

Unclassified

COM/ENV/EPOC/IEA/SLT(2005)7



Organisation de Coopération et de Développement Economiques
Organisation for Economic Co-operation and Development

22-Nov-2005

English - Or. English

**ENVIRONMENT DIRECTORATE
INTERNATIONAL ENERGY AGENCY**

Cancels & replaces the same document of 21 November 2005

THE DEVELOPING CDM MARKET

Jane Ellis and Ellina Levina, OECD

The ideas expressed in this paper are those of the authors and do not necessarily represent views of the OECD, the IEA or their member countries, or the endorsement of any approach described herein.

JT00194679

Document complet disponible sur OLIS dans son format d'origine
Complete document available on OLIS in its original format

**COM/ENV/EPOC/IEA/SLT(2005)7
Unclassified**

English - Or. English

Copyright OECD/IEA, 2005

Applications for permission to reproduce or translate all or part of this material should be addressed to:
Head of Publications Service, OECD/IEA
2 rue André Pascal, 75775 Paris Cedex 16, France
or
9, rue de la Fédération, 75739 Paris Cedex 15, France.

FOREWORD

This document was prepared by the OECD and IEA Secretariats in September-November 2005 in response to the Annex I Expert Group on the United Nations Framework Convention on Climate Change (UNFCCC). The Annex I Expert Group oversees development of analytical papers for the purpose of providing useful and timely input to the climate change negotiations. These papers may also be useful to national policy-makers and other decision-makers. In a collaborative effort, authors work with the Annex I Expert Group to develop these papers. However, the papers do not necessarily represent the views of the OECD or the IEA, nor are they intended to prejudice the views of countries participating in the Annex I Expert Group. Rather, they are Secretariat information papers intended to inform Member countries, as well as the UNFCCC audience.

The Annex I Parties or countries referred to in this document are those listed in Annex I of the UNFCCC (as amended at the 3rd Conference of the Parties in December 1997): Australia, Austria, Belarus, Belgium, Bulgaria, Canada, Croatia, Czech Republic, Denmark, the European Community, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Japan, Latvia, Liechtenstein, Lithuania, Luxembourg, Monaco, Netherlands, New Zealand, Norway, Poland, Portugal, Romania, Russian Federation, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey, Ukraine, United Kingdom of Great Britain and Northern Ireland, and United States of America. Korea and Mexico, as OECD member countries, also participate in the Annex I Expert Group. Where this document refers to “countries” or “governments”, it is also intended to include “regional economic organisations”, if appropriate.

ACKNOWLEDGEMENTS

This paper was prepared by Jane Ellis and Ellina Levina, OECD. The authors would like to thank Fabian Scharf and Benoît Pichon (OECD) for their help in updating the project database and preparing the graphics, as well as Dennis Tirpak (OECD) and Annex I Expert group delegates, for the information, comments and ideas they provided.

Questions and comments should be sent to:

Jane Ellis OECD Environment Directorate 2, rue André-Pascal 75775 Paris Cedex 16 Email: jane.ellis@oecd.org	Ellina Levina OECD Environment Directorate 2, rue André-Pascal 75775 Paris Cedex 16 Email: ellina.levina@oecd.org
---	---

OECD and IEA information papers for the Annex I Expert Group on the UNFCCC can be downloaded from: <http://www.oecd.org/env/cc/>

TABLE OF CONTENTS

EXECUTIVE SUMMARY	5
1. INTRODUCTION.....	6
2. UPDATE ON THE CDM PROJECT ACTIVITIES	6
3. TRENDS IN PROJECT TYPES	8
4. GEOGRAPHICAL DISTRIBUTION OF CDM PROJECTS.....	11
5. REFERENCES.....	13
6. GLOSSARY.....	14

LIST OF TABLES

Table 1. Top 10 countries.....	12
---------------------------------------	-----------

LIST OF FIGURES

Figure 1. Evolution of the CDM portfolio in CO₂ eq/year and number of projects.....	7
Figure 2. Percentage of annual credits by project type, November 2005	8
Figure 3. Number of projects by type, November 2005.....	9
Figure 4. Distribution of credits for registered and proposed CDM projects by project type	10
Figure 5. Geographical split of expected annual CDM credits (in total CDM portfolio) and non-Annex I CO₂ emissions	11

Executive Summary

The following are key observations regarding developments in the CDM portfolio:

- The CDM portfolio is growing extremely rapidly, and currently expects to generate yearly credits equivalent to 1.2% of Annex I Parties' 1990 greenhouse gas emissions.
- There are currently more than 670 projects in the pipeline¹ with an estimated GHG emission reduction potential of 139 Mt CO₂-eq/year in the commitment period of 2008-2012 and a further 243 Mt CO₂-eq pre-2008. This project pipeline expects to generate 936 million CERs by 2012. These projects are located in 58 countries. Twelve of them have not yet established DNAs.
- By November 16, 2005 35 CDM projects have been registered, and a further 22 projects submitted for registration. The total estimated GHG emission reductions from registered CDM projects is almost 8.2 Mt CO₂-eq/year. Important decisions on the functioning of the EB need to be made to provide for a smooth passage of a large quantity of CDM projects through the registration process;
- By November 16, 2005, CDM projects expecting to generate a further 79 Mt CO₂-eq credits per year during 2008-12 had initiated/completed the validation process. Some – but not all - of these projects have also been submitted for registration. Any project undergoing validation uses already-approved methodologies to estimate their credit generation, and so has no “methodology risk”. The recent spectacular growth in projects being submitted for validation is likely to be due to project developers trying to submit projects for validation in order to generate retroactive credits.
- Almost half of all proposed CDM projects are in the electricity sector. Many are small renewable energy projects, so their total share in the estimated GHG emission reductions is only 20%. These projects represent the most widespread type of CDM projects, occurring in 40 countries.
- However, the majority of credits are expected to come from CDM projects reducing higher-GWP gases, i.e., HFC23, N₂O and CH₄:
 - Some of these projects are very large-scale, expecting to generate up to 10 Mt CO₂-eq/y.
 - Proposed CDM projects that reduce emissions of HFC23 and N₂O expect to supply 37% of projected annual CERs: the largest “slice” of credits.
 - Landfill gas projects also account for a significant share in the CDM portfolio, supplying about 9% of annual GHG emission reductions. These and other proposed methane-reducing projects represent 18% of the total estimated CERs in the current portfolio.
- The geographical distribution of proposed CDM projects continues to be uneven. India accounts for the largest share, both in terms of expected numbers of projects (224) and credits (25% of total expected reductions). The importance of China has grown very rapidly, with two very large HFC23-reducing projects in its portfolio. Brazil, Korea and Mexico are the next most important host countries in terms of credits, and also all include large HFC23 and/or N₂O-reducing projects in their portfolio (as well as more smaller-scale energy projects). Africa's share of the CDM portfolio has grown slightly in 2005, mainly due to a large project reducing gas flaring in Nigeria.

¹ Defined here as projects that have developed a project design document, and/or that have received approval by a host country designated national authority.

1. Introduction

This paper presents and analyses the data on proposed CDM projects, including their types, estimates of CO₂ emission reductions, and the projects' geographic distribution. The data is based predominantly on publicly available project design documents (PDDs) submitted to the EB of the UNFCCC, from national or international carbon funds and from country-specific or other information. The information presented does not include emission reduction estimates from proposed CDM projects that do not yet have a PDD or have not been approved by a host country designated national authority (DNA).

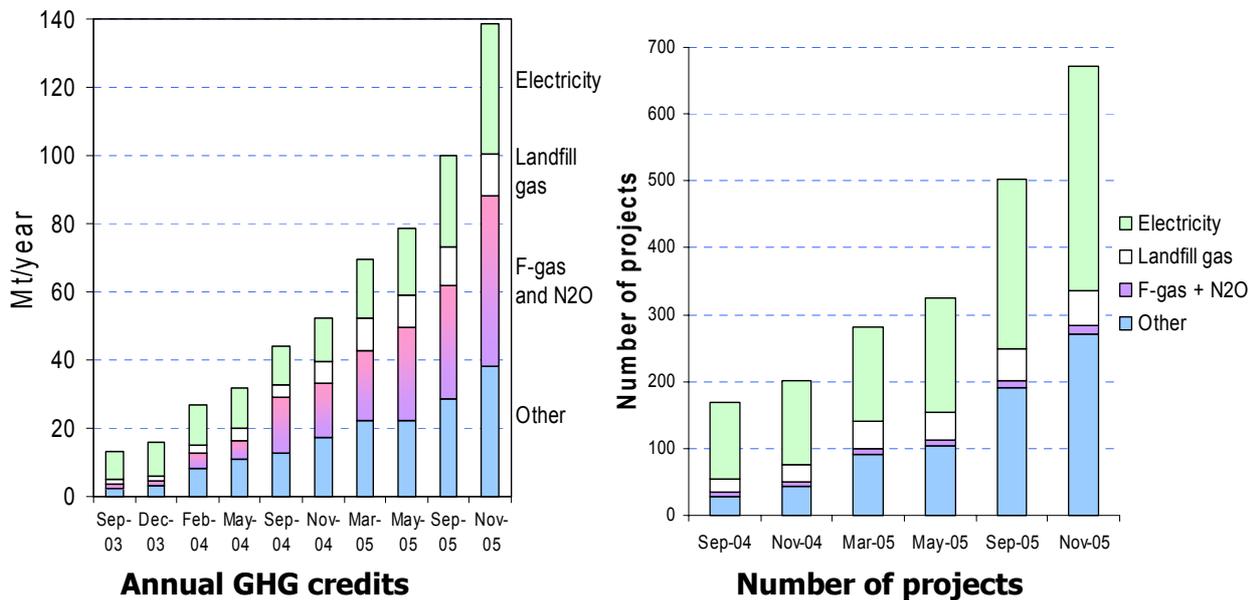
2. Update on the CDM Project Activities

The CDM portfolio continues to grow, and currently expects to generate yearly credits equivalent to 1.2% of Annex I Parties' 1990 greenhouse gas emissions. By November 16 2005, information available on proposed CDM projects at the PDD stage and/or approved by host country DNAs, shows that the expected GHG emission reductions during the commitment period 2008-2012 will reach 139 Mt CO₂-eq/y (see Figure 1)². A further 243 million CERs are expected to be generated prior to 2008. Thus, almost 940 million credits are expected to be generated by 2012: more than 2 ½ that estimated a year ago.

There are currently more than 670 projects in the pipeline (see Figure 1). By November 16, 2005, 35 of them have already been registered as CDM projects, 22 more have requested registration, and more than 430 have initiated or completed the validation process. These numbers show that large quantities of CDM projects still need to go through the official UNFCCC registration process, which will represent a significant workload for the EB. Some important decisions on functioning of the EB may be needed in the near future to improve its efficiency and provide for a smooth passage of a large quantity of CDM projects through the official registration procedure. Other improvements, e.g. to the methodology approval process, are also possible within the CDM's current framework, and could help reduce the delays currently noted between submitting a baseline/monitoring methodology and it being approved by the CDM EB³. However, these issues are out of the scope of this paper. An efficient EB is imperative to the success of the CDM.

² This figure, and those that follow, assume that all proposed projects are approved by relevant national and international bodies, and that they generate credits at the level expected in the PDD. However, if a host country designated national authority does not approve the project, if the underlying methodology is not approved, or is changed, there is a risk that the total number of credits generated by this portfolio of projects could be reduced.

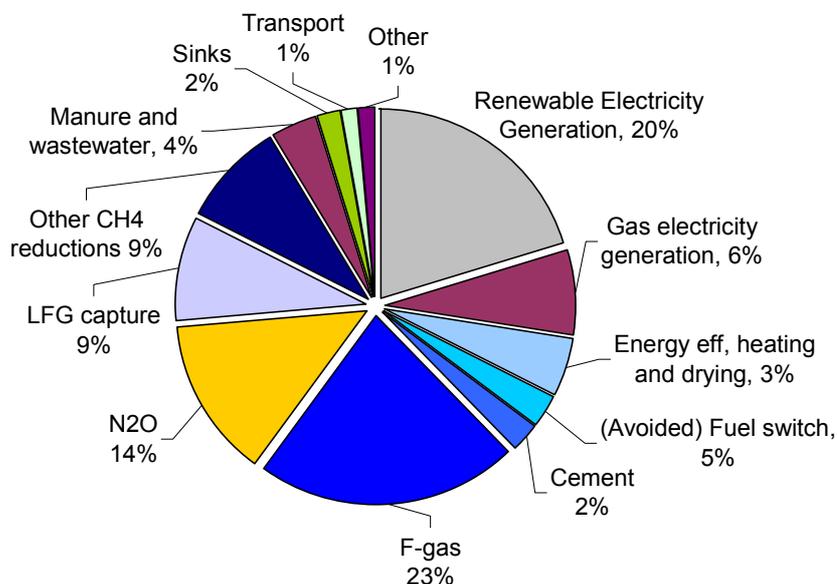
³ There have sometimes been significant delays between submitting baseline/monitoring methodologies to the CDM EB and having such methodologies approved. These delays are often caused by the number of iterations needed to develop a robust baseline methodology: many project participants need to provide 1 or more set of clarifications or revisions to methodologies before they can be approved. Each set of clarifications/revisions is examined by the Meth Panel. Since this body only meets periodically, it can take many months to assess an initial methodology, clarifications to the initial methodology, a revised version of the methodology, and sometimes clarifications to that revision.

Figure 1. Evolution of the CDM portfolio in CO₂ eq/year and number of projects

Source: authors' calculations

The overall trend in the development of the CDM portfolio has not changed since the last report in November 2004 (Ellis and Gagnon-Lebrun, 2004). The majority of the GHG emission reduction credits come from non-electricity projects, with significant shares of the GHG emission reductions achieved by the N₂O, F-gas and landfill gas recovery (LFG) projects. This is explained by the nature of some of the N₂O, F-gas and LFG projects that are able to generate extremely large volumes of GHG emission reductions. For example, 23% of the estimated annual GHG emission reductions from the current CDM portfolio come from nine projects that reduce F-gas emissions. Five N₂O projects contribute another 14% of the estimated GHG emission reductions for the period 2008-2012. Projects that reduce emissions of landfill gas (LFG) also have an important place in the CDM portfolio, accounting for 9% of the estimated emission reductions. Indeed, expected emission reductions from the 9 proposed F-gas reducing projects are more than the combined emission reductions expected from the 321 renewable electricity projects. The total share of electricity projects in annual CDM-related GHG emission reductions is about 20%.

Figure 2 below illustrates the distribution of the expected GHG emission reduction credits by project type. As noted above, N₂O and F-gas reduction projects really stand out as they generate large shares of CERs for a small number of projects.

Figure 2. **Percentage of annual credits by project type, November 2005**

Source: authors' calculations

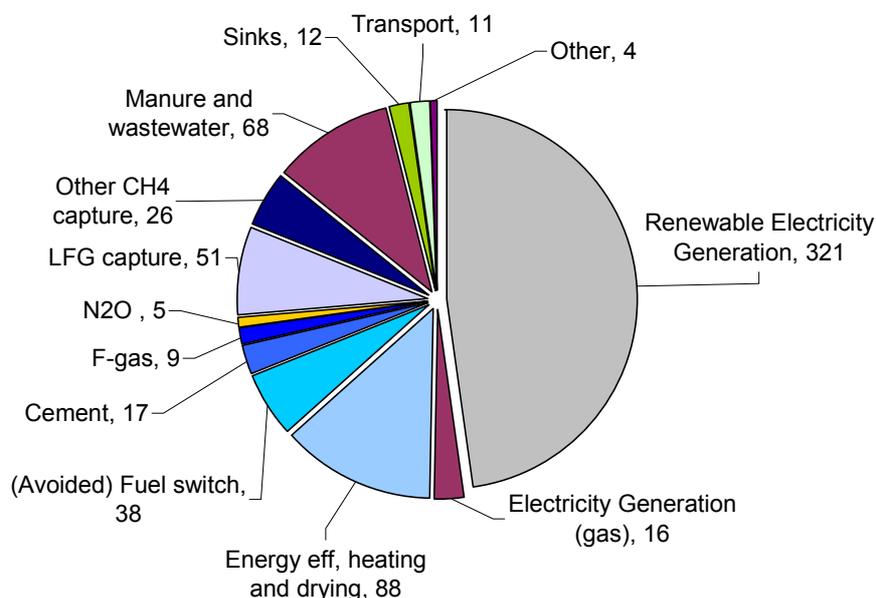
3. Trends in Project Types

The CDM portfolio, including all proposed projects, includes a wide variety of project types (see Figure 3). It is possible to distinguish at least 18 types of projects, with numerous CDM projects initiated in 8 most popular categories such as wind energy, hydro-energy, biomass energy, energy efficiency, industrial fuel switch, land-fills, CH₄ capture, and manure and wastewater management.

The number of projects continues to increase in all project categories. The number of renewable electricity projects in particular has grown substantially with more than 160 renewable electricity projects being proposed between May-November 2005. The number of energy efficiency projects has also tripled in the same period, mainly from relatively small-scale projects in different industrial sectors in India. However, the importance of such projects in the estimated CDM portfolio is small. There are also 50 more manure management/wastewater treatment projects in the same period (mainly in the Philippines, Brazil and Mexico). There has also been a very small increase in the number of new projects in the sequestration and transport sectors, but these project types still account for a very low proportion of the total portfolio (2 and 1% respectively).

During 2005, the largest growth in expected credit generation has come from F-gas reduction projects. Four new F-gas projects (all HFC23-reduction projects) are expected to generate more than 25 million credits per year. New projects that generate electricity from renewable energy accounted for the second largest growth, adding almost 18 million credits/year to the portfolio. Growth in N₂O-reduction and landfill gas projects has also been significant (in terms of expected credit generation, rather than number of projects). This large variation in project sizes between the different project types explains why the picture in terms of numbers of projects (Figure 3) is so different from that in terms of numbers of expected credits (Figure 2).

Figure 3. Number of projects by type, November 2005



Source: authors' calculations

The rapidly growing number of small renewable electricity and energy efficiency projects demonstrates that project developers do not shy away from projects that do not generate large GHG emission reductions. Although these projects have higher abatement costs than some other project types, this can be partly counterbalanced by the auxiliary benefits such as improved regional and/or local economic development, reduced cost of production, introduction of new technologies and policies, improvements of local air quality, and others. Further, the transaction cost is much lower for projects that can use already-approved methodologies – such as for renewable electricity generation⁴.

There are 35 registered CDM projects (to November 17, 2005). These are distributed within 6 categories. 22 of these projects are in renewable electricity generation. Two projects reduce HFC23 emissions and contribute more than half of total GHG emission reduction credits for registered CDM projects. There are also 6 LFG projects 3 manure management projects, one energy efficiency and one fuel switch project registered. The total estimated GHG emission reductions from registered CDM projects (Figure 4) amount to approximately 8.2 Mt CO₂-eq/year.

Three project types really stand out as the most noteworthy in terms of either significant quantity of projects or in their capacity to generate considerable GHG emission reductions. They are the following:

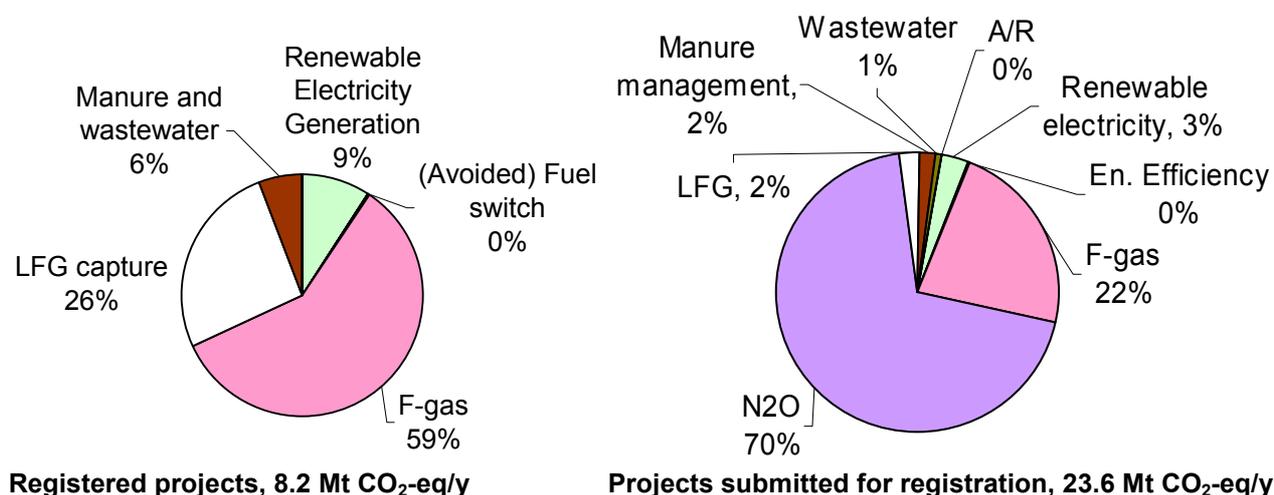
- renewable electricity projects that are by far the most numerous in the CDM portfolio,
- F-gas and N₂O reduction projects in the industrial sector that are low-cost, often extremely large (generating up to 10 million credits/year), and

⁴ Indeed, the two most-used methodologies related to renewable electricity generation. The simplified methodology for small-scale renewable electricity projects (AMS-I.D.) has been used in almost 120 proposed projects (and this number is growing extremely rapidly). The consolidated methodology for renewable electricity generation (ACM0002) has been used in 43 proposed projects to date.

- CH₄-reduction projects. Taken together, these account for the fourth largest slice of the CDM pie (after F-gas, N₂O and renewable electricity projects), and also account for a considerable number of CDM projects. There are several different types of project that reduce methane emissions, including some very large proposed projects reducing emissions during coal or oil production, as well as LFG projects.

Figure 4 illustrates that the relative importance of project types varies markedly between the total CDM portfolio and the projects either registered (35 projects) or requesting registration (24 projects). Indeed, the domination of large end-of-pipe projects is striking for projects in these latter categories. This is particularly striking for industrial N₂O-reduction projects, a relatively new project type (the first methodology for such project types was approved in February 2005). However, it is to be expected that interest is growing in project types where EB-approved baseline methodologies exist and that can generate large volumes of relatively cheap credits with a low investment and relatively short lead-times. Moreover, it would be surprising if the importance of project types such as HFC23 and N₂O reduction from industrial sources did not continue to grow further, in both absolute and relative terms.

Figure 4. **Distribution of credits for registered and proposed CDM projects by project type**



Sources: UNFCCC website and authors' calculations

In addition to projects already registered, by November 2005 more than 430 CDM projects expecting to generate a further 79 Mt CO₂-eq credits per year during 2008-12 had initiated/completed the validation process. This has almost doubled since September 2005. Some – but not all - of these projects have also been submitted for registration. Any project undergoing validation uses already-approved methodologies to estimate their credit generation, and so has no associated “methodology risk”⁵. The Marrakech Accords indicate that projects submitted for registration before 31 December 2005 can generate retroactive credits, i.e. credits from before the date of project registration. The spectacular growth in projects being submitted for validation is likely to be due to project developers trying to meet this deadline.

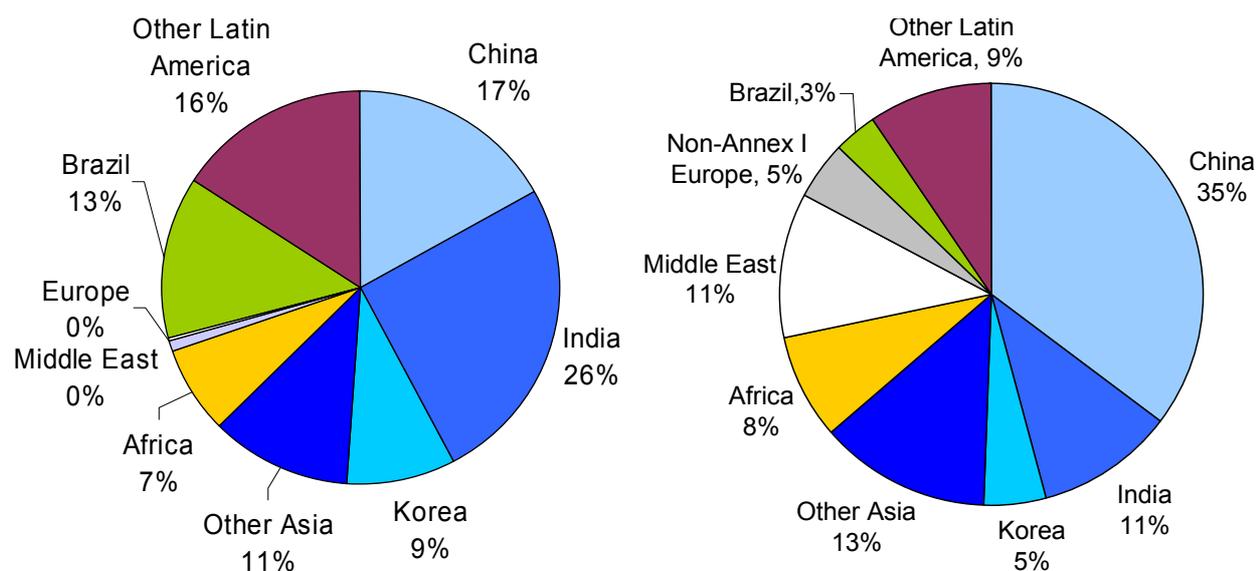
⁵ Unless the EB withdraws a previously-approved methodology.

4. Geographical Distribution of CDM Projects

The geographical distribution of the CDM projects is uneven. More than half of all proposed CDM projects are located in Asia, and almost 40% is in Latin America. Africa, Middle East, Small Island States and Europe host a very small number of projects. Currently 58 countries host CDM projects. India, China and Brazil stand out as the three countries that account for more than half of expected CDM credits and host the largest number of CDM projects. India is currently expecting to host 224 CDM projects, and Brazil 109. Korea⁶ follows in the share of GHG emission reductions, although Korea hosts only 6 CDM projects that are responsible for 9% of the total estimated GHG emission reductions (see Figure 5). Figure 5 also illustrates that India, Brazil and Korea account for a much larger share of the CDM portfolio than of global energy-related CO₂ emissions. Conversely, China and the Middle East currently account for a significantly smaller share.

Asia also dominates the number of credits expected to be generated from registered projects, accounting for 65% of the total (indeed, projects in India account for 43% of the total). Korea and Brazil account for the next largest shares of GHG emission reductions from registered projects. Africa accounts for just over 2%.

Figure 5. Geographical split of expected annual CDM credits (in total CDM portfolio) and non-Annex I CO₂ emissions



Sources: authors' calculations and IEA 2004

The geographical distribution of CDM projects has changed significantly during 2005, both at a regional and a country-by-country level. India still dominates the CDM market in terms of supply of credits. However, China's importance has grown significantly as its portfolio now includes two very large HFC23-reducing projects (expecting to generate 5.8 and 10.1 million credits per year respectively). The proportion of non-Annex I CO₂ emissions from China remains significantly larger than the proportion of CDM credits expected to be generated from projects in China. Nevertheless, this could change rapidly if the 90 million

⁶ There is significant interest in developing CDM projects in China. However, much less information about proposed projects that have not yet been submitted to the UNFCCC is available than in some other countries. The importance of China may therefore be slightly under-represented here.

CER generation potential (Lu 2004) of HFC23-reducing projects in China is tapped further, or if projects reducing N₂O emissions from nitric or adipic acid production are developed.

Brazil and Korea are also still very significant countries in supplying the GHG emission reductions. However, there is one notable change in the list of the top 10 countries. Last year, projects in Mexico were expected to provide less than 1% of the CDM GHG emission reduction credits: it is now anticipated that Mexico will supply more than 7% of the expected estimated CERs, partly due to a large HFC23-reducing project (the only such project not in Asia).

Together the top 10 countries (in terms of hosting the largest shares of expected CERs) host 70% of the proposed CDM projects and are expected to supply 83.1% of all estimated GHG emission reductions (see Table 1). AOSIS countries host 9 proposed CDM projects, representing 2 Mt CO₂-eq/y or 1.4 % of currently expected credits (predominantly from a large sequestration project in Belize).

Table 1. **Top 10 countries**

	Yearly credits (kt CO ₂ -eq/y)	% of total reductions
India	35092	25.3
China	23420	16.9
Brazil	18471	13.3
Korea	12296	8.9
Mexico	9189	6.6
Vietnam	4668	3.4
Indonesia	3336	2.4
Chile	3012	2.2
Nigeria	2911	2.1
Thailand	2730	2.0
TOTAL	115,128	83.1

Out of 58 CDM host countries, 12 do not yet have a DNA. In addition to undergoing a validation process for the proposed projects, these countries will also need to go through a process of setting up an administrative structure that will be responsible for approving CDM projects.

5. References

Information on proposed CDM projects was obtained from various sources, principally:

- <http://cdm.unfccc.int/Projects/Validation> and
- <http://cdm.unfccc.int/methodologies>.

Other sources include host country Designated National Authorities, e.g. <http://www.envfor.nic.in/cdm/>, investor country information, e.g. <http://global.finland.fi/english/projects/cdm/>, information from carbon funds, e.g. <http://www.carbonfinance.org/> or organisations involved in developing CDM projects, e.g. <http://www.southsouthnorth.org/>.

Ellis, Jane and Gagnon-Lebrun, 2004, *The CDM Portfolio: Update on non-Electricity Projects*, <http://www.oecd.org/dataoecd/25/32/34008610.pdf>

International Energy Agency, 2004, *CO₂ Emissions From Fuel Combustion, 1971-2002*, Paris

Lu, Guoqiang, 2004, *Incineration of HFC-23 Waste Streams CDM Projects in China, Opportunities in the project development and cooperation*

6. Glossary

AOSIS	Alliance of Small Island States
CDM	Clean Development Mechanism, defined in Article 12 of the Kyoto Protocol.
CER	Certified Emission Reduction (credits generated by CDM project activities)
CH ₄	Methane
CO ₂	Carbon dioxide
DNA	Designated National Authority
EB	The Executive Board of the Clean Development Mechanism
GHG	Greenhouse gas
GWP	Global Warming Potential
HFC	Hydrofluorocarbons
LFG	Landfill Gas
Mt	Million (metric) tons
N ₂ O	Nitrous oxide
OECD	Organisation for Economic Co-operation and Development
PDD	Project design document (form used to describe a proposed CDM project)
UNFCCC	United Nations' Framework Convention on Climate Change