DISCUSSION PAPER

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MEASURING THE WAY TO A NEW GLOBAL CLIMATE AGREEMENT

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INTRODUCTION

Enacting a global climate change agreement hinges on finding common ground among countries on a set of interconnected questions: who should mitigate greenhouse gas (GHG) emissions, who should bear the cost of mitigation, and how and under what circumstances the international community can recognize and hold actors accountable for meeting their obligations.

This paper explores key provisions of the Bali Action Plan (BAP), adopted by the Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC) in 2007, that begin to address these questions as part of a road map to a post 2012 agreement. We review existing international climate change agreements, national climate change strategies, Party submissions to the international climate policy negotiation process and other background literature. We first discuss how developing countries frame nationally appropriate mitigation actions. We then consider what forms of technology, financing and capacity-building might support them, and how both mitigation actions and support might be made measurable, reportable and verifiable (MRV) in the context of an international agreement. We suggest that a robust MRV framework for mitigation actions and support can make an important contribution to equitable and environmentally effective mitigation. We therefore propose that the development of a set of principles to guide the inclusion of MRV in the international climate policy framework may help achieve this crucial outcome.

The United Nations Framework Convention on Climate Change and the Bali Action Plan

The UNFCCC, which has been ratified by most countries, including the United States, is based on the principle of common but differentiated responsibilities. This principle recognizes that an equitable and effective global agreement depends on a set of variables that differ between countries based on factors such as their contribution to climate change and their ability to commit financial resources towards a solution. Under the Kyoto Protocol, this principle has largely been applied by dividing the world into two categories: Annex I countries (most of the OECD and former communist block), which have legally binding emission limits, and non-Annex I countries, which have only hortatory responsibilities.

The BAP, adopted in 2007, charts a path to a new international climate agreement that will create a space for developing countries to take actions that help advance their national development goals, while also addressing climate change mitigation priorities. The BAP also stipulates that developed countries, in addition to taking on domestic GHG reduction obligations, will provide technology, finance, and capacity to support developing country mitigation actions. Several factors have influenced the environment in which the BAP was adopted, including the following:

- *Science:* The Fourth Assessment Report[1] of the Intergovernmental Panel on Climate Change (IPCC) outlines a substantially increased certainty regarding the causes of climate change: we now understand global warming and its effects to be related to human activity and to be occurring earlier and at more significant levels than previously projected. The science thus conveys a sense of heightened urgency for action.
- *Mitigation:* Collectively, efforts to date to mitigate GHG emissions have been inadequate. Not only are global emissions rising rapidly, but some major developed countries (in particular the United States) have spent most of the past decade avoiding national-level action rather than implementing policy and have provided only very modest support for developing country mitigation.

1 IPCC, 2007

Developing countries have begun to link their climate and development goals, but this has not yet led to significant reductions in emissions growth. Thus, the BAP sought to substantially boost mitigation efforts.

- *Adaptation:* The impacts of climate change are already being felt in many parts of the world. Even rapid and aggressive levels of mitigation will not allow the world to avoid further damages. It is also widely recognized that extensive resources will be required to adapt to climate change impacts. Thus, the BAP sought to catalyze and finance adaptation as well as mitigation efforts.
- *Rising energy prices:* The rising costs of conventional fossil fuels have caused economic hardship in both developed and developing countries, and prompted countries to consider alternative options to meet their energy needs and ensure energy security.

The BAP calls for "enhanced national/international action on mitigation of climate change, including consideration of:

(i) "Measurable, reportable and verifiable nationally appropriate mitigation commitments or actions, including quantified emission limitation and reduction objectives, by all developed country Parties, while ensuring the comparability of efforts among them, taking into account differences in their national circumstances;

(ii) "Nationally appropriate mitigation actions by developing country Parties in the context of sustainable development, supported and enabled by technology, financing and capacity-building, in a measurable, reportable and verifiable manner."

The phrase "measurable, reportable, and verifiable" was critical to the agreement of the BAP, and how MRV is reflected in the post-2012 agreement will have significant implications for the effectiveness of that agreement for stakeholders in both developing as well as developed countries. To that end, this paper seeks to provide background and context for considering the role of MRV in a new international agreement, and to ground these discussions in the actual experiences and plans of key developing countries.[2]

The BAP broadens participation in GHG mitigation from previous agreements, while maintaining important distinctions between developed and developing countries. All countries agreed in principle to undertake mitigation actions. In addition to "actions," developed countries are obligated to undertake mitigation "commitments." Furthermore, developing country mitigation actions are entitled to support in the form of finance, technology and capacity building. Both the nationally appropriate mitigation actions (NAMAs) by developing countries and the associated technology, financing and capacity-building (TFCB) support are subject to MRV.[3] The framing of developing country actions as "nationally appropriate" implies that they are likely to build on existing national priorities and capacities. Accordingly, the BAP presents an important new opportunity to help developing countries implement mitigation actions, and to enhance their capacity to pursue sustainable development goals.

The extent to which this opportunity plays out in practice will depend significantly on both national prioritization of developing country mitigation actions and the extent to which these efforts are supported within a post-2012 policy framework. Measurement, reporting and verification can enhance and support developing country mitigation actions[4] by:

- Improving availability of information about the range and impacts of actions that countries are taking to mitigate climate change
- Helping countries clearly delineate actions they can take to meet GHG mitigation and development objectives
- Increasing awareness among countries of options and best practices for effective mitigation
- Enhancing the effectiveness of implementation of such actions at national and local levels, and the credibility of all countries' mitigation efforts
- Holding developed countries accountable for meeting their commitments to support developing country actions

All of the above can provide a foundation for developing countries to seek support for their mitigation actions.

Nationally Appropriate Mitigation Actions

The BAP calls for developing countries to consider NAMAs in the context of sustainable development. The BAP does not provide a definition of the term "action," leaving it open to being defined in a variety of ways.

2 This analysis does not, on the other hand, seek to define in detail what would qualify as a nationally appropriate mitigation action or technology, finance, and capacity-building support; define in detail by what metrics (e.g. CO_2e reduced; MW capacity built, dollars invested, etc.) they would be MRVed or address the MRV of developed country actions and commitments, except to the extent that it is necessary to define consistent principles for MRV generally.

3 This is consistent with AWG-LCA submissions by Brazil; Costa Rica, El Salvador, Honduras, Nicaragua and Panama; the European Union; New Zealand; and South Africa.

4 MRV can also enhance confidence among developed countries regarding each others' mitigation activities; this issue is not explicitly discussed in this paper.

TABLE 1 | INDICATIVE NAMAS AND METRICS *

NAMA	COUNTRY	METRIC	SOURCE	STATUS**
AGRICULTURE AND FOREST LAND				
Promotion of conservation tillage	Mexico	hectares agricultural land under conservation tillage; # tillage machines in use	Special Program on Climate Change	Proposed
Greening India Program to expand forest cover	India	% land area under forest cover	National Action Plan on Climate Change	Current
Action Plan for the Prevention and Control of Deforestation in the Legal Amazon	Brazil	deforestation rates	National Plan on Climate Change	Current
ELECTRICITY GENERATION AND USE				
Consideration of climate externalities in evaluation under Electric Sector Investment Program	Mexico	% generation capacity of natural gas plants	Special Program on Climate Change	Proposed
Renewable Energy Law	China	GWh renewable energy generated	11th Five-Year Plan	Current
Promotion of concentrating solar thermal power	India	MW capacity	National Action Plan on Climate Change	Current
Ambitious energy efficiency programs	South Africa	efficiency standards, mandatory reduction targets	Long Term Mitigation Scenarios	Proposed
INDUSTRY				
T-1,000 Program	China	% reduction in energy use	11th Five-Year Plan	Current
Restriction of steel exports	China	no metric specified; potential metric: tons steel exported; tCO2e from steel production	China's National Climate Change Programme	Proposed
TRANSPORT				
Tax incentives for smaller, more efficient, and less polluting cars	China	no metric specified; potential metric: # of more efficient vehicles purchased; tax incentives claimed; estimated tCO2e abated	11th Five-Year Plan	Current
Certification and labeling of biofuels	Brazil	no metric specified; potential metric: volume ethanol certified	National Action Plan on Climate Change	Proposed
WASTE				
Reduce landfill methane emissions	Mexico	# GHG reduction projects built	Special Program on Climate Change	Proposed
OVERARCHING				
Carbon tax	South Africa	no metric specified.; potential metric: tCO_2e taxed; revenue from tax	Long Term Mitigation Scenarios	Proposed

* NAMAs shown in this table were selected to reflect the prospective spectrum of metrics that could be considered for MRV of developing country actions. They are not intended to be representative of the climate change strategies proposed by the countries listed.
**The status of the national plans refers to whether the action has been agreed at the national level or is still under consideration.

One useful starting point for informing the framing of NAMAs, is the variety of existing sustainable development policies and measures (SD-PAMs)[5] that developing countries are already implementing, as well as their specific proposals for addressing climate change at the national level. Brazil, China, India, Mexico and South Africa have recently published initial national strategies on climate change in which they propose a range of measures to mitigate GHG emissions (see Annex 1)[6]. The published strategies differ significantly in terms of the mitigation scenarios that frame them, the extent to which they are new or additional, the ambition of the proposed actions, and their specificity in terms of assigning metrics to MRV progress. Despite these differences, they identify a range of mitigation actions that developing countries consider "nationally appropriate."

Table 1 highlights indicative NAMAs extracted from the national strategies of select developing countries. These include actions targeting specific sectors, such as power generation and consumption (e.g. efficiency standards), agriculture (e.g. conservation tillage), and transport (e.g. incentives for efficient vehicles), as well as those that transcend sectors, such as carbon taxes, which seek to incentivize mitigation across sectors, or GHG registries, which build the capacity for GHG management.

An initial review of developing country strategies (presented in Annex I of this paper) and indicative NAMAs prompts the following observations. First, all the countries examined propose actions whose impacts could be measured with quantitative metrics such as a change in GHG emissions or amount of energy used. This highlights the need to build capacity on GHG accounting and quantification across sectors and countries in order to facilitate the MRV of these actions and ensure that information reported is reliable. The use of consistent standards and quantification methodologies, such as the Greenhouse Gas Protocol[7], can play an important role in providing such coherence. Developed countries could support developing countries to build this capacity.

Second, most developing country strategies on climate change have also highlighted the need for institutional reform to support mitigation activities, particularly to promote renewable energy and efficiency. Metrics to assess the integrity of processes by which such reforms take place – e.g. transparency, accountability, and inclusiveness – will be important in order to ensure that reform is implemented in meaningful and productive ways, and to avoid unanticipated problems.

5 Bradley et al., 2005; WRI, SD-PAMs database
6 Mexico has published a review draft of its strategy but has not yet finalized it.
7 See http://www.ghgprotocol.org

Finally, the associated metrics are diverse, ranging from quantitative measures of GHG abatement or energy efficiency to qualitative indicators such as the existence or enforcement of a particular regulation or program. The metrics were not necessarily designed to facilitate MRV under an international framework, and are not always well suited to this purpose.

Technology, Capacity, and Finance

The BAP states that NAMAs are to be "supported and enabled by technology, financing and capacity-building, in a measurable, reportable and verifiable manner." The BAP does not specify which parties or institutions will be responsible for providing the

BOX 1 | Support for Developing Country Actions under the UNFCCC

Article 4 of the UNFCCC commits developed-country parties to support developing countries in their efforts to mitigate and adapt to climate change. Relevant sections of Article 4 include:

Art. 4.3: The developed country Parties and other developed Parties included in Annex II shall provide new and additional financial resources to meet the agreed full costs incurred by developing country Parties in complying with their obligations under Article 12, paragraph 1. They shall also provide such financial resources, including for the transfer of technology, needed by the developing country Parties to meet the agreed full incremental costs of implementing measures that are covered by paragraph 1 of this Article and that are agreed between a developing country Party and the international entity or entities referred to in Article 11, in accordance with that Article. The implementation of these commitments shall take into account the need for adequacy and predictability in the flow of funds and the importance of appropriate burden sharing among the developed country Parties.

Art. 4.4: The developed country Parties and other developed Parties included in Annex II shall also assist the developing country Parties that are particularly vulnerable to the adverse effects of climate change in meeting costs of adaptation to those adverse effects.

Art. 4.5: The developed country Parties and other developed Parties included in Annex II shall take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally sound technologies and know-how to other Parties, particularly developing country Parties, to enable them to implement the provisions of the Convention. In this process, the developed country Parties shall support the development and enhancement of endogenous capacities and technologies of developing country Parties. Other Parties and organizations in a position to do so may also assist in facilitating the transfer of such technologies.

Art. 4.7: The extent to which developing country Parties will effectively implement their commitments under the Convention will depend on the effective implementation by developed country Parties of their commitments under the Convention related to financial resources and transfer of technology and will take fully into account that economic and social development and poverty eradication are the first and overriding priorities of the developing country Parties.

technology, financing and capacity-building (TFCB). It is usually assumed, however, that, consistent with the principle of common but differentiated responsibilities and with relevant articles of the UNFCCC (see Box 1), developed countries would provide the bulk of the incremental support beyond that which is available through national development agendas and domestic financing .

Technology

The IPCC[8] defines technology transfer as: "a broad set of processes covering the flows of know-how, experience and equipment amongst different stakeholders such as governments, private sector entities, financial institutions, non-governmental organizations and research/education institutions. It comprises the process of learning to understand, utilize and replicate the technology, including the capacity to use it and adapt it to local conditions and integrate it with indigenous technologies." This definition, while inclusive, indicates a process that is undertaken rather than a result that can be measured.

Developing countries are seeking more effective technology transfer than established instruments such as the Clean Development Mechanism (CDM) and other initiatives under the UNFCCC have been able to deliver to date.[9] They have emphasized the need to reduce the perceived risks associated with investment in mitigation technologies, and particularly to make such investments more appealing to private investors. Many parties, particularly developing countries, have focused on the issue of intellectual property rights as a significant barrier to clean energy. However, several of the barriers to the deployment of clean technologies are not directly linked to intellectual property regimes. The importance of enabling environments within countries to promote clean technology is increasingly acknowledged.[10] Developed countries in particular have emphasized this point.

While many developing countries have completed Technology Needs Assessments under the UNFCCC, several parties' submissions to the Ad Hoc Working Group on Long-Term Cooperative Action (AWG-LCA) have noted the need for deeper, more targeted assessment of specific needs, for which financial or capacity support could be sought. Technology support is therefore linked to capacity building, as well as to finance.

Possible metrics for technology support might include: the number of joint or collaborative research, demonstration and early deployment programs set up; the quantity of financing made available in support of the deployment of clean technologies in developing countries; or the number and quality of joint infrastructure projects that include clean technologies. The UNFCCC Expert Group on Technology Transfer is in the process of developing a more comprehensive list of such performance indicators.

Capacity

The Marrakech Accords (Decision 2/CP.7) define the scope of capacity-building activities in broad categories, including:

- •institutional capacity building;
- •enhancement/creation of enabling environments;
- •national communications and climate change programs;
- •research and systematic observation;
- •education, training, and public awareness; and
- •information, networking, and improved decision-making.

The question of how to measure and successfully target capacity-building efforts warrants further consideration by the international community. Countries have noted the need for capacity-building activities for technology deployment and transfer across the technology development cycle[11]. The G77 proposal on technology flags the need to build capacity to manage and generate technological change and to create enabling conditions, including through enhanced human and institutional capacity, and research, development and demonstration of new technologies. Brazil has proposed the establishment of Technology Centres of Excellence, and raised the need for programs to support South-South exchanges in experience and expertise. The EU has suggested the consideration of a sectoral approach (technology-oriented agreements) to guide and regulate technology cooperation, including capacity-building features such as knowledge-sharing platforms and international research and development. Several countries have flagged the need to build on and learn from past multilateral efforts to build capacity.

Capacity metrics of a qualitative and diagnostic nature might facilitate the identification of areas where improvement is needed. For example:

- To what extent do key line ministries have the capacity to develop robust national level GHG inventories?
- To what extent do planning bureaus and energy sector regulators have the capacity to develop robust and reliable projections of energy demand?

8 IPCC, 2001
9 Muller et al., 2008
10 Bazilian et al., 2008.
11 Staley et al., 2008.

- To what extent do actors involved in energy planning, such as utility managers and representatives of planning agencies, have access to new software that allows them to integrate renewable energy options and efficiency into energy scenarios?
- To what extent do such actors have the mandate and capacity to develop and implement integrated resource plans?

There are a number of existing criteria and indicators that can be used to inform the development of such metrics. For example, the WRI-Prayas Electricity Governance Indicator Toolkit[12] proposes a comprehensive set of criteria with which to assess institutional capacity, as well as transparency, inclusiveness, and accountability in policy and regulatory processes for the electricity sector.

Finance

Financing is generally the most defined form of support, but questions remain as to how MRV of finance would be implemented. The range of activities and sectors that affect climate change is vast, and includes energy and transport, as well as waste, agriculture, water, and forestry. A key challenge is to align investments in all these sectors with achieving climate change mitigation. While the precise scale of financing necessary to meet the incremental costs of mitigation is a point of debate, it is estimated that hundreds of billions of dollars will be needed by 2030.

Since the UNFCCC entered into force, the Global Environment Facility (GEF) has been supporting mitigation activities in developing countries. The Kyoto Protocol later established the CDM, which likewise finances mitigation and clean technology deployment. However, the level of funding channeled through these mechanisms has been far from adequate. More recently, the World Bank has proposed two Climate Investment Funds (CIFs) that would be administered in partnership with regional development banks[13] to support mitigation and adaptation activities. The ability of the CIFs to channel significant additional funding is as yet unclear.

There is a wide range of views among Parties on two key issues: where finance comes from, and under what governance structure it is administered.

Potential sources of financing include pledges of support as a percentage of developed countries' GDP, a share of revenues from the auctioning of allocation units and a range of carbon taxes in sectors such as international bunker fuels.

A number of country submissions focus on governance as a means of including or excluding funds from consideration as financing support under a post-2012 climate agreement. The G77 consider that "any funding not under the authority and guidance of the UNFCCC shall not be regarded as the fulfillment of commitments by developed countries under Art. 4.3 of the Convention or decision 1/CP.13." Both the G77 and Mexico have proposed new financing mechanisms accountable to the UNFCCC COP. Japan, conversely, suggests that a range of financial flows be considered, including contributions outside of the UNFCCC.[14] Several countries and organizations have also proposed an expansion of the scope of the CDM to support programs, rather than discrete projects, in an effort to increase the scale and ease of financing for developing country mitigation and adaptation actions through the carbon markets.

MRV under the UNFCCC and the Kyoto Protocol

The UNFCCC and the Kyoto Protocol contain MRV provisions for GHG emissions, and, in less detail, for the kinds of policies and measures that might be considered as developing country NAMAs. A post-2012 agreement would likely need to provide additional MRV guidance. But despite their more limited scope, the current UNFCCC and the Kyoto Protocol MRV provisions provide a useful starting point for considering how they might be addressed in a future agreement (see Table 2).

The measurement of developed country commitments such as quantitative emissions limitation and reduction obligations is prescribed in some detail in Article 5 of the Kyoto Protocol, and is backed by an extensive methodological foundation provided by the IPCC. On the other hand, measurement of policies and measures that might fall under NAMAs, as well as measurement of technology, financing and capacity-building support, is not yet defined.

In terms of reporting, Article 4.2(b) of the UNFCCC provides for developing country reporting of policies and measures on a voluntary basis. Possibilities and implications for linking a post-2012 NAMA reporting structure to Article 4.2(b) could be considered going forward. There is no meaningful existing structure for the verification of policies and measures or technology, financing, and capacity building. It is important to note that recent

12 Dixit et al., 2007

13 The Asian Development Bank, the InterAmerican Development Bank, the African Development Bank, and the European Bank for reconstruction and development.

14 Parties' submissions to the UNFCCC

submissions to the AWG-LCA have called for strengthening and increasing the frequency of reporting under the UNFCCC.

Most Parties still support different reporting processes on GHG-related information for developed and developing countries (see Table 2), continuing a distinction already established under the UNFCCC. Currently, for example:

- Developed countries are required to report on emission inventories and policies and measures every year, while developing countries report at their own discretion.
- Developed countries are required to provide detailed national GHG inventories and information on abatement programs, while developing countries are subject to fewer specific requirements (and may choose not to report on their emissions at all after the submission of an initial inventory).
- Developed countries must provide a detailed explanation of the methodologies used, including assumptions underlying their inventory, whereas developing countries are only encouraged to do so to the best of their abilities.
- Developed country reports are subject to an in-depth review

TABLE 2 | MRV PROVISIONS UNDER THE UNFCCC AND THE KYOTO PROTOCOL

Under the UNFCCC	Under the Kyoto Protocol
MEASUREMENT	
Art 4.1(a): "All Parties, taking into account their common but differentiated responsibilities and their specific national and regional development priorities, objectives and circumstances, shall develop, periodically update, publish and make available to the COP, in accordance with Article 12, national inventories of anthropogenic emissions by sources and removals by sinks of all GHGs not controlled by the Montreal Protocol, using comparable methodologies to be agreed upon by the COP." See also **Art. 7.2(d)**	**Art. 5.1:** "Each Party included in Annex I shall have in place, no later than one year prior to the start of the first commitment period, a national system for the estimation of anthropogenic emissions by sources and removals by sinks of all GHGs not controlled by the Montreal Protocol...." **Art. 5.2:** [Specifications regarding methodologies] **Art. 5.3:** [Specifications regarding Global Warming Potentials]
REPORTING	
Art. 4.1(a): [See above.] **Art. 4.1(j):** "All Parties, taking into account their common but differentiated responsibilities and their specific national and regional development priorities, objectives and circumstances, shall…. communicate to the Conference of the Parties information related to implementation..." **Art. 4.2(b):** Parties shall communicate detailed information on policies and measures and on projected emissions and removals… "this information will be reviewed by the COP, at its first session and periodically thereafter." See also **Art. 12**.	**Art. 7.1:** "Each Party included in Annex I shall incorporate in its annual inventory of anthropogenic emissions by sources and removals by sinks of GHGs not controlled by the Montreal Protocol, submitted in accordance with the relevant decisions of the COP, the necessary supplementary information for the purposes of ensuring compliance with Article 3…. **Art. 7.2:** "Each Party included in Annex I shall incorporate in its national communication…the supplementary information necessary to demonstrate compliance with its commitments under this Protocol…." **Art. 7.3:** Each Party included in Annex I shall submit the information required under paragraph 1 above annually….
VERIFICATION	
Art. 4.2(b): [See above.] **Art. 7.2(e):** "The COP shall assess…the implementation of the COP, the overall effects of the measures taken pursuant to the Convention…and the extent to which progress towards the objective of the Convention is being achieved" See also **Art. 10.**	**Art. 8.1:** "The information submitted under Article 7 by each Party included in Annex I shall be reviewed by expert review teams…" **Art. 8.2**: "Expert review teams shall be coordinated by the secretariat and shall be composed of experts selected from those nominated by Parties to the Convention and, as appropriate, by intergovernmental organizations…" **Art. 8.3:** The review process shall provide a thorough and comprehensive technical assessment of all aspects of the implementation…. The expert review teams shall prepare a report to the COP …assessing the implementation of the commitments of the Party and identifying any potential problems in, and factors influencing, the fulfillment of commitments. Such reports shall be circulated by the secretariat to all Parties to the Convention. The secretariat shall list those questions of implementation indicated in such reports for further consideration by the COP….

Based in part on South Centre (2008).

by an international group of experts that is coordinated by the UNFCCC secretariat, while developing country reports are considered by an expert group convened by the Subsidiary Body on Implementation of the UNFCCC.

Existing GHG reporting systems, including those for Annex I countries, are less effective than they could be, and improvements to the process, agreed multilaterally, would be useful[15]. For developing countries, one of the major problems has been the lack of available data to develop inventories. The rigor of inventories also varies by country. Many developing countries have not collected comprehensive data on emissions since 1994, and the accuracy of much of the data that has been collected is not clear. Only three developing countries have submitted a second national communication. It has also been difficult for developing countries to access the necessary resources to generate better quality information on a regular basis.

MRV will require more regular reporting and data collection by developing countries. It will be essential to design better systems and processes to compile such information and make it easily accessible and understandable for all participants in the UNFCCC process. This will be a significant operational challenge to be addressed at the same time as principles and criteria for MRV are agreed upon.

PARTY POSITIONS ON MRV SINCE THE BALI ACTION PLAN

Recent submissions to the UNFCCC present diverse perspectives on the purpose and implementation of MRV:

- The G77 stress the need for MRV of technical, financial and capacity building support and the creation of bodies to assess developed country performance; some members have also noted the need for MRV of the implementation of developing country actions as well. Many Annex I submissions focus on MRV for developing country actions.
- Some submissions propose institutional arrangements for recognizing NAMAs and technology, financing and capacity-building for them. For example, Brazil, South Korea and South Africa have proposed the creation of a registry through which NAMAs and developed country support would be reported; similarly, Costa Rica proposes the compilation of lists of actions and associated support. Some Annex I countries have suggested that NAMAs would be reflected in the national GHG inventories of developing countries. Mexico's proposed Global Climate Fund also has an MRV function.
- Some Annex I countries have suggested a further differentiation between developing countries based on their economic profiles. Other countries, such as South Africa have suggested that support for developing country NAMAs should be commensurate with the level of ambition and accountability for implementation of the proposed actions.
- The US submission, uniquely, states that the legal character of actions must be similar between countries.

CHARTING A WAY FORWARD: ISSUES TO CONSIDER

Robust MRV of NAMAs and support for developing countries can create an enabling environment for a new international climate agreement. To that end, careful consideration of the following questions can help elucidate the key design elements of an effective policy framework.

Nationally Appropriate Mitigation Actions

- **Which actions are MRVed:** Should MRV be required of all NAMAs, or only those that receive developed country support? Would developing countries undertake NAMAs in the absence of international support? South Africa's suggestion that verification would depend on whether the NAMA is unilateral or supported suggests that the presence or absence of support would affect the MRV of the NAMA.

- **Direct versus indirect actions:** Should MRV be applied only to NAMAs that directly reduce GHG emissions, or also to actions that build capacity and create an enabling environment for future reductions? The EU and others see merit in supporting sustainable development goals of countries in line with their national plans. The United States also support these activities where they lead to the strengthening of national regulatory environments. As previously discussed, several major developing countries emphasize institutional reform in their national climate change strategies and plans. Such institutional reform may not directly reduce GHG emissions, but could be critical in setting the stage for later reductions. Should such indirect actions to reduce GHGs qualify as NAMAs, be subject to MRV and linked to support? If so, how?

- **Defining metrics:** What metrics should be applied to different types of NAMAs? A decentralized approach has been suggested whereby the developing countries proposing NAMAs would also propose the metrics by which they would

15 Winkler, 2008

be measured. Due to the variety of mitigation actions that are likely to be considered nationally appropriate, a decentralized model makes some sense, however: How credible would the countries providing support for the actions consider the measurement? Would it be more efficient to develop a suite of metrics for various action types, so that each country did not have to start from scratch on metric definition?

- **Process:** Who proposes and approves the processes by which NAMAs are MRVed? South Africa's proposal of a NAMA registry suggests that NAMAs be verified by national bodies in accordance with international guidelines; the details of this process would depend on whether the action were undertaken unilaterally or with international support (see Box 3). What are the implications of this approach? Are there others that should be considered? What institutional arrangements and mechanisms might be required?

Technology, Financing and Capacity-Building Support.

- **Linking support to actions**: How should support be linked to specific actions? The United States suggests that donor countries direct resources to the highest priority actions, implying an initial assessment of the relative effectiveness of proposed actions. South Korea suggests that developed countries support specific actions. On the other hand, G77 proposals emphasize the role of the UNFCCC in collecting and channeling support.

- **Financing mechanisms:** What kinds of financing will be subject to MRV? Would support channeled outside of the UNFCCC process be MRVed, and if so, how? What kinds of reporting provisions and guidelines would be needed to ensure that these funds were in fact additional? Under the G77 proposal, would the COP have ultimate authority to both set these guidelines, and make decisions as to what was (or was not) additional? Given the need to ensure predictable revenues at large scale, greater specificity about the sources of financing may be needed.

- **Predictability of support:** Can MRV help ensure predictable and consistent provision of support? At what stage will support for proposed actions be delivered? G77 countries have emphasized the need for funding to be predictable. Will the support be delivered in advance, or upon demonstration that the action has been implemented, or some combination of the two?

- **Private finance:** Will finance leveraged from the private sector through public policy, in particular via carbon markets, be appropriate for MRV? Carbon finance is central to a range of proposals brought forward within the UNFCCC process, but the scale of such finance is hard to predict in advance. (This relates to the problem of predictability noted above.)

- **Technology and capacity building:** How will metrics for technology and capacity building support be defined, and MRVed? Should we consider capacity building support to be independent of technology and financial support, or is it a cross-cutting component? Brazil proposes having specific performance indicators for technology transfer to non-Annex 1 countries.

Reporting and Verification

- **Verification of support:** How will technology, financing and capacity building support be verified? China and the G77, in separate submissions, propose a new technology body that would assess performance in terms of technology flows from Annex 1 to non-Annex 1 countries. The verification body would sit under the COP. This implies an increased role for the UNFCCC in verification.

BOX 2 | South Africa Principles on MRV of Technology, Financing and Capacity Building

South Africa has suggested a set of principles for a policy architecture on technology, finance, and capacity-building support, which could inform the development of a set of principles governing the MRV of support:

- Be flexible, and able to package finance, technology, and capacity building support depending on the specific requirements of the nationally appropriate adaptation or mitigation action being taken, as well as the unique circumstances of developing countries and regions.
- Be able to mobilize all sources of finance, technology, and capacity building, including from international, regional and domestic sources, both public and private.
- Be able to address the development, application, and diffusion, including transfer of technologies through all the technology life stages. These life stages have different financial requirements, different risk profiles, and different capacity building needs.
- Enable a shift from a project based approach to a programmatic approach in order to drastically scale up climate action and make optimal use of the full range of means of implementation available.
- Recognise, promote, and strengthen the significance of engagement at the country level, in order to give effect to the principles of a country-driven approach, and direct access to funding, technology and capacity building, and enable the implementation of these principles.

Source: South Africa Submission to the AWG-LCA 30 September 2008. (Parties' submissions to the UNFCCC)

- **Verification of actions:** How will actions be verified, and by whom? South Africa suggests that national entities would be responsible for reporting and verifying sustainable development benefits and GHG reductions.

- **Cost of verification:** Who would pay for verification? The South African submission stipulates that verification would be paid for by Annex 1 countries. This is currently the case for the national communications to the UNFCCC by non-Annex 1 countries, where the GEF is responsible for funding. Would the GEF therefore fund verification processes?

- **Institutional issues:** Is a new mechanism needed for reporting and/or verifying NAMAs and support? A number of submissions argue that the National Communications are sufficient. South Africa and South Korea propose a registry of NAMAs that may complement this process.

CONCLUSION

MRV is a key policy design question central to the negotiation of an equitable and environmentally effective outcome. It should not be relegated to an operational issue that can be addressed after an agreement has been forged. Robust MRV mechanisms for both NAMAs in developing countries and technology, finance and capacity building support from developed countries will help build trust among parties. Such trust is essential to achieve a new international agreement and ensure developed and developing countries take bold, ambitious, and creative actions that drive GHG reductions and promote sustainable development.

Some countries have already proposed principles for framing the MRV of technology, finance and capacity building support, but a fuller range of perspectives is needed, as well as an added focus on the MRV of NAMAs. There is an urgent need for a common set of principles on the MRV of NAMAs and developed country support to inform the negotiating process, and enable the achievement of an equitable and effective post-2012 agreement.

Glossary of Acronyms

AWG-LCA	Ad Hoc Working Group on Long-term Cooperative Action
CDM	Clean Development Mechanism
BAP	Bali Action Plan
COP	Conference of the Parties
GHG	greenhouse gas
IPCC	Intergovernmental Panel on Climate Change
MRV	measurable, reportable, and verifiable
NAMA	nationally appropriate mitigation actions
OECD	Organisation for Economic Co-operation and Development
SD-PAMs	sustainable development policies and measures
TFCB	technology, finance and capacity building
UNFCCC	United Nations Framework Convention on Climate Change

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ANNEX A: ***Strategies for Change: A Comparative Analysis Of Developing Country National Climate Change Plans***

	INDIA	BRAZIL
	National Action Plan on Climate Change (NAPCC)	**National Plan on Climate Change (PNMC)**
Issuing agency	Prime Minister's Council on Climate Change July 2008	Inter-Ministerial Committee on Climate Change (CIM), September 2008 (public review draft)
Process for development	Plan developed by a special council appointed by the Prime Minister. Efforts began in 2007. Council includes ministers, government officials, scientists, civil society and business, but has met infrequently. Ministries are to submit detailed implementation plans to the Prime Minister by December 2008. The need for further stakeholder engagement has been recognized.	President initiated PNMC in April 2007 on the recommendation of the Ministry of Environment and Brazilian Forum on Climate Change. In November 2007, President appointed CIM (15 ministries plus the President's Secretariat of Strategic Affairs, overseen by Casa Civil) to oversee Plan. CIM surveyed government ministries to identify actions that could be incorporated in the Plan. Stakeholder consultations are underway; stronger action is being sought.
GHG emission scenarios framing plan	NAPCC notes that there is evidence of climate change, and references the IPCC reports. Makes a commitment that the per capita emissions of Indians will not exceed those of people in developed countries.	Cites the IPCC as scientific consensus that anthropogenic climate change is occurring. States that Brazil has contributed little to the problem (in terms of comparative per capita and per area emissions), but has done its part in mitigation to date, and is determined to do more while ensuring the well-being of its citizens.
Key adaptation interventions	WATER • Increasing water efficiency • Mandating water harvesting and recharge in urban areas • Recharge of sources and groundwater aquifers • Water assessments and audits • Conservation of wetlands through mapping, inventory, regulation • Desalination technology development ECOSYSTEMS / BIODIVERSITY • Monitoring of Himalayan glaciers and ecosystems • Improve land use and development planning in Himalayas; sustainable tourism • Biodiversity conservation • Drought and pest resistant crop development • Weather modeling, risk insurance; improve access to weather and agricultural information • Strengthen disaster management and communication OTHER • Support research and modeling to build strategic knowledge on climate change	ECOSYSTEMS • Improved regional modeling of climate change impacts • Vulnerability mapping for coastal zones, biodiversity, water resources, electricity generation, oil and gas, desertification, urban areas • Proposed adaptation measures fall under national desertification plan and water resources plan OTHER • Institutional strengthening • Research and development

CHINA	MEXICO	SOUTH AFRICA
National Climate Change Program (NACCP)	**Special Program on Climate Change (PECC)**	**Long Term Mitigation Scenarios (LTMS)**
National Development and Reform Commission June 2007	Inter-Secretarial Commission July 2008 (public review draft)	Cabinet of South Africa July 2008
China was the first major developing economy to issue an action plan. Process was led by the National Development and Reform Commission, with input from leading universities. Chinese Premier Zeng Peiyan and State Councilor Tang Jiaxuan now head a National Coordination Committee on Climate Change, which includes 17 ministries and agencies, to orchestrate climate change policy.	Inter-Secretarial Commission on Climate Change (CICC) formed in April 2005. CICC prepared National Strategy on Climate Change (ENACC), presented by President Calderón in May 2007, who ordered development PECC based on ENACC and National Development Plan (PND). 17 "sectoral programs" (review of what each sector can accomplish) fed into draft PECC. President has requested development of new set of scenarios and options for Mexico to take stronger action.	Commissioned by Cabinet in 2006; Department of Environment and Tourism tasked to develop plan. A "Scenario Building Team" was set up, including research institutes, business, and civil society. LTMS identifies measures to reduce emissions and adapt: (i) activities to "start now" as they will save money over time; (ii) measures to scale these actions up with additional resources; (iii) tax and incentive packages; (iv) parallel options e.g. behavioral changes and generation technologies.
NACCP makes reference to IPCC reports and Stern reports to confirm the need for early action on the part of all countries to reduce emissions. Notes that emissions intensity is reducing. Emphasizes China's right to development, and the need to consider developing country emissions on a per capita basis.	PECC notes that although decarbonisation must be led by industrialized countries, productive processes of developing countries whose economies are growing rapidly should also be transformed. Gap between reasonable self-effort and needed transformations should be met with large-scale cooperation and new financing.	LTMS are developed with reference to emission scenarios if growth were "not constrained" and emission levels "required by science" to prevent climate change. The actions identified in the LTMS are to reduce emissions to the levels required by science.
AGRICULTURE • Eco-agriculture in intensive areas, improve agricultural infrastructure • High yield and stress-resilient crops • Improve livestock management FORESTS • Incorporate climate change into laws and regulations on forests, conservation, and wetlands • Afforestation at all levels of government • Expand forest monitoring systems to include all ecosystems • Improve municipal waste systems • Prevent grassland desertification (increase grasslands by 24 million hectares, and restore 52 million hectares) WATER • Unified water management • Speed up water infrastructure development including North to South Water Diversion project • Slope and shore protection through engineering and biological measures	AGRICULTURE • Deepen understanding of impacts of climate change on agriculture, forestry, water, ecosystems, infrastructure, cities • Reduce soil degradation • Modernize hydro-agricultural infrastructure • Databases on resilience of key crops ECOSYSTEMS • Avoid and control spread of invasive species, diseases, parasites • Preserve, widen, and connect protected areas • Build resilience of continental, coastal & marine ecosystems • Payments for environmental services • Reduce vulnerability to extreme weather	Plan focused on mitigation scenarios; does not address adaptation.

	INDIA	BRAZIL
Key mitigation interventions	ENERGY GENERATION/USE • Increased deployment of solar PV • 1,000 MW of concentrating solar thermal power • Energy efficiency in industries, small enterprises, and energy production • Promotion of ESCOs and retrofits • Efficiency in residential and commercial sectors • Improved municipal solid waste management • Regulate power tariffs for irrigation • Retire or rehabilitate 10,000 MW old capacity • R&D and deployment of supercritical coal • Promote nuclear power (closed cycle technology) • Exploit hydropower potential (large, medium, micro) • Renewables; biomass combustion and gasification • Explore a dynamic minimum renewables purchase standard (excluding large hydro) starting in '09-10 TRANSPORT • Urban public transport • R&D in Indian railways • Transport pricing reform and higher regulatory standards FORESTS • Greening India Program to expand forest cover to 1/3 of country's area • Other afforestation programs	ENERGY GENERATION/USE • Improve efficiency of energy supply and distribution • Substitute less carbon-intensive/renewable fuels • Carbon capture and storage • Efficiency; solar energy; integrated planning to permit efficiency gains • Efficiency; adoption of recycling and material substitution TRANSPORT • Use efficient vehicles, rail systems, and collective transport; land use and transport planning AGRICULTURE • Enhance soil storage • Restore degraded areas • Intensify bovine ranching; improve cultivation/fertilization to reduce CH4 and N2O emissions; cultivate energy crops SILVICULTURE/FORESTS • Reduce deforestation • Stimulate sustainable forest management • Afforestation and reforestation • Use sustainably sourced forest products WASTE • Recuperation of methane from landfills • Energy recuperation and recycling
Extent to which interventions are new / additional	Many programs in the NAPCC underway for some time. Not always clear how the plan will build on or expand upon these existing programs. Proposes to revisit many difficult or stalled policy and regulatory reform processes. Proposed programs to significantly expand solar power and Concentrating Solar Thermal Power are new. Overall, sets few new targets or goals to impact emissions.	Lists "Actions in Implementation Phase" and "Actions in Conception Phase." Numbers of actions in each category are comparable; further analysis would be required to determine the additionality of the actions' impacts on GHG emissions.

CHINA	MEXICO	SOUTH AFRICA
ENERGY GENERATION/USE • Optimize energy mix; reduce energy consumption per unit GDP by 20% • Strengthen energy laws and regulations to support mitigation • Accelerate institutional reform • Foster market for renewables: wind, solar, geothermal and tidal • Develop hydropower resources • Actively promote nuclear power • Ultra-supercritical coal, methane bed, and mine methane technology • Promote bioenergy including garbage burning plants and biofuels • R&D for efficient coal mining, oil & gas exploration/use technologies • Improve efficiency standards; raise sectoral efficiency standards • Improve efficiency programs and monitor implementation • New financing mechanisms and tax policies to promote energy savings • Most efficient technologies for iron & steel, cement, oil & petrochemical, agricultural machinery industries	ENERGY GENERATION/USE • Improve energy efficiency; reduce GHG emissions from oil & gas • Evaluate use of ESCOs to enhance efficiency; develop framework for sourcing co-gen energy • Develop National Renewable Energy Program and financing to enhance renewable energy production and use • Include climate change in evaluating projects in the Electric Sector Investment Program (POISE) • Identify and reduce SF6 leakage • Nuclear generation options • Enforce efficiency goals for national electricity utility • Assess efficiency in building standards • Promote efficiency through standards, incentives, certification INDUSTRY • Enhance GHG accounting and reporting; create registry and verification system; conduct benchmarking • Advance voluntary and mandatory regulation of equipment, energy generation systems, consumption AGRICULTURE AND FORESTRY • Promote afforestation, reforestation, and conservation tillage • Improve fertilizer and manure management • Promote sequestration through payment for environmental services • Develop and test a REDD mechanism with international financial support WASTE • Integrated waste management • Promote waste-to-energy projects	ENERGY GENERATION/USE • Accelerated energy efficiency and conservation across all sectors, including industry, commerce, transport and residential (including stringent building standards) • Ambitious and mandatory targets for energy efficiency • Response to the electricity crisis should be reviewed and amended to ensure alignment with the LTMS • Explore options for a price on carbon through escalating CO2 tax, or an alternative market mechanism • Diversify energy mix away from coal while promoting cleaner coal (e.g. stringent thermal efficiency and emissions standards) • Incentivize renewable energy with feed-in tariffs • Set targets for renewable energy • Set targets for nuclear energy • Explore CCS and Coal to Liquids (eventually, coal plants without CCS may not be allowed) • Industrial policy to favor less energy use per unit economic output • Build domestic industries in clean sectors TRANSPORT • Targets to reduce transport emissions (voluntary and mandatory if needed, including through stringent and escalating fuel efficiency standards) • Promote public transport, hybrids and electric vehicles
Varies from sector to sector. Much of the plan builds on ongoing programs. Emphasis on building research and development / technical capacity within the country. Identifies potential emission reductions of some interventions. Strong new emphasis on institutional reform, and coordination across agencies in implementing the plan.	Varies from sector to sector. Plan includes existing efforts, and in some cases proposes new activities to enhance them (Mexico GHG Program, energy efficiency standards, Fund for Electric Energy Savings). It is not clear in all cases whether proposed activities are new or already underway, or how some proposed activities would alter emissions trajectories.	Plan explicitly identifies actions that would be new / scaled up as part of a response to climate change. Actions identified in the "start now" scenarios reflect ongoing priorities and programs; the plan next identifies measures to scale up these initiatives and explores how market and other instruments might allow South Africa to take higher-cost steps.