

AN ANALYSIS OF NON-ANNEX I PARTIES NAMAs: *Challenges for Designing International Support and Implementing an Effective MRV Framework*

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Abstract:

This paper analyses the Nationally Appropriate Mitigation Actions (NAMAs) that non-Annex I Parties pledged to the UNFCCC in compliance with Appendix II provisions of the Copenhagen Accord. The purpose of the analysis is to suggest an effective framework for delivering international financial, technology, and capacity building support as well as a measuring, reporting, and verifying (MRV) GHG emission reductions. The paper shows NAMAs can be divided into four groups: 1) enabling conditions; 2) projects, programs and sectoral measures; 3) carbon neutrality; and 4) national GHG emission reduction targets. The diversity in NAMAs reflects the diverse mitigation needs of non-Annex I Parties and thus calls for a “layering” approach to international support and MRV for NAMAs. This paper further identifies remaining designing issues for an MRV framework by exploring what needs to be incorporated in guidelines for MRV and International Consultations and Analysis (ICA) to be adopted by COP.

Key Word: Nationally Appropriate Mitigation Actions (NAMAs), Measurable, Reportable, Verifiable (MRV), International Consultations and Analysis (ICA), the Copenhagen Accord, the Bali Action Plan (BAP)

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The views expressed in this working paper are those of the authors and do not necessarily represent those of IGES. Working papers describe research in progress by the authors and are published to elicit comments and to further debate.

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1. Introduction

Achieving the ultimate objective of the United Nations Framework Convention on Climate Change (UNFCCC) requires mitigation actions from both Annex I and non-Annex I Parties. While Article 4 of the UNFCCC obliges Annex I Parties to take the mitigation lead, it also suggests non-Annex I Parties have a common but differentiated responsibility (CBDR) for tackling climate change. The CBDR principle is also implied in paragraphs 5 and 8 in the Copenhagen Accord that calls on both Annex I Parties to submit quantified economy-wide emission targets and non-Annex I Parties to submit mitigation actions to the UNFCCC by January 31st 2010. As of August 2010, 40 non-Annex I Parties had submitted mitigation actions to Appendix II of the Copenhagen Accord (UNFCCC 2010). This paper analyses those NAMAs to suggest an effective framework for international support as well as measurement, reporting, and verification (MRV).

The paper is divided into four sections. The second section reviews literatures on NAMAs and MRV. The third section categorises NAMAs submitted by the non-Annex I Parties to the Appendix II of the Copenhagen Accord by their contents, scopes and design features. Based upon the categorisation, international support and MRV framework for NAMAs are analysed in the fourth section. The paper further explores and remaining design issues for a MRV framework.

2. Previous Studies

The terms Nationally Appropriate Mitigation Actions (NAMAs) and measurable, reportable and verifiable (MRV) originated with the adoption of the Bali Action Plan at the 13th Conference of the Parties (COP13) to the UNFCCC in 2007. Since COP13, both climate change negotiators and researchers have become increasingly interested in reconciling varying interpretations of these terms. The growing body of literature on NAMAs and MRV attempts to define these still abstract concepts, and can be divided into four groups: 1) overarching analysis, 2)

reinforcement of existing MRV-related instruments, 3) in-country analysis, and 4) analysis of MRV for support.

Studies belonging to the overarching analysis category look at the overall design of NAMA and MRV frameworks, including the scope of NAMAs, support for NAMAs, and low carbon development strategies (Breidenich and Bodansky 2009; D CCAP 2009a; CCAP 2009b; Ellis and Moarif 2009; Ellis, Moarif, and Briner 2010). Those classified under the reinforcement of existing MRV instruments category consider how to utilise existing GHG inventories and national communications to build an MRV framework (Fransen et al. 2009; South Centre 2008). Studies concerned with in-country analysis concentrate on how countries such as China could use their own policies and institutional arrangements to build NAMAs and MRV (Mintzer et al. 2010; Teng et al. 2009). Studies on an MRV framework for international support look at the challenges associated with tracking, monitoring and reporting various financial flows (World Bank 2009; Corfee-Morlot et al. 2009; Moncel et al. 2009; Tirpak et al. 2010) and the creation of a registry that would match NAMAs of non-Annex I Parties with support (OECD 2009; McMahan and Moncel 2009; Muller and Gomez-Echeverri 2009).

While these studies have outlined possible architectures for NAMAs and MRV, their recommendations remain conceptual in nature. This is paralleled by developments in international climate negotiations that have revolved around adding meaning to acronyms. Yet if NAMAs and MRV are to be operationalised in the two years before the expiry of the first commitment period of Kyoto Protocol, there is an urgent need to ground both the academic literature and negotiations in greater detail. Fortunately, a significant number of countries have pledged NAMAs to the UNFCCC in compliance with the Copenhagen Accord. Looking at the content of these pledges and exploring the possible framework for international support and MRV can begin to insert substance into text.

Table 1. The Copenhagen Accord: Current Status of Association and Submission of the Nationally Appropriate Mitigation Actions for Appendixes (as of August 2010)

	Parties Associating with the Accord	Parties submitting NAMACs/NAMAs to the Appendixes
【Annex I】 16 Countries / Regions	Australia, Belarus, Canada, Croatia, EU, Iceland, Japan, Kazakhstan, Lichtenstein, Monaco, New Zealand, Norway, Russia, Switzerland, Ukraine, US	【Annex I: Mitigation Actions and Commitments】 16 Countries/Regions Australia, Belarus, Canada, Croatia, EU, Iceland, Japan, Kazakhstan, Lichtenstein, Monaco, New Zealand, Norway, Russia, Switzerland, Ukraine, US
【non-Annex I Parties】 100 Countries	【Asia and the Pacific】 Afghanistan, Bangladesh, Bhutan, Brunei, Cambodia, China, Cook Islands, Fiji, India, Indonesia, Jordan, Kuwait, Laos, Lebanon, Maldives, Marshall Islands, Mongolia, Nauru, Nepal, Palau, Papua New Guinea, South Korea, Samoa, Singapore, Timor Leste, Tonga, UAE, Vietnam	【Appendix II: NAMAs】 40 Countries Afghanistan, Bhutan, China, India, Indonesia, Jordan, Maldives, Marshall Islands, Papua New Guinea, South Korea, Singapore
	【Africa】 Algeria, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Republic of Congo, Cote d'Ivoire, Democratic Republic of Congo, Djibouti, Ethiopia, Eritrea, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Guyana, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritius, Morocco, Mozambique, Namibia, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Swaziland, Togo, Tunisia, Uganda, Tanzania, Zambia	Benin, Botswana, Cameroon, Central African Republic, Republic of Congo, Cote d'Ivoire, Ethiopia, Eritrea, Gabon, Ghana, Madagascar, Mauritania, Morocco, Sierra Leone, South Africa, Togo, Tunisia
	【Latin America and Caribbean】 Antigua Barbuda, Argentina, Bahamas, Barbados, Belize, Brazil, Chile, Columbia, Costa Rica, Ecuador, Guatemala, Jamaica, Mexico, Panama, Peru, St. Lucia, Trinidad Tobago, Uruguay	Antigua Barbuda, Brazil, Costa Rica, Peru
	【East Europe】 Albania, Armenia, Bosnia Herzegovina, Georgia, Montenegro, Moldova, Serbia, Macedonia	Armenia, Georgia, Moldova, Macedonia
	【West Europe and Others】 San Marino	San Marino
【Others】 Israel, Kiribati	Israel	

*EU includes following countries: Belgium, Bulgaria, Czech Republic, Denmark, Germany, Estonia, Ireland, Greece, Spain, France, Italy, Cyprus, Latvia, Lithuania, Luxemburg, Hungary, Malta, Netherlands, Austria, Poland, Portugal, Rumania, Slovenia, Slovakia, Finland, Sweden, England

3. Categorization of NAMAs

To analyse the scope, contents and design features of the 40 non-Annex I Parties mitigation actions, the paper reviewed NAMAs submitted to Appendix II of the Copenhagen Accord. The review reveals NAMAs can be categorised into four different groups in terms

of content and stringency criteria: 1) enabling conditions; 2) project-based and sectoral program-based measures; 3) carbon neutrality; and 4) numerical emission reduction targets. Table 2 categorises NAMAs according to these groupings.

Table 2. Categorization of NAMAs by Non-Annex I Parties based on Appendix II of Copenhagen Accord (40 Countries)

Category 1	Category 2	Category 3	Category 4		
Enabling Conditions ³	Projects, Programs and Sectoral Measures	Carbon Neutrality ⁴	Emission Reduction Targets		
Afghanistan Botswana Georgia	Armenia Benin Central African Republic Republic of Congo Cote d'Ivoire Ethiopia Eritrea Gabon Ghana Cameroon Jordan Madagascar Mauritania Mongolia Peru San Marino Sierra Leone Macedonia Togo Tunisia	Bhutan Costa Rica Maldives	Intensity target (GDP)	Absolute target	
				Base Year	BAU
			China India	Antigua Barbuda (1990) Marshall Islands (2009) Moldova (1990)	Brazil Indonesia Israel Mexico Papua New Guinea Republic of Korea Singapore South Africa

³ Category I includes such mitigation related actions as preparation of Initial National Communications (INC), GHG Inventories, identification of BAU emission path, and identification of NAMAs itself, among others.

⁴ Carbon neutrality refers to achieving zero net GHG emissions by balancing total anthropogenic GHG emissions and total amount of carbon sequestrations, emission reductions, and offsets.

Some examples can help illustrate the cross-national variation in interpretations of NAMAs.

- **Category 1 (Enabling Conditions):** The non-Annex I Parties in Category 1, such as Afghanistan and Georgia, envisage the establishment of necessary conditions to formulate and implement mitigation actions as well as measures to fulfill the mandate assigned to Parties in the current climate regime as their NAMAs. The former includes the identification of NAMAs and emissions baselines (identification of BAU emission path), whereas the latter includes enabling measures such as the completion of Initial National Communications (INC) and GHG Inventories.
- **Category 2 (Projects, Programs and Sectoral Measures):** Approximately half of the non-Annex I Parties submitting NAMAs to the Appendix II can be placed into this category. The defining feature of the group is that most of the countries have submitted lists of individual mitigation projects and programs as NAMAs. The target sectors for NAMAs include energy, waste, agriculture, and forestry. The detail and scope of project and program lists vary from one country to the next, with the primary difference being some countries provide more concrete descriptions of NAMAs than others. For instance, Morocco proposes estimating mitigation potentials for each project and program, while Ethiopia provides estimates of installed capacities (MW) of renewable energy-based projects. Information and estimation of mitigation potential for NAMAs in this category will be critical to the MRV of mitigation impacts and support.
- **Category 3 (Carbon Neutrality Target):** This category includes countries such as Bhutan and Costa Rica. As a relatively small group of non-Annex I Parties, countries belonging to this

category envisage more economy-wide mitigation targets as their NAMAs. This is likely because sector-wise mitigation measures may not be suitable due to the size of economy (i.e. Bhutan and Maldives). It might also be due to the fact that these countries are strong advocates of environmental conservations (i.e. Costa Rica).

- **Category 4 (Emission Reduction Targets):** The 13 non-Annex I Parties in Category 4, including China and India, envisage national level GHG emission reduction targets by 2020 as their NAMAs. The countries in this Category can be subdivided into countries pledging intensity targets and others envisaging absolute targets, where the latter group could be further subdivided into those using either a base year or a BAU baseline. While more work will be needed to assess the ambition level of numerical targets against their overall mitigation impacts, pursuing voluntary emission reduction targets as their NAMAs reflects their willingness to contribute to mitigation.

It is also worth noting that, as Table 3 illustrates, most of the non-Annex I Parties listed in the Category 4 have already formulated (or are in the process of formulating) national development plans or national climate change strategies. Though further research is necessary to examine their actual implementation and effectiveness, it can be inferred from the formulation of these plans that these non-Annex I Parties recognise the importance of mainstreaming climate change concerns into development plans. In fact, some countries, including Indonesia and China, have developed detailed plans for achieving their targets, including listing mitigation activities as NAMAs and estimation of mitigation potentials. Other non-Annex I Parties seem poised to follow the mainstreaming trend, potentially increasing the number of mitigation actions.

Table 3. Selected Examples and Current Status of Mainstreaming Climate Change into National Development Plans/Strategies among non-Annex I Parties

Country	Name of National Development Plan	Year of Formulation
China	11 th 5-year Plan (2006-2010) National Climate Change Program	March 2006 June 2007
India	National Action Plan on Climate Change (NAPCC)	June 2008
Brazil	National Plan on Climate Change (PNMC)	December 2008
Indonesia	National Action Plan Addressing Climate Change Climate Change in Indonesia National Development Planning Mid-term Development Plan (RPJM 2010-2014)	December 2007 July 2008 May 2010
Israel	National Action Plan on Climate Change	In process (inter-ministerial Steering Committee established(May 2009))
Mexico	National Strategy of Climate Change (ENACC) Special Program on Climate Change (PECC) as part of the National Development Plan (PND, 2007-2012)	May 2007 July 2008 (initial draft), March 2009
Papua New Guinea	Preliminary Climate Compatible Development Plan	December 2009
South Korea	4th Comprehensive National Action Plan for Climate Change (2008-2012) 5-Year National Action Plan for Green Growth Basic Law on Low Carbon and Green Growth	2008 July 2009 January 2010
Singapore	Sustainable Singapore Blueprint	April 2009 (Implementation)
South Africa	Long Term Mitigation Scenarios (LTMS)	October 2007
Marshall Islands	National Energy Policy and Energy Action Plan	October 2009

Source : Compilation of Fransen et al. 2009, Murphy et al. 2009 and UNFCCC documents

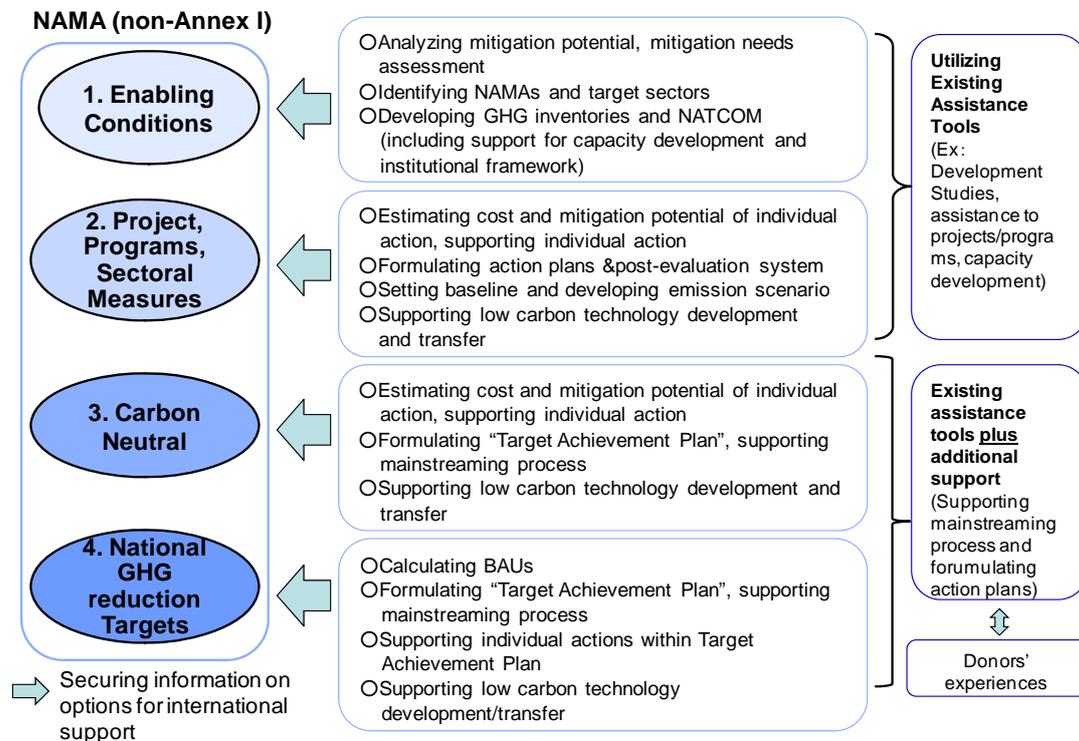
4. Implications of Cross-National Variations of NAMAs

The cross-national variation identified through the categorisation of Appendix II of the Copenhagen Accord suggest diverse mitigation needs of non-Annex I Parties, including those that contribute directly and indirectly to GHG emission reduction. In order to meet these diverse needs, the paper proposes a layered framework for international support as well as MRV of such mitigation actions. This section explores and analyses how layered framework can fit into the context of international support and MRV for different categories of NAMAs.

4-1. Support for NAMAs: How to meet the diverse needs?

The provision of international support is crucial to the effective implementation of NAMAs envisaged by non-Annex I Parties. Figure 1 provides examples of how a layered framework could match support with different categories of NAMAs (While taking into account cross-national variation in NAMAs, stage of economic development, and other national circumstances).

Figure 1. Examples of International Support for Different Categories of NAMAs



It is possible to imagine various channels to allocate support and strengthen the implementation of NAMAs, including bilateral and multilateral channels. In this regard, conventional ODA tools such as development surveys, project assistance (including feasibility studies) and capacity development activities can support the implementation of the Category 1 and 2 NAMAs. For those non-Annex I Parties in Category 2 providing only descriptions of measures to be taken as NAMAs, additional assistance for estimating GHG mitigation potential for each measure might be required.

In contrast, support for NAMAs at the national level in the Category 3 and 4 NAMAs will be better framed through both assisting overall design, mainstreaming climate change into national development plans as well as the effective implementation of plans. While the provision of support for NAMAs at the national level is a relatively new area for international assistance,

increased flexibility and expertise from the donor community is anticipated as ODA and other forms of development are reformed programmatic (World Bank 2009). Moreover, experiences and expertise with the Plan-Do-Check-Act (PDCA) cycle could become basis for international support for designing and implementing NAMAs and facilitating linkages between economy-wide mitigation policies and targets.

In the meantime, from the perspective of non-Annex I Parties, information on the types of options for support of NAMAs should be made available, including opportunities for finance and low carbon technology development and transfer. In this regard, a registry mechanism currently proposed at negotiation could facilitate the recording of NAMAs and the matching of support.

Another area that requires further consideration in designing support for NAMAs is the frequency of updating and renewing. For instance, the duration of

Category 1 NAMAs might be a couple of years, indicating frequent renewal of NAMAs. Likewise, the duration of project-based NAMAs in Category 2 also require similar frequency of renewals. In contrast, non-Annex I Parties proposing NAMAs with wider coverage, including program-based or national GHG emission reduction targets NAMAs, will need to renew and update their pledges less frequently. In this regard, while Appendix II of the Copenhagen Accord provides general overview and trend of NAMAs, international support should also aim to build on existing NAMAs envisaged within the Appendix II and expand their scopes by assisting further assessment of mitigation opportunities and development of new NAMAs for each non-Annex I Parties in line with their national contexts. This may be particularly applicable to those non-Annex I Parties falling into Category 1 and 2 where mitigation actions are currently limited to the preparation stage or project, program and sectoral levels.

Additionally, while beyond the scope of mitigation, closer analysis of each country's submission for Appendix II of the Copenhagen Accord reveals adaptation measures from some non-Annex I Parties. While no consensus is so far observed as to how to achieve a balanced allocation of resources between mitigation and adaptation, provision of international support.

In sum, international support for NAMAs should be provided through a step-wise framework that tailors support to differences between NAMAs. At the same time, it is desirable that different sets of support be adjusted to varying rates of economic development and levels of GHG emissions. For instance, the existing support framework could be used for countries with a moderate speed of economic growth, while more stringent target setting for those growing more quickly. In addition to the provision of international support for NAMAs, developing partnerships between non-Annex I Parties such as regional south-south cooperation framework that facilitates the exchange of human resources and sharing of best practices (such as in the field of National Communications and GHG inventories

preparation) could complement international support by Annex I Parties and enhance the overall effectiveness of NAMAs (Fukuda 2009).

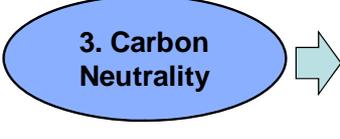
4-2. Measurement, Reporting and Verification (MRV) of NAMAs: How to meet the diverse needs?

The introduction and implementation of MRV for quantified economy-wide emission targets and mitigation actions of the Parties, including non-Annex I Parties NAMAs, is one of the more contentious issues in climate change negotiations. The core of MRV lies in its anticipated function as an instrument to ensure the effectiveness, transparency and equity of mitigation actions, as well as to assess the status of global emission reductions.

The Copenhagen Accord stipulates that among the NAMAs implemented by non-Annex I Parties, internationally supported NAMAs will be subject to international MRV, whereas domestically funded NAMAs will be subject to domestic MRV along with International Consultation and Analysis (ICA). At the same time, the Copenhagen Accord also reinforces the existing reporting system, including GHG inventories and National Communications (UFCCC 2010). While the concept of MRV on NAMAs of non-Annex I Parties could narrow the gap between the reporting systems under the current climate regime and a new system (Ellis et al. 2010), the Copenhagen Accord does not contain detailed description of these linkages.

As previously mentioned, the categorisation of NAMAs reflects diverse mitigation needs for non-Annex I Parties. This cross-national variation should also be taken into consideration in designing and operationalising MRV framework, as applying one-size-fits-all type of MRV is impractical to cope with the diversity observed. The paper hence proposes to extend layered approach to MRV provisions, and Figure 2 provides examples of potential contents of MRV for each category of NAMAs.

Figure 2. Examples of Layered MRV for Different Categories of NAMAs

	What to Measure & Report	What to Verify
 <p>1. Enabling Conditions</p>	<ul style="list-style-type: none"> ➤ Progress of INC and GHG inventories ➤ Identification of NAMAs ➤ Other relevant measures 	<ul style="list-style-type: none"> ➤ Progress of INC and GHG inventories ➤ Identification of NAMAs ➤ Other relevant measures
 <p>2. Projects, Programs, Sectoral Measures</p>	<ul style="list-style-type: none"> ➤ Quantitative: estimated reduced/avoided emissions (t-CO₂ eq) ➤ Qualitative: progress of qualitative actions 	<ul style="list-style-type: none"> ➤ Measurement and Reporting process ➤ Estimated reduced/avoided emissions (t-CO₂ eq)
 <p>3. Carbon Neutrality</p>	<ul style="list-style-type: none"> ➤ Total amount of national emissions ➤ Total amount of sinks 	<ul style="list-style-type: none"> ➤ Measurement and Reporting process ➤ Total amount of national emissions and sink
 <p>4. GHG Emission Reduction Target</p>	<ul style="list-style-type: none"> ➤ Absolute target: Total national emissions, deviation from BAU ➤ Intensity target: Carbon emission per GDP 	<ul style="list-style-type: none"> ➤ Measurement and Reporting process ➤ Estimated value

For Category 1 and some Category 2 NAMAs, actions enhancing NAMA readiness could be subject to MRV. In contrast, for those Category 2 NAMAs that are quantifiable, MRVing total amount of reduced or avoided GHG emissions generated from particular mitigation action could be MRVed. Calibration of such GHG emissions, however, should be based on standardised methodology agreed to by all Parties, including guidelines to be adopted by COP, existing IPCC methodologies, and CDM methodologies⁵.

Category 3 NAMAs on carbon neutrality requires slightly different set of information for MRV. What needs to be MRVed is the total amount of GHG emissions at national level and total amount of sinks so as to demonstrate whether equilibrium has been achieved.

As for Category 4, different contents of information

could be subject to MRV depending on target setting; for those non-Annex I Parties putting forward an absolute target, the total amount of GHG emission reduction would be MRVed, whereas those non-Annex I Parties putting forward an intensity target (i.e. carbon emission per GDP), information on estimated value of such intensity-based emission could be subject to MRV. With regard to the carbon emission per GDP, further analysis is necessary with respect to the technical feasibility and acceptability of MRV. In order to ensure comparability and accuracy of the data provided, standardised methodology or minimum requirements for baselines should be identified in guidelines.

In sum, a step-wise, layered framework for MRV should be applied to meet diverse scope of mitigation actions of non-Annex I Parties. Guidelines defining standardised methodology or minimum requirements for each category of NAMAs would be useful to guide non-Annex I Parties to submit comparable, streamlined information to be MRVed.

⁵ In the latter case, a question remains on whether the current level of stringency required under the CDM methodology (i.e. additionality test) should be transferred and applied to MRV for NAMAs.

5. Remaining Issues over MRV of NAMAs

While exploring potential international support and MRV framework by each category of NAMAs based on Appendix II of the Copenhagen Accord is a practical approach to operationalise these concepts, some designing issues remain unsolved. This section explores and identifies remaining design issues both from the perspectives of overall framework as well as individual component of Measurement(M), Reporting(R) and Verification(V). In particular, breaking up MRV into individual component helps Parties understand the current developmental status on each component, and identify what needs to be improved to make the system robust and transparent.

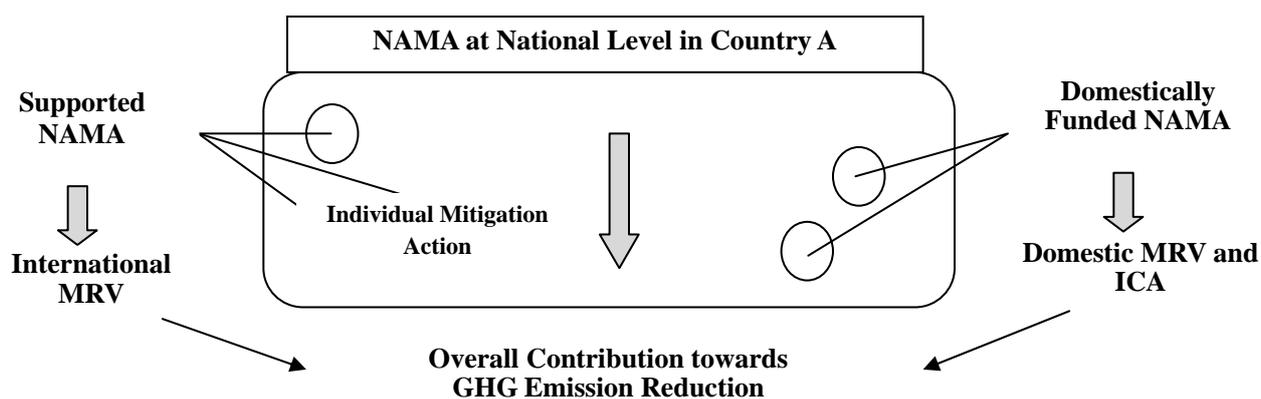
5-1. Overall framework of MRV

There is still considerable uncertainty over MRVing NAMAs at the national level. With economic development and increased capacity to design and implement mitigation actions, non-Annex I Parties tend to propose NAMAs with wider coverage such

as national emission reduction targets. Yet it is important to note that national level NAMAs are comprised of many different individual mitigation actions that in turn could contain both domestically funded as well as internationally funded NAMAs. The multiple levels of NAMAs could make the MRV process more complicated (Figure 3). In fact, some of non-Annex I Parties submitting national emission reduction targets as NAMAs requested international support for some policies and measures, raising the risks of double-counting emission reductions.

Another risk is that different funding sources use different MRV processes for similar NAMAs. There are diverse views on this issue. One side of the argument emphasises the needs for a clear distinction of NAMAs into domestically funded components and internationally funded components, while the other suggests that only leaving the treatment of NAMAs up to the discretion of non-Annex I Parties' because of the difficulties of dividing them up into components. (MOEJ 2010)

Figure 3. Complexity over MRVing NAMAs at National Level



At the same time, the cross-cutting nature of NAMAs at the national level raises another challenge; designing and implementation of NAMAs at the national-level requires inter-ministerial coordination that can be a bottleneck for some non-Annex I Parties. For non-Annex I Parties undergoing decentralisation, coordination between central and local governments poses a related barrier (MOEJ 2010).

Yet another challenge relating to the overall design of MRV framework is how to balance the level of stringency of MRV while ensuring national sovereignty for non-Annex I Parties. Some non-Annex I Parties might be reluctant to disclose information on GHG emissions. In this regard, it should be noted that imposition of stringent MRV and transparency requirements might lead

non-Annex I Parties to turn down international support. This would in turn undermine the effectiveness of NAMAs. In the meantime, given the preservation of national sovereignty is critical to any international treaty, it is essential that Parties reach an agreement that balances the level of MRV stringency with concerns over national sovereignty in a manner that offers sufficient incentives for implementing non-Annex I Party NAMAs.

5-2. Measurement (M)

Aside from the issues surrounding the overall framework, individual component of MRV also contains various design issues. From a measurement (M) perspective, the treatment of qualitative NAMAs and preconditions of NAMAs at the national level pose several challenges. Some of the NAMAs under the Appendix II of the Copenhagen Accord include qualitative elements such as a development strategy (i.e. low carbon growth plan), basic research (i.e. scientific, technological, technical, socio-economic and other research related to the climate system) and capacity development (i.e. education, training, and public awareness). While qualitative NAMAs create enabling conditions and strengthen national capacity for mitigation, no clear guidance is available on how their mitigation impacts can be measured and verified, what indicators should be used for the MRV process, and how qualitative NAMAs and quantitative NAMAs can be differentiated. These issues will require further discussion and negotiation.

Similarly, for those non-Annex I Parties submitting national GHG emission reduction targets as NAMAs, while adoption of common base year and standardisation of methodology runs into technical difficulties, adding transparency to the process of calculating BAU, including disclosure of methodologies and dataset used for such calculation, will clarify the rationale behind the calculation and hence build trust among Parties. However, to what extent information should be disclosed will require further discussion.

5-3. Reporting (R)

The form used for reporting, the use and reinforcement of existing reporting tools, as well as standards for reporting international support also merit greater consideration. As for the form of reporting, given different types of information required to assess the status and progress of different categories and types of NAMAs, developing a standard reporting format for non-Annex I Parties may be difficult. In this regard, Ellis, Moarif, and Briner (2010) propose a tiered approach that allows flexibility in the form of reporting NAMAs through National Communications. The contents of what is to be reported can vary with the type of country, mitigation pledge, and/or frequency of changes in particular parameters. How and what is to be reported for diverse NAMAs links into discussions of how to build upon and reinforce existing tools such as National Communications and GHG inventories, an issue that lies outside the scope of this paper. It is also crucial that reporting standards and rules be tailored to different types of international support, financial assistance, technology development and transfer, and capacity development.

5-4. Verification (V)

In terms of verification (V), the first and foremost concern is that while the current negotiation text stipulates the internationally supported mitigation actions and support will be subject to international verification whereas domestically funded mitigation actions will be subject to domestic verification followed by International Consultations and Analysis (ICA), no international consensus emerged on the interpretation and function of verification.

As far as domestic verification and ICA for self-funded NAMAs is concerned, interviews with experts in China and India suggest a view that domestic verification stands for a technical process to provide rationale (including data) and underlying assumptions for what has been reported upon request, whereas ICA is a process to ensure transparency of

domestic MRV, and that ICA should not include judgmental assessment of the actions reported. The topic on the form of ICA, whether the process should be experts-oriented or peers-oriented, should be left to further discussion. There is, however, a rising concern that inclusion of judgmental assessment in domestic verification and associated ICA processes would translate voluntary targets or actions into legally binding nature, which is not acceptable to non-Annex I Parties⁶.

Besides, the overall design issue for institutional arrangements for verification, the level of stringency as well as the degree of information disclosure needs to be addressed. As for the institutional arrangements for verification, in designing domestic verification process for domestically funded NAMAs, domestic institutional and technical capacity gaps within non-Annex I Parties remain a challenge. As far as national capacity to cross-check what has been reported domestically is concerned, while some non-Annex I Parties such as China already have established a system to cross-check their records for inconsistencies or errors through by sending out experts to data suppliers and carrying out rounds of revisions by the National Bureau of Statistics (Mintzer et al, 2010), multiple national organizations are required for cross-checking at national level. Establishment of such domestic organizations for cross-check also remains a challenge. Similar concerns exist over how to reflect different levels of preparedness and other national circumstances among non-Annex I Parties into verification process. In this regard, whether a common set of standards for institutional arrangement can be applied across non-Annex I Parties or should there be flexibility and differentiation in institutions used for verification remains to be a point of contention.

As for setting the level of stringency of MRV, while greater accuracy and credibility might result from a

more stringent MRV process, a potential drawback could be increased financial and capacity burden, as well as conflict with national sovereignty. For this reason, additional discussion is needed on the level of stringency to maximise accuracy and minimise transaction costs. As for information disclosure, further discussion is also needed on to what extent the information of the results of MRV should be disclosed as well as how to select information to be disclosed.

In the meantime, these design issues for verification should also be discussed in the context of mitigation actions and commitments of the Annex I Parties, as the verification framework currently has not been fully developed for Annex I Parties.

Likewise, for the international MRV for supported NAMAs, agreement is needed on a detailed verification framework and the place of such verification; whether international verification should be conducted where all Parties are involved such as the Scientific Board on Implementation (SBI) or among selected members such as an MRV committee. For the latter option, further discussion is required over the selection process and eligibility criteria for committee members.

In sum, while MRVing NAMAs is anticipated to ensure transparency, effectiveness, comparability and equity of NAMAs, there are still numerous design and implementation challenges. In order for an MRV framework to reflect the diversity of NAMAs envisaged by the non-Annex I Parties, constructing a layered framework differentiating MRV requirements for different types of NAMAs is suggested. Such differentiation can potentially take several forms including differentiations by types or even sectors for NAMAs. Table 4 presents an example of differentiation by type of NAMAs.

⁶ Based on the in-country interviews with experts in China (11-15 September 2010, Beijing) and in India (25-28 October 2010, New Delhi). From the perspective of some non-Annex I Parties (including those who have not associated with the Copenhagen Accord), ICA is an additional effort to the mandate of the BAP, which requires additional support for implementation.

Table 4. Example of Differentiation of MRV by Categories of NAMAs

Category of NAMAs	Measurement (M)	Reporting(R)	Verification(V)
Enabling Conditions	What to Measure: Qualitative: <ul style="list-style-type: none"> ➤ Progress of INC and GHG inventories ➤ Identification of NAMAs ➤ Other relevant measures 	What to Report: Qualitative: <ul style="list-style-type: none"> ➤ Progress of INC, GHG inventories ➤ Status of needs assessment/identification of NAMAs ➤ Other relevant measures to establish enabling environment 	What to Verify: <ul style="list-style-type: none"> ➤ Progress of INC, GHG inventories ➤ Status of needs assessment/identification of NAMAs ➤ Other relevant measures to establish enabling environment
	Potential elements to be covered in the Guideline: <ul style="list-style-type: none"> ➤ Guidance for measuring qualitative NAMAs (i.e. research, strategy formulation, capacity development) 	Potential elements to be covered in the Guideline: <ul style="list-style-type: none"> ➤ Frequency of reporting ➤ Reporting format ➤ Guidance to link with reporting tools (biennial report, NATCOM) 	Potential elements to be covered in the Guideline: <ul style="list-style-type: none"> ➤ Indicators for verifying (& evaluating) qualitative NAMAs ➤ Institutional arrangement for verification
Project, Programs, Sectoral Measures	What to Measure: <ul style="list-style-type: none"> ➤ Quantitative: estimated reduced/avoided emissions (t-CO₂ eq) ➤ Qualitative: progress of qualitative actions 	What to Report: <ul style="list-style-type: none"> ➤ Quantitative: estimated reduced/avoided emissions (t-CO₂ eq) ➤ Qualitative: progress of qualitative actions 	What to Verify: <ul style="list-style-type: none"> ➤ Measurement and Reporting process ➤ Estimated reduced/avoided emissions (t-CO₂ eq)
	Potential elements to be covered in the Guideline: <ul style="list-style-type: none"> ➤ Indicators for measurement by sectors and types of projects ➤ Methodology for estimating reduced/avoided emissions 	Potential elements to be covered in the Guideline: <ul style="list-style-type: none"> ➤ Frequency of reporting ➤ Reporting format ➤ Guidance to link with reporting tools (biennial report, NATCOM) 	Potential elements to be covered in the Guideline: <ul style="list-style-type: none"> ➤ Indicators for verification by sectors and types of projects ➤ Indicators/steps for verifying baseline setting and methodology used
Carbon Neutral	What to Measure: <ul style="list-style-type: none"> ➤ Total national emissions ➤ Total amount of sinks 	What to Report: <ul style="list-style-type: none"> ➤ Total amount of national emissions ➤ Total amount of sinks 	What to Verify: <ul style="list-style-type: none"> ➤ Measurement and Reporting process ➤ Total amount of national emissions and sinks
	Potential elements to be covered in the Guideline: <ul style="list-style-type: none"> ➤ Replaced by GHG inventory guideline (including sink part (LULUCF)) 	Potential elements to be covered in the Guideline: <ul style="list-style-type: none"> ➤ Frequency of reporting ➤ Reporting format (follow GHG inventory guideline) ➤ Guidance to link with reporting tools (biennial report, NATCOM) 	Potential elements to be covered in the Guideline: <ul style="list-style-type: none"> ➤ Indicators for verifying Measurement and Reporting ➤ Indicators for verifying emissions and sinks ➤ Institutional arrangement for verification

Table 4. (continued)

Category of NAMAs	Measurement (M)	Reporting(R)	Verification(V)
National GHG Reduction Targets	What to Measure: <ul style="list-style-type: none"> ➤ (1) Total national emissions (absolute target) ➤ (2) Deviation from BAU (absolute target) ➤ (3) Carbon emission per GDP (intensity target) 	What to Report: <ul style="list-style-type: none"> ➤ (1) Total national emissions (absolute target) ➤ (2) Deviation from BAU (absolute target) ➤ (3) Carbon emission per GDP (intensity target) 	What to Verify: <ul style="list-style-type: none"> ➤ Measurement and Reporting process ➤ Estimated value for (1), (2) and (3)
	Potential elements to be covered in the Guideline: <ul style="list-style-type: none"> ➤ (1) replaced by GHG inventory guideline ➤ (2) GHG inventory guideline plus methodologies for setting BAU ➤ (3) GHG inventory guideline + guidance for estimation of national GDP 	Potential elements to be covered in the Guideline: <ul style="list-style-type: none"> ➤ Frequency of reporting ➤ Reporting format (follow GHG inventory guideline) ➤ Guidance to link with reporting tools (biennial report, NATCOM) 	Potential elements to be covered in the Guideline: <ul style="list-style-type: none"> ➤ Indicators for verifying Measurement and Reporting ➤ Indicators for verifying estimated value for (1), (2) and (3) ➤ Institutional arrangement for verification

5. Conclusion

This paper analysed NAMAs submitted by the non-Annex I Parties in compliance with Appendix II of the Copenhagen Accord, and proposed an effective framework for delivering both international financial, technology, and capacity building support as well as for MRVing GHG emission reductions. The paper further identified remaining challenges for designing and implementing an effective MRV framework. The analysis showed that NAMAs can be categorised into four different groups. The diversity in NAMAs reflects the diverse mitigation needs of non-Annex I Parties and thus calls for a “layering” approach for design and implementation of international support and MRV. The analysis on remaining design and implementation issues for an MRV framework also identified numerous challenges both in terms of the overall framework and individual component of MRV, ultimately incorporated in an envisaged guideline to be adopted by COP. In this regard, building flexibility into the international support and MRV framework is crucial for accommodating the diverse needs and nature of NAMAs. At the same time, all Parties should make efforts to incorporate lessons learned from MRV-related systems in existing international

organisations and treaties. Above all, Parties should make effort to commit in spirit of mutual collaboration to the process of designing and implementing NAMAs, international support and MRV framework in facilitative way, which would serve as a concrete step toward trust building among Parties.

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Appendix I Detailed Descriptions of Non-Annex I Parties' NAMAs

Category I: Enabling Conditions

Country		Target	Other Descriptions (highlights)
1	Afghanistan	1) Preparation of the Initial National Communication (INC) including specific mitigation strategies and activities appropriate for the national context 2) Completion of national GHG inventory	
2	Botswana	3) To establish the baseline through capacity building activities 4) To conduct analysis of mitigation options 5) To develop a long term mitigation and adaptation strategy (LTMAS) to assess mitigation potential Key areas of mitigation opportunities to be refined later (reference to shift to gas from coal, nuclear, renewable, biomass, CCS, mass transportation system, transport, building and low energy appliances)	1) Reference to adaptation activities (i.e. application of drought-resistant crops, application and climate change friendly technologies) 2) Utilization of registry to include energy efficiency programs, transport policies, building standards, minimum energy performance standards (MEPs) for household appliances 3) Reporting through national communications
3	Georgia	1) To establish NAMAs in the context of sustainable development, supported and enabled by technology and capacity-building, in a MRV manner 2) To achieve MRVable deviation from the baseline (below BAU levels) supported and enabled by technology and capacity-building 3) To establish the baseline or reference case against which the action shall be MRVed 4) To develop a low carbon growth plan and low carbon strategy, in particular through the use of renewable energy investments and global cooperation	1) All mitigation actions by Georgia will be voluntary and nationally appropriate actions supported and enabled by technology, financing, and capacity-building, through existing mechanisms, the Technology Mechanism and other mechanisms established by the Copenhagen Accord 2) To support the implementation of the mechanisms mentioned in the Copenhagen Accord, in particular the Technology Mechanism, Copenhagen Green Climate Fund and the High Level Panel 3) To support CDM as one of the most important means for further cooperation in the field of NAMAs

Category II: Projects, Programs, and Sectoral Measures

Country	Energy/Industry	Forestry	Transport	Waste	Agriculture	Misc/Cross-cutting	
4	Armenia	1) Implementation of "The National Program on Energy Saving and Renewable Energy of the Republic of Armenia (2007)": Increase in energy production based on renewable energy sources; modernization of thermal power plants; improvement of energy efficiency in all sectors of the economy; improvement of energy efficiency in buildings and constructions; decrease of loss in methane flow in gas transportation and gas delivery systems	Reforestation of degraded forests, afforestation and reducing the volumes of deforestation, sustaining soil CO ₂ content and ensuring its increase	Expansion of electrical transport and increase of the natural gas share in motor transport's fuel	Decrease in methane emissions from solid municipal waste and waste water		
5	Benin		Sustainable management of natural forests and development of forest plantations to increase carbon sinks	Development of public transport in Cotonou city and its agglomeration in order to reduce GHG emissions	Recovery of methane emitted from municipal wastes discharged by municipalities of particular status (Cotonou and its surroundings, Porto-Novo and Parakou)		
6	Central African Republic	[Energy] 1) Program on the creation of new urban zones, integration of principles of optimization in energy consumption and limitation in the spread of urban constructions 2) Implementation of a new	1) Increase in forest coverage from 11% (2005) to 25% (2050) in relation to the national surface area through reforestation, forest management and the FLEGT process		1) Valuation of household waste (solid and liquid) of large cities through the production of green fertilizers 2) Multiplication	1) Promotion of soil improvement techniques using nitrogen-fixing species 2) Multiplication	1) Installation of a relay station for the reception of satellite imagery 2) Creation of a national observatory on the environment

	Country	Energy/Industry	Forestry	Transport	Waste	Agriculture	Misc/Cross-cutting
6	Central African Republic (continued)	<p>Energy/Industry program on rural habitats aiming for the construction of ecological villages integrating energy efficiency and renewable energy</p> <p>3) Rehabilitation of hydroelectric dams in Bouali I, II and III</p> <p>4) Installation of micro-hydroelectric plants of 4MW and a total of 35 MW until 2030 on the various waterfalls of the country: Toutoubou, Baidou, Nakombo-Soso, Kembé and la-Mbi.</p> <p>5) Utilization of improved cooking stoves</p> <p>6) Control of conventional energy sources</p> <p>7) Development of a wind farm of 4000 MW : 1000 MW in 2012 with a strong mitigation potential</p> <p>8) Control of emissions from motor vehicles</p> <p>9) Program for the import of natural gas (Butane), targeting consumption by 80% of households</p> <p>10) National awareness-raising campaign on energy-saving and the use of energy-saving lamps</p>	<p>2) Promotion of sustainable management and certification of production forests</p> <p>3) Promotion of silviculture and enhancement of village, community and privately-owned plantations</p> <p>4) Promotion and enhancement of non-timber forest products</p> <p>5) Development of REDD activities; mitigation potential: under evaluation</p>		and energy (Biogas)	<p>of forage seeds and their promotion in the pastoral regions (Ouham, Ouham-Pendé and Nana-Mambéré)</p> <p>3) Intensification of the production of improved agricultural seeds among farmers</p>	
7	Republic of Congo	<p>[Energy]</p> <p>1) Promotion of improved cooking stoves for better combustion</p> <p>2) Control of energy efficiency</p>	<p>1) Development of REDD (Reducing Emissions from Deforestation and Forest Degradation) activities</p>	<p>1) Control of vehicle emissions</p> <p>2) Rehabilitation of transport infrastructure</p>	<p>1) Construction of managed municipal landfills</p>	<p>1) Choice of and promotion of climate resilient agricultural</p>	<p>1) Creation of a national observatory on the environment</p> <p>2) Frequent dredging of</p>

Country	Energy/Industry	Forestry	Transport	Waste	Agriculture	Misc/Cross-cutting
7 Republic of Congo (Continued)	3)Enhancement of the hydroelectric potential 4)Energy production through cogeneration in enhanced forestry concessions; rehabilitation of hydroelectric dams of Djoué and Moukoulou 5)Valuation of gas flare during petrol production stages	2)Development of silviculture in degraded forests and implementation of silvicultural activities in dense forests 3) Elaboration of a national land-use plan 4)Promotion of sustainable management and certification of production forests 5) Promotion of silviculture and enhancement of village, community and privately-owned plantations 6)Promotion and enhancement of non timber forest products 7)Reforestation of eroded zones 8)Promotion of youth employment through regeneration and sustainable management of forest ecosystems 9)Education and awareness-raising of the population and economic players in the practice of forest conservation	and electrical energy and drinking water distribution	2)Elaboration of a management plan on wastes from large urban agglomerations	activities 2)Promotion of climate resilient cultivars 3)Promotion of irrigation 4)Promotion of soil improvement techniques using nitrogen-fixing species 5)Capacity building of rural populations in improved agricultural techniques and in cultivating climate resilient products	the port in Pointe Noire and navigable waterways 3)Installation of a control station on atmospheric pollution, water and soil quality 4) Installation of a relay station for the reception of satellite imagery 5)Countermeasures against coastal erosion 6)Countermeasures against invasive aquatic plant species 7)Enhancement in the equipments of geomatic laboratories (GIS and remote sensing)
8 Cote d'Ivoire	[Energy] 1)Elaborate and carry out an action plan on the development of renewable energy such as micro-hydraulic, photovoltaic and biomass power generation for decentralized electrification	1)Rehabilitate, develop and manage forests of rural and state-owned areas in a sustainable manner 2)Elaborate and carry out a national plan against soil degradation	2)Conduct awareness-raising campaigns to encourage the transport and industrial sectors to adopt clean means of production and		1)Develop farms in a sustainable manner	1) Implement an environmental surveillance system to control air, water and soil quality 2)Elaborate and carry out a national strategy to

Country	Energy/Industry	Forestry	Transport	Waste	Agriculture	Misc/Cross-cutting
8 Cote d'Ivoire (continued)	2) Promote low energy consumption lamps 3) Take actions to economize firewood by promoting better combustion techniques through the promotion of improved cooking stoves	3) Ensure an integrated and sustainable management of water resources	consumption			reduce the risks of hazards
9 Ethiopia	[Energy] 1) Electricity generation from renewable energy for the grid system 1-1 Hydropower (on-going): Beles Project (460 MW); Gibe III Project (1870 MW); Fan Project (100 MW); Halele Werabesa Project (422 MW); Chemoga-Yeda Project (278 MW); Gibe IV Project (1472 MW); Genale III Project (258 MW); Genale IV Project (256 MW); Geba I and II projects (366 MW); Gojeb Project (150 MW); among lists of other projects under study 1-2. Wind power (on-going): Ashengoda Project (120 MW); Adama Project (51 MW); Adama II Project (51 MW); Assela Project (100 MW); Ayisha Project (300 MW); Debre Birhan Project (100 MW); Messobo Project (42 MW) 1-3. Geothermal (on-going): Aluto Langano Project (75 MW); Tendaho Project (100 MW); Corbeti Project (75 MW); Abaya Project (100 MW); Tulu Moye	1) Enhanced district level reforestation actions for the increment of vegetation cover of 214,440 Km ² of degraded lands, lands affected by gullies and slopes including through the management of community areas closed off to grazing 2) 28,736.70 Km ² of natural high forest area sustainably managed in order to reduce GHG emissions from deforestation and forest degradation 3) 4,390.96 Km ² of deciduous forest land sustainably managed in order to reduce GHG emissions from deforestation and forest degradation 4) 60,360 Km ² of national parks sustainably managed to reduce GHG emissions from deforestation and forest degradation 5) 198,175 Km ² of existing forests that are providing	Railway Projects with Trains to Run with Electricity Generated from Renewable Energy: Route 1 : (Addis Ababa-Modjo-Awash, 656 Km); Route 2 : (Modjo-Shashemene-Awassa-Konso-Woyito – including Konso-Moyale, 903 km), Route 3 : (Addis Ababa-Ejaji-Jimma-Guraferda-Dima-directed to Boma, 637 km); Route 4 : (Ejaji-Nekemt –Asossa-Kurmuk, 460 km); Route 5 : (Awash-Kombolcha-Mekele-Shire, 730 km); Route 6 : (Finoteselam-Bahirdar-Wereta-Weldia -Mile-Djibouti, 740 km) Route 7 : (Wereta-Azezo –Metema, 248 km);	1) Repi-Addis Abeba project to reduce the generation of methane from deposited urban waste 2) Addis Abeba project to reduce the generation of methane from urban waste 3) Mekele project to reduce the generation of methane from urban waste 4) Adama project to reduce the generation of methane from urban waste 5) Bahir Dar project to reduce the generation of methane from urban waste	1) Application of compost on 80,000 Km ² of agricultural land of rural local communities for increased carbon retention by the soil 2) Implementation of agroforestry practices and systems on 261,840 Km ² of agricultural land for livelihood improvement and carbon sequestration	

Country	Energy/Industry	Forestry	Transport	Waste	Agriculture	Misc/Cross-cutting
9 Ethiopia (continued)	<p>Project (40 MW); Dofan Project (60 MW)</p> <p>2) Bio-fuel Development for Road Transport and for household use: Project to produce 63.36 million L of ethanol, produce 621.6 million L of biodiesel</p> <p>3) Electricity Generation from Renewable Energy for Off-grid Use and Direct Use of Renewable Energy</p> <p>Projects to install:</p> <p>150,000 solar home systems; construct 65,000 small hydro electric power generation facilities; 300 wind pumps; 300 solar pumps; 3,000 institutional PVs; 3 million solar lanterns; 3,500 solar water heaters; distribute 10,000 solar cookers; distribute 9,000,000 improved biomass household stoves; distribute 10,000 biodiesel stoves; 25,000 household biogas digesters; 1,000 institutional biogas plant</p>	<p>non-timber forest products maintained as buffer area for mitigating desertification</p> <p>6) 52,695 Km² of forest in exhaustion or production forests established and sustainably managed for the purpose of sequestering carbon</p> <p>7) 51,496 Km² of wetlands wisely managed and sustainably used</p>	<p>Route 8: (Adama-Indeto-Gasera, 215 km);</p> <p>Route 9: Addis Ababa Light Rail Transit project, 300 km)</p>	<p>6) Diredawa project to reduce the generation of methane from urban waste</p> <p>7) Hawasa project to reduce the generation of methane from urban waste</p> <p>8) Harari waste to energy project to reduce the generation of methane from urban waste</p> <p>9) Kaliti waste treatment facility to reduce the generation of methane from liquid waste</p>		
10 Eritrea	<p>[Energy]</p> <p>1) Develop and implement energy conservation and efficiency projects</p>	<p>1) Implement projects and programs which reduce deforestation and forest degradation</p> <p>2) Develop and implement projects and programs for sustainable management of biomass resources, forests and sea as well as other</p>			<p>1) Implement projects and programs which enhance soil carbon stocks in agricultural soils</p>	<p>1) Research, develop, demonstrate, apply, diffuse and transfer of technologies, practices and processes that control, reduce or prevent anthropogenic emissions of GHGs not controlled by the</p>

	Country	Energy/Industry	Forestry	Transport	Waste	Agriculture	Misc/Cross-cutting
10	Eritrea (continued)		terrestrial, coastal and marine ecosystems thereby conserving and enhancing sinks and reservoirs of all greenhouse gases not controlled by the Montreal Protocol				<p>Montreal Protocol (MOP) in the energy, transport, industry, agriculture, forestry and waste management sectors</p> <p>2) Develop and elaborate appropriate and integrated plans which are supportive of both adaptation and mitigation actions for coastal zone management, water resources and agriculture, and for the protection and rehabilitation of areas in Eritrea affected by drought, desertification, and floods</p> <p>3) Mainstream climate change considerations in Eritrea's relevant social, economic and environmental policies and actions to mitigate or adapt to climate change</p> <p>4) Promote and cooperate in scientific, technological, technical, socio-economic and other research, systematic observation</p>

Country		Energy/Industry	Forestry	Transport	Waste	Agriculture	Misc/Cross-cutting
10	Eritrea (continued)						<p>related to the climate system</p> <p>5) Develop data archives related to the climate system and intended to further understanding and to contribute to reduction of the remaining uncertainties regarding the causes, effects, magnitude and timing of climate change and the economic and social consequences of various response strategies</p> <p>6) Promote and cooperate in the exchange of relevant scientific, technological, technical, socio-economic and legal information related to the climate system and climate change, and to the economic and social consequences of various response strategies</p> <p>7) Promote and cooperate in education, training and public awareness related to climate change and</p>

	Country	Energy/Industry	Forestry	Transport	Waste	Agriculture	Misc/Cross-cutting
10	Eritrea (continued)						<p>encourage the widest participation in this process, including that of non-governmental organizations</p> <p>8)Develop, periodically update, publish and make available to the COP national inventories of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the MOP using comparable methodologies agreed upon by the COP</p> <p>9) Formulate, implement, publish and regularly update national and,where appropriate, regional programmes containing measures to mitigate climate change</p> <p>19)Communicate to the COP information related to implementation, in accordance with Article 12 as well as cooperate in reporting of technological, capacity building and financial support by developed countries</p>

	Country	Energy/Industry	Forestry	Transport	Waste	Agriculture	Misc/Cross-cutting
11	Gabon	<p>[Energy] 1)Renewable energy development: construction of hydroelectric dams, solar panels 2)Banning of burning of gas flare and petroleum</p> <p>[Industry] Reinforcement of energy efficiency in public buildings and industrial units (awareness for low energy consumption, construction of low energy consumption industrial units)</p>	<p>1)Sustainable management of forest: expanding certified forest area based on internationally recognized management standard, i.e. 2 million ha in 2010 to 6 million ha in 2020 with proper funding 2)Reforestation/regeneration: plantation/reduction of degraded zone (i.e. 30,000 ha in 2010 to 10,000 ha in 2020; afforestation activities in savanna) 3) Agroforestry/forest community (i.e.0 ha in 2010 to 100,000 ha in 2020) 4)Potential forests 5) Stratification of forests in coastal zone 6) National forest inventory 7) conservation of biodiversity</p>	<p>1)Promotion of clean transport: development of quality public transport with natural gas vehicles (bus); imports/sales of vehicles less than 5-years old</p>	<p>1)Waste recovery: construction of waste treatment and sewage treatment center</p>		
12	Ghana	<p>[Energy] 1)Electricity 1-1.Supply: switch to natural gas; combined cycle; retrofit existing and build more hydro dams; improve reliability of power supply; expand grid access; and promote renewable-based power generation to increase the share of renewable to 10-20% by 2020 1-2.Transmission: reinforce transmission system to reduce loss to 3%; balance transmission and</p>	<p>1) Land conversion: Promote sustainable forest management, implement REDD+ mechanism; implement various forest governance initiatives (voluntary, partnership agreement and forest law enforcement, governance and trade, non-legally binding instrument); rehabilitate degraded wetlands; develop and enforce land use plans</p>	<p>1) Infrastructure/Mode: Expand road, and developed infrastructure for and promote rail, maritime, air, and inland water transportation systems; improve road conditions by increasing the percent of paved road; expand infrastructure for non-motorized transport 2) Services: develop and</p>	<p>1)Solid waste disposal (landfill): promote waste separation and composting, support waste-to-energy initiatives (sawdust, oil palm, waste and other agricultural waste residue);</p>	<p>1)Land preparation: promote spot and zero burning practices; minimum tillage; incentivize use of bio-fuels for mechanized agriculture 2)Cultivation: promote the use of organic</p>	

	Country	Energy/Industry	Forestry	Transport	Waste	Agriculture	Misc/Cross-cutting
12	Ghana (continued)	<p>generation</p> <p>1-3.Distribution: standardize transformers; expand and maintain distribution system on timely basis</p> <p>1-4.End-use: develop/enforce standard and labels for appliances; intensify public education on energy conservation; promote solar PV lighting; increase rate of rural electrification</p> <p>2) Residential cooking: promote the use of LPG; energy efficient cooking devices; efficient and clean carbonization technologies</p> <p>3) Liquid and gaseous fuels: promote zero fugitive emissions; promote and incorporate CCS in gas production and utilization</p> <p>[Industry]</p> <p>1)Manufacturing industries: improve power factor correction across industries and institute energy efficient measures in industrial operations; improve on resource efficiency in industries to promote sustainable production and consumption</p> <p>2) Metal production (Aluminum): reduce carbon dioxide emissions from anode reactions</p>	<p>2)Degraded forest lands: enhance rehabilitation of degraded forest lands; promote small afforestation/reforestation activities at the community level; establish commercial plantations</p>	<p>improve facilities for public transport system; incentivize the use of public transport and promote car pooling</p> <p>3) Fuel use: enforce road worthiness certification requirements; retrofit existing refinery infrastructure and ensure that new, refinery produce non-metallic based gasoline; substitute the use of gasoline with CNG, LPG, and electricity for public transport; and promote the production and use of bio-fuels</p> <p>4)Vehicle technology: promote the use of Euro III and above as well as use Flexi Vehicles</p>	<p>capture and utilize methane gas from landfill sites; institute measures to minimize waste generation</p> <p>2)Waste water handling: build, operate and maintain waste water treatment plants</p>	<p>fertilizers; integrated use of plant nutrients; cultivation of high yielding upland rice</p> <p>3) Harvest to post-harvest: promote the recycling of crop residues; improve storage facilities and promote the use of post harvest technologies</p>	
13	Cameroon		<p>1) Mitigation action through REDD+, CDM projects, reforestation, sectoral actions within the scope of national</p>				<p>1) Adaptation actions of the vulnerable sectors against climate change; agriculture, livestock,</p>

	Country	Energy/Industry	Forestry	Transport	Waste	Agriculture	Misc/Cross-cutting
13	Cameroon (continued)		mitigation strategies				fishery, energy, health, and development of the climate service for all development sector through the climate change national observatory
14	Jordan	[Energy] 1) Fuel switch, and growing the natural gas supply and distribution and increase the contribution of the natural gas to the national energy system 2) Renewable energy law enacted by the government (wind, solar energy) 3) Biogas to become part of the sources for Jordanian electricity system 4) Upgrade of the Jordan refinery to improve quality of diesel and further emissions reduction. 5) Recycling projects to improve solid waste management.	1) Control and stop deforestation, expand forest areas and trees covered areas	1) Jordan railway project, start design and feasibility study. 2) Amman – Zarqa light rail project, to improve urban transport standards in greater Amman – Zarqa metropolitan area, reduce pollution and cut back vehicles emission, by introducing an environmentally friendly transport system 3) Modernize the freight transport fleet operating in Jordan, stop importing old trucks and transform gradually into a modern efficient fleet 4) Build and Develop the Amman dry port south of the city on an 80 m new ring road to create a new corridor which aims to reduce congestion of trucks and pollution	1) Solid Waste Sector Emission reduction from Solid waste management projects: (Aldlail DSWLF, AL-Ekaider DSWLF, AL-Karak DSWLF, Al-Hamra DSWLF, Maddaba DSWLF, Ghabawi, Suwaqqa, Medical and H.W) 2) Waste water and water sector: emission reduction from waste water treatment plants by utilizing local solar and wind energy (Aqaba DWWTP, As-	1) Growing Perennial Forages in the Badia Region 2) Best management practices in Irrigated farming fertilization applications 3) Use of methane emitted from livestock and chicken farming Production and slaughter houses	1) Jordan Armed Forces and Air Force: environment strategy and action plans including the upgrade of engines and old vehicles, by deploying environment best practices and energy saving technologies in their facilities and bases 2) Other environmental projects

	Country	Energy/Industry	Forestry	Transport	Waste	Agriculture	Misc/Cross-cutting
14	Jordan (continued)			5) Aqaba Port Project by moving the port south to the Saudi border, thus cutting back significantly the distance for the ships to travel in Jordan water and congestion in the city of Aqaba	Samra DWWTP, Baqa'a DWWTP, Madaba DWWTP, Ramtha DWWTP, Salt DWWTP, Wadi Arab DWWTP)		
15	Madagascar	[Energy] 1) Elaborate and carry out an action plan on the development of renewable energy such as micro-hydraulic, photovoltaic and biomass power generation for decentralized electrification 2) Install hydroelectric power plants for the large cities 3) Take actions to economize firewood by promoting better combustion techniques through the promotion of improved cooking stoves 4) Popularize low energy-consumption lamps	1) Carry out a large scale reforestation in the 22 regions of Madagascar 2) Restore the wetlands of Torotorofotsy which measures around 9000 ha including its watershed 3) Improve the management of protected areas through the implementation of a management plan and activities to manage biodiversity 4) REDD+: Development of the REDD+ policy and strategy; strengthening of the current pilot projects which will contribute to the setting of a national strategy on REDD+; strengthening of technical capacity at all levels; development of an institutional and legal framework for the implementation of REDD+; improvement of knowledge on	1) Promote the exploitation and use of biofuels 2) Introduce and develop less polluting means of transport: intermediate means of transport, railed urban public transport, improvement of transport vectors	Valuation of household waste (solid and liquid) of large cities in Madagascar through the production of fertilizers and energy (biogas, electricity)	1) Multiplication of forage seeds and their promotion in the pastoral regions 2) Intensification of the production of improved agricultural seeds among farmers 3) Production of compost and high quality organic fertilizers in the rural areas of the Agricultural Investment Zones (AIZ)	

Country		Energy/Industry	Forestry	Transport	Waste	Agriculture	Misc/Cross-cutting
15	Madagascar (continued)		REDD+ among the general public and decision-makers through communication measures; improvement of financing mechanisms for the implementation of REDD+				
16	Mauritania	<p>[Energy]</p> <p>1) Energy efficiency in urban and rural settings – reduction of energy consumption: promotion of public transport; use of butane gas as a substitute for firewood, replacement of high consumption lamps with energy efficient lamps</p> <p>2) Control of conventional energy sources in Mauritania: rationalize the use of conventional energy sources (biomass); use improved cooking stoves; improve the efficiency of wood combustion for the production of charcoal</p> <p>3) Promotion of renewable energy in Mauritania: develop projects on the production of solar and wind power (above 800 MW/h by 2020); promote the techniques of biogas use; focus research on the techniques for efficient production and use of renewable energy</p>	<p>Increase forest cover from 3.2% in 2009 to 9% in 2050 in relation to the national surface area through reforestation:</p> <p>1) Creation of sinks to sequester GHG</p> <p>2) Improvement of availability of forest resources</p>				
17	Morocco	<p>[Energy]</p> <p>1) Installation of micro-hydroelectric power plants of a unitary capacity of 3 MW and a total of 300 MW (715 kteCO₂/yr)</p>	1) Reforestation – reforestation following the Directional Plan on Reforestation (DPR) adopted in 1994, and which will conduct the reforestation of	1) Strengthening of technical control on marketed vehicles by the centers of technical assistance (54	1) Rehabilitation of uncontrolled landfills and recovery of methane	Improvement of agricultural productivity (2025 kteCO ₂ /yr)	Other actions on Habitat

Country	Energy/Industry	Forestry	Transport	Waste	Agriculture	Misc/Cross-cutting
17 Morocco (continued)	<p>2) Installation of hydroelectric power plants of 40 MW (Tanafnit El Borj) (171 kteCO₂/yr)</p> <p>3) Development of high power solar energy plants of 2000 MW on 5 sites (3700 kteCO₂/yr)</p> <p>4) Promotion of solar thermal collectors: 40,000 m²/yr, 440,000 m² of solar thermal water heaters in 2012, 1,700,000 m² in 2020 (232 kteCO₂/yr)</p> <p>5) Development of a national wind farm of 5000 MW (Energipro program) (9250 kteCO₂/yr)</p> <p>6) Installation of combined cycle power plants of a total of 870 MW (Ain Beni Mathar to begin service in 2010) (4038 kteCO₂/yr)</p> <p>7) Improvement of the efficiency of power plants through optimization of maintenance plans (under evaluation)</p> <p>8) Use of clean charcoal technologies for the plants of Jorf Lasfar and Safi (under evaluation)</p> <p>9) Project on the import of natural gas: target as reaching 20% of the national consumption by 2020 (6421 kteCO₂/yr)</p> <p>10) Nuclear power plant project of 2 x 1000 MW Planned for 2020 – 2030 (14 968 kteCO₂/yr)</p> <p>11) Optimization of public lighting (under evaluation)</p>	<p>50,000 ha/year up to 2013, and 1 million hectares by 2030 (209 kteCO₂/yr)</p> <p>2) Protection of forests from fires through the implementation of the Directional Plan on the Prevention and Countermeasures against Fires (DPCF) adopted in 2003 (under evaluation)</p>	<p>kteCO₂/yr)</p> <p>2) Renewal of car parks for taxis and vehicles transporting merchandise, through a price premium for renewing vehicles(501 kteCO₂/yr)</p> <p>3) Promotion and development of rail transport through the connection of a high speed train (TGV) line between Tanger – Casablanca and the electrification of the Fès-Oujda line(under evaluation)</p> <p>4) Projects for the development of urban transport: Casablanca Regional Express Network (880 kteCO₂/yr)</p> <p>5) Activation of the Tramway in Rabat (119 kteCO₂/yr)</p> <p>6) Implementation of the plans on urban and interurban travel with due attention to the coherence with municipal land management plans(under evaluation)</p>	<p>emissions from the landfills following the National Plan on household wastes (NPHW) (284 kteCO₂/yr)</p> <p>2) Recovery of methane emissions from controlled landfills following the NPHW (3507 kteCO₂/yr)</p> <p>3) Recovery of GHG emissions from wastewater treatment stations following the National Plan on liquid sanitization (NPS), treatment of 80%, and 90% of wastewater up to 2020 and up to 2030, respectively(336 kteCO₂/yr)</p>		

Country	Energy/Industry	Forestry	Transport	Waste	Agriculture	Misc/Cross-cutting
17	<p>Morocco (continued)</p> <p>awareness-raising campaigns on energy-saving and related equipments (under evaluation)</p> <p>12)Distribution of 22.7 million energy-saving lamps to households and the service sector by 2012 (490 kteCO₂/yr)</p> <p>13)Eco-labeling of domestic devices (in particular: refrigerators and air conditioners) (779 kteCO₂/yr)</p> <p>14)Improvement of the measurement and billing systems of energy (under evaluation)</p> <p>15)Obligation of the sellers of energy to make energy-savings through issuing of energy certificates (under evaluation)</p> <p>[Industry]</p> <p>1) OCP(Phosphate producer):setting up a system of energy recovery in 4 sites (343 kteCO₂/year)</p> <p>2) OCP: Installation of a phosphate pipeline between Khouribga and the ports of Safi and Jorf Lasfar (2012~)(974 kteCO₂eq/yr)</p> <p>3) Ciments du Maroc (Moroccan cement company): installation of 20 MW wind power plant(55 kteCO₂/year)</p> <p>4) Ciments du Maroc: installation of 10 MW wind power plant,</p>					

	Country	Energy/Industry	Forestry	Transport	Waste	Agriculture	Misc/Cross-cutting
17	Morocco (continued)	extension up to 32 MW (2010 – 2012)(88 kteCO ₂ /yr) 5) Development of energy efficiency in industries through partnerships with the Centre for the Development of Renewable Energy (Launched in 2009) (581 kteCO ₂ /yr)					
18	Mongolia	[Energy] 1) Increase renewable options: PV and solar heating; wind power generators and wind farms, hydropower plants 2) Improve coal quality: coal beneficiation; coal briquetting 3) Improve efficiency of heating boilers: improve efficiency of existing HOBs and install boilers with new design and high efficiency; convert hot water boilers into small capacity thermal power plants, 4) Improve household stoves and furnaces: change fuels for household stoves and furnaces, modernize existing and implement the new design for household stoves and furnaces 5) Improve CHP plants: improve efficiency and reduce internal use 6) Increase use of electricity for local heating in cities: use of electricity from grid for individual houses in cities	1) Improve forest management, reduce emissions from deforestation and forest degradation, improve sustainable management of forests and enhance forest carbon stocks in Mongolian forest sector	1)Use more fuel efficient vehicles		1)Limit the increase of the total number of livestock by increasing the productivity of each type of animal, especially cattle	

	Country	Energy/Industry	Forestry	Transport	Waste	Agriculture	Misc/Cross-cutting
18	Mongolia (continued)	7) Building: building energy efficiency improvement: improve district heating system in buildings, install heat and hot water meters in apartments, make insulation improvements for existing building and implement new energy efficient standards for new buildings, improve lighting efficiency in buildings [Industry] Energy efficiency improvement in industry: improve housekeeping practices, implement motor efficiency improvements, introducing dry-processing in cement industry					
19	Peru	[Energy] 1)Increasing renewable energy up to 33% of energy consumption by 2020	1)Reducing and ending deforestation by 2021		1)Addressing inadequate waste management		
20	San Marino	[Energy] 1) Promotion and development on the territory of energy production from renewable sources 2) Rationalization and modernization of infrastructures, energy transport and supply networks and the relevant plants in relation to territory and environment: reduction of final energy consumptions in the transport, production, housing and tertiary sectors, the services					1)Reduction of emissions of gases causing climate change

	Country	Energy/Industry	Forestry	Transport	Waste	Agriculture	Misc/Cross-cutting
20	San Marino (continued)	supplied being equal, through energy savings and rational use, as well as information campaigns to favor implementation thereof 3) Direct measures, such as interventions for energy saving and the use of renewable energy sources (RES)					
21	Sierra Leone	[Energy] 1) Expanding clean energy utilization: solar; mini-hydro; LPG; biomass stove 2) Development of energy efficiency programs through sensitization and awareness raising campaigns; sustainable production of charcoal and reduce dependence on firewood 3) Development of alternative energy sources such as biofuels from sugarcane, corn, rice husk etc	1) Increase conservation efforts in Sierra Leone: establishment of a network of 12 protected areas by 2015; sustainable management and protection of forest reserves and Catchment areas including mangroves, coastal and inland wetlands; delineation and restoration of vulnerable habitats and ecosystems in the western areas; provide support for a national assessment on forest resources. 2) Improve forest governance to maintain the proportion of land area covered by forests to at least 3.4 million ha by 2015, through the development of legislation, regulations and by-laws for environmental protection, including control of deforestation, firewood collection and charcoal production and through capacity building, training and	1) Development and enforcement of regulations on regular maintenance of vehicles (improving the use of mass transport (road & water) for passengers and cargo to reduce traffic congestion and GHGs emissions	1) Developing agricultural and urban waste incineration programs for energy production 2) Improved waste management through composting and recycling of waste	1) Introducing conservation farming and promoting the use of other sustainable agricultural practices (i.e. agroforestry)	1) Establishment of National Secretariat for Climate Change(NSCC) 2) Institutional strengthening and capacity building for environmental protection and management as well as the country's mitigation and adaptation efforts to climate change 3) Setting/developing air, water and soil quality pollution standards, and ensure regular assessments and monitoring through control programs

	Country	Energy/Industry	Forestry	Transport	Waste	Agriculture	Misc/Cross-cutting
21	Sierra Leone (continued)		<p>support to law enforcement services and the Ministry of Agriculture</p> <p>3) Development of an Integrated Natural Resources and Environmental Management program, including sustainable land management programs, particularly in relation to ecosystems</p>				
22	Macedonia	<p>[Energy]</p> <p>1) Harmonization and implementation of EU legislation in Energy and Climate</p> <p>2) Ensuring stability in energy supply with investment activities for building new big hydro power plants</p> <p>3) Ensuring stability in energy supply with investment activities for building new thermal power plants on gas</p> <p>4) Increasing the share of renewable in the energy sector</p> <p>5) Improvement of the energy efficiency</p> <p>[Industry]</p> <p>1) Reduction of the use of carbon intensive fuels</p> <p>2) Improvement of the energy efficiency and energy saving</p> <p>3) Increase of the contribution of renewable energy sources in the</p>	<p>1) Enabling favorable pre-conditions for GHG emission reduction (laws , by laws, institutional measures, support measures)</p> <p>2) Implementation of the national strategic documents in the forestry</p>	<p>1) Improvement of the overall efficiency in the transport sector and energy efficiency of the vehicles</p> <p>2) Improvement of the public urban and inter-city transport</p> <p>3) Harmonization of the national legislative, regarding the transport sector, within the European Union directives</p>	<p>1) GHG emission reduction at the existing landfills</p> <p>2) Improvement of the possibilities for efficient methane collection</p> <p>3) Reduction of the nitrous oxide (N₂O) emissions</p> <p>4) Reduction of the methane emissions from the wastewater</p>	<p>1) Introduction /development of GHG mitigation technologies in agriculture</p> <p>2) Strengthening the national and local capacities for carbon financing</p> <p>3) Education (of experts/farmers/ decision makers) for application of mitigation measures/technologies in agriculture</p>	

Country		Energy/Industry	Forestry	Transport	Waste	Agriculture	Misc/Cross-cutting
22	Macedonia (continued)	country's energy balance 4) Awareness raising of the final consumers					
23	Togo	[Energy] 1) Energy efficiency in urban and rural settings of Togo: reduction of energy consumption (public transport, use of gas as a substitute); reduction of GHG emissions; replacement of high consumption lamps with energy efficient lamps 2) Control of conventional energy sources: rationalizing the use of conventional energy sources (biomass); use of improved cooking stoves; improvement of the efficiency of wood combustion for the production of charcoal 3) Promotion of renewable energy in Togo: solar; wind; biogas; biofuels; focusing research on the use of solar and wind energy; focusing research on the use of biogas and biofuels	1) Increase forest cover from 7% in 2005 to 30% in 2050 in relation to the national surface area through reforestation: creation of sinks to sequester GHGs; reduction of GHG emissions; improvement of availability of forest resources)				
24	Tunisia	[Energy] 1) Development of renewable energy supplemented by the energy recovery from solid waste and wastewater: electricity production through concentrated solar power system(CSP); photovoltaic power, solar heating, and wind power; biomass power	Expansion of forest area from 12.8% (2009) to 16% (2020) through reforestation and regeneration of forest and pastoral land (25 million ha); expansion of protected areas from 17% (2009) to 20% (2024) creation of additional 20 protected zones; 500 million	1) Promotion of utilization of clean energy in transport sector (i.e. natural gas) 2) Rational utilization of energy and energy efficiency: development of clean public transport(metro, train,	1) Energy recovery from waste and waste water treatment/ management; methane collection		

	Country	Energy/Industry	Forestry	Transport	Waste	Agriculture	Misc/Cross-cutting
24	Tunisia (continued)	<p>generation</p> <p>2) Alternative energy development: development of alternative energy with less GHG emission</p> <p>3) Rational utilization of energy and energy efficiency: construction of buildings/houses in compliance with energy efficiency standards; buildings with solar power equipment; accreditation of household appliances; promotion and development of energy efficient lamps; co-generation and tri-generation,</p> <p>[Industry]</p> <p>1) Alternative energy development: Development and utilization of natural gas for industries, tertiary sector, and residential sector</p> <p>2) Industrial process: reinforcement of corporate environmental standard; reduction of GHG emission from industrial process (i.e. N2O from phosphate production and utilization process)</p> <p>3) Recuperation and utilization of gases associated with petroleum production</p>	<p>ha of organic farming by 2014; introduction of modern technologies for reducing water requirement for irrigation; reinforcement of desalination program.</p>	<p>bus); urban planning, regrouping of demand for transportation means; multi-modal transport; expanding spaces for railroads, etc</p>			

Category 3: Carbon Neutrality

	Country	Target	Other Descriptions
25	Bhutan	To remain carbon neutral	Pursuant to “the Declaration of the Kingdom of Bhutan – Land of Gross Happiness to save our Planet”
26	Costa Rica	To achieve carbon neutrality	Sectoral identification (transport, energy, forestry, waste management) and estimation of incremental costs for implementation currently underway
27	Maldives	To achieve carbon neutrality	

Category 4: National GHG Emission Reduction Target (by 2020)

Country		Target	Nature of reduction target	Reference (year/BAU)	Conditions/Components
28	China	40-45%	Intensity Target: Per unit of GDP	Compared to 2005 level	
					2) Increase the share of non-fossil fuels in primary energy consumption to around 15% by 2020 3) Increase forest coverage by 40 million hectares and forest stock volume by 1.3 billion m ³ by 2020 from the 2005 level
29	India	20-25%	Intensity target: Per unit of GDP	Compared to 2005 level	excluding the emissions from agricultural sector
30	Antigua Barbuda	25%	Absolute target	Compared to 1990 level	Through 1) Pursuing low carbon, green growth development strategy (2010-2015) 2) Development and implementation of nationally appropriate adaptation plans, programs and projects, and capacity building Communication through national communication
31	Marshall Islands	40%	Absolute target	Compared to 2009 level	Pursuant to the 2009 National energy Policy and Energy Action Plan
32	Moldova	25%	Absolute target	Compared to 1990 level	Through implementation of global economical mechanisms focused on the climate change mitigation
33	Brazil	36.1~38.9 %	Absolute target	BAU	Through 1) Reduction in Amazon deforestation (564 million t-CO ₂ eq) 2) Reduction in Cerrado deforestation (104 million t-CO ₂ eq) 3) Restoration of grazing land (83~104 million t-CO ₂ eq) 4) Integrated crop-livestock system (18~22 million t-CO ₂ eq) 5) No-till farming (16~20 million t-CO ₂ eq) 6) Biological N ₂ fixation (16~20 million t-CO ₂ eq) 7) Energy efficiency (12 ~ 15 million t-CO ₂ eq) 8) Increase the use of biofuels (48~60 million t-CO ₂ eq) 9) Increase in energy supply by hydroelectric power plant (79~99 million t-CO ₂ eq) 10) Alternative energy sources (26~33 million t-CO ₂ eq), iron and steel (8~10 million t-CO ₂ eq)
34	Indonesia	26%	Absolute target	BAU	Through 1) Sustainable peat land management 2) Reduction in rate of deforestation and land degradation

Country		Target	Nature of reduction target	Reference (year/BAU)	Conditions/Components
34	Indonesia (continued)				3) Development of carbon sequestration projects in Forestry and Agriculture 4) Promotion of energy efficiency 5) Development of alternative and renewable energy sources 6) Reduction in solid waste and liquid waste 7) Shifting to low-emission transportation mode
35	Israel	20%	Absolute target	BAU	Through 1) 10% renewable energy for electricity generation 2) 20% reduction of electricity consumption
36	Mexico	30%	Absolute target	BAU	Special Climate Change Program(2009-2012) will achieve total annual emissions of 51 million t-CO ₂ eq
37	Papua New Guinea	At least 50%(before 2030) carbon neutral (before 2050)	Absolute target	BAU	In accordance with Preliminary Climate Compatible Development Plan
		2) Increase GDP per capita more than 3 times by 2030			
		3) Increase adaptation investments per annum by \$80-90 million to reduce expected losses by \$230-250 million			
38	South Korea	30%	Absolute target	BAU	
39	Singapore	16%	Absolute target	BAU	In accordance with the Sustainable Singapore Blueprint
40	South Africa	34% (2020)	Absolute target	BAU	
		42% (2025)			

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