transparent, so that project developers are not subjected to confusing and changing formats for the presentation of their projects.

Establish national procedures for the evaluation and approval of projects

One of the key elements for attracting CDM investments is the host country's application of quick and transparent procedures for screening, evaluating and approving projects. To achieve this goal, the CDM office should implement a standardized system to screen, evaluate and approve CDM projects.

Screening: The screening criteria for proposed CDM projects could be divided into two major phases. The first phase or Primary Screening could be designed to determine if the data and information necessary to carry out a full evaluation of the proposed project is contained within the submitted documentation. The Primary Screening process is not intended to assess the accuracy of the information provided but to assess the completeness and adequacy of the information requested to allow, in the Secondary Screening stage, a full assessment of the information of the project proposal against the established CDM criteria. As such, the Primary Screening can be done quickly and by non-technical, mid-level staff.

Some countries have developed pilot formats to organize the information required at the primary screening stage. The simplest format is the Project Identification Note (PIN). The PIN is approximately five pages long and provides indicative information on the type and size of the project, its location,

the anticipated total amount of GHG reduction compared to the business-as-usual scenario (which will be elaborated in the baseline later at the PDD level), the suggested crediting life time, the suggested CER price in US$/tonne CO_2 equivalent reduced, the financial structuring and the project's other social or environmental benefits.

A more advanced format is the Project Concept Note (PCN). The PCN is approximately 10–15 pages and builds on the PIN. The PCN provides information on the legal status and implementation capacity of the project sponsors and information on the sectoral policies within which the project would operate. The PCN also has a more detailed description of the baseline scenario and a summary of the risk assessment.

Samples of a PIN and a PCN are included in Appendix III. However, it must be made absolutely clear that these formats are not part of the Marrakech requirements. They have been developed by some CDM participants as helpful tools in the process of evaluation. If an NA chooses to use them, they should be adapted to local needs and priorities.

The second phase of the evaluation process or Secondary Screening may be designed to determine if the project should, in fact, be approved as a sustainable development project eligible for the CDM. The Secondary Screening process is significantly more detailed and requires technical evaluation of the key factors and data associated with the project against the established national and international criteria of proposed CDM projects. The purpose of the Secondary Screening is to ensure that all projects that pass this screening and are approved will have a high probability of being validated and certified as CDM projects by the CDM executive board. Therefore, the Secondary Screening must be performed by qualified technical experts with carbon expertise in the specific sector for which the project is proposed.

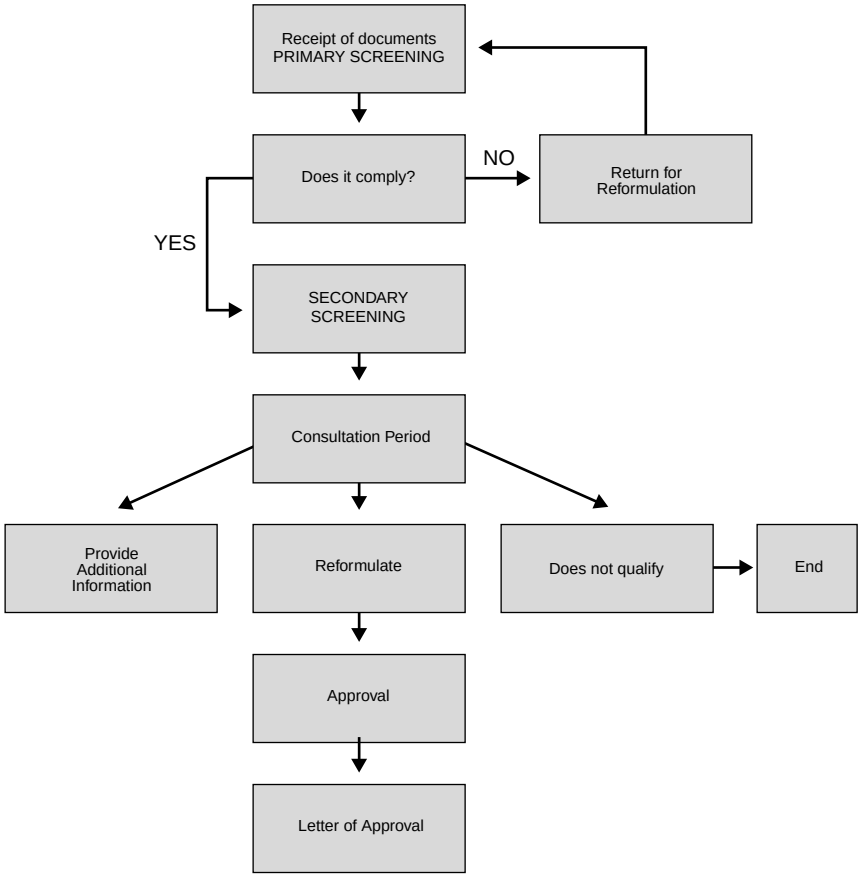
The secondary screening phase must be based on the Project Design Document, which is a final and complete description of the project. The exact format will be determined by the executive board of the CDM. In the meantime, general guidelines are given in Annex B of the Marrakech Accords (FCCC/CP/2001/L.24/Add.2) and a sample format based on those guidelines is included in this guide's Appendix IV.

Transparency: One of the most important characteristics of the evaluation and approval process is the credibility and transparency of the entire process. Specifically, this means making the rules or criteria for screening, evaluation and approval publicly known in advance of applying them to proposed projects. Project proponents must have access to the criteria so that they can prepare their projects in accordance with the requirements. Application of the criteria must be done as consistently as possible. All data and background calculations used in the process of evaluating a proposed project must be documented and made available for review by project proponents if requested. If a

project is rejected, the reasons for its rejection must be clearly stated and substantiated so that the project proponent is either able to modify the project to meet the required criteria or understands and accepts the reasons for the rejection of the project. If the process of screening, evaluating and approving is done in a manner that is not credible and transparent, proponents of potential CDM projects will lose confidence in the process and may withdraw from participation.

One possible evaluation procedure is presented in Figure 5.1.

Figure 5.1: Evaluation Procedure



Staffing: The evaluation of CDM projects requires conventional project due diligence capabilities as well as understanding the technical requirements of carbon mitigation projects. Staffing of the NA is always a challenge due to

both usual budgetary constraints as well as the broad range of skills required. Specifically, expertise is needed in the following areas:

- Understanding of all the criteria for CDM projects that are defined by the Bonn and Marrakech Agreements and by forthcoming guidance from the CDM executive board.
- Knowledge of the relevant national development priorities and the ability to determine if proposed CDM projects meet or support these priorities.
- Technical expertise to determine if the proposed CDM project is technically sound and well designed.
- Environmental impact assessment expertise in order to assess the acceptability of proposed CDM projects against national and local environmental concerns.
- Technical and economic expertise in evaluating the associated baseline for the proposed CDM project and determining the emissions of the project.
- Financial expertise for assessing the financial viability of proposed CDM projects.
- Legal and regulatory expertise to evaluate the corresponding aspects of proposed CDM projects and ensure that the projects are consistent with established national and local laws and regulations.

While a broad skill base is needed for the effective screening and evaluation of proposed projects, Chapter 3 shows that several existing CDM entities have met the challenge by forming ad hoc interdisciplinary teams that draw on external expertise.

Tracking and Reporting: Finally, the last component of the regulatory functions of the NA is tracking and annual reporting. The UNFCCC Secretariat requires each developing country to annually report on the CDM activities that have occurred. For this purpose, the NA should develop a system, preferably electronic, for registering and tracking the holding and transfer of CERs of each of the projects. It is to be expected that the CDM executive board will soon release a reporting format that must be followed for the annual reporting of CDM activities. The tracking system designed by the NA should facilitate the drafting of that report.

Capacity Building for CDM Project Development

The second type of functions, which an NA may choose to perform are those of promotional nature, centred on capacity building and marketing. These functions are optional, not internationally regulated and should be designed to meet the specific needs of the host country.

Experience has shown that the capacity of project proponents (in both private and public sectors) in developing countries needs to be strengthened in order to promote technically feasible CDM projects that produce CERs on a competitive basis. An NA may offer capacity building opportunities in the following areas: 1) project identification formulation 2) baseline definition 3) quantification of emissions reductions and 4) monitoring project performance.

Project identification and formulation

Carbon mitigation projects may be poorly understood in many developing countries. Project developers in either the land use sector or the energy sector are familiar with traditional project development. However, the potential carbon flow or carbon upgrade component of projects is not commonly recognized. Any project that can be improved in such a way that greenhouse gas emissions are reduced or avoided is a potential CDM project. In order to promote CDM investment, the NA can hold training sessions for project developers during which they are shown how to identify projects in which the base project can be distinguished from the carbon component. They can also begin to understand the context of the UNFCCC and the carbon market and to familiarize themselves with the PDD, the format in which CDM projects should be drafted.

Baseline definition

The definition of the baseline is one of the most crucial technical aspects of a CDM project. A project baseline defines the level of expected emissions/carbon stores in the business-as-usual scenario without the implementation of the CDM project. It is the basis from which the CERs for a CDM project activity must be measured and it is important that it be established properly and credibly at the outset.

The principal responsibility for defining the baseline associated with a specific project will lie with the project developer/investor. However, the underlying assumptions and data that support a baseline definition must be derived from national or international entities. For example, the sector growth rates, performance of baseline technologies, cost of baseline technologies and emission/sequestration rates of baseline technologies will need to be derived from national data and ultimately validated at the national level.

Once the NA has staff thoroughly familiar with baseline definition, it is advisable to hold training sessions for project developers. Developers should understand that there are several possible approaches to baseline definition with corresponding consequences on the transaction cost of the project and in meeting emission reduction verification requirements. Project developers should also know how to properly document the establishment of baselines (including assumptions and methodologies used) in order to facilitate future validation and certification of emissions reductions.

The importance of providing training on baseline definition cannot be overemphasized. Without basic knowledge of project baseline setting, project developers may expend significant time and resources in identifying and preparing ill-designed projects, resulting in higher transaction costs and ultimately fewer projects being implemented. In order to lower project preparation costs, the NA may establish national baseline parameters for each of the main project sectors.

Quantification of emissions reductions

Closely linked with baseline setting is quantification of emissions reductions. When submitting a project proposal to the NA the project proponent should clearly present the project baseline, the project emissions, the project boundaries and the estimated leakage. The amount of emissions reductions that will be accrued by the proposed project is the difference between emissions in the baseline and the proposed project, minus the leakage.

An accurate estimate of the emissions reduction potential may also be critical to the financial feasibility of the project. A low estimate may unduly disqualify a potential project based on inadequate revenue for financial sustainability. A high estimate may oversell the benefits of the project. Due to the critical role that estimated emissions reduction potential can play in financing decisions for CDM projects, it is important that project developers are knowledgeable about the procedures for estimating the emissions reduction potential of CDM projects.

Monitoring project performance

To determine the actual performance and emissions reduction that is achieved by the project during implementation, project indicators will need to be closely monitored. A monitoring plan should be established that is transparent and in accordance with international standards in order for independent third party agents to verify the results. To ensure that appropriate monitoring plans are implemented for CDM projects, project proponents should be familiar with the requirements of international standards for monitoring project performance. To enhance the capacity and knowledge on monitoring requirements for CDM projects, the NA should provide training for project proponents on efficient and accepted methods of collecting the required project indicators.

In order to promote the widespread implementation of CDM projects, the CDM office can organize training for project proponents that strengthen their understanding of the primary requirements for projects. Participants of the training courses should include project developers, private companies, government agencies, bankers, non-government organizations and other stakeholders involved in project development.

Marketing CDM Projects

The entry into the CDM market is likely to be highly competitive for developing countries. The market has been diminished both by the stringent requirements imposed on the CDM by the Marrakech Accords as well as by the exit of the United States from the Kyoto Protocol. The CDM market during the first commitment period may not reach volumes that were originally forecasted. So only those CDM projects which can be deemed of high quality will compete in a restricted market.

Although it is by no means a required function, an NA may choose to support project developers in the marketing of approved projects. In order to maximize the possibility of being successfully marketed, projects should have the following characteristics:

- Support sustainable development objectives for the host country.
- Result in CERs that are additional to defined baselines.
- Maximize the generation and supply of cost effective CERs.
- Provide reliable information.
- Provide legal recourse for both buyers and sellers of CERs.

The NA can facilitate international investment by developing a portfolio of diverse high quality CDM projects that cater to the needs and interests of a wide spectrum of potential investors. However, in a restricted market even high quality is not a guarantee that CERs will be sold. A host country interested in being actively engaged in the carbon market must seek to differentiate its quality projects with an aggressive marketing strategy. That strategy should take full advantage of the following elements that are emerging to support the development of the market:

- Institutions/specialists/consultants that provide technical inputs for identification, formulation and development of CDM projects and project baseline.
- Institutions/banks/development agencies that are acting as intermediaries for buyers.
- Consulting companies that provide services for the design of projects.
- Accredited operational entities that provide validation, verification and certification services for CDM projects.
- Markets and information sites where potential sellers and buyers can obtain pricing and other relevant information relating to the supply of, and demand for, CERs.
- Brokers that bring potential buyers and sellers together and assist in the buying and selling of CERs.

It is difficult for project developers to gain expertise in the operation of this intricate market network. The successful marketing of CERs will depend on the effectiveness with which the NA uses its network to showcase prime projects and support the project developer in closing the deal.

Conclusion

The functions of an NA are many and varied. It is impossible for a newly formed NA in a developing country to exercise all functions from the beginning and it is not necessary to do so. Participation in the CDM is a learning process in each country. A new NA need not feel intimidated by the breadth of responsibilities described in this chapter. It is important to start and in order to do so, an NA may choose to begin with the prescribed evaluation and approval functions. Those are the functions that an NA must perform and that cannot be delegated. Capacity building and technical training can be provided by specialized agencies and funded by different sources of official development aid. Over time, the growing maturity of the market will allow the NA to gradually assume other responsibilities.

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United Nations Framework Convention on Climate, FCCC/SBSTA/2000/10/Add.1 (PART II).

6 Types of Projects

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Introduction

A National Authority (NA) must be familiar with the different types of projects that are eligible for the Clean Development Mechanism (CDM). At the basic level it is important to understand what all CDM projects have in common: the environmental objective of lowering the concentration of greenhouse gases in the atmosphere. This can be done by either reducing or avoiding greenhouse gas emissions or sequestering carbon dioxide. The avoidance or reduction of GHG emissions results from the substitution of a high emitting source with a lower or non-emitting source or through improvements in energy efficiency. Sequestration refers to the capacity of absorbing carbon dioxide out of the air through the process of photosynthesis, decreasing the levels of atmospheric carbon dioxide.

Defining the types of projects eligible for the CDM for the first commitment period was not easy. There was much controversy regarding the inclusion of certain types of projects in the CDM, namely, land use, land use change and forestry, nuclear energy and large-scale hydroelectric energy among others. This chapter presents an overview of the main types of projects an NA may evaluate, and briefly describes the methodology which could be used in each project type for the estimation of the GHG reductions. The details of any of these methodologies can be found in the Intergovernmental Panel on Climate Change (IPCC) Reference Manual. The list of project types presented here is not an exhaustive one, but rather indicative.

Energy Generation

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Renewable energy (RE)

Renewable energy projects can be built for off-grid energy supply or to provide electricity to the grid. Small scale distributed projects often use solar, wind and mini or micro hydro as the source of energy. These projects usually occur in isolated communities where the cost of line extension is prohibitive. Small scale renewable energy technologies have a high social and environmental development value, but they require an up front investment, which is often difficult to meet justify given the reduced limited number of users of the energy. In these cases, the sale of carbon offsets can defray some of the installation financing costs. However, the volume of reductions in these small projects is rarely high enough to dramatically change the financial feasibility of such proj-

ects. It is likely that these projects will be included in the fast track for Small Scale Projects to be determined by the executive board of the CDM.

Projects that supply renewable energy to the grid can reduce greenhouse gas emissions as well as overall costs on a long-term, commercial basis. The most common applications of RE for grid-connected power are small hydro, wind farms (multiple wind turbine generators in one location), geothermal and surplus electricity from biomass cogeneration.

Fossil-fueled cogeneration

Like RE electricity generation projects, fossil-fueled cogeneration can reduce overall energy costs and also deliver reductions in GHG emissions. While conventional electricity generation plants are typically about 35 per cent efficient in the conversion of fossil fuel into electricity, cogeneration plants achieve overall efficiencies of about 45 per cent to 70 per cent by capturing waste heat from the fuel combustion process and putting it to productive use.

Quantification of emission reductions

The quality of CERs from an offset project depends on the credibility of the project's additionality, which requires a credible, quantifiable and verifiable baseline of emissions. Thus, "the baseline describes the GHG emissions associated with a counterfactual scenario that would prevail without the JI or CDM intervention and with which actual emissions can be compared."[76] The credibility of the baseline is crucial, as this is the key to the acceptance of a CDM project's CERs as additional under the UNFCCC.

The baseline case should be the same for all electric generation projects proposed. This does not mean, however, that the baseline generation source, or the corresponding emission intensity, should be constant. Rather, the baseline energy sources can be expected to have different output profiles as a function of time (seasonally or even hourly), causing variations in the baseline emission intensity. In addition, the baseline source that the project replaces could vary over the lifetime of the project or it could depend on when the project enters into service. These variations can also affect the baseline emission intensity.

Net emission reductions (ERs) for renewable energy or cogeneration projects must be compared on the basis of the carbon content of the fossil fuel replaced. So the principal parameters that determine the ERs for such energy projects are the baseline carbon emission intensity, the project emissions (if any) and the projects' energy production rates, once the baseline has been identified.

The ERs from each renewable energy or cogeneration project are proportional to the energy produced and the relevant baseline carbon intensity value, which is determined from the carbon content of the fossil fuel replaced in the base-

line case. The two values that must be quantified and measured in order to generate CERs are the baseline carbon intensity and the electric energy produced by the renewable energy or cogeneration projects.

Energy Efficiency

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Energy efficiency projects can also result in numerous benefits. By using energy more efficiently, an organization's vulnerability to fluctuations in energy prices is reduced whereas its cost effectiveness is improved and the environmental impacts of displaced energy consumption are avoided. Frequently entities must choose between investing in energy efficiency or energy supply. There are numerous issues surrounding these decisions.

In developing countries, energy use is expected to triple in the next 30 years due to population growth and economic expansion. Annual electricity sector investments would have to double to provide supplies to meet projected growth rates.

Investing in supply is a capital intensive undertaking, usually paid primarily in foreign exchange adding currency risk to the investment consideration. Already a large part of public investment budgets, additional investments in supply can have difficult financial consequences and damaging environmental impacts. Even if the funding is available, it is difficult to expand supply capacity quickly.

In contrast to generation projects, energy efficiency projects tend to be on a small scale, occurring at numerous sites with highly engineered technology. Energy efficiency reduces the need to build additional capacity by reducing energy demand. It decreases the environmental impacts of increased generation through avoided demand. Energy efficiency decreases life cycle costs to consumers while also reducing system-wide capital costs. Efficiency can be achieved through improvements to a variety of systems including HVAC, motors, drives, lighting and controls. Projects can be funded via grants, low interest loans, market rate loans, leases or performance contracts from funding sources including Energy Services Companies (ESCOs), utilities, capital markets, equipment vendors or development banks. Energy cost savings result in cash flows for energy efficiency projects. Direct project costs include design, installation and maintenance of the energy efficiency measures.

Energy efficiency measures

There are nearly as many energy efficiency measures as there are different ways in which energy is consumed. A few of the common energy efficiency measures suitable for CDM projects are:

Measures	Description
Boiler oxygen trim controls (commercial buildings or industrial plants)	Increases combustion efficiency, thus decreasing fuel (oil, coal or natural gas) consumption
Heating crude oil (oil production and oil pipeline facilities)	Reduces oil viscosity using heat recovered from gas turbines and engines, thus reducing required pumping energy
High efficiency cooling equipment (commercial buildings and industrial facilities)	Efficiency improvements of industrial process chillers and air conditioning systems
High efficiency electric lighting (commercial buildings and industrial facilities)	Upgrade to premium efficiency lighting equipment
Premium efficiency motors (industrial facilities)	Replace older electric motors with new premium efficiency motors
Synchronous belt drives (commercial buildings and industrial facilities)	Improve the overall efficiency of electric motor drive train system
Variable speed drives (commercial buildings and industrial facilities)	Places controllers on the motors that adjust motor speed to track variable loads
Waste heat recovery (industrial facilities)	Capturing heat from industrial processes, combustion fuel gases or cooling equipment condensers and putting it to economical use
Automated control systems (commercial buildings and industrial facilities)	Computerized controls that automatically adjust the operation of energy consuming equipment to reduce energy usage
Ultrasonic humidifiers (industrial facilities)	Serve precise humidity control requirements with ultrasonic devices that replace electric resistance or fuel-fired humidifiers
Energy efficient appliances and motion sensors (residential)	Reduce electricity consumption

Quantification of emission reductions

An energy audit of the targeted facility is the first step in understanding how it currently uses energy. The purpose of an audit is to identify and prioritize cost effective energy efficiency measures. Carbon emissions reductions that result from investments in energy efficiency can be directly calculated from the amount and type of energy savings that the project delivers.

The objectives of the carbon management analysis are to:

- Quantify the energy savings that would result from energy efficiency measures.
- Determine the quantity of carbon emissions saved based on the incremental energy savings.

Once the energy efficiency analysis has quantified energy savings, carbon emissions balances are calculated for each carbon management measure. Estimates of net carbon emission reductions are quantified with respect to the emissions baseline, on the basis of the carbon content of fuels consumed and the carbon intensity of displaced grid electricity.

The baseline represents the emissions from fuel consumption or electricity generation "that would occur in the absence of the certified project activity," such as the energy efficiency measures. Having successfully established the baseline, the developers must analyze similar models of the prospective energy efficiency measure. The models are used to quantify the approximate reduction in energy consumption for each efficiency improvement measure relative to the baseline.

The developer analyzes carbon emissions for the measures based on whether the fuel is consumed on-site or electricity is purchased from the local electric utility. In the latter case, calculation of carbon emissions reduction uses the emission rate in mtC/MWh of the least efficient peaking fossil fuel-fired power plant in the power sector. In the case of on-site fuel consumption, the carbon content of the specific fuel is the basis for determining the reduction in carbon emissions delivered by the efficiency project. The resultant carbon intensity is multiplied by the electricity saved, in order to calculate a carbon emissions reduction resulting from the energy efficiency measures.

Transportation

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The transportation sector is the fastest growing source of greenhouse gas emissions in the world. As nations grow wealthier, their people buy cars at increasing rates. Motor gasoline consumption yields about one-fifth of all U.S. GHGs. One gallon of motor gasoline consumed emits 19.6 pounds of carbon dioxide and one gallon of diesel emits 22.4 pounds of carbon dioxide.[77]

Several types of transportation projects can be considered under the CDM. Here we examine alternative fuel vehicles and mass transit.

Alternative fuel vehicles

A decrease in carbon emissions can be achieved by replacing traditional gasoline and diesel powered vehicles with certain applications of alternative fuel vehicles (AFVs).[78] Studies show that electric vehicles, hybrid electric vehicles, compression ignition, direct injection vehicles and E85 (85 per cent ethanol and 15 per cent gasoline) flexible fuel vehicles can reduce fuel cycle GHG emissions by 80 per cent.[79]

As AFV use grows, major automobile manufacturers and governments are also researching new types of clean transportation technologies. Other advanced technologies include hydrogen fuel cell and "clean diesel" vehicles.[80] These technologies have the medium to long-term potential of being used in addition to, or as replacements for, the technologies listed above.

There is currently little international experience with GHG emission reduction projects using transportation technologies. Of the 125 AIJ projects reported to the UNFCCC, there is only one transportation project. There are currently no CDM projects using transportation technologies, although there is active interest on the part of public and private sector participants in the Clean Cities Santiago Program in Santiago, Chile in creating a CDM project using natural gas vehicle (NGV) technologies.[81] Also in Santiago, the International Institute for Sustainable Development, in connection with the Center for Clean Air Policy and Climate Change & Development, Santiago, are working toward identifying two potential projects to serve as CDM case studies. The primary reason for the scarcity of transportation projects to date is the lack of proven methodology and experience quantifying potential emission reductions due to the relative immaturity of the mechanism.

Quantification of emission reductions

Unlike other advanced technologies with a set location and owner, transportation technologies are normally owned on an individual user, small, medium and/or large fleet basis. Just as in the case of other advanced technologies, the availability and quality of GHG emission reductions for the technology depend on the maintenance of the equipment. Therefore, it is extremely difficult to monitor and verify (M&V) potential GHG emission reductions due to the dispersed ownership and locations and consequent maintenance of the technologies.

There is also significant debate with respect to which emission sources to include in the estimation of emission reductions (tailpipe versus full fuel cycle). Though the most accurate measurement of potential GHG emission reductions for the transportation sector would include looking at the full fuel cycle of switching to a specific technology,[82] the cost of this type of data collection according to organizations such as the U.S. based Gas Research Institute (GRI), would be prohibitive.[83] Due to the fact that most of the data on GHG emission reductions from certain transportation technologies are based only

on tailpipe measurements, there is concern that true GHG emission reductions for this sector are not currently measured properly.

The presence of transportation projects in the CDM would be strengthened by an increase in research on tailpipe and full fuel cycle GHG emission reductions, development of standard M&V methodologies with broad international acceptance for dispersed projects and more training/capacity building on how to design a CDM project using transportation technologies.

Mass transit

Mass transit projects are inherently more attractive as CDM projects because, compared to individual AFVs, implementation requires only one economic decision-maker rather than hundreds or thousands of individual economic decision-makers. Furthermore, with mass transit projects the data required to verify GHG emissions reductions typically resides in a centralized location. This makes the cost of M&V affordable.

In the context of CDM, mass transit comprises rail systems and bus systems. A mass transit CDM project can produce GHG emissions reductions by either getting people out of individual automobiles and into mass transit vehicles or by replacing carbon-intensive mass transit vehicle fuel with less carbon-intensive fuel. An example of the former would be a project that provides subsidized passes to encourage people to ride the metro rather than drive their individual cars. The latter is exemplified by a project that substitutes petroleum diesel with biodiesel as fuel for buses.

Other CDM approaches to mass transit include improved urban transportation systems, fuel conversions such as fuel cell powered buses replacing internal combustion engine powered buses, hybrid buses replacing conventional buses and expansion of a metro system that provides a transportation alternative to the individual automobile. A hybrid bus is powered by a system that combines a small internal combustion engine with an electric motor. The electric motor powers the bus from a dead stop and the internal combustion engine takes over at a certain speed.

Metro trains are typically powered by electric motors. If the electricity consumed by the motors is generated from a clean source, such as hydroelectricity or other renewable energy sources, then the carbon intensity per passenger mile is much lower than the carbon intensity per passenger mile associated with an individual automobile and possibly even lower than that of a diesel fueled bus. Thus, a CDM project that encourages people to ride the metro could produce substantial GHG emissions reductions.

Quantification of emission reductions

To estimate the emissions from a mass transit project, basic information is required such as the type of fuels consumed, the combustion technologies,

operating conditions during combustion and the emissions control technologies applied during and after the combustion process. The data on these several parameters can affect the performance of each transport vehicle, making this emissions analysis very complex.

In order to calculate the CO_2 emissions reductions originated from the replacement of internal combustion engines vehicles to cleaner vehicles, the national or local CO_2 inventory needs to be analyzed, which provides the total pollutant emissions in tonnes of CO_2 per a specific year.

Once the required data is gathered and the baseline is established, an engineering analysis is conducted in order to identify the offset generated by the project. The carbon emissions for the case in which the fuel is consumed in an internal combustion engine in the local market must be analyzed. Calculation of carbon emissions reduction uses the emission rate from a combustion engine for the total number of vehicles to be replaced, in mtC/yr. The new fleet of cleaner vehicles will offset the carbon emissions originated from the combustion process, depending on the technology applied.

Note that for a small fleet, formed by vehicles that follow the same energy use approach (use the same fuel type and consume the same amount of energy), this methodology can be simplified. In any case, it is important to remember that there is a significant amount of uncertainty when any methodology is used to determine the emissions. Any indicators of uncertainties in the emissions estimates must be provided.

Non-CO_2 GHG emissions

In addition to the CO_2 emissions, the major pollutant causing global warming, there are emissions of other significant GHGs that contribute for air pollution including CO, NO_x, CH_4, N_2O and non-methane volatile organic compounds (NMVOCs). These emissions are much smaller in quantity than the CO_2 emissions. However, these gases are strong GHGs and their contribution to global climate change can be expressed as equivalent tonnes of CO_2 emissions using the IPCC's method of estimating the global warming potential (GWP) of each GHG in relation to CO_2. For example, using a 100-year time horizon, the GWP of CH_4 is 21 and the GWP of N_2O is 310.

CO emissions are a function of the efficiency of the combustion process and NO_x emissions are related to air-fuel mixes and combustion temperatures. Moreover, CO and NO_x emissions are both function of pollution control equipments. CH_4 and NMVOC emissions are a function of the methane content of the motor fuel and postcombustion control of hydrocarbons emissions such as catalytic converters. N_2O emissions are relatively small compared to total anthropogenic sources. However, NO_2 emissions are higher when emissions control technology is used.[84]

Waste Management

Edward Hoyt, Econergy International Corporation (EIC)

Projects involving changes in the management of municipal wastes offer opportunities to reduce emissions of methane (CH_4), an especially potent greenhouse gas, as well as to displace consumption of fossil fuels that generate CO_2. Although CH_4 emissions represent a very small part of aggregate emissions to the atmosphere, the magnified warming potential of methane (21 times that of CO_2) means that mitigation projects offer correspondingly greater benefits. When these benefits are considered together with the significant local environmental benefits of such projects and the potential for offsetting consumption of fossil fuels, projects in the waste management sector may be particularly attractive.

Reductions of CH_4 emissions and displacement of CO_2 emissions from waste management projects occur as a result of the following physical linkages and dynamics:

- **Solid waste – methane.** Solid waste landfills generate CH_4 as the natural byproduct of decomposition of organic material in the solid waste stream. In developing countries, solid waste generation tends to include a higher percentage of organic material, as opposed to plastics, metals, glass, paper and other types of materials. Accordingly, the potential for obtaining CH_4 gas from landfills located in population centres in developing countries is significant. However, the volume of extractable landfill gas depends on the extent to which a landfill is adequately sealed and managed to avoid gas seepage directly into the atmosphere and ensure gas quality over time (landfill gas is typically a mix of CH_4 and CO_2).
- **Human/animal/agricultural waste – methane.** Methane gas is also an important byproduct of chemical processing of human and animal wastes, and different types of agricultural wastes, especially those containing high levels of moisture. Gas produced in biogas fermentation, in gas capture and processing units located at agribusiness facilities, in municipal wastewater treatment facilities and even in residential areas may be captured and processed for use.
- **Methane – fossil energy displacement.** Methane gas extracted from landfills or produced from animal or vegetable waste is a high quality fuel, virtually identical in terms of chemical composition to natural gas. Depending on the CH_4 content of the landfill gas extracted, landfill gas extraction projects make it possible for most facilities to generate fuel for small generation units to produce electricity and/or steam for various uses. To the extent that power and thermal energy produced in this way is used in displacing electricity produced by fossil-fired generation facilities or in place of fossil or biomass fuels for heating, cooking or thermal energy requirements in production processes, such projects yield reduc-

tions of uncontrolled methane emissions and CO_2 emissions from fossil fuel combustion. The exact degree to which the project reduces total GHG emissions will depend on the type of fuel used for energy production prior to switching to landfill or waste gas and the extent of uncontrolled methane emissions prior to the project.

- **Recoverable energy content of solid waste – fossil energy displacement.** In addition to methane production from landfills and other facilities where human, animal or agricultural wastes are generated, non-biodegradable solid wastes deposited in landfills offer recoverable energy content. This may be exploited in either of two ways. First, by using the waste as fuel in waste-to-energy facilities, thereby displacing other energy resources, as is often the case in developed nations. And second through recycling certain high value solid waste materials such as steel, aluminum, glass, plastic and paper. Recycling avoids the energy consumption required to produce virgin materials, albeit to a greater or lesser degree depending on the material in question (aluminum offers substantial savings in this respect). The extent to which waste-to-energy facilities and recycling programs and businesses yield significant emissions reductions depend on the characteristics of electricity production on the grid, as well as for thermal energy production, and the amount of electric and thermal energy production embodied in recycled materials. The recoverable energy content tends be inversely proportional to the moisture content of the solid waste stream and is directly related to the presence of high value recyclable wastes. Accordingly, cities in developing countries tend to generate solid waste with relatively low energy contents, while waste from cities in industrialized countries tends to offer higher calorific value.

The feasibility of implementing projects involving the recovery or production of methane gas for use as fuel, or the recovery of energy content in solid waste through direct use as fuel or recycling, will in turn depend on a series of socio-economic linkages and dynamics. These issues include the stringency of the application of environmental and sanitary regulations, the availability and cost of alternative sources of electric and thermal energy, the social and economic opportunity costs of recovering energy content of waste streams, allocation of investment resources in urban infrastructure and public services, opportunities for private investment in infrastructure and public services and public opposition to specific types and locations for public or private infrastructure development. The extent to which these factors inhibit the implementation of projects in the waste management area varies significantly from nation to nation and may even vary from city to city within a given country.

Since waste management activities of some scale are indispensable in even the smallest settlements, industrial facilities and agribusiness facilities where large numbers of animals are concentrated, it is impossible to implement new waste

management projects without displacing or affecting existing arrangements for handling waste. Where projects are undertaken by or on behalf of the public sector, the process of implementing a project becomes a preeminently political process. Hence, project proponents must consider the necessary political process to implement projects that are feasible from a technical and economic point of view.

Quantification of emission reductions

In waste management projects the measurement of emissions reductions for the purposes of evaluating the potential impact of a project and the monitoring and verification of project implementation requires evaluations of two general areas. The first involves the waste management area itself, while the second involves the impact of energy produced through the combustion of waste or fuels generated from the waste such as biogas. This means that the preparation of project baselines and implementation of project monitoring and verification protocols will tend to be more elaborate and costly than evaluations of projects involving renewable energy or energy efficiency.

With respect to the first general area, the process of quantification involves an assessment of the reference case situation in terms of waste flows, estimates of methane and CO_2 production from those waste flows based on the extent to which the waste flows contain organic matter, any existing arrangements for gas capture and, clearly, climatic conditions. The capture and utilization of the landfill gas will generate emissions of CO_2 through combustion of the CH_4 gas, but due to the higher GWP of methane, this is counted as a net reduction relative to the CO_2 equivalent emissions present in the absence of the project.

The second area is in effect a case of fuel substitution. As in the standard analysis of the emissions impacts resulting from a change in fuel, the new fuel would be CH_4 gas. The extent to which the displacement yields any net benefit will depend on the type of fuel utilized to produce the thermal energy and electricity now provided by the landfill gas. If the displaced fuel has a higher carbon content than the landfill gas, there will be a net emissions reduction over and above the emissions reduction associated with capturing the landfill gas at all.

In instances where the waste management project does not involve landfill gas production, but rather displacement of consumption of virgin materials through recycling of glass, aluminum, paper or other materials, the analysis required involves a comparison of the energy and resources utilized to produce a unit of the material being recycled, compared to the energy and resource consumption required to process the recovered material.

Land Use Change

William G. Stanley, The Nature Conservancy (TNC)

Forests act as carbon sinks by absorbing atmospheric CO_2 through photosynthesis and as emissions sources when carbon stored in trees and other pools is released into the atmosphere. In their Third Assessment Report, the IPCC estimated that land use, land use change and forestry (LULUCF) activities such as reforestation and reductions in deforestation could contribute on the order of 100 GtC (cumulative) of greenhouse gas emissions reductions and removals through 2050. This would be equivalent to about 10 per cent to 20 per cent of projected fossil fuel emissions during that same period.[85]

The potential contribution of land use activities to climate change mitigation is significant and a large majority of the potential identified by the IPCC would come from Non-Annex B countries. Even so, the inclusion of LULUCF in the CDM was one of the more contentious issues in the Kyoto debates due to numerous concerns regarding its use. The concerns are varied, ranging from technical issues[86] to ideological ones.

The numerous proponents of LULUCF activities cite the ancillary benefits that can accompany these projects such as biodiversity protection, soil conservation, watershed maintenance and sustainable forest management. Since land use change, particularly deforestation, accounts for about 25 per cent of annual CO_2 emissions,[87] effectively conserving threatened forests would reduce emissions while protecting habitat. In addition to removing CO_2 from the atmosphere, restoration of vegetation and changes in management can help to replace valuable resources such as timber and soil.

Afforestation and reforestation

The Framework Convention on Climate Change supports a comprehensive approach to mitigating climate change by "addressing anthropogenic emissions by sources and removals by sinks." However, due the various concerns of parties the use of LULUCF in the CDM during the first commitment period (2008–2012) was restricted through the Marrakech Accords by first limiting the list of eligible activities to afforestation and reforestation and second, putting an overall cap on the LULUCF credits under the CDM that is effectively equal to one per cent of 1990 emissions of all Annex B Parties that ratify the treaty and engage in trading. The list of eligible activities could be expanded and the cap modified or eliminated for the second commitment period.

The exact definitions of afforestation and reforestation for use in the CDM have not yet been determined, so the scope of eligible activities is still somewhat unclear. However, the definition of these terms included in the Marrakech accords for use in other parts of the Kyoto Protocol are likely to be the starting point for future negotiations and provide an indication of what will be accepted.

Definitions of afforestation and reforestation in the Marrakech Accords

Afforestation is the direct human-induced conversion of land that has not been forested for a period of at least 50 years to forested land through planting, seeding and/or human-induced promotion of natural seed sources.

Reforestation is the direct human-induced conversion of non-forested land to forested land through planting, seeding, and/or the human-induced promotion of natural seed sources, on land that was forested but that has been converted to non-forested land. For the first commitment period, reforestation activities will be limited to reforestation on those lands that did not contain forest on 31 December 1989.

Source: The Marrakech Accords, Decision 11/CP.7, FCCC/CP/2001/13/Add.1

There are numerous subcategories within the broad categories of afforestation and reforestation. These include, but are not limited to, short rotation plantation forestry, natural forest restoration as well as reforestation and management. Some analysts suggest that plantation forestry or other activities with significant economic returns from harvesting may not be eligible in the CDM due to concerns that they are nothing more than a continuation of business-as-usual. They may have happened anyway, meaning they would not result in additional removals of CO_2, only additional income for project developers. Others are concerned that project developers will place projects in locations that have already been abandoned and would regenerate anyway. That is, there is a concern that some of the emissions removals that could fall within the broad categories of afforestation and reforestation would have happened even without the CDM.

The IPCC Subsidiary Body on Scientific and Technical Advice (SBSTA) has been tasked with adopting the definitions and modalities for including afforestation and reforestation project activities in the CDM. Their work will explore the various technical and other issues, and should result in clear analyses that will be provided to negotiators. The negotiators will consider the analyses and make decisions, providing the final eligibility criteria. These decisions should be made by the end of 2004.

Quantification of emission removals

In the case of afforestation and reforestation, emission removals are quantified through measurements of carbon stocks in various carbon pools in the project as compared to those that would have been expected without the project. Essentially, the emission removals from a project are:

$=\sum_1^n$ (carbon pools$_1$ with the project – carbon pools$_1$ in the baseline case)

The major carbon pools in afforestation and reforestation projects are live biomass, dead biomass, soil and wood products. Though the definitions and modalities for these projects are yet to be clarified, it is likely all carbon stocks that are decreasing because of the project will need to be measured and debited from the participant's carbon ledger while carbon stocks that are increasing may be measured at the participant's discretion.[88] Wood products may not be eligible for crediting as tracking these pools over time would be challenging and rights to the emissions removals associated with them complicated.[89] Some carbon stocks, such as soil carbon or carbon stored in herbaceous plants, may be too expensive to measure relative to how much carbon is stored in them.

Baselines for afforestation and reforestation projects are likely to be fairly straightforward. It is likely that if an area has been non-forested since a certain date, for example December 31, 1989,[90] and is still not forested, it will be eligible for afforestation and reforestation. Baseline carbon stocks will be those that are found on the land when the project is initiated. Credited emission removals will be the difference in carbon stocks found within the project over time compared to those found at its initiation.

Carbon monitoring refers to the ongoing measurement of carbon pools in project and baseline cases. Permanent sample plots allow for efficient assessments of changes in carbon pools over time and for cost and time efficient verification of the project's reported emission removals.[91] The frequency and intensity of monitoring may depend on the nature of the project.

Emissions removals are unlike emissions reductions from the energy sector in that they are reversible or potentially non-permanent.[92] Carbon dioxide stored through photosynthesis can be released back into the atmosphere if forests are disturbed and decomposition or burning takes place. Due to this fact, distinctive accounting approaches for the emission removals produced by LULUCF projects have been proposed. The approach that appears most likely to be adopted is one of permanent liability. This approach requires that emission removals must be retired at the end of a project and that if carbon storage is lost during the project period it must be made up for through other greenhouse gas emission reductions or removals.[93]

Endnotes

76 World Bank. "Baseline Methodologies for PCF Projects," The World Bank, Washington, D.C., October, 1999.

77 Voluntary Reporting of Greenhouse Gases Form Instructions, Energy Information Administration, U.S. Department of Energy, 2000, www.eia.doe.gov.

78 Alternative fuels are substantially non-petroleum and yield energy security and environmental benefits. DOE currently recognizes the following as alternative fuels: methanol and denatured ethanol as alcohol fuels (alcohol mixtures that contain no less than 70 per cent of the alcohol fuel), natural gas (compressed or liquefied), liquefied petroleum gas, hydrogen, coal-derived liquid fuels, fuels derived from biological materials, and electricity (including solar energy).

79 Wang, Michael Q. "Fuel-Cycle Greenhouse Gas Emission Impacts of Alternative Transportation Fuels and Advanced Vehicle Technologies," Transportation Research Record 1664, Paper No. 99-1327, Argonne National Laboratory.

80 A hydrogen fuel cell vehicle works by converting the chemical energy of hydrogen and combining it with oxygen to produce electricity, heat, and water. "Clean diesel" fuel usually means low-sulfur diesel.

81 Clean Cities is sponsored by the U.S. Department of Energy (DOE) and is designed to encourage the use of AFVs and the implementation of supporting infrastructure, thereby improving energy security and environmental quality goals on local, national, and international levels.

82 An example could include looking at the decrease in emissions from natural gas which is transported by pipeline as opposed to gasoline which is at times transported by vehicle and also goes through a refining process.

83 Gas Research Institute (GRI), "Natural Gas Vehicles and Greenhouse Gas Emissions," Presented at the 6th National Clean Cities Conference, San Diego, CA, May 10, 2000.

84 IPCC Guidelines for National Greenhouse Gas Inventory: Reference Manual.

85 IPCC Working Group III. 2001. Climate Change 2001: Mitigation.

86 For a review of these issues see Schlamadinger, B. and Marland, G. June, 2000.

87 IPCC Working Group I. 2001. Climate Change 2001: The Scientific Basis.

88 Sathaye, J., W. Makundi, B. Goldberg, C. Jepma, and M. Pinard, eds. 1997, pp. 91–99.

89 IPCC. 2000. Afforestation, Reforestation and Deforestation (ARD) Activities.

90 Though the definition for reforestation currently included in the Marrakech Accords supports this date, the date may be different for the purposes of the CDM. Some suggest that the date may be December 31, 1999 instead.

91 MacDicken, K. 1997.

92 The term temporary emissions reductions, or T-CERs, was coined to describe the non-permanent characteristic of LULUCF credits, but has not been formally adopted.

93 This is a slight variation of a proposal by Colombia that has been viewed favourably by parties.

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Concluding Note

Jodi Browne, International Institute for Sustainable Development (IISD)

COP-7 marked a milestone in the climate change negotiations as Parties to the Protocol sat down to decide on the rules and modalities for the CDM as a global mechanism, and the procedures for individual CDM projects. The CDM executive board continues to move this agenda forward. Since COP-7 in Marrakech, we have seen a mushrooming of ideas, thinking, exploration and actions aimed at moving the CDM from a paper concept to a reality. Countries of varying levels of interest and engagement of the CDM are exploring the possibilities and options for involvement, while also determining how this new mechanism will fit with their respective sustainable development and climate change policies and priorities.

Among the flexibility mechanisms, the CDM is unique in its dual purpose of contributing to global mitigation efforts and simultaneously furthering national development goals. National Authorities play a crucial role in establishing the link between these two objectives. Although the operation of the CDM involves the participation of many entities, it is the National Authority which must ensure that all approved projects actually promote national sustainable development goals while achieving real GHG reductions. It is an all important responsibility and one which cannot be taken lightly. Developing countries will serve their interests in as much as they thoughtfully establish their National Authorities. This timely Guide appears just as governments begin to grapple with the specific stages and requirements involved in developing their NAs.

This publication is a product of the Climate Change Knowledge Network (CCKN), spearheaded by IISD. As a network, the CCKN's 14 members work together to promote a more effective, sustainable and equitable climate change regime through capacity building, research and communications on issues such as the Kyoto mechanisms, adaptation and technology transfer. The Guide to Establishing National Authorities reflects the CCKN's goal of enhancing the capacity of developing countries to respond to climate change in a manner consistent with their own sustainable development priorities. In addition, the Guide aims to improve dialogue and exchange among industrialized and developing countries in an effort to promote understanding of the linkages between climate change and sustainable development in all regions.

The Guide draws on CSDA's wealth of experience gathered from working to develop National Authorities in the region of Latin America. These lessons mark important steps in the maturity of the climate regime and of the flexibility mechanisms, and are valuable in charting the course for developing countries' entry into the wide range of sustainable development opportunities presented by CDM projects. It is the hope and expectation of IISD and the CCKN that the Guide represents a beneficial and practical development tool that will be useful in the development of National Authorities worldwide.

Appendix I

Countries that have signed/ratified the Kyoto Protocol

This list shows in bold letters those countries that ratified or acceded to the Protocol as at May 6, 2002. Constant updates of this list can be found on the UNFCCC's web site www.unfccc.int/resource/kpstats.pdf.

Country	Signature	Ratification or Accession
Antigua and Barbuda	16/03/98	3/11/98 (R)
Argentina	16/03/98	28/09/01 (R)
Australia	29/04/98	
Austria	29/04/98	
Azerbaijan		28/09/00 (Ac)
Bahamas		09/04/99 (Ac)
Bangladesh		22/10/01 (Ac)
Barbados		07/08/00 (Ac)
Belgium	29/04/98	
Benin		25/02/02 (Ac)
Bolivia	09/07/98	30/11/99 (R)
Brazil	29/04/98	
Bulgaria	18/09/98	
Burundi		18/10/01 (Ac)
Canada	29/04/98	
Chile	17/06/98	
China	29/05/98	
Colombia		30/11/01 (Ac)
Cook Islands	16/09/98	27/08/01 (R)
Costa Rica	27/04/98	
Croatia	11/03/99	
Cuba	15/03/99	30/04/02 (R)
Cyprus		16/07/99 (R)
Czech Republic	23/11/98	15/11/01 (Ac)
Denmark	29/04/98	

Country	Signature	Ratification or Accession
Djibouti		12/03/02 (Ac)
Dominican Republic		12/02/02 (Ac)
Ecuador	15/01/99	13/01/00 (R)
Egypt	15/03/99	
El Salvador	08/06/98	30/11/98 (R)
Equatorial Guinea		16/08/00 (Ac)
Estonia	03/12/98	
European Community	29/04/98	
Fiji	17/09/98	17/09/98 (R)
Finland	29/04/98	
France	29/04/98	
Gambia		01/06/01 (Ac)
Georgia		16/06/99 (Ac)
Germany	29/04/98	
Greece	29/04/98	
Guatemala	10/07/98	05/10/99 (R)
Guinea		07/09/00 (Ac)
Honduras	25/02/99	19/07/00 (R)
Indonesia	13/07/98	
Ireland	29/04/98	
Israel	16/12/98	
Italy	29/04/98	
Jamaica		28/06/99 (Ac)
Japan	28/04/98	
Kazakhstan	12/03/99	
Kiribati		07/09/00 (Ac)
Latvia	14/12/98	
Lesotho		06/09/00 (Ac)
Liechtenstein	29/06/98	
Lithuania	21/09/98	

Country	Signature	Ratification or Accession
Luxembourg	29/04/98	
Malawi		26/10/01 (Ac)
Malaysia	12/03/99	
Maldives	16/03/98	30/12/98 (R)
Mali	27/01/99	28/03/02 (R)
Malta	17/04/98	11/11/01 (R)
Marshall Islands	17/03/98	
Mauritius		09/05/01 (Ac)
Mexico	09/06/98	07/09/00 (R)
Micronesia	17/03/98	21/06/99 (R)
Monaco	24/04/98	
Mongolia		15/12/99 (Ac)
Morocco		25/01/02 (Ac)
Nauru		16/08/01 (R)
Netherlands	29/04/98	
New Zealand	22/05/98	
Nicaragua	07/07/98	18/11/99 (R)
Niger	23/10/98	
Niue	8/12/98	06/05/99 (R)
Norway	29/04/98	
Palau		10/12/99 (Ac)
Panama	08/06/98	05/03/99 (R)
Papua New Guinea	02/03/99	28/03/02 (R)
Paraguay	25/08/98	27/08/99 (R)
Peru	13/11/98	
Philippines	15/04/98	
Poland	15/07/98	
Portugal	29/04/98	
Republic of Korea	25/09/98	
Romania	05/01/99	19/03/01 (R)

Country	Signature	Ratification or Accession
Russian Federation	11/03/99	
Saint Lucia	16/03/98	
Saint Vincent and the Grenadines	19/03/98	
Samoa	16/03/98	27/11/00 (R)
Senegal		20/07/01 (Ac)
Seychelles	20/03/98	
Slovakia	26/02/99	
Slovenia	21/10/98	
Solomon Islands	29/09/98	
Spain	29/04/98	
Sweden	29/04/98	
Switzerland	16/03/98	
Thailand	02/02/99	
Trinidad and Tobago	07/01/99	28/01/99 (R)
Turkmenistan	28/09/98	11/01/00(R)
Tuvalu	16/11/98	16/11/98 (R)
Uganda		25/03/02 (Ac)
Ukraine	15/03/99	
United Kingdom	29/04/98	
United States of America	12/11/98	
Uruguay	29/07/98	05/02/01 (R)
Vanuatu		17/07/01 (Ac)
Vietnam	03/12/98	
Uzbekistan	20/11/98	12/10/99 (R)
Zambia	05/08/98	
TOTAL	**84**	**54**

Quantified emission reduction obligations of Annex I countries

Country	Quantified emission limitation or reduction commitment (per cent of base year or period)
Australia	108
Austria	92
Belgium	92
Bulgaria*	92
Canada	94
Croatia*	95
Czech Republic*	92
Denmark	92
Estonia*	92
European Community	92
Finland	92
France	92
Germany	92
Greece	92
Hungary*	94
Iceland	110
Ireland	92
Italy	92
Japan	94
Latvia*	92
Liechtenstein	92
Lithuania*	92
Luxembourg	92
Monaco	92
Netherlands	92
New Zealand	100
Norway	101

Country	Quantified emission limitation or reduction commitment (per cent of base year or period)
Poland*	94
Portugal	92
Romania*	92
Russian Federation*	100
Slovakia*	92
Spain	92
Sweden	92
Switzerland	92
Ukraine*	100
United Kingdom and Northern Ireland	92
United States of America	93

* Countries that are undergoing the process of transition to a market economy.

Source: Annex B, Kyoto Protocol

Appendix II

Sample National Criteria for Submission of Projects

During the Activities Implemented Jointly (AIJ) pilot phase, several countries developed national criteria for the evaluation of mitigation projects. These criteria are given here as a reference, but it is important to clarify that each country will have to update these criteria to the new CDM requirements.

Argentina

CDM (AIJ) national project criteria defined by the OAIC (Organización Argentina de Implementación Conjunta)

Projects submitted to the OAIC should be categorized AIJ or CDM, as outlined under Decision 5 at COP-1 (Conference of Parties 1 under the UNFCCC). These are specific projects dealing with GHG mitigation either by emissions reductions and/or by the proliferation of sinks, implemented by an Annex 1 country either by a public or private entity and hosted in a Non-Annex 1 country.

National sources and sinks of GHGs

On a global scale CO_2 emissions account for 60 per cent of the total amount of GHG contributing to global warming. On a national level this contribution may be greater. CO_2 is the final product of fossil fuel burning, which is the most likely cause for greenhouse gas induced emissions from anthropogenic activities.

In Argentina, the energy sector is relatively modern and efficient with a large hydro and a modest nuclear component. In order of importance, methane emissions account for the second greatest contribution to the greenhouse effect. Ninety per cent of methane emissions are produced by agricultural activities. Other sources include rice paddies, biomass decay and natural gas leaks. Finally, nitrous oxide emitted industrially from fertilizers and from land cover change to agriculture is the third greatest contributor to the greenhouse effect.

Although minor, gases used in refrigeration and air conditioning are major culprits in global warming. This is due to their enormous heating power, thousands of times greater than the mass equivalent of CO_2. Unfortunately, their contribution has not been quantified in the GHG inventory, since they were not part of the initial list put out by the UNFCCC.

National mitigation options by sector are as follows:

Energy

The bulk of fuel consumption lies in the generation of electricity. However, the focus of mitigation would not be based on increasing the efficiency of conventional thermoelectric generators, but in reducing GHG emissions by allowing the introduction of cleaner technologies (e.g., wind, solar) into the market.

Within the conventional thermoelectric plants, an effort would be made to substitute highly contaminant fuels with cleaner fuels (e.g., gas substituting coal).

Transport

Mitigation in this sector means implementing policy changes relative to the transport of passengers and cargo. This implies:

1) A change in the organization of transit – Improving highways and mass transit as well as limiting the use of single occupancy vehicles.
2) Cleaner transport mechanisms – Public transport replacing single cars, using trains instead of cargo trucks and implementing subway systems decreasing the need for bus circulation.
3) Substituting emission sources – Promoting the use of less damaging fuels and decreasing the age of the public transit float.
4) A widespread use of cleaner engines and better techniques – Engines run by hydrogen combustion are an example.

Agriculture

Adopting new technologies in land use can reduce GHG emissions. For example, traditional tilling of the soil causes carbon emissions that are retained by the land. The change to minimum tillage greatly contributes to the reduction of such emissions.

Residential, commercial and institutional buildings

Mitigation of GHG emissions can be carried out by adopting technologies destined to reduce the energy consumed by equipment (appliances, heating, air conditioning, ventilation, lighting, etc.) and to optimize the thermal integrity of buildings, preventing the loss of energy through poor heating and ventilation.

Other measures to reduce emissions include urban design and land use planning, the optimization of urban heating and ventilation systems, the implementation of sustainable construction techniques and the use of renewable energy sources.

Industry

GHG emissions can be reduced by the adoption of cleaner technologies and the more efficient use of energy. Cogeneration, where two forms of usable energy are generated, is an example of more efficient energy consumption. The following techniques would be applied: a) Topping, where the primary product of combustion is the generation of electrical mechanical energy and the excess heat can be used for other processes (this technology can be applied to paper, textile, petroleum industries, etc.) and b) Bottoming, where the primary energy is heat applied to the industrial process and the secondary energy gen-

erated is mechanical and finally electrical (this technology can be applied to ceramic and metallurgical industries).

Waste management

The amount of methane produced from landfills can be mitigated by classifying and recycling waste. Installing a capture mechanism can also collect methane. Captured methane is then combusted and liberated into the atmosphere as CO_2, which has a lesser greenhouse effect.

Technology and measures to increase GHG sinks

With the increase in photosynthetic activity, atmospheric carbon dioxide is absorbed by leaves and converted to plant material. Photosynthetic activity can be increased by taking action in the forestry sector (promoting forestation and controlling deforestation), by expanding green areas of low irrigation in arid regions, by augmenting the biomass density of lands or by using better watering systems.

Land use changes and the control over native forests can contribute to the absorption of carbon dioxide. However, there are many uncertainties surrounding the measurable fixation of carbon dioxide and studies concerning the carbon cycle and the evaluation of biomass in different ecosystems are required.

Colombia

Project Evaluation and Acceptance: The Colombian office will adhere to the regulations on CDM set forth by the COP, which will most likely include the criteria and methodologies to deal with baselines, additionality and sustainable development. Meanwhile, the Colombian office will define the criteria for the evaluation and approval of CDM projects as follows:

- Evaluation criteria: To establish the evaluation criteria and CDM project approval. These criteria should be approved by the Board of Directors and be consistent with the FCCC and the Kyoto Protocol.
- Evaluation procedures: To establish step-by-step procedures of evaluation of projects within a set timeframe previously approved by the Board of Directors.
- Verification of Proposals (Prerequisites): To verify that the projects contain all required information and fulfill all entry prerequisites. To register the projects which fulfill the prerequisites.
- Evaluation (projects and baselines): To evaluate the projects with defined, clear and pre-established technical criteria, which have already been approved by the Board of Directors and are consistent with the Protocol.
- National approval: The office will concede national approval to projects that have fulfilled all criteria. Once the office has approved the project

it implies that the government of Colombia 1) authorizes that the CDM project can be carried out 2) ensures that the project complies with the established approval criteria and 3) authorizes the exchange of certified emissions reductions generated under this project.

- Follow up: To keep an up-to-date account of projects registered with the office.

Costa Rica

Basic Project Considerations and Domestic Priorities

1. Legal Compatibility

   Is the project consistent with applicable Costa Rican laws and regulations?

2. Investor Home Acceptance

   Is the project acceptable to the home country government or does the project proponent intend to apply for such acceptance?

3. National Sustainable Development Priorities:

   Is the project compatible with, and supportive of, Costa Rican national environment and development priorities and strategies including:

   - Biodiversity conservation
   - Reforestation and forest conservation
   - Sustainable land use
   - Watershed protection
   - Air and water pollution reduction
   - Reduction of fossil fuel consumption
   - Increased utilization of renewable resources
   - Enhanced energy efficiency

   Support for Costa Rica's efforts to fulfill its obligations under the UNFCCC, Biological Diversity and Agenda 21.

   Enhancement of income opportunities and quality of life for the Costa Rican civil society:

   - A minimized or acceptably low level of adverse consequences of the project, through site selection, scale adjustment, timing, attenuation and mitigating measures.
   - Local capacity building such as the transfer and adaptation of know-how and high quality technologies.

4. Local or Community Support

   Will the local community support and participate in and/or benefit from the project?

Environmental Feasibility

1. Offset Additionality

   Will the project bring about real, measurable and long-term environmental benefits related to the mitigation of GHG that would not have occurred in the absence of such activities? The proposal should include a defensible reference or baseline case for emissions reductions or sequestration processes in the absence of the project.

2. Monitoring

   Does the project have a monitoring plan that includes the participation of organizations capable of successfully monitoring the project? The monitoring plans should include actual measurements of the project's emissions or sequestration in order to establish a high degree of certainty that the predicted benefits were achieved by the project.

3. Verification

   Will the proposal allow for the verification of the project's progress through inspection by a qualified third party verifier

4. Durability or Quality of Offset

   Does the project have a high likelihood that the greenhouse gas offset will be maintained over the life of the project?

   The proposal should include a work plan for project start-up, provide the timeline for starting or completing significant phases or stages of the project, including but not limited to, feasibility studies, development and beginning of operations as well as completion of advanced stages of the project.

5. Greenhouse Gas Benefits

   What methodologies were used to calculate greenhouse gas emissions reductions (avoidance) and carbon sequestration (fixation), and what are the key uncertainties affecting those estimates?

Financial Feasibility

1. Financial Additionality

   Is the financing of the project additional to the financial obligations of Annex II Parties to the UNFCCC and the current Official Development Assistance flows (ODA)?

2. Cost Estimates and Financial Feasibility

   Does the project include an accounting of all the associated costs of operation and economic benefits including organizations or entities, other than official project participants, that may contribute to the project's operation?

   Does the project address the cost issue (in US$) of the per avoided tonne of CO_2 equivalent?

   Does the project developers state the AIJ financial component (in US$)?

   Does the proposal include the financial projections (cash flow, profitability, rate of return, benefit/cost relationship, etc.) with and without the AIJ additional financial contribution?

   Does the proposal address the issue of sharing the monetary surplus related with the project GHG abatement benefits?

Technical and Institutional Feasibility

1. Institutional Infrastructure and Governmental Role

   Does the domestic Costa Rican institutional framework (legal, administrative and technological) exist to adequately implement and administer the project?

2. Reliability and Credibility of the Project Participants

   What is the prior experience and track record of the project partner(s) and intermediaries? Is each partner's role in the project's development and implementation made explicit in the proposal?

Ecuador

National evaluation criteria are defined as follows:

- Congruence with national sustainable development objectives and priorities
- Sustainable development environmental strategy
- Consistency with the current legal framework

1. Investment priority areas

   In order to promote the development priorities of a country, each host nation has the right to define the areas for CDM priority investment. For Ecuador these areas were defined as:

   - Energy Sector
     - Substitution of bunker diesel for renewable energy projects

- Promotion of natural gas
- Switch from open single cycle to combined cycle technology
- Combination of hydroelectric generation with forestry conservation
- Energy efficiency

- Transportation Sector
  - SF_6 emission reduction projects
  - Promotion of massive transport
  - Substitution of traditional fossil fuels for the use of compressed natural gas and petroleum liquefied gas
- Land use change and forestry sector
  - Participation of community affected/benefited
  - Linkages with national social development funds
  - Optimization of land use, in order to limit the advance of the agricultural frontier

Honduras

I. National Priorities

The OICH (Joint Implementation Office of Honduras) considers and packages CDM projects based on national priorities within the policies and framework related to climate change mitigation and adaptability processes. National and foreign project promoters and related activities should clearly base their project ideas on national socio-economic criteria. Environmentally, all projects should comply with the obligations and environmental regulations as given by Serna and municipal authorities, keeping biodiversity and water, land and forest conservation as priorities.

II. Project selection based on socio-economic, cultural and environmental criteria

The CDM project selection criteria are based on the following international negotiation criteria:

- Financial feasibility
- Defined and project-based legal framework
- GHG mitigation potential
- Cost effective GHG reductions

- Project duplicability
- Investment return (financial rentability and environmental additionality)
- Proponent's interest
- Contribution to the expansion and creation of new markets and GHG efficient technology transfer (Promotion of energy-related technology with low or nil carbon emissions)
- Risk (stability and credibility)

III. Project selection based on technical feasibility (industrial profiling)

Before engaging into a pre-investment initiative the project idea should be examined by undertaking a technical pre-feasibility assessment. This involves the study of the project's costs and benefits and offers the indicators to allow the formulation of an informed decision.

IV. Input, analysis and sector estimates

Independent analyses of the concerned sector should be carried out. This is done in order to highlight sector opportunities, organization, perspectives and projections.

V. Prerequisite studies

The following studies should be carried out:

- Baseline studies
- Leak analyses (financial and environmental)
- Permanence analyses
- Risk assessment

VI. National criteria and indicators (database)

Each project will contribute in the compilation of a national database to be used as a reference for similar projects carried out in other countries. The measurement and indicators that are generated will be incorporated into the National Environmental Information System. The analyses of these indicators and measurements will be critical in the comparison with the results obtained from project activities in other countries.

VII. Documentation

This step involves writing the project document. It contains the results of all studies previously undertaken. The document must also include the potential partners selected, an organizational chart and the defined responsibilities within the organization.

Panama

All projects presented for approval by FUPASA (Panamanian Foundation of Environmental Services) should contribute to Panama's overall sustainable development and mitigate the effects of GHG emissions by reducing and/or sequestering greenhouse gases. The following criteria will be used to evaluate all projects:

1. Institutional Policy:
   - Congruence with Panama's legal framework
   - Congruence with Panama's mandates on sustainable development by the sectors involved
   - The active involvement in the design and implementation of projects by all parties involved
   - Contribution to the country's institutional strengthening
   - Both Panama and the implementing organization must have the institutional capacity to execute the project
2. Socio-economics:
   - The project must have direct influence in the socio-economic situation of the area
   - The effects and outcome of the project should be disseminated
3. Environmental:
   - A clear definition of baselines and environmental additionality
   - A net effect quantification of reduced or avoided GHG emissions and / or sequestered CO_2
   - Presentation of the quantifying methodology
   - A defined monitoring plan
   - A defined verification protocol
   - The identification of other positive environmental effects as well as negative effects produced as a consequence of the project
4. Economic and Financial:
   - The internalization of implementation and project maintenance costs during the set timeframe.
   - A positive financial analysis, financial flux coming from funds.

Appendix III

The Prototype Carbon Fund of the World Bank first developed the Project Idea Note (PIN©) and Project Concept Note (PCN©) formats as helpful tools in the gradual process of evaluating projects. Those formats were then adopted and adapted by several CDM participants including the government of the Netherlands and the Corporación Andina de Fomento. These formats are not part of the formal CDM requirements established in the Marrakech Accords. Should an NA choose to use them, they should be adapted to local needs and priorities.

Sample format for a PIN©

Project Idea Note for [Project Name]

(The PIN© is a five-page document providing indicative information on the project)

Date submitted:_____

A. Project participants, type of the project, location and schedule

Project developer	
Name of the project developer	
Organizational category	Government/Government agency/ Municipality/Private company/ Non-governmental Organization (*mention what is applicable*)
Other function(s) of the project developer in the project	Sponsor/Operational entity/Intermediary/ Technical advisor (*mention what is applicable*)
Address	Address, PO Box, City, Country
Contact person	Name of the Project Development Manager
Telephone/fax	
E-mail	

Project sponsors (List all project sponsors)	
Name of the project sponsor	
Organizational category	Government/Government agency/ Municipality/Private company/ Non-governmental Organization/? (*mention what is applicable*)
Address	Address, PO Box, City, Country
Main activities	*Not more than five lines*
Type of the project	
Greenhouse gases targeted	CO_2/CH_4/N_2O/HFCs/PFCs/SF_6 (*mention what is applicable*)
Type of activities	Abatement
Field of the activities	
a. Energy supply	Renewable energy, excluding biomass/ biomass/cogeneration/improving energy efficiency by replacing existing equipment/ minimization of transport and distribution/ fuel switch (e.g., switch coal to biomass) (*mention what is applicable*)
b. Energy demand	Replacing of existing household equipment/ improvement of energy efficiency of existing production equipment (*mention what is applicable*)
c. Transport	More efficient engines for transport/modal shift/fuel switch (e.g., public transport buses fuelled by natural gas) (*mention what is applicable*)
d. Waste management	Capture of landfill methane emissions/ utilization of waste and wastewater emissions (*mention what is applicable*)
Location of the project	
Region	
Country	
City	
Brief description of the location of the plant	*No more than three to five lines*

Expected schedule	
Earliest project start date	Year in which the plant will be operational
Estimate of time required before becoming operational after approval of the PIN by VROM	Time required for financial commitments: xx months Time required for legal matters: xx months Time required for negotiations: xx months Time required for construction: xx months
Expected first year of CER delivery	Year
Project lifetime	Number of years
Current status or phase of the project	Identification and pre-selection phase/ opportunity study finished/pre-feasibility study finished/feasibility study finished/ negotiations phase/contracting phase, etc. (*mention what is applicable*)
Current status of the acceptance of the Host Country	Host Country Agreement is under discussion or signed
The position of the Host Country to the Kyoto Protocol	The Host Country a. signed, signed and ratified, accepted, approved or acceded to the Kyoto Protocol or b. signed and have demonstrated a clear interest in becoming a party in due time (e.g., countries which have already started or are on the verge of starting the national ratification, acceptance or approval process) or c. have already started or are on the verge of starting the national accession process (*mention what is applicable*)

B. Finance

Total project costs estimate	
Development costs	xx million
Installed costs	xx million $US
Other costs	xx million $US
Total project costs	xx million $US

Sources of finance identified	
Equity	Name of the organizations and finance in xx million $US
Debt – Long-term	Name of the organizations and finance in xx million $US
Debt – Short term	Name of the organizations and finance in xx million $US
Not identified	xx million $US
CDM contribution sought	xx million $US
CDM contribution in advance payments	xx $ million $US and a brief clarification (*not more than five lines*)
Expected Price of the CERs in case of	
A period until 2012 (end of the first budget period)	xx $US
A period of 10 years	xx $US
A period of 7 years	xx $US
A period of 14 years (2 * 7 years)	xx $US

C. Technical summary of the project

Technical description of the project	*About 1/2 page*

D. Expected environmental benefits

Estimate of Greenhouse Gases abated/CO_2 Sequestered (in tonnes of CO_2-equivalents)	Annual: Up to and including 2012: xx tCO_2-equivalents Up to a period of 10 years: xx tCO_2-equivalents Up to a period of 7 years: xx tCO_2-equivalents Up to a period of 14 years: xx tCO_2-equivalents
Baseline scenario	What is the proposed CDM project displacing? How would the future look like without the proposed CDM project? What would the estimated total GHG reduction be? (*About 1/4–1/2 page*)
Specific global and local environmental benefits	(*In total about 1/4 page*)
Which guidelines will be applied?	Name and, if possible, the web site location
Local benefits	List the benefits
Global benefits	List the benefits
Social and economic aspects	
What social and economic effects can be attributed to the project and which would not have occurred in a comparable situation without that project?	(*In total about 1/4 page*)
Which guidelines will be applied?	Name and, if possible, the web site location
What are the possible direct effects (e.g., employment creation, capital required, foreign exchange effects)?	List the possible direct effects
What are the possible other effects? For example: • training/education associated with the introduction of new processes, technologies and products and/or • the effects of a project on other industries	List the possible other effects
Environmental strategy/priorities of the Host Country	A brief description of the relationship with the local institutional structure as well as with that of the region and/or country (*Not more than 1/4 page*)

Sample format for a PCN©

Project Concept Note for [Project Name]

(The PCN© is a 10–15 page document with more extensive information on the project)

Date submitted:_____

A. Project participants, type of the project, location and schedule

Project developer	
Name of the project developer	
Organizational category	Government/Government agency/ Municipality/Private company/ Non-Governmental Organization (*mention what is applicable*)
Legal status	State-owned company/private held company/private held company with limited liability/family owned company/limited company/limited liability company/limited partnership/other (*mention what is applicable*)
Other function(s) of the project developer in the project	Sponsor/Operational entity/ Intermediary/Technical advisor/? (*mention what is applicable*)
Address	Address, PO Box, City, Country
Contact person	Name of the Project Development Manager
Telephone/fax	
E-mail	
Project sponsors (List all project sponsors)	
Name of the project sponsor	
Organizational category	Government/Government agency/ Municipality/Private company/ Non-Governmental Organization (*mention what is applicable*)
Address	Address, PO Box, City, Country

Legal status	State-owned company/private held company/private held company with limited liability/family owned company/limited company/limited liability company/limited partnership/other (*mention what is applicable*)
Main activities	*Not more than five lines*
Type of the project (List all project sponsors)	
Greenhouse gases targeted	$CO_2/CH_4/N_2O$/HFCs/PFCs/SF_6
Type of activities	Abatement
Field of the activities	
a. Energy supply	Renewable energy, excluding biomass/ biomass/cogeneration/improving energy efficiency by replacing existing equipment/ minimization of transport and distribution/ fuel switch (e.g., switch coal to biomass) (*mention what is applicable*)
b. Energy demand	Replacing of existing household equipment/ improvement of energy efficiency of existing production equipment (*mention what is applicable*)
c. Transport	More efficient engines for transport/modal shift/fuel switch (e.g., public transport buses fuelled by natural gas) (*mention what is applicable*)
d. Waste management	Capture of landfill methane emissions/ utilization of waste and wastewater emissions (*mention what is applicable*)
Capability in implementing the project	A description of the knowledge and experience of the Project Developer and/or Project Sponsors in building and operating similar projects (*Not more than one page*)
Location of the project	
Region	
Country	
City	
Description of the location of the plant	*Not more than 5–10 lines*

Sector background	
General structure and organization	Example: In case of an energy project a description of the power generating capacity in the last five or ten years, the electricity production and consumption in the last one or two years and the predicted electricity production and consumption in the next five years. Attention should also be paid to the organizational sector and institutional framework in the region and/or country (*Not more than one page*)
Sector policy/strategy	Example: In case of an energy project a description of the energy policy and future strategy of the government related to the use of renewable energy sources (*Not more than 1/2 page*)
Legal framework	A description of the legal relationship between the Project Developer, Project Sponsor, Project Owner and/or the Owner of the future CERs (*Not more than 1/2 page*)
Barriers and Constraints	A description of financial, institutional, technical and/or commercial barriers and constraints which prevent the Project Developer and/or Project Sponsors to take advance action under the current situation (*Not more than 1/2 page*)
Expected schedule	
Earliest project start date	Month and year in which the plant will be operational
Time required before becoming operational after approval of the PIN by VROM	Time required for financial commitments: xx months Time required for legal matters: xx months Time required for negotiations: xx months Time required for construction: xx months
Expected first year of CER delivery	Year
Project lifetime	Number of years

Current phase and status of the project and next major steps toward Design and Financial Closure of Underlying Project	A description of the phase of the project: Identification and pre-selection phase/ opportunity study finished/pre-feasibility study finished/feasibility study finished/ negotiations phase/contracting phase, etc. (*Not more than 1/4 page*) A description of the status of the project: Availability of an Environmental Impact Assessment/is there an Approval of the Board of the Project Developer and/or Project Sponsors/status of the most important Regulatory Requirements/status of other relevant issues/aspects/ documents, etc. (*Not more than 1/2 page*)
Current status of the acceptance of the Host Country	Letter of Endorsement is under discussion or available/Host Country Agreement is under discussion or signed (*Mention what is applicable*)
The position of the Host Country to the Kyoto Protocol	The Host Country a. signed, signed and ratified, accepted, approved or acceded to the Kyoto Protocol or b. signed and has demonstrated a clear interest in becoming a party in due time (e.g., countries which have already started or are on the verge of starting the national ratification, acceptance or approval process) or c. has already started or is on the verge of starting the national accession process (*mention what is applicable*)

B. Finance

Total project costs estimate	
Development costs	xx million $US and a brief clarification
Installed costs	xx million $US and a brief clarification
Other costs	xx million $US and a brief clarification
Total project costs	xx million $US and a brief clarification

Sources of finance identified	
Equity	Name of the organizations and finance (xx million $US) For the total equity amount a brief clarification (*3–5 lines*)
Debt – Long-term	Name of the organizations and finance (xx million $US) For the total Debt – long-term a brief clarification (*3–5 lines*)
Debt – Short term	Name of the organizations and finance (xx million $US) For the total Debt – Short-term a brief clarification (*3–5 lines*)
Not identified	xx million $US and a brief clarification (*3–5 lines*)
CDM contribution sought	xx million $US and a brief clarification (*3–5 lines*)
CDM contribution in advance payments	xx million $US and a brief clarification (*5–10 lines*)
Status and estimating timing of financial closure	Month and year
Expected Price of the CER in case of	
A period until 2012 (end of the first budget period)	xx $US
A period of 10 years	xx $US
A period of 7 years	xx $US
A period of 14 years (2 * 7 years)	xx $US

C. Technical summary of the project

Technical description of the project	*About 1/2 page*
Technology to be employed	*About 1/2 page*
Description of the technology	*About 1/2 page*

D. Expected environmental benefits

Estimate of Greenhouse Gases abated/CO_2 Sequestered (in tonnes of CO_2-equivalents)	Annual: Up to and including 2012: xx tCO_2-equivalents Up to a period of 10 years: xx tCO_2-equivalents Up to a period of 7 years: xx tCO_2-equivalents Up to a period of 14 years: xx tCO_2-equivalents
Baseline scenario	• Is the project a Small scale or a Regular CDM project and why? • What will be the possible lifetime of the baseline? • Which sources and sinks will be taken into account for the baseline and which will not? • What are the current circumstances (including historical emissions data) and policies? • What baseline methodology will be chosen and why? • What are the uncertainties associated with the estimate emission reduction? • What are the key variables potentially effecting future credibility of the baseline? (*About two–four pages*)
Specific global & local environmental benefits	(*In total about 1/2 page*)
Which guidelines will be applied?	Name and, if possible, the web site location
Local benefits	Mention the benefits with an explanation
Global benefits	Mention the benefits with an explanation
Stage of the Environmental review	What is at this moment available (preliminary work has been undertaken, a complete review, a global review, etc.)?
Social and economic aspects	
What social and economic effects can be attributed to the project and which would not have occurred in a comparable situation without that project?	(*In total about 1/2 page*)

Which guidelines will be applied?	Name and, if possible, the web site location
What are the possible direct effects (e.g., employment creation, capital required, foreign exchange effects)?	Mention the benefits with an explanation
What are the possible other effects. For example: • training/education associated with the introduction of new processes, technologies and products and/or • the effects of a project on other industries	Mention the benefits with an explanation
Stage of the Socio-economic review	What is at this moment available (preliminary work has been undertaken, a complete review, a global review, etc.)?
Environmental strategy/priorities of the Host Country	A description of the relationship with the local institutional structure, as well as with that of the region and/or country (*About 1/2 page*)
The process of stakeholders involvement	A brief description of the process, a summary of the comments received and a report on how due account was taken of any comments received (*About1/2 page*)

E. Risk, uncertainty and sensitivity

Risk/uncertainty and sensitivity	
The risk/uncertainty analysis	Mention the major risks and uncertainties with an explanation (*About one page*)
Risk and uncertainty mitigation measures	Mention the risk and uncertainty mitigation measures with an explanation (*About 1/2–one page*)

Appendix IV

Project Design Document

The Project Design Document is an official CDM requirement according to the Marrakech Accords. Annex B to Decision 17/CP.7 lists the components which must be included in the PDD. The following is one format which was originally developed by the Prototype Carbon Fund of the World Bank and then adopted and adapted by other CDM participants such as the government of the Netherlands and the Corporación Andina de Fomento. If, and when, the executive board of the CDM issues an official format for the PDD, all projects will have to use that official version. Until such time, each NA can develop the format which is most useful, as long as the format satisfies all the requirements of Annex B.

Project Design Document for [Project Name]

(The PDD is a detailed, well substantiated document. Together with the PDD, the project sponsor shall provide the additional documents listed at the end of this form.)

Date submitted: _____

1. Project Summary

Project objectives	Describe GHG-reduction [list greenhouse gas(es) targeted] and summarize sustainable development objectives of the project.
Project location	Describe the location
Type of project	e.g., (CO_2 abatement: Fuel switching, renewable energy, etc.)
Project baseline	Selecting a baseline methodology for a project activity requires the choice among existing actual or historical emissions, emissions from a technology that represents an economically attractive course of action or the average emissions of similar project activities. List the baseline methodology.

Crediting period	Project participants can select a crediting period for a proposed project activity from one of the following alternative approaches: a) A maximum of seven years which may be renewed at most two times, provided that, for each renewal, a designated operational entity determines and informs the executive board that the original project baseline is still valid or has been updated taking account of new data where applicable or b) A maximum of ten years with no option of renewal.
Estimated CO_2 reduction	Provide the estimated emission reductions (ERs) for the [ ] years crediting period.
Sources of ERs	Disaggregate the source of emissions reduction from the project.
Sustainable development impact	The project contributes to sustainable development in [ ] through, e.g., • use of local renewable energy resources. • increased commercial activity through clean and renewable source of power. • Generation of employment.
Project financing	Estimate of total project cost.
Project revenues (including sale of CO_2 reductions)	• Revenues from the sale of electricity: • Sale of CO_2 emission reductions (ERs)
Host country approval	The project [was endorsed/received no objection] by the [ ] which is the National Authority for the CDM. [ ] is a Non-Annex I Party of the UNFCCC. [ ] has signed the Kyoto Protocol on [ ] and [is preparing to ratify/has ratified] the Kyoto Protocol.
Project start	Indicate the date of commissioning of the project. If an alternative date is chosen as the start date, provide a brief description (less than five lines) for the choice of the alternate start date.

2. Project Partners and Support

Project sponsor	Contact Person: Phone/Fax: E-mail:

Project Operator	Contact Person: Phone/Fax: E-mail:
Project planning and assistance	

3. Project and Sector Background

Description of sector policy in country. Other important features of the sector should be summarized in the Baseline Study.

4. Project Description

Description of the project activities:	
Location and cost of project:	
Technology to be employed:	
Brief description of technology:	

5. Project Baseline and Environmental Additionality

The baseline for a CDM project activity is the scenario that reasonably represents the anthropogenic emissions by sources of greenhouse gases that would occur in the absence of the proposed project activity. See paragraphs 44 to 48 of document FCCC/CP/2001/L.24/Add.2 for more details. In choosing a baseline methodology for project activity, the Marrakech Accord (document FCCC/CP/2001/L.24.Add2) requires the choice among the following approaches: 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 per cent of their category.

A description of how *ex ante* estimates of potential emission reduction from the project will be estimated should also be provided. The main features of the analysis should be summarized in the table below but the baseline study should address all the elements in detail.

Issue Area	**Explanation**
Project baseline	Summarize the project baseline scenario from the list of plausible scenarios to be described below.
Baseline methodology	In addition to describing the baseline, justify the choice in methodology, including an assessment of strengths and weaknesses of the methodology.

Plausible scenarios	Describe the plausible scenarios for meeting the same level of service equivalence as for the baseline scenario.
Baseline drivers	Describe the main factors describing the baseline scenarios and its evolution in time.
Geographical boundary	Describe the geographical boundaries for the project and the baseline.
System boundary	Describe the project boundaries.
Time boundary	The development of the baseline scenario over time is monitored by Monitoring Plan indicators.
Leakage	Leakage is defined as the net change of anthropogenic emissions by sources of greenhouse gases which occurs outside the project boundary and which is measurable and attributable to the CDM project activity. Describe for the project.
GHG coverage	Indicate the greenhouse gas(es) covered in the project.
Environmental additionality	Consistent with Article 12, paragraph 5(c), of the Kyoto Protocol and with paragraph 43 of FCCC/CP/2001/L.24/Add.2, 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, e.g., if the emissions from the baseline scenario exceed the project scenario.
ODA and environmental additionality	Public funding for Clean Development Mechanism projects from Parties in Annex I is not to result in the diversion of official development assistance and needs to be separate from, and not counted towards, the financial obligations of Parties included in Annex I. Please provide description of any ODA in the project financing.
Funding (ODA) additionality	If ODA is used in the project, please provide any information available which would indicate that there is no diversion of ODA as a result of the CDM activity.

6. Monitoring Plan

Instructions for monitoring, ER calculation and verification should be included in the Monitoring Plan (MP), which forms part of the design documents. The main features should be summarized in the following Tables.

Issue Area	Explanation
Monitoring	Monitoring plan for collecting and archiving all relevant data necessary for estimating or measuring anthropogenic emissions by sources of greenhouse gases occurring within the project boundary during the crediting period is required for all projects. See paragraphs 53 to 60 of FCCC/CP/2001/L.24/Add.2 for more details. Please summarize the monitoring plan features.
Calculation of ERs	*Concept:* Briefly describe the monitoring plan based on the baseline method. *Method:* Indicate how the data collected through the implementation of the monitoring plan will be used to calculate the emission reduction from the project which will be verified [for example, Excel spreadsheet model].
Data needs	Describe the data to be collected for fulfilling the monitoring plan and for calculating the ERs.
Conservative ER estimates	Guidelines on establishment of the baseline require the estimates to be made in a conservative manner regarding the choice of approaches, assumptions, methodologies, parameters, data sources and key factors taking into account uncertainty. See paragraph 43(b) of FCCC/CP/2001/L.24/Add.2 for more details. Justify that conservative estimates based on conservative parameters, growth rates, data selection and methodology, etc., have been made to indicate that ERs have been systematically underestimated to offset potential of overestimation.

Verification	Verification is the periodic independent review and *ex post* determination by the designated operational entity of the monitored reductions in anthropogenic emissions by sources of greenhouse gases that have occurred as a result of a registered CDM project activity during the verification period. See paragraphs 61 to 63 of FCCC/CP/2001/L.24/Add.2 for more details. Describe how verification will take place in the project.
Baseline, MP revision	Indicate if the baseline is expected to be revised, particularly if it is expected to evolve in time and if it is to be monitored in time. Point out if any revisions in the monitoring plan is expected. See paragraph 57 and 58 of CCCC/CP/2001/L.24/ Add.2.
Sustainable Development	The purpose of the Clean Development Mechanism is to assist Parties not included in Annex I to the Convention in achieving sustainable development and to assist Parties included in Annex I in achieving compliance with their quantified emission limitation and reduction commitments. Indicate if the monitoring plan intends to make any measurements with regards to defined target indicators for environmental and socio-economic performance.

7. Emission Reduction Projections

This section provides a format for the description of the method (including formula) used to calculate and estimate emissions by sources of greenhouse gases of the CDM project activity within the project boundary for different period of interest. The description should include consideration of the project leakage, if any. The estimates of emission reduction should be summarized in the format indicated in the table below.

Period	**Estimated emission reduction (TOC2e)**
Total [for 10 or (7 X 3 = 21)]-year crediting period	

8. Local Environmental and Socio-Economic Benefits

Each project required a confirmation by the designated national authority of host Party that the project activity assists it in achieving sustainable development. It is expected that the process of affirming the sustainable development criteria would also include confirmation of all national criteria for the host country.

Issue Area	Explanation
Local environmental benefits	Please list any local environmental benefits identified for the project. Indicate if any measurements are proposed in the monitoring plan.
Socio-economic benefits	Please list any socio-economic benefits identified for the project. Indicate if any measurements are proposed in the monitoring plan.
Capacity building	Describe components of the project that address capacity building.
Technology transfer	Describe if the project involves technology transfer to the host country.
Host Country criteria	Indicate if any specific host country criteria exist for approval of the project as a CDM activity.
Sustainable Development Criteria	Has specific sustainable development criteria been defined by the country or has this been identified for the project? If specific measurements are recommended in the monitoring plan, please summarize.
Environmental Impact Assessment (EIA)	Para 37(c) of FCCC/CP/2001/L.24/Add.2 requires that every project has undertaken an environmental impact assessment in accordance with procedures as required by the host Party. Please describe the main result of the EIA for the project.

9. Due Diligence and Expected CDM Process Requirements

In anticipation of implementation of the CDM, attempts should be made to meet the requirements and modalities also with regard to a due process as far as possible at this time and without established CDM institutions in host countries and at the UNFCCC level. The following Table contains special process level requirements the project might be expected to meet.

"Issue" Area	Explanation
Project risks	• Normal project-related risks: A summary of the risk assessment that has been conducted to study project risks and mitigation options should be summarized (a full assessment should be available). • Kyoto Protocol-related risks: CDM activities have to be approved by the host country, including its contribution to sustainable development, transfer of emission reduction, ratification of the Protocol within a specified period of it coming into force and being in compliance with the Protocol. The approval should come from the designated national authority in the host party.
Other criteria including standards and guidelines	The project has to meet other specific standards of the bank, in particular the safeguard policies. Other guidelines provided by VROM should also be fulfilled.
Local stakeholder participation	Summarize the local stakeholders consultation as required by law of the host country and any additional stakeholder consultation undertaken for the project to qualify as a CDM activity.
Public comments to validator	The PDD, baseline study and MP should be disclosed during the validation period to invite comments from Parties, stakeholders and NGOs for consideration by the validator.
Validation	The proposed validation process should be summarized here. The CDM eligibility criteria (host country approval, approval by all participants, appointment of the designated national authority in the host country, etc.) for validation should be summarized.

10. Other Project Documents

The following documents have been prepared in the course of the design of the (prospective) CDM project and support the project design as presented above.

- Project Design Document
- Baseline Study
- Monitoring Plan (includes Excel Workbooks for emission reduction calculation)
- Environmental Assessment, Executive Summary
- Host Country Approval

Additional background information, work material, data collections and contact information is available upon request for validation purposes from the organization that assist with the design and implementation of this project.

Appendix V

A Climate Change Glossary

(The terms which are **bolded** within a definition have been defined separately in this Glossary)

A

Accreditation Body

The accreditation body shall accredit independent entities, in accordance with the standards and procedures contained in Appendix A of the **Kyoto Protocol** and relevant decisions by the executive board and the **COP/MOP**.[94]

Activities Implemented Jointly (AIJ)

COP-1 defined a pilot phase for AIJ activities, under which projects can be carried out through partnerships between an investor from a developed country and a counterpart in a host country. However, no credits are granted for AIJ pilot phase activities.[95]

Adaptation

The degree to which adjustments are possible in practices, processes, structures or systems in response to projected or actual changes in climate. Adaptation activities contribute to the mitigation of the effects of **climate change** on terrestrial and aquatic ecosystems, hydrology and water resources management, agriculture and forestry, human infrastructure and human health.[96] Examples of adaptation activities include introducing different crops to compensate for local climate change and protection of coastal areas from sea level rise.

Adaptation can be spontaneous or planned and can be carried out after the fact or in anticipation of changes in climatic conditions. Areas that are particularly vulnerable to the effects of climate change—low lying islands, for example—will need to consider adaptation options as a response to possible future changes. The **Clean Development Mechanism** (CDM) under the **Kyoto Protocol** has a provision for assisting "developing country Parties that are particularly vulnerable to the adverse effects of climate change to meet the costs of adaptation"[97] although the terms of this provision have yet to be decided upon.

Additionality

The Kyoto Protocol establishes the requirement that joint implementation and **Clean Development Mechanism** (CDM) projects may only count emissions reductions that are "additional to what otherwise would have occurred in the absence of the certified project activity"[98] (*environmental additionality*). These reductions must be real and measurable and must be quantified against a proj-

ect baseline against which the additionality of the project can be measured and tested. Central to the discussion of additionality is that of what constitutes a project baseline.

A COP-1 decision on Activities Implemented Jointly under the pilot phase expresses another form of additionality (*financial additionality*). It states that "the financing of activities implemented jointly shall be additional to the financial obligations of Parties included in Annex II of the Convention within the framework of the financial mechanism as well as to current official development assistance (ODA)."[99] Another interpretation of *financial additionality* is the notion that a project is made commercially viable through its ability to generate value in the form of certified emissions reductions. Here again, no internationally agreed upon method for determining additionality is available.

Ad hoc Group on Article 13 (AG13)

A subsidiary body (committee) created by COP-1 to explore how to help governments overcome difficulties they may experience in meeting their commitments to the **UNFCCC**.

Ad hoc Group on the Berlin Mandate (AGBM)

A subsidiary body created by COP-1 to conduct the talks that led to the **Kyoto Protocol**, the AGBM concluded its final meeting on November 30, 1997.[100]

Afforestation

Afforestation is the direct human-induced conversion of land that has not been forested for a period of at least 50 years to forested land through planting, seeding and/or human-induced promotion of natural seed sources.

Annex I Parties

Annex I Parties to the Climate Convention (**UNFCCC**) lists all the countries in the Organization of Economic Cooperation and Development (OECD), plus **Countries With Economies in Transition**, Central and Eastern Europe (excluding the former Yugoslavia and Albania). By default the other countries are referred to as Non-Annex I countries. Under Article 4.2 (a & b) of the Convention, Annex I countries commit themselves specifically to the aim of returning individually or jointly to their 1990 levels by the year 2000.[101] Ratification of the Kyoto Protocol would mean their acceptance of emission targets for the period 2008–2012 as per Article 3 and Annex B of the Protocol.[102]

Annex II Parties

The countries listed in Annex II to the UN Framework Convention on Climate Change have a special obligation to help developing countries with financial and technological resources. They include the 24 original **OECD** members plus the **European Union**.[103]

Annex A

Annex A of the **Kyoto Protocol** lists the **Greenhouse Gases** (GHGs) regulated by the Protocol as well as sector/source categories. The gases are carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride. The base year for calculating emission reduction commitments is 1990 for the first three gases and 1995 for the other three.

Annex B

Since the **Kyoto Protocol** is a separate legal instrument and must be ratified separately, a new list of countries taking on legally binding commitments along with a listing of their actual commitments was created. Annex B consists of all of those countries listed in Annex I of the FCCC with the exception of Turkey and Czechoslovakia. New countries added to Annex B include Croatia, Czech Republic, Liechtenstein, Monaco, Slovakia and Slovenia.[104] Annex B lists the **Quantified Emission Limitation and Reduction Commitment** (**QELRC**) for each country.

Anthropogenic

Derived from human activities.[105]

Article 4.1 (UNFCCC)

This Convention article contains general commitments for all Parties—developing and developed[106]—taking into account their common but differentiated responsibilities and specific national and regional priorities, objectives and circumstances.[107]

Article 4.2 (UNFCCC)

This Convention article contains specific commitments for developed country (**Annex I**) Parties only, notably to take measures aimed at returning **Greenhouse Gas** emissions to 1990 levels by the year 2000.[108]

Assigned Amounts

According to Article 3.7 in the **Kyoto Protocol**, from 2008-2012, the assigned amount for each party included in Annex I shall be equal to the percentage inscribed for it in Annex B of its aggregate anthropogenic carbon dioxide equivalent emissions of the greenhouses gases listed in Annex A in 1990 or the base year or period determined in paragraph 3.5, multiplied by five.[109] According to Articles 3.10, 3.11 and 3.12, parts of assigned amounts may be transferred from one Party to another via international **Joint Implementation** under Article 6 and emissions trading between Annex I countries under Article 17 and certified emissions reductions acquired via the **Clean Development Mechanism** (CDM) under Article 12 may by added to that Party's assigned amount.[110]

Assigned Amount Unit (AAU)

The assigned amount unit is the measurement used for the assigned amount previously defined (see **assigned amount**). This unit is equal to a tonne of carbon dioxide equivalent, calculated using global warming potentials.[111]

Atmosphere

The atmosphere is a gas layer surrounding the Earth. The Earth's atmosphere is composed of about 79.1 per cent nitrogen (by volume), 20.9 per cent oxygen, 0.036 per cent carbon dioxide and trace amounts of other gases. According to chemical characteristics largely determined by thermal properties (temperature), the atmosphere has sub-layers. The troposphere is the layer from the Earth's surface up to 17 kilometres above the equator. The stratosphere lies above the troposphere and extends to 50 km. The mesosphere, which extends up to 80-90 km, lies over the stratosphere. And finally the thermosphere, or ionosphere, gradually diminishes, forming a fuzzy border with outer space. There is relatively little mixing of gases between layers.[112]

Avoidance

The avoidance of **Greenhouse Gas** emissions resulting from the substitution of a high emitting source with a lower or non-emitting source or through improvements in energy efficiency.[113]

B

Banking

Banking of emissions, which refers to the saving of emissions credits for future consumption or trading, can take three forms: 1) holding reductions within a commitment period 2) applying reductions earned from one period to another or 3) applying reductions earned before the first compliance period via the Clean Development Mechanism.

Articles 3.13 and 12.10 of the Kyoto Protocol refer to banking. Article 3.13 states that "If the emissions of a Party included in Annex I in a commitment period are less than its assigned amounts, the difference shall, upon the request of that Party, be added to the assigned amount for that Party for the subsequent commitment period."[114] This, in effect, allows a Party which over complies with its emission reduction commitments the choice whether to trade its excess reductions or "bank" them as a hedge against future difficulties in meeting them.

Article 12.10 states that **Certified Emissions Reductions (CERs)** (under the Clean Development Mechanism) obtained during the period from 2000 up to the beginning of the first commitment period (2008) can be used to assist in achieving compliance in the first commitment period.[115]

Base year

According to the IPCC, the Base Year is the year when a national inventory is to be taken, which is currently 1990 for Annex I countries. In some cases (such as estimating **Methane** from rice production), the base year is simply the middle of a three-year period over which an average must be taken.[116] A base year may also be used as a reference for establishing an emissions baseline. Under the Kyoto Protocol, the base year for hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride is 1995.[117]

Baseline

Standard by which to measure verifiable changes in carbon stocks for the purpose of determining net changes of **Greenhouse Gas** emissions from **anthropogenic** activities. The scenario that reasonably represents the anthropogenic emissions by sources, of greenhouse gases, that would occur in the absence of project activities.[118]

Berlin Mandate

The Second Assessment Report of the IPCC warned that even if developed countries were to comply with the emission reductions stipulated by the **UNFCCC**, those would not be enough to stabilize the atmosphere. Further reductions were necessary. The Berlin Mandate calls for a legally binding instrument, which would obligate developed countries to reductions below the 1990 level. This effort led to the adoption of the **Kyoto Protocol** in 1997.[119]

Biomass

The total dry organic matter or stored energy content of living organisms. Biomass can be used for fuel directly by burning it (e.g., wood), indirectly by fermentation to an alcohol (e.g., sugar) or by extraction of combustible oils (e.g., soybeans).[120]

Borrowing

Within the context of a **Greenhouse Gas** emissions trading regime, borrowing refers to using future emissions reductions from future commitment periods in order to meet current emissions targets.[121]

Bubble

The generic concept of a "bubble" refers to the idea that emissions reductions anywhere within a specific area count towards a common reduction goal, as if a giant bubble were placed over the various sources to contain them in a common area. Under the Kyoto Protocol, the European Union acts as a bubble in the compliance of its emission reductions.

Bureau

The bureau was responsible for directing the work of the **Conference of the Parties** (COP). Its 10 members are delegates elected by each of the five regional groups and they include the COP President, six Vice-presidents, the Chairs of **SBI** and **SBSTA** and a reporter. In addition, each subsidiary body also has its own Bureau.[122]

C

Capacity Building

Increasing skilled personnel and technical and institutional capacity.[123]

Carbon

Chemical Element. Animals and plants are carbon-based.

Carbon-based resources

The recoverable fossil fuel reserves (coal, crude oil, oil shale, tar sands, natural gas) that can be used for energy production/consumption.[124]

Carbon Cycle

The natural processes that influence the exchange of carbon (in the form of carbon dioxide, carbonates and organic compounds, etc.) among the atmosphere, ocean and terrestrial systems. Major components include photosynthesis, respiration and decay between atmospheric and terrestrial systems (approximately 100 gigatonnes/year) as well as thermodynamic invasion and evasion between the ocean and atmosphere, operation of the carbon pump and mixing in the deep ocean (approximately 90 gigatonnes/year). Deforestation and fossil fuel burning releases approximately 7Gt into the atmosphere annually. The total carbon in the reservoirs is approximately 2,000 Gt in land biota, soil and detritus, 750 Gt in the atmosphere and 38,000 Gt in the oceans.[125]

Carbon Dioxide (CO_2)

CO_2 is a naturally occurring gas. It is also a byproduct of burning fossil fuels and biomass as well as land use changes and other industrial processes. CO_2 is the principal anthropogenic GHG that affects the Earth's temperature. It is the reference gas against which other GHGs are measured and therefore has a **Global Warming Potential** (GWP) of 1.[126]

Carbon Sequestration

The long-term storage of carbon **CO_2** in the forests, soils, ocean or underground in depleted oil and gas reservoirs, coal seams and saline aquifers. Examples include the separation and disposal of CO_2 fuel gases or processing fossil fuels to produce H_2 and CO_2 rich fractions as well as the direct removal of CO_2 from the atmosphere through land use change, afforestation, reforestation, ocean fertilization and agricultural practices to enhance soil carbon.[127]

Carbon Sinks

Natural or anthropogenic systems that absorb **carbon dioxide** (CO_2) from the atmosphere and store them. Trees, plants and the oceans all absorb CO_2 and, therefore, are carbon sinks.[128]

Carbon Source

A pool (reservoir) that gives up carbon to another reservoir within the **Carbon Cycle**. For example, if the net exchange between the Biosphere and the **Atmosphere** is toward the ocean, then the atmosphere is the source.[129] Common human sources include fossil fuel combustion, solid waste decomposition, land use change and transport.

Carbon Stocks

Carbon stocks include carbon stored in vegetation (above and below ground), decomposing matter, soils, wood products and the carbon substituted by burning wood for energy instead of fossil fuels.[130]

Certification

The process by which an independent accredited body (operational entity) gives written assurance of the emission reductions achieved by a project during a specified time period as verified (and under the conditions) necessary for recognition by the Parties.[131]

Certified Emission Reductions (CERs)

A unit of **Greenhouse Gas** reductions that has been generated and certified under the provisions of Article 12 of the **Kyoto Protocol**, in reference to the **Clean Development Mechanism** (CDM). This unit is equal to one metric tonne of carbon dioxide equivalent, calculated using global warming potentials.[132]

Certified Tradable Offset (CTO)

A financial instrument that can be used to transfer or sell **Greenhouse Gas** offsets in the international marketplace. A Certified Tradable Offset (CTO) represents a specific number of units of greenhouse gas emission expressed in carbon equivalent units reduced or sequestered. The home country verification process certifies that the offsets are of high enough quality to allow them to count against national and company level greenhouse gas reduction commitments, if such crediting is eventually permitted under the **UNFCCC**.[133] CTOs were created by Costa Rica in 1996.

Chlorofluorocarbons (CFCs) and Related Compounds

This family of **anthropogenic** compounds includes chlorofluorocarbons (CFCs), bromofluorocarbons (halons), methyl chloroform, carbon tetrachloride, methyl bromide and hydrochlorofluorocarbons (HCFCs). These com-

pounds have been shown to deplete stratospheric ozone and, therefore, are typically referred to as ozone depleting substances. The most ozone depleting of these compounds are being phased out under the Montreal Protocol.[134]

Clean Development Mechanism (CDM)

The mechanism defined in Article 12 of the Kyoto Protocol that provides *inter alia* for the transfer of **Certified Emission Reductions** from Non-Annex I countries to Annex I countries. The purpose of the CDM shall be to assist Parties not included in Annex I in achieving sustainable development, in contributing to the ultimate objective of the Convention and to assist Parties included in Annex I in achieving compliance with their quantified emission limitation and reduction commitments under Article 3.[135]

Climate Change

A change in climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability over comparable time periods.[136]

Climate Model

Large and complex computer program used to mathematically simulate global climate. These models are based on mathematical equations derived from our knowledge of the physics that governs the Earth atmosphere system.[137]

Cogeneration

The use of waste heat from electric generation, such as exhaust from gas turbines, for either industrial purposes or district heating.[138]

Commitment Period

The commitment period, sometimes referred to as the "compliance period" or the "budget period," is the timeframe given to Parties to the **Kyoto Protocol** to meet their **Quantified Emission Limitation and Reduction Commitments (QELRCs)** established in Annex B. Under the Protocol the first commitment period is 2008–2012, during which the **assigned amount** (of emissions) for each Party (on average, 5 per cent below 1990 emission levels) included in **Annex I** must be equal to or lower than the percentage listed for it in Annex B multiplied by five.[139]

Conference of the Parties (COP)

The COP is the supreme body of the Convention. It currently meets once a year to review the Convention's progress. The word "conference" is not used here in the sense of "meeting" but rather of "association" the Parties.[140]

COP Sessions

The sessions of the **Conference of the Parties**. The first session (COP-1) was held in Berlin from March 28 to April 7, 1995, the second (COP-2) in Geneva

from July 8–19, 1996, the third (COP-3) in Kyoto from December 1–11, 1997, the fourth (COP-4) in Buenos Aires from November 2–13, 1998, the fifth (COP-5) in Bonn from October 25 to November 5, 1999, the sixth (COP-6) in The Hague from November 13–24, 2000 and the seventh (COP-7) in Marrakech from October 29 to November 9, 2001.[141] COP-8 is scheduled to be held in New Delhi from October 23 to November 1, 2002.

COP/MOP

The Conference of the Parties to the **UNFCCC** serving as the meeting of the Parties to the **Kyoto Protocol**. The COP/MOP cannot be held until the Kyoto Protocol goes into force.

Countries with Economies in Transition (EIT)

Those Central and East European countries and former republics of the Soviet Union that are in transition to a market economy.[142]

Credit

Originally defined as a "quantifiable and verifiable recognition of the reduction, avoidance or sequestration of carbon dioxide or other greenhouse gases as a result of carbon offset project,"[143] the word "credit" was discontinued in the official language of the climate negotiations after COP-3 in favour of **Emissions Reduction Units (ERUs)** and **Certified Emissions Reductions (CERs)**. "Credit" was a difficult term because its numerous meanings and connotations, which made negotiations on issues involving GHG credits confusing.

D

Deforestation

The removal of forest stands by cutting and burning to provide land for agricultural purposes, residential or industrial building sites, roads, etc., or by harvesting the trees for building material or fuel.[144]

Designated Operational Entity

An entity accredited by the **executive board** and subsequently designated by the **COP/MOP** pursuant to the Annex to Decision 17/CP.7 of the **Marrakech Accords**, *inter alia* to validate proposed **CDM** project activities and to verify and certify GHG reductions.

Discounting

A method used by economists to determine the dollar value today of a project's future costs and benefits. This is done by weighing money values that occur in the future by a value less than 1 or discounting them. Because environmental decision-makers are increasingly forced to evaluate policies with costs and benefits that will be spread over tens—perhaps hundreds—of years, discounting is

used to help evaluate the value of measures that deal with problems such as stratospheric ozone depletion and global climate change.[145]

Double Dividend

The notion that environmental taxes can both reduce pollution (the first dividend) and reduce the overall economic costs associated with the tax system by using the revenue generated to displace other more distortionary taxes that slow economic grow at the same time (the second dividend).[146]

E

Economies in Transition

See **Countries with Economies in Transition**

Emissions

The release of GHGs and/or their precursors (pollutants) into the atmosphere over a specified area and period of time. Emissions can also be released into waterways (streams, oceans, etc.).[147]

Emissions Budgets

See **Assigned Amounts**

Emission Permit

A non-transferable, non-tradable allocation of entitlement by a government to an individual firm to emit a specified amount of a substance.[148]

Emission Quota

The portion or share of total allowable emissions assigned to a country or group of countries within a framework of maximum total emissions and mandatory allocations of resources or assessments.[149]

Emission Reductions Purchase Agreement (ERPA)

A legal contract commonly used as the basis of sale of emissions reductions. It is usually signed by the respective seller(s) and the buyer(s), and establishes the volume, price and conditions of the CERs.

Emission Reduction Units (ERUs)

Emissions reduction units (ERUs) are units of **Greenhouse Gas** reductions (or portion of a country's **Assigned Amount**) that have been generated via **Joint Implementation** under Article 6 of the Kyoto Protocol. This unit is equal to a tonne of carbon dioxide equivalent, calculated using **Global Warming Potential**.[150]

Emission Standard

A level of emissions that, under law, cannot be exceeded.[151]

Emissions Trading

The **Kyoto Protocol**, in Article 17, establishes a mechanism whereby (Annex I) Parties with emissions commitments may trade their emission allowances with other (Annex I) Parties. The aim is to improve the overall flexibility and economic efficiency of making emissions cuts.[152]

Environmental Integrity Group

UNFCCC negotiating block composed of Switzerland, South Korea and Mexico.

European Union (EU)

As a regional economic integration organization, the European Union can be, and is, a Party to the Convention, however, it does not have a separate vote from its members. The EU can also be a Party to the Protocol. Because it signed the Convention when it was known as the EEC, it retains this name for all formal Convention-related purposes. Its members are Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Sweden and the United Kingdom.[153]

Executive Board

The executive board of the **CDM** is established in Article 12 of the **Kyoto Protocol**, with the purpose of supervising the CDM and overseeing the operational entities. The executive board is comprised of 10 members, each a Party to the Kyoto Protocol, as follows: one member from each of the five United Nations regional groups, two other members from the Parties included in Annex I, two other members from the Parties not included in Annex I and one representative of the small island developing States, taking into account the current practice in the Bureau of the Conference of the Parties.[154] Members are nominated by their respective geographic constituencies, have appropriate technical and policy expertise, and have no participation in any aspect of a CDM project activity in order to avoid conflict of interest. The first members of the Board were elected at COP-7 in Marrakech, November 2001.

F

Financial Mechanism

As defined by the Convention, its role is to transfer funds and technologies to developing countries on a grant or consessional basis, under the guidance of the COP. The Global Environment Facility is operating the mechanism on an interim basis.[155]

Flexibility Mechanisms

Refers to the three cooperative implementation mechanisms under the Kyoto Protocol (**Joint Implementation**, international **Emissions Trading** and **Clean**

Development Mechanism) including the notion of differentiated commitments.

Fluorocarbons

Carbon-fluorine compounds that often contain other elements such as hydrogen, chlorine or bromine. Common fluorocarbons include chlorofluorocarbons and related compounds (ozone depleting substances), hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs).[156]

Forest

Ecological systems with a minimum of 10 per cent crown coverage of trees and/or bamboos, generally associated with wild flora, fauna and natural soil conditions, and not subject to agricultural practices.[157]

Fossil Fuels

Carbon-based fuels, including coal, oil and natural gas and their derived fuels such as gasoline, synthesis gas from coal, etc.[158] Combustion of fossil fuels not only results in the liberation of carbon dioxide into the atmosphere but its byproducts (unburned hydrocarbons and carbon monoxide) can oxidize to carbon dioxide.

Fugitive Emissions

Fugitive emissions are intentional or unintentional releases of gases from **anthropogenic** activities such as the processing, transmission or transportation of gas or petroleum. In particular, they may arise from the production, processing, transmission, storage and use of fuels, and include emissions from combustion only where it does not support a productive activity (e.g., flaring of natural gases at oil and gas production facilities).[159]

Fungibility

The interchangeability of the emission reduction credits among the mechanisms.[160]

G

General Circulation Model (GCM)

A global, three-dimensional computer model of the climate system, which can be used to simulate human-induced climate change. GCMs are highly complex and represent the effects of such factors as reflective and absorptive properties of atmospheric water vapour, **greenhouse gas** concentrations, clouds, annual and daily solar heating, ocean temperatures and ice boundaries. The most recent GCMs include global representations of the atmosphere, oceans and land surface.[161]

Global Environmental Facility (GEF)

The multi-billion-dollar GEF was established by the World Bank, the UN Development Programme and the UN Environment Programme in 1990. It operates the Convention's **financial mechanism** on an interim basis and funds developing country projects that have global climate change benefits.[162]

Global Warming

An increase in the near surface temperature of the Earth. Global warming has occurred in the distant past as the result of natural influences, but the term is most often used to refer to the warming predicted to occur as a result of increased emissions of **greenhouse gases**.[163]

Global Warming Potential (GWP)

Index that allows for equal comparison of the various greenhouse gases. It is the radiative forcing that results from the addition of one kilogram of a gas to the atmosphere compared to equal mass of carbon dioxide. Over 100 years, methane has a GWP of 21 and nitrous oxide of 310.

Greenhouse Effect

The effect produced as greenhouse gases allow incoming solar radiation to pass through the Earth's atmosphere, but prevent most of the outgoing longwave infrared radiation from the surface and lower atmosphere from escaping into outer space.[164] This envelope of heat-trapping gases keeps the Earth about 30°C warmer than if these gases did not exist.[165]

Greenhouse Gases (GHGs)

Any gases that absorb and re-emit infrared radiation into the atmosphere.[166]

GHG Reduction Potential

Possible reductions in emissions of **GHGs** (quantified in terms of absolute reductions of in percentages of baseline emissions) that could be achieved through the use of technologies and measures.[167]

Group of 77 and China

The G-77 negotiating block was founded in 1967 under the auspices of the United Nations Conference for Trade and Development (UNCTAD). It seeks to harmonize the negotiating positions of its 133 developing country members.[168] It is the largest negotiating block in the **UNFCCC**.

H

Host country

The Non-Annex I country where the reduction, avoidance or sequestration of greenhouse gas takes place.

"Hot Air"

Term developed by the NGO community to describe the difference in emissions reductions according to the established base year agreed to under the **Kyoto Protocol** and actual emissions reductions as a result of reasons unrelated to climate mitigation, such as changes in the economies of Russia and other economies in transition. Since the **base year** of 1990, political and economic circumstances such as the reunification of Germany and the dissolution of the Soviet Union have resulted in emission trajectories in some countries that put expected emissions well below their **assigned amounts** under Annex B.

For example, since 1990, former Eastern Bloc countries have upgraded their energy generation and industrial processes significantly, resulting in much lower emission levels. In the case of Germany, this excess has been counted within the EU "**bubble**." Russia and other former Soviet republics, however, will have excess emission reductions without taking any domestic action and will be able to meet targets without making investments in new emissions reductions. Without a trading scenario in place, this would not be an issue, but under a trading regime, the country owning these excess reductions or "hot air," could sell them to countries not complying with their reduction targets.

Infrared Radiation

The heat energy that is emitted from all solids, liquids and gases. In the context of the greenhouse issue, the term refers to the heat energy emitted by the Earth's surface and its atmosphere. **Greenhouse Gases** strongly absorb this radiation in the Earth's atmosphere and reradiate some back towards the surface, creating the **greenhouse effect**.[169]

Intergovernmental Negotiating Committee (INC)

INC is the international body that prepared the draft text of the **UNFCCC**. The INC met during five sessions between February 1991 and May 1992 to draft the Convention and met six more times to prepare for COP-1 before completing its work in February 1995.[170]

Intergovernmental Panel on Climate Change (IPCC)

The World Meteorological Organization (WMO) and the UN Environment Program (UNEP) established the IPCC in 1988. It conducts rigorous surveys of worldwide technical and scientific literature and publishes assessment reports that are widely recognized as the most credible existing sources on climate change. The IPCC also works on methodologies and responds to specific requests from the Convention's subsidiary bodies.[171]

International emissions trading

See **Emissions Trading**

Inventory

Typically, a national inventory is the registry of sources and sinks of greenhouse gases in a particular country. The **UNFCCC** calls for all Parties to commit to "develop, update periodically, publish and make available to the Conference of the Parties (COP) their national inventories of **anthropogenic** emissions by sources and removals by sinks of all **Greenhouse Gases** not controlled by the Montreal Protocol" and to "use comparable methodologies for inventories of GHG emissions and removals."[172]

Issuance of CERs

The forwarding of CERs by the **CDM** Registry Administrator to the relevant registry account.[173]

J

Joint Implementation (JI)

Under Article 6 the **Kyoto Protocol** establishes a mechanism whereby a developed country can receive **emissions reductions units** when it helps finance projects that reduce net emissions in another developed country (including countries with economies in transition).[174]

JUSSCANNZ

The non-**EU** industrialized countries meet as a group to discuss various issues. They are Japan, the United States, Switzerland, Canada, Australia, Norway and New Zealand, Iceland, Mexico and the Republic of Korea may also attend meetings.[175]

K

Kyoto Mechanisms

Economic mechanisms based on market principles that Parties to the **Kyoto Protocol** can use in an attempt to lessen the potential economic impacts of GHG emission reduction requirements. They include **Joint Implementation** (Article 6), the **Clean Development Mechanism** (Article 12) and **Emissions Trading** (Article 17).[176]

Kyoto Protocol

The Protocol to the **UNFCCC** drafted as a result of the **Berlin Mandate** process. Upon entry into force, it would obligate countries listed in its Annex B (developed nations) to meet differentiated reduction targets for their **GHG** emissions relative to 1990 levels by 2008–2012. All Parties to the Climate Convention in Kyoto, Japan, adopted it on December 11, 1997.[177] In order to enter into force, 55 countries, whose total emissions represent 55 per cent of the emissions of the Annex I countries in the year 1990, must ratify it.

L

Leakage

Leakage is the indirect effect of emission reduction policies or activities that lead to a rise in emissions elsewhere (e.g., fossil fuel substitution leads to a decline in fuel prices and a rise in fuel use elsewhere). For land use change and forestry activities, leakage can be defined as the unexpected loss of estimated net carbon sequestered. Specific to **CDM/AIJ/JI** projects in both forestry and energy sectors, leakage can be a result of unexpected effects including unforeseen circumstances, improperly defined baseline, improperly defined project lifetime or project boundaries and inappropriate project design.[178]

M

Marrakech Accords

The agreement emanating from COP-7 held in Marrakech, Morocco from October 29 to November 9, 2001. Delegations from over 170 countries came to final agreement on the package of decisions which elaborate a finely drawn structure for the implementation of the **Kyoto Protocol**. The resulting Marrakech Accords completed the 1998 Buenos Aires Plan of Action and paved the way for ratification of the Protocol.

Market Barriers

In the context of climate change, this refers to conditions (such as policy and legal frameworks) that impede the diffusion of cost effective technologies or practices that could mitigate GHG emissions.[179]

Market-based Incentives

In the context of climate change, this refers to measures (such as subsidies, taxes, emissions trading) intended to directly change relative prices of climate-friendly technologies in order to overcome market barriers.[180]

Market Potential

The portion of the economic potential for **GHG** emission reduction or energy efficiency improvements that could be achieved under existing market conditions, assuming no new polices and measures.[181]

Methane (CH_4)

One of the six **GHGs** to be mitigated under the **Kyoto Protocol**, it has a relatively short atmospheric lifetime (10±2 years). Primary sources of methane are landfills, coal mines, paddy fields, natural gas systems and livestock (e.g., cows and sheep). It has a **GWP** of 21 (over a 100 year time horizon).[182]

Measures

Actions that can be taken by a government or a group of governments, often in conjunction with the private sector, to accelerate the use of technologies or other practices that reduce **GHG** emissions.[183]

Mitigation

An **anthropogenic** intervention to reduce the emissions or enhance the sinks of greenhouse gases.[184]

Monitoring

The systematic surveillance of the project's performance by measuring and recording performance-related indicators, which are used to assess the **GHG** reductions resulting from a project pursuant to the terms of the **Monitoring Plan** for that project.

Monitoring Plan

Set of requirements for **Monitoring** and **Verification** of the GHG reductions achieved by a project, in accordance with Section H of the Annex to Decision 17/CP.7 of the **Marrakech Accords**. A monitoring plan 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 should clearly identify responsibility and authority for registration, frequency of monitoring and measurement activities and should determine the verification schedule for claimed emissions reductions. The monitoring plan should be based on internationally recognized methodologies and give enough information to satisfy the needs of future verifiers.

N

Nitrogen Oxides (NO_x)

Gases consisting of one molecule of nitrogen and varying numbers of oxygen atoms. Nitrogen oxides are produced in the emissions of vehicle exhausts and from power stations. In the atmosphere, nitrogen oxides can contribute to the formation of photochemical ozone (smog), which is a **greenhouse gas**.[185]

Nitrous Oxide (N_2O)

A powerful **greenhouse gas** emitted through soil cultivation practices, especially the use of commercial and organic fertilizers, fossil fuel combustion, nitric acid production and biomass burning.[186] This GHG is listed in Annex A of the **Kyoto Protocol**.

No-regrets Mitigation Options

Measures whose benefits—such as improved performance or reduced emissions of local/regional pollutants, but excluding the benefits of climate change mitigation—equal or exceed their costs. They are sometimes known as "measures worth doing anyway."[187]

Non-Annex I countries

Countries that are not listed in Annex I to the **UNFCCC**.

Non-Governmental Organizations (NGOs)

NGOs are typically private organizations or institutes, independent and at arms length from government, formed to promote environment, development or social justice issues at local, regional, national or international levels. NGOs generally rely, in whole or in part, on charitable donations or grants in order to operate. Many relevant NGOs have participated in the climate change talks as observers in order to interact with delegates and the press, and to provide information.[188]

O

OECD

The organization for Economic Cooperation and Development consists of Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Republic of Korea, Japan, Luxembourg, Mexico, the Netherlands, New Zealand, Norway, Poland, Portugal, Spain, Sweden, Switzerland, Turkey, the United Kingdom and the United States.[189]

Ozone (O_3)

Ozone in the troposphere, or lower part of the atmosphere, can be a constituent of smog and acts as a **GHG**. It is created naturally and also by reactions in the atmosphere that involves gases resulting from human activities, including nitrogen oxides (NO_x) from motor vehicles and power plants. The Montreal Protocol seeks to control chemicals that destroy ozone in the stratosphere (upper part of the atmosphere), where the ozone absorbs ultraviolet radiation.[190]

Operational Entity (OE)

Designated Operational Entity, or in the absence thereof, an Independent Third Party.

P

Party

A state (or regional economic integration organization such as the EU) that agrees to be bound by a treaty and for which the treaty has entered into force.[191]

Permit

A marketable instrument conferring a quantified emissions allowance during a specific timeframe.[192]

Perfluorocarbons (PFCs)

A group of manmade chemicals composed of carbon and fluorine only: CF_4 and C_2F_6. These chemicals, along with hydrofluorocarbons, were introduced as alternatives to ozone depleting substances. They are powerful **greenhouse gases**.[193]

Policies and Measures

Countries must decide what policies and measures to adopt in order to achieve their emissions targets. Some possible policies and measures, which Parties could implement, are listed in the **Kyoto Protocol** and could offer opportunities for intergovernmental cooperation.[194]

Polluter pays

The principle which states those who cause pollution should offset its effects by compensating for the damage incurred, or by taking precautionary measures to avoid creating pollution.[195]

Precautionary Principle

Article 3 of the **UNFCCC** states: "Parties should take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures taking into account that policies and measures to deal with climate change should be cost effective so as to ensure global benefits at the lowest possible cost."[196]

Project cycle

According to the **Marrakech Accords**, the cycle of a **CDM** project has five fundamental stages: design and formulation, national approval, validation and registration, monitoring and verification/certification. The first three are performed previous to the implementation of the project. The last two are performed during the lifetime of the project.

Q

Quantified Emissions Limitation and Reduction Commitments (QELRCs)

Commitment by countries listed in Annex B to the **Kyoto Protocol** to reduce **greenhouse gas** emissions by the percentage provided for in such Annex from a base year established pursuant to the Protocol.[197]

R

Radiative Forcing

A change in the balance between incoming solar radiation and outgoing infrared radiation. Without any radiative forcing, solar radiation coming to the Earth would continue to be approximately equal to the infrared radiation emitted from the Earth. The addition of **greenhouse gases** traps an increased fraction of the infrared radiation, reradiating it back toward the surface and creating a warming influence (e.g., positive radiative forcing because incoming solar radiation will exceed outgoing infrared radiation).[198]

Ratification

After becoming a signatory to the Convention or the Protocol, a country must ratify. Ratification by a state is the act of establishing consent to be bound by the Convention or the Protocol. The legal system in some countries provides that when ratified, the agreement automatically becomes a part of existing national law. In other countries legislation is needed to give legal effect at national level. The instrument of ratification must be registered with the UN Secretary General to start the 90-day countdown to becoming a Party.[199]

Reforestation

Reforestation is the direct human-induced conversion of non-forested land to forested land through planting, seeding and/or the human-induced promotion of natural seed sources, on land that was forested but that has been converted to non-forested land. For the first commitment period, reforestation activities will be limited to reforestation on those lands that did not contain forest on December 31, 1989.[200]

Registration

The formal acceptance of a validated **CDM** project by the executive board.

Regional Groups

The five regional groups meet privately to discuss issues and nominate bureau members and other officials. They are Africa, Asia, Central and Eastern Europe (CEE), Latin America and the Caribbean (GRULAC) and the Western Europe and Others Group (WEOG).[201]

Removal Unit (RMU)

This is a new unit, defined during the **Marrakech Accords**, to address greenhouse gas emissions reduced by land use, land use change and forestry projects in Annex I countries (including those produced under JI projects). RMUs can be used only to meet a party's emissions target in the **commitment period** in which they are generated. They cannot be banked for a future commitment period. An RMU unit is equal to a tonne of carbon dioxide equivalent, calculated using **global warming potentials**.[202]

Renewables

Energy sources that are sustainable within a short timeframe relative to the Earth's natural cycles and include non-carbon technologies such as solar energy, hydropower and wind as well as carbon-neutral technologies like biomass.[203]

Review of Commitments

The Parties must regularly review the adequacy of the Convention's Article 4.2 (a) and (b) outlining developed country commitments to limit emissions. The first review took place at COP-1 and led to the **Berlin Mandate** and the adoption of the **Kyoto Protocol**.[204]

S

Second Assessment Report (SAR)

Also known as Climate Change 1995, the **IPCC**'s SAR was written and reviewed by some 2,000 scientists and experts worldwide. It concluded "the balance of evidence suggests that there is a discernible human influence on global climate" and confirmed the availability of **no-regrets** options and other cost effective strategies for combating climate change.[205]

Secretariat

Staffed by international civil servants and responsible for servicing the **COP** and ensuring its smooth operation, the secretariat makes arrangements for meetings, compiles and prepares reports, and coordinates with other relevant international bodies. The Climate Change secretariat is institutionally linked to the United Nations.[206]

Sequestration

The capacity to absorb **carbon dioxide** from the atmosphere through photosynthesis.

Sinks

Under the **Kyoto Protocol**, developed countries can include changes in net emissions (calculated as emissions minus removals of CO_2) from certain activities in the land use change and forestry sector. Calculating the effects of sinks

(growing vegetation tends to absorb carbon dioxide from the atmosphere) is methodologically complex and still needs to be clarified.[207]

Solar Radiation

Radiation emitted by the sun. Also known as shortwave radiation. Solar radiation has a distinctive spectrum (e.g., range of wavelengths) governed by the temperature of the Sun. The spectrum of solar radiation is practically distinct from that of infrared or terrestrial radiation because of the difference in temperature between the sun and the Earth atmosphere system.[208]

Subsidiary Body

The Subsidiary Body is a committee that assists the **Conference of the Parties**. Two permanent ones are defined by the Convention: the **Subsidiary Body for Implementation** (SBI) and the **Subsidiary Body for Scientific and Technological Advice** (SBSTA). COP-1 also established two other temporary bodies: the **Ad hoc Group on the Berlin Mandate**, which concluded its work on November 30, 1997 and the **Ad hoc Group on Article 13**. Additional subsidiary bodies may be established as needed.[209]

Subsidiary Body for Implementation (SBI)

Makes recommendations on policy and implementation issues to the COP and, if requested, other bodies.[210]

Subsidiary Body for Scientific and Technological Advice (SBSTA)

Serves as the link between the information and assessment provided by expert sources (such as the **IPCC**) on one hand and the policy-oriented needs of the COP on the other.[211]

Sulfur hexafluoride (SF_6)

One of the six **GHGs** to be curbed under the **Kyoto Protocol**. It is largely used in heavy industry to insulate high voltage equipment and to assist in the manufacturing of cable cooling systems. It has a large GWP (23,900 times that of CO_2 over a 100 year horizon).[212]

Supplementarity

Article 17 specifies that trading be supplemental to domestic actions for the purpose of meeting **quantified emission limitation and reductions** under that article. According to one point of view, supplementarity should be implemented by imposing a cap, or fixed numerical restriction, on the quantity of emissions reductions that can be achieved internationally, as opposed to via domestic actions and policies. The theory behind this perspective is, in the absence of pressure to change production and consumption patterns at home, countries with high energy intensities will not have an incentive to spur innovation and adopt new, cleaner technologies and practices.

Sustainable Development

Sustainable Development is a broad concept referring to the need to balance the satisfaction of near-term interests with the protection of the interests of future generations, including their need for a safe and healthy environment. As expressed by the 1987 UN World Commission on Environment and Development (the Brundtland Commission), sustainable development "meets the needs of the present generation without compromising the ability of future generations to meet their needs."

T

Technology Transfer

The broad set of processes covering the exchange of knowledge, money and goods among different stakeholders that lead to the spreading of technology for adapting to or mitigating climate change. In an attempt to use the broadest and most inclusive concept possible, the IPCC Reports use the word "transfer" to encompass both diffusion of technologies and cooperation across and within countries.[213]

Third Assessment Report (TAR)

The **IPCC**'s Third Assessment Report was finalized in late 2000 and published in early 2001.[214] It presents new and more compelling evidence of the human footprint on recent **global warming**. The report provides new data related to temperature and sea level rises. The scientific assessments predict a warming of 1.4° to 5.8°C between 1990 and 2100 and sea levels rise by about 11to 77 centimetres by 2100.[215]

U

Umbrella Group

The Umbrella Group, which emerged at Kyoto and afterwards, brings the **JUSSCANNZ** countries except Switzerland together with the Russian Federation and Ukraine.[216]

United Nations Framework Convention on Climate Change (UNFCCC)

A treaty signed in 1992 Earth Summit in Rio de Janeiro by more than 150 countries. Its ultimate objective is the "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic (human-induced) interference with the climate system." While no legally binding level of emissions is set, the treaty states an aim by Annex I countries to return these emissions to 1990 levels by the year 2000. The treaty took effect in March 1994 upon the ratification of more than 50 countries; a total of some 160 nations have now ratified. In March 1995, the UNFCCC held the first session of the **COP** in Berlin. Its Secretariat is based in Bonn, Germany and houses approximately 80 personnel.[217]

V

Validation

The process of independent evaluation of a project activity by an **Operational Entity**. This is evaluated against the requirements of the **CDM** on the basis of a Project Design Document.[218]

Verification

The periodic independent review and *ex post* determination by an **Operational Entity** of the monitored reductions in **anthropogenic** emissions by sources of **greenhouse gases** that have occurred as a result of a registered **CDM** Project activity during the verification period. It could involve physical, on-site inspection, or where useful, deployment of techniques such as remote sensing or interviewing relevant personnel in person or otherwise. It could be applied to each and every project or to a fraction of projects chosen randomly or selected according to agreed criteria.[219]

Vulnerability

The degree to which a system is susceptible to, and unable to cope with, injury damage or harm.[220]

Voluntary Commitments

During the Kyoto negotiations, a draft article that would have permitted developing countries to voluntary adhere to legally binding emissions targets was dropped in the final hours. The issue remains important for some negotiators.[221]

Voluntary Measures

Measures to reduce **GHG** emissions that are adopted by firms or other actors in the absence of government mandates. Voluntary measures help make climate-friendly products or processes more readily available or encourage governments and consumers to incorporate environmental values in their choices.[222]

W

Water Vapour (H_2O)

The most abundant **GHG**. **Anthropogenic** activities are not significantly increasing its concentration, but warming leads to a positive water vapour feedback. The concentration of water vapour regulates the temperature of the planet, in part, because of its relationship with the atmosphere and the water cycle.

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Establishing National Authorities for the CDM

From the Foreword by Michael Zammit Cutajar...

"This timely publication by the Center for Sustainable Development in the Americas and the International Institute for Sustainable Development is a step-by-step guide to the establishment of National Authorities that can successfully evaluate, approve and market CDM project proposals… Distilling the experiences of Latin American countries, it contains a wealth of information, commentary and practical advice on the functioning of these bodies. It is a 'must read' for all those, in developing countries and elsewhere, whose mission is to lay solid institutional foundations for benefiting from the CDM."

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