

The Development Dividend Project – Phase III

# **Market Mechanisms for Sustainable Development: How Do They Fit in the Various Post-2012 Climate Efforts?**

Aaron Cosbey, Deborah Murphy and John Drexhage



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July 2007

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International Institute for Sustainable Development  
161 Portage Avenue East, 6th Floor  
Winnipeg, Manitoba  
Canada R3B 0Y4  
Tel.: +1 (204) 958-7700  
Fax: +1 (204) 958-7710  
Web site: <http://www.iisd.org>

*Market Mechanisms for Sustainable Development: How Do They Fit in the Various Post-2012 Climate Efforts?* is available online in IISD's Publications Centre at <http://www.iisd.org/publications>

## ***Foreword***

This document was developed under the Development Dividend Project – Phase III, a project implemented by the International Institute for Sustainable Development (IISD) that aims to find a meaningful place in the international carbon market for Clean Development Mechanism (CDM) projects that provide host countries with socio-economic and environmental gains, while meeting investors' need for low-cost emission reductions.

This paper was funded through grants from Canada's Clean Development Mechanism and Joint Implementation Office, Foreign Affairs and International Trade; Ministry of Foreign Affairs of Denmark and Ministry of Environment of Norway.

The views expressed remain those of IISD and do not necessarily reflect those of the funders, nor should they be attributed to them.

## ***Acknowledgements***

The paper was prepared by Aaron Cosbey, Deborah Murphy and John Drexhage, IISD. The authors would like to thank the members of the Development Dividend Task Force for the comments and ideas they provided. In particular, they would like to thank John Balint, Rob Bradley, Jane Ellis, Sushma Gera, Elizabeth Harvey, Jeanne-Marie Huddleston, Andrei Marcu, Alan Miller, Frode Neergarde, Aline Ribas, Agus P. Sari, Brent Swallow and Xianli Zhu for their input. Any errors or omissions, of course, remain the sole responsibility of the authors.

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## **Abbreviations and Acronyms**

AAU	Assigned Amount Unit
BRICSAM	Brazil, India, China, South Africa and Mexico
CDM	Clean Development Mechanism
CDT	Climate-wise Development Treaty
CER	Certified Emission Reduction
CFL	Compact Fluorescent Light Bulb
CH <sub>4</sub>	Methane
COP	Conference of the Parties
CO <sub>2</sub> e	Carbon Dioxide Equivalent
DNA	Designated National Authority
EB	Executive Board
ERU	Emissions Reduction Unit
EU-ETS	European Union-Emissions Trading Scheme
GDP	Gross Domestic Product
GEF	Global Environment Fund
GHG	Greenhouse Gas
GT	Gigatonne
GWP	Global Warming Potential
HFC	Hydrofluorocarbon
IEA	International Energy Agency
IET	International Emissions Trading
IFI	International Financial Institution
IISD	International Institute for Sustainable Development
IPCC	Intergovernmental Panel on Climate Change
JI	Joint Implementation
LDC	Least Developed Country
LULUCF	Land Use, Land Use Change and Forestry
MMSD	Market Mechanism for Sustainable Development
MOP	Meeting of the Parties
N <sub>2</sub> O	Nitrous Oxide
ODA	Official Development Assistance
OECD	Organization for Economic Co-operation and Development
PAM	Policies and Measures
PDD	Project Design Document
REDD	Reducing Emissions from Deforestation and Degradation
RGGI	Regional Greenhouse Gas Initiative
S&L	Standards and Labelling
SCM	Sectoral Crediting Mechanism
SD-PAM	Sustainable Development Policies and Measures
SIDS	Small Island Developing States
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
VER	Voluntary Emission Reduction
WRCAI	Western Regional Climate Action Initiative

## **1.0 Introduction**

A number of potential future climate change regimes are under discussion, both within and outside of formal United Nations Framework Convention on Climate Change (UNFCCC) processes. The Montreal Action Plan of COP-11/MOP-1 opened two tracks of discussion on the post-2012 time period within the UN formal negotiations: 1) under Article 3.9 of the Kyoto Protocol to consider future commitments for the period beyond 2012, and 2) under the UNFCCC to undertake a non-binding dialogue for long-term cooperative action to address climate change. Yet, the complexity of the issue, the range of perspectives and the diversity of stakeholders has determined that considerable research and analysis regarding the future regime has already taken place outside the formal process. The scope for and role of the Clean Development Mechanism (CDM) (see Box 1) or some similar market mechanism for sustainable development (MMSD) in these post-2012 options is not entirely clear.

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### **Box 1: The Clean Development Mechanism**

The CDM is the only mechanism that offers developing (non-Annex I) countries an opportunity to participate in the carbon market. As noted above, the CDM has two objectives, low-cost mitigation and sustainable development in host countries (as defined by the host country). CDM projects or programs of activities must result in real, measurable and long-term greenhouse gas (GHG) emission reductions. Project developers must substantiate that reductions in GHG emissions go beyond business as usual and are additional to any emission reductions that would occur in the absence of the project. Participation in the CDM is voluntary and both public and private entities can participate. The host country for the investment must be a developing country that has ratified the Kyoto Protocol and set up a Designated National Authority (DNA). The Executive Board (EB) is the supervisory body of the CDM and is responsible for the administration of CDM rules and modalities. Examples of CDM project sectors include energy efficiency, renewable energy, HFC-23 (hydrofluorocarbon) destruction, agriculture, afforestation and reforestation.

The CDM Project Cycle:

- project design and development of project design document by the project proponent;
  - approval of sustainable development aspects by the host country;
  - validation by a designated operational entity;
  - registration with the CDM Executive Board;
  - project monitoring by the project proponent;
  - verification and certification by a designated operational entity; and
  - issuance of Certified Emission Reductions (CERs) by the CDM Executive Board.
-

This paper examines how an MMSD could fit in the various post-2012 climate efforts. In this paper, the term “market mechanism for sustainable development” will be used rather than CDM as it is understood that some of the scenarios contemplated involve a regime configured rather differently than the current CDM. Indeed, some post-2012 options preclude specific Annex I emissions targets, which are the basis for the CDM as it currently functions. Thus the term MMSD is used here to describe a market mechanism that can be used to achieve the goals of the current CDM as stated in Article 12 of the Kyoto Protocol, “to assist Parties not included in Annex I in achieving sustainable development and in contributing to the ultimate objective of the Convention, and to assist Parties included in Annex I in achieving compliance with their quantified emission limitation and reduction commitments.”

Most, if not all, UNFCCC Parties envision an important role for an MMSD in the post-2012 regime, yet there are different views of what constitutes an effective mechanism. Developed countries are interested in an MMSD that provides access to low-cost credits to meet compliance targets under the Kyoto Protocol. Additionality is also a priority to ensure the environmental integrity of credits under the mechanism. While there are differing perspectives among developed countries on the use of the CDM to meet reduction targets, political sentiment requires robust additionality processes to demonstrate that reductions that occur overseas in developing countries result in quality credits. Developed countries are also interested in an MMSD as a means to engage developing countries in efforts to reduce emissions and to encourage large-emitting countries to go beyond the CDM in the post-2012 regime.

Developing countries see the mechanism as an important means of supporting sustainable development, and are careful to safeguard their sovereign right to define what constitutes sustainable development in the national context. For most, it includes at least increases in the flow of investments, technology transfer and access to leading-edge clean technologies. Equity of access and the regional distribution of projects under the mechanism is particularly a concern for least developed countries (LDCs). Developing countries also want an MMSD that keeps demand robust; while this is dependent on governments reaching agreement on further GHG emission reduction targets, the structure of the mechanism will have a bearing on supply and demand post-2012. As well, they are conscious of the fact that the integrity of the mechanism will also have an impact on demand from Annex I Parties, CERs being only one of several options for Annex I compliance via trading (see Box 2).

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## **Box 2: Kyoto Flexibility Mechanisms**

Flexibility mechanisms were included in the Kyoto Protocol in part to assist Annex I countries in meeting their emission reduction commitments in a cost-effective manner. The three mechanisms are:

*International Emissions Trading (IET):* allows Annex I countries (i.e., industrialized countries and countries with economies in transition, such as Russia, Ukraine, Bulgaria and Romania) to buy and sell parts of each country's assigned amount units (AAUs). This increases the allowable emission in the recipient country and reduces those of the seller country.

*Joint Implementation (JI):* A project to mitigate climate change in an Annex I country can earn credits (Emissions Reduction Units – ERUs) that can be used by another Annex I Party to help meet its emission limitation commitment. For example, Japan (through the government or a company) could invest in an emissions reduction project in Russia and then use the credits to offset its national reduction target. Only emission reductions taking place between 2008 and 2012 will be credited.

*Clean Development Mechanism (CDM):* A project or program of activities to mitigate climate change in a developing country can generate credits (certified emission reductions – CERs) that can be used by an Annex I Party to help meet its emission limitation commitment. CDM is the one mechanism for developing countries—which were not subject to binding emission reductions as part of the Protocol—to be involved in the implementation of the agreement and contribute to achieving the objectives of the UNFCCC. The prompt start clause allows credits to accrue from projects from 2000 onward.

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An effective MMSD in a post-2012 regime will need to balance the demands and expectations of developed and developing countries. From a development dividend perspective, this means understanding how the potential regimes could assist in improving the quality (e.g., sustainable development) and quantity (e.g., accessible and cost-effective) dimensions of projects in developing countries; as well as enhancing the geographical distribution of projects.<sup>1</sup> Any MMSD should ensure that projects are of a quality to deliver the level of development dividend that stakeholders expect at a quantity commensurate with market demand. Regional distribution of the benefits of the mechanism should also be accounted for, consistent with the aims of the *Nairobi Framework on Capacity Building for the CDM* to help African governments and project developers undertake CDM projects, though Africa is not the only region where distribution of CDM investment is a concern.<sup>2</sup>

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<sup>1</sup> The Development Dividend is about trying to find a meaningful place in the international carbon market for CDM projects that bring significant benefits beyond GHG reductions. IISD's ongoing Development Dividend Project explores what can be done to improve both the quantity and quality of CDM projects. Project information and reports can be found at: <http://www.iisd.org/climate/global/dividend.asp>.

<sup>2</sup> Former UN Secretary General Kofi Annan announced a joint initiative in November 2006 by international organizations including the UNFCCC, UNDP, UNEP, World Bank and African Development Bank—the Nairobi Framework on capacity building for CDM—to enhance geographic equity and accessibility to CDM.

This paper begins with an analysis that considers the range of options being proposed for the post-2012 regime and then asks what potential role an MMSD might play in these regimes. It also asks what the various sorts of MMSDs might imply for the nature of the overall regime. Section three examines characteristics of regime structures—targets, differentiation, transition and governance—as they relate to an MMSD. The fourth section examines the options from a development dividend perspective and section five includes concluding remarks.

## **2.0 Review of Market Mechanisms for Sustainable Development in Proposed Post-2012 Approaches**

The structure of the post-2012 regime will have a strong influence on the success of an MMSD. If developed country concerns of access to low-cost quality credits are met and there is meaningful participation by developing countries, especially the large emitters of China, India and Brazil, there likely will be high demand for these credits.<sup>3</sup> If these concerns are not met, there could be strong political pressure in developed countries to undertake domestic emission reductions, weakening the market for credits under the CDM or other MMSD.

There is a range of possible post-2012 approaches, including proposals that are part of the formal negotiations (i.e., Brazil and Russia) and a number that have arisen outside of the formal negotiations. These post-2012 approaches vary in their degree of complexity; many follow on or could evolve out of the current system of internationally binding targets for Annex I countries, while others are structured differently than the Kyoto Protocol (e.g., technology-centred, carbon tax). The big question will be how to synthesize the existing elements, including the CDM, to produce an agreement that achieves the ultimate goal of the UNFCCC, which is to prevent climate change,<sup>4</sup> while respecting environmental effectiveness and global participation.

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<sup>3</sup> Of course if “meaningful participation” takes the form of developing country targets, the CDM as it is currently configured will not operate. This issue is taken up in more depth in section two below.

<sup>4</sup> According to Article 2 of the UNFCCC, “the ultimate objective of the Convention is [...] stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system [...]”

Though there have been hundreds of different proposals for a post-2012 agreement on climate change, a number of elements are repeated across approaches, which enables a broad analysis of how an MMSD could work. Appendix 1 lists 43 proposed post-2012 approaches, which vary in the manner by which they would deal with the current goals stated in Article 12 of the Kyoto Protocol. Some approaches make explicit mention of the CDM, while others have no role for the CDM as it is currently construed—indicating the need for a new tool that will address the issue of sustainable development in developing countries, while offering low-cost emission reductions.

The 43 selected approaches were reviewed and assessed to identify five broad categories for further analysis:

1. targets with flexibility mechanisms;
2. targets with emissions trading only;
3. policy and sectoral approaches;
4. technology approaches; and
5. other approaches.

Each of these five categories and how an MMSD might fit in them is discussed below. It is important to note that these approaches are not all mutually exclusive; many of them can, and likely will be, mixed to develop a workable post-2012 regime.

## **2.1 Targets with Flexibility Mechanisms**

The 16 approaches in this category are compatible with the CDM in its current form. While many see some elements of improvement and streamlining, in the end the CDM under these regimes remains a strictly project-by-project mechanism. There are currently a handful of methodologies and projects that have programmatic characteristics, or that amount to crediting for good policies as opposed to good projects (Cosbey, *et al.* 2006). Proponents of such forms of CDM were given a boost by the decision at COP/MOP-1 to allow for programmatic CDM, and the EB's subsequent guidance on the modalities at EB-28.<sup>5</sup> These sorts of developments are considered in greater depth in section 2.3, while this section assumes that the current predominance of projects in the CDM will continue as at present.

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<sup>5</sup> See EB-28 Meeting Report, Annex 15.

The current CDM system could accommodate fixed and binding systems, as described in a number of proposals: Brazilian Proposal; Common but Differentiated Convergence; Converging Markets; Expanded Common but Differentiated; Graduation and Deepening; Growth Baseline; Multistage; and Safety Valve with Buyer Liability.<sup>6</sup> The current CDM could also be used in approaches that include more flexible, non-binding targets for developing countries, such as action targets that would give developing countries two means of generating reductions—the CDM, and action targets that define a quantity of GHG abatement to be achieved. Other such approaches include binding dynamic targets under Further Differentiation; indicative national targets based on sectoral standards in the Multi-sector Convergence proposal; and annual commitments based on absolute emissions limits, intensity limits and financial contributions in the Sao Paulo proposal.<sup>7</sup>

Two of the proposals include the CDM as one of a number of elements: Carbon Credit Banking; Dual Track Approach and Technology + Compensation Fund; and Orchestra of Treaties.<sup>8</sup> The Gradual Process of Accommodation approach proposes that emissions trading and the CDM only be used for carbon dioxide (CO<sub>2</sub>) emissions, with multilateral funds for technologies established to deal with emissions of methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O) and Hydrofluorocarbons (HFCs).

The distinguishing characteristics of a regime that can accommodate the current type of CDM are two-fold: First is the need for targets, whether they are specified in terms of overall emissions or intensity. For the purposes of emissions trading, intensity targets can in fact work, if they are simply translated after the fact into tonnes of carbon. This is the mode used under the Canadian regulatory framework, which is specified in terms of intensity targets, and for which emissions trading is allowed (Government of Canada 2007). Herzog, *et al.* (2006) argue that this may involve an imperfect market, since the number of tonnes allowed is not known until after the market “closes” for each period of operation, and production figures are revealed. If the market does not develop appropriate derivative instruments, some of the key cost-reducing benefits of an MMSD may be lost.

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<sup>6</sup> See in Appendix 1, Category 1: The Brazilian Proposal (Brazil 1997); Common but Differentiated Convergence (Höhne, den Elzen and Weiss 2006); Converging Markets (Tangan and Hasselknippe 2003); Expanded Common but Differentiated (Gupta and Bhandari 2003); Graduation and Deepening (Michealowa, Butengeiger and Jung 2003); Growth Baseline (Hargrave, *et al.* 1998); Multistage (den Elzen, *et al.* 2006); Safety Valve with Buyer Liability (Victor 2001).

<sup>7</sup> See in Appendix 1, Category 1: Action Targets (Baumert and Goldberg 2006); Further Differentiation (Swedish Environmental Protection Agency 2002); Multi-sector Convergence (Sijm, *et al.* 2001); Sao Paulo Proposal (University of Sao Paulo 2006).

<sup>8</sup> See in Appendix 1, Category 1: Carbon Credit Banking, Dual Track Approach and Technology + Compensation Fund (Kameyama 2006); Orchestra of Treaties (Sugiyama and Sinton 2005); Gradual Process of Accommodation (Wara 2006).

The second is the need for the regime to differentiate between those with targets and those without. This is fairly straightforward. The CDM as currently conceived acts as a bridge between these two types of groups. If there is no such distinction—such as in the case where all countries have similar targets—then there can be no CDM. The following section discusses the types of MMSD that might prevail under such a system.

## **2.2 Targets with Emissions Trading Only**

Emissions trading is a key part of any approach to achieve least-cost solutions to climate change. The European Union Emissions Trading Scheme (EU-ETS) is up and running and will continue after 2012 regardless of the results of the international climate change negotiations. Other trading schemes are in various stages of development: Regional Greenhouse Gas Initiative (RGGI); Western Regional Climate Action Initiative (WRCAI); and Japan, Australia, Norway and many corporations are taking actions on a voluntary basis.<sup>9</sup> At the multilateral level emissions trading can occur between Annex I Parties, which are allowed to achieve their Kyoto Protocol assigned amounts jointly.

Most of the 11 approaches in the second category in Appendix 1 propose fixed and binding targets for all countries and participation in a multilateral emissions trading regime, although Dual Intensity Targets are proposed by Kim and Baumert, and Pizer proposes intensity targets.<sup>10</sup> Many of the proposals in category two provide incentive for developing country participation by allowing these countries to receive large amounts of surplus allowances. For example, the Domestic Hybrid Trading Schemes proposes that developing countries receive emission endowments in excess of their current emissions. The Hybrid

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<sup>9</sup> The RGGI is a cooperative effort by nine Northeastern and Mid-Atlantic U.S. states to reduce GHGs. It is a multi-state cap-and-trade program with a market-based emissions trading system as a central feature of this initiative. The WRCAI is an agreement by five western U.S. states and the Canadian province of British Columbia to identify, evaluate and implement ways to collectively reduce GHG emissions in the region and to achieve related co-benefits. The initiative requires partners to set an overall regional goal to reduce emissions, develop a market-based, multi-sector mechanism to help achieve that goal, and participate in a cross-border GHG registry (see Government of British Columbia 2007). The Japanese voluntary emissions trading scheme, launched in 2005, included eight companies as traders and 31 firms with voluntary emissions reduction targets in 2006 (see Sudo 2006). In Australia, the New South Wales Greenhouse Gas Reduction Scheme, launched in 2003, is a trading scheme designed to reduce GHG emissions associated with the production and use of electricity. Norway initiated its emissions trading system in January 2005 for the period up to December 2007.

<sup>10</sup> See Appendix 1, Category 2: Dual Intensity Targets (Kim and Baumert 2002) and Safety Valve and Intensity Targets (Pizer 2005).

International Emissions Trading proposal suggests that a portion of the safety valve funds be directed to developing countries for abatement efforts. The One Human – One Emission Right proposal suggests that developing countries receive more Global Climate Change Certificates than they need and can sell them at a fixed price to the industrialized countries. The money would have to be spent according to a “Sustainable Development and Elimination of Poverty” plan developed at the national level and approved internationally. The Three-Part Policy Architecture approach proposes that non-participating low income countries be given short-term targets that are above their current emissions. The Parallel Climate Policy proposal suggests that the United States and China, and other developing countries if necessary, establish a cap and trade system, and that assistance should be provided to poorer regions of the world to assist with adaptive technologies.<sup>11</sup>

Other proposals (e.g., Dual Intensity Targets, Human Development Goals with Low Emissions) suggest that developing countries be given non-binding targets, whereby a country with a non-binding target is a potential seller, but never need be a buyer.<sup>12</sup> The opportunity to sell credits provides an incentive for developing nations, although most put some restrictions on the sale of credits. For example, the Human Development Goals with Low Emissions proposal distinguishes between voluntary reductions that should not be eligible for trading, conditional reductions that could be traded (which could be binding in developed countries and non-binding in developing countries) and luxury emissions that could be subject to taxation.

In the final event, any regime that assigns targets to all countries cannot have an MMSD that looks much like the current CDM. In such a context, emissions trading would probably be limited to mechanisms much like the current IET and JI, both of which occur between Annex I Parties. But there are a few issues worth considering in that context.

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<sup>11</sup> See Appendix 1, Category 2: Domestic Hybrid Trading Schemes (McKibbin and Wilcoxon 2002) Hybrid International Emissions Trading (Aldy, *et al.* 2001); One Human – One Emission Right (Wicke 2005); Three-Part Policy Architecture (Olmstead and Stavins 2006) Parallel Climate Policy (Stewart and Wiener 2003).

<sup>12</sup> See Appendix 1, Category 2: Dual Intensity Targets (Kim and Baumert 2002); Human Development Goals with Low Emissions (Pan, 2005).

First, the CDM is explicitly aimed at fostering sustainable development in the host countries, and thus arguably delivers some degree of development dividend. IET and JI, on the other hand, have no such explicit aim. If the starting point is the need for an MMSD focused on both low-cost emissions and sustainable development, then one option would be to “green” AAUs in a development-friendly manner, or to amend the JI to include sustainable development requirements (i.e., the requirement for host country approval on sustainable development grounds). This could be made effective exclusively for developing country hosts, or more broadly for all host countries. On the other hand, it can be argued that JI *implicitly* includes an imperative to foster sustainable development, or at least to serve national interests according to some definition. If a JI project offered no development dividend (i.e., no social, economic or non-climate-related environmental benefits), there would be no reason for a host country to allow it, given that any ERUs it produced would result in increases to the host’s emission reduction commitment. In fact, since some percentage of JI projects will inevitably be non-additional, the ancillary benefits of the project roster as a whole will have to be seen by the host to be sufficient to *more* than balance out the resulting effective increases in its assigned amount.

Another option, feasible under regimes that involve targets for major developing countries but not for least-developed, would be to involve the major developing country parties with targets in EIT and JI-like mechanisms, and create a separate scaled-down version of the current CDM for those countries without targets. That is, there would be a tool for least-cost emission reductions in large volumes that would include the major emitters and there would be another mechanism to focus more strongly on delivering a development dividend, which would include the smaller developing countries. Three of the approaches suggest that the more advanced developing countries take on targets, leaving a greater share of the CDM to lesser developed nations: Common but Differentiated Convergence; Further Differentiation and the Sao Paulo Proposal. The Parallel Climate Policy approach sees major developing countries participating in emissions trading, with developed countries providing assistance to the poorer regions of the world.<sup>13</sup>

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<sup>13</sup> See Appendix 1 , Category 1: Common but Differentiated Convergence (Höhne, den Elzen and Weiss 2006); Further Differentiation (Swedish Environmental Protection Agency 2002), Sao Paulo Proposal (University of Sao Paulo 2006) ; and Category 2: Parallel Climate Policy (Stewart and Weiner 2003)

One implication of a JI as a replacement for the CDM is that such a regime would shift the burden for determining additionality away from the international level and toward the national (to the extent that the new mechanism functioned like Track 1 JI). That is, at the global level the JI mechanism does not allow for a net reduction in emission reduction commitments. Only the host state needs to be concerned about additionality since non-additional projects, as noted above, amount to an effective increase in its assigned amount. This would greatly simplify the international administrative machinery as compared to the CDM, but it might also result in inefficient duplication of similar efforts at each national level.

Any regime that incorporated such a mechanism, of course, would have to account for the fundamental differences between it and the existing narrow CDM. From a developing country perspective, the existing CDM is a more or less unblemished good, bringing as it does a measure of development dividend without any attendant obligations. A JI-type mechanism that covered developing countries would still bring those sorts of benefits. But it would have the disadvantage that the resulting emission reductions would not count toward the host country's reduction commitments, giving up the lowest hanging fruit for the emissions reduction benefit of others.

For example, from the perspective of a China with targets, would it make sense to allow massive Emissions Reduction Unit (ERU) generation through investment in cheap HFC-23 destruction, or would it be better to mandate that technology through regulation, and apply the significant resulting reductions to the Chinese assigned amount (or sell them through emissions trading)? From a negotiating perspective, the point is that "losing" the CDM would constitute a loss for those developing countries that accepted targets in the post-2012 regime—a loss that would not be fully compensated by the existence of JI.

### **2.3 Approaches Involving an Expanded CDM**

Nine of the proposals in Appendix 1 outline approaches that include an expanded CDM or an MMSD that encourages greater participation by including policy or sectoral approaches. The general framework of the current CDM is maintained, but these proposals attempt to overcome perceived constraints of the current CDM—the project-by-project nature of approvals and an institutional framework that is bureaucratic. A number of these proposals attempt to improve the current mechanism to allow it to have greater influence on major capital investments, such as energy, and in sectors that have seen little CDM activity, such as transportation. Some proposals attempt to create more effective linkages

between the CDM and national development priorities to improve the effectiveness of the mechanism. While the existing architecture of the CDM would need to be modified to accommodate sectoral or policy CDM—technical issues such as baselines, monitoring and verification, and institutional issues such as working through the EB could build on the current CDM framework.

The progress being made on programmatic CDM is an example of how the current mechanism can be expanded. At COP/MOP-1 it was decided that the CDM need not only cover projects, but that it can also cover programs of activities in support of policies (UNFCCC 2005: 5). Distributing compact fluorescent light bulbs (CFL), for example, is in fact a discrete project for each light bulb, or each household involved. But there is now an approved methodology for covering a program of CFL distribution, allowing proponents to avoid prohibitive transaction costs.

An expanded version of the CDM might cover a number of different top-down approaches as complements, or alternatives, to the current project-by-project approach:

- **Policies** – the CDM might award CERs to developing countries that adopted policies resulting in the reduction of GHG emissions;
- **Programs** – the CDM might award CERs for programs of activities that either implement existing policies, or act independently of policy in seeking to reduce GHG emissions. An example of the latter might be a private sector power provider undertaking a suite of demand-side management measures (in excess of those it would have undertaken under a business as usual scenario, of course); and
- **Sectors** – the CDM might award CERs for sectoral efforts. A country might set, for example, a fixed target of emissions or an intensity target for a sector such as energy, with credits for those installations that beat the baseline target (alternatively credit could go to the whole sector, or to the national government, or be shared in some manner).

Each of these types of “expanded CDM” is discussed in turn below, followed by some considerations about the regime implications of each.

### *2.3.1 Policy CDM*

The concept behind policy CDM is fairly straightforward. A non-Annex I country adopts a policy or a standard that results in reduced GHG emissions—even one that may have non-climate change objectives, such as a fuel efficiency standard

for automobiles aimed at reducing air pollution.<sup>14</sup> The policy or standard is additional, in the sense that it would not have been adopted in the absence of the CDM. CERs are then awarded in the amount of the reduced GHG emissions.

Along these lines, the South-North Dialogue and Dual Track approaches propose that developing countries make voluntary pledges to implement sustainable development policies measure to reduce GHG emissions. Ideally these pledges would integrate climate policies within national development policies. In most proposals, these entail no binding commitments from developing countries, but do involve commitments from developed countries to support their voluntary efforts, such as technology incentives and funding for developing countries.<sup>15</sup>

Sustainable Development Policies and Measures (SD-PAMs) are not a market mechanism, as pledges are specified in terms of policies implemented rather than GHG emission reductions. Baumert and Kim have explored the possibility of using Action Targets to incorporate a quantitative dimension into SD-PAMs, and an MMSD could be supportive of SD-PAMs as projects implemented under approved policies could be eligible for crediting under the MMSD. The Dual Track Approach suggests that developing countries choose between an emissions trading with safety valve approach or a PAM-based approach that is not legally binding (but these latter countries will have access to the CDM by including plans for CDM projects in their PAM list).

It is important to note that at present policies and standards cannot be considered for crediting under the current CDM, as per the EB's guidance from COP/MOP-1 in 2005.<sup>16</sup> Moreover, there seems to be little pressure to consider expanding CDM in this particular direction, aside from a strong push on policies to avoid deforestation, examined below. In part this is due to the many unresolved complexities that attend this apparently straightforward type of CDM. Primary among them is the issue of additionality. It is impossible to prove definitively that a policy would not have been undertaken had the CDM not existed. The difficulty is heightened where the policy serves non-climate-related objectives such as air quality, human health and energy security, as these constitute motivation for the policy or standard.

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<sup>14</sup> A policy can be binding (e.g., renewable portfolio standard) or non-binding (e.g., targets for percentage of renewable energy in total mix). A standard as defined here is a mandatory requirement that specifies the characteristics of a product (e.g., automobile fuel efficiency standard).

<sup>15</sup> See Appendix 1, Category 3: South-North Dialogue (Ott, *et al.* 2004) and Dual Track (Kameyama 2003).

<sup>16</sup> Decision 7/CMP.1, paras 20 and 21.

These problems might be addressed in any of several ways:

- Credits from policy CDM might be discounted by some agreed percentage across the board;<sup>17</sup>
- Penalties or preferences might vary by the type of policy or standard in question. Some have suggested, for example, that policies with only climate-related goals (e.g., policies to reduce N<sub>2</sub>O and HFC-23 emissions) are more easily shown to be additional (Baron and Ellis 2006: 21). As such, it might be agreed that such policies would be given preferential treatment as regards additionality. In the same vein, parties might prepare a list of policies and standards that would be automatically considered to be additional; and
- Additionality might be determined by the degree to which similar policies have been adopted by countries in similar conditions. This, of course, would be a dynamic determination, changing over time as best practice gradually becomes mainstream.

As well as concerns about additionality, policy CDM may give rise to concerns about flooding the market for compliance units. One of the key benefits that many see in the prospect of policy CDM is its ability to deliver large quantities of GHG reductions as compared to the bottom-up approach. But the question is whether the resulting flow of CERs would in fact find buyers, or to what extent the price of CERs would reach disastrous lows.

This is a question that to some extent applies to other forms of expanded CDM, so it bears some more in-depth analysis. In the context of policy CDM, it is first instructive to ask what the probable international demand will be for CERs. Capoor and Ambrosi (2007) estimate that the market for all Kyoto compliance units will probably be in the range of 3–5 gigatonnes (GT) of carbon dioxide equivalent (CO<sub>2</sub>e) over the first commitment period, or some 0.6–1 GT annually on average. Such figures are best taken as rough indicators, but they give a probable range, based on projected shortfalls from Annex I Parties.

Set against that demand is supply of CERs but also of ERUs and AAUs. The latter are a huge potential source of compliance credits, with easily enough to satisfy the entire Kyoto compliance demands of Annex I countries based on current projections of shortfall. However, the political dynamics of such purchases are such that, other things being equal, most parties would prefer to purchase CERs or ERUs.

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<sup>17</sup> Yamagata (2004) suggests a 50 per cent discount.

An idea of the size of potential supply of CERs from policies and standards can be gleaned from several sources, though all such estimates are indicative only. One such source is the International Energy Agency's (2007) Alternative Scenario—a hypothetical future in which the countries of the world adopt a broad range of policies and measures that they are currently considering related to energy security and energy-related CO<sub>2</sub> emissions. The measures that make up the Alternative Scenario can be thought of as additional, in the sense that they are not part of the IEA's baseline scenario. They yield a very conservative estimate of what might be achieved through policy measures in area of energy use.<sup>18</sup> The result is a decrease in non-OECD country annual emissions by 2030 of 3.6 GT of CO<sub>2</sub>.

Another area of potential supply is the forestry sector, where non-Annex I countries have enormous potential for reforestation and afforestation. Some argue that forestry has the highest potential of any sector to contribute to low-cost mitigation between now and 2030 (Enkvist, *et al.* 2007). Moreover, a number of studies have suggested that sequestering carbon in forests is likely to be much less costly than other approaches to reducing atmospheric CO<sub>2</sub> (Stavins and Richards 2005).<sup>19</sup> In total, some estimates have deforestation emitting as much as 8 GT of CO<sub>2</sub> annually, or some 18 per cent of total anthropogenic emissions of GHGs (Baumert, *et al.* 2005). The Stern Report (Stern 2006: Ch. 25) estimates that if deforestation were to be completely eliminated, the marginal cost of CO<sub>2</sub> abatement (including all economic opportunity costs) would rise only as high as \$30/tonne. While this is a highly hypothetical scenario, it shows that many policies to reduce emissions from deforestation are actually viable. If CDM revenue were available to boost incentives in this area, a huge potential supply could become unlocked.

Note, however, that avoided deforestation is currently not allowed for crediting under the CDM. There is some political pressure to change this situation, however. A proposal from Papua New Guinea and Costa Rica pushed for the CDM to help provide incentives for avoided deforestation, and there is broad

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<sup>18</sup> The conservative nature of the IEA figures is due to the fact that only measures currently being considered are part of the scenario. This seriously understates the potential of future policy measures that may come to be considered for any number of reasons: technological advances, political will, or even the advent of some sort of policy-based CDM. Also the non-OECD figures used here do not include several key non-Annex I countries, such as Mexico and Korea.

<sup>19</sup> See, though, Enkvist, *et al.* (2007) for a contrary view holding that, while a large number of cheap credits might be available, a wide range of other policies and measures would be more cost effective.

recognition that any political deal that addresses climate change and development concerns jointly will have to address avoided deforestation in some manner (PNG/Costa Rica 2005; Cosbey and Drexhage 2007). On the other hand, a proposal from Brazil (2006) argues that such policies should be credited outside the carbon market, under a dedicated fund—a proposition that would lessen concerns about over-supply.

Estimates of potential supply from just these two sources show that there might be significant impacts from the expansion of the CDM to cover policies and standards, with either of them alone able to supply enough CERs to completely swamp the market. Recall that the current projected supply from CERs is not high, even relative to the projected demand. The entire project roster (including projects not yet registered, but in the process of validation, and assuming that all of them are registered and produce at expected levels—highly optimistic assumptions) in the UNEP-Risø pipeline of May 2007 is expected to produce less than two GTs of CO<sub>2</sub>e by 2012.<sup>20</sup>

Of course, if we assume that demand is not static, the implications change. It may be that if enough low-cost CERs become available, they will serve as a lifeboat for the troubled voluntary market. While projections are for demand to explode in this market, there are serious questions about its ability to deliver credible product (Trexler, *et al.* 2007). The most serious concerns are over additionality, double counting and sustainable development—all areas in which the CDM for all its faults offers something of a premium product.

### 2.3.2 Programmatic CDM

As noted above, programmatic CDM is in some sense the current reality. A small number of CDM projects and methodologies in the current roster have programmatic characteristics (Cosbey, *et al.* 2006). The EB at its 28th session approved *Guidance on the Registration of Project Activities under a Programme of Activities as a Single CDM Project Activity*—guidance that in effect clears the way for explicit approval of programmatic CDM. Further guidance was issued by the EB at its 32nd meeting in June 2007 but it is still too early to begin to see the full impact of those decisions. No large-scale programmatic CDM activity has yet been registered or proposed.

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<sup>20</sup> The World Bank cites work by Fenhann that shows a 70 per cent average production of CERs relative to Project Design Documents (PDDs) to date.

Yet there is enormous potential for credits generated under such a mechanism.<sup>21</sup> Mollet (2005) argues for the potential of standards and labelling (S&L) to mitigate GHG emissions, for example, calculating that S&L for just four products (including refrigerators and air conditioners) could reduce global emissions by more than 500 MtCO<sub>2e</sub> by 2020.<sup>22</sup> The scale of potential projects is limited only by the budgets and capacity of the proponents. For example, the Kuyasa project—a South African CDM project involving installation of solar water heaters, improved insulation and efficient lighting in selected low-income housing—could be scaled up to a national or regional level, with massive potential impacts.

To be clear on the distinction, what was approved by the EB was not policy CDM. So a standard for energy efficiency is not eligible to constitute a CDM activity. However, the *implementation* of that standard, by governmental or non-governmental agencies, can constitute CDM. For example, a standards agency that enforces a standard, educates the public about it, and works to help disseminate the new technology, could characterize those activities as a program of activities under the CDM, and be credited with the resulting emission reductions.

In practice, however, it may be difficult to distinguish policy CDM from programmatic CDM. That is, any GHG-reducing policy that has an effective degree of enforcement can arguably be considered programmatic CDM. Some, of course, will be easier to monitor than others. How would one calculate the GHG impacts of a reduced speed limit, for example? This, along with the question of effective enforcement, will probably be most significant in distinguishing programmatic CDM from non-“CDM-able” government policies. The question of whether it is a policy or the implementation of a policy, on the other hand, will probably mostly be moot. In the end, it is probably correct to think of policy CDM as a sub-category of programmatic CDM.

Any post-2012 regime that includes a CDM-like facility will undoubtedly carry on the evolution of CDM from narrow to more broadly cast (that is, including more top-down approaches), and will build on the work done up to that point in elaborating programmatic CDM. We can clearly expect to see some development of methodologies in the first commitment period that will pave the way for greater use of this possibility. As with policy CDM, the major implication for the shape of the post-2012 regime relates to scale. The estimates done above are applicable here as well, since programmatic CDM is in some senses simply the implementation of the policies posited above (minus, for the time-being, policies for avoided deforestation).

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<sup>21</sup> See Appendix 1, Category 3: Sectoral CDM (Figueres 2006; Samaniego and Figueres 2002).

<sup>22</sup> Note that this estimate includes some reductions from developed countries.

### 2.3.3 Sectoral Crediting Mechanisms

A sectoral crediting mechanism (SCM) would involve an expanded scope for the CDM, with a focus on mitigation at the sectoral level and a top-down approach that contrasts with the CDM's project-based approach. There are a number of possible types of such mechanisms.<sup>23</sup> In the first instance they can be distinguished by the basis for crediting:

- **Policy-based** – governments would undertake policies that result in emissions reductions at the sectoral level. The reductions attributable to the policies would be credited to either the government or in some fashion to the sector;
- **Intensity-based** – sectors would be assigned targets based on emissions intensity and would be credited for achieving (as a sector) better than the target; and
- **Fixed targets** – sectors would be assigned fixed targets for emissions and would be credited for achieving (as a sector) better than the target.

In the second instance they can be distinguished by their scope. SCMs might be either transnational in scope, encompassing an entire global sector, or national in scope, focused on a sector only within a given country.

Along these lines, the Centre for Clean Air Policy's Sector-based Approach proposes an MMSD under which reductions achieved beyond a country's sectoral pledge would automatically be considered additional and available for sale. The approach suggests that the only the 10 largest GHG-emitting developing countries in each sector be involved, with other countries participating through projects in the sector under the current CDM structure. A sectoral MMSD could support national development plans, and help to enhance emissions monitoring and reporting systems. The Triptych Approach is also a sectoral approach in which sector emissions targets are set according to various indicators, and national targets are determined by adding up sectoral approaches.<sup>24</sup>

It is worth noting that the current CDM, while it is a project-based mechanism, has in effect been applied in a systematic way in particular sectors, HFC-23 destruction in China being one of the best examples. Also in China, 69 per cent of the wind capacity installed in 2006 applied for CDM status (Baron and Ellis 2006).

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<sup>23</sup> The taxonomy presented here is based on Bosi and Ellis 2005.

<sup>24</sup> See Appendix 1, Category 3: Sector-based Approach (Schmidt 2006); Triptych Approach (Groenenberg 2001; Höhne, *et al.* 2003).

SCMs, like the other forms of expanded CDM discussed above, hold potential for an enormous amount of GHG mitigation, on a scale that far outpaces the current project-by-project formulation of the CDM (Bosi and Ellis 2005). At the same time, the potential for contributing to sustainable development is obvious. SCM could be employed to exploit the win-win opportunities in sectors such as deforestation, energy and transportation, all of which have enormous development linkages.

On the other hand, the various formulations of SCM, to greater or lesser degrees, are subject to serious limitations. A primary difficulty is that there are not many sectors that would be amenable to transnational SCM; it demands a small number of coordinated large emitters. As well, for both transnational and national SCM, baseline determination is plagued with fundamental difficulties, with incentives at the sectoral level to set them relatively low and with no easy way to determine the additionality of policies. And it is difficult to get around the problem of punishing first movers by crediting only those that moved after the implementation of the SCM.

But the implications of interest here are those that apply to the overall regime. Policy-based SCM at the national level is in effect one aspect of the sorts of expanded CDM described above—crediting for policies or the implementation of programs of activities. As such its implications have been discussed. The more interesting question is the regime implications of a transnational approach to SCM.

A basic requirement is an international carbon market, which implies targets of some sort administered by an overarching international authority. Baron and Ellis (2006) argue that the difficulties of coordinating SCM across a number of linked domestic and regional trading systems would probably prove insurmountable.

There would need to be international agreement on baselines and scope. These are not easy tasks. The baseline negotiations would be plagued by the need to reflect differing circumstances in each country and, in some cases, for each plant. There are few historical parallels for an international negotiation that would set the detailed parameters for such a calculation, where various national and regional economic interests would be keenly affected by each parameter chosen. Differing national interests would also plague the critical choice of scope. Provided such a system could in fact be established, however, it would require little ongoing international effort. Administering the system, verification and granting of credits would probably be done at the national level. An international institutional presence here would amount to direct governance of a private sector by an international agency—something for which there is no precedent in international law (Schmidt and Helme 2005).

Transnational sectoral crediting could exist either in parallel to the CDM (in which case there would need to be careful elaboration of what was covered under the respective schemes) or in the absence of a CDM. It bears repeating, however, that there are relatively few sectors that might be good candidates for SCM. It could not be considered a broad enough scheme to replace the CDM, for example.

### *2.3.3 Regime Implications*

What are the regime implications of an expanded version of the CDM? As with the current CDM, a key implication is the need for the existing division between parties with quantifiable emissions reductions targets and those without.

Of course, as with the existing CDM, even a regime with targets for all could function with a JI-like mechanism. Would an expanded post-2012 JI—one that covered policy crediting, sectoral crediting and programs of activities—be any different than the JI mechanism discussed above in section 2.2? Recall that a narrow post-2012 JI would, relative to the CDM, entail a loss for developing countries, who would still receive the development dividend benefits of project investment, but whose targets would in effect be increased by any non-additional emissions reductions. This would still be the case in the context of an expanded JI. In fact, if we assume that most policy crediting, sectoral crediting and programs of activities would be in some sense coordinated by the host governments, there would be little incentive for them to pursue such activities in the context of JI. That is, if there is no investor or proponent outside the host government itself, or one of its implementing agencies, the JI loses its only advantage over unilateral action. It would make far more sense to generate such credits as counting toward national targets, to be potentially used as tradable AAUs. As such, the project roster of a narrow version of a post-2012 JI would not look much different than that of an expanded version, and the regime implications would be much the same.

It is also important to note that the more attractive the CDM becomes in a post-2012 regime, other things being equal, the less incentive any developing country has to take on targets that entail lost access to the mechanism.<sup>25</sup> If the post-2012 regime radically expands the capacity of the CDM to cover policy-based and programmatic initiatives, it is offering governments the opportunity to fund a

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<sup>25</sup> The assumption of other things being equal is important. It is of course possible to imagine a regime such as those described in section 2.2, involving targets for all, emissions trading, with tough enough developed country targets and generous enough allowances for developing countries to overcome the disadvantage of losing the CDM as a mechanism.

variety of policies that they might have as current priorities, but for which they lack the requisite resources. This clearly counts as making the CDM a more attractive mechanism.

Perhaps the key difference between the narrow and expanded versions of the CDM is scale. Baumert and Winkler (2005) have argued that the expanded version of the CDM would vastly increase the potential for generating credits, perhaps well beyond what the market would bear in terms of demand. The analysis above cited projections of demand for all Kyoto compliance mechanisms—not just CERs—of between 1.6 and 2.5 GT by 2012. On the supply side, very conservative estimates indicated potential for policy CDM to yield at least 3.6 GT of annual CO<sub>2</sub>e reductions by 2030. Potential for forestry-based CDM if avoided deforestation is credited is cited at 1.6 GT annually (assuming, hypothetically, that all deforestation is halted). These figures compare to a total annual reduction potential of 1.96 GT by 2012 for all the CDM projects in the pipeline as of May 2007.<sup>26</sup>

The bottom line is that an expanded CDM has clear potential to reduce GHG emissions at a higher order of magnitude than the narrow version. This may be good news for buyers, but only to a point. If the market becomes swamped it will crash, with values for CERs coming in at well below what proponents projected, potentially leading to widespread abandonment of project-based initiatives. One clear implication for a regime that includes an expanded CDM is the need for ambitious reduction targets that will fuel demand for the additional CERs that may be brought on line, though it is noted above that the expanding voluntary market may pick up some of any excess supply. In institutional terms the regime is not otherwise much different from that implied by the narrow version of the CDM.

## **2.4 Technology Approaches**

The four approaches in category four are focused on technology cooperation. The simple bottom line with respect to such approaches is that, in and of themselves, they do not include a role for an MMSD. They are included in this discussion as they offer a means to support elements of sustainable development in developing countries by different means. Sustainable development is not dealt with directly,

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<sup>26</sup> This assumes that all projects in the process of validation become registered, and that all CERs projected in the PDDs actually get issued. On the other hand, it is a static picture, only showing what is currently in the roster and not allowing for future additions.

but tends to be looked at as an economic development issue, with technology development and diffusion expected to result in emission reductions. Technology transfer in certain sectors (e.g., renewable energy, energy efficiency) may be considered to contribute to sustainable development. At the end of the day, however, technology approaches are seen as having a longer-term focus based on non-binding bilateral and regional cooperation, and as complementary to approaches that might involve some form of MMSD.

The Technology-centred Approach suggests that developed countries pay for technology adoption in developing countries; and the Portfolio Approach proposes that developed countries transfer new technologies to developing countries. The Technology R&D Proposal addresses the concerns of developing countries through collaborative R&D. Other proposals also have an explicit technology component. The Sector-based Approach proposes a technology incentive package provided by developed nations to encourage developing countries to meet aggressive targets. The proposal on Carbon Credit Banking, Dual Track Approach and Technology + Compensation Fund suggests that each technology agreement include a technology compensation fund to assist developing countries adversely impacted by climate change. The Orchestra of Treaties proposes that a Climate Wise Development Treaty be signed to address the concerns of developing countries in a number of areas, including technology.<sup>27</sup>

Commitments to specific actions on technology could incorporate some “market plus” elements, such as a carbon offset, but this would be difficult as there is little experience or discussion of technology credits. For example, the Japanese have proposed credits for technology transfer in which industrialized countries would be able to transfer energy-saving technologies to developing nations as part of emission quota transactions. While the details are not clear, it is recognized that the amount of credits that could be acquired through the transfer of a single technology would be difficult to estimate. Canada’s regulatory framework for large GHG emitters includes a link between emissions obligations and technology in the form of a technology fund as one means of compliance with obligations. A capped (and declining) percentage of obligations is allowed to be met by paying into the fund at a fixed price per tonne.

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<sup>27</sup> See Appendix 1, Category 3: Technology-centred Approach (Barrett 2001); Portfolio Approach (Benedick 2001) Technology R&D Proposal (Edmonds and Wise 1999). See Category 3: Sector-based Approach (Schmidt, *et al.* 2006). See Category 1: Carbon Credit Banking, Dual Track Approach and Technology + Compensation Fund (Kameyama, 2006); Orchestra of Treaties (Sugiyama and Sinton, 2005).

## 2.5 Other Approaches

The three other approaches advocate financial transfers from developed to developing countries.<sup>28</sup> The Agreed Domestic Carbon Tax and Harmonized Carbon Taxes approaches propose carbon taxes as the basis of the post-2012 regime, and suggest that part of the revenue from the tax be redistributed to developing countries. The Climate Marshall Plan includes financial transfers to developing countries. Although none of these proposals explicitly consider directing financial transfers to sustainable development priorities, there could be some potential for linking the transfers to specific sustainable development attributes by associating the revenue from carbon taxes with a fund-based mechanism.

This suggests another possibility, not advocated in any of the approaches specified in Appendix I. The original proposal from Brazil that led to the creation of the CDM was for a clean development *fund*, endowed by Annex I countries, that would support sustainable development in developing countries in ways that also achieved mitigation. A fund-based mechanism, based on this original conception, is discussed here because it is unique among the options described; it can operate outside a regime of internationally agreed targets.

The fund-based mechanism could have a scope similar to the CDM, whether the narrowly defined or expanded version discussed above. That is, it could be project-based or it could also cover GHG-reducing policies and programs. At its base would be a fund with mandatory contributions from UNFCCC Parties, the nature and extent of the contributions being a matter of international negotiations. One possibility for the distribution of costs in contributing to the fund would be to base them on first compliance-period performance. Under such a scenario the contributions to the fund would probably look much like the first commitment-period expenditures on compliance credits, with high contributions from those countries that had been least able to meet their obligations through domestic actions. *A priori* there would be no reason to rule out some level of contributions from high-emitting developing countries as well.

This fund would then be used to purchase emission reduction credits from GHG-reducing projects, policies or programs in developing countries. If the fund operated under a regime with targets, the credits involved could be used to retire obligations of the funders, assigned in proportion to contributions. If it operated under a regime without targets, it would be considered a straight funding

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<sup>28</sup> See Appendix 1, Category 5: Agreed Domestic Carbon Tax (Cooper 2006); Harmonized Carbon Taxes (Nordhaus 2006) and Climate Marshall Plan (Schelling 2002).

mechanism, able to fulfill developed countries' Article 4.3 UNFCCC obligations to cover the incremental costs of addressing climate change in developing countries.<sup>29</sup> In contrast to the "with targets" fund, such a scheme would result in net global mitigation of GHG emissions.

There are a number of ways in which the fund could disperse its resources, but primary among the design considerations would be a desire to harness the ingenuity and energy of the private sector, as does the existing CDM. One possibility would be a reverse auction arrangement, whereby project proponents would commit to delivering credits for agreed prices, and would bid against each other in competition for contracts. Under this scenario, contracts would be awarded to the lowest bidder that satisfied the methodological requirements (such as additionality), and the bidding would stop when the budget tranche for a particular time period had been exhausted.<sup>30</sup> Inevitably there would be projects for which the terms of the contract were unfulfilled, for example because the project failed to receive project funding. The unused funds from such projects could simply be rolled back into the next tranche of funding.

It might be possible to target specific sectors for reward or punishment based on such characteristics as their perceived contributions to sustainable development. If it were judged, for example, that renewable energy projects were highly desirable, they could be assigned a price premium, or assigned a dedicated tranche of funding. Alternatively, less desirable sectors might be assigned a penalty.

What are the regime implications of such a scheme? If the fund operated under a targets regime, it would imply something similar to the status quo, with centrally assigned targets and a mechanism for investing in developing country initiatives as a way to achieve low-cost emissions reduction credits. As with the current CDM and JI, there would be a need for an institution to assess the additionality and baseline calculations for each such initiative. It would seem obvious that the roster of approved methodologies, and the institutional developments that have been achieved over the first commitment period, should be put to use in a post-2012 scenario even if it did not involve a CDM or JI.

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<sup>29</sup> If the fund operated in this mode, there is no reason why it could not welcome non-governmental "voluntary market" investors as well, in a scheme that could simultaneously give that market the credibility it needed, and provide important extra funding for mitigation and sustainable development in developing countries.

<sup>30</sup> One advantage to such a process is that it would eliminate some of the huge producer surplus generated by the current system. In a reverse auction it is highly unlikely, for example, that HFC projects with costs as low as \$1/tonne would fetch the kinds of prices they are currently fetching in the carbon market.

If the fund were run under a no-targets regime, it would again be well-advised to rely on the vast body of work that has been done in the first commitment period under the CDM and JI. This version of the fund, however, would not necessarily need to be governed by the UNFCCC, but could just as easily be operated by a designated agency such as the GEF or some *sui generis* institution.

It is worth noting that such a mechanism might hold great interest for the international donor community (the current Annex I Parties), and one of the necessary negotiations would involve deciding what portion (if any) of fund contributions could be categorized as Official Development Assistance (ODA). From the perspective of the private sector, however, the current CDM model would probably be preferable. Few private sector actors like the idea of reverse auctions, preferring instead to take their chances with the market for CERs.

## **2.6 Concluding Thoughts**

There is considerable uncertainty about the long-term nature of the carbon market given that governments have not yet entered into explicit negotiations on future actions to reduce GHG emissions. Many analysts (e.g., Carbon Finance 2007; Knudson 2007) believe that emissions trading will continue even in the absence of agreement on a second commitment period, and that technology and policy approaches could be complementary, helping to increase the attractiveness of participation in the regime for both developed and developing countries. The analysis in this section indicates that many of the proposed post-2012 approaches view the existing regime as moving forward and advocate emissions trading as forming an important cornerstone of future action on climate change. As well, the CDM or other MMSD with a strong focus on cost efficiency and flexibility is important to businesses seeking credits for compliance. Such a mechanism is needed to ensure that developing countries are able to encourage sustainable development and contribute to the objective of the UNFCCC to reduce GHG emissions, consistent with the goal of Article 12 of the Kyoto Protocol. Not all of the approaches surveyed did specify a role for an MMSD, however, and several of them would imply a very different role for a market mechanism than currently played by the CDM. This highlights the importance of foresight and planning for a smooth transition if indeed parties want to preserve some sort of MMSD in the post-2012 regime.

### **3.0. Regime Characteristics**

The preceding section aimed to answer the questions: what sort of regimes might be conducive to an MMSD in the post-2012 context? And what might the nature of any MMSD imply for the overall regime? This section summarizes some of the results of that analysis, breaking it down into four themes—targets, differentiation, transition and governance.

#### **3.1 Targets**

One of the most basic descriptors of any post-2012 regime is whether it involves targets, and if so what type. An important follow-on question is who might be subject to those targets; this issue is addressed in the following section, on differentiation.

The question of targets is particularly important to any discussion of an MMSD, since under most scenarios targets of some sort are needed to generate market demand for emission reduction credits. These do not necessarily have to be quantitative targets, though these would make for the simplest formulation. It is possible to conceive of, for example, a sectoral crediting baseline that is specified in terms of intensity targets. However, in the end such approaches cannot avoid being translated into a quantitative target of sorts. The credits awarded in an intensity-based sectoral scheme, for example, would be based on a simple calculation of GHG emissions reduced: output times the amount by which actual intensities beat the baseline.

One approach surveyed above—the fund-based mechanism—can function as a MMSD in the absence of targets. Other than that, however, it seems that the existence of targets is an essential prerequisite for an MMSD. It was noted above that the four technology approaches surveyed could not by themselves support an MMSD for that reason.

It is also worth noting that the strength of any assigned targets are key in establishing the level of demand for any MMSD. That is, if targets exist but they are unambitious, the result might be a crash in the price for CERs, similar to that seen in the EU's first phase ETS. This would be particularly true if we were to see a CDM that evolved to include more top-down approaches (such as programmatic CDM), or that included avoided deforestation.

### 3.2 Differentiation

The issue of differentiation arises in a number of the post-2012 approaches in Appendix 1, and differentiation of commitments is critical to the current formulation of the CDM, which may be consistent with the view of developed country negotiators in 1997 that the CDM would be a step toward a binding global cap and trade regime. Many of the approaches suggest that countries will graduate from the current non-Annex I specification (or other differentiated categorization) to eventually take on commitments.

A number of proposals (in categories 1 and 2 in Appendix 1) include discussion of criteria for countries to move to or toward binding mitigation commitments after 2012, and as such, could be considered as criteria for graduation from the CDM:

- Historical responsibility – Brazilian Proposal;
- Per capita emissions – Common but Differentiated Convergence;
- GDP per capita – Multistage/New Multistage;
- GHG emissions growth compared to economic output – Growth Baseline;
- Level of Human Development – Human Development Goals with Low Emissions;
- Sales of CERs reaching the country's share of the global limit – Sao Paulo Proposal; and
- Mixture of criteria: Further Differentiation; Keep it Simple Stupid; Global Framework; Graduation and Deepening; and South-North Dialogue.<sup>31</sup>

Certain non-Annex I countries have been targeted as prime candidates for taking on reduction targets in the next commitment period. South Korea and Mexico joined the OECD after the adoption of the UNFCCC and were not automatically included in Annex I. These two large emitting countries had CO<sub>2</sub> emissions of 9.61 and 3.59 tonnes per capita, respectively, in 2006, compared to a world average of 4.18 tCO<sub>2</sub>/capita and an OECD country average of 11.09 tCO<sub>2</sub>/capita. (IEA 2006: 48–57). Eight per cent of 2012 CERs in the current CDM pipeline will flow to these two countries. Other non-Annex I countries that are over the OECD average include major oil exporting nations (Bahrain, Brunei Darussalam, Kazakhstan, Kuwait, Qatar, Saudi Arabia, Trinidad and Tobago, and the United Arab Emirates) and the rapidly industrializing nations of Singapore and Taiwan.

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<sup>31</sup> Brazilian Proposal (Brazil 1997); Common but Differentiated Convergence (Höhne, *et al.* 2006); Multistage/New Multistage (den Elzen, *et al.* 2006); Growth Baseline (Hargrave, *et al.* 1998); Human Development Goals with Low Emissions (Pan 2005); Sao Paulo Proposal (University of Sao Paulo 2006); Further Differentiation (SEPA 2002); Keep it Simple Stupid (Gupta 2003); Global Framework (CAN 2003); Graduation and Deepening (Michaelowa, Butzengeiger and Jung 2003); and South-North Dialogue (Ott, *et al.* 2004).

Graduation of the BRICSAM countries (Brazil, India, China, South Africa and Mexico) is also an issue of discussion, despite China and India being extremely hard-line regarding developing countries not taking on commitments. The BRICSAM countries are still developing and have significantly lower GHG emissions per capita than Annex I countries, but their large populations and rapid growth mean that these countries have huge influence in terms of their absolute emissions. China is predicted by some to overtake the United States as the world's biggest emitter of GHGs some time in 2007.

With graduation from the CDM comes the issue of dealing with credits for existing CDM projects. Michaelowa, *et al.* (2003: 15) suggested a number of possibilities, including providing no compensation for CER loss; converting projects into JI that generate the same amount of ERUs; providing investors with AAUs equivalent to the CERs and buying out investors. The Sao Paulo proposal of the BASIC project (University of Sao Paulo 2006: 11) suggests:

*When a Non-Annex I Party adopts a quantified emissions limitation commitment CERs, lCERs and tCERs may be issued for reductions achieved prior to the end of the current crediting period for each project activity registered prior to the effective date of the commitment. This creates some double counting, but provides security for existing CDM investments. The projects continue to earn CERs until the end of the current crediting period. Those reductions also help the Party achieve its newly adopted commitment.*

The main concern is to ensure that there is security for CDM investments, and that they retain their value in the carbon market.

The prospect of graduation also means loss of access to an MMSD that is formulated along the lines of the current CDM, of course. It was noted above that this might simply mean that countries with targets would have to rely on JI instead, though it was argued that this prospect might not be attractive for many developing countries. If all countries had targets, there would be no CDM-like mechanism. If there was selective graduation, the CDM would probably become more oriented to development than to mitigation, serving the lesser developed countries and comprising a portfolio of projects that achieve high development dividends, but not the large volumes of credits seen in the major CDM players. If, for example, we removed China from the market, the number of projects in the current CDM pipeline would be reduced by 22 per cent, but the number of CERs would drop by fully 50 per cent (UNEP-Risø Centre 2007).

### **3.3 Transition**

Introducing a new MMSD also brings in the issues of how to deal with on-going CDM projects, and how to deal with credits that have been banked for future use. Investors want to be sure that the present system is protected and their investments have value post-2012. To continue with the CDM in its current form would eliminate a transitional stage because the current system would be maintained. But a decision on the CDM post-2012 is needed in the near future or CDM investments in methane and carbon emission reductions are likely to stop due to the lack of sufficient carbon value, which is no longer bankable after 2012 under the current regime.

The increasing interest in and demand for CERs from projects after the first commitment period of the Kyoto Protocol expires in 2012 may be creating momentum for a continuation of the current regime. Point Carbon (2007: 7) noted that EcoSecurities has options to buy 86 million CERs for the period from 2013 to 2028, and is pursuing project opportunities beyond 2012. The World Bank (2007) has agreed to buy CERs until 2014; and under its *Clean Energy for Development Investment Framework*, is designing a new carbon facility that would purchase emission reductions beyond the current regulatory period of the Kyoto Protocol, emphasizing programmatic and sector-based approaches. This new facility would aim to ensure continuity in the carbon market while international negotiations on a post-2012 regime continue under the UNFCCC. Drivers of this post-2012 demand include the European Commission's commitment to a third phase in the EU-ETS that includes a role for CDM, and the development of regional trading schemes in the United States.

The transition contemplated in several post-2012 approaches from a regime with differentiation to a regime wherein all countries (or major developing countries) have targets, presents a problem of potential double counting. Ongoing CDM projects in the transition countries will be generating credits for emission reductions, but those same emissions reductions might be counted against the national targets. The Sao Paulo (BASIC) proposal actually argues that "some" double counting of this type should be allowed to ensure continuity to existing CDM investments. Another possible solution would be to require transition countries to simply augment their obligations by the amount of CERs generated. This would be analogous to the requirements whereby EU members must set aside reserves in the National Allocation Plans against any approved JI projects for which they act as host.

### **3.4 Governance Structures**

Governance is an important aspect of any MMSD for developing countries and there is an obvious benefit to building on the existing regime architecture. A wealth of experience and expertise has been built up over the past few years on the CDM, including significant expenditure to develop a large set of tested and approved methodologies and investments by companies to become verifiers and validators. The private sector is increasingly engaged in the CDM and initiatives such as the Nairobi Framework are underway to build capacity for the CDM in African countries. These established structures should form the basis for a framework and governance structure for the CDM or other MMSD in the post-2012 regime.

The EB has received increased funding, allowing for an expansion of UNFCCC staff working on the CDM and enabling the EB to better fulfill its mission and obligations. Yet, there is still need for improvement, including streamlining of approval processes and professionalization of the CDM system. Suggestions to professionalize the body include representation that is non-governmental or spinning off the administration of the CDM to the private sector. An international partnership arrangement to manage the CDM, such as a corporation established to serve the international community, could be part of the post-2012 regime, but the details of such an arrangement are beyond the scope of this paper.

## **4.0 Increasing the Development Dividend**

The Development Dividend is defined by Cosbey, *et al.* (2006) as “benefits to developing countries beyond those strictly related to climate change, in the areas of economic growth through investment; technological evolution; poverty alleviation; environmental and health improvements.” In other words, the development dividend consists of those benefits that might arise from CDM projects *other than the reduction of GHG emissions*. An MMSD for the post-2012 regime with an emphasis on the development dividend could help to address many of the concerns about the CDM of both developed and developing nations that were noted in section one. Improving the development dividend requires that a MMSD address the issues of:

- **Quality** – encouraging stronger sustainable development in developing nations;
- **Quantity** – encouraging large-scale investments in such sectors as energy and transportation infrastructure; and
- **Regional Distribution** – increasing activity in LDCs, Small Island Development States (SIDS) and other poor countries (although Cosbey, *et al.* (2006) recognize that some countries might be better advised to focus scarce resources in the short-term on other priorities).

Four considerations in the design of the MMSD regime that could impact on the development dividend are discussed below.

### **4.1 Increasing the Quality – The Issue of HFC-23 Destruction**

The extent to which the CDM has, or will, contribute to sustainable development has been a major point of contention for many stakeholders and some have asserted that the CDM has not lived up to expectations in this regard. As noted previously, all CDM host countries are required to assess projects to ensure that they are compatible with their sustainable development objectives, and there have been a range of different approaches adopted by countries in terms of how they screen projects for the achievement of these objectives.

HFC-23 destruction and N<sub>2</sub>O projects are the most contentious in this regard. These projects account for only 2.5 per cent of CDM projects, but 38 per cent of the pipeline’s CERs in the UNEP-Risø May 2007 pipeline because they reduce the emission of gases with very high global warming potential.<sup>32</sup> The differential

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<sup>32</sup> HFC-23 has a global warming potential (GWP) of 11,700, meaning one tonne of HFC-23 has a greenhouse effect equivalent to 11,700 tonnes of CO<sub>2</sub>. N<sub>2</sub>O has a GWP of 310.

between project numbers and CER flows is an issue of concern to some stakeholders because of the lack of sustainable development benefits associated with these projects. But the reality is that these types of projects are highly attractive to investors: they generate large quantities of CERs at relatively low cost; project additionality is easy to substantiate; they have approved baselines that have been successfully applied and replicated; and they are quick to implement.

While the majority of private sector investors are seeking low-cost credits, some investors are looking for quality CERs with strong sustainable development outcomes, often as a result of corporate sustainability concerns and a need to demonstrate to shareholders and consumers that offsets are community-based and/or offer development benefits. The World Bank notes that sustainable development concerns are greater amongst private sector investors than public sector entities, and some investors have chosen to steer clear of CDM investments in HFC-23 destruction projects.<sup>33</sup>

This could cease to be an issue for the CDM in the post-2012 regime if a decision were taken to not allow HFC-23 reduction from “new” HCFC-22 refrigerant plants; although a decision is pending from the COP-MOP and there is considerable pressure from such countries as China and Japan to include these projects. A decision to restrict CDM projects to HCFC-22 facilities built before 2004 would restrict the share of HFC-23 projects to below 30 per cent in the commitment period to 2012; although destroying the HFC-23 formed at the 30 existing production plants in developing countries could generate at least 100 million CERs annually during the Protocol’s first commitment period (Matsumoto 2006). Removal of HFC-23 destruction projects would have a huge impact on the supply of CERs post-2012, but this could potentially be offset by a scale-up of programmatic CDM activities.

Other options are being considered to support the destruction of HFC-23, and there is discussion that post-2012 negotiations may see China and India offer concessions to developed countries by removing HFC-23 destruction projects from the CDM. Possible alternatives to address HFC-23 destruction in a new regime include a new sectoral arrangement separate from the CDM; or the establishment of a public or private group that would pay to destroy HFC-23 and get incentives to cover the cost. Carbon credits could be issued to a government that destroys HFC-23 and makes emissions cuts elsewhere. A green fund could be established, where revenue earned by countries through their sales of

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<sup>33</sup> Discussion with Mahua Acharya, World Bank, January 2007.

HFC CERs would be earmarked for use in projects that provide sustainable development. China, which has a number of CDM projects on its older generation HFC plants, has attempted to address the sustainable development issue by levying a tax of 65 per cent on these projects that is to be put into a national Sustainable Development Fund to be used to support climate mitigation activities.

#### **4.2 *Increasing the Quality and Quantity – Integration with National Development Objectives***

For an MMSD to make a meaningful contribution to sustainable development it needs to be integrated with other policies and programs and used as a vehicle to achieve national development objectives. If projects are reviewed and assessed in isolation, such as the case with the narrow CDM, it is unlikely that full potential sustainable development benefits will be realized for individual countries. Projects such as transportation, the built environment and construction, metals processing and mining, and energy distribution currently seem to have little appeal to investors due to various methodology risks, technical barriers and relatively low volumes of CERs. Expanded CDM or SCMs could help to overcome these barriers by linking the MMSD with national development policies, and encouraging project development in such sectors as energy efficiency and transportation that support the development dividend. The UNDP (2006) noted that China, the Philippines, Malaysia, Morocco, and several other countries have all devoted effort towards developing a strategic and integrated approach to the CDM, which could be reinforced by a more comprehensive MMSD.

#### **4.3 *Increasing the Quality and Quantity – A Wider Scope for LULUCF Projects***

An MMSD might also encourage broader participation if a wider scope of land use, land use change and forestry (LULUCF) projects were allowed. Section 2.3.1 noted the huge potential in non-Annex I countries for reforestation and afforestation; and the CDM or other MMSD could be expanded to include LULUCF projects other than afforestation and reforestation, such as improved agriculture, reducing the unsustainable use of biomass energy, avoided deforestation and revegetation. Emissions and removals of carbon from land use change are a huge part of the global carbon cycle. The Working Group III's contribution to the Intergovernmental Panel on Climate Change's Fourth Assessment Report (2007: 20) noted that including non-CO<sub>2</sub> and CO<sub>2</sub> land-use and forestry mitigation options provides greater flexibility and cost-effectiveness for achieving stabilization, and that forest-related mitigation activities can support adaptation and sustainable development.

Discussions and decisions on proposals on Reducing Emissions from Deforestation and Degradation (REDD) in developing countries will eventually provide guidance on this issue, but considerable methodological work remains (e.g., baselines, methodologies and leakage). This is also the case for improved agricultural practices, reducing the unsustainable use of biomass energy and revegetation, which require considerable front-end methodological work before such sectors could be considered as viable options for a post-2012 MMSD.

#### **4.4 Enhancing Regional Equity – Graduation of Large Emitting Developing Countries**

As discussed in Section 3, CDM graduation is an issue of concern for the post-2012 regime, both in regard to the tiers of countries (e.g., Annex I and non-Annex I, or some other differentiation) and the targets adopted by countries. Graduation could impact on the regional and equitable distribution of projects; as countries graduate from the CDM or other MMSD, a greater share of the market will be open to LDCs. At present, regional distribution is very unequal with Latin America & the Caribbean and Asia & Pacific together accounting for over 95 per cent of CDM projects and just under 95 per cent of CERs. Just three countries—China, Brazil and India—account for 74 per cent of the CERs in the pipeline, and just over two-thirds of the projects (as noted in the May UNEP-Risø pipeline). Only nine LDCs (of the 49 defined by the UNFCCC) have projects in the pipeline accounting for just 12 projects—less than one per cent of the projects in the pipeline and 1.4 per cent of the CERs.<sup>34</sup>

The *Nairobi Framework on Capacity Building for the CDM* aims to increase the number of CDM projects in African countries, where poor accessibility to the CDM has been a major challenge. This challenge also holds true for small developing countries, LDCs and SIDS. But over time and with the development of MMSD graduation criteria, it is expected that the MMSD will eventually become a mechanism to support sustainable development in LDCs and lesser developed countries, with the BRICSAM and other major developing countries eventually participating in emissions trading. Cosbey and Drexhage (2007) argue that there will be pressure for these countries to take actions commensurate with their capacity, which could include an expansion of Kyoto's simple two-tiered system, leaving the MMSD as a means to allow lesser developing nations to participate in the global regime.

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<sup>34</sup> As of May 1, 2007, Bangladesh and Nepal had three projects each, Cambodia and Uganda each had two projects, and there was one project each in Bhutan, Lao PDR, Equatorial Guinea, Senegal and Tanzania.

## **5.0 Conclusion**

As of this writing, in July 2007, perhaps the one thing on which there is broad consensus in the international talks on a post-2012 climate change regime is the need for some perpetuation of the CDM—a market mechanism for sustainable development. Knowing even this much can help to better define the options for the broader regime, however, since different regime designs imply different contexts within which to support an MMSD. Conversely, different conceptions of the MMSD can imply certain types of regimes. This paper has looked in depth at these connections, with a view to helping flesh out the options for a post-2012 regime design.

At the most basic level, a regime without targets will not support an MMSD. That said, targets can be specified in several different ways, and intensity targets and sectoral targets can in fact be amenable to trading and an MMSD, though not as easily as a regime with absolute targets. If parties want to pursue technology approaches, for example, they will need to supplement them with some other target-based approach if they also want an MMSD.

Approaches that favour graduation of non-Annex I countries to a state of target-based commitments will have perhaps the most interesting impacts on the function of any MMSD. Of course, if all countries have targets there can be no CDM-like element; and trading, if it does occur, would have to be done via some JI-like mechanism. The analysis above noted the disincentives there might be for developing countries to pursue such a negotiated outcome, perhaps surmountable by the granting of large surplus allowances matched by tough Annex I targets.

If only the key large emitting developing countries take on targets, the CDM market will see massive reduction in volumes supplied, since the majority of the projects and CERs in the current pipeline are from such countries. There are, however, several regime designs that involve something between hard commitments and no commitments, and several of these allow for crediting based on voluntary actions. Under such regimes the main consideration would be the volume of credits potentially issued, and the subsequent impacts on the carbon market. One such proposal—for sectoral crediting mechanisms—suffers from the problem that it is viable only for a small number of sectors. This would mean that in and of itself it probably would not serve to generate a sufficient supply of CERs.

Similar concerns surround the possible evolution of the CDM itself. Recent EB guidance allows programs of activities to be registered as CDM and, in spite of

the EB direction to the contrary, this may amount to a blessing for policy-based CDM. Along with the possibility of including avoided deforestation projects in the CDM, these types of top-down innovations would have positive outcomes from a number of perspectives, bringing high development dividend benefits and high volumes of CER production. But, absent ambitious Annex I targets, those high volumes have the potential to increase the supply of CERs to the point where the market might be swamped. In such a case there may be potential for CERs to sell on the as-yet-nascent voluntary market. Without such increases in demand, however, and unless Annex I countries take on tough targets, prices might hit destructively low levels under some of the expanded CDM scenarios.

Finally, there are a number of issues that relate to how the present regime might undertake the transition to a future regime. If a new regime changes the rules, care must be taken to ensure fair treatment of those that have taken action under the present regime. None of these issues are insurmountable with adequate foresight and careful design. It may be desirable to quickly move to guarantee some sort of bridging facility that would guarantee long-term value for carbon, for example. This would avoid a destructive investment gap between the first and next commitment period, born of uncertainty.

Given the broad desire for some sort of market mechanism in the post-2012 regime, it is surprising that more analysis has not been devoted to understanding the implications of the various possible regimes to the shape of an MMSD, and to understanding the implications of the various regimes of the possible iterations of the MMSD. This paper takes a first step in this direction, providing policy makers with a deeper understanding of the implications of various post-2012 possibilities.

## **Appendix 1: Categorization of Post-2012 Approaches – A Top-Down Analysis**

A number of post-2012 approaches have been put forward. A select list is included below as a starting point for analyzing how a market mechanism for sustainable development (MMSD) could be applied in emerging post-2012 approaches. Thirty-four of the post-2012 approaches identified in Bodansky's 2004 *International Climate Efforts beyond 2012: A Survey of Approaches* are used in the analysis, and nine more were identified through a literature review for a total of 43 post-2012 approaches.<sup>35</sup> These 43 approaches were then analyzed in regard to the potential role of the CDM.

Five preliminary categories were developed as a result of the analysis. Each of the 43 approaches was categorized into one of the following five categories, while noting that there is overlap:

1. Targets with Flexibility Mechanisms – the framework of the current CDM can be used in these approaches, most of which suggest some form of graduation from the CDM;
2. Targets with Emissions Trading Only – all countries participate in emissions trading, the role for CDM or another MMSD is not stated, but in many cases could be used for developing countries that are not capable of developing or participating in emissions trading systems;
3. Policy and Sectoral Approaches – an expanded CDM is promoted in these approaches;
4. Technology Approaches – these approaches promote technologies in developing countries, but do not support the CDM or another MMSD; and
5. Other Approaches – approaches that have no stated role for the CDM or other MMSD (e.g., carbon taxes).

The table below includes a brief description of the approach/proposal, the considerations put forward to account for sustainable development needs of developing countries, and the potential role of the CDM.

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<sup>35</sup> A number of approaches in Bodansky were focused on "burden sharing" and are not included in this analysis; although it is noted that these burden-sharing approaches could provide information that could be applied to the issue of CDM graduation.

Post-2012 Option	Description	Developing Country Considerations	Potential Role of CDM
<b>1. Targets with Flexibility Mechanisms</b>			
Action Targets (Baumert and Goldberg 2006)	An action target is an obligation to achieve or acquire an agreed amount of GHG emission reductions. The amount of reductions required by the action target is expressed as a percentage of the country's actual emissions during the compliance period.	Like countries with emissions targets, a country adopting an action target can comply with its obligation by purchasing Kyoto compliant emission allowances or credits in lieu of (or in concert with) taking domestic action. Likewise, countries can be permitted to sell allowances if they over-comply with their action targets. To promote sustainable development and maximize GHG abatement, the action targets are able to accommodate policies and even private-sector-led initiatives that have a sectoral or national reach—such as renewable energy portfolio standards. The approach to additionality under the CDM is altered. A promising approach is to define a set of activities or policies that are unquestionably climate-friendly and therefore <i>a priori</i> eligible for crediting.	Action targets can operate in a manner that is complementary and consistent with the prevailing Kyoto system of fixed targets, emissions trading and the CDM. A simple way to introduce action targets into the Kyoto system is to use the same accounting rules employed by the CDM for defining and measuring reductions as well as monitoring and verifying projects. Another approach is to leave the CDM intact, so that developing countries have available to them two means of generating reductions; the CDM and action targets. CDM accounting and trading remain as is, while action targets have a different set of accounting and trading rules that promote a broader, but complementary, set of actions not recognized under the CDM.
Brazilian Proposal (Brazil 1997)	Burden sharing based on historical responsibility determines emission reduction commitments. Countries in groups that do not commit to emission targets (e.g., LDCs) either make other types of commitments, such as qualitative commitments, or no commitments at all.	Original proposal includes a Clean Development Fund within the GEF—this became the CDM.	Current CDM structure can be used.

Post-2012 Option	Description	Developing Country Considerations	Potential Role of CDM
Carbon Credit Banking, Dual Track Approach and Technology + Compensation Fund (Kameyama 2006)	Emissions trading and flexible mechanisms play a central role, where each country has an emissions limitation target. A Carbon Credit Bank is established under the UNFCCC to set an upper-price limit to act as a safety valve. The dual track approach has two types of commitments—Track A of non-legally binding PAMs and Track B where emission targets are legally binding and with a regime similar to Kyoto. Numerous technology agreements are signed on a bilateral or regional level, and each establishes a technology compensation fund.	Non-Annex I countries set emissions targets that allow some emissions growth, but without creating a lot of “hot air.” A lower price is offered for developing countries through the bank. In the dual track approach, developing countries are required to reduce emissions at a lower rate than BAU. The technology compensation fund is used to assist developing countries adversely impacted by climate change and to spread existing technologies to developing countries.	The CDM in its current structure can be used. Sector-wide CDM projects can also be permitted in the dual-track approach. The Carbon Credit Bank can also support the CDM; non-Annex I countries can offer project designs to the bank, and the bank can support the projects by combining small project investments into one large investment.  <i>Also includes PAMs (category 3) and Technology (category 4)</i>
Common but Differentiated Convergence (Höhne, den Elzen and Weiss 2006)	Industrialized countries’ per capita emission allowances converge within an agreed-to time period, e.g., 40 years, to an equal level for all countries. Individual developing countries’ per capita emissions also converge within the same period to the same level but convergence starts from the date when their per capita emissions reach a certain percentage threshold of the (gradually declining) global average.	Developing countries that do not pass the percentage threshold do not have binding emission reduction requirements. They participate in the CDM or voluntarily take on “positively binding” emission reduction targets. Under the latter, emission allowances may be sold if the target is overachieved, but none have to be bought if the target is not reached.	Current CDM structure can be used for developing countries that do not pass the percentage threshold.
Converging Markets (Tangan and Hasselknippe 2003)	Integration of fragmented national emissions trading systems through bilateral negotiations. To gain admission to the emissions trading group, a country needs to accept binding targets. A multistage regime with core trading countries, partial reporting, trading countries and CDM hosts.	Need for reliable inventories and registries suggests that many developing countries may have to develop infrastructure and may choose to do it by sector.	Current CDM structure can be used. Partial reporting and trading countries can host CDM in non-trading sectors.

Post-2012 Option	Description	Developing Country Considerations	Potential Role of CDM
Expanded "Common but Differentiated" (Gupta and Bhandari 2003)	This approach suggests in the longer term (beyond the year 2025) a limit on global GHG emissions is determined and allocated on an equal per capita basis. In the shorter-term, emissions reductions for developed countries are increasingly reduced over time, with due consideration for the differing national levels of carbon efficiency (or the inverse of carbon intensity).	Along with the long-term reduction in the emissions of GHGs by Annex B countries, the establishment of per capita emissions limits implies controlled growth in emissions by the developing countries. Developing countries will take on targets in the longer term.	Current CDM structure can be used in the shorter-term—up to 2025.
Further Differentiation (Swedish Environmental Protection Agency 2002)	Parties to the Protocol are split into at least three groups based on a mixture of criteria. Developed countries have quantified binding, while the more advanced developing countries are allocated binding dynamic targets. The framework is compatible with an emissions trading regime.	A group of the poorest developing countries (Group 4) have non-binding (voluntary) targets. Group 3 has non-binding fixed targets.	CDM can be used for project activities in poorest countries and for Group 3 emission reductions in excess of their non-binding targets.
Gradual Process of Accommodation (Wara 2006)	A broader but shallower participation in the Kyoto Protocol is encouraged by a gradualist strategy whereby a series of protocols replaces aspects of the CDM, which only deal with CO <sub>2</sub> . A global institution addresses energy and CO <sub>2</sub> , and likely includes emissions trading.	Encourages participation by key developing countries through the establishment of multilateral funds for technologies for HFC-23, N <sub>2</sub> O and CH <sub>4</sub> .	The CDM can be used for emissions trading to deal with CO <sub>2</sub> .
Graduation and Deepening (Michealowa, Buttengeiger and Jung 2003)	Quantified emissions budgets are the basis of the regime. Coordinated expansion of countries that take on emissions. International transport will be included, and sequestration of carbon will play an increasing role. Principles of Kyoto Mechanisms remain valid with rules streamlined.	Emissions budgets based on capacity to pay and current emissions per capita.	CDM is used for non-Annex B countries. For such most developing countries, CDM is the instrument of choice; and participation in the CDM will help to create national institutions and promote markets. Sinks can be used without limit (if they can be properly monitored), but CDM sinks credits are temporary.

Post-2012 Option	Description	Developing Country Considerations	Potential Role of CDM
Growth Baseline (Hargrave, Helme and Vanderlan 1998)	<p>Developing country emissions are not capped in absolute terms, but countries have to make sure that GHG emissions grow at a slower rate than their economic output. Developed country emissions are capped in absolute terms at or below 1990 levels. Growth baselines are established only for the 13 countries that account for over 90 per cent of developing country emissions. Other countries will take on growth baselines commitments as their emissions grow.</p>	<p>Uses the Kyoto structure, with the 13 developing countries adopting growth baselines and participating in emissions trading.</p>	<p>Current CDM structure can be used by “other” countries until their emissions growth rates surpass economic growth rates.</p>
Multi-Sector Convergence (Sijm, <i>et al.</i> 2001)	<p>The multi-sector approach starts with the definition of seven sectors—power generation, households, transport, industry, services, agriculture and waste. For these sectors global “emission standards” are set on a per capita basis derived from a set concentration target; they converge at a set future year. The sectoral standards are then converted into indicative national targets. All countries that have per capita emissions above the world average have to make that target binding. Countries that take up targets can apply an adjustment period of one commitment period before the targets become binding.</p>	<p>The amounts of per capita emissions assigned ultimately converge at the same level for all countries. Additional allowances may be conceded to countries facing specific circumstances that warrant higher emissions than countries that have more favourable circumstances relating to emissions mitigations, other factors being the same.</p>	<p>The CDM can be used by countries whose targets are not binding.</p>

Post-2012 Option	Description	Developing Country Considerations	Potential Role of CDM
Multistage/New Multistage (den Elzen, <i>et al.</i> 2006)	Countries participate in several stages with differentiated types and levels of commitments. Countries graduate into next stages when they exceed certain thresholds (e.g., emissions per capita or GDP per capita). All countries agree to have commitments at a later point in time. Höhne and Ullrich (2005) identify three stages: 1) no commitments for countries with a low level of development; 2) countries commit in a clear way to SD with environmental objectives built into development policies; and 3) absolute emission targets. Countries move through these stages based on their level of emissions per capita.	Countries are put into several groups according to GDP per capita, and emission targets are set for countries in the developed country group. The additional costs for stage 2 (sustainable development policies) can be borne by the country itself or by other countries, e.g., ODA supplemented by additional climate-related funds.	CDM can be used with host countries in stages 2 and 3.
Orchestra of Treaties (Sugiyama and Sinton 2005)	This approach leaves it up to countries' own willingness to agree to a number of agreements, which would address single issues, such as emissions trading, technology cooperation, and development cooperation. The UNFCCC facilitates, oversees and negotiates emissions monitoring and information exchange. A Zero-Emission Technology Treaty addresses long-term technological change.	The Climate-wise Development Treaty addresses concerns of developing countries by promoting development, adaptation, technology transfer and mitigation.	The emissions trading markets can recognize CDM credits.  <i>Also includes Technology (category 4)</i>
Russian Federation proposal to develop appropriate procedures for the approval of voluntary commitments (Russian Federation 2006)	The objective of the proposal is to encourage and expand possibilities for voluntary GHG emissions reduction commitments.	Non-Annex I Parties that take on commitments voluntarily should implement national policies and measures to support a national GHG emissions inventory and provide regular reporting.	Current CDM structure can be used.

Post-2012 Option	Description	Developing Country Considerations	Potential Role of CDM
Safety Valve with Buyer Liability (Victor 2001)	In the short term the approach is similar to the Kyoto Protocol, except that individual countries can buy unlimited numbers of allowances at a specified price (safety valve). Compliance is promoted through a buyer liability scheme, under which if the seller of a permit did not reduce its emissions as promised, the buyer can not claim the emission credit. Since buyers of emission credits are most likely to be private entities in developed countries, the buyer liability rule can be reliably enforced by domestic institutions in these countries.	In the short term, developing countries participate through the CDM, but in the long term a graduation mechanism is proposed for developing countries. As they reach particular incomes, they must then adopt either quotas (as developed countries) or growth targets.	Current CDM structure can be used in the short term.
Sao Paulo Proposal (University of Sao Paulo, The BASIC Project 2006)	Sets out targets for Annex I/B countries in the form of annual emission limitation commitments for six years 2013–2018. Each Party may choose the form of its annual commitments; absolute emissions limits, intensity limits and financial contributions. These commitments are subject to an automatic adjustment process that extends and makes them more stringent on an annual basis whilst retaining the assessment of compliance at five-year intervals. If during the most recent year compliance has been “burdensome” the last annual commitment is simply extended without change. Otherwise the extension is a one per cent reduction from the last annual commitment.	Developing countries commit to quantify and report the emission reductions achieved by SD policies, but do not earn tradable credits for reductions achieved by these policies. Alternatively, a developing country can adopt a sectoral or “no lose” commitment and earn a new type of credit; voluntary emission reduction units (VERs). A levy of two per cent of the AAUs, RMUs and ERUs transferred internationally under JI and ET are proposed to assist Non-Annex I Parties with technology development and diffusion. The two per cent share of proceeds on CERs remains in effect for adaptation assistance and is extended to VERs.	The CDM is a core element, but is phased out over the very long term, as more and more non-Annex I Parties take on national emissions commitments. This leaves a greater share of the CDM market to LDCs and others who are currently not able to benefit from the CDM to their full potential. Proposed improvements to the CDM include simplifying the procedure for small-scale project activities. A country will graduate from the CDM when its cumulative sales of CERs and VERs reach its share of the global limit.

Post-2012 Option	Description	Developing Country Considerations	Potential Role of CDM
<b>2. Targets with Emissions Trading Only</b>			
Contraction and Convergence (Meyer 2004)	This proposal aims for equal emissions per capita in the long term (such as by 2050), and links each country's present emissions and long term target in order to set emission targets for the years between now and 2050.	Not all developing countries benefit from this approach. Those developing countries above or close to the average will soon (e.g., 2020) be constrained and will not receive excess allowances.	Role of CDM is not specified in proposal, but there can be a role for an MMSD for developing countries that are not capable of participating in emissions trading.
Domestic Hybrid Trading Schemes (McKibbin and Wilcoxon 2000)	This approach involves establishing emissions trading systems at the domestic level in each country. The system offers two types of allowances, one annual and the other in perpetuity. This is largely a price-based approach, with two domestic markets for tradable permits; one for annual emissions and another for perpetuities ("endowments"). As in other proposals, governments provide a safety valve of permit sales at a fixed price (which can rise over time).	Endowments are made to both industrialized and developing countries, the latter in excess of current or anticipated emissions, to allow for economic growth. At first the allocation of long-term permits in developing countries exceeds current emissions and no annual permits are sold. But when emissions begin to grow, annual permits are sold, thus providing a price signal to energy producers and potential investors about the expected future price of carbon in these economies. A developing country can also use the long-term permits (which cannot be traded internationally) to encourage direct investment in low-carbon energy generation in its economy.	No role for CDM or other MMSD noted in proposal.
Dual Intensity Targets (Kim and Baumert 2002)	First, <i>dynamic targets</i> , where an emission target adjusts in response to another variable, are proposed for developing countries as a possible future alternative to the Kyoto Protocol's fixed target approach. Second, rather than a single target, a <i>target range</i> can be established; this approach is called <i>dual targets</i> . <i>Dual-intensity</i> targets combine the ideas behind both dynamic and dual targets. Two emission targets are set; one legally binding and one not legally binding (but more ambitious). Countries aim to achieve the latter, but may participate in emissions trading when they achieve the former target.	Dynamic targets are compatible with sustainable development because they are geared toward achieving emission reductions <i>relative</i> to economic development rather than achieving absolute reductions in emissions. Dynamic targets may perform better than fixed targets for economies facing considerable uncertainty, particularly in developing countries.	No role for CDM or other MMSD noted in proposal.

Post-2012 Option	Description	Developing Country Considerations	Potential Role of CDM
Human Development Goals with Low Emissions (Pan 2005)	<p>There are three types of commitments—voluntary, conditional and obligatory—which depend on potential at the project, sectoral and economy-wide levels. Voluntary actions aim at no-regret emission reductions that require no external support and no strict obligation would be implied. For developed nations, this part of their commitment can be made binding. Conditional commitments in developing countries are dependent on the provision of technologies and financial assistance from developed countries. Conditional commitments are legally binding in developed nations. There is no distinction between developing and developed countries in regard to obligatory commitments, which are a binding moral commitment to restrict luxurious and wasteful emissions.</p>	<p>The aim is to develop a regime that does not compromise human development, and is consistent with sustainable development requirements. Voluntary emissions reductions are not eligible for trading, as they are considered a baseline and the result of no-regret policies. Conditional reductions are an additional reduction and can be traded. Obligatory reductions are tradable if there is a restriction in emissions; increases in luxurious emissions are deducted from reductions for trading. A progressive tax on emissions discourages excessive emissions and raises funds for low-carbon technologies. Emissions lower than basic needs can receive a subsidy, emissions at the basic needs level are taxed at a normal rate, and luxury emissions are taxed at higher rates.</p>	<p>No role for CDM or other MMSD noted in proposal.</p>
Hybrid International Emission Trading (Aldy, Orszag and Stiglitz 2001)	<p>Combines an international trading mechanism with a safety valve or price ceiling, to be implemented by an international agency making available additional permits at a fixed price. Not a substantial departure from the Kyoto Protocol, but needs an international agency to make available additional permits at a fixed price. The system also needs a mechanism for ensuring enforcement (e.g., trade sanctions, incentives).</p>	<p>Ideally, all countries have mandatory targets, with developing countries taking emissions commitments that are less stringent than the OECD. Proceeds from the sale of additional permits finance climate change research and help developing countries meet their targets. A second, but less preferred option is to allow developing countries to have voluntary near-term commitments, moving to a binding commitment in the medium term.</p>	<p>No role for CDM or other MMSD noted in proposal.</p>

Post-2012 Option	Description	Developing Country Considerations	Potential Role of CDM
One Human – One Emission Right (Wicke 2005)	An international emissions trading system that is based on a Global Climate Certificate System that is based on the “one human – one emission right” principle.	Developing countries receive more climate certificates than they need and can sell them at a fixed price to the industrialized countries. The money will be spent according to a “Sustainable Development and Elimination of Poverty” plan developed at the national level and approved internationally.	No role for CDM or other MMSD noted in proposal.
Parallel Climate Policy (Stewart and Wiener 2003)	This approach anticipates U.S. leadership in efforts to mitigate climate change. It suggests that the U.S. and China, and other developing countries if necessary, establish an agreement based on a cap and trade system, and other countries stick to the current Kyoto Protocol. It is assumed that the two regimes will merge after a while.	The cap and trade system will build out to include other countries—India and Brazil. Major developing countries that participate are assigned allowances above their existing emissions. Governments provide assistance for poorer regions of the world, which lack affordable insurance or access to adaptive technologies.	The CDM is viewed as a second and more cumbersome system.
Purchase of a Global Public Good or International Emission Trading without a Cap (Bradford 2002)	This proposal is the equivalent of an international emissions trading program without a fixed cap on emissions. All nations, including developing countries, are allocated permits equivalent to their anticipated business-as-usual time path of emissions. Periodically, an international authority offers to purchase (and retire) emissions allowances. Distributional issues are handled through the financing of the international authority.	Differential funding responsibilities are established on the basis of per capita income levels and other criteria. The resulting income from the sale can be used for climate-related purposes, such as financial support for developing countries.	No role for CDM or other MMSD noted in proposal.
Safety Valve and Intensity Targets (Pizer 2005)	Also described as a “hybrid” approach, refers to a combination of emissions trading and emissions tax. A price-based safety valve—that is, a price at which the government would sell additional emissions permits in order to keep allowance prices and costs from rising above acceptable levels. Intensity targets might be more suitable for trajectories that initially slow, rather than halt, emissions growth.	The potential advantages of an intensity target are amplified for developing countries.	No role for CDM or other MMSD noted in proposal.

Post-2012 Option	Description	Developing Country Considerations	Potential Role of CDM
Soft Landing in Emission Growth (Blanchard, <i>et al.</i> 2001)	Staged approach for 2010–2030 where countries have fixed, binding targets and emissions trading.	Developing countries must stabilize emissions by different dates, depending on ability to pay—high income developing by 2015; middle by 2030 and low income by 2045.	CDM or other MMSD can be an option for countries that are not capable of participating in emissions trading.
Three-Part Policy Architecture (Olmstead and Stavins 2006)	Three-part policy architecture: 1) all countries participate; 2) aggregate short-term targets that are moderate yet rigid, and long-term targets—put in place now—that are much more ambitious (in order to induce needed technological change), but flexible to respond to learning; and 3) market-based instruments, including international permit trading, possibly with a safety valve. The next international agreement uses time horizons that are much longer than Kyoto’s five-year blocks. If the atmospheric carbon level is to be stabilized at 550 parts per million, they say, then annual carbon emissions should peak around the year 2030, according to the most cost-effective model.	Non-participating low-income countries are lured into the next treaty with short-term targets that are above their current emissions levels, so they do not feel any immediate anxiety about harming their industries. Has an explicit mechanism providing for voluntary accession by developing countries, and a trigger, linked with per capita income, that requires developing countries to take on “growth targets”—commitments that are a function of per capita income and other negotiated factors.	No role for CDM or other MMSD noted in proposal.

### 3. Policy and Sectoral Approaches

Dual Track (Kameyama 2003)	Countries choose between a PAM-based approach that is not legally binding (Track A) or an emissions trading with safety-valve approach (Track B) where commitments are binding.	There is no distinction between Annex I and non-Annex I countries.	Any country, either Track A or B, can invest in or host CDM projects. Track B countries may sell emission permits raised by CDM in the international market. Track A countries may include plans for CDM activities in their country PAM list. JI will be included in CDM. As each party has its own emission target in this proposal, procedures to certify and verify CDM projects may be simplified in order to decrease transaction costs and facilitate implementation of projects.
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Post-2012 Option	Description	Developing Country Considerations	Potential Role of CDM
Global Framework: Kyoto, Decarbonization and Adaptation (CAN 2003)	This climate regime has three parallel, inter-linked tracks: 1) The Kyoto track building on the current system of legally binding absolute emission reductions and compliance regime; 2) Greening (decarbonization) Track with resources and technology provided by developed countries; and 3) Adaptation Track to support the most vulnerable regions (SIDS, LDCs). The level and the character of the mitigation actions within this framework are determined by reference to agreed level of per capita emissions, ability or capacity to act and historical responsibility.	Track 2 replaces the CDM and includes decarbonization of energy services in developing countries while accelerating the achievement of sustainable development objectives. As countries develop they move from Track 2 to Track 1. The LDCs, where their emissions remain below an agreed level, are not involved. There will however be significant incentives from a sustainable development perspective for LDCs to be involved, should they wish.	While the CDM has been replaced by Track 2, which can include sectoral or PAMs approaches, the mechanism can be used as a means to involve lesser developed nations in clean technology projects.
Keep It Simple, Stupid (KISS) (Gupta 2003)	Methodologies for differing commitments gradually involve all developing nations. There are 12 categories of countries with differing commitments.	All countries are obligated to implement PAMs, and the approach includes obligations for technology transfer.	Current CDM structure can be used between the levels of countries.
Sector-based Approach (Schmidt, <i>et al.</i> 2006)	Key developing countries pledge to achieve a voluntary "no lose" GHG intensity target in the electricity and key industrial sectors. Emissions achieved beyond the voluntary pledge are eligible for sale as credits to developed countries. Failure to meet the pledge will not involve any penalty or requirement to purchase credits from other countries. Developed countries have hard, aggregate economy-wide targets. Thus, absolute GHG emissions in developing country sectors can grow, while in growth in the sectors of developed countries will be limited.	Developing countries that reduce their sectoral GHG emissions below the pledged level will be awarded credits that could be sold to developed nations, and would be fully fungible with international emissions trading mechanisms. A technology incentive package is provided by developed nations and IFIs to encourage developing countries to meet aggressive targets.	In the developing countries which participate in a sectoral program, the pledge process supplants the CDM in the covered sectors. Developing countries not participating in the sectoral program, as well as entities in uncovered sectors of participating developing countries, can still carry out projects under the current or revised (policy-based or sectoral) version of the CDM. The benchmarking process will assist the CDM to establish project-specific baselines and additionality in these sectors.

Post-2012 Option	Description	Developing Country Considerations	Potential Role of CDM
Sectoral CDM (Samaniego and Figueres 2002)	By dealing with emissions from a whole sector, developing countries may be able to control their emissions while being able to obtain technological and financial assistance from developed countries.	Instead of committing to national emissions targets, developing countries may commit to develop and host sectoral projects under the CDM.	Programmatic CDM has been accepted by the COP-MOP. The rules and modalities are being developed.
Sectoral Crediting Mechanism (Bosi and Ellis 2005; Sterk and Wittneben 2005)	Three potential designs for a sectoral crediting mechanism (SCM) are; policy-based crediting, rate-based (indexed) crediting, and fixed sectoral emission limits. Two approaches for SCMs are transnational sectoral mechanisms that encompass companies operating in a given sector world-wide, and national sectoral mechanisms that have national governments proposing baselines for some of their sectors as a means of providing incentives to exploit GHG-reducing opportunities by attracting GHG-friendly investments with sectoral emission credits.	Integrating GHG considerations into broader economic development policy-making through a sectoral policy crediting mechanism can effectively lead to clearer and possibly longer-term policy signals and potentially lead to significant GHG reductions. The sectoral approach can contribute to achieving sector wide transformations in host countries, and it may be a way to encourage activities with development benefits that are not as cost effective as others. But it may exacerbate the regional inequity of CDM project distribution.	The CDM is expanded to include sectoral CDM, although it must be recognized that such an approach could be difficult in certain sectors (e.g., forestry) and in countries lacking baseline data.
South-North Dialogue (Ott, <i>et al.</i> 2004)	Countries are classified into six groups (including four for non-Annex I Parties) according to a mixture of three indicators (potential to mitigate, responsibility to mitigate, and capacity to mitigate). Commitments are categorized into emission limitation commitments, qualitative action and financial transfers to support mitigation activities. Developed countries have Kyoto-style commitments.	Developed countries are committed to financial and technological transfers to non-Annex I countries, particularly to those with low to medium capability to mitigate. Qualitative targets for non-Annex I include sector CDM, P&Ms and non-binding renewable energy and energy efficiency targets.	The CDM can work in its current form between identified categories of countries. Sectoral or PAM CDM can be used.  <i>Also includes Technology (category 4)</i>

Post-2012 Option	Description	Developing Country Considerations	Potential Role of CDM
Sustainable Development PAMs (Winkler, <i>et al.</i> 2002; Baumert and Winkler 2005)	Developing countries make voluntary pledges to implement sustainable development policies and measures that would reduce GHG emissions. Such pledges amount to an integration of climate policies within national development programs; they are designed primarily to serve domestic policy objectives such as energy security and rural development. But they also result in significant GHG emission reductions. The SD-PAMs approach involves no binding commitments from developing countries, but does involve commitments from developed countries to support their voluntary efforts. Pledges are specified in terms of policies implemented, rather than in terms of GHG emission reductions. They can be made by a single country or by groups of countries acting in concert on specific issues of shared interest.	This approach is proposed mainly for developing countries, many of which find quantitative emission targets to be unacceptable—not only for political but also for technical reasons. If PAMs are successfully carried out, they are supported with funding, either through existing channels (e.g., ODA, the GEF, multilateral development banks) or through some expressly designed international mechanism (which might coordinate existing funding channels).	The CDM can be supportive of SD-PAMs. Projects implemented under approved policies can be eligible for crediting under the CDM, although changes will be required as projects will be non-additional if they are required under a policy or law. Lessons learned from the CDM-registry, etc., can be applied to an SD-PAM approach. Action targets can be used to incorporate a quantitative dimension into SD-PAMs.
Tryptych/Extended Global Tryptych (Groenberger, <i>et al.</i> 2001; Höhne, <i>et al.</i> 2003; Höhne 2006)	The approach is designed to take into account national circumstances in setting goals for policy action. It is a sector-based approach to sharing emission allowances among a group of countries. The Tryptych approach does not define which countries should participate. The Tryptych methodology calculates emission allowances for various sectors (electricity production, industrial production, the domestic sector, fossil fuel production, agriculture and waste) which are added to obtain a national target. The national targets are binding, not so for the sectoral targets. Countries can pursue any cost-effective emission reduction strategy they desire. Countries are allotted to a category based on their GDP per capita.	Sectoral emission targets are set according to various indicators, such as population or GDP. National targets are determined by adding up the sectoral targets. The approach can be applied globally, but would work best on a subset of countries where sectoral data are available. The high data requirements may prevent participation by less developed countries.	The CDM is not mentioned, but can be used to assist in the transfer of technologies to countries that have do not have targets.

Post-2012 Option	Description	Developing Country Considerations	Potential Role of CDM
<b>Technology Approaches</b>			
International Agreements on Energy Efficiency (Ninomiya 2003)	Negotiation of international energy efficiency agreements in the residential, transportation and industrial sectors. Can be complementary to Kyoto Protocol.	Participation may initially be limited to the OECD and four major developing countries (Brazil, China, India and Russia), as they account for more than 75 per cent of the global primary energy consumption.	Further research is necessary to design such scheme in future, particularly concerning the compatibility with the CDM.
Portfolio Approach (Benedick 2001)	Technology approach that emphasizes international standards and incentives for technology innovation and diffusion, but also includes a renegotiation of the Kyoto targets and a process in which participation in negotiations expands over time. The approach is to adopt a portfolio of policies to move the international community toward a desirable technology strategy.	The portfolio of policies includes a small carbon tax to fund new technology research and developed countries are to provide assistance to developing countries to finance the incremental costs of mitigation measures.	CDM-like instrument that is focused on energy sector can support technology innovation.
Technology R&D Proposal (Edmonds and Wise 1999)	This approach aims to give countries incentives to stimulate technology research and development (R&D) at the domestic level. International agreements may be used to promote collaboration on technological R&D.	Concerns of developing countries addressed through collaborative R&D.	No role for CDM.
Technology-Centred Approach (Barrett 2001)	This approach involves the creation of an international technology fund to invest efficiently in the most innovative, effective technologies to mitigate climate change. This proposal emphasizes common incentives for climate-friendly technology R&D, rather than targets and time tables. Includes an R&D protocol that supports collaborative research, and protocols that require common standards for technologies identified through collaborative research efforts.	Concerns of developing countries addressed through collaborative R&D.	No role for CDM.

Post-2012 Option	Description	Developing Country Considerations	Potential Role of CDM
<b>Other</b>			
Agreed Domestic Carbon Tax (Cooper 2006)	This approach is based on the view that the coordinated introduction of carbon taxes would be more effective than cap and trade systems. Countries negotiate a set of common actions aimed at achieving global emissions targets. In particular, a harmonized carbon tax would be used by all participating nations—industrialized and developing alike—to tax their domestic carbon usage at a common rate, thereby achieving cost-effectiveness. Focus on level of effort rather than on quantitative targets; includes the introduction, within an internationally agreed framework, of a domestic tax on GHG emissions.	Developing countries are part of the carbon tax regime, but can be granted a longer period of time to introduce the tax (e.g., five years delay, followed by the phase-in period). The circumstances of developing countries can be accommodated by lowering their carbon tax rates. The approach includes transfers to developing countries.	No role for the CDM.
Climate Marshall Plan (Schelling, 2002)	This climate “Marshall Plan” has developed countries contribute funds and developing countries commit themselves to emissions mitigation strategies using the funds. International mechanisms in pursuit of targets and time tables (such as international permit trading) are dismissed, although domestic market-based instruments are recommended.	Transfers for developing countries are a main focus of approach.	No role for the CDM.
Harmonized Carbon Taxes (Nordhaus, 2006)	This proposal combines the notion of harmonized carbon taxes with attention to the efficiency of the targets. This is done by setting the harmonized carbon tax at the efficient level through a dynamic benefit–cost analysis, where the benefits are determined through an international voting mechanism which is intended to reflect countries’ true willingness to pay.	As in other proposals, developing countries participate only when their per capita incomes reach particular threshold levels. Compliance is promoted through import duties, which are levied on goods from non-participant countries, based on carbon content, with goods from poor countries exempted.	No role for the CDM.

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