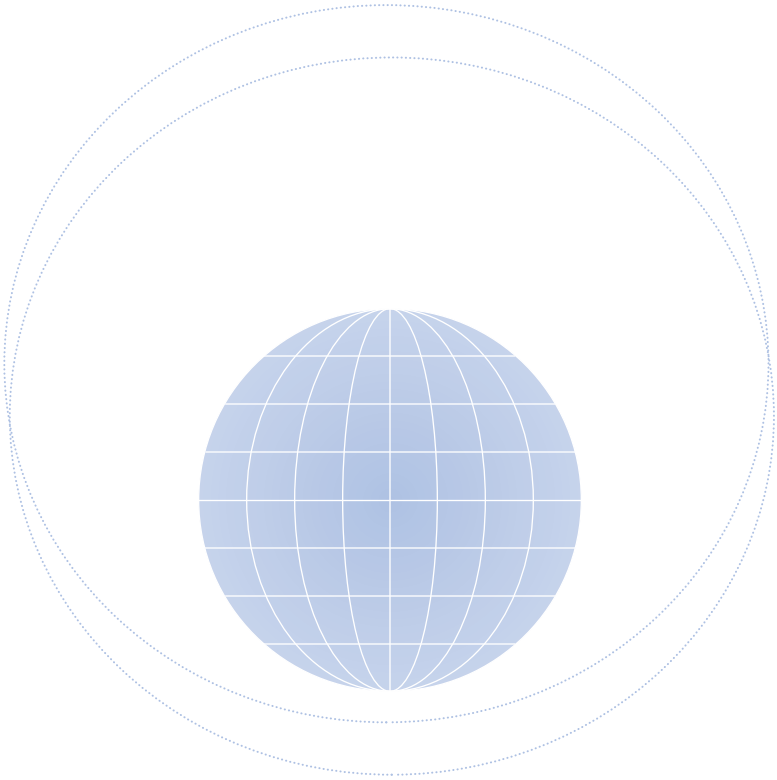
THE Clean Development Mechanism:

A USER'S GUIDE

Energy & Environment Group • Bureau for Development Policy



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CONTENTS

FOREWORD

This manual is designed as a tool to help diverse stakeholders put the Clean Development Mechanism into action, and to implement projects efficiently and equitably in a variety of national and sectoral contexts. Produced by UNDP's Climate Change Programme, this manual is being field tested in selected client countries. A primary audience is UNDP's country offices, which are actively engaged in policy advocacy, institutional strengthening, and information and knowledge sharing. As national partners of developing country governments, the country offices are also involved in piloting and testing innovative initiatives, and in developing the national and institutional capacity for efficient CDM governance and implementation that will be instrumental to its success.

UNDP's ability to contribute in this arena relies on the ability of the country offices to successfully meet the demands of their respective countries. This manual is designed to help them in that regard. The earlier drafts have benefited from regional discussions with UNDP country offices in Asia Pacific, Latin America and the Caribbean, Arab states, the Central Africa regions and external resource persons and stakeholders. We look forward to continued feedback, so that this evolving document can advance the use of CDM as a voluntary and mutually beneficial resource for meeting the emissions reduction commitments of developed countries while promoting sustainable development in developing countries. More importantly, UNDP would like to ensure that the CDM projects maintain the integrity of the Kyoto Protocol. These were the objectives agreed to at the Seventh Conference of Parties to the United Nations Framework Convention on Climate Change (COP-7) in Marrakech.

The CDM manual is meant to be a living document that will be periodically updated, based in part on learning from experience, as the rules and regulations relating to the implementation of CDM are strengthened. It is being presented at this stage as a means of engaging a broader group of experts, actors and users. We appreciate your continued comments to ensure that we have accurately presented the attributes and process of CDM and have not overlooked its nuances. In addition to your feedback, lessons from UNDP's field-testing of the CDM manual will contribute towards making it a stronger and more practical document.

The challenge of addressing global climate change is a lengthy process. The UNFCCC has brought about an awareness of the necessity to immediately undertake 'no regrets' options. With the Kyoto Protocol coming into force eventually, the global community will have agreed to take the first, and very initial steps, towards proactively combating climate change. As climate change is an issue of sustainable development, UNDP intends to remain an engaged stakeholder in the CDM process, with a particular emphasis on getting the governance issues in the CDM process right and engaging the private sector to achieve mutually beneficial outcomes that can help alleviate poverty and contribute to sustainable development. Ultimately, the CDM process should lead to greater equity and contribute to the progress towards mobilizing low carbon technology and innovation to combat long-term climate change.

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Janet Jensen did the final editing and Mary Zehngut designed the publication.

ABBREVIATIONS

(see glossary in annex 5 for more details about many of the following terms)

AIJ	Activities Implemented Jointly
BAU	Business as Usual
CDM	Clean Development Mechanism
CEF	CO2 Emissions Factor
CER	Certified Emissions Reduction
COP	Conference of Parties to the UNFCCC
COP-3	3rd Conference of Parties to the UNFCCC, (Kyoto, 1997)
COP-7	7th Conference of Parties to the UNFCCC, (Marrakech, 2001)
COP-8	8th Conference of Parties to the UNFCCC, (Delhi, 2002)
COP-9	9th Conference of Parties to the UNFCCC, (Milan, 2003)
COP/MOP	Conference of Parties/Meeting of Parties to the Kyoto Protocol
DNA	Designated National Authority
DOE	Designated Operational Entity
EIA	Environmental Impact Assessment
ER	Emissions Reduction
ERPA	Emission Reduction Purchase Agreement
EU	European Union
FDI	Foreign Direct Investment
GEF	Global Environment Facility
GHG	Greenhouse Gas
GWP	Global Warming Potential
IBRD	International Bank for Reconstruction and Development
JI	Joint Implementation
LUCF	Land-Use Change and Forestry
LULUCF	Land Use, Land Use Change and Forestry
MDGs	Millennium Development Goals
MOU	Memorandum of Understanding
NGO	Non-Governmental Organization
ODA	Official Development Assistance
PDD	Project Design Document
PIN	Project Idea Note
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
WEHAB	Water, Energy, Health, Agriculture and Biodiversity
WWF	World Wildlife Fund

ENERGY MEASUREMENTS

k	thousand
kW	kilowatt
M	million
Mt	million tons
MW	megawatt
t	ton
W	watt

EXECUTIVE SUMMARY

Of the three flexibility mechanisms in the Kyoto Protocol designed to engage the marketplace in meeting the commitments of the developed countries, the Clean Development Mechanism (Article 12) is the only one that involves developing countries. The CDM aims to direct private sector investment into emissions-reduction projects in developing countries while promoting sustainable development in these countries. In return, the industrialized countries investing in projects will receive credits against their Kyoto targets. Kyoto Parties with emission targets for 2008-2012 are eligible to apply certified emission reduction units from CDM-funded emission reductions towards meeting their target in and after 2000. An important outcome of the Eighth Conference of the Parties (COP-8, 2002) was to make the Kyoto Protocol's CDM fully operational. The decision also adopted the simplified modalities and procedures for small-scale CDM project activities and paved the way for possible early approval of CDM activities.

This manual is intended to be a reference tool for UNDP country officers so that they can assist national public and private stakeholders in implementing activities under the CDM. Those stakeholders potentially include government negotiators, designated national authorities, in-country government agencies in the fields of environment, energy, development and finance, local project developers, relevant NGOs, local financial institutions, technology vendors and consultants and operational entities.

The manual is not meant to – and cannot – replace the direct expertise that is required to identify, engage and execute project finance and emission transaction contracts under the CDM. Rather, it is intended to provide a holistic overview of the emergent CDM process and the many supportive functions that are required for its success. Engagement is the key to successfully using this tool. UNDP seeks to have its country officers understand client country strengths and weaknesses and to orient its efforts to shore up areas of identified shortfall to ensure that CDM is implemented efficiently, transparently and equitably through negotiations between developing countries, developed countries and the private sector as equal partners.

The CDM is unique in that the commodity it delivers – greenhouse gas emission reductions – requires no physical infrastructure for placement into international markets. Thus, if transaction costs and other barriers can be minimized, it is theoretically possible for even small-scale development projects to enhance revenue flow to developing countries via the emerging market for greenhouse gas reductions.

UNDP promotes the human, institutional and system-wide capacity development component of the CDM and works to bring the financial and technological benefits of the CDM to less advantaged participants. UNDP, as a knowledge-based capacity development and facilitating agent, can use its expertise to:

- Identify demand-based national CDM capacity development needs and work with private sector entrepreneurs, host country governments and the civil society to create an effective and efficient enabling environment and a CDM management regime that not only reduces transaction costs but also assists the developing countries achieve sustainable development as an intrinsic component of their national development priorities.
- Identify types of CDM projects including small scale projects that may be appropriate within different country contexts;
- Give project developers and host governments realistic assessments of the external market situation and CDM transaction structures;
- Identify in-country groups that may be able to provide services to CDM projects;
- Help project developers understand CDM transaction modalities;
- Assist governments prioritize project types in view of their particular sustainable development criteria and

establish internal policies to facilitate their development; and

- Help governments establish internal check and balance systems for regulating and promoting CDM projects and ensuring that they support sustainable development aims.

There is currently no single model for successfully operationalizing the CDM and probably never will be. UNDP country officers will encounter a wide range of situations in engaging with CDM participants. The key to success will be to listen to this client base, efficiently disseminate important information to stakeholders and act as a *de facto* neutral clearinghouse for information and knowledge that strengthens national capacity to effectively participate in the opportunities afforded by the CDM. While some country officers will spend the majority of their early stage efforts with the project development community, others will be more engaged with the governmental process and work with local NGOs that seek to ensure that their voices are heard.

It is expected that over the coming years, UNDP will make ongoing efforts to document successes – and lessons learned – in the implementation of the CDM across various countries. This will, over time, add a real 'learning by doing' context to this manual. As this manual represents only the first iteration of work-in-progress, subsequent versions will necessarily incorporate future policy developments and market trends and add to the guidance provided here. This manual is, therefore, the first step in an on-going process to establish a common understanding of CDM procedures and experiences.

The manual begins with background information about the CDM's evolution and objectives, and a discussion of UNDP's role in building the kinds of human, institutional and system-wide capacity that will make it a success. **Chapter 1** also considers how climate change is linked to sustainable development, discusses lessons learned in the course of implementing similar projects, and outlines the need for capacity strengthening and the forms of enabling governance that will be needed to make the CDM a success. The chapter concludes with a discussion of some of the more controversial aspects of the mechanism, and how these are being resolved.

Chapter 2 presents the CDM participants and project types. It then walks the reader through the entire CDM cycle, from a preliminary checklist of eligibility factors through to the process of validation and registration of CERs. Most UNDP interactions in developing capacity for CDM market interaction will have to do with the project components described in the chapter, including technical analysis, documentation requirements and the need to successfully interact with stakeholders and regulators at both the domestic and international level.

Success in steering a project through the CDM process hinges largely on developing a clear, accurate and comprehensive project design document, or PDD. This is the key document that the host country, investors, stakeholders (local, national and international) and designated operational entities will use to evaluate the project's potential and judge its merit. Indeed, no project can earn CERs without the development, validation and Executive Board acceptance of a project design document. Because the Kyoto Protocol specifies that CDM projects must contribute to greenhouse gas emission reduction that are additional to what would have occurred in their absence, a critical element of the project design document is development of the baseline scenario for use in assessing this key issue. **Chapter 3** discusses the project design document, paying particular attention to the technically complex issue of developing a credible baseline and using it to establish the project's additionality. This last issue is also discussed in annex 3.

Contributions to sustainable development in the host country are a primary product of CDM projects. The definition of sustainable development and how CDM projects should contribute to it is considered the host country's prerogative. The CDM is potentially a way to foster rural development in host countries by directing investments in appropriate energy technologies through small-scale projects to people living in rural communities. However, its potential in this regard could be undermined by the high transaction costs associated with small-scale and community-based development projects relative to the likely return on

investments. **Chapter 4** discusses strategies and simplified procedures that could reduce the transaction costs for smaller projects.

Precisely because so much is at stake – not only investments, but also the development paths of many countries and the world's ability to effectively address climate change – many safeguards and checks have been built into the CDM project cycle. The objective is to make the CDM live up to its promise. One result, however, is a complex and expensive approval process that can moderate the degree of utilization of CDM. The costs of implementing CDM projects will likely decrease over time as a result of learning and 'learning by sharing' effects. However, several institutional arrangements can keep CDM transaction costs down even in the early stages of its implementation. **Chapter 5** first provides an introduction to transaction costs and their implications on project feasibility. It then examines ways in which the CDM can be efficiently managed by host country governments, if capacity in the area of governance can be strengthened.

The CDM's dual goals of yielding sustainable development benefits while creating low-cost greenhouse gas emission reductions can be achieved only via carefully structured contracts. Although all contracts can be complicated, CDM transactions offer particular challenges, as the parties often have very different business and cultural perspectives. Carbon trading can be extremely complex and has the potential to impact development trajectories in ways that may be unforeseen and unintended. Shortfalls in analytical and negotiating capacity in developing countries relative to their industrialized country counterparts create a very real possibility that poorer developing countries will not be able to negotiate as equal partners. Purchasers of CERs will often be large, sophisticated multinationals with significant experience in project finance, commodity and derivative transactions. While some CER sellers will be multinationals as well, the sustainable development component of the CDM means local energy developers, community groups and even NGOs may end up as counter-parties. In order to successfully execute a CDM transaction, the buyer and seller need to reach agreement on an appropriate structure for the transaction, and an appropriate contract for the transaction. **Chapter 6** examines various ways of structuring suitable CDM transactions.

International agreements designed to combat climate change, including the CDM, have effectively created a new 'commodity' in international trade – one that will increasingly be produced in the global South and consumed by richer, more industrialized countries. International trade in this new commodity of carbon offsets has already begun to develop as countries and companies seek to meet international agreements. **Chapter 7** describes the evolving market for CERs in terms estimated market size, prices and buyers.

The manual concludes with the following informational annexes:

Annex 1: The Project Design Document
Annex 2: Gold Standard: Quality Standards for CDM and JI Projects
Annex 3: Additional Notes on Baseline Analysis, Leakage and Monitoring
Annex 4: Resources for Further Information
Annex 5: Glossary

CHAPTER 1:

Furthering Sustainable Development and Emissions Reductions

This chapter provides background information about the Clean Development Mechanism's evolution and objectives, as well as about UNDP's role in building the kinds of human and institutional capacity that will make it a success. The chapter addresses:

CHAPTER 1: FURTHERING SUSTAINABLE DEVELOPMENT AND EMISSIONS REDUCTIONS

Adopted at the Third Conference of Parties (COP-3) to the United Nations Convention on Climate Change, the Clean Development Mechanism is an emissions trading mechanism designed to simultaneously benefit developing and industrialized countries. The CDM is the only flexibility mechanism created by the Kyoto Protocol that involves developing countries. Innovative and complex, the mechanism is designed to stimulate emission reductions in the developing countries, while also promoting sustainable development. Ideally, it will encourage additional capital flows into developing countries, accelerate technology transfer, and enable developing countries to leapfrog to cleaner technologies. At the same time, it is intended to help developed countries achieve their emission reduction commitments at a lower cost than would otherwise be possible. Whether or not the CDM achieves these aims will depend to a great extent on the ability of project developers, host countries and other stakeholders to implement it efficiently, and in ways that promote social, economic and environmental objectives and maintain the integrity of the Kyoto Protocol. This chapter describes the CDM's evolution and objectives, and discusses UNDP's role in building the kinds of human and institutional capacity that will make it a success.

CLIMATE CHANGE AND SUSTAINABLE DEVELOPMENT

Climate change is one of UNDP's priority areas. For UNDP, climate change is not simply an environmental issue. Rather, it is a part of the larger challenge of sus-

BOX 1.1: THE CDM IN BRIEF

The CDM has two primary goals:

- To assist Annex I countries in reaching their emission reduction targets, and;
- To promote sustainable development objectives in the host countries (non-Annex I countries).

The first goal allows developed countries to achieve part of their reduction obligations through projects in developing countries that reduce emissions through clean energy, energy efficiency and renewable energy projects or sequester CO_2 from the atmosphere in the form of biomass through reforestation or afforestation.

The mains characteristics of the CDM are:

- Participation in a CDM project activity is voluntary and CDM investments will be market driven. Public and private parties are eligible to participate.
- CDM activities must lead to measurable reductions in emissions, which will be transferable to the investor in the form of certified emission reductions, or CERs, upon quantification and certification by a third party.
- The reduction in emissions must be additional to any that would occur in the absence of the approved project activity. In order to earn CERs, emissions reductions must be quantified and certified by a third party.
- Contributions to sustainable development in the host country are a primary aim of CDM projects. The definition of sustainable development or how CDM projects should contribute to it is considered to be the host country's prerogative.

The CDM allows transfer of CERs to a parties investing in such projects. This market-based system will allow individual firms, as well as countries, to select the most cost-effective solutions to mitigating greenhouse gas emissions.

The Marrakech Accords, agreed upon at COP-7 in 2001, established a CDM Executive Board and recognized that CERs achieved in the CDM host developing countries can accrue from emissions reductions activities undertaken since 2000. The developed countries in turn can use these to fulfil their emissions reductions commitments in the first commitment period (2008-2012).

tainable development. It is also one of the most serious threats to poverty eradication. In 2000, in committing themselves to the Millennium Declaration, the world's leaders resolved to improve the quality of life of poor people through the achievement of global development objectives. Of the eight fundamental Millennium Development Goals, foremost is the commitment of 189 nations to reduce by half the proportion of people living in abject poverty by 2015. The Millennium Development Goals recognize the fundamental connection between energy, environment and sustainable development. Similarly the Delhi Declaration on climate change and sustainable development (agreed to at the Eighth Conference of the Parties to the UNFCCC in 2002) highlights the principle of common but differentiated responsibilities of countries to address climate change, reaffirms development and poverty eradication as overriding priorities in developing countries and emphasizes the integration of climate change objectives into national sustainable development strategies.

UNDP has adopted a strategic approach to sustainable development proposed by the UN Secretary General that emphasizes action in five key thematic areas: water, energy, health, agriculture and biodiversity (collectively called WEHAB). Climate change is recognized as a cross-cutting issue that impacts all of the five WEHAB areas, one that is integral to a coherent approach to sustainable development. Thus, addressing climate change should be integrated into national strategies for poverty eradication. In theory, CDM can assist in accomplishing this objective through partnerships with diverse stakeholders and innovative policy formulation and implementation. This will require increased human, institutional and system-wide capacity at the national level and enabling policies, laws and regulations in the host countries.

OPERATIONALIZING THE CDM

An important outcome of COP-8 (Delhi, 2002) was to enact many decisions to make the CDM fully operational. At that meeting, simplified modalities and procedures for small-scale CDM project activities were also adopted (see chapter 4).

Participation in a CDM project activity is voluntary and investments in CDM will be market driven. While both public and private entities are eligible to participate in CDM, investments are likely to be private sector driven. CDM activities must lead to quantified reductions in emissions, which will be transferable to the investor in the form of CERs, a marketable commodity in the carbon market under the Kyoto Protocol. Contributions to sustainable development shall be a

BOX 1.2: STATUS OF THE KYOTO PROTOCOL

Despite the fact that more than 100 countries have already ratified it, the Kyoto Protocol still had not come into force as this publication was going to press.

The environmental treaty sets individual targets for industrialized countries to lower their emissions of carbon gases, on average by 5.2 per cent below their 1990 levels, over the next 10 years. It suffered a serious setback in 2001 when the United States, which alone accounts for around 35 per cent of the world's greenhouse emissions, pulled out of the treaty.

Under the Kyoto Protocol's complex weighting system, 55 Parties to the Convention should ratify the Protocol including Annex I Parties that were responsible for producing 55 percent of that group's carbon dioxide emissions in 1990, before it comes into force. With the decision of the US to pull out of the treaty, Russia's ratification is required to put the protocol into force.

At the opening of a five-day World Climate Change Conference in Moscow in September 2003, Russian President Vladimir Putin officially postponed a decision on the country's ratification of the Protocol. He said his country agrees in principle to the treaty, but wants more time to study the plan.

For UNDP, climate change is not simply an environmental issue. Rather, it is a part of the larger challenge of sustainable development.

primary product of CDM projects in the host countries. The definition of sustainable development or how CDM projects should contribute to it is considered the host country's prerogative.

CDM promises to generate additional resources for investment in renewable energy, energy efficiency and other projects to reduce greenhouse gas emissions in the South. Although it will not solve all development problems of host countries, CDM can potentially influence investments, technology and economic growth. However, the non-Annex I countries differ widely in terms of national capacities to utilize technology, access finance and efficiently implement CDM activities.

The knowledge base to deal with the complexities of CDM is rapidly increasing and serious efforts are being made by the CDM Executive Board to make the final architecture coherent and efficient. There appears to be a high demand from the developing countries for initiating CDM transactions. Their successful implementation, however, will depend on the presentation of viable projects capable of attracting foreign investments and on the assurance of efficient transactions. This, in turn, will demand clearly defined sustainable development priorities by host countries, as well as the institutional capacity and system-wide support to make the project approval process transparent, fair and efficient.

CDM outcomes must be evaluated from a long-term equity[1] perspective, that is, by considering how these projects can create capacity for implementation of mitigation activities and increase the number of win-win options that will result in a high-growth, low-carbon trajectory within the financial, institutional, and technological reach of host countries. Strengthening broad-based capacity that fully integrates equity concerns into the CDM will foster the ability of host countries to eventually undertake emissions reductions of the magnitude that will be required globally, while maintaining their commitment to sustainable development. The key to this is long-term thinking.

WHAT UNDP HAS LEARNED

Until the carbon market evolves sufficiently, the private sector is likely to focus on 'straightforward' CDM projects that are commercially viable on their own, with the resulting CERs providing an incremental benefit. UNDP's experience from the country level informs us that while a high internal rate of return is necessary, it is not a sufficient condition for attracting private sector investment. Even though a number of projects analyzed by UNDP in cooperation with host countries had a significantly high internal rate of return, they did not attract investors. Non-economic project barriers – including inadequate human capacity, policies, institutions, legal frameworks, and add a lack of innovative, development-oriented financial institutions – were major constraints to attracting foreign investment.

Similarly, learning from the pilot phase of Activities Implemented Jointly[2] highlights the critical importance of adequate human, institutional and systemic capacity, an enabling environment and access to knowledge and information by the host countries for its success. AIJ projects were concentrated in countries and regions that had targeted policies, adequate capacity to undertake and implement projects, and actively encouraged stakeholders' participation. Also 'learning-by-doing' capacity development was found to be an important component in the success of the projects undertaken.

Low and fragmented skill levels in developing countries constrain internal responses to climate change challenges within the framework of sustainable development. In order for the host countries to fully embrace CDM as a tool for sustainable development, they must be empowered to be equal partners in negotiations with the developed countries and private sector. A critical element of the solution lies in capacity development and institutional strengthening to address limitations

[1] Equity does not imply equality; it entails the existence of an equal opportunity to access resources available under CDM.

[2] A pilot programme established by the UNFCCC in 1992, AIJ allowed private entities in one country to reduce, sequester, or avoid emissions through a project in a different country. During the AIJ Pilot Phase, projects were conducted with the objective of establishing protocols and experiences, but without allowing carbon credits to be transferred between developed and developing countries.

BOX 1.3: LEARNING-BY-DOING CAPACITY DEVELOPMENT

The 'learning-by-doing' strategy to capacity development is a solution-oriented approach grounded in investment and project appraisal in the real world, while taking into account host country needs and concerns. It involves identifying a private sector entrepreneur from an industrial sector, one who is amenable to sharing his or her learning, and taking the entrepreneur through the project cycle, thereby decreasing transaction costs and developing capacity through hands-on tangible activities.

An important output of this strategy is an investment-grade project design document that can be taken by the host country project developers to the potential investors. While only one entrepreneur is identified for designing the project document, the gains of greater capacity are visible across the sector essentially because of the 'learning by sharing' activities involving entrepreneurs throughout the sector. The strategy successfully involves diverse stakeholders including the government and civil society who gain an understanding of mutual needs and responsibilities. The result is greater transparency of actions and participation.

CDM capacity development also needs to focus on creating in the host country an effective and efficient enabling environment and CDM management that not only reduces transaction costs but also assists the developing country in advancing its national development priorities. Even if a host country has many attractive CDM project opportunities, it will not necessarily mean that many projects will actually be implemented. An effective national institutional structure is necessary to attract investors and harness the CDM's potential. Host countries should develop a clear understanding about the approval criteria and sectoral as well as technological priorities. The institutional and regulatory framework should be set up with an emphasis on the competitive nature of the CDM. The CDM regulatory and outreach function also should be designed to avoid any conflict of interest. It will be beneficial for countries with multi-tiered political structures to have creative and participatory processes to keep all stakeholders well informed and avoid inefficiencies in the approval structure.

in the CDM implementation resulting from weak administrative structures. Ideally, this will lead to transparent, efficiently administered policies, laws and regulations, and to the accountability and participation of diverse stakeholders.

Lessons from UNDP's country level activities in the pilot phase also suggested that in the absence of effective host country capacity to competently address issues relating to project approval, coherently articulated national, sectoral and technological priorities and transparently defined sustainable development criteria, CDM processes will incur prohibitive transaction costs. These issues constitute, *inter alia*, the primary responsibility of the host country's designated national authority, in accordance with the participation requirements under CDM rules.

UNDP'S APPROACH TO BUILDING CAPACITY

As the lead agency for capacity building for sustainable development, UNDP has a specific contribution to make in the overall response of the United Nations system and in assisting developing countries to implement the UNFCCC and the Kyoto Protocol. UNDP's integrated approach to national development – with a focus on creating an enabling policy environment and strengthening human and institutional capacities through a learning-by-doing strategy – is suited to overcoming barriers to CDM's success.

UNDP has already analyzed several small-scale UNDP-GEF projects to determine their potential for viable CDM operations. It recommends taking completed UNDP-GEF projects and GEF's Small Grants Programme projects to scale as a way to increase capacity through practical experience. In keeping with UNDP's focus on promoting greater project level and geographical equity in the implementation of CDM, many of these projects could be included in a portfolio approach that will focus on disadvantaged countries and, as relevant, on smaller projects.

KNOWLEDGE SHARING

UNDP promotes the sustainable development component of the CDM and works to bring the financial and technological benefits of the CDM to less advantaged participants. UNDP, as a knowledge based facilitating agent, can assist the host countries to:

- Identify demand-based national CDM capacity development needs and work with private sector entrepreneurs, host country governments and the civil society to create an effective and efficient enabling environment and a CDM management regime that not only reduces transaction costs but also assists the developing country in achieving sustainable development as an intrinsic component of its national development priorities.
- Identify types of CDM projects, including small-

BOX 1.4: GREENHOUSE GASES ADDRESSED BY THE CDM

The Kyoto Protocol addresses mitigation of the six gases believed to be the main contributors to the climate change effect, which is associated with an increase in the global temperature and disturbed climatic patterns. The relative impact caused by the release of greenhouse gases into the atmosphere is measured by the global warming potential or GWP. Global warming potential is an index defined as the cumulative radiative forcing between the present and some chosen time horizon caused by a unit mass of gas emitted now, expressed relative to a reference gas such as carbon dioxide. The Intergovernmental Panel on Climate Change is responsible for setting and adjusting the indices based on the most current scientific knowledge.
For instance, in the Second Assessment Report of the IPCC, methane has a radiative forcing that was estimated to be about 21 times greater than that of CO_2, thus it has a GWP of 21.
The three greenhouse gases most frequently found in nature are:

- Carbon dioxide (CO_2) – a naturally occurring gas released as a by-product of fossil fuel combustion, selected industrial processes and changes in the patterns of land-use, particularly deforestation. In terms of gross volume of emissions, it is by far the most important greenhouse gas. Carbon dioxide is given the base global warming potential value, 1.
- Methane (CH_4) – a gas released in coal mining, landfill operations, livestock raising and natural gas/oil drilling (among other processes). Methane has a global warming potential of 21 (in other words, it is 21 times more potent in terms of global warming effect than carbon dioxide).
- Nitrous oxide (N_2O) – a gas emitted during fertilizer manufacturing and fossil fuel combustion. The transportation sector is usually a significant contributor to N_2O emissions. N_2O has a global warming potential of 310.

Human activity clearly contributes to the increased concentrations of CO_2, CH_4 and N_2O in the atmosphere, but they can also be released through natural processes. It is expected that the vast majority of CDM projects will involved these gases.

In addition to these three greenhouse gases, there are three additional classes of engineered gases, which occur on a very limited basis in nature.

- Hydrofluorocarbons (HFCs) – a group of gasses emitted in selected manufacturing processes and frequently used in refrigeration and air conditioning equipment. HFC-23, HFC-12, HFC-134a and HFC 152a have global warming potentials of 11,700, 2800, 1300 and 140 respectively.
- Perfluorocarbons (PFCs) – similar to HFCs, PFCs were developed and introduced as an alternative to ozone depleting CFCs and HCFCs. They are emitted in a variety of manufacturing processes. Their global warming potential ranges from 6.500 for CF_4 to 9,200 for C_2F_6.
- Sulphur hexofluoride (SF) – the most potent greenhouse gas, released in a very limited number of manufacturing processes where it is used as a dielectric fluid. The global warming potential of SF_6 is equal to 23,900, and one molecule of SF_6 has the atmospheric lifetime of 3,200 years. Hence, SF_6 represent the most dangerous group of anthropogenic-induced greenhouse gas emissions.

As of October 2003, there has been only one project undertaken in Korea involving the destruction of the engineered gases. Though the impact from such projects could be significant, they are not expected to constitute a large share of CDM projects.

scale projects, that may be appropriate within different country contexts;
- Give project developers and host governments realistic assessments of the external market situation and CDM transaction structures;
- Identify in-country groups that may be able to provide services to CDM projects;
- Help project developers understand CDM transaction modalities;
- Assist governments prioritize project types in view of their particular sustainable development criteria and establish internal policies to facilitate their development; and
- Help government establish internal checks and balance systems for regulating and promoting CDM projects and ensuring that they support sustainable development aims.

There is currently no single model for successfully operationalizing the CDM and probably never will be. UNDP country officers will encounter a wide range of situations in engaging with CDM participants. The key to success will be to listen to this client base, efficiently disseminate important information to stakeholders and act as a *de facto* neutral clearinghouse for information that impacts national capacity to fully participate in the opportunities afforded by the CDM. While some country officers will spend the majority of their early stage efforts with the project development community, others will be more engaged with the governmental process and work with local NGOs to ensure that their voices are heard.

It is expected that over the coming years, UNDP will make ongoing efforts to document successes – and lessons learned – in the implementation of the CDM across various countries. This will, over time, add a real 'learning by doing' context to this manual. As this represents only a first iteration of work-in-progress, subsequent versions will necessarily incorporate future policy developments and market trends and add to the guidance provided here.[3] This manual is, therefore, the first step in an on-going process to establish a common understanding of CDM procedures and experiences.

RESERVATIONS AND RESPONSES TO THE CDM

Whether the CDM is the most effective and equitable way to reduce the impact of climate change has been debated by governments, the private sector and NGOs since the concept was first conceived. It has taken the better part of a decade to negotiate the terms by which the CDM should operate. Among the difficult negotiations were those concerning the allocation of required emission reductions, responsibilities of non-Annex I countries, future obligations and equity issues. Over time the Conference of the Parties and other stakeholders have worked to try and address these major concerns. Some of the key issues that were hotly debated are discussed below.

Common but differentiated responsibilities

One issue has to do with what the Kyoto Protocol terms 'the common but differentiated' responsibilities that should be borne by industrialized and developing countries. The OECD countries are undeniably responsible for a disproportionate amount of the buildup of atmospheric greenhouse gasses implicated in climate change. This buildup began with dawn of the industrial revolution some 150 years ago. Developing countries have contributed less than one-third of the CO_2 and CH_4 accumulated in the atmosphere and less that 20 per cent of all industrial CO_2 emissions, Accordingly, there is no requirement that developing countries participate in the CDM or engage in emission reductions. They are free to use the CDM – or not – as they engage in their own sustainable development priorities or emissions reductions.

Emissions reductions trading

Another issue is whether the CDM shifts the economic 'burden' of emission reductions from those who are responsible – industrialized countries – to the developing countries. Developing countries are most vulnerable to climate change and can least afford to pay for emission reducing technologies, measures to adapt to climate change and for the presumed problems that climate change will create. Does the CDM effectively insist that developing countries help the industrial world out of this mess by providing cost competitive emission reductions?

[3] A review of three UNDP/GEF biomethanation and landfill gas projects in Jordan, China and India is currently being undertaken. Their high cost-effectiveness makes them good potential candidates as CDM projects. This study will form an annex to the CDM manual and will be included in subsequent versions.

When its rules were being negotiated it became clear that the only way for the Kyoto Protocol to succeed was if it established reduction targets that were both possible to reach yet stringent enough to make a difference. The economic dislocation and inefficiency that would likely result from meeting emission commitments without being able to use the most cost effective options were in no one's interest. The notion of countries trading emission rights and emission reductions first emerged in the text of the original Framework Convention of Climate Change as a way to bring greater economic efficiency to the task of lowering emissions globally. There is little doubt that during the first commitments period, Annex I countries and industries will take advantage of the CDM to cushion the economic impact of their newly carbon-constrained economies. The transition to a less greenhouse gas intensive economy is a long-term process and emissions trading is one of many tools that should be employed to minimize global economic impacts and enable developing countries to promote their economic growth in a sustainable manner. The CDM can, in principle, be a win-win solution – a facilitating instrument to provide capital and technology flows (that may otherwise not occur) to developing countries, while keeping the overall basis of the global economy flowing smoothly.

Sovereignty issues

Another contentious issue was whether the CDM would diminish national sovereignty by allowing external forces to change the development paths of the host countries. This issue is particularly acute with regard to the land-use component of the CDM. This raised heated debate during the time that international forest conservation was being considered as a tool to combat climate change. The debate arose from the fact that some of the earliest projects undertaken as Activities Implemented Jointly in the early 1990's were based on forest conservation. Many of these projects made extravagant claims about the carbon savings attributable to their implementation. A fear emerged that with large expanses of undeveloped forest in the major tropical countries worth just dollars per hectare on the open market in many cases, Western multinationals would purchase land in vast scale and set up private 'reserves'. This action – if taken on the basis of carbon sequestration – would undermine the rights of sovereign countries and local inhabitants to manage their own resource base, while also allowing multinationals to continue along a path of excessive emissions at a small cost.

However, since the CDM process now excludes 'avoided deforestation' in the trading regime, the objection is less pertinent. Furthermore, the 'free for all' that characterized earlier transactions has been reduced by rigorous standards mandated by the CDM process cycle. With the requirement for host country endorsement, inclusion of sustainable development criteria based on the host country's prerogative, the use of third party validators, and the requisite local and international stakeholders consultations, the CDM process provides extraordinary –- accountability. This helps ensure that the eventual investments focus not only on cost-effectiveness, but also on the contribution of CDM projects to sustainable development priorities.

Exhausting inexpensive reduction options

Lastly, it was feared that the CDM would exhaust all inexpensive reduction opportunities in the host countries, leaving them with very high-cost emission abatement projects at the point when the countries are required – or opt – to take on an emissions cap during future iterations of the UNFCCC. Observers have voiced concern that once emissions reductions credits are transferred from a developing country project to an industrial country they will no longer be available for the use by the host country in meeting its own commitments.

However, several factors alleviate this concern. First of all, CDM projects can receive credit for 10 or 21 years (including baseline reassessments after year 7 and 14), meaning that any emission performance that occurs after the period of the CDM contract will be a component of the country's emission inventory. Second, a variety of contractual structures are available under which a developing country can protect its emission reduction credits, including revisiting terms of the transaction if and when the country's emissions are capped. Most importantly, CDM is a voluntary activity that host countries have considerable control over.