iisd International Institute for Sustainable Development / Institut international du développement durable
http://www.iisd.org

Encouraging Developing Country Participation in a Future Climate Change Regime

Deborah Murphy, Dennis Tirpak, John Drexhage and Frédéric Gagnon-Lebrun with contributions from Jean Nolet, Jo-Ellen Parry and Peter Wooders

March 2009

Encouraging Developing Country Participation in a Future Climate Change Regime

Deborah Murphy, Dennis Tirpak , John Drexhage and Frédéric Gagnon-Lebrun
with contributions from Jean Nolet, Jo-Ellen Parry and Peter Wooders

March 2009

IISD acknowledges the generous support of Environment Canada.

Published by the International Institute for Sustainable Development

The International Institute for Sustainable Development contributes to sustainable development by advancing policy recommendations on international trade and investment, economic policy, climate change, measurement and assessment, and natural resources management. Through the Internet, we report on international negotiations and share knowledge gained through collaborative projects with global partners, resulting in more rigorous research, capacity building in developing countries and better dialogue between North and South.

IISD's vision is better living for all—sustainably; its mission is to champion innovation, enabling societies to live sustainably. IISD is registered as a charitable organization in Canada and has 501(c)(3) status in the United States. IISD receives core operating support from the Government of Canada, provided through the Canadian International Development Agency (CIDA), the International Development Research Centre (IDRC) and Environment Canada; and from the Province of Manitoba. The institute receives project funding from numerous governments inside and outside Canada, United Nations agencies, foundations and the private sector.

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
E-mail: info@iisd.ca
Web site: http://www.iisd.org/

Preface

The International Institute for Sustainable Development (IISD) has prepared three papers to explore how major developing economies might become effectively engaged in a post-2012 global climate change regime. The goal of this first paper, *Global Climate Change Goals: Encouraging Developing Country Participation*, is to set out a synthesis of how an international climate deal might play out—including appropriate actions and commitments by major developing economies, and the support required to help them make these commitments and undertake actions.

The analysis in this first paper is supported by two background papers:

1. Financing Mitigation and Adaptation in Developing Countries: New options and mechanisms; and
2. The Carbon Market: How the future market can encourage developing country participation.

Abbreviations and Acronyms

AAU	assigned amount units
AOSIS	Alliance of Small Island States
APP	Asia Pacific Partnership for Clean Development and Climate
APEC	Asia-Pacific Economic Cooperation
AR4	Fourth Assessment Report
AWG-KP	Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol
AWG-LCA	Ad Hoc Working Group on Long-term Cooperative Action under the Convention
BAU	business as usual
CCS	carbon dioxide capture and storage
CDM	Clean Development Mechanism
CER	certified emission reduction
CMP	Conference of the Parties serving as the Meeting of the Parties
CO_2	carbon dioxide
CO_2-eq	carbon dioxide equivalency
COP	Conference of the Parties
CSLF	Carbon Sequestration Leadership Forum
EC	European Commission
ECA	export crediting agency
EU	European Union
EU-ETS	European Union Emissions Trading System
ERU	emission reduction unit
G8	Group of Eight
G20	Group of Twenty
G77	Group of Seventy-seven
GDP	gross domestic product
GEF	Global Environment Facility
GENIV	Generation IV International Forum
GHG	greenhouse gas
GNEP	Global Nuclear Energy Partnership
GNI	gross national income
ICB	International Carbon Bank
IEA	International Energy Agency
IISD	International Institute for Sustainable Development
IMF	International Monetary Fund

IPCC	Intergovernmental Panel on Climate Change
IPHE	International Partnership for the Hydrogen Economy
IPR	intellectual property rights
JI	Joint Implementation
LCGP	Low Carbon Growth Plan
LDC	least developed country
LULUCF	land use, land use change and forestry
M2M	Methane to Markets
MDE	major developing economy
MMSD	market mechanism for sustainable development
MOP	Meeting of the Parties
MRV	measurable, reportable and verifiable
Mt	megatonne (millions of tonnes)
MW	megawatt (millions of watts)
NAMA	nationally appropriate mitigation actions
NDRC	National Development and Reform Commission
NGO	non-governmental organization
ODA	official development assistance
OECD	Organisation for Economic Co-operation and Development
OPEC	Organization of Oil Producing Countries
PPP	purchasing power parity
ppmv	parts per million per volume
R&D	research and development
RD&D	research, development and demonstration
REDD	reducing emissions from deforestation and forest degradation
RMU	removal unit
SBI	Subsidiary Body for Implementation
SBSTA	Subsidiary Body for Scientific and Technological Advice
SD	Sustainable Development
SD-PAM	Sustainable Development Policies and Measures
SIDS	small island developing states
UN	United Nations
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
U.S.	United States of America
WRI	World Resources Institute

Table of Contents

1.0 Introduction

Climate change is now commonly identified as one of the most urgent and critical issues facing the global community. The Fourth Assessment Report (AR4) of the Intergovernmental Panel on Climate Change (IPCC, 2007) confirmed that warming of the climate system is unequivocal, and human actions are changing the Earth's climate and creating major disturbance for ecosystems with serious consequences for human development and well being. The IPCC reports that the world has warmed by an average of 0.76° Celsius since pre-industrial times and projects that global average temperature is likely to increase by the end of the 21st century a further 1.8° to 4°C (or in the worst case by as much as 6.4°C) if no action is taken. Change in temperature has already impacted natural and human systems—including reduced snow cover, a drop in Arctic sea ice, thawing permafrost, more intense and longer droughts and increased frequency of heavy precipitation events—and there are predictions of even more devastating impacts with future temperature increases.

Parties to the United Nations Framework Convention on Climate Change (UNFCCC) will meet at the fifteenth Conference of the Parties (COP 15) in Copenhagen, Denmark in November-December 2009 with the aim of reaching a decision on an agreed outcome to enable the full, effective and sustained implementation of the Convention beyond 2012, the end of the first commitment period of the Kyoto Protocol. The goal of the UNFCCC is "to achieve… stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system."

The Bali Action Plan (BAP), agreed to at COP 13 in December 2007, identified four pillars to address in reaching a new agreement: mitigation, adaptation, technology development and transfer, and financing and investment. The BAP calls for mitigation actions by all developed countries, including quantified GHG emission reduction objectives; as well as mitigation actions in developing countries, "that are supported and enabled by technology, financing and capacity building in a measurable, reportable and verifiable manner" (UNFCCC, 2007b: 1). In December 2008, Parties to the UNFCCC agreed at COP 14 in Poznan, Poland to focus the negotiating process and begin providing negotiating text by early 2009 to enable fulfillment of the BAP.

The negotiating process will take on increased urgency over 2009, as the world strives to agree on the commitments and structure of a post-2012 climate change regime by COP 15. Part of the negotiations will be to define what scale of GHG emission reductions will prevent dangerous anthropogenic interference with the climate system, and how this translates into targets and commitments/actions for developed and developing countries. Another large component of the negotiations will be the development of a package of measures to assist developing countries in mitigating and adapting to climate change.

Engaging developing countries will be critical to success in reaching the goal of the UNFCCC. While historical GHG emissions contributing to anthropogenic climate change have been mainly from developed countries, an increasing share of GHG emissions is coming from developing countries, especially the large developing nations that are experiencing powerful economic growth. This means that action by developed countries will be insufficient in preventing dangerous human interference with the climate system. The Stern Review (2006) notes that the world has little chance of creating an enduring impact on atmospheric concentrations of GHGs unless leading developed and developing economies act seriously on climate change.

There is a growing consensus that global GHG emissions need to peak in the next 10 to 15 years and be reduced below half of the 2000 level by 2050. Halving these emissions will take place in a world where population is projected to increase from 6.1 billion in 2000 to 9.2 billion in 2050 (UN, 2007), meaning that emissions per capita will need to drop from 6.37 to 2.11 tonnes carbon dioxide equivalent (CO_2e). [1] The developing countries will account for around eight billion people, out of a world population of nine billion, and the greater part of global GHG emissions in 2050. Developing countries will need to make significant progress in economic growth and standards of living in a manner that is significantly less GHG intensive than the development path taken by the industrialized world.

Incentives will be required to convince developing countries to undertake the required GHG emission reductions. Many developing countries face considerable obstacles to reducing or limiting the growth of their GHG emissions including a lack of capacity, infrastructure and financial resources to explicitly address the issue while continuing to prioritize traditional economic development priorities. Yet, the active participation of the major developing economies (MDEs)—Brazil, China, India, Indonesia, South Africa, South Korea and Mexico—is required for an environmentally effective post-2012 agreement. These points are worth noting:

- The science calls for it: limiting climate to a2° warming can only work with MDEs reducing their emissions;
- The economics calls for it: once a certain carbon price threshold has been reached, the ability of developed countries to significantly strengthen their targets will only be possible with commensurate actions by MDEs; and
- The local politics (in North America) call for it: the Bush "counter message" characterizing the Kyoto Protocol as a "patchwork" agreement with significant disadvantages for countries of the Organisation for Economic Co-operation and Development (OECD) played well with the local electorate.

[1] Derived from the International Energy Agency (IEA, 2006: p. III.37) 2000 global GHG emission measurement of 38,869 million tonnes CO_2e.

The competitiveness of many developed countries' industries is framed as being contingent on maintaining a level playing field internationally, in terms of energy and climate mitigation costs, such that high-GHH-emitting activities do not shift to non-participants and perceived major trade competitors. This is particularly true in the case of the MDEs. This paper explores how these countries might become effectively engaged in a post-2012 global climate change regime.

A key assumption of this paper is that developing countries will not go forward without major developed countries already engaged and agreeing to international binding mitigation commitments. Strong action and leadership will be needed from developed countries and without such leadership the prospects of expecting significant actions by developing countries would be next to nil.

The report begins with an overview of the situation in the MDEs. Section 3 examines proposed actions and commitments for developing countries, attempting to identify those with the greatest likelihood of encouraging MDE mitigation actions. Section 4 identifies important considerations that will influence the negotiations, including the U.S. position and global economic crisis. Section 5 sets out a possible post-2012 climate change package that includes elements to encourage participation by MDEs and Section 6 provides concluding comments.

The analysis in the report is supported by two background papers:

1. Financing Mitigation and Adaptation in Developing Countries: New options and mechanisms; and
2. The Carbon Market: How the future market can encourage developing country participation.

2.0 Setting the Context

2.1 GHG Emissions in Developing Countries

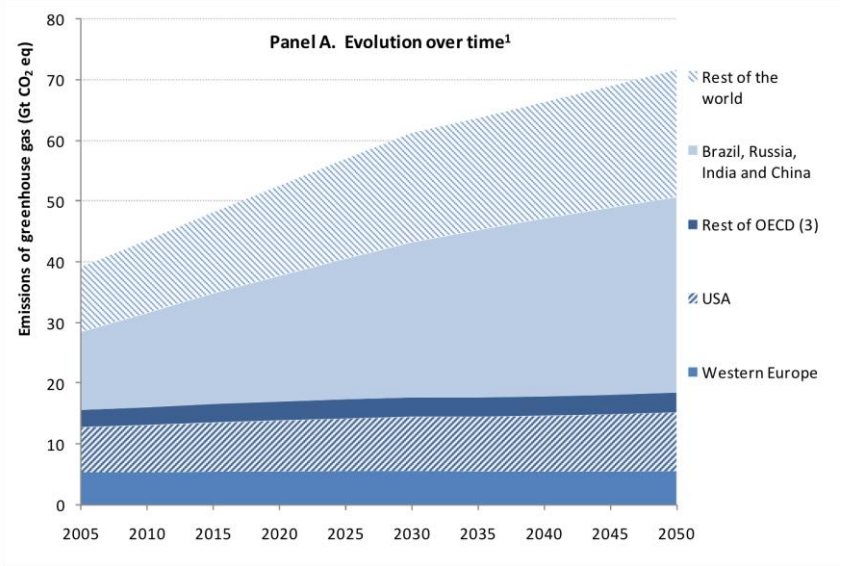
In the 1997 Kyoto Protocol, Annex I countries committed to take on GHG emission limitation and reduction objectives based on the principles of equity and common but differentiated responsibilities. The Annex I Parties—OECD nations, countries with economies in transition, Monaco and Liechtenstein—were considered in the mid-1990s to be historically responsible for climate change and, therefore, needed to act first.

Twelve years after Kyoto, the world is a different place and the political and economic reality of some non-Annex I countries has changed. Mexico and the Republic of Korea are now member countries of the OECD and Cyprus and Malta are Member States of the European Union (EU). [2] An important development is the ascendency of China to the status of a world economic power. These countries are strong candidates for taking on enhanced actions and commitments under a post-2012 agreement.

But, perhaps more importantly, a compelling argument can now be made that the responsibility no longer rests only with Annex I countries as defined in the UNFCCC. Annex I countries undoubtedly still hold much responsibility for the problem, and this is even more so for those Annex I countries that have not ratified the Kyoto Protocol or that will not meet their Kyoto commitment. That said, two-thirds of GHG emissions in 2009 are accounted for by economic activities in non-OECD countries and this share is projected to grow significantly if no new policies and measures are implemented to limit this growth (see Figure 1). Figure 2 shows that, already by 2025, much of this growth will come from a few key developing countries, notably China, India, Brazil and Mexico. This implies that a post-2012 regime will need to foster a drastic change in policy in those countries to slow their GHG emissions growth in the near term and reverse the trend as soon as possible thereafter. For climate change to be effectively addressed, new commitments should be based not only on the historic responsibility of countries, but also somehow take into account the potential future responsibility of major economies with fast growing GHG emissions. Recognition of MDEs as major critical players in the UNFCCC likely means a commensurate recognition in other traditional modes of global policy making. This offers an exciting opportunity to evolve such institutions such as the OECD, World Bank and International Monetary Fund (IMF).

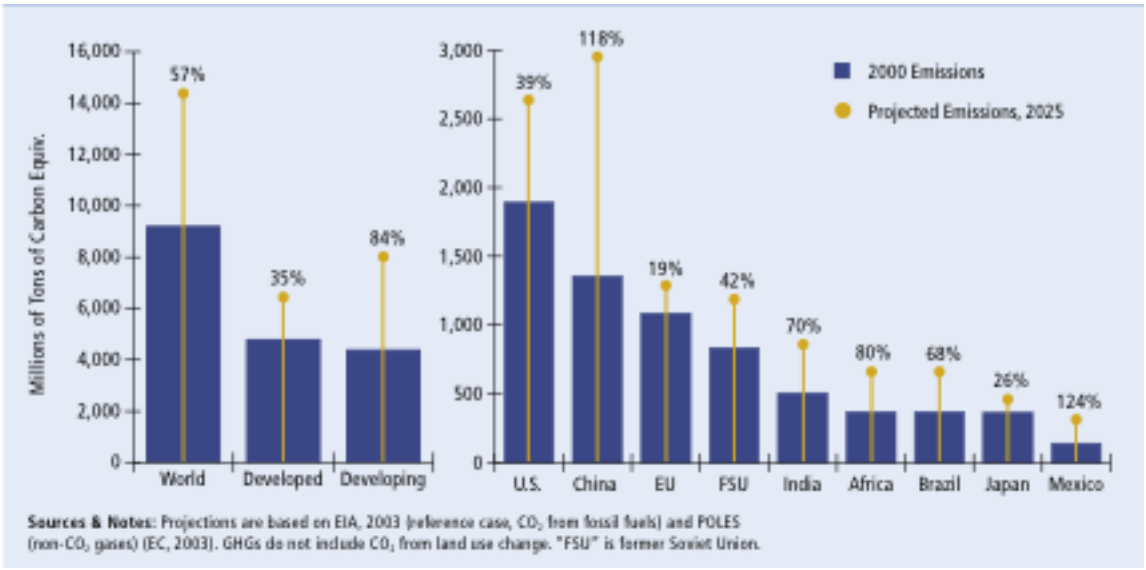
[2] In 2007, OECD countries agreed to invite Chile, Estonia, Israel, Russia and Slovenia to open discussions for membership in the Organisation.

Figure 1: Developing Countries Account for Most of the Projected Increase in GHG Emissions



Notes: 1) excluding GHG emissions from land use, land-use change and forestry (LULUCF); and 3) excluding Mexico, Korea and Turkey, which are included in rest of the world.
Source: OECD, 2008b, p. 7.

Figure 2: Projected GHG Emissions Growth will be Concentrated in a Few MDEs



Source: Baumert, *et al.*, 2005.

If history is any indicator, future GHG emission paths will be largely determined by GDP and population growth. Various structural factors, such as the carbon intensity of fossil fuel consumption, the share of fossil fuel use in total energy consumption, and the energy intensity of the

economy will be key drivers of GHG emissions resulting from GDP and population growth (World Bank 2007). The fact that many of those MDEs are also among the 25 most populous countries and the richest in the world inevitably injects a sense of urgency in implementing policy to curb absolute GHG emissions in those countries.

It is important to note these countries are still developing and on a per capita basis their incomes and GHG emission levels remain far below those of developed countries (see Table 1). Average per capita carbon dioxide (CO_2) emissions amounted to 3.67 megatonnes (Mt) in MDEs in 2006 compared to 10.93 Mt in OECD countries while per capita GDP averaged only US$878 in MDEs in 2006 compared to US$29,168 in OECD countries. The carbon intensity (CO_2 emissions/GDP) of MDE economies (except China and South Africa) is already equal to that of OECD countries as a whole but below that of Canada and the U.S.

Table 1: Select Indicators for Major Developing and Developed Country CO_2 Emitters, 2006 (does not include deforestation and other land use change)

Country	Population (million)	GDP (billion 2000$)	CO_2 Emissions (Mt of CO_2) (from fuel combustion only)	CO_2 Emissions Share of World Total (%)	CO_2 Emissions per Capita (Mt)	CO_2 Emissions per Unit of GDP (Kg CO_2/GDP (PPP)
OECD Countries	1,177.93	29,168.70	12,873.67	46.0	10.93	0.41
EU-27	493.79	9,500.65	3,983.05	14.2	8.07	0.33
Canada	32.62	844.60	538.82	1.9	16.52	0.53
U.S.	299.83	11,265.20	5,696.77	20.3	19.00	0.51
Brazil	189.32	765.13	332.42	1.2	1.76	0.23
China	1,311.80	2,092.15	5,606.54	20.0	4.27	0.65
India	1,109.81	703.33	1,249.74	4.5	1.13	0.34
Indonesia	223.04	219.27	334.64	1.2	1.50	0.42
Mexico	104.75	665.50	416.26	1.5	3.97	0.40
South Africa	47.39	168.81	341.96	1.2	7.22	0.70
South Korea	48.30	671.30	476.10	1.7	9.86	0.47
World	6,535.98	37,759.40	28,002.74 [3]		4.28	0.49

Source: IEA, 2008b.

[3] The figure includes CO_2 emissions from international aviation and international maritime bunkers.

While it is imperative for environmental reasons to engage MDEs, it is also highly desirable from a political point of view for an agreement to be reached in Copenhagen. Reducing GHG emissions can be economically burdensome for some sectors and this leads to international competitiveness concerns. While comparable stringency was recognized as an important criterion among developed countries in the BAP, there is growing pressure from industry and other sectors in Annex I countries for some type of commensurate actions by developing countries to address competitiveness concerns. That said, the significant diversity seen among the highest GHG-emitting countries in the world implies that the post-2012 regime will need to provide flexibility in the stringency and form of commitment. Also required is some support for developing countries in the form of adaptation, technology, financing and capacity building. This will greatly enhance the complexity of any exercise aiming to compare the stringency of commitments.

The IPCC AR4 assessed the range of GHG emission reductions needed to reach different stabilization levels. Table 2 summarizes the implications for Annex I countries as a group and subgroup of non-Annex I countries to achieve such concentration levels by 2020 and 2050. For instance, stabilizing concentrations at 650 ppmv CO_2e by 2050 would not mean a change of course for non-Annex I countries, but reaching 450 ppmv CO_2e would require substantial emission reductions in all regions of the developing world except Africa. [4] Therefore, the lower the stabilization levels, the greater the contribution of developing countries and over a shorter time frame.

The EU, Norway and many environmental non-governmental organizations (NGOs) have called for actions to limit the global warming to less than a 2°C rise above pre-industrial levels. Meinshausen (2006) found that stabilizing GHG concentrations in the atmosphere at 450 ppmv CO_2eq, which would require deep cuts by developed and developing countries, would result in about a 50 per cent chance of not exceeding a 2°C increase.

Höhne, Michelson *et al.* (2008) explored the implications of a less than 2°C rise in the Earth's global average temperature for Brazil, China, India, Mexico, South Africa and South Korea. They developed four scenarios, each describing possible future GHG emission reduction actions/commitments for 2020 and their resulting impacts on GHG emission levels by 2020.[5] Table 3 depicts GHG emission reduction potentials resulting from what Höhne, Michelson *et al.* consider the most ambitious actions/commitments—yet equitable and technically feasible in their view—that could be required from these countries.

[4] A recent study by Den Elzen and Höhne (2008) concluded that these ranges still hold when taking into account new information, such as baseline emissions and assumptions on land-use change and forestry emissions.

[5] The first scenario, the BAU scenario, follows production, energy consumption and energy efficiency trends that are based on moderate assumptions. The no-regret scenario includes GHG emission reduction options that can be achieved at negative or no direct costs. The co-benefit scenario considers reduction options that are reasonable due to political aims other than GHG emission reductions. The ambitious scenario includes reduction options, which can be implemented, but at extra net costs, while maintaining the same service level.

Table 2: Different Stabilization Levels Imply Different Emission Paths for Countries

Scenario category	Region	2020	2050
A: 450 ppmv CO_2 e[b]	Annex I	-25% to -40%	-80% to -95%
	Non-Annex I	Substantial derivation from baseline in Latin America, Middle East, East Asia and Centrally-Planned Asia	Substantial derivation from baseline in all regions
B: 550 ppmv CO_2 e	Annex I	-10% to -30%	-40% to -90%
	Non-Annex I	Substantial derivation from baseline in Latin America and Middle East, East Asia	Derivation from baseline in most regions, especially in Latin America and Middle East
C: 650 ppmv CO_2 e	Annex I	0% to -25%	-30% to -80%
	Non-Annex I	Baseline	Derivation from baseline in Latin America, Middle East and East Asia

a. The aggregate range is based on multiple approaches to apportion emissions between regions (concentration and convergence, multistage, Triptych and intensity targets, among others). Each approach makes different assumptions about the pathway, specific national efforts and other variables. Additional extreme cases—in which Annex I undertakes all reductions, or non-Annex I undertakes all reductions—are not included. The ranges presented here do not imply political feasibility, nor do the results reflect cost variances.

b. Only the studies aiming at stabilization at 450 ppmv CO_2e assume a (temporary) overshoot of about 50 ppmv CO_2e (see Den Elzen and Meinshausen, 2006).

Source: Gupta, Tirpak *et al.*, 2007, Box 13.7, p. 776.

Table 3: Ambitious Reduction Potentials below BAU levels in 2020 for MDEs

Country	Ambitious Reduction Potentials below BAU Levels in 2020 (%)	Change in GHG Emissions Compared to 2005 Levels if Ambitious Reduction Potential is Implemented (%)	Recommended Equitable and Feasible Actions to keep Temperature Change Below a 2˚C Increase
Brazil	14	6	Commit to an absolute country-wide "no-lose" emission target
China	32	1	Commit to no-lose sectoral targets for the power production, iron/steel and cement sectors, where relatively good data are available
India	38	19	Implement a set of Sustainable Development Policies and Measures (SD PAMs)
Mexico	39	-17	Commit to an absolute country-wide no-lose emission target
South Africa	35	-15	Commit to sectoral no-lose targets for the power production and industry sectors
South Korea	42	-9	Join Annex I and commit to an absolute and binding national emission limitation target

Source: Based on Höhne, Michelson *et al.*, 2008.

For the six countries as a whole, the estimated reduction potential amounts to about 30 per cent below business as usual (BAU) emissions. For Mexico, South Africa and South Korea, this represents a reduction below 2005 levels of 17, 15 and nine per cent respectively.

2.2 Developing Countries and the Post-2012 Negotiations

The developing countries tend to work together in the climate change negations through the Group of 77 (G77) and China to develop common negotiating positions. These countries represent a large, diverse group that have a variety of needs and required responses to climate change, and there are calls for differentiation or for different levels of actions. [6] It will be important to ensure that a post-2012 agreement has incentives for the various countries and is flexible to meet the needs of all. Bodansky (2004) reviewed several proposals that include criteria for differentiating commitments with criteria including per capita GDP, per capita GHG emissions, GHG emissions per unit GDP, population, historical GHG emissions, total current GHG emissions and membership in particular international organizations such as the OECD. Japan and Turkey called for a redefinition of developed and developing countries in Poznan, and Australia (2008) put forward three lists in its 2008 submission on mitigation—the Ukraine list, the Portugal List and the Turkey list—attempting to provide some sense of the current reality. [7]

The intent of the grouping of countries below is simply to demonstrate the diversity of realities represented in the G77 and China. Within the G77 and China, there are:

- Wealthy advanced developing nations (Portugal list) – Bahamas, Bahrain, Brunei Darussalam, Cyprus, Israel, Kuwait, Malta, Oman, Qatar, Saudi Arabia, Singapore and United Arab Emirates. This includes those nations with a GDP per capita higher than Portugal, which was the benchmark for inclusion in Annex II. The majority of these countries favour a post-2012 regime that includes positive incentives to encourage developing countries to take voluntary commitments to reduce their GHG emissions through "nationally appropriate mitigation actions" (NAMAs). Those measures would be conditional on developed countries' technology and financial support. [8]
- There may need to be consideration of the special situation of nations that are members of the Organization of Petroleum Exporting Countries (OPEC), which highlight the need to reduce the impact of developed countries mitigation measures on developing countries'

[6] See, for example, Australia's submission on mitigation (Australia, 2008) and the submission of the Alliance of Small Island States (AOSIS) on mitigation (AOSIS, 2008).

[7] The Ukraine list includes 44 countries that had a higher GDP per capita (PPP) in 2007 than Ukraine, an Annex I country. The Portugal list includes 15 Parties that had a higher GDP per capita than Portugal, which was the benchmark in terms of GDP per capita for inclusion in Annex II. The Turkey list includes 43 developing countries that had a greater Human Development Index in 2005 than Turkey, an Annex I country (Australia, 2008).

[8] See submissions from the Russian Federation (2007) and South Korea (2008).

economies. This block of countries tries to postpone the negotiating process on further commitments for Annex I Parties (Hohne, *et al.*, 2006).

- Major developing economiess (MDEs) – Brazil, China, India, Indonesia, South Africa, South Korea (also a wealthy advanced developing nation) and Mexico. The rising economic power and aggregate GHG emissions from these countries mean that action in these countries can have significant impacts and influence action in other nationss. In particular, GHG emission limits or cuts in China and India have the potential to have a huge impact on meeting global reduction goals because of the massive size of their populations and economies, and their level of economic growth. While some of these countries (Brazil, South Africa and China) have taken a hard line on the need for Annex I countries to reduce their GHG emissions by 25-40 per cent by 2020 below 1990 levels, [9] there is a growing constructive atmosphere characterized by some of these countries indicating that they are getting ready to take on actions (for example., South Africa, Mexico and Brazil). Most of these countries favour voluntary action, arguing that developed countries must first demonstrate that GHG emission reductions can be made in a growing economy.
- Mid-level developing nations – For example, Argentina, Chile, Malaysia, Thailand, Morocco, Nigeria and others. According to these countries, developed countries should take the lead in: combating climate change and the associated adverse effects; providing developing countries with adequate, predictable, and sustainable financial and technical support; and, where appropriate, providing technology transfer. The level of development varies widely in this group, indicating the need for flexibility in an international regime to meet various needs. These mid-level developing countries could implement NAMAs and undertake adaptation activities, adequately supported by international cooperation and funding (UNFCCC, 2009).
- Least developed countries (LDCs) and small island developing states (SIDS) – This includes the 36 LDCs, 39 SIDS and 12 countries that are considered both LDCs and SIDS. Future commitments from developed countries should ensure that the negative impacts resulting from the build-up of GHGs in the atmosphere do not adversely affect the developmental aspirations and survival of any country, especially the most vulnerable. Due weight should be given to: the differing national circumstances of LDCs and SIDS within the developing countries, particularly in respect of institutional and human resource capacity; generation of and access to technology; and capability to generate financial resources for investment and capacity building (UNFCCC, 2009).

[9] See submissions from South Africa (2008a), China (2008) and Höhne *et al.* (2006).

2.3 Multilateral Actions to Engage Developing Nations

The UNFCCC has been the main vehicle for engaging developing countries on climate change, including work on technology and capacity building, Global Environment Facility (GEF) funds and the Clean Development Mechanism (CDM). Several other multilateral processes outside the UNFCCC also seek to engage developing countries to act to address climate change. These include actions by existing institutions, such as the G8, but perhaps more importantly, new forums of discussion and some that focus on climate change. The multilateral processes include:

- Major Economies Forum on Energy and Climate – President Obama invited 16 major economies to a preparatory session on April 27-28, 2009 in Washington, which was followed by a second preparatory session on May 25-26, 2009 in France. A third meeting will be held in Mexico in June, and a meeting of leaders is scheduled for July 2009 in Italy. The forum aims to augment UNFCCC discussions and make a contribution to success in the UNFCCC negotiations in Copenhagen. In Washington, participants expressed the need to ensure that developed country actions are clear and robust The view was also expressed that all major economies must take actions, consistent with the science, which support energy security and sustainable development (SD) (Bureau of Public Affairs, 2009). At the May meeting, participants worked on identifying the key points in the negotiations including benchmark years, "peak" year, reduction trajectories, low-carbon strategies for developing countries, and medium- and long-term objectives. The discussions also resulted in significant progress on the role of technology and funding, based, in particular, on Mexico's proposal to create a "Green Fund."
- G8/Gleneagles Dialogue – Climate change has become an important topic of discussion at G8 summits in recent years and is on the agenda of the 2009 meeting. These discussions complement and reinforce the UNFCCC negotiations by trying to create the conditions necessary for a successful post-2012 agreement. The Gleneagles Dialogue on Climate Change, Clean Energy and Sustainable Development, which ended in 2008, was an informal forum that gathered the environment ministers of the G8 countries and Australia, Brazil, China, India, Indonesia, Mexico, Nigeria, Poland, South Africa, South Korea and Spain. [10]
- G8+5 – During the informal G8+5 (South Africa, Brazil, China, India and Mexico) Climate Change Dialogue in 2007, a non-binding agreement was reached to cooperate on tackling climate change. During the G8 meeting in 2008 in Tokyo, the group presented a report on the principles and elements that should be included in a post-2012 regime. An International Commission on Climate and Energy Security, comprised of senior legislators from each of the major economies, was formed in 2009 to help create the political conditions for success at COP 15, and will report to the GLOBE Forum in Copenhagen in October 2009,

[10] The EC, World Bank, multilateral development banks (MDBs) UNFCCC Secretariat, IEA and other groups also participated in the Dialogue.

examining the specific issues of financing, commitments, carbon capture and storage, other technologies and energy security.

- Commonwealth of Nations – The Commonwealth countries adopted a climate change action plan in 2007, resolving that governments would play their full part to implement shared goals and actions, including contributing additional technical and financial support according to their means. They seek active participation through the UNFCCC and the shared goal is a comprehensive post-2012 agreement.
- UN General Assembly – In 2007, a high-level UN summit, hosted by the Secretary General, coincided with the UN General Assembly. At least 100 countries attended, over half of which were represented by heads of state. It reaffirmed the necessity of an agreement on a post-2012 regime and some participants noted the need to reduce GHG emissions by 50 per cent before 2050. In February 2008, the UN General Assembly President convened a high-level thematic debate on "Addressing Climate Change: The United Nations and the World at Work." In June 2008, the General Assembly held an informal meeting on global private investments and climate change and in July 2008 an informal meeting was held on climate change and the most vulnerable countries.
- Asia-Pacific Economic Conference (APEC) – An intergovernmental forum where, in 2007, leaders reaffirmed their commitment to the UNFCCC and highlighted the importance of improving energy efficiency by working toward achieving an APEC-wide regional aspirational goal of reduction in energy intensity of at least 25 per cent by 2030 (with 2005 as the base year). At the 2009 transportation meeting, ministers advocated the work at the International Maritime Organization and the International Civil Aviation Organization in support of the UNFCCC.

Initially some argued that these processes had taken attention away from the UNFCCC and threatened its authority. The majority of these parallel processes have, however, concluded that a global agreement for the post-2012 period needs to be reached by 2009 and that it should be under the auspices of the UNFCCC. These forums were created to some extent to fill a gap in the UNFCCC negotiations and have played a constructive role in consensus-building and maintaining the momentum of worldwide climate talks. This gap has now been filled, for instance, with the establishment of working groups on long-term actions and commitments. The return of the U.S. as an active actor at the UNFCCC negotiating table in 2009 may mean that many of these forums will lose momentum, if not their relevance.

There are also multilateral technology agreements related to climate change including:

- Asia Pacific Partnership on Clean Development and Climate (APP) – A public-private partnership on a regional scale that encourages interaction of business, government and researchers from partner countries. It aims to facilitate the development, diffusion and transfer of cost-effective, cleaner and more efficient technologies.

- Carbon Sequestration Leadership Forum (CSLF) – This initiative focuses on the development of cost-effective technologies for the separation and capture of CO_2 for its transport and long-term safe storage, and making these technologies broadly available internationally.
- Methane to Markets Partnership (M2M) – This partnership aims at advancing cost-effective, near-term methane recovery and use as a clean energy source so that global methane emissions are reduced.
- International Partnership for the Hydrogen Economy (IPHE) – Members have committed to accelerate the transition to a hydrogen economy through the development of hydrogen and fuel cell technologies.
- Climate Technology Initiative (CTI) – A multilateral initiative operating as an Implementing Agreement under the IEA that aims to foster international cooperation in the accelerated development and diffusion of climate-friendly and environmentally-sound technologies and practices.

Most climate-relevant technology agreements focus on knowledge-sharing and coordination, and much less on research, development and demonstration (RD&D), technology transfer or technology standards and incentives. Some suggest that the voluntary, non-binding nature of these frameworks has limited their effectiveness, but they could offer valuable lessons for sectoral approaches in a new post-2012 agreement (Fischer *et al.*, 2008).

2.4 Domestic Actions in Major Developing Economies

The MDEs recognize the challenge of tackling climate change and appear willing to do more as long as it makes sense from a development point of view and their efforts are recognized, and to some extent supported by an international agreement. Several MDEs have introduced national climate change plans, in addition to taking specific actions that have significantly reduced the growth of their GHG emissions. Ogonowski *et al.* (2007) state that Chinese policies adopted between 2000 and 2005 will reduce GHG emissions in key energy-intensive sectors by almost 400 $MtCO_2e$ in 2020; that is more than seven per cent below BAU emissions in 2020. Aggregate CO_2 emissions, from seven key sectors (excluding deforestation), in Brazil are expected to fall by 14 per cent from BAU levels in 2020. Furthermore, the full and effective implementation of the energy measures identified in the *Mexican National Strategy for Climate Change* are estimated to reduce GHG emissions by 106 $MtCO_2e$ annually through 2014.

The MDEs have adopted new energy-related measures in the past two years that are likely to positively affect the climate. In June 2007, China adopted one of the most comprehensive and aggressive energy-related proposals yet to be undertaken in a developing country. China's plan aims to reduce national energy intensity per unit of GDP by 20 per cent by 2010 and increase the share of

renewable energy in the primary energy supply by up to 10 per cent by 2010 (National Development and Reform Commission [NDRC], 2007). Similarly, India plans to increase the production of photovoltaics to 1000 MW per year and to deploy at least 1000 MW of solar thermal power generation (Prime Minister, Council on Climate Change, 2008). South Korea announced plans in September 2008 to achieve a 46 per cent improvement in energy efficiency by 2030, and the country is seeking to introduce a carbon tax beginning in 2010. In 2008, South Africa confirmed its willingness to set ambitious and mandatory targets for energy efficiency and in other sectors. South Africa also recalled that climate change mitigation measures should be informed by, and monitored and measured against, a "plateau and decline" GHG emission trajectory that would see GHG emissions growing until 2020-25 and begin declining in absolute terms in 2030-35 (Republic of South Africa, 2008).

All seven MDEs have adopted or are developing national climate change plans. The main measures are described in Table 4. At COP 14, Fernando Tudela, Vice Minister of the environment and natural resources of Mexico, announced that his country was designing a program that would cap GHG emissions in the electricity, steel, cement and oil sectors starting in 2011, according to an overall goal to stabilize Mexico's GHG emissions at 320 $MtCO_2e$ by 2050 or to reduce them by 50 per cent below 2002 levels (Center for Clean Air Policy, 2008). In December 2008, Brazilian President Lula da Silva presented a national climate change plan that included a pledge to cut Brazil's deforestation rate in half from today's levels by 2018 in stages over defined four-year periods: 2006 to 2009, a 40 per cent cut below the 10-year average used in the plan; 2010-2013, an additional 30 per cent reduction from the previous four years; and 2014-2017, an additional 30 per cent reduction from the previous four years.

To what extent will these actions and plans contribute to curbing GHG emission growth and limiting global warming to less than a 2°C rise? Will these actions curb GHG emission paths in line with those recommended by Höhne, Michelson *et al.* (2008) and described in Table 3? This is very difficult to assess, being dependent on their effectiveness and level of implementation, which is yet to be seen.

Ogonowski *et al.,* 2007 estimate that the unilateral policies and programs adopted by China, Brazil and Mexico between 2000 and 2007, if fully implemented, are projected to yield total annual reductions greater than EU's 30 per cent reduction target in 2020 and the annual reductions under the Kyoto Protocol (excluding the U.S.). [11] China's expected reduction of seven per cent below BAU emissions by 2020 from policies adopted between 2000 and 2005 for key-energy intensive sectors correspond to about a fourth of the reductions recommended by Höhne, Michelson *et al.* (2008) to keep global warming to less than a 2°C rise .

[11] The total annual reductions in China, Brazil and Mexico amount to 2,100 $MtCO_2e$, whereas the EU's 30 percent target and is expected to amount to 1,687 $MtCO_2e$ of reductions (Ogonowski *et al.*, 2007).

Table 4: Actions taken by Major Developing County GHG Emitters on Climate Change

Country	Climate Change Plan	Examples of Domestic Measures/Actions/Targets
Brazil	National Plan on Climate Change, September 2008	• Double ethanol production during the period 2008-2017 • Reduce deforestation GHG emissions
China	National Action Plan on Climate Change, June 2007 and recent Climate Change White Paper, 2008	• Reduce energy intensity (energy consumption per unit GDP) by 20% in the five years to 2010 • Increase renewable energy to 15% of total energy supply by 2020 • Increase the forest coverage rate to 20% and an increase in carbon sinks of 50 million tonnes by 2010 over 2005 levels
India	National Action Plan on Climate Change, June 2008 (8 core "national missions" running through 2017)	• Produce 25% of energy from renewables by 2020 • Increase production of photovoltaics to 1000 MW/year • Include the afforestation of 6 million hectares of degraded forest lands and expand forest cover from 23% to 33% of India's territory
Indonesia	National Action Plan Addressing Climate Change, 2007	• Launch market-mechanism pilot projects for REDD • Develop policy and regulatory frameworks to facilitate private sector investment to increase the share of renewable energy to at least 10% of total energy supply in 2025 • Reduce CO_2 emissions in power plants up to 17% per year from BAU in 2025 by renewable energy development and energy conservation • Reduce energy intensity to the range of between 12% and 18% by 2025
Mexico	National Strategy on Climate Change, 2007 Special Program on Climate Change (as part of the National Development Plan, 2007-2012), 2008	• Reduce GHG emissions by sector (for example. from oil and gas) • Develop and test an REDD mechanism with international financial support • National trans-sectoral cap-and-trade to be operational by 2012 • Committed to reducing CO_2 by 50% in 2050 from 2001 levels
South Africa	Long-term mitigation scenario, 2006 National Climate Change Response Policy Development Summit, February 2009	• GHG emissions will peak by 2020-2025 as part of a comprehensive international effort to limit global warming below a 2°C rise (substantial deviation from the "business-as-usual" scenario under which South African GHG emissions would double by 2030 and quadruple by 2050)
South Korea	4th National Action Plan for UNFCCC, 2008	• Restructure energy supply and demand—for example, increase share of renewable energy from 2.3% to 9% in 2030 • Increase role of nuclear energy • Removal of GHGs by sinks • Energy efficiency improvements • Voluntary GHG emissions trading

Sources: State Ministry of Environment, Indonesia, 2007; Seung, 2008; Fransen, *et al.*, 2008; Prime Minister, Council on Climate Change, Government of India, 2008; and Findlay and Dimsdale, 2008.

The effectiveness of MDE climate change actions and plans remains to be seen, but efforts should be taken to encourage success. Substantial GHG emission reductions will be needed in these countries to reach global goals, and, as reported by the McKinsey Global Institute (2008), the developing world, excluding China, represents more than 40 per cent of the total 2030 abatement potential.

3.0 Important Considerations in Moving Forward

The pace of the negotiations will increase over 2009 and negotiating text is to be developed by June 2009. Important considerations that will influence the negotiations are the global economic crisis, the new U.S. Administration, the positions of the EU and the need to engage China. As the international discussions proceed, these and other considerations will impact directions and outcomes of the negotiating process, including the positions and actions of MDEs.

3.1 The Global Economic Crisis

The global economic crisis will undoubtedly play a major role in the climate change negotiations. While some were and are concerned that the crisis will distract political attention on climate, it is encouraging that in the midst of this downturn, in December 2008 in Poznan countries confirmed their commitment to GHG emission reductions and the need to agree to a GHG emission reduction target by COP 15.

In mid-2008, some of the biggest names in solar and wind project finance were firms such as Lehman Brothers, Morgan Stanley, GE Capital and Wells Fargo. Today many of these firms are mired in their own financial crisis. Many of the existing financial incentives such as tax credits are either not needed or are now unattractive for these firms. Thus, developers of big wind and solar projects have been struggling to find the capital needed for continued expansion, and many firms are retrenching. New Energy Finance (2009) reported that new investment in low-carbon energy declined by four per cent in 2008, down from record levels in 2007, due to the global financial crisis. The economic crisis will inevitably affect the way finance ministers view the issue and more importantly the options they are willing to consider in Copenhagen.

The current economic crisis, however, offers both opportunities and challenges for addressing climate change. Efforts to get the global and national economies back on track include stimulus packages (see examples in Table 5). Given the enormous sums of money going into these various programs, there is substantial potential to negatively affect the environment if applied to propping up old facilities and expanding dependence on fossil fuels, or to positively impact the environment, in particular by reducing energy use, encouraging research and development (R&D), promoting innovation and decreasing GHG emissions. According to the IPCC (2007) and the IEA (2008c), a large-scale shift in global energy infrastructure will be required if we are to avoid the most serious consequences of climate change. In particular, this will shift demand away from CO_2-emitting fossil fuels toward a combination of increased energy efficiency, non-emitting fossil generation (by application of capture and storage technologies) and zero-emitting alternative energy sources, such as nuclear power and renewable energy.

Table 5: Examples of Stimulus Packages with Environmental and Climate Implications

China – US$584 billion (16 per cent of GDP), announced November 9, 2008

- The central government will fund approximately one-quarter of the total stimulus package; local and private sector will provide remainder; unclear how much is new spending and how much was already planned. "Local" sector spending indicates giving bonding authority to local governments to raise their own capital, which has never been allowed.
- A total of: 37.5 per cent will be allocated to transport and power infrastructure; 34 per cent to rural areas; 5 per cent to energy conservation and environment; and the remainder to public housing, technical upgrading and R&D, and health care and education.
- Central province of Hubei will spend 512.8 billion yuan (US$75 billion): to build nine eco-cities around the provincial capital, Wuhan, by 2020; and to fund 459 projects, including energy conservation and environmental protection.
- Beijing will get 90 billion yuan (US$13 billion) to finish subway lines and Shanghai will receive 500 billion yuan (US$73 billion) by 2010 on urban infrastructure.

Germany –US$66 billion stretched over 2009 and 2010, approved in February 2009

- One-year tax holiday on new cars and a two-year holiday on low-emission vehicles.
- €1.5 billion to offer €2,500 bounty to owners of cars nine years or older willing to trade in for new or nearly new models.
- Tax breaks for some home repairs and energy efficiency improvements.
- €3.8 billion for program to make buildings more energy efficient.
- €2.5 billion for transport infrastructure projects.

South Korea – US$58 billion over the next four years, (50 trillion won approved since January 2009, with 29.8 trillion won included in March 2009 budget)

The original 50 billion won was to create a "Green New Deal" supporting projects ranging from energy conservation to creating new green areas and fostering low-carbon transportation. It included:

- 18 trillion won – water-related projects, including and water treatment facilities, dam building along the nations four main waterways.
- 11 trillion won – low-carbon transportation network, including rail projects and bicycle pathways.
- 2 trillion won – flood prevention.
- 3 trillion won – forest management.

United States – US$787 billion stimulus package approved in February 2009

Nearly 14 per cent of the package is for green energy, including tax breaks, loan guarantees and incentives. About US$18 billion of the green investments will help improve mass-transit systems. Investments in energy, as outlined in *The American Recovery and Reinvestment Act of 2009*, include:

- $4.5 billion – increase energy efficiency in federal buildings.
- $3.4 billion – fossil energy research and development.
- $11 billion – smart-grid related activities.
- $6.3 billion – energy efficiency and conservation grants.
- $5 billion – Weatherization Assistance Program.
- $2.4 billion – energy efficiency and renewable energy research.
- $2 billion – grant funding for the manufacturing of advanced batteries systems and components.
- $6 billion – new loan guarantees aimed at renewable projects and for electricity transmission projects.
- $1 billion – other energy efficiency programs, for example, alternative fuel trucks and buses, and efficient appliances.

Sources: Batson, 2009; Associated Press, 2008; Oliver, 2009; Deutsche Bank Group, 2009; and U.S. Congress, 2009.

The majority of the Group of Twenty (G20) economic recovery packages include green stimulus measures. Robins, Clover and Singh (2009) estimate that more than US$430 billion out of nearly US$8.2 trillion in tax cuts, credits and extra spending are aligned with investment consistent with a low-carbon economy. China and the U.S. dominate in terms of the size of their overall stimulus packages and the extent of the green dimension. A study by Deutsche Asset Management (Fulton, 2008) argues that directing stimulus packages toward renewable energy and green infrastructure can benefit the economy by creating jobs and benefit the environment by helping to reduce GHG emissions.

This investment can also help countries move toward energy independence. Several stimulus packages include significant spending on renewable energy and can be viewed as enhancing energy security. Energy importers—such as the U.S., China, the European Union, Japan and increasingly India—view energy security as necessary to achieve social and development goals due to potential restrictions on energy availability, the economic impact of high-cost energy imports or both. A goal of U.S. President Obama's long-term energy plan is to eliminate the U.S. dependency on Middle Eastern and Venezuelan oil imports by 2019; and the stimulus package can be viewed as one effort working toward this goal (Stratfor, 2009).

The stimulus packages being adopted by countries are the only financial assistance programs at a scale commensurate with the demand. At a global level, other policies could be equivalent, but none has so far been implemented with adequate stringency. The challenge is to "internationalize" green stimulus packages being developed on a national basis.

This will not be easy. In the short run, tightened credit markets are restricting financing for projects, new ventures and working capital. While 2008 was a record year for clean technology venture capital investments, most of that money was dealt out in the first three-quarters of the year. Fourth quarter investments dropped by 35 per cent from the third quarter (Kho, 2009). As well, government budgets are under pressure with ominous potential consequences for official development assistance (ODA). Companies are either cancelling or scaling back proposed projects, particularly for renewable energy, which must now compete with oil at low prices. (See examples of impacts on the solar industry in Table 6.)

The slowdown in investment could have dual impacts. It could buy time in a not unhelpful way, by not locking the world into unsustainable GHG emission pathways by deferring the question of what investments to make. But falling oil prices present a challenge, impacting on technology investments as alternative energy sources become relatively more expensive and payback falls for energy efficiency making it difficult for governments and the private sector to foster intensity reductions in any sector of the economy. The global economic downturn also has the potential to elevate the debate on competitiveness and leakage, and the concerns and possible reactions of developed

Table 6: Impact of the Financial Crisis on the Solar Industry

The financial crisis comes at a particularly critical time for the solar industry. Goldman Sachs (2008) reports there is a substantial risk of an oversupply of solar cells in the market in 2009-10 as considerable additional supplies enter the market and less generous financial incentives take hold in some European countries. The liberal subsidies of the past, in such markets as Germany and Spain, are unlikely to be replicated given fears of their ultimate cost in a bad world economy. As supply continues to come online in a less favourable subsidy environment, pricing will have to adjust strongly downward to generate demand, margins will shrink and some consolidation in the industry will likely follow.

However, there are some bright spots for this industry. In the U.S., the "bail out" bill passed last year included provision for a 30 per cent tax credit over the next eight years, providing certainty to the industry. In California, despite the turbulent economy, a battered stock market and sinking home sales, solar energy is a growth industry. The amount of solar installed in 2008 doubled that of 2007 with the busiest five months for applications between August and December, 2008. Experts attribute the surge in solar sales to an increase in the federal tax credit, an ongoing state rebate and new innovative financing programs, as well as mounting consumer concerns over climate change. California has more than half of the solar capacity in the U.S. and ranks as the world's fourth solar entity after Germany, Spain and Japan.

On January 2, 2009, two Chinese companies announced plans to build a solar power plant in north-western China that could one day be the largest photovoltaic solar project in the world. China Technology Development Group Corp and Qinghai New Energy Group will begin construction on a 30 megawatt solar power station in China's Qaidam Basin in 2009 with an initial investment of US$150 million. The facility could ultimately produce one gigawatt of power, exceeding the largest photovoltaic solar project announced to date—a 550 MW project to be built for PG&E Corporation (a California utility).

In yet another development, the U.S.-based Evergreen Solar saw its market value decrease by nearly 75 per cent through no fault of its own when Lehman Brothers went bankrupt. Evergreen had loaned Lehman Brothers 30 million shares for five years in exchange for raising over US$400 million to build a new production facility. The fate of the 30 million shares is now in the hands of the bankruptcy judge. His decision will materially affect the capital structure and hence the financial viability of the company.

countries. For example, protectionist measures such as border carbon adjustments could impact on climate discussions.

A recession means lower GHG emissions, which takes some pressure off the atmosphere, for now. But given that the climate change impacts are a result of accumulated GHGs in the atmosphere, a global economic crisis (unless it is very long-lasting) will not likely lead to a change in global temperature trends. A post-2012 climate agreement is still much needed, as the recession will not last forever and a framework needs to be in place to influence investments as the economy turns around—that is, the world must ensure that the GHG emissions trajectory stays at "recession" levels when the economy resumes grow. As well, the economic crisis suggests that nations will need to be creative in identifying financing options and look at innovative options—such as a levy on

international air travel or a commitment to allocate a portion of auctioning allowances—to fund mitigation and adaptation actions in developing countries.

The ultimate political impact of the financial crisis on the post-2012 negotiations in Copenhagen is difficult to predict. Several questions and uncertainties could cast a shadow over the negotiations: How will the financial crisis affect countries' willingness to accept new commitments under a new climate change agreement? Will developed countries be able to expand their financial support to developing countries? Will countries direct spending under stimulus packages to further climate change goals? Will Parties once again be willing to give Russia and Ukraine substantial assigned amount units (AAUs) based on the original base year? Will these nations sell their stockpiles of AAUs?

3.2 The U.S. Position

The global community is looking to the U.S. with increased expectation of leadership on the climate change issue. The MDEs are unlikely to take on commitments without the U.S., but the U.S. is likely to seek a demonstration of significant actions by major developing economies, especially China, which is perceived a serious trade competitor and a global economic peer.

President Obama has said action on climate change would be a priority in his administration and framed climate action as a way to strengthen energy security and revitalize the U.S. economy. Recent appointments have reiterated this message with the Secretary of Energy, Steven Chu, indicating he would pursue policies to address climate change and reduce U.S. dependence on foreign oil (Tate, 2008). The Secretary of State nominee, Hilary Clinton, during her confirmation hearing, called for all major nations, including China and India, to be part of a Copenhagen climate change agreement (New York Times, 2009). And Todd Stern has been appointed as the special envoy for climate change negotiator to international efforts to halt global climate change.

Obama's climate change agenda consists of:

- playing a more central role in the UNFCCC;
- investing US$150 billion over the next 10 years to develop clean energy projects and create five million new "green" jobs;
- ensuring that 10 per cent of electricity comes from renewable sources by 2012 and 25 per cent by 2025;
- reducing GHG emissions to 1990 levels by 2020 and by 80 per cent below 1990 levels by 2050; and
- using a cap-and-trade system as one policy measure to reach the goal (Rothenburg and Stone, 2009).

The Obama administration is undertaking a broad review of all the policy levers at its disposal to address climate change. The U.S. stimulus package provides an initial down payment on Obama's climate change agenda by providing incentives for research, development and demonstration (RD&D) of energy efficient, renewable and carbon capture and storage (CCS) technologies, and improvements to the electrical grid. A second component is the use of existing regulatory authorities to reduce GHG emissions. Examples include the May 2009 introduction of tough standards for tailpipe emissions from new automobiles, acceleration of energy efficiency standards by the U.S. Department of Energy and the use of the 1990 Clean Air Act to require fossil fuel plants to reduce their CO_2 emissions. A third component will be a cap-and-trade bill. President Obama has made this a high priority by putting the revenues (in the out years) in his proposed budget for 2010 and has called on Congress to send him such a bill. The Waxman-Markey Bill (an energy and cap-and-trade bill) was approved by the U.S. House Energy and Commerce Committee in May 2009, and is expected to be approved by the House of Representatives in summer 2009. But there is no certainty that both houses of Congress will be able to finish legislation prior to Copenhagen.

What does this mean for the international climate negotiations? First the U.S. likely will be in a stronger position than it has been in the past. The U.S. is committed to a Copenhagen Agreement and U.S. negotiators will have an outline of what will constitute a meaningful domestic climate and energy policy and what GHG emission reductions it may be able to commit to in a new international post-2012 agreement. President Obama has proposed to bring U.S. GHG emissions back to 1990 levels by 2020, and set a long-term GHG emission goal of an 80 per cent reduction by 2050 from 1990 levels. More importantly, the new U.S. administration will bring a new tone to the negotiations during the critical months leading up to Copenhagen. An example is closer cooperation with China to push for positive results in Copenhagen and Todd Stern's speech at the Climate Change Talks in March 2009, in which he talked about making up for lost time and taking responsibility for historical GHG emissions. However, without a final piece of legislation, it may be difficult for the new administration to agree to particular levels of financial support, which may be contingent on auction revenues from a cap-and-trade system. The prospects of success in Copenhagen are, therefore, partially coupled with progress made by Congress and the administration on several fronts, particularly a cap-and- trade bill.

Although expectations are high the U.S. will take action on climate change, as the world moves toward Copenhagen, the U.S. is sending signals that some expectations cannot be met. For example, while the EU has called for a 25-40 per cent reduction in GHG emissions by 2020, this would require U.S. GHG emissions to decline at four times the rate they increased over the past two decades. A formula will be necessary to allow the U.S. flexibility to achieve greater reductions in the 2020 to 2030 time period.

3.3 European Commission Communication: Towards a Comprehensive Climate Change Agreement in Copenhagen

The EU is widely seen (fairly or unfairly) as a leader in the international negotiations. It has put in place:

- a target of a 20 per cent reduction in GHG emissions by 2020;
- created the EU- Emissions Trading System (EU-ETS); and
- identified climate change as an area for integration in the EU's renewed SD strategy, energy policy and its action plan on climate change in the context of development cooperation.

On January 28, 2009, the European Commission (EC) set out its proposals for a comprehensive new global climate agreement and how it could be financed (Commission of the European Communities, 2009). The proposal aims to further refine the EU's negotiating position toward its achievement of the EU goal to limit global warming to less than a 2°C rise above pre-industrial temperature. The proposal calls for developed countries to cut their collective GHG emissions by 30 per cent of 1990 levels by 2020.

The Communication proposes a structure for a Copenhagen agreement calling on developing countries, except the poorest, to limit their growth in collective GHG emissions to 15-30 per cent below business as usual levels by 2020. They propose that developing countries commit to adopting low-carbon development strategies covering all major GHG-emitting sectors by 2011 and rapidly decreasing GHG emissions from deforestation. A new international mechanism will assess the strategies and match proposed actions with appropriate external support. Mitigation actions could be entered in a registry for NAMAs with clear provisions for monitoring, reporting and verification of actions. To help track GHG emission reductions, developing countries, aside from LDCs, should be required to provide regular GHG emission inventories under a Copenhagen agreement.

Developing country strategies will need to identify required support for implementation of proposed actions (the incremental costs that cannot be sustained by the developing country). The proposal notes that, up to 2020, the bulk of actions in developing countries will have low costs and should be financed domestically with financial support for actions exceeding a country's domestic capacity coming from sources including public funds and international carbon crediting mechanisms (including "no-lose" sectoral crediting approaches for highly competitive economic sectors and CDM for less advanced sectors) and technology cooperation. The proposal estimates that crediting mechanisms can provide one third or more of the additional investments in low-carbon development in developing countries.

The greater the role of MDEs (especially China, India and Brazil) in the multilateral negotiations, the fewer prospects there will be for the EU to be the final dealmaker. This is a significant change from

Kyoto, where the EU was very much the broker of the final deal; this is unlikely to occur in Copenhagen.

3.4 The Need to Engage China

China is a major GHG emitter, as noted in Table 1, responsible for 20 per cent of the world's total CO_2 emissions China will be a critical player in efforts to reduce global emissions. The country's status and profile in the multilateral world has gained considerably and its rise continues unabated in the economic and political world. China is now quite experienced in playing a constructive, proactive role in many international negotiations, including the World Trade Organization and the G20.

China developed a national climate change plan in 2007 and announced that it is working on a further national plan based on a longer term in a bid to strengthen the enforcement of international treaties on the issue (China Climate Change Info-Net, 2009a). Considerable research and preparation is taking place in China, involving such organizations as Tsinghua University, Chinese Association of Social Sciences and the Chinese Exchange, among others.

There is expectation of cooperation between the U.S. and China, the two largest GHG emitters, prior to Copenhagen. The U.S. is seeking some kind of bipartisan agreement on how the two countries negotiate with other countries at Copenhagen (AFP, 2009), and the Chinese Premier indicated that China will enhance cooperation with the U.S. in coping with climate change (China Climate Change Info-Net, 2009b). While China is reluctant to make GHG emission reduction commitments under the UNFCCC, if agreement can be reached on how to identify and recognize China for its actions, a way might be found to alleviate concerns of U.S. businesses and politicians. On the other hand, if the U.S. can find a formula for expanding technology cooperation with China, a significant concern of China might be met. There is hope that an agreement between the U.S. and China could remove one obstacle in the negotiations and serve as a model for other countries.

A significant question going into Copenhagen is, will China move toward mitigation targets. If it does, it would mean breaking with G77 solidarity and moving ahead without India and other large developing country GHG emitters.

4.0 Proposed Actions/Commitments for Developing Countries

Several UNFCCC Parties and researchers worldwide have developed proposals outlining how major developing economies can be engaged. Areas that appear to be gaining traction and have the greatest likelihood of being part of a post-2012 package are discussed below.

It is important to keep in mind that many of the actions discussed in this section, in and of themselves, will not provide enough incentive for developing countries to take on quantitative commitments. The general spirit of the negotiations has been characterized by a lack of confidence and mutual trust, at times descending into acrimony, and many developing countries lack capacity and sufficiency to take on meaningful actions in a post-2012 agreement. A critical step is confidence building to establish a regime of trust, which includes building a package that allows flexibility for individual countries, developed and developing, to reduce GHG emissions in a manner that is appropriate to domestic circumstances.

A growing constructive atmosphere is evident, with some developing countries indicating that they are getting ready to take on actions. Mr. Xie Zhenhua, Vice Director of NDRC, China, stated at the joint High-Level Segment of COP 14 and CMP 4, that, "For their part, developing countries will also take positive and effective mitigation and adaptation measures in the context of SD and with the support of developed countries." In December 2008, Mexico announced a national goal to reduce carbon emissions economy wide by 50 per cent below 2002 levels by the year 2050 and that it is designing sectoral targets to be met through a national trans-sectoral cap-and-trade program that will be operational by 2012. Brazil pledged to cut deforestation rates in half by 2018; South Korea is developing an emissions trading scheme and declared in August 2008 that it will announce a target in 2009; and South Africa has a target to stabilize GHG emissions by 2020 to 2025 with absolute emission reductions to begin 10 years after growth is halted.

Of course, a huge consideration for MDEs in taking on commitments/actions is the provision of adequate financing and investment from developed countries. Developing countries have called for several fund mechanisms to support action on climate change. It is likely that action in developing countries will be supported through a combination of fund mechanisms and market mechanisms, although in the case of the MDEs, most actions will be funded domestically. These mechanisms are discussed further in Section 5 and examined in detail in the two background papers: *Financing Mitigation and Adaptation in Developing Countries: New options and mechanisms*, which examines financing and investment in greater detail; and *The Carbon Market: How the future market can encourage developing country participation*, which explores the carbon market and market mechanisms in greater detail. This section explores actions and mechanisms that would encourage meaningful participation on the part

of developing nations; it does not consider nor recommend punitive measures, such as border carbon adjustments.

4.1 Mitigation Actions

The BAP encourages consideration of NAMAs in the context of SD for mitigation in developing countries. Encouraging national level policy reform reflects the view that developing country governments have more control over their countries' policies than over their GHG emissions and that these governments are interested in policies that promote economic growth and sustainable development, more so than climate change goals. This is a central challenge is elaborating a post-2012 agreement—ensuring that the regime simultaneously pursues climate change mitigation and economic prosperity.

NAMAs can be envisioned as policies, legal requirements and measures that integrate climate considerations with national SD policies. This can include individual action or a set of actions that do not necessarily have GHG emission reductions as the primary objective. AOSIS (2008) has called for an incentive mechanism to provide appropriate financial and technical support for major GHG-emitting developing countries (based on absolute GHG emissions) to take specific NAMA targets. Several countries (for example, South Africa, 2008a; AOSIS, 2008b; and South Korea, 2008) have called for an international registry held by the UNFCCC secretariat that would include recognition of each pledged action's contribution to SD and mitigation, which would be measureable, reportable and verifiable (MRV). Developing countries would pledge to implement these actions in the context of specific support to enable implementation. Technology, financing and capacity building for pledged NAMAs would be provided by developed countries.

South Africa (2008a) has suggested that developing countries would be able to choose from a range of mitigation actions, including SD-PAMs, reducing GHG emissions from deforestation and forest degradation (REDD), programmatic CDM and no-lose sectoral crediting baselines. These and other options to encourage developing country mitigation are set out in Table 7. The table notes possible funding sources, MRV options and MDE considerations.

MRV is an important topic for developing countries, which likely will deal with two aspects: the MRV of deviation of GHG emissions growth from baselines, conditional on support from developed countries; and MRV of the means of implementation (the provision of finance, technology and capacity building by developed countries). [12] Michael Zamit Cutajar, Vice Chair of the AWG-LCA, noted that the provision of data regarding mitigation action by developed and developing countries is a means of accountability and a way of demonstrating credibility and that the

[12] The third aspect is MRV of mitigation commitments of developed countries.

provision of data is necessary for obtaining recognition as a means for credit, in terms of both political and financial credit (Third World Network, 2008).

MRV could be a tool for recognition of developing country mitigation efforts, which means that accountability and environmental integrity are important elements. It will be important to build on existing requirements (as currently embedded in the legal framework of obligations under the Convention and Kyoto Protocol) and guidance (such as that provided by the IPCC). For example, national communications of developed countries are required to include information on the provision of new and additional financial resources, assistance to meet the cost of adaptation and support for technology transfer. The MRV of deviation of GHG emissions growth from baselines in developing countries will need to build on the existing processes—such as Article 12.1 of the Convention that requires measurement and reporting through national communications of developing countries (recognizing that many developing countries do not have robust accounting systems and require considerable capacity building)—and the modalities of the CDM (recognizing that measurement and verification are primarily at the level of the project at this time).

Established MRV programs could have benefits for developing countries, including ensuring recognition of actions, enabling access to carbon markets, building capacity and institutional knowledge and helping to identify gaps (for example, mitigation potential; and financing, technology and capacity development needs). There could be different MRV requirements for different developing country groupings or actions and there will likely be higher expectations for MDEs. MRV actions in MDEs will likely be expected to lay the groundwork for their taking on quantified GHG emission reduction commitments in the future.

Table 7: Mitigation Actions and MDE Considerations

Mitigation Action	Description	Possible Funding Source	MRV Options	MDE Considerations
International R&D Technology Cooperation	Countries enter into international R&D technology agreements aimed at "breakthrough" technologies.	Fund-based mechanism, or developed countries sponsor research partnerships.	Funds under the UNFCCC are tracked and reported by the Secretariat. Any fund outside the UNFCCC would need reporting frameworks. MRV of developed country support could be through an expert review team or independent assessment panel. China has suggested a Monitoring and Assessment Panel.	MDEs are participants in current R&D technology agreements (e.g., CSLF, IPHE, M2M). In some cases, they have contributed significant funding (e.g., China and India contributions to ITER).

Mitigation Action	Description	Possible Funding Source	MRV Options	MDE Considerations
Technology Cooperation – Montreal Protocol Approach	A multilateral fund covers incremental costs for industrial transition or closure, funds the cost of technology transfer and in some cases pays royalties and acquires patent rights on new technologies. This would be directed toward existing technologies.	Fund-based mechanism. Developed countries also sponsor technology transfer from their domestic industries.	Funds under the UNFCCC are tracked and reported by the Secretariat. If a fund is established outside the UNFCCC, it would need reporting frameworks. MRV of developing country support could be through an expert review team or independent assessment panel, such as a Monitoring and Assessment Panel.	MDEs are participants in current technology agreements (e.g., M2M, APP). China and India have indicated interest in energy efficiency, clean coal, CCS, natural gas, renewable and nuclear.
NAMAs	Countries register NAMA plans, and actions are voluntary and non-binding. Verifiable mitigation actions from NAMAs are granted emission reduction units to be sold through the market. Extent and scope of actions that can generate credits to be determined (could include SD-PAMs, REDD, sectoral crediting, cap-and-trade schemes). Other actions can be supported through grant and other funding.	Grant fund or other funding tool. Korea has put forward a crediting mechanism for verifiable (not all) mitigation – Carbon Credit for NAMAs.	International registry of NAMA – pledge voluntary actions and report on status. MRV is voluntary for unilateral actions of developing countries; mandatory for actions supported by developing countries; and MRV by established criteria for credit-based mechanism, building on the CDM. MRV will focus on environmental impact, i.e., GHG emission reductions.	MDEs agreed at the Meeting of Major Economies to pursue, in the context of sustainable develop met, NAMAs, supported and enabled by technology, financing and capacity building, with a view to achieving a deviation from BAU emissions.
SD-PAMs	Developing countries make voluntary pledges to implement SD-PAMs and developed countries make commitments to support efforts. Pledges are specified in terms of policies implemented, rather than in terms of GHG emission reductions. Action targets can be used to incorporate a quantitative dimension to SD-PAMs.	South Africa suggests that SD-PAMs be financed though non-carbon market sources, i.e., grant funding. Others suggest that projects under SD-PAMs be eligible for crediting under the CDM or other MMSD.	Recorded in a registry under the UNFCCC. Countries set up a national monitoring system to track implementation, sustainable development and GHG emission reduction results. Review is part of national communications or a specific review. Funding support to be reported in a transparent manner, and verification will ensure that support flowed to the reported activities.	Originally designed as a means to have large developing emitters make voluntary pledges to reduce GHG emissions. Can be a stepping stone between countries with quantified emissions limitation commitments, and those without; thus compatible with multi-stage approaches.
REDD	Value is assigned to intact forest and peat swamps. Countries receive funding or credits based on the value.	Fund-based mechanism (favored by Brazil); or crediting mechanism, adding REDD to existing CDM or creating a new MMSD.	Need for robust, spatially-explicit estimation methodologies to provide greater confidence in the MRV of emission reductions and allow for greater equivalence among various credit types. Considerable progress has been made in the development of MRV methodologies.	Brazil has been active in REDD discussions, maintaining that a dedicated fund is needed. The other MDEs are also supportive of REDD. Some have suggested expanding REDD to include sustainable land management, which has been strongly opposed by Brazil.

Mitigation Action	Description	Possible Funding Source	MRV Options	MDE Considerations
Project-level Carbon Credit Activities	Project-level activities or programs of these activities in specified sectors that generate carbon credits. The AWG-KP is exploring broadening the scope of the CDM to include other activities (LULUCF including agricultural soils, CCS and nuclear).	CDM where developed countries purchase CERs generated by developing country project activities. Joint Implementation (JI) governs project-level carbon credit activities between Annex I countries.	MRV options are clearly defined under the CDM and JI. Project developers monitor and report on emission reductions in a manner consistent with the approved monitoring methodology. Designated Operational Entities verify that the reductions occurred. If the CDM is broadened or expanded, new methodologies will be needed.	Programmatic CDM viewed as a means to scale up the CDM, especially for demand side management projects. Broadening the scope to include CCS and nuclear would likely benefit MDEs. If there were differentiation in a new regime, the CDM would likely be more oriented to development than mitigation, serving the needs of lesser developed nations.
Sector-based Market Approaches	Developing countries make GHG reduction commit-ments in specific energy-intensive sectors, even if they do not take on economy-wide targets. Developing countries could take on a voluntary "no-lose" GHG intensity target. Emissions reductions achieved beyond the pledge are eligible for sale as emission reduction units to developed countries. Failure to meet the pledge would not involve any penalty or requirement to purchase credits.	Sectoral crediting mechanism (sectoral CDM or other MMSD).	Work being done under technology agreements—such as the APP, Cement Sustainability Initiative —to develop scientific/ technical procedures for calculating indicators. Good data may be lacking in some MDEs.	Best suited to certain energy-intensive targets such as cement, aluminum and steel. May be a way to engage MDEs not prepared to take on economy-wide commitments. MDEs interpret sectoral approaches a form of sector-based technology cooperation —they are wary of attempts to impose targets on their economies through sectoral target setting. The G77/China has stated that transnational sectoral agreements are not acceptable for developing countries.
No-lose or Non-binding Targets	Developing countries take on one-sided emission reduction targets, where countries benefit from going further than their target required and selling emission rights, without an obligation to buy if they miss the target.	Emissions trading and a JI-like mechanism.	Emissions reductions within a trading system can only occur if they can be measured at the level of operator or installation and reported to a regulator. Trading companies maintain an inventory of emissions. For international trading, these inventories must be consistent, with equivalent units and measurement techniques. Measurements may require verification.	This could be part of a multi-stage regime, where there is differentiation between countries, with MDEs being the first to take on one-sided targets. MDEs are likely to be opposed to taking on any targets.

4.2 Options most likely to Encourage Action on the part of MDEs

A review of submissions to the AWG-LCA from the seven major developing GHG emitters helps to identify incentives/actions that they consider important for a post-2012 climate agreement. Of course, MDEs will be interested in mitigation options that include the greatest flows of financial and technology support; but an agreement that is politically acceptable to all countries will need to account for broader considerations.

Brazil has indicated that it will continue to take national action on climate change and will do more if incentives are provided. Brazil has called for an outcome that includes an international registry for NAMAs and the support NAMAs receive from developed countries. Support from developed countries should be put into capacity building and institutional strengthening, in addition to actions that generate GHG emission reductions. Forestry activities offer an important contribution within the registry. Significant financing and technology from developed countries should be directed toward such activities. Brazil has viewed actions on REDD as an important part of mitigation efforts, and has supported a fund-based approach (as opposed to a market mechanism). Brazil has opposed expanding the REDD concept to include sustainable land management, despite an interest in this on the part of some African nations and some developed nations, including Canada and the U.S. Brazil has supported the G77 and China proposal on a financing mechanism, which includes specialized funds that are managed under the direction of the UNFCCC. A framework for adaptation must be developed.

China has noted that developing country NAMAs should be supported by technology, financing and capacity building from developed countries. In its submissions, China indicated that MRV on NAMAs by developing countries should only be applicable to mitigation actions, and MRV requirements should be undertaken by national entities in accordance with national circumstances and practices. China has called for incentives for REDD, and an international cooperation mechanism for cooperation on R&D and technology transfer. Cooperative sectoral approaches and sector-specific actions should focus on enhanced cooperation between countries at the sectoral level for the purpose of promoting technology cooperation. China has also called for financing mechanisms and for establishing specialized funds such as the Convention Adaptation Fund, Mitigation Fund and Multilateral Technology Acquisition Fund, all governed under the COP. The financial mechanisms supporting technology cooperation should encourage public-private partnerships by linking public finance with carbon markets, capital markets and technology markets, and public finance should leverage private finance. China has supported the G-77 and China financing proposal for the operationalization of an effective financing mechanism, and has indicated that developed countries should make assessed contributions of a percentage of annual GDP (for example, 0.5—1 per cent) in addition to existing ODA. An adaptation framework is required.

India's submissions have called for new and additional grant funding that has no conditionalities. India has stated that NAMA actions must be voluntary, and NAMAs do not include national actions by developing countries with their own resources and without external support. India has indicated that the NAMA registry must be under the UNFCCC and financial support should be provided by a financial mechanism set up under the UNFCCC COP. India has called for REDD incentives, including support for reduced deforestation, conservation and sustainable management of forests and increases in forest cover. The financial resources provided by developed countries should meet the agreed full incremental costs of mitigation and adaptation actions by developing countries. India has called for developed countries to contribute one per cent of their GDP to the financial mechanism. India has supported the G-77 and China financing proposal, stating that funds should be organized into functional windows, such as research, technology and adaptation. Funds delivered under the UNFCCC should have nothing less than the structure of the current Adaptation Fund. India has also called for the establishment of a framework for adaptation.

Indonesia has indicated that NAMAs should be supported by technology, financing and capacity building. Developing countries will be able to transfer GHG emission reduction units to developed countries for actions that are supplemental to the no-lose target and domestic actions for meeting NAMAs. Indonesia has called for reform of the afforestation/reforestation rules under the CDM, and views REDD-Plus as an important element of mitigation efforts. A REDD-Plus mechanism should be designed to accommodate different national circumstances and include fund-based and market-based approaches. Sectoral approaches can complement strategies and goals, but they are not to be used for quantification of national goals. Indonesia has noted the need for a basket of options on international finance and investment, and indicated that MRV of mitigation actions should be ensured though new and additional financing and technology. Any financial mechanism should be established under the COP, and expansion of international carbon markets and auctioning of allowances may be means of generating funding. Indonesia has called for a comprehensive mechanism for adaptation.

Mexico has proposed a World Climate Change Fund (Green Fund) to address adaptation, mitigation and technology transfer. Methods for determining developed country contributions could be based on a formula that could consider GHG emissions, population and GNP. Mexico has called for positive incentives for REDD-Plus activities, and noted that a fund scheme would be most appropriate for the "Plus" activities (for example, conservation and sustainable management of forests), while a market-based approach would be most suitable for REDD activities.

South Africa has noted that both the mitigation actions in developing countries and the support from developed countries must be "MRV'able." South Africa has supported an SD-PAMs approach, calling for the establishment of a registry of NAMAs including SD-PAMs under the UNFCCC, and noted that actions should be supported through a fund. A national coordinating body should

address all aspects of the means of implementation and strengthen the institutional capacity of national focal points and stakeholders. The country also has called for a shift from project-based to programmatic approaches for market mechanisms for developing countries. South Africa has voluntarily committed itself to MRV action and has expressed its willingness to do more. South Africa has supported the G-77 and China financing and technology mechanism proposals and calls for a comprehensive program on adaptation.

South Korea has called for a registry of NAMAs under the UNFCCC Secretariat where actions could be recognized as international actions for mitigation. The registry would serve as the basis for the MRV. NAMAs would be voluntary and could include SD-PAMs, REDD, sector-wide technology standards, laws and regulations and cap-and-trade schemes. South Korea has called for a NAMA crediting mechanism, either as a financing and technology transfer mechanism under the UNFCCC or as an enhancement of the current CDM. Only those NAMAs not supported by developed countries would be eligible for credit and the MRV would build on the existing rules of the CDM. South Korea has suggested that carbon crediting could go beyond carbon off-setting if a specific portion of the carbon credits is discounted and retired from the global carbon market. Discounting of carbon credits could also be used to enhance the environmental integrity of credits from NAMAs.

Most MDEs have called for an ambitious mid-term goal for Annex I Parties of at least 25 to 40 per cent GHG emission reductions from 1990 levels by 2020, and have supported the G77 and China proposals for finance and technology. [13] It is important to note that G77 and China proposals have formed the basis for negotiating text in the past, in part because the group consists of a majority of Parties to the UNFCCC. It is not inconsistent to expect this in the 2009 negotiations.

MDEs are looking for technology support, a broadening of market-based mechanisms, incentives for REDD and predictable financing. But encouraging action and/or commitments on the part of MDEs must consider the sum of the parts. For example, the more attractive the CDM or other MMSDs becomes in a post-2012 regime, the less incentive an MDE will have to take on targets that entail lost access to the mechanisms. Sectoral and NAMA initiatives could be considered more attractive, offering MDE governments the opportunity to fund a variety of policies and programs that they have as current priorities. Recent signs that the EU intends to restrict acceptance of CDM credits can be seen in this light (large-scale sales of CDM credits may stand in the way of developing countries taking on more comprehensive commitments) (European Commission, 2009).

Common but differentiated responsibilities will be a central issue in engaging developing countries, and there are calls for a reinterpretation of this concept to reflect the world of 2009—as opposed to the world of 15 years ago when the Kyoto Protocol was negotiated. There are increasing calls for

[13] The background paper on financing and investment includes additional information about the financing proposal.

graduation of some non-Annex I Parties to a state of target- or action-based commitments—a highly contentious issue in the negotiations. As noted earlier in Section 2.2, Australia has identified 15 non-Annex I countries that have a GDP per capita higher than that of Portugal, which was the benchmark in terms of GDP per capita for inclusion in Annex II of the Kyoto Protocol. Japan and Turkey have called for a redefinition of "developed" and "developing" and Japan has advocated the graduation of some countries into Annex I. Developing countries have expressed firm opposition to such proposals, although AOSIS (2008b) has called for major GHG-emitting developing countries to take the lead and make a significant contribution to reducing their GHG emissions below business as usual projections. Cosbey and Drexhage (2007) argue that there will be pressure for major developing countries to take actions commensurate with their capacity, which could include an expansion of Kyoto's simple two-tiered system.

5.0 A Possible Post-2012 Climate Regime that Encourages Developing-Country Participation

There is growing acceptance that an agreement in Copenhagen will be a package deal, and much of this package—adaptation, forestry, technology and financing—will be aimed at developing countries. Yvo de Boer, Executive Secretary of the UNFCCC, has noted four essential elements that are required for an international agreement in Copenhagen:

1. clarity on the commitments of developed countries, (by how much they are willing to reduce their GHG emissions);
2. clarity on the actions that major developing countries, such as China and India, are willing to undertake to alter the growth of their GHG emissions;
3. clarity on the financing needed to help developing countries to engage in reducing their GHG emissions and adapting to the impacts of climate change; and
4. decision on how that money will be managed (E&ETV, 2009).

Once these issues are framed, negotiators will face an intricate and interdependent set of secondary issues relating to adaptation, technology transfer, forestry (LULUCF/REDD), MRV and capacity building, plus other issues relating to response measures, spillover effects and compliance. With regard to finance, political agreement is needed on issues related to sources of financial support, the institutional arrangements for managing resources, the characterization of mitigation and adaptation activities and how all activities will be "MRV'ed."

The negotiations will take on increased intensity over 2009 with a critical issue being the commitments of Annex I countries to reduce GHG emissions in both the near- and long-term and the actions to be undertaken by non-Annex I Parties to begin significantly altering the growth of their GHG emissions. Several countries have proposed that to reach 450 ppm CO_2e, developed countries as a group would need to reduce their GHG emissions in 2020 about 25 to 40 per cent below 1990 levels. The text of the AWG-KP on this matter notes that the contributions of Annex I Parties to the scale of aggregate GHG emission reductions to be achieved by Annex I parties should be informed by consideration of, *inter alia*, the analysis of the mitigation potential; effectiveness, efficiency, costs and benefits of current and future policies, and measures and technologies at the disposal of Annex I parties, appropriate in different national circumstances. The text recognizes that this may lead to a spread of values for quantified GHG emission limitation reduction and reduction objectives among Annex I Parties. This discussion will also need to address any modifications to the CDM or approval of new MMSDs to offset Annex I GHG emissions.

Determining an appropriate post-2012 regime will be challenging and will need to be guided by current political and economic realities. There are different views as to what would comprise a

"ratifiable" agreement, but consideration will need to be given to the positions of the U.S. and the MDEs, especially China (together the U.S. and China account for approximately 40 per cent of global GHG emissions). It will be extremely difficult to get members of the Umbrella Group—in particular Canada, Japan and Russia—to talk about commitments without some indication of what the U.S. might do. Likewise, MDEs may not be willing to make significant concessions.

It is unclear what form a final post-2012 agreement will take, (COP and/or MOP decisions, amendments to the Convention and the Kyoto Protocol and/or the adoption of a new Protocol.) [14] The tight timeframe and complex process present a real risk to developing a comprehensive and successful agreement at COP 15. Even if an agreement is reached in Copenhagen, negotiations will continue for another three to four years on processes and modalities. Similar to the Kyoto Protocol, a Copenhagen agreement will be more a matter of planting "flags," and further elaboration and final definition will continue up to 2012.

A mix of options will be needed to ensure that MDEs are included in a manner that means real and substantial GHG emission reductions. Important considerations in the areas of targets and timelines, mitigation, adaptation and financing are discussed below.

5.1 Targets and Timelines

Mitigation actions will be driven by the level of quantitative commitments adopted by developed countries. Stringent targets will be needed to keep atmospheric GHG emissions at a safe level and MDEs and other developing countries cannot be expected to agree to meaningful action in the absence of developed country leadership. This leadership means improving on the results attained since the signing of the Kyoto Protocol. During the 16-year period from 1990 to 2006, CO_2e emissions dropped by 894 million tonnes, but emissions increased by 2.3 per cent (403 mission tonnes CO_2e) from 2000 to 2006 (UNFCCC, 2008) with the 16-year dip due to the drop in economic activity in former Eastern bloc countries after the 1989 fall of communist governments. There needs to be demonstration of real progress in developed countries—one of the largest incentives for MDE action.

The discussions on targets and timelines may have to be expanded to ensure success. A real gap in the climate change negotiations is that the current discussions only talk about timelines up to 2020

[14] The process initiated by MOP 1 pursuant to Article 3.9 of the Kyoto Protocol contemplates the adoption of an amendment to Annex B, setting forth a new round of emission reduction targets for Annex I Parties. But the Article 3.9 process does not preclude the MOP from adopting a decision or an amendment to the main body of the Kyoto Protocol. The requirements for amending the Kyoto Protocol are set forth in Article 20 of the Protocol and are the same as for amendments to the Convention, including, in particular, the requirement of a three-quarters affirmative vote. If Parties wish to create a single integrated regime, this could most easily be done by adoption of a single new instrument under the Convention, which addresses actions and/or commitments by both Kyoto Protocol Parties and Convention Parties that are not Parties to the Protocol.

and 2050. This narrow discussion prejudices certain targets at those times and not all developed countries, such as the U.S. and Canada, are well positioned to deliver 25 to 40 per cent GHG emission reductions by 2020. But these countries might be positioned to deliver meaningful reductions by 2025-2030 and 80 per cent reductions by 2050. There is a need to consider options that allow all countries to make reductions in a manner consistent with their national circumstances. One option could be viewing the 25 to 40 per cent reduction as a collective target, where Annex I countries as a group agree to meet the 25 to 40 per cent reduction target (similar to the EU bubble). Or there is the possibility of starting at a lower level for 2020 and laying out a roadmap for 2030 and 2040 that ensures Annex I countries will meet the agreed 2050 target. To support such approaches, it would be helpful if developed countries provided roadmaps or plans setting out reductions over the next 20 years to build confidence in their commitment.

This could be a selling point in the negotiations with MDEs in a manner similar to the phase-out commitments of the Montreal Protocol. In this treaty, developed and developing countries have different timelines for reducing GHG emissions with a 10-year grace period in developing country efforts to phase out substances that deplete the ozone layer. A climate roadmap with more milestones (for example, 2020, 2030 and 2040) for GHG emission reductions than just 2020 and 2050 could open up a discussion with MDEs as to when they would be able to start taking on commitments. There could also be consideration of changing the baseline from 1990 to 2005 to ease the inventory requirements of MDEs that will eventually take on mitigation commitments.

5.2 Mitigation

To reduce the rate of growth in their GHG emissions, developing countries will need a portfolio of domestic policies that suit national circumstances and access to financing though the carbon offset mechanisms, new financial mechanisms and private sector funds. Discussed in greater detail in the second background paper, *The Carbon Market: How the future market can encourage developing country participation,* carbon offset mechanisms offer a means to finance mitigation actions in developing countries, including options for sectoral crediting, REDD and crediting under SD-PAMs and NAMAs. A range of possible market mechanisms for the post-2012 period are described in Table 8, which notes those mechanisms that hold the greatest promise for various sectors. In regard to the MDEs, allocation-based MMSDs and sectoral crediting approaches hold the most promise. Such mechanisms would potentially be attractive to MDEs, and could help MDEs meet other policy aims and offer co-benefits, such as energy security and local environmental improvements.

Allocation-based MMSDs offer large potential to include developing countries in market measures that encourage reduce GHG emissions. This category includes crediting for NAMAs, SD-PAMs and REDD and could include a wide range of other policies and legal requirements. These would operate by first granting an "allocation," to a sector which could include the impacts of expected

Table 8: MMSD Options for Developing Country Mitigation

Sector	Share of Non-Annex I GHG Emissions (%)	Impact of Current CDM	Expanded CDM Scope (extra areas eligible)	Programmatic CDM (bundling of many projects)	Sectoral CDM ("project" is a sector)	Technology Oriented Agreements (standards, labelling, among others)	Allocation-based MMSDs (policies, legal requirements and measures)
Electricity & Heat Generation	22	Has been main impact. Must move beyond "low-hanging fruit"	**Could allow inclusion of CCS and nuclear**	Most projects large enough already. Useful for future micro-generation	**Depends on specific design. Major potential if industry-wide baseline applied**	**Theoretically could lead to significant GHG reductions. But how incentivized?**	**Could have major impact. Depends on demand for credits generated – would be considered additional?**
Other Energy Industry	2	Some coverage, notably gas flare recovery	No particular constraints at present	Application appears limited – projects large enough to cope with transaction costs	**May be some promise to scale-up mitigation**	**May be some promise to scale-up mitigation**	**Certain policies could lead to very high mitigation reductions (for example, cessation of gas flaring)**
Manufacturing, Construction, Industrial Proc. and Waste	15	Industry low. Landfill gas and industrial gas destruction	No particular constraints at present	Application appears limited – projects large enough to cope with transaction costs	**Very promising to scale-up mitigation, using a common baseline**	**Theoretically could lead to significant GHG reductions. How incentivized?**	**Likely to be similar to Technology agreements – easier to administer, harder to quantify impact**
Transport	7	Very low	No particular constraints at present	Could have some use for pooling small projects	Potential in marine and aviation sectors; other projects too diverse	**Key way to regulate performance. Demand for credits generated?**	**Probably best option to include the transport sector in an agreement**
Residential, Commercial, and Public Sector, Others	4	Very low	No particular constraints at present	**Key focus: lowers transaction costs for small projects**	Activities and projects too diverse to fit into a homogenous sector	**Key way to regulate performance. Demand for credits generated?**	**Considerable promise. Larger potential scope than Programmatic CDM**
AFOLU	50 (15% Agriculture, 35% Forestry and OLU)	Low	Could allow agriculture sequestration activities and forest management activities	**Would facilitate aggregation of projects to overcome the transaction and monitoring costs barriers**	**Would facilitate aggregation of projects to overcome transaction and monitoring costs and barriers; would encourage sequestration activities**	Difficult to see how it could be applied	**Great potential for REDD and agricultural carbon sequestration activities and sustainable land-based management practices**

Note: GHG emission data based on year 2000 data from the Climate Analysis Indicators Tool (CAIT) Version 6.0, World Resources Institute, 2009. Table from Wooders and Nolet, 2009.

reductions.[15] Any reductions beyond this allocation, measured in tonnes of carbon, would be eligible for sale through the carbon market. These allocations could be set out in NAMA plans and agreed to by the COP. The allowances would be subject to MRV requirements. The intent of a broader MMSD is to move away from credits for project-based GHG emissions and the need to demonstrate additionality—an issue that has proven controversial over the life of the CDM. Allocation MMSDs include a range of options whereby countries will receive units for GHG emission reductions if their GHG emissions from a sector are below an "allocated" value. The key issue for incorporation into the carbon market is what the allocation should be for a sector or activity. While there are issues around the setting of appropriate baselines for CDM projects, there are at least firm protocols and methodologies covering how boundaries should be set, how GHG emissions should be measured and how to account for leakage. Allocation-based MMSDs could be attractive to MDEs and could encourage reductions in high-emitting sectors.

A sectoral crediting mechanism would apply to specific sectors within a country, where private actors would implement local projects that, "would be clustered along the lines of a specific sector" (Schneider, 2007). For MDEs, there is considerable potential in the electricity and heat generation, other energy industry, and manufacturing, construction and industrial processes sectors. An example of a sectoral approach would be to define baselines for activities in the cement sector. Investments that contribute to staying below the baseline level could then receive the difference between the baseline level and the achieved level in the form of credits.

A consideration in the discussion of new MMSDs or expanding the CDM is the risk of flooding the market. One of the key benefits of expanding market-based mechanisms under a new post-2012 agreement is a larger quantity of GHG reductions, but a question is whether the resulting flow of credits from developing countries would find buyers, or to what extent the price of credits would reach disastrous lows. A clear implication for a post-2012 regime that includes an expanded CDM or new MMSDs is the need for ambitious targets for developed countries that will fuel demand for these additional CERs. As well, there needs to be consideration of who will buy the credits, as some developed countries may choose to cap the amount of GHG emissions that can be purchased internationally. One consideration could be to have MDEs involved in purchasing carbon units, addressing the issue of potential over supply through a broadened scope. Agreeing to an expanded CDM or an allocation-based MMSD will create expectations in developing countries and developed countries must be sure they are willing to fulfill those expectations.

Losing access to the CDM is a critical factor in MDEs not wanting to take on mitigation commitments. The mechanism has provided and is viewed as a stream of foreign investment that will get increasingly lucrative with more stringent targets in developed nations. Thus, taking on targets and giving up the CDM is not an option that MDEs want to consider, as it delivers two

[15] In effect, any option which is not project-based could be included as an allocation-based MMSD.

painful blows simultaneously. Another issue is that most of the proposed crediting mechanisms that involve MDEs do not represent real GHG emission reductions—they are offsets. To encourage the necessary level of global GHG emission reductions, a post-2012 regime will need to enable and facilitate real reductions in MDEs, using such mechanisms as an allocation-based MMSD as a bridge to greater actions/commitments on the part of MDEs.

For example, MDEs could keep a sectoral crediting mechanism or allocation-based MMSD in the immediate term (up to 2020), but have it phased out over this time as these countries move toward taking on targets. MDEs would be allowed access to the carbon market through no-lose sectoral targets. Meaningful sectoral targets are likely to be hard to achieve with no prospect of financing via a crediting mechanism until the targets are reached, meaning dampened incentives to take on ambitious targets. A transition mechanism would see MDEs allowed tradable credit for a small and increasing percentage of their GHG emission reductions even before they reach the targets. So, for example, they might be allowed tradable credits for a percentage of their reductions equal to the percentage of the way they have gone toward the target. That is, assume that in moving from achieving, say, nine per cent to 10 per cent of a no-lose target a country reduced its GHG emissions by one Mt CO_2e. They would be allowed tradable credit for 10 per cent of that amount or 0.1 Mt CO_2e. At the point of achieving 100 per cent of its target, a country would be credited for 100 per cent of the incremental GHG emission reductions. Such an approach provides incentive to take on a larger target and provides a stable financing source in the form of revenues that can, in part, make up for the loss of the CDM.

5.3 Adaptation

While the focus of this paper is mitigation, it is widely recognized that adaptation will be an integral and essential component of any future international climate agreement. A future agreement will need to provide guidance on the role of the UNFCCC in facilitating climate change, such as through the generation and sharing of knowledge and best practices, the transfer of technologies for adaptation, and the implementation of adaptation projects and programs. Perhaps of greatest importance, a future agreement will also need to establish a mechanism(s) for the provision of adequate, predictable and sustainable financing for adaptation that is accessible to all developing countries.

Positive progress towards a framework on enhanced action on adaptation has the potential to incentivize mitigation commitments or actions by MDEs. For one, such progress could generate goodwill and trust between developing and developed countries that could be transferred into the negotiations on mitigation. For another, if the expectations of LDCs and SIDS with respect to adaptation can be met, there is greater likelihood of these countries putting additional pressure on MDEs to address their GHG emissions. As well, it may be possible to translate developing country concerns related to adaptation directly into progress on mitigation by recognizing the potential of

some measures to provide both mitigation and adaptation benefits. A landscape-based approach to forest management has the potential to enhance ecosystem services at a watershed level and hence contribute to an increase in resilience to climate change, while also opening up new opportunities for carbon sequestration activities such as wetlands management.

Several challenges will need to be overcome to make positive progress toward an agreement on adaptation. Therefore, there is the potential for this matter to also undermine achievement of substantive agreement on other components of the BAP. Agreement will need to be reached regarding what constitutes "adequate" financing and (potentially) how to determine the costs of adaptation as opposed to development activities that reduce vulnerability to climate change. Balance will need to be achieved between ensuring that the most vulnerable developing countries—namely the LDCs and SIDS—receive adequate financial support while also meeting the expectations of the MDEs. Issues related to the basis upon which new and additional financial resources are provided need to be addressed (as compensation or as assistance). Decisions will also be needed regarding the type of activities to be supported under the UNFCCC in comparison to other mechanisms, such as multilateral development banks, development assistance agencies and the private sector. And an appropriate mechanism(s) for the delivery of adaptation financing will need to be agreed upon.

5.4 Financing

Money will, of course, be at the heart of the negotiations. On the one side will be developed country governments that are feeling extremely stretched by the current financial crisis and many of which are sceptical about the effectiveness of large-scale funding flows through international institutions. On the other side are developing countries, which are the most vulnerable to climate risks, the least responsible for historic GHG emissions, have the fewest resources to address the issue, and argue that they have a right to grow and achieve the economic prosperity of the developed countries without paying significant climate costs. Squaring this circle will be the "make or break" issue of the negotiations.

There is little doubt, however, that addressing climate change will require significant shifts and an overall net increase in global investment and financial flows. While the changes appear large at first glance, they are small relative to total investment. Most of the changes and additional investment are likely to be made by corporations and households, although this may require government policies and incentives. But additional public sector investment and financial flows will be required, especially for adaptation. Approximately half of the shifts and net increase in investment and financial flows needed to address climate change will occur in developing countries. Mitigation investments in developing countries are more cost effective and provide larger GHG emission reductions per dollar invested.

The UNFCCC (2007c) report on financing and investment and other studies concluded that developing countries, especially the poorest and those most vulnerable to the adverse impacts of climate change, will need international financial support for mitigation and adaptation. These investment and financial flows are over and above those of ODA, which plays a large role in meeting the development needs of the LDCs. The background paper, *Financing Mitigation and Adaptation in Developing Counties*, goes into greater detail about existing sources of funding, options to raise additional funds and options for structuring a new financial mechanism.

5.4.1 Delivering Funding Flows to Developing Countries

There are three basic ways that funding flows could be delivered to developing countries:

- Grants allocated through funding institutions – Such payments would primarily be targeted at up-front capacity building and preparation, as well as payments to support policy implementation, overcome barriers and support financing costs for capital projects.
- Loan funds allocated through funding institutions – As many mitigation and adaptation actions involve capital investments in infrastructure and many developing countries have limited access to capital markets or only at very high financing rates, loan funds at concessional rates and loan guarantees would also be required.
- Offset credits generated through project, sector and national performance-based mechanisms (sectoral crediting and allocation-based MMSD options are discussed earlier in Section 5.2) – These would complement the "pay for policy" grants and loans and essentially be done on a "pay for performance" basis.

One of the institutional challenges of a Copenhagen agreement is that the diversity of developing country economies and the variety of mitigation and adaptation actions means that the mix of the above three elements would need to differ greatly by country and even by sector within a country. For example, an MDE with good access to capital markets might need relatively little assistance to capture negative-cost energy efficiency opportunities on the left side of the abatement cost curve, other than some support for policy implementation. But this MDE might be a good candidate for an ambitious one-sided offset incentive scheme in its major sectors. While LDCs might prioritize adaptation efforts requiring grant support, they might also want to take advantage of project-based efforts that create offsets in the agricultural sector including support for low-carbon agricultural practices that also increase food output. This diversity of funding requirements, forms and channels will need to be managed in an institutional structure that enables accountability, transparency, resistance to gaming, and fairness in governance for both developing and developed countries.

There are two basic ways the funding (grant and loan-making) institutions can be organized:

- A wholesale "fund of funds", such as an International Carbon Bank (ICB) – This would be a new institution whose purpose would be to collect funding from various sources and then channel it as appropriate to an adaptation fund, sector-focused mitigation programs (for

example, power and transport), a forestry fund, a technology fund and so on. These delivery funds might be existing institutions (for example the World Bank, regional development banks, UN organizations, NGOs or private sector institutions) or they might be new institutions created for the specific purpose of delivering those funds for example,, a new forestry fund). The delivery funds could also "compete" for the business of the ICB on their effectiveness in delivering funds and meeting treaty goals.

- A set of self-standing funds – The alternative is a set of self-standing funds each with its own funding sources and dedicated to specific purposes. For example, one could have a fund for energy efficiency focused largely on capacity building and capital loans for implementation or a forestry fund focused on preparatory work and REDD. Each fund would then have its own funding sources, governance and so on. Again they could be new creations or built as departments or extensions of existing institutions.

The advantage of the wholesale approach is that by aggregating funding flows the ICB could then optimally allocate across the needs of the delivery funds. In addition, the ICB could smooth variations in individual funding sources over time. For example, if the adaptation fund were self-standing and funded by an ODA surcharge, the flow might be too small or too large or too uneven for its needs. If adaptation were part of the ICB, it would get its fair share of the funding pie and a potentially more reliable funding stream. The ICB could also dynamically adjust allocations as needs change over time. The disadvantage of such a model (and the advantage of a more disaggregated approach) is that it creates a layer of bureaucracy between funding provision and funding delivery. It also requires the creation of a major new institution which takes time and introduces political complexity.

The background paper, *Financing Mitigation and Adaptation in Developing Countries: New Options and Mechanisms* reviews four proposals related to what should be funded and how a new financial agreement should be structured, identifying several common elements in the proposals. [16] These elements set out some of the needs that will be considered by Parties in the negotiations, and include:

- New Fund – They all recognize the need for a new fund dedicated to the deployment of mitigation technologies on a significantly larger scale than the GEF.
- Technology Innovation Chain – They address to varying degrees and different levels of depth one or more stages of the technology innovation chain. Only the WRI proposal sets out to address specific barriers at each stage of the innovation chain.
- Institutional Arrangements – They address the need for new institutional arrangements under the UNFCCC, however the proposed arrangements vary from the creation of a new subsidiary body with centralized responsibilities to less elaborate and decentralized links to the UNFCCC.

[16] These proposals are from Remin University, China; World Resources Institute, U.S.; Netherlands Environment Assessment Agency; and Chatham House and E3G, United Kingdom.

- Linking Funds to Policy Action – Several proposals link new funds for the development of technology to a variety of policy actions by developing countries. These include the development of NAMAs, sectoral plans, technology needs assessments and other national policies.
- R&D – Proposals to promote R&D vary with some focusing just on a few critical technologies while others appear to address a broad set of technologies.
- Capacity Building and Intellectual Property Rights (IPR) – There are no common elements regarding capacity building and IPR. They are included in some proposals but the details vary considerably.
- Carbon Market – While all the proposals acknowledge the role of a carbon market, no explicit suggestions are made about how to integrate the above proposals into an overall framework. The elements tend to be viewed as components that would set the stage for, but be supplemental to, carbon offset mechanisms.
- Leveraging of Private Sector Funds – Two of the proposals explicitly recognize the need to leverage private sector funds with innovative public sector finance instruments.
- Monitoring, Reporting and Verification – There is general recognition of the need for MRV procedures, but few details are provided in the context of the above proposals.

Notwithstanding the above, there are several options for organizing the carbon market. The simplest would be to simply scale the existing CDM market where creators of offsets sell directly to buyers via various middlemen "market-makers." There are two likely scenarios depending on the relative speed of abatement between developed and developing country efforts:

- Too low a developed country carbon price – If developing countries move quickly in generating offsets, then their large quantity and low cost could depress the developed world carbon price thus reducing the incentives for domestic action. This could slow down technology development in the developed world and reduce prices down learning curves. And given the long lead-times on many abatement actions, this could put meeting domestic targets at risk.
- Overpayment for too little abatement – The other scenario is where developed countries move quickly and developing countries generate offsets more slowly. In this case, the developed world would have a high carbon price and would then pay for a modest number of offsets.

There several options for avoiding these scenarios:

- Tax offset income at the national level and use the income to finance "off market" abatement – Ensuring that these funds are truly recycled would be challenging and it would potentially penalize less developed countries that have fewer capabilities for generating offsets.
- Increase the existing CDM levy to finance abatements "off-market" – The advantage here

would be that it can be achieved within the existing framework and used for delivering abatement via a fund. However, the scale of the levy increase required might reduce carbon market trading and liquidity.

- Discount developing country offsets – One could imagine a rule whereby a developed country has to buy three developing country tonnes for every developed country tonne it claims an offset for. The scheme has the benefit of simplicity, but the discount factor would need to be very carefully (and apolitically) set to balance the need for appropriate price signals in each market.
- Limit offsets to specific sectors that have relatively high costs – For example, power and industries where the differences between abatement costs in developed and developing countries are not so large.
- Developed countries limit offset "imports" – This is what the EU does today. But by keeping developed market prices high it would only protect against the first scenario, but would aggravate the second by concentrating economic surplus on a small number of tonnes of developing country abatement.
- Create a "Carbon Bank" – The Carbon Bank would use back-to-back auctions to buy emission credits from developing countries at one price and then sell credits to developed countries at another. In essence, the Bank would create a firewall between the two markets that preserves price integrity in each. Credits could be freely traded from one developed country Party to another developed country Party or from a developing country Party to another developing country Party. But the auctions would be the only place a credit could be bought or sold across the line between developed and developing economies. Just like a central bank, the Carbon Bank would be charged with managing price stability in each market by controlling the supply of permits. In other words, it would buy more credits than it would sell in effect creating a discount factor, but one that would be variable according to market conditions rather than fixed. A further benefit of the Carbon Bank concept is it could also use the price differential in the two markets to create substantial flows for the ICB or other funds.

5.4.2 *Addressing Finance Issues up to and including Copenhagen*

The two critical issues that need to be addressed first in Copenhagen are financing, and GHG emission reduction commitments of developed countries and actions by developing countries. If these two issues are addressed everything else is likely to fall into place. However, while doable, bringing negotiations on finance to a conclusion in Copenhagen will not be easy. Progress will have to be made on all financing issues relating to adaptation, mitigation and forestry in the meetings prior to COP 15 if they are to be integrated in a final package.

The historical dynamic of the G77 and China provides that group an advantage in the negotiating process. When they have reached agreement on a proposal, it is highly likely that their proposal could become the basis for negotiations over the course of the year. This is not to suggest that there isn't considerable room for negotiations. That being the case, Parties will first need to consider and articulate an overall philosophy regarding how financing is to occur including: what should be addressed within and outside the Convention, what principles should guide any agreement on financing, what specific technological and financial barriers should be addressed, what functions need to be performed by any new mechanism, and whether a new mechanism is warranted (see Table 9). Annex III, in the background paper on financing and investment, provides arguments for and against a totally new mechanism.

Table 9: Examples of Functions of a New Financial Mechanism for Mitigation

There is a range of specialized functions that may be necessary within an overall and integrated carbon system architecture. These could include:

- a technical mechanism to review country programs and performance, build consistent methodologies and develop tools for different practitioners;
- a regulator to link carbon markets across cap-and-trade countries and define criteria for conditional access provided to non-cap-and-trade countries;
- an investment function to overcome capital constraints to energy;
- efficiency programs to accelerate deployment of low-carbon technology options, create long-term support for bio-sequestration and climate resilient development;
- a central banking function to improve long-term carbon price discovery; and
- a dispute settlement mechanism to resolve competitiveness issues.

Having developed individual national positions, the following is a possible general sequence for addressing financial issues leading up to (and in) Copenhagen, recognizing that some elements are being discussed in different forums (REDD, AWG-KP and other working groups):

- Developed country governments (individually and collectively) will need to decide what new sources of funds will be used to support an expanded mitigation technology program so as to provide some certainty that funds will be available over time. The specific level of funding might wait until later in the process, but consideration will be needed as to the mix of ODA,

  auction revenues and other sources that might be made available, and whether countries would have flexibility to raise funds using different sources.
- All governments will need to decide what "needs" will be covered with any new funds and whether/how such funds will be linked to developing country actions in the case of mitigation, adaptation and forestry. For example, will funding be contingent on developing

countries preparing adaptation and low-carbon development or sectoral plans, including national policies? Will all stages of the technology innovation cycle be addressed in the case of mitigation? In other words, seek to find common ground on what problems/barriers are to be addressed and some sense of how significant they are prior to getting into a discussion of how to structure any new financial mechanism.

- All governments will then need to decide how such funds should be managed within the UNFCCC and what should be left to other processes. A key issue is will the governance of technology funds be managed in a centralized or decentralized approach or in some compromise fashion. Should the management of funds differ for adaptation, forestry and mitigation? Will different funds be established to address different needs? Should any new mechanism(s) have flexibility, indeed be encouraged, to use a variety of public finance mechanisms to leverage private funds?
- Finally, all governments will need to decide on an accounting system to monitor, report and verify what money has been made available, what it has been spent on and what has accomplished.

6.0 A Possible Regime – A Phased Approach to a Safe Climate

There is currently a very low probability that any developing countries will agree to undertake national caps within a 2020 timeframe. In Bali, developing countries agreed to NAMAs and several countries have since floated various proposals for sector targets/approaches, energy intensity targets, per capita targets, targets that reflect a deflection from BAU and long-term mitigation aspirations. There is an enormous diversity of developing countries in terms of size, stage of development, and types of economic and political systems. It is unlikely that a one-size-fits-all approach will work politically or practically.

One option for engaging developing countries in a regime that would encourage deep cuts in global GHG emissions by 2050 is presented in this section—*A Phased Approach to a Safe Climate* (see Table 9). A phased approach would help to build confidence that developed countries will meet their mitigation commitments and financial commitments to developing countries. A phased approach may be the best means to engage developing countries from the perspective of ensuring that these countries pursue GHG emission reductions in a nationally appropriate manner and have adequate financial and other incentives to do so. MDEs have stated clearly that they will not accept economy-wide GHG emission limits for a commitment period starting in 2012; but they, or a subset, could be expected to take on these targets in 2020—provided that developed countries meet agreed-to targets for the 2012-2017 time period. This is important. Over 15 years ago, Annex I Parties set GHG emission reduction targets; and it is clear that some countries will not achieve these targets. As part of a trust building process, the developed countries have to demonstrate that large-scale GHG emission reductions are doable in a manner that does not seriously impede economic growth.

A *Phased Approach to a Safe Climate* includes three groups of countries:

1. Developed Countries – This group includes all countries that currently have targets, all OECD members and all Member States of the EU. South Korea and Mexico will be considered Developed Countries because of their current membership in the OECD; Cyprus and Malta because they are EU Member States. Mexico participation in this group will be contingent on it receiving special support from other developed nations.
2. Advanced Developing Countries – Any country reaching agreed criteria of an Advanced Developed Country will take on certain actions and commitments. The criteria of Advanced Developing Country will include per capita GDP, contribution to overall GHG emissions and ability/capability to contribute to obtaining GHG emission reductions. An indicative list could include Argentina, Bahamas, Brazil, Chile, China, Kuwait, Malaysia, Saudi Arabia, Singapore, South Africa, Qatar, United Arab Emirates and other countries reaching agreed criteria.

Table 9: Phased Approach to a Safe Climate

<table>
<tr><th colspan="2">Phased Approach to a Safe Climate
Goal: To encourage deep cuts in global GHG emissions by 2050</th></tr>
<tr><td>Phase I
- to 2017 for developed countries
- to 2020 for developing countries</td><td>Phase II
- Post-2017 for developed countries
- Post-2020 for developing countries
Targets and actions based on a review of the scientific adequacy of emission reductions in developed countries in 2014.</td></tr>
<tr><td colspan="2">Developed Countries
(includes all OECD members and EU Member States)</td></tr>
<tr><td>• Binding commitments based on a long-term goal to 2050 and collective/national goals set out for 2017 and at 10-year intervals beginning in 2020 (2020-2030, 2030-2040 and 2040-2050).
• Individual country low-carbon plans to reach long-term goal.
• GHG inventories submitted on an annual basis.
• Access to market-based mechanisms.
• Commitment to joint developed and developing country R&D program(s) for critical technologies.
• Establishment of climate change fund(s) for mitigation and adaptation in developing countries with multiple sources of revenue including grant funding, auctioning of AAUs and international market-based levies.</td><td>• Regime continues, with updates in individual country plans and potential revisions in milestones/targets based on at least a decadal basis, informed by new science and technology information.</td></tr>
<tr><td colspan="2">Advanced Developing Countries
Any country reaching agreed criteria of an advanced developing country will take on commitments as set out below. Criteria to include: per capita GDP, contribution to overall GHG emissions and ability/capability to contribute to obtaining GHG emission reductions.
(The group could include Bahamas, Brazil, Chile, China, Kuwait, Saudi Arabia, Singapore, South Africa, Qatar and United Arab Emirates)</td></tr>
<tr><td>• Begin setting sectoral/sub-national no-lose targets with a base year of 2005 in preparation for national targets starting in 2017.
• Individual country NAMA plans, registered with the UNFCCC.
• GHG inventories submitted on a biennial basis and include reporting on sectoral/sub-national no-lose targets, and GHG emission reductions linked to actions under NAMA plans.
• Access to financing through market-based mechanisms.
• Commitment to joint developed and developing country R&D program(s) for critical technologies.
• Access to financing from new funds for NAMAs, REDD, technology and capacity building activities.</td><td>Provided that developed countries meet their collective 2017 goal, for the post-2020 period:
• Binding commitments based on a long-term goal to 2050 and collective/national goals at 2020, 2030 and 2040 from a 2005 baseline.
• Individual country low-carbon plans to reach long-term goal.
• GHG inventories submitted on an annual basis.
• Access to market-based mechanisms.
• Commitment to joint developed and developing country R&D program(s) for critical technologies.
• Financial contributions to NAMAs and adaptation in LDCs.</td></tr>
</table>

Other Developing Countries All other developing countries, with recognition of the unique and not always common needs and responsibilities. For example, LDCs and SIDS will require special assistance.	
• No commitments, but encouraged to develop NAMAs and register them to access financial and capacity building support for actions. (LDCs able to access financing prior to the developing of NAMA plans; other developing countries require plans to access funds.) • Access to financing from new funds for NAMAs, REDD, technology and adaptation. • Access to financing through market mechanisms. • GHG inventories submitted on a biennial basis and include reporting on GHG emission reductions linked to actions under NAMA plans. • Differentiation within this group is explicitly recognized.	***Provided that developed countries meet their collective 2017 goal for the post-2020 period:*** • Explore appropriateness of developing sectoral/sub-national no-lose targets in preparation for national targets over the following decades. • Individual country NAMA plans, registered with the UNFCCC. • Access to financing from funds for NAMAs, technology and adaptation. • Access to financing through market mechanisms. • GHG inventories submitted on a biennial basis, which include reporting on sectoral/sub-national no-lose targets, and GHG emission reductions linked to actions under NAMA plans.

3. Other Developing Countries – All other developing countries, recognizing the unique and not always common needs and responsibilities. For example, LDCs and SIDS will require special assistance.

Actions expected in two phases are described below, looking at targets, mitigation, technology and financing. Phase I is the time period up to 2017 for Developed Countries and up to 2020 for Advanced and Other Developing Countries. Phase II is post-2017 for Developed Countries. Provided that developed countries meet their collective 2017 goal, Phase II will begin in 2020 for developing countries.

6.1 Targets

6.1.1 Phase I

In Phase I, Developed Countries take on binding absolute targets. The binding commitments are based on a long-term goal to 2050 and collective/national goals set out for 2017 and at 10-year intervals (2017-2027, 2027-2037 and so on). Countries report on progress in meeting targets in their GHG inventories that are submitted on an annual basis.

Advanced Developing Countries begin setting sectoral/sub-national no-lose targets with a base year of 2005. Targets are set somewhere below BAU, with carbon reduction units acquired by these countries if this target is exceeded. If the target is not met, there are no punitive measures. The use of a 2005 baseline will help ease inventory requirements for these nations. Support is needed to help

develop the inventories of the advanced developing nations, which should be submitted on a annual basis. U.S. leadership could be an important factor in having advanced nations agree to sectoral or sub-national no-lose targets because many of these countries have important trade relations with the U.S.

Other Developing Countries are not expected to take on commitments. These counties submit GHG inventories on a biennial basis, including reporting on GHG emission reductions linked to actions under NAMA plans.

6.1.2 Phase II

In Phase II (post-2017), the regime would be continued for Developed Countries (the group could be expanded depending on whether other countries become a member of the OECD and the EU). Each country would be expected to update its low-carbon plan and make revisions in milestones/targets that are informed by new science and technology information. Countries would make revisions in targets and milestones on at least a decadal basis. The targets and actions for post-2017 would be based on a 2014 review of the scientific adequacy of GHG emission reductions in developed countries.

Provided that the developed countries meet their collective 2017 target, Advanced Developing Countries would take on binding commitments based on a long-term goal to 2050 and collective/national goals at 2020, 2030 and 2040 from a 2005 baseline. Targets and actions would be based on a 2014 review of the scientific adequacy of GHG emission reductions in developed countries. Countries would report on progress in meeting targets in their GHG inventories that are submitted on an annual basis.

Provided that the developed countries meet their collective 2017 target, Other Developing Countries would explore the appropriateness of developing sectoral/sub-national no-lose targets in preparation for national targets over the following decades; with a a particular focus on supporting MDEs, such as India and IndonesiaGHG inventories would be submitted on a biennial basis, and include reporting on sectoral/sub-national no-lose targets and GHG emission reductions linked to actions under NAMA plans.

6.2 Mitigation Plans

6.2.1 Phase I

Developed Countries would develop individual low-carbon plans with milestones setting out how they will reach the 2050 goal. They would have access to market-based mechanisms—international GHG emissions trading, JI, CDM and any other agreed to MMSDs—to help meet these goals.

Advanced Developing Countries would develop individual NAMA plans that are registered with the UNFCCC. An effective NAMA plan has four elements:

1. a long-term strategy for low-carbon development;
2. long-term mitigation and development targets;
3. a detailed near-term plan with the specific policies, measures, actions and investments required to implement the strategy, and
4. the required financial, capacity and technology support.

For such an exercise to be meaningful, it would need to be rooted in national domestic policy processes and not just a technocractic exercise to fulfill a treaty obligation. Therefore, the process for creating the plans should be led by a national authority with an appropriate mandate, involve a broad array of national stakeholders and be approved by the highest-level national political processes (for example, head of state or government, or national legislature). The experience of countries such as South Africa, South Korea, Mexico, China, India, the United Kingdom and Germany, which have created these types of plans, is that such exercises are enormously useful in generating a fact-base for action, and bring key political constituencies to the table. Such plans would also create a higher level of transparency among countries that would help build trust. For these reasons, it might be desirable not only for developing countries to prepare NAMAs or Low Carbon Growth Plans (LCGPs), but for developed countries to do so as well, but with a different amount of detail. This would be a further enhancement of Article 4.1.b of the Convention to create "national programmes."

Once reviewed, the NAMAs would be entered in a registry where they would become the basis for an MRV process. The MRV of developed country LCGPs would focus on whether GHG emissions commitments, treaty funding and support commitments were being met. The MRV of developing country plans would focus on whether pledges to undertake policies, measures and other actions were being met. Any financial support linked to a NAMA would be predictable and transparent with rewards linked initially to policy implementation (payments would be made up front for the development of policies), but then progressively move toward rewarding GHG emission reductions. Finally, NAMAs and LCGPs would be part of a system that is oriented toward development and improvement of national strategies and not a rigid system that creates high barriers to entry or penalties for failure. LCGPs would be encouraged, supported and challenged. As such they would become a critical basis for global collective action.

Advanced Developing Countries would have access to financing through market-based mechanisms—including MMSDs that are agreed to as transition mechanisms—to help meet these goals.

Other Developing Countries would be encouraged to develop NAMAs and register them to access financial and capacity building support for actions. LDCs are able to access financing prior to the

developing of NAMA plans, but other developing countries require plans to access funds. These countries will have access to the CDM or other agreed-to MMSD.

6.2.2 *Phase II*

In Phase II (post-2017), the regime continues for Developed Countries. Each country would be expected to update its low-carbon plan and make revisions in milestones/targets that are informed by new science and technology information.

Provided that the developed countries meet their collective 2017 target, Advanced Developing Countries would develop individual low-carbon plans with milestones setting out how they will reach the 2050 goal. They would have access to market-based mechanisms—international GHG emissions trading, JI, CDM and any other agreed to MMSDs—to help meet these goals.

Provided that the developed countries meet their collective 2017 target, Other Developing Countries would update NAMAs and continue to have access to the CDM or other agreed-to MMSD.

6.3 Technology

6.3.1 *Phase I*

Individual Developed Countries would support technology efforts though a combination of funding mechanisms while drawing on their individual areas of expertise and technology know-how. Developed Countries would commit to develop joint research and technology programs with their Advanced and Other Developing Country counterparts.

Domestic, bilateral and regional efforts would be important, especially in regard to technology cooperation. There is an existing architecture of technology cooperation that includes developed and developing nations that could be ramped up, rather than re-invented. As noted in Section 2, the CSLF, M2M and IPHE are U.S.-initiated technology cooperation agreements. In addition, there are the Generation IV International Forum, Global Nuclear Energy Partnership, ITER, Renewable Energy and Energy Efficiency Partnership, and Technology Agreements under the IEA that include the Global Market Initiative for Concentrating Solar Power and the Climate Technology Initiative. Successful technology agreements would likely need greater output orientation than these initiatives, which have mainly focused on information sharing. Programs are needed that have real targets and timelines; for example, benchmarks such as technology penetration rates to be achieved by a set date.

Advanced Developing Countries would commit to develop joint research and technology programs with their Developed Country counterparts.

Where appropriate, Other Developing Countries would participate in joint research and technology programs with Developed and Advanced Developing Countries.

6.3.1 *Phase II*

The regime would continue with Developed Countries leading joint research and technology efforts, and Advanced Developing Countries participating. Other Developing Countries participate where appropriate.

6.4 Financing

6.4.1 *Phase I*

In Phase I, Developed Countries would establish climate change fund(s) for mitigation (as set out in NAMA plans) and adaptation in Advanced Developing and Other Developing Countries. These funds would have multiple sources of revenue, including new grant funds, expanded share of proceeds and proceeds from the auctioning of allowances. [17] The funds would be managed through a decentralized approach, building on the strengths of existing institutions (for example, institutions already established for the CDM, Adaptation Fund and Special Climate Change Fund). Mitigation efforts would need to be incorporated into various government programs and the private sector; funds would be distributed through a variety of channels. The UNFCCC would play a facilitative role with a particular focus on issues of interest to poor developing nations. As well, it would establish reporting and monitoring mechanisms to ensure that the contributions of funding programs to global GHG emission reductions are recognized and accounted for.

Advanced Developing Countries would have access to financing from new funds for NAMA, REDD, technology and capacity building activities. As noted, taking on targets and giving up the CDM is not an option that MDEs want to consider. Therefore, the Phased Approach allows Advanced Developing Countries to have a transition mechanism in the immediate term up to 2017, but have it phased out over this time as these countries move toward taking on targets. An allocation-based MMSD in competitive sectors could be used, where Advanced Developing Countries take on no-lose sectoral/sub-national targets. As noted in section 5.2, the Phased Approach would see Advanced Developing Countries allowed tradable carbon units for a small and increasing percentage of their GHG emission reductions even before they reach the targets, providing a stable financing source in the form of revenues that can in part make up for the loss of the CDM. The transition mechanism would be phased out by 2017 as Advanced Developing Countries prepare to take on binding targets.

[17] For example, the Norway proposal of withholding a small portion of permits from national quota allocations and auctioning it by an appropriate international institution as a innovative means to raise funds for both adaptation and technology deployment in developing countries.

Other Developing Countries would have access to financing from new funds for NAMAs, REDD, technology and adaptation. Funding for adaptation would be of particular importance for LDCs and SIDS. These countries would also have access to financing through market mechanisms.

6.4.2 *Phase II*

The regime would continue with Developed Countries continuing to provide funding for mitigation and adaptation in Other Developing Countries.

Advanced Developing Countries would make financial contributions for adaptation efforts in LDCs and SIDS. The transition mechanism would be phased out and these countries would have access to market mechanisms in a manner similar to Developed Countries.

Other Developing Countries would continue to have access to financing from funds for NAMAs, REDD, technology and adaptation. These countries will also have access to financing through market mechanisms.

7.0 Conclusion

The participation of MDEs in a post-2012 regime is necessary to prevent the world from facing dangerous climate change. Engaging these countries in effective mitigation actions will require financial incentives through grants and the carbon market, as well as technology cooperation. While there is much work to be done over 2009, there is reason for cautious optimism as we head to Copenhagen. The new U.S. administration has called for increased action on climate change, at home and internationally, and many are looking for leadership from this country. There has also been a softening in the positions of Brazil, China, India, Mexico and South Africa, indicating a willingness to act with appropriate incentives and being more proactive in bringing forward proposals for consideration by the international community. The global economic crisis means that climate change may not be a top priority for governments, but leadership from the U.S. and the EU can help keep the issue on the table, the crisis may encourage adoption of innovative financing options, and the large stimulus packages offer an opportunity for many countries to make green investments and start down a clean energy path.

This paper presents a framework for discussion and debate on how to encourage MDE participation in achieving global climate change goals. It suggests several questions that will need to be answered in the coming year as the world comes ever closer toward elaborating a post-2012 regime for international action on climate change:

1. Are science-based targets compatible with economic and political realities?
2. What is the ideal mix of approaches to encourage meaningful and effective participation of MDEs in a post-2012 regime? Is there a mix of incentives that would encourage the MDEs to take on binding targets (or in the event that is not possible, then no-lose sectoral/sub-national targets)?
3. How should the international community differentiate the participation of nation-states in a post-2012 regime? Is it reasonable to have a category of Advanced Developing Countries? Or might it be reasonable to engage MDEs in separate deals, given that GHG emission limits or cuts in these countries can potentially have a huge impact on meeting global GHG emission goals because of the massive size of their populations and economies and their level of economic growth?
4. Is it reasonable for the world to wait if the U.S. is not prepared (or unable because of its domestic situation) to sign on to a comprehensive new agreement?
5. What is the best way to ensure that climate-friendly technologies efforts are effectively complemented within and outside the formal UNFCCC negotiations?
6. How do we more effectively engage industry and the private sector in efforts with MDEs?

8.0 References

AFP, 2009. *Pelosi upbeat on US-China climate cooperation.* June 1. http://www.google.com/hostednews/afp/article/ALeqM5jI40WP4WJkZp69Ryy_qzZ2ExgOHg

AOSIS, 2008. *AOSIS Input into the Assembly Document: "Shared Vision."*

AOSIS, 2008b. *AOSIS Input to the Assembly Paper on Financing.*

Associated Press, 2008. "What the Chinese stimulus package means." *International Herald Tribune,* November 23.

Australia, 2008. *Mitigation*. Submission to the AWG-LCA and AWB-KP.

Batson, A. 2009. "China Stimulus Tweaks Don't Redress Imbalances." *Real Time Economics, WSJ Blogs*, March 9. http://blogs.wsj.com/economics/2009/03/09/china-stimulus-tweaks-dont-redress-imbalances

Baumert, K.A., T. Herzog and J. Pershing, 2005. *Navigating the Numbers, Greenhouse Gas Data and International Climate Policy*. Washington, D.C., World Resources Institute.

Bodansky, D., 2004. *International Climate Efforts beyond 2012: A Survey of Approaches*. Washington, D.C.: Pew Center on Global Climate Change.

Bradley, R., K. A. Baumert, *et al*.., 2007. *Slicing the Pie. Sector-Based Approaches to International Climate Agreements*. Washington, D.C., World Resources Institute.

Brazil, 2008. *Views on the range of topics and other relevant information relating to reducing emissions from deforestation in developing countries*, Submissions from Parties. FCCC/SBSTA/2007/MISC.2.

Bureau of Public Affairs, 2009. *Chairman's Summary from the First Preparatory Meeting of the Major Economies Forum on Energy and Climate*. Press Release, April 29.

Center for Clean Air Policy, 2008a. "Mexican Government announces aggressive national Goal to Reduce Carbon Emissions by 2050." Press Release, December 11. http://www.ccap.org/index.php?component=news&id=151

Chandler, W., R. Schaeffer, D. Zhou, P.R. Shukla, F.Tudela, O. Davidson and S. Alpan-Atamer, 2002. *Climate Change Mitigation in Developing Countries, Brazil, China, Indi, Mexico, South Africa, and Turkey*. Arlington: The Pew Center on Global Climate Change.

China, 2008.*Views on Enabling the Full, Effective, and sustained implementation of the Convention through Long-term Cooperative Action Now, up to and beyond 2012.*

China Climate Change Info-Net, 2009a. *China working on further national plan to address climate change: official*. May 20. http://www.ccchina.gov.cn/en/index.asp

China Climate Change Info-Net, 2009b. *Chinese Premier: China ready to cooperate with U.S. in coping with climate change*. May 31. http://www.ccchina.gov.cn/en/NewsInfo.asp?NewsId=17616

Commission of the European Communities, 2009. *Towards a comprehensive climate change agreement in Copenhagen: Provisional Version*. Communisation from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. COM(2009) 39/3.

The Commonwealth of Nations, 2007. *Commonwealth Climate Change Action Plan.*

De Connick, H., C. Fischer, R.G. Newell and T. Ueno, 2007. *International Technology-Oriented Agreements to Address Climate Change*. Washington, D.C.: Resources for the Future.

Den Elzen, M.G.J. and N. Höhne, 2008. "Reductions of greenhouse gas emissions in Annex I and non-Annex I countries." *Climate Change* 91(3), pp. 249-274.

Den Elzen, M.G.J. and M. Meinshausen, 2006. *Meeting the EU 2°C climate target: global and regional emission implications*. Bilthoven: Netherlands Environmental Assessment Agency.

Deutsche Bank Group, 2009. *New research from Deutshe Bank's Asset Management division indicates governments stay committed to climate change despite economic environment.* Press release, February 23.

Diringer, E., 2008. "Prospects for a New International Climate Agreement under the Obama Administration." *Bridges* 20, December. http://www.ostina.org/content/view/3781/1108/

E&ETV, 2009. *UNFCCC chief de Boer discusses U.S. role in Copenhagen talks*. Transcript. March 5. http://www.eenews.net/tv/transcript/958

Findlay, M. and T. Dimsdale, 2008. *Climate Action in Major Emerging Economies: Brazil, China, India, Mexico and South Africa*. London: Third Generation Environmentalism (E3G).

First Major Economies Meeting on Energy Security and Climate Change, 2007. *Final Chairman's Summary*. September 27-28.

Fischer, C., C. Egenhofer and M. Alessi, 2008. "The Critical Role of Technology for International Climate Change Policy." In C. Egenhofer, Åhman M., T.L. Brewer, Carolyn Fischer, N. Helme, N. Höhne, L.G. Josefsson, S. Kartha, A. Macey, S.P. Sethi, A. Wijkman and L. Zetterberg, Strategic *Issues for the Post-2012 Climate Change Regime*. Brussels: Centre for European Policy Studies, pp. 118-134.

France Diplomatie, 2008. *Major economies meeting on energy and climate (Paris, 17-18 April 2008)*. http://www.diplomatie.gouv.fr/en/france-priorities_1/environment_1097/events_2130/major-economies-meeting-on-energy-and-climate-paris-17-18-april-2008_11108.html

Fransen, T., S. Nakhooda, and H. McMahon, 2008.*Comparative Analysis of Developing Country National Climate Change Strategies*. Washington, D.C.: World Resources Institute.

Fulton, M., 2008. *Investing in Climate Change 2009: Necessity and Opportunity in Turbulent Times*. New York: Deutsche Bank Group.

G20, 2008. *Declaration: Summit on Financial Markets and the World Economy*. November 15. http://www.g20.org/Documents/g20_summit_declaration.pdf

Garnaut, R., 2008. *The Garnaut Climate Change Review: Final Report*. Melbourne: Cambridge University Press.

Gleneagles Dialogue on Climate Change, Energy and Sustainable Development, 2008. *Chair's Conclusions*. 4th Ministerial Meeting, Chiba, Japan, March 14-16. http://www.env.go.jp/earth/g8/en/g20/img/G20%20Chair%27s%20Summary.pdf

Goldman Sachs, 2008. *America. Energy: Alternative Energy*. Note to clients.

Gupta, S., D. A. Tirpak, N. Burger, J. Gupta, N. Höhne, A. I. Boncheva, G. M. Kanoan, C. Kolstad, J. A. Kruger, A. Michaelowa, S. Murase, J. Pershing, T. Saijo, A. Sari, 2007. "Policies, Instruments and Co-operative Arrangements." In B. Metz, O.R. Davidson, P.R. Bosch, R. Dave, L.A. Meyer (eds), *Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge and New York: Cambridge University Press.

Höhne, N., G. MeiraFilho, J. Marcovitch, F. Yaminet and S. Molmann, 2006. *History and Status of the International Climate Change Negotiations on a Future Climate Agreement*. Background Paper 1. "BASIC workshop : Future International Climate Policy," Sao Paulo, August 7-9. http://www.basic-project.net/data/final/Paper15Background%20Paper%20History%20and%20Status%20Climate%20Negotia%85.pdf

Höhne, N., C. Michelsen, S. Moltmann, H. E. Ott, W Sterk, S. Thomas and R. Watanabe, 2008. *Proposals for contributions of emerging economies to the climate regime under the UNFCCC post 2012*. Dessau-Roßlau : Federal Environmental Agency.

Höhne, N, F.Yamin and E. Haites, 2008. "The History and Status of the International Negotiations on a Future Climate Agreement." In C. Egenhofer, Åhman M., T.L. Brewer, Carolyn Fischer, N. Helme, N. Höhne, L.G. Josefsson, S. Kartha, A. Macey, S.P. Sethi, A. Wijkman and L. Zetterberg, *Strategic Issues for the Post-2012 Climate Change Regime*. Brussels: Centre for European Policy Studies, pp. 13-36.

IPCC, 2007. *Climate Change 2007: Mitigation of Climate Change*. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Geneva: IPCC.

International Energy Agency, 2006. "Part III: Greenhouse Gas Emissions. " *CO_2 Emissions from Fuel Combustion*. Paris: IEA, pp. III.1-III.41.

_____, 2008a. *Energy Technology Perspectives: Scenarios and Strategies to 2050*. Paris: IEA.

_____, 2008b. *Key World Energy Statistics*. Paris: IEA.

_____, 2008c. *World Energy Outlook 2008*. Paris: IEA.

Kho, M., 2009. "Cleantech Investment Slowdown Predicted in 2009." *Clean Technica.com*. 7 January. http://cleantechnica.com/2009/01/07/cleantech-investment-slowdown-predicted-in-2009/

Leaders Meeting of Major Economies, 2008. *Declaration of Leaders Meeting of Major Economies on Energy Security and Climate Change*. G8 Hokkaido Toyako Summit. http://www.mofa.go.jp/policy/economy/summit/2008/doc/index.html

McKinsey Global Institute, 2008. *The Carbon Productivity Challenge: Curbing climate change and sustaining economic growth*. Washington, D.C.: McKinsey and Company.

Meinshausen, M., 2006. "What does a 2°C target mean for greenhouse gas concentrations? A brief analysis based on multi-gas emission pathways and several climate sensitivity uncertainty estimates." In H. J. Schellnhuber, W. Cramer, N. Nakicenovic, T. M. L. Wigley and G. Yohe (eds.), *Avoiding Dangerous Climate Change*. Cambridge: Cambridge University Press.

National Development and Reform Commission People's Republic of China, 2007. *China's National Climate Change Programme.* http://www.pewclimate.org/docUploads/ChinaNationalClimateChangeProgramme%20June%2007.pdf

New Energy Finance, 2009. *Global Futures 2009*. London: New Energy Finance.

New York Times, 2009. *Senate Confirmation Hearing: Hillary Clinton.* Transcript. http://www.nytimes.com/2009/01/13/us/politics/13text-clinton.html?_r=1

Ogonowski, M., J. Schmidt, H. Ma, M.Houdashelt, D. Movius and N. Helme, 2007.*Greenhouse Gas Mitigation in China, Brazil and Mexico: Recent Efforts and Implications*. Washington, D.C.: The Center for Clean Air Policy.

OECD , 2008a. *OECD Environmental Outlook to 2030.* Paris: OECD.

_____, 2008b. *Climate Change Mitigation: What do we do?* Paris: OECD.
Oliver, C., 2009. "South Korea targets $37 billion on "green" projects. *MarketWatch*. January 6.

Prime Minister Council on Climate Change, Government of India, 2008. *National Action Plan on Climate Change*. http://pmindia.nic.in/Pg01-52.pdf

Republic of Korea, 2008. *Further input in relation to possible improvements to emissions trading and the project-based mechanisms under the Kyoto Protocol.* FCCC/KP/AWG/2008/MISC.7.

Republic of South Africa, Department: Environmental Affairs and Tourism, 2008. *Long-Term Mitigation Scenarios South Africa's Strategic Options for approaching the climate change challenge*. Budget Speech Presentation, May.
http://www.environment.gov.za/HotIssues/2008/LTMS/budgtSpchPrsntation.ppt

Robins, N., R. Clover and C. Singh, 2009. *A Climate for Recovery: The colour of stimulus goes green.* HSBC Global Research.

Rothenburg, E. and L. Wing Stone, 2009. "The Obama Climate Change Agenda." *O'Melveny and Myers LLP*. http://www.omm.com/newsroom/publication.aspx?pub=706

Russian Federation, 2007.*Views on the proposal for the development of appropriate procedures to enable Parties to the Kyoto Protocol to adopt voluntary commitments*, Submissions from Parties and a Party/observer State, FCCC/KP/CMP/2007/MISC.2.

Samaniego, J. and C. Figueres, 2002. "Evolving to a Sector-Based Clean Development Mechanism. Building on the Kyoto Protocol." In K. A. Baumert, O. Blanchard, S. Llosa and J. F. Perkaus, *Building on the Kyoto Protocol: Options for Protecting the* Climate. Washington D.C.: World Resources Institute, pp. 89-108.

Schneider, L. 2007. *Is the CDM fulfilling its environmental and sustainable development objectives? An evaluation of the CDM and options for improvement*. Berlin: Öko-Institut.

Schmidt, J., N. Helme, J. Lin and M. Houdashelt, 2008. "Sector-based Approach to the Post-2012 Climate Policy Architecture." *Climate Policy* 8, pp. 494-515.

Schwarze, R., 2008. "Opportunity or Threat? The financial crisis and international climate policy," *Research for the Environment*. Leopzig, Germany: Helmholtz Centre for Environmental Research. http://www.ufz.de/index.php?en=17300

Seung, J.Y., 2008. *Climate Change Policies in Korea*. Workshop of the Economic and Social Research Institute, March 7.

South Africa, 2008a. *Register of nationally-appropriate mitigation actions by developing countries including Sustainable Development Policies and Measures.*

_____, 2008b. *Views regarding the work programme of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention Submissions from Parties Addendum*, FCCC/AWGLCA/2008/MISC.1/Add.1.

South Korea, 2008. *Further input in relation to possible improvements to emissions trading and the project-based mechanisms under the Kyoto Protocol,* August 13.

State Ministry of Environment, Indonesia, 2007. *National Action Plan Addressing Climate Change.* Jakarta: State Ministry of Environment.

Stern, N., 2006. *The Stern Review of the Economics of Climate Change.* Report presented to the Prime Minister and the Chancellor of the Exchequer.

_____, 2008. *Key Elements of a Global Deal on Climate Change*. London: The London School of Economics and Political Science.

Strator, 2009. "Obama's Energy Plan: Trying to Kill 3 Birds With 1 Stone," *Stratfor Global Intelligence*. http://www.stratfor.com/analysis/20090217_obamas_energy_plan_trying_kill_three_birds_one_stone

Tate, D., 2009. "Obama's Choice for Energy Secretary Vows to Address Climate Change." *Voice of America*, January 13. http://www.voanews.com/english/2009-01-13-voa64.cfm

Third World Network, 2008. "Mitigation group discusses how to measure, report and verify efforts." *TWN Poznan News Update*. Volume 10, December 9.

United Nations, 2007. *The World Population Prospects – The 2006 Revision: Executive Summary*. New York: United Nations.

United Nations Framework Convention on Climate Change (UNFCCC), 2006. *GHG Data 2006: Highlights from Greenhouse Gas (GHG) Emissions Data for 1990-2004 for Annex I Parties*. FCCC/SBI/2006/26.

_____, 2007a. *Analysis of mitigation potentials and identification of ranges of emission reduction objectives of Annex I Parties*. Draft conclusions proposed by the Chair, FCCC/KP/AWG/2007/L.4.

_____, 2007b. *Bali Action Plan*. Decision adopted by COP 13 and CMP 3 (Decision 1/CP.13). December 2007. http://unfccc.int/files/meetings/cop_13/application/pdf/cp_bali_action.pdf

_____, 2007c. *Views on the range of topics and other relevant information relating to reducing emissions from deforestation in developing countries, Submissions from Parties*. FCCC/SBSTA/2007/MISC.2.

_____, 2008. *National Greens house Gas Inventory Date for the period 1990-2006*. FCCC/SBI/2008/12.

_____, 2009a. *Ideas and proposals on paragraph 1of the Bali Action Plan, Revised note by the Chair*. FCCC/AWGLCA/2008/16/Rev.1. January 15.

_____, 2009b. *Ideas and proposals on the elements contained in paragraph 1 of the Bali Action Plan. Submissions from Parties. Part I*. FCCC/AWGLCA/2009/MISC.4 (Part I). May 19.

_____, 2009c. *Ideas and proposals on the elements contained in paragraph 1 of the Bali Action Plan.*

Submissions from Parties. Part II. FCCC/AWGLCA/2009/MISC.4 (Part II). May 19.

_____, 2009d. *Ideas and proposals on the elements contained in paragraph 1 of the Bali Action Plan. Submissions from Parties. Addendum.* FCCC/AWGLCA/2009/MISC.4/Add.1 (Part II). May 22.

United States Congress, 2009. *The American Recovery and Reinvestment Act of 2009.* February 12. http://appropriations.house.gov/pdf/PressSummary02-12-09.pdf

White House, 2008. *Declaration of the Summit on Financial Markets and the World Economy*, 2008. http://www.ue2008.fr/webdav/site/PFUE/shared/import/1115_sommet_crise_financiere/declaration_washington_en.pdf

Winkler, H., 2008a. *Climate change mitigation negotiations, with an emphasis on options for developing countries.* Bern: United Nations Development Programme.

_____, 2008b. *Sustainable Development Policies and Measures: A strategic approach to long-term cooperation action now, up to and beyond 2012.* Presentation at workshop on sectoral approaches, April 16, Paris.

Wooders, P. and J. Nolet, 2009. *State of the Carbon Market: How the future market can encourage developing country participation*. Winnipeg: International Institute for Sustainable Development.

World Bank, 2007. *Growth and CO_2 emissions: How do Different Countries Fare?* Washington, D.C.: Environment Department, World Bank.