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# **THE DEVELOPING CDM MARKET: MAY 2006 UPDATE**

Jane Ellis and Katia Karousakis, OECD  
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**Jane Ellis and Katia Karousakis, OECD**

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## FOREWORD

This document was prepared by the OECD and IEA Secretariats in April-May 2006 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.

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OECD and IEA information papers for the Annex I Expert Group on the UNFCCC can be downloaded from:  
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## Executive Summary

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

- The CDM portfolio is growing rapidly. Projects currently in the pipeline are expected to generate more than 1.3 billion credits by 2012: equivalent to 24-33% of the projected “commitment gap” of OECD Parties to the Kyoto Protocol (IEA, 2005). This illustrates the potential for the CDM to assist Annex I countries to meet their commitments under the Kyoto Protocol.
- There are now nearly 1000 CDM projects in the pipeline<sup>1</sup> - an increase of almost 50% in less than 6 months. Expected credit generation has also increased by more than 35% in the same time period. These proposed projects are located in 69 countries.
- The number of registered CDM projects has also grown rapidly over the last few months. By May 2, 2006, 172 CDM projects had been registered, and a further 53 projects submitted for registration. It is estimated that GHG emission reductions from registered CDM projects will generate 364 million credits prior to 2012.
- In addition to the already-registered CDM projects, a large number of proposed CDM projects (741) have initiated or completed the validation process. These projects expect to generate a further 146 Mt CO<sub>2</sub>-eq credits by 2012. Any project undergoing validation uses already-approved methodologies to estimate their credit generation, and therefore has no “methodology risk”.
- Almost half (49%) of all proposed CDM projects are in the electricity sector – predominantly renewable electricity projects. However, many renewable energy projects are small, so the total share of expected credits from renewable electricity is much lower: less than 18%. These projects represent the most widespread type of CDM projects, occurring in 43 countries. There are also a growing number of large projects involving electricity generation from natural gas.
- More than 60% of credits in the current CDM pipeline are expected to come from CDM projects that address high GWP gases:
  - Many of these projects are very large-scale, and expect to generate 1-10 million CERs/y.
  - Proposed CDM projects that reduce emissions of HFC23 and N<sub>2</sub>O are expected to supply 41% of projected annual CERs: the largest “slice” of credits.
  - Projects in the waste sector, and other proposed methane-reducing projects, represent 20% of the total estimated CERs in the current portfolio.

The geographical distribution of proposed CDM projects continues to be uneven. There has been strong growth in China – largely due to its 5 proposed and 2 registered HFC23-reduction projects. China accounts for the largest share of expected credits (29.5%), although India leads in terms of the expected numbers of projects. Together, China and India account for 57.5% of the total expected CDM credits, with Brazil, Korea, Mexico and S. Africa accounting for a further 25.6%. Africa’s share of the CDM portfolio has continued to grow - mainly due to a very large fuel switching project in South Africa, and some gas-recovery projects in Nigeria and Equatorial Guinea.

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<sup>1</sup> 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

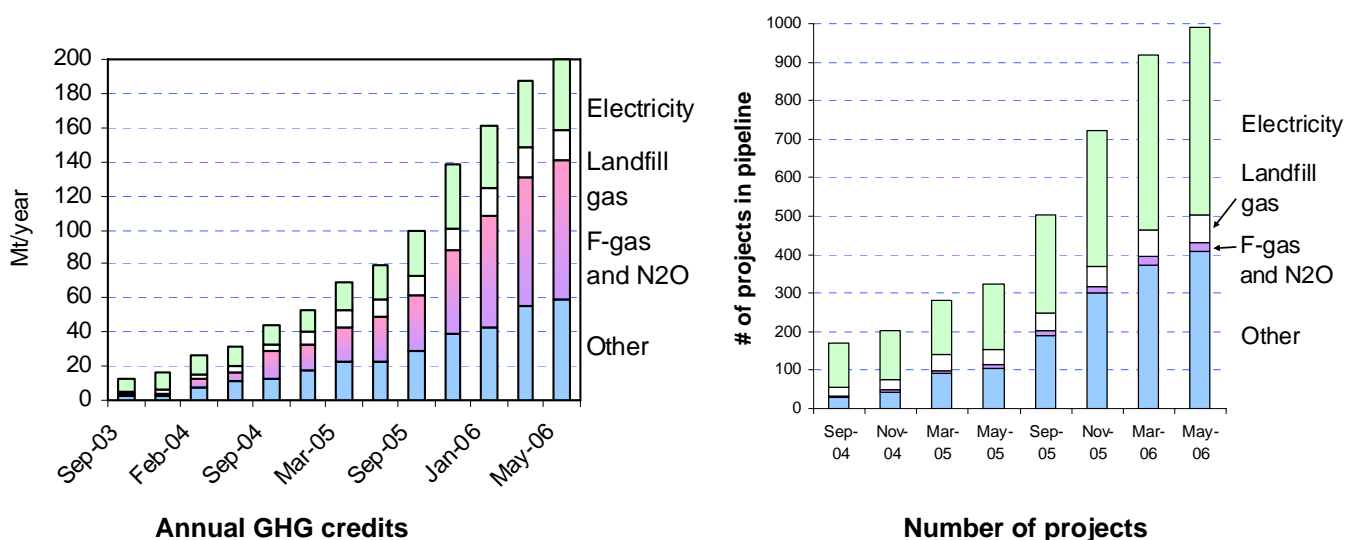
This paper presents and analyses the data on proposed CDM projects, including their types, estimates of CO<sub>2</sub> (or CO<sub>2</sub>-equivalent) emission reductions, and the projects' geographic distribution. The data is based predominantly on publicly available project design documents (PDDs) submitted 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 1.7% of Annex I Parties' 1990 greenhouse gas emissions. By May 2, 2006, 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 200 Mt CO<sub>2</sub>-eq/y (see Figure 1)<sup>2</sup>. A further 330 million CERs are expected to be generated prior to 2008. Thus, more than 1.3 billion credits are expected to be generated by 2012: double the amount estimated 8 months ago.

There are currently nearly 1000 projects in the pipeline (Figure 1). By May 2, 2006, 172 have already been registered as CDM projects, 53 more have requested registration, and more than 740 have initiated or completed the validation process. There has been a sharp increase in the number of registered CDM projects since COP/MOP1. However, these numbers show that there are still large quantities of CDM projects that need to go through the official UNFCCC registration process. This represents a significant workload for the EB, even though it will be helped in this task by external experts as part of the EB's registration teams.

**Figure 1. Evolution of the CDM portfolio in CO<sub>2</sub> eq/year and number of projects**



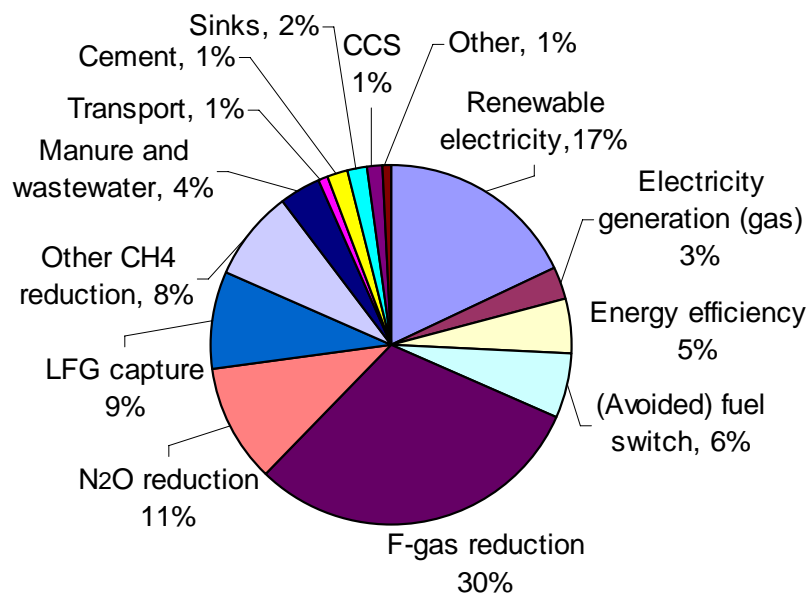
Source: authors' calculations

<sup>2</sup> 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.

The overall trend in the development of the CDM portfolio has not changed since the last report in November 2005 (Ellis and Levina, 2005). The majority of the GHG emission reduction credits come from non-electricity projects, with significant shares of the GHG emission reductions achieved by the F-gas, N<sub>2</sub>O and landfill gas recovery (LFG) projects. This is because these project types are able to generate extremely large volumes of GHG emission reductions. For example, 30% of the estimated annual GHG emission reductions from the current CDM portfolio come from 17 projects that reduce F-gas emissions. These are mainly projects that reduce emissions of HFC23 from HCFC22 production, but also include a couple of projects reducing PFC emissions and one reducing emissions of SF<sub>6</sub>. Nine N<sub>2</sub>O projects contribute another 11% of the estimated GHG emission reductions for the period 2008-2012. Projects that reduce emissions of methane (from landfills, fossil fuel production, waste water, manure or other project types) also have an important place in the CDM portfolio, accounting for 20% of the estimated emission reductions. In contrast, the proportion of expected credits from renewable electricity projects has declined somewhat, to 17% of the total. Indeed, expected emission reductions from the 17 proposed F-gas reducing projects are more than the combined emission reductions expected from the 466 renewable electricity projects.

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

**Figure 2. Percentage of annual credits by project type, April 2006**



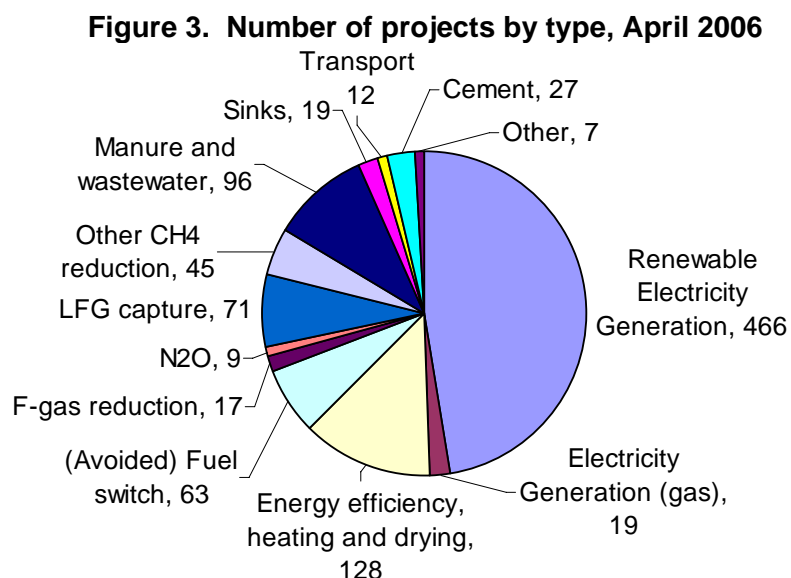
Source: authors' calculations



### 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, landfills, CH<sub>4</sub> 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 130 renewable electricity projects being proposed between November 2005 and April 2006. There are also 36 more energy efficiency projects, and a continued steady increase in new landfill gas and manure management projects. However, as during 2005, the largest growth in expected credit generation has come from F-gas reduction projects. These projects accounted for almost half of the increase in expected credits compared to November 2005. In contrast, renewable electricity projects accounted for 11% of the expected credit volume added since November 2005, and the importance of this sector is therefore continuing to diminish. The 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).



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 generation<sup>3</sup>.

<sup>3</sup> 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 200 proposed projects (and this number is growing extremely rapidly). The consolidated methodology for renewable electricity generation (ACM0002) has been used in 84 proposed projects to date.

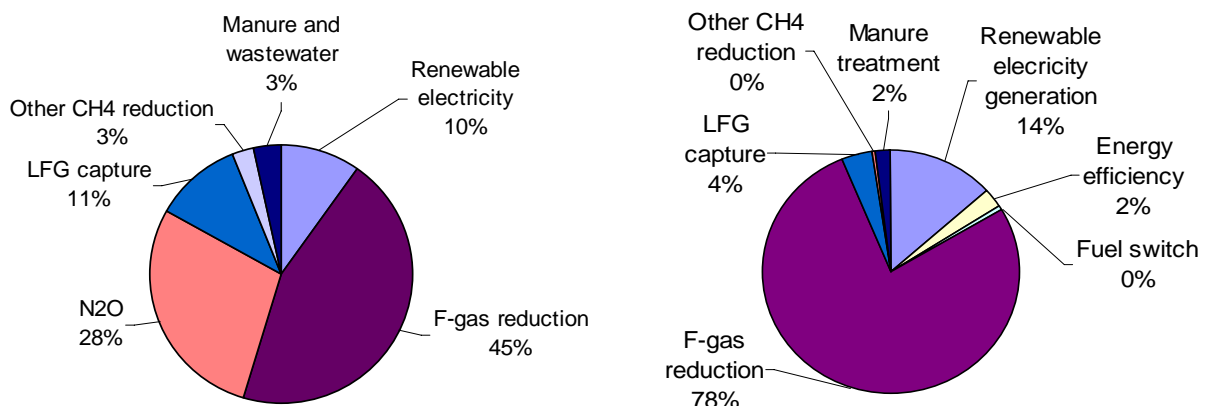
There are 172 registered CDM projects (as of May 2, 2006). These are distributed within 11 categories. 104 of these projects are in renewable electricity generation. Five projects reduce HFC23 emissions and contribute more than half of total GHG emission reduction credits for registered CDM projects. There are also 20 landfill gas (LFG) projects, 19 manure management projects, 9 energy efficiency and 4 fuel switch projects registered. The total estimated GHG emission reductions from registered CDM projects (Figure 4) amount to approximately 53.6 Mt CO<sub>2</sub>-eq/year.

Three project types are particularly 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 N<sub>2</sub>O reduction projects in the industrial sector, that are low-cost and often extremely large (generating up to 10 million credits/year), and
- CH<sub>4</sub>-reduction projects, that taken together account for the third largest slice of the CDM “pie” in terms of credits (after F-gas and N<sub>2</sub>O-reduction projects), and also account for a considerable number of CDM projects. Several different types of projects reduce methane emissions, including some very large proposed projects reducing emissions during coal or oil production, as well as LFG projects and projects reducing emissions from wastewater or manure treatment.

Figure 4 illustrates that the relative importance of project types varies markedly between the total CDM portfolio and the projects either registered (172 projects) or requesting registration (53 projects). Indeed, the dominance of F-gas projects is striking for projects in these latter categories.

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



**Registered projects, 53.6 Mt CO<sub>2</sub>-eq/y**

**Projects submitted for registration, 29.3 Mt CO<sub>2</sub>-eq/y**

Sources: UNFCCC website and authors' calculations

In addition to projects already registered, by the end of April 2006 more than 741 CDM projects expecting to generate a further 146 Mt CO<sub>2</sub>-eq credits per year during 2008-12 had initiated or completed the validation process. Some of these projects have also been submitted for registration. Any project undergoing validation uses already-approved methodologies to estimate their credit generation, and therefore has no associated “methodology risk”<sup>4</sup>.

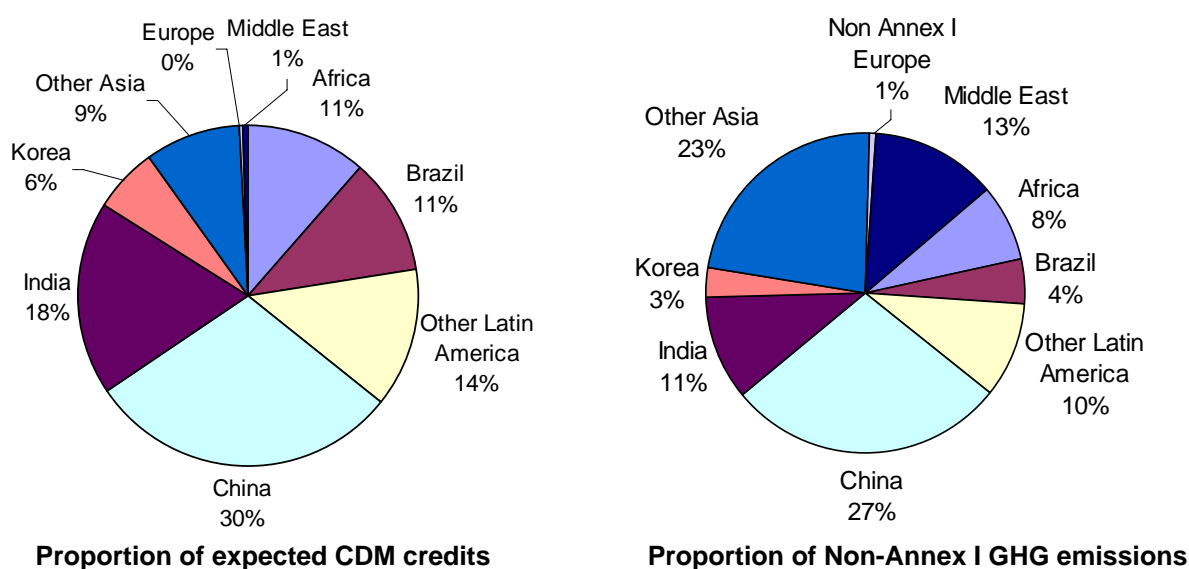
<sup>4</sup> Unless the EB withdraws a previously-approved methodology.

#### 4. Geographical Distribution of CDM Projects

The geographical distribution of the CDM projects remains uneven. More than half of all proposed CDM projects are located in Asia, and almost 30% in Latin America. Africa, Middle East and Europe host a very small number of projects. Currently 69 countries host CDM projects. China, India, 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 350 CDM projects, and Brazil 157. China is expecting to host only 70 CDM projects but these account for 30% of total GHG emissions reductions as many of them are large-scale projects (particularly to reduce emissions of HFC23). Korea follows in the share of GHG emission reductions, although Korea hosts only 9 CDM projects that are responsible for 6% of the total estimated GHG emission reductions (see Figure 5). Figure 5 also illustrates that India, Brazil, Korea and 'Other Asia' account for a much larger share of the CDM portfolio than of global energy-related GHG emissions. The importance of Vietnam in the CDM portfolio is particularly notable. Conversely, the Middle East currently accounts for a significantly smaller share.

Asia also dominates the number of credits expected to be generated from registered projects, accounting for 68% of the total (indeed, projects in China account for 31% of the total). Brazil and Korea account for the next largest shares of GHG emission reductions from registered projects. Africa accounts for just over 0.5%.

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



Sources: authors' calculations and WRI 2006

The geographical distribution of CDM projects has changed significantly during 2006, both at a regional and a country-by-country level. In particular, China's share of the CDM "pie" has grown very rapidly – largely due to the recent approval by its designated national authority of 5 large-scale HFC23-reduction projects – and China now dominates the CDM market in terms of expected supply of credits. India is the second largest expected supplier of credits.

Brazil and Korea remain significant countries in supplying the GHG emission reductions and Mexico remains fifth within the top 10 countries. Another notable change is that South Africa now expects to be the sixth largest supplier of credits – mainly due to a very large-scale proposed project involving a change of

feedstocks. A few, large, proposed projects to reduce emissions of natural gas are the main reason why Nigeria is now relatively important in terms of expected CER generation. Vietnam's place in the "top 10" is also due to a couple of large proposed projects – including one that involves carbon capture and storage.

Together the top 10 countries (in terms of hosting the largest shares of expected CERs) host 702 (71%) of the proposed CDM projects and are expected to supply 81.0% of all estimated GHG emission reductions (see Table 1). By contrast, Small Island States countries host 13 proposed CDM projects.

**Table 1. Top 10 countries**

|              | <b>Yearly<br/>credits<br/>(kt CO<sub>2</sub>-eq/y)</b> | <b>% of total<br/>reductions</b> |
|--------------|--|----------------------------------|
| China        | 58,925   | 29.5                             |
| India        | 36,257   | 18.2                             |
| Brazil       | 22,131   | 11.1                             |
| Korea        | 11,013   | 5.5                              |
| Mexico       | 9,679  | 4.8                              |
| S. Africa    | 8,976  | 4.5                              |
| Nigeria      | 4,604  | 2.3                              |
| Argentina    | 3,956  | 2.0                              |
| Vietnam      | 3,840  | 1.9                              |
| Chile        | 3298   | 1.8                              |
| <b>TOTAL</b> | <b>163,051</b>   | <b>81.0</b>                      |

## 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/>.

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## 6. Glossary

|                  |  |
|------------------|--|
| AOSIS            | Alliance of Small Island States  |
| CDM              | Clean Development Mechanism, defined in Article 12 of the Kyoto Protocol.  |
| CCS              | Carbon Capture and Storage   |
| CER              | Certified Emission Reduction (credits generated by CDM project activities) |
| CH <sub>4</sub>  | Methane  |
| CO <sub>2</sub>  | 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 <sub>2</sub> 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                     |