

## Achieving 'Green Growth' in a carbon constrained world

By Jodie Keane and Gareth Potts

**T**his Background Note assesses the options available to developing countries in a 'carbon constrained' world. The term 'carbon constrained' refers both to binding emissions targets set at the multilateral level and to the constraints imposed by the high price of oil, which are particularly severe for developing countries. It begins by discussing the emissions reductions mechanisms included within the Kyoto Protocol and the ways in which they can contribute to 'green growth' – economic growth with reduced or neutral greenhouse gas (GHG) emissions.

A brief overview of emissions traded through the Clean Development Mechanism (CDM) is followed by an analysis of the geographical distribution of CDM projects and types. Although it is difficult to assess the sustainable development benefits of the CDM, it is clear that some developing countries have gained. Despite this, the future success and continued growth of the CDM is under threat due to the uncertainty surrounding the second commitment period of the Kyoto Protocol.

The second section of this Background Note outlines the current state of play of negotiations. Assuming the CDM continues beyond 2012, some of the new initiatives and reforms that are likely to shape the next climate change regime are discussed. This includes the adaptation fund levied at 2% of all CDM transactions (excluding LDCs) agreed at the Climate Change Conference held in Bali, December 2007, sponsored by the United Nations Framework Convention on Climate Change (UNFCCC). The latest round of UN sponsored negotiations in Accra, Ghana (21-27 August 2008) constitutes the third major negotiating session this year; to be followed by a further conference in Poznan, Poland (1-12 December

2008). Negotiations are expected to conclude at the Copenhagen conference of December 2009.

### The Kyoto Protocol

#### Origins and signatories

The Kyoto Protocol is an amendment to the UNFCCC, which emerged out of the Rio Earth Summit in 1992. All signatories to the UNFCCC are referred to as Annex 1 countries and all, with the exception of Belarus and Turkey, are also known as Annex B countries, as they were listed in Annex B of the treaty (see Box 2). The Kyoto Protocol, which was signed in 1997, committed the 39 Annex B parties to reduce overall greenhouse gas (GHG) emissions by 5.2% compared to 1990 levels (UN 1998). Although the Kyoto Protocol was signed by most countries in 1997, it did not become active until February 2005 when the number of signatories reached 55 – the number required to bring it into force, binding signatories to its emissions reductions targets. The treaty required that these countries

#### Box 1: A guide to acronyms

CER	Certified Emission Reduction
CDM	Clean Development Mechanism
CO <sub>2</sub>	Carbon dioxide
CO <sub>2</sub> e	CO <sub>2</sub> equivalent
DOE	Designated Operational Entity
ERU	Emission Reduction Unit
ETS	Emissions Trading Scheme
GHG	Greenhouse gas
HFC	Hydrofluorocarbon
JI	Joint Implementation
kCER	One thousand CERs
LDCs	Least-developed countries
N <sub>2</sub> O	Nitrous Oxide
REDD	Reduced emissions from deforestation and degradation
UNFCCC	United Nations Framework Convention on Climate Change

**Box 2: Signatories of the Kyoto Protocol (Annex B countries and the EC)**

Australia	Finland	Liechtenstein	Russian Federation
Austria	France	Lithuania	Slovakia
Belgium	Germany	Luxembourg	Slovenia
Bulgaria	Greece	Monaco	Spain
Canada	Hungary	Netherlands	Sweden
Croatia	Iceland	New Zealand	Switzerland
Czech Republic	Ireland	Norway	Ukraine
Denmark	Italy	Poland	UK
Estonia	Japan	Portugal	USA
The EC	Latvia	Romania	

should account for at least 55% of global carbon dioxide (CO<sub>2</sub>) emissions (at the 1990 level). The ratification by the Russian Federation in November 2004 allowed these conditions to be met. As of December 2007, the USA was the only party listed in Annex B that had not ratified the Kyoto Protocol.

**The Protocol and green growth**

The Kyoto Protocol created three ‘flexibility mechanisms’ to help Annex B countries meet their emissions reduction targets.

- 1. Emissions Trading:** allows Annex B countries to purchase excess emission allowances from other Annex B countries;
- 2. Joint Implementation (JI):** allows Annex B countries to offset their own emissions through the purchase of Emission Reduction Units (ERUs) from offset projects in other Annex B countries; and
- 3. The Clean Development Mechanism (CDM):** allows Annex B countries to offset their own emissions through the purchase of Certified Emission Reductions (CERs) from offset projects in non-Annex countries – developing countries that are signatories to the UNFCCC, none of whom have emission reduction targets.

The CDM is of particular interest as it was designed to help developing countries pursue sustainable development with additional investment from developed and industrialised countries. As such, the CDM is the principal tool within the climate regime established in 1997 to encourage trade in CERs between developing and developed countries, enabling developing countries to tap into a new market and source of income and achieve a form of ‘green growth’. Theoretically, the binding emission targets of the Kyoto Protocol, coupled with the CDM, make it possible for both developed and developing countries to achieve green or greener economic growth: through reducing emissions in developed countries and incentives for investments to reduce emissions in developing coun-

tries (which count towards national and international targets).

**Emissions trading and the CDM**

There are a multitude of emissions reductions credits that may fulfil the national targets of a number of Annex B countries. Certified Emissions Reductions (CERs) issued through the CDM differ in that they are fully convertible in national emissions trading schemes, such as the European Emissions Trading Scheme (ETS).

A single CER is issued to a CDM project for every tonne of CO<sub>2</sub>e that it offsets. The CDM works by allowing Annex 1 countries (and businesses within them) to buy certified emission reductions (CERs) originating from the developing world, as opposed to cutting emissions at home. The additionality criterion of the CDM requires that for a CDM project to be registered, developers must be able to show that the project will provide additional emission reductions, i.e. that the project would not have taken place without the CDM.

CDM projects must be validated before they can be registered as delivering certified emissions reductions. Designated Operational Entities (DOEs) verify that CDM projects have delivered offsets and reduced emissions. Such entities are accredited by the CDM Executive Board and validate standard CDM projects according to the Board’s guidelines. Project developers are subsequently issued with CERs according to the volume of greenhouse gases offset, which they can then sell in the carbon market. The carbon market encompasses a number of different actors. But the institutional and legal framework of global carbon market – of which the CDM plays a crucial role – is set out by the UNFCCC.

**Market value and volume of transactions**

It is fair to say the ETS has been vital for the success of the CDM to date. Approximately 90% of all JI and CDM CERs sold in 2007 went to European buyers. The ETS is a cap and trade system that has been operating since

2005. It places a limit on the CO<sub>2</sub> output of European businesses operating in certain heavy industries and is expected to include additional GHGs in its second phase (2008-2012). Although the growth of the emissions traded has been impressive, the ETS and CDM are currently trading only around 0.5% of annual GHG emissions. Global anthropogenic GHG emissions are in the region of 49 billion tonnes of CO<sub>2</sub>e per annum (IPCC 2007c), calculated on the basis of emissions in 2004. According to Nordhaus (2006), the Kyoto Protocol covers 30% of global emissions, while the ETS accounts for approximately 8%. The market for emissions reductions is large, growing and potentially huge.

The value of primary CDM transactions was \$7.4 billion in 2007, up 28% from 2006 (Capoor and Ambrosi, 2008). The volume of transactions in the ETS was in the region of 2 billion tonnes of CO<sub>2</sub> in 2007, up 87% on 2006. The volume of trade in the CDM market was 551 million tonnes of CO<sub>2</sub>e in 2007, up 3% on 2006. In 2007 and early 2008 the average price for a CER was \$13.60, compared to \$10.60 in 2006 and \$7.20 in 2005 (Capoor and Ambrosi 2007, 2008).

### Geographical distribution of CDM projects

Over half of all registered projects are based in either India or China, with only 2% located in sub-Saharan Africa. This bias looks set to become even more marked: of the 2,567 CDM projects at the validation stage or requesting registration as of August 2008, 43% were in China, almost double the amount of the nearest country, India. Only 1% of forthcoming

### Box 3: Additionality criterion

If a factory wishes to establish an energy supply from a renewable project, to register as a CDM project, the companies involved must demonstrate that they would not have gone ahead without the CDM project. That is, developers are not using the project to simply to obtain additional financial gains through selling CERs onto the carbon market. Determining the motivations of project developers will, inevitably, be something of a grey area.

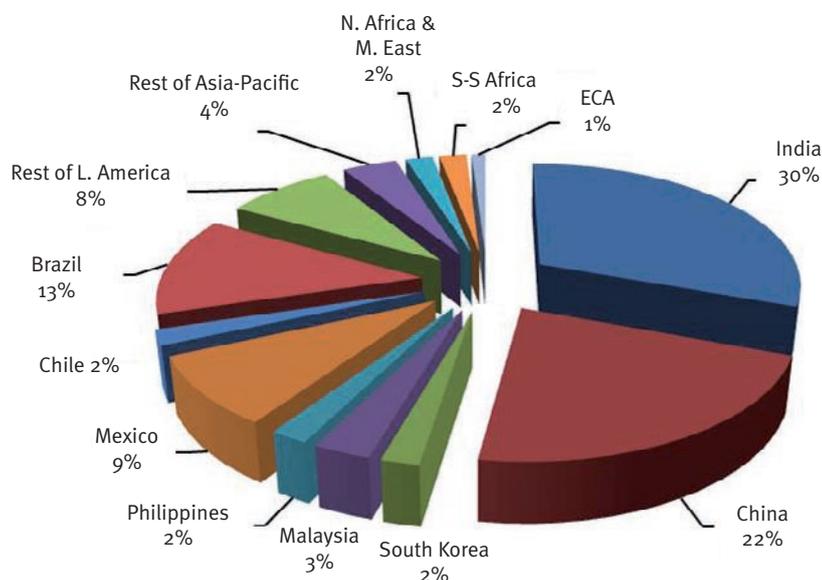
projects will be located in sub-Saharan Africa.

China has supplied the greatest number of CERs to the market every year since 2005-2006, while India's relative share of CERs supplied has declined dramatically (Figure 2). In 2007 China accounted for 73% of total CER supply, providing 402 million CERs to the market (Capoor and Ambrosi 2008).

Hydro and biomass energy projects (including biofuels) have been the most common project type to date, each accounting for 22% of the total of 1,133 registered projects. But such projects do not bring big wins in terms of the number of CERs issued. Most CERs issued have been from Hydrofluorocarbon (HFC) or nitrous oxide (N<sub>2</sub>O) projects (54% and 19% respectively). Although these industrial gas projects account for just 5% of total registered CDM projects, they account for 73% of CERs issued to date.

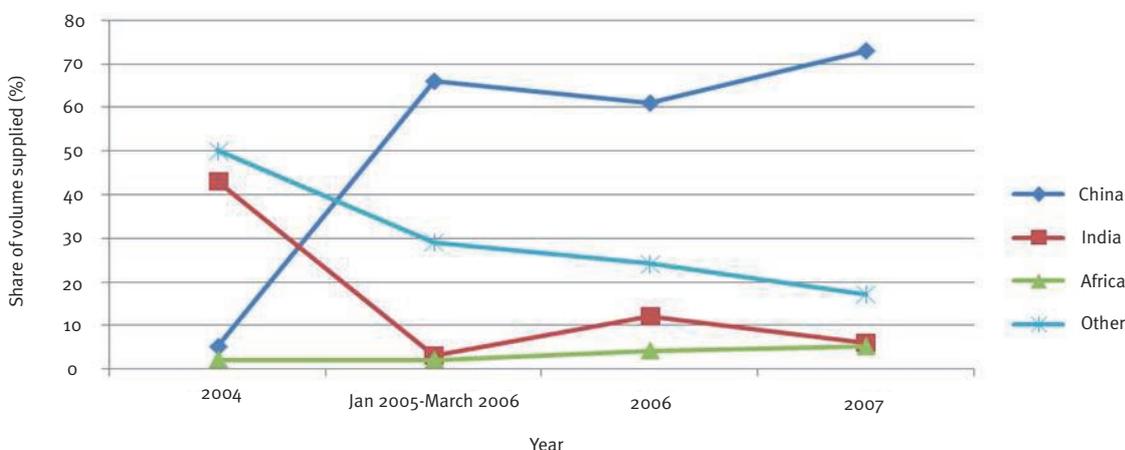
However, the share of industrial gas projects (HFC and N<sub>2</sub>O) has declined recently, from around 60% of total CER supply in 2005-6, to under 10% in 2007, as shown in Figure 3. The share of clean energy CDM projects increased from a low of just over 10% in

**Figure 1: Location of registered CDM projects to date (up to August 2008)<sup>4</sup>**

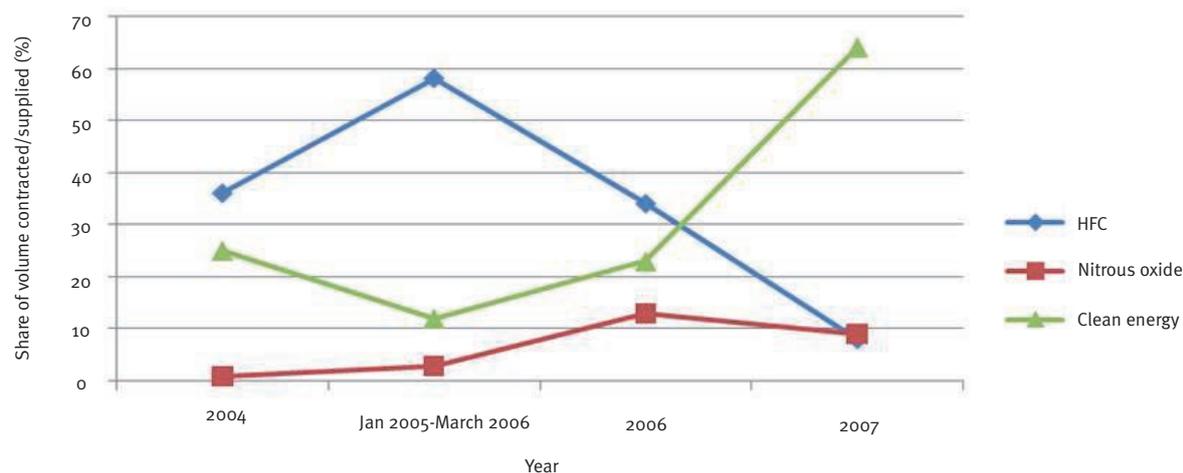


Source: adapted from UNEP Risoe (2008)

**Figure 2: Sources of CER supply by region (2004-2007)**



**Figure 3: Sources of CER supply by CDM project type 2004-2007**



Source: adapted from Capoor and Ambrosi (2008), (2007) and (2006).

2005-6 to 64% of total CER supply in 2007. The figures for 2004 and for January 2005 to March 2006 are based on the share of volume contracted, while figures for 2007 and 2007 are based on the share of volume supplied.

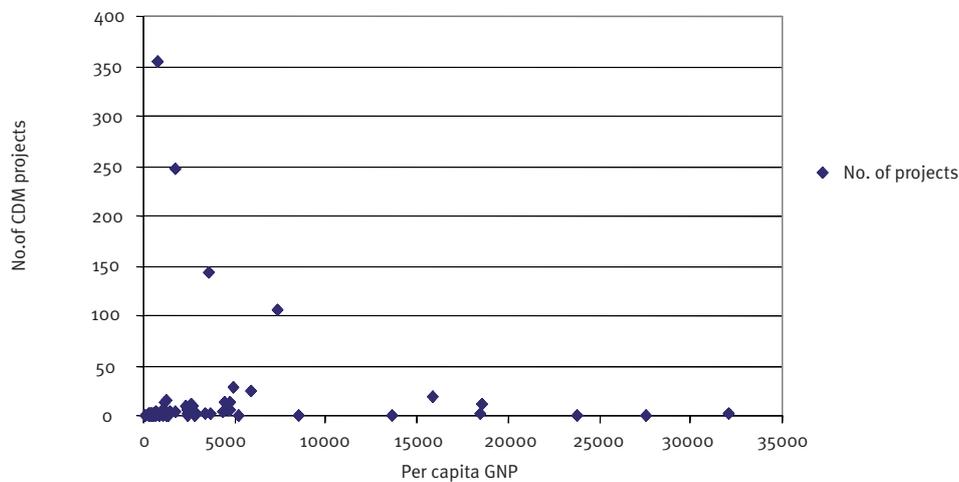
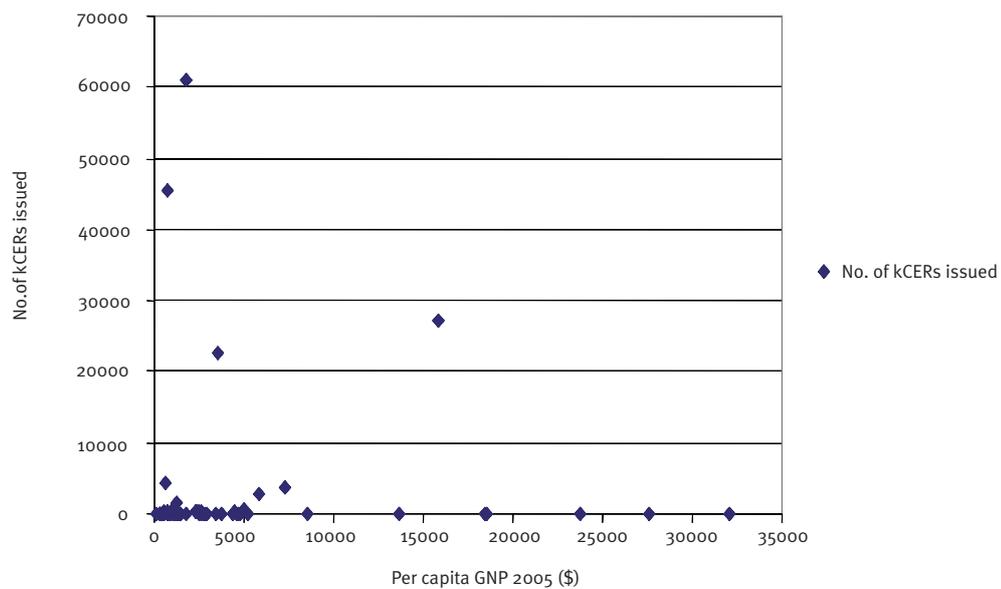
Clean energy projects are not as reliant on the existence of heavy industries and thus, in theory, can be implemented in many more countries. This category includes those projects dealing with energy efficiency and/or fuel switching, such as hydro, wind, biomass (including biofuels) and other renewable energies. Biofuels are arguably the most controversial renewable energy source.

Capoor and Ambrosi (2008) concede that the controversy about the energy balance of biofuels derived from maize in the United States has spilled over to the CDM. There is no approved CDM methodology for biofuels derived from other crops or plants, such as sugar cane: that is, the methodology for verifying GHG

emissions offset (since land may have been cleared to produce the biofuel crop). Without an approved methodology, there is a risk that biofuels may lose out relative to other 'clean' energy types. This may have negative implications for some producers in developing countries. As a result of concerns over the GHG pathways of biofuels the EU has adopted sustainability criteria. The GHG emission saving from the use of biofuels and other bioliquids shall be at least 35%, applicable from 1 April, 2013 (EC 2008a). The European Commission will report on the requirements of a 'sustainability scheme' for biomass energy uses by 31 December, 2010.

**CDM successes to date**

Larger developing countries such as China, India, and Brazil may have been able to tap into the CDM to a greater extent than other developing countries because within they have a number of existing indus-

**Figure 4: Number of CDM Projects and GNP per capita \$ (2005)****Figure 5: Number of kCERs issued and GNP per capita \$ (2005)**

Source: UNEP (accessed August 2008) and WDI.

tries that require ‘cleaning up’, with emissions ready to be offset. The CDM could be considered a success for these countries, as not only are their industries likely to be less polluting and more energy efficient as a result of participation, project developers are also likely to have gained financially by selling CERs issued onto the carbon market.

Although larger and middle income developing countries have been the main participants in the CDM to date, a look at the number of CDM projects registered within country and per capita GNP (Figure 4) reveals that there is no clear relationship (correlation of -0.05). The same is true for those awaiting validation and registration (0.06) and between the number of CERs supplied by country and per capita

GNP (0.00) (Figure 5). We know that China, Brazil, Mexico and India have participated in the CDM to a greater extent than other developing countries, but we also know that clean energy projects are, increasingly, outstripping industrial gas projects – which may be more accessible to more developing countries and may account for this result.

## The post-2012 climate change regime

### Emissions targets

The second Kyoto commitment period is being negotiated and is scheduled to run from 2012-2016. The Bali conference at the end of 2007 provided the best indication so far of the possible content of the succes-

tor treaty, with the EU pushing for a commitment of 25-40% cuts from the industrialised states by 2020. However, in the face of opposition from other states such as the USA, Canada and Japan, the final declaration of the Bali conference omitted any precise figure for emission cuts.

### **The European Emissions Trading Scheme**

The EU is attempting to use a form of extra-territoriality to exert pressure for a new set of targets. Its ETS Directive of January 2008 (EC 2008b) states that if no satisfactory international agreement is reached, the amount of CERs allowed into the ETS from 2013 will be limited to the 2008-2012 level of 1,400 million tonnes. It has made clear that: “additional use of CERs and ERUs should be provided for once there is an international agreement on climate change [post-2012], from parties which have concluded that agreement” (2008b:17-18).

### **Will agreement be reached?**

The targets set out in Annex B of the Kyoto Protocol were intended to be met by 2012 through emissions trading. A failure to agree emissions reduction targets after 2012 will remove the need for carbon offsetting and, hence, the CDM. Although this worst case scenario seems highly unlikely, there are widespread concerns over the future level of demand for CERs: the CDM is driven by government targets. The uncertainty of the post 2012 climate change regime may constrain further investment in CDM projects, which may stall the continued growth of clean energy projects.

### **Achieving Green Growth in a carbon constrained world: mitigation and adaptation?**

Future growth in many developing countries, particularly low income and least developed, will depend on their ability to adapt to climate change. But the Kyoto protocol and mechanisms such as the CDM and JI were designed for mitigation of emissions to reduce climate change, not adaptation to climate change. Thus the availability of funds to enable developing countries to adapt to climate change is a major concern.

It was agreed at the Bali conference that a 2% levy on all CDM transactions could be channelled into an adaptation fund, although projects undertaken in less developed countries would be exempt from this charge. The inclusion of an adaptation fund, overseen by a board of representatives from Kyoto signatory countries, and levied at 2% of the value of CDM

transactions may mean that even countries unable to participate in emissions trading markets may still benefit from the continued growth of this market. In addition to the adaptation fund, the opportunities for developing countries to benefit from the 2012 climate change regime could potentially be much enhanced as a result of the following changes:

- The inclusion of reduced emissions from deforestation and degradation projects (REDD) within the CDM is likely to encourage otherwise excluded developing countries with forestry assets to participate in the emissions reductions market, although the distributional effects of REDD within each country will need to be further investigated;
- A greater emphasis on programmatic CDM may enable more developing countries to benefit from the CDM; the scheme could be scaled up considerably both across and within countries.

The post-2012 climate change regime could look very different to the current situation. If a global agreement is reached, the commitment and inclusion of larger players such as the USA could have a dramatic impact on the emissions trading market, and the CDM. The inclusion of the adaptation fund levied at 2% of all CDM transactions (excluding LDCs) will enhance the ability of some developing countries to achieve ‘green growth’ by tapping into carbon markets; and the ability of others to achieve growth in a ‘carbon constrained’ world through adaptation (and use of the 2% funds).

Although industrialised countries have indicated that they are willing to make substantial emission cuts, it remains unclear whether any definitive target will be agreed upon by the end of 2009. This uncertainty poses a major threat to the future of the CDM. If agreement is reached incorporating new initiatives such as the 2% adaptation fund, it could represent a new step forward towards the finance of global environmental public goods. A failure to negotiate a successful conclusion at the Copenhagen conference of 2009 will certainly diminish any expectations of agreement for the second commitment period of the Kyoto protocol; and will diminish the expectations of many in the ability to negotiate to conclusion at the multilateral level.

For more information, contact Jodie Keane, Research Officer, International Economic Development Group, ODI ([j.keane@odi.org.uk](mailto:j.keane@odi.org.uk)).

## Endnotes and references

### Endnotes:

- 1 ECA stands for Europe and Central Asia.

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