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Nationally Appropriate Mitigation Actions: Definitions, Issues and Options

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Deutsche Zusammenfassung

Entsprechend dem Bali-Aktionsplan (BAP) verhandeln die Staaten derzeit u.a. “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.“ Jedoch haben weder der BAP noch die weiteren Verhandlungen bisher eine Definition von NAMAs hervor gebracht. Es zeichnet sich ab, dass letztendlich jede Maßnahme zulässig sein wird, so lange gezeigt werden kann, dass sie Emissionen reduziert.

Die bisher diskutierten NAMAs lassen sich in fünf Kategorien gruppieren: Nationale Emissionsneutralitätsziele, nationale Emissionsintensitätsziele, nationale Reduktionsziele im Vergleich zum “business as usual” (BAU), sektorale Emissionsziele, sowie spezifische Politiken und Maßnahmen auf nationaler oder lokaler Ebene.

Des Weiteren wird über drei “Schichten” von NAMAs diskutiert: Unilaterale NAMAs aus eigener Kraft, NAMAs, die direkt von den Industrieländern unterstützt werden, und NAMAs für den Kohlenstoffmarkt. Viele Entwicklungsländer sind allerdings nicht mit dieser Konzeption der drei Schichten einverstanden. Sie wenden sich insbesondere gegen die Verwendung von NAMAs als Mittel zur Zielerreichung für die Industrieländer.

Die hohe Bandbreite von verschiedenen Maßnahmen, die Entwicklungsländer als NAMAs durchführen können, stellt die Messung, Berichterstattung und Verifizierung vor große Herausforderungen. Während es prinzipiell eingehende Erfahrungen mit der Messung von nationalen oder sektoralen Emissionen gibt, ist die Feststellung einer Abweichung vom BAU mit erheblichen Unsicherheiten behaftet. Die Möglichkeiten zur Überprüfung von spezifischen Politiken und Maßnahmen sind sehr fallspezifisch. Während bspw. der Ausbau von erneuerbaren Energien relativ leicht quantifiziert werden kann, sind Energieeinsparungen deutlich schwerer zu messen. Besondere Schwierigkeiten ergeben sich, wenn sich die Wirkungen von verschiedenen Maßnahmen überschneiden, z.B. im Fall von Maßnahmen zur Energieeinsparung und zur Nutzung von erneuerbaren Energienquellen.

Grundsätzlich sollte unterschieden werden, ob die Messung, Berichterstattung und Verifizierung vor allem der Transparenz dienen soll oder aber der Generierung von Emissionsgutschriften. In ersterem Fall könnte es ausreichend sein, sich in einem vereinfachten Verfahren auf die Überprüfung der Umsetzung zu konzentrieren. Falls jedoch Emissionsgutschriften generiert werden sollen, sind die Emissionen und Reduktionen detailliert zu bewerten, um die ökologische Integrität des Kohlenstoffmarktes sicherzustellen. Insgesamt werden die Verhandlungen über die Messung, Berichterstattung und Verifizierung bisher noch sehr oberflächlich geführt und konzentrieren sich vor allem auf das institutionelle Rahmenwerk.

Die Bereitstellung von finanzieller und technologischer Unterstützung wurde durch die Industrieländer bisher als Nebenthema betrachtet, ist seit dem Bali-Aktionsplan jedoch eines der Schlüsselthemen in den Verhandlungen geworden. Bisher konzentrieren sich die Verhandlungen jedoch hauptsächlich auf die institutionellen Grundstrukturen und weniger auf die konkreten Mechanismen der Bereitstellung von Unterstützung. Während die Entwicklungsländer zentralisierte Mechanismen unter der direkten Aufsicht der Vertragsstaatenkonferenz einfordern, bevorzugen die Industrieländer bilaterale Kanäle oder die Verwendung etablierter Organisationen wie der Weltbank. Im Copenhagen Accord wurde entschieden, einen Fonds und einen Technologiemechanismus einzurichten. Die genauen Mandate dieser Institutionen sind jedoch noch weiter zu verhandeln.

Das Verhältnis von NAMAs und Kohlenstoffmarkt ist bisher noch unklar. Prinzipiell müsste in Zukunft die Feststellung der Zusätzlichkeit und der Baselines von CDM-Projekten oder NAMAs, die Zertifikate generieren sollen, alle relevanten unilateralen und direkt unterstützten NAMAs in dem jeweiligen Land berücksichtigen. Im CDM gilt jedoch bisher die Regelung, dass neue emissionsmindernde Politikmaßnahmen bei der Bewertung von Projekten nicht berücksichtigt werden müssen.

Neben aggregierten Emissionszielen und Maßnahmen haben jedoch viele Länder auch sehr spezifische Investitionsvorhaben als NAMAs gemeldet, z.B. den BAU neuer Wasserkraftwerke oder Programme zur Verbreitung von Solar Home Systems. Solche Vorhaben könnten prinzipiell ohne Weiteres über den CDM abgewickelt werden. Es bleibt daher im konkreten Fall zu untersuchen, welche spezifischen NAMAs die Entwicklungsländer jeweils ergreifen und wie diese jeweils entweder mit dem Kohlenstoffmarkt kompatibel sind oder Überschneidungsprobleme auftauchen.

1 Introduction

According to the Bali Action Plan (BAP), the current negotiations on the future climate regime include consideration of "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." With this provision, the Bali Action Plan further specified the basic balance of the deal between Annex I and Non-Annex I countries that was struck in Art. 4 of the UN Framework Convention on Climate Change (UNFCCC). Art. 4.1 (b) commits all Parties to "Formulate, implement, publish and regularly update national and, where appropriate, regional programmes containing measures to mitigate climate change...;" Furthermore, Art. 4 requires Annex II countries, i.e. the wealthiest Annex I countries, to financially and technologically support non-Annex I countries to enable them to implement the Convention and clarifies that "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...".

The above-quoted provision in the BAP can be broken down into the following elements:

- Developing countries are to undertake mitigation actions.
- These are to be nationally appropriate, i.e. tailored to countries' national circumstances and in line with the Convention's principle of common but differentiated responsibilities.
- They are to take place in the context of sustainable development, meaning they are to be embedded in the countries' broader sustainable development strategies.
- They are to be measurable, reportable and verifiable.
- They are to be supported by developed countries in an equally measurable, reportable and verifiable manner.

While the Bali Action Plan thus reiterates the core balance at the heart of the Annex I-non-Annex I debate, it significantly raises the bar for both sides. For developing countries, the debate has shifted from the qualitative commitments under Art. 4.1 of the Convention to mitigation actions that are measurable, reportable and verifiable. For developed countries, the BAP also constitutes a step change from the past, where support for developing countries was mainly delivered through voluntary contributions to funds and any technology transferred was neither measurable nor reportable nor verifiable.

Despite two years of discussions and negotiations, a clear consensus on the exact nature of NAMAs and mechanisms for support has yet to emerge. This paper therefore aims to present an overview of the current state of debate and possible ways forward. The paper first reviews the definitions of NAMAs that have so far been put forward in the negotiations and in particular the types of NAMAs that have been submitted under the Copenhagen Accord. This review leads to a typology of actions that have so far been discussed. On this basis, the paper discusses possibilities of measuring, reporting and verifying (MRVing) these different types of NAMAs. Finally, the paper synthesises the current status of the negotiations about delivering financial and technological support from industrialised to developing countries.

2 Defining Nationally Appropriate Mitigation Actions

2.1 Scope and Types of Actions

The wording in the BAP is very broad. An "action" can in principle be any kind of activity, from local projects to national policies. This broad understanding of NAMAs is affirmed in Parties' submissions to the negotiations, which are for the most part not very specific. NAMAs appear to be generally understood to include any action that reduces emissions. Some have even subsumed the Clean Development Mechanism (CDM) under NAMAs. The following is a non-exhaustive lists of types of possible actions mentioned by Parties (UNFCCC 2009a, 2009b):

- Australia: All countries to establish a National Schedule, which would include a long-term emissions pathway to 2050 as well as mitigation commitments and actions. Schedules would recognise diversity among Parties, a wide range of commitments and actions could be registered.
- Brazil: Allow large-scale mitigation programmes, beyond projects. Would not generate offsets, would be additional to CDM, domestic effort of Annex I countries and unilateral actions of non-Annex I countries.
- China: The form of each specific action shall be subject to the determination of each developing country.
- Ecuador: Allow innovative NAMAs such as maintaining oil underground in exchange for compensation.
- EU: Developing countries should develop comprehensive low-carbon development strategies covering all key sectors by 2012. These strategies would indicate their contribution to the global mitigation effort and describe their NAMAs. Should include description of a long-term strategy including emissions pathways. Developing countries as a group should reduce emissions by 15-30% below business as usual by 2020. The EU also proposes sectoral crediting and sectoral trading as incentives to implement NAMAs.
- Indonesia: Developing countries should pursue a sustainable development strategy. Developing countries may submit a no-lose target as deviation from business as usual that will be pursued in the form of NAMAs supported and enabled by technology, financing and capacity building.
- Japan: Differentiation of countries into (i) developing countries that are expected to take further mitigation actions based on their responsibility and capability, (ii) countries whose emissions are very low, (iii) other countries. Countries in category (i) should adopt binding targets for GHG emissions per unit of activity or energy consumption per unit of activity in major sectors, as well as binding economy-wide targets for GHG emissions per GPD or energy consumption per GDP. Countries in groups (ii) and (iii) should submit voluntary national action plans.
- New Zealand: Suggest categorising types of actions according to national circumstances and level of development, e.g. quantified targets, price-based measures, regulations and other policies and measures.
- Panama, Paraguay and El Salvador: Scale up low-carbon actions by aggregating mitigation policies, programmes and measures carried out at different levels.
- Singapore: NAMAs include sustainable development policies and measures (SD-PAMs) such as energy efficiency programmes, policies in the transport sector, standards in the building sector and minimum energy performance standards for household appliances.
- South Korea: The scope and extent of NAMAs could range from economy-wide mitigation targets to specific policies and measures in certain sectors or areas.

- South Africa: NAMAs may comprise individual mitigation actions, sets of actions or programmes. Developing countries may choose from a variety of forms of action, including SD PAMS, REDD (reducing emissions from deforestation and forest degradation), programmatic CDM, no lose sectoral crediting baselines and others.
- USA: Parties shall formulate and submit low-carbon strategies that articulate an emissions pathway to 2050, including developing country Parties whose national circumstances reflect greater responsibility or capability. Other developing country Parties should implement nationally appropriate mitigation actions and develop low-carbon strategies, consistent with their capacity.

The NAMAs that were submitted under the Copenhagen Accord are equally varied. The submissions can be classified into five categories:

- National emission neutrality targets;
- National emission intensity targets;
- National emission targets in terms of a deviation from business as usual;
- Sectoral emission targets;
- Specific actions at national and/or local level;
- Combination of specific actions plus an aggregated target that is supposed to be achieved with these actions.

The following table lists some examples of each category. What is emerging for developing countries in the negotiations is therefore a framework for highly diversified actions. While some more advanced developing countries have adopted emission or emission intensity targets, for the most part developing country actions will probably not be target-based but consist of specific policies and measures. This poses substantial challenges to the measuring, reporting and verification of NAMAs as called for in the Bali Action Plan, which will be discussed further in chapter 3.

Table 1: Types of NAMAs in the Copenhagen Accord

National Emission Neutrality Target	**Maldives:** Achieve carbon neutrality as a country by 2020. **Bhutan:** Bhutan already sequesters more carbon than is emitted, and we have declared our intent to ensure that our emissions do not exceed our sequestration capacity.
National Intensity Target	**China** Lower carbon dioxide emissions per unit of GDP by 40-45% by 2020 compared to the 2005 level, increase the share of non-fossil fuels in primary energy consumption to around 15% by 2020 and increase forest coverage by 40 million hectares and forest stock volume by 1.3 billion cubic meters by 2020 from the 2005 levels. **India:** Reduce the emissions intensity of its GDP by 20-25% by 2020 in comparison to the 2005 level. The emissions from agriculture sector will not form part of the assessment of emissions intensity.

Economy-National Target of Reduction below BAU	**Mexico:** 30% below BAU by 2020 **South Korea:** 30% below BAU by 2020 **South Africa:** 34% below BAU by 2020, 42% below BAU by 2025
Sectoral Emission Targets	**Brazil:** • Reduction in Amazon deforestation (range of estimated reduction: 564 million t CO_2-eq. in 2020) • Reduction in ""Cerrado"" deforestation (range of estimated reduction: 104 million t CO_2-eq. in 2020)
Specific Actions	**Ethiopia:** 1. Electricity Generation from Renewable Energy for the Grid System 1.1. Hydro Power 1.1.1. Beles Project, with 460 MW electric power generation capacity; to be completed in 2010 …(long list of further renewables projects) 2. Bio-fuel Development for Road Transport and for household use 2.1. Project to produce 63.36 million litters of ethanol starting from 2010 up to 2015 2.2. Project to produce 621.6 million litters of biodiesel starting from 2010 up to 2015 3. Electricity Generation from Renewable Energy for Off-grid Use and Direct Use of Renewable Energy 3.1. Project to install 150000 solar home systems starting from 2010 up to 2015 …(list of 11 further projects) …(lists of further projects covering transport, forestry, agriculture and waste management) **Ghana:** Energy - Electricity Supply • BAU Situation: Thermal generation using light crude oil. NAMAs: Switch to natural gas (Combined cycle). • BAU: Hydro generation. NAMAs: Retrofit existing hydro dams. Build more hydro dams. • BAU: Off-grid/ independent generation using diesel and gasoline. NAMAs: Improve reliability of electricity supply by improved maintenance, timely expansion and upgrading. Expand grid access to discourage the need for off-grid generation. • BAU: Generation from conventional sources. NAMAs: Promote electricity generation from renewable energy sources to increase the share of renewable to 10-20% by 2020. …(long list of further measures covering all sectors)
Combination of Specific Actions and Aggregated Target	**Brazil:** • Reduction in Amazon deforestation (range of estimated reduction: 564 million t CO_2-eq. in 2020) • Reduction in ""Cerrado"" deforestation (range of estimated reduction: 104 million t CO_2-eq. in 2020) • Restoration of grazing land (range of estimated reduction: 83 to 104 million t CO_2-eq. in 2020) • Integrated crop-livestock system (18 to 22 million t CO_2-eq. in 2020) • No-till farming (16-20 million t CO_2-eq. in 2020)

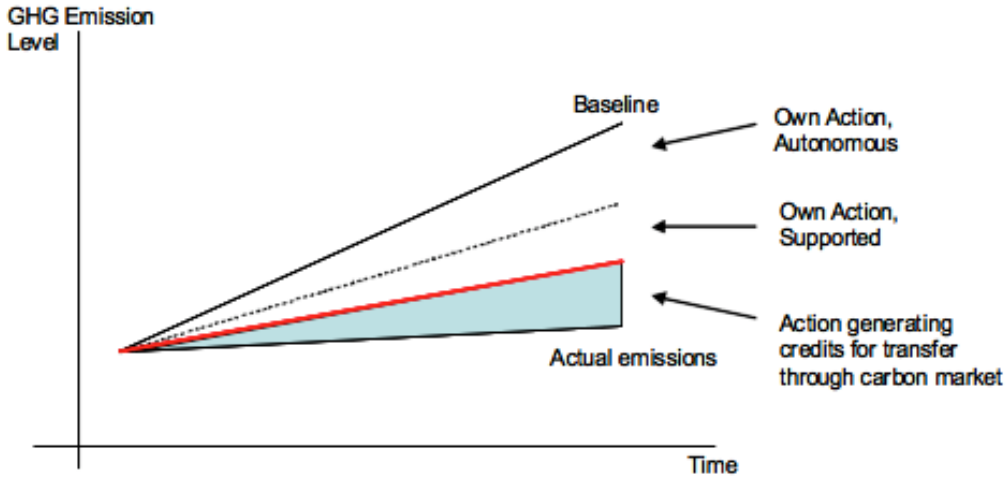
	• Biological N2 fixation (16-20 million tons of CO_2-eq. in 2020) • Energy efficiency (12-15 million t CO_2-eq. in 2020) • Increase the use of biofuels (48-60 million t CO_2-eq. in 2020) • Increase in energy supply by hydroelectric power plants (79-99 million t CO_2-eq. in 2020) • Alternative energy sources (26-33 million tons of CO_2-eq. in 2020) • Iron & steel (replace coal from deforestation with coal from planted forests) (8-10 million t CO_2-eq. in 2020). It is anticipated that these actions will lead to an expected reduction of 36,1% to 38,9% regarding the projected emissions of Brazil by 2020."

2.2 Layers of NAMAs

In addition to different types of NAMAs there is also a discussion about different "layers". Several countries including the EU have proposed to distinguish three layers of NAMAs:

- Unilateral NAMAs, i.e. actions implemented unilaterally by a country from its own resources;
- Supported NAMAs, i.e. additional actions enabled and supported by technology, financing and capacity building;
- Credited NAMAs, i.e. further actions supported through the carbon market.

Figure 1: EU View of Future Developing Country Emissions



Source: European Commission 2009

This concept of three layers has been opposed by many developing countries, though. In particular the crediting of NAMAs is controversial. While many developing countries such as Indonesia, South Korea and South Africa are open to crediting NAMAs, many others such as Brazil and China have opposed this concept. They regard NAMAs as a new form of contribution to protecting the climate that is different from offsetting mechanisms (Teng 2009; UNFCCC 2009a, 2009b).

Critics have also argued that the suggested approach would set up the carbon market to compete with autonomous efforts by developing countries since the carbon market would capture low-cost emission reduction potential and the reductions would then be counted towards Annex I targets rather than towards non-Annex I efforts (Third World Network 2009).

2.3 Legal Form

In addition to the substantive form, there is also controversy about the legal form of NAMAs. Developing countries emphasise that NAMAs are voluntary and should correspond to the capabilities of each Party. By contrast, industrialised countries and in particular the USA have put forward the position that at least for some countries (such as major emitters and emerging economies) NAMAs should be of the same kind as actions by developed countries. Moreover, the USA has stressed that actions by all countries should be of the same legal character, i.e. either voluntary or binding, only the substantive content may differ between countries. Also Australia, Canada, and Japan have demanded legally binding actions by the more advanced developing countries (UNFCCC 2009c).

3 Measuring, Reporting and Verification

3.1 Status of Negotiations

The Bali Action Plan placed measuring, reporting and verification (MRV) at the centre of the future climate agreement. The rigour of the current MRV regime varies widely between Annex I and non-Annex I and between different aspects. As for their emissions, industrialised countries are required to submit annual inventories according to IPCC methodologies and reporting guidelines adopted by the Parties. These inventories are reviewed annually by independent expert teams, with in-country reviews taking place at least every five years. Given the intense focus put into improving the inventories over several years, they are nowadays fairly reliable. By contrast, while industrialised countries are also required to report on their policies and measures and their impacts as well as on the financial and technological support they provide to developing countries, so far no specific standards and metrics have been agreed and the quality of reporting differs widely.

Non-Annex I inventories are submitted as part of their national communications. They are prepared using less rigorous standards than those applied to Annex I inventories, are submitted less frequently and not subject to an international review. Most developing countries have serious capacity constraints. While they are entitled to full cost coverage in the preparation of their inventories, this support is project-based for each individual submission. It is therefore episodic, which makes it difficult to maintain inventory capacity on a continuous basis. The reporting guidelines for policies and measures in developing countries are also less rigorous than for industrialised countries and the quality of reporting varies widely (Breideneich/Bodansky 2009).

In the negotiations, submissions by Parties have so far mainly focused on the broad institutional outlines rather than methodological details of MRV. Submissions have in particular revolved around the different understandings of NAMAs. Industrialised countries have demanded that all actions by developing countries should be subject to international MRV, including actions countries implement using their own resources. As means of MRV, industrialised countries have in particular demanded that developing countries should submit national emission inventories much for frequently and according to more stringent standards than so far. By contrast, developing countries have held that only actions that are enabled by industrialised countries should be subject to international MRV while actions that developing countries take autonomously should be MRVed domestically. They have posited that international MRV of autonomous actions would violate their national sovereignty.

On institutions, there is a consensus that NAMAs should be inscribed into some form of international registry and that this registry could be used as a platform to bring together actions by the South and resources from the North. There is also consensus that there would be technical bodies connected to the registry that would assess the assumptions and methodologies underlying the proposed NAMAs and the required support and to undertake the verification of implementation. But here as well there has been controversy over whether such a registry should register all actions by developing countries or only those enabled by industrialised countries. While some non-Annex I countries such as South Korea have agreed that the registry should also include unilateral NAMS, others such as China and India have held that only enabled actions should be recorded (Moncel et al. 2009).

The Copenhagen Accord has achieved some convergence of positions. According to the Accord, non-Annex I countries will report on the implementation of unilateral mitigation actions through biannual national communications which will include national inventory reports, “with provisions for international consultations and analysis under clearly defined guidelines that will ensure that national sovereignty is respected.” Nationally appropriate mitigation actions that seek international support are to be recorded in a registry, together with technological, financial and capacity building support. These supported actions are to be “subject to international measurement, reporting and verification in accordance with guidelines adopted by the Conference of the Parties.” However, the Accord contains no details on these guidelines

3.2 MRV Options

How to MRV is a function of what purpose MRV is to achieve. One possible purpose would be to simply assess whether the actions are actually taking place. Another, though not mutually exclusive, purpose would be to assess the mitigation impact of those actions. Yet another purpose is to use the results from MRV as basis for planning future actions. Another distinction is whether MRV is undertaken for the purpose of transparency, or for the purpose of generating emission reduction credits which industrialised countries could use for achieving their targets (though as indicated above many developing countries so far oppose the crediting of NAMAs).

Further distinctions are brought in by the different types of actions countries could take. As discussed in chapter 2, what is emerging in the negotiations for developing countries is a framework for highly diversified actions. To recall, what we have under the Copenhagen Accord are:

- National emission neutrality targets;
- National emission intensity targets;
- National emission targets in terms of a deviation from business as usual;
- Sectoral emission targets;
- Specific actions at national and/or local level;

If the COP agrees that any kind of NAMA will be valid, as seems certain, MRVing such different types of actions will require different types of methods. It therefore seems useful to discuss them one by one.

3.2.1 National Emission Neutrality Targets

Emission neutrality means that national emissions are "neutralised" by some means. Bhutan has made its means explicit, it aims to keep its emissions below the amount of GHGs that are being sequestered in its forests. Another possible means is the use of internationally valid compliance units, i.e. assigned amount units (AAUs), certified emission reductions (CERs), emission reduction units (ERUs), or further units the new international agreement may create.

MRV of such a NAMA therefore requires MRV of two elements: A complete inventory of national emissions and MRV of the means of neutralisation. In the case of neutralisation by biomass sequestration the means of neutralisation is included in the national inventory. If emissions trading is used, MRV of neutralisation would simply involve a check of whether a country has acquired and surrendered emission units equal to its national emissions.

Developing countries are already required to submit emission inventories as part of their national communications, the MRV requirements are therefore clear. The further negotiations may to lead to a strengthening of these requirements, bringing them more in line with requirements for Annex I inventories. Most developing countries will probably require capacity building to enable them to meet such new requirements. As discussed above, under current rules developing countries are entitled to full coverage of all costs connected to the development of emission inventories.

One key questions relating to all target-based approaches, including the ones discussed in the following below, is whether MRV is for the purpose of transparency or whether overachievement of such a target should generate tradable emission reduction credits. If there is to be the possibility of generating credits, the emission inventories should be required to be as robust as Annex I inventories to safeguard the environmental integrity of the carbon market. If not, it may not be necessary to raise the requirements for non-Annex I inventories completely to the level of the Annex I requirements.

3.2.2 National Emission Intensity Targets

National emission intensity targets equally consist of two elements: national emissions and the intensity index. The intensity targets submitted under the Copenhagen Accord are denoted in terms of emissions per unit of GDP compared to a base year. MRV of such NAMAs is therefore fairly straightforward and consists of:

- Establishment of total national emissions and national GDP in the base year;
- Establishment of total national emissions and national GDP in the end year;
- Dividing emissions by GDP and comparing the values in the base and end year;

It will obviously also be useful to take stock at intervals, e.g. every two years as envisaged in the Copenhagen Accord, to continuously track a country's progress towards its target.

Here as well MRV will be able to rely on the established conventions for determining national emission inventories and GDP.

3.2.3 National Emission Targets in Terms of a Deviation from Business as Usual

MRV of a deviation from BAU is significantly more complex than MRV of the previous two types of targets. While the previous two types of targets relate to total national emissions, here an emission reduction is aimed for.

Again, two elements are required: An inventory of national emissions and a projection of how national emissions would have developed under business as usual, i.e., a national emissions baseline.

Baseline projections are by definition uncertain as they need to be based on assumptions about the future impact of current policies, the development and penetration of technologies and the development of economic activity. Uncertainties are likely to be especially great for countries that are growing rapidly and where the GHG-intensity of production can vary significantly over the period of the baseline projection, either through technology choice or technology developments. Ellis/Moarif (2009) highlight an example from China, where the IEA in 2000 projected that electricity generation would be 1.5 trillion kWh in 2005, whereas actual generation in 2005 ended up at 2.5 trillion kWh. Schneider/Cames (2009) discuss in detail the practical challenges associated with establishing reliable baselines. As it is not possible to verify assumptions on key emission drivers such as future economic growth and fuel prices, it may not be possible to assess proposed baselines purely on technical grounds and in an objective manner. One key political risk is that countries have an incentive to inflate their baselines in order to weaken the level of effort they have to make.

It may therefore be seen as fortunate that the two countries that dominate non-Annex I emissions – China and India – have notified intensity targets. However, other major emitters such as Brazil and South Africa have notified reduction targets.

Provisions for the MRV of reduction targets may draw from the modalities that have been agreed for Annex I national communications. In contrast to the current rules for non-Annex I national communications, the communications of Annex I countries shall provide one and may provide up to three emission projections:

- A "with measures" projection, which is mandatory and shall encompass currently implemented and adopted policies and measures;
- A "with additional measures" projection, that is, including measures that may be adopted in the future;
- A "without measures" projection, which excludes all policies and measures implemented, adopted or planned after the year chosen as the starting point.

These rules and the experience that has been gained with their implementation may serve as basis for the development of the modalities of MRVing non-Annex I reduction targets.

3.2.4 Sectoral Emission Targets

As national targets, sectoral targets may be absolute, intensity-based or in terms of a deviation from BAU. The above considerations therefore apply mutatis mutandis. While there have been few notifications of sectoral targets under the Copenhagen Accord, there is experience with MRVing sectoral emissions, especially from industrialised countries. For example, UNFCCC inventories are required to have a sectoral breakdown. Other examples are the EU emission trading system and the accounting protocol developed by the Cement Sustainability Initiative. This experience would be especially relevant if sectoral targets where to serve as basis for emissions trading, as aimed for by the EU and other industrialised countries. If no crediting of reductions is envisaged, requirements need not be as stringent.

3.2.5 Specific Actions at National and/or Local Level

If the COP does not restrict the eligibility of NAMAs, which does not seem likely, developing countries may use the whole toolbox of emission reduction policies and measures (PAMs) that have so far been developed and will be developed in future, such as:

- General economic and fiscal PAMs such as energy/CO_2 taxation, emissions trading, abolishment of fossil fuel subsidies;
- Targeted economic and fiscal PAMs, such as subsidies for energy saving investments, feed-in tariffs for electricity from renewable energy sources or from cogeneration of heat and power, or certificate schemes for energy savings or electricity from renewable energy sources;
- Standards such as building codes or efficiency standards for electric appliances or vehicles
- Information, know-how transfer and education PAMs such as PR campaigns, energy analyses (audits), specialised consultancy, demonstration and training activities, energy labelling or driver training.
- Research and development of new technologies.

PAMs may also have very different geographical scopes. In transport, for example, key factors are determined locally rather than nationally, for example what infrastructure is provided for non-motorised transport, individual motorised transport and public transport respectively. From the negotiations so far it would seem that the NAMA concept also includes such local actions. At local level, scopes may again differ. A comprehensive mobility plan for a metropolitan area could include transport demand management measures (e.g. parking fees, road pricing), improvement of public transport (bus rapid transit lines, improvement of the conventional bus system, metro expansion) and non-motorised transport (bike lanes). The NAMA could then be

- One measure (just one bus rapid transit line), or
- A set of measures which are part of such a comprehensive plan (e.g. road pricing, bus rapid transit and metro expansion), or even
- The definition and/or implementation of the whole plan itself (Jung et al. 2010).

The possibilities of MRVing policies and measures (PAMs) are very case-specific and many different approaches are possible. MRV may focus on (Ellis/Moarif 2009):

- Policy inputs, such as the level of a CO_2 tax, a feed-in tariff or an efficiency standard;
- Intermediate outcomes, such as the amount of installed renewable energy generation capacity or the amount of renewable electricity fed into a grid;
- GHG outcomes, either in terms of absolute emissions or emission reductions.

The possibility to measure the GHG impacts of a specific action varies from case to case. In the case of renewable electricity that is fed into a grid it is relatively straightforward to count the amount of electricity that is fed in and multiply that amount with the grid's average emission factor (though establishing a grid emission factor is far from trivial, especially in large countries). By contrast, while it is possible to determine whether a vehicle efficiency standard has been introduced and it is also possible to measure whether transport emissions are declining, it is not possible to know for certain to what extent the decline of emissions is attributable to the policy, or to other influencing factors, such as changing fuel prices. In fact, while there is substantial experience with monitoring and reporting emission reduction PAMs in both industrialised and developing countries, these reports have so far generally been illustrative rather than comprehensive (Ellis/Moarif 2009).

Here again the question becomes relevant whether MRV of NAMAs is for the purpose of transparency or for the purpose of generating tradable emission reduction credits. If the purpose is only transparency, it may suffice to focus on policy inputs and intermediate outputs, rather than investing substantial resources to assess the emission impact of PAMs, which would nevertheless only yield approximate results. One should also bear in mind that the almost complete absence of transport and demand side energy efficiency projects in the CDM is, among other factors, partly due to the difficulties of exactly MRVing emission reductions for those types of projects. How successful developing countries are in reducing their emissions could then be assessed at the aggregate level through much more robust and frequent emission inventories and an international review process. By contrast, if NAMAs are supposed to generate credits, a detailed assessment of emissions and reductions will be necessary to safeguard the environmental integrity of the market.

3.3 Boundaries and Overlaps

Accurate MRV will be especially difficult if several actions overlap. For example, one NAMA may promote the introduction of electricity-saving appliances while another NAMA promotes the expansion of electricity generation from renewable sources. Both actions have the result of reducing electricity generation from fossil fuel power plants. Specifying the emission impact of each NAMA individually would therefore require to separate out the impact of each measure (and important external factors). Such problems could be minimised if such related NAMAs were proposed and evaluated as a package. However, due to their capacity restraints many developing countries may not be able to design comprehensive packages ex ante but may instead develop NAMAs in a more piecemeal approach. This is underlined by the differing levels of sophistication of the NAMAs submitted under the Copenhagen Accord.

The relationship between unilateral and supported NAMAs on the one hand and credited NAMAs on the other hand seems especially complex. In line with the concept of "layers", the determination of additionality and baselines of credited NAMAs would in principle need to take into account all the related unilateral and supported NAMAs. For example, if a country introduces a renewables feed-in tariff as a unilateral or supported NAMA, only those renewable energy installations should be eligible for crediting that are still not profitable despite the feed-in tariff. Otherwise, reductions would be counted twice, first as the reduction of the developing country and second as credits counting towards Annex I targets. Also, if the feed-in tariff NAMA was financed by Annex I countries, they would pay twice for the same reduction: First for the tariff and second for the credits.

In fact, this problem relates not only to the new concept of credited NAMAs but also to the mechanism that is already in place, the CDM. If a country introduces a NAMA to promote renewable electricity, this will also have an impact on CDM projects that are already in place or may be proposed in the future. According to the current CDM rules, new emission reduction policies do not need to be taken into account when determining the baseline of a project (whether this also holds for the determination of additionality has so far not been clarified). The EB made this decision to deal with the perverse incentives problem, where countries otherwise would have had an incentive not to introduce ambitious policies in order not to damage their CDM prospects.

This approach may need to be revised if developing countries start to introduce comprehensive NAMAs at an aggregate level and these are funded by industrialised countries. From the perspective of effectiveness comprehensive approaches are anyway preferable to individual lighthouse projects. However, developing countries will probably only agree to changing the current CDM rules if they can be certain that funding for NAMAs will be an effective substitute for funding under the CDM.

On the other hand, the relationship between the CDM and NAMAs may also be seen the other way around: Using the CDM as a means to implement NAMAs. Several countries have mentioned the CDM in their submissions under the Copenhagen Accord. In the introductions to their submissions, Brazil and Tunisia highlight the need for support from industrialised countries and in this context note that that "use of the CDM is not excluded". Similarly, Georgia mentions the CDM as "one of the most important means for further cooperation in the field of NAMAs". Cameroon and Macedonia list CDM projects as one option for NAMAs. However, this again raises the question how to avoid overlaps and double counting between different support mechanisms.

The exact implications will depend on the specific NAMAs a country is implementing. If a country just sets a target, for example a target of x GW installed renewable electricity capacity, the CDM may easily be conceived as vehicle to meet that target. Also, many of the very specific NAMAs submitted by many of the less developed countries, such as Ethiopia's aim to install 150,000 solar home systems starting from 2010 up to 2015, may easily be conceived in the form of programmatic CDM projects. It will therefore probably be necessary to examine for each specific case what NAMAs a country is implementing and whether these might be compatible or interfere with carbon market mechanisms.

4 Financing and Technology Transfer

4.1 Financing

The issue of finance had been a low priority issue in the climate negotiations for a long time. Although Article 4 of the UNFCCC and Article 11 of the Kyoto Protocol mandate Annex II parties to provide new and additional financial resources to developing countries in support of the development of national communications, capacity-building, development and transfer of technologies, support for adaptation, support for mitigation, etc., demands of developing countries for financial resources used to receive little attention. This has

drastically changed since the adoption of the Bali Action Plan. Throughout the two-year-negotiations between Bali and Copenhagen, finance was negotiated as one of the most important agenda items. Developing countries have constantly reiterated that, in addition to GHG emission reductions, providing sufficient financial support is the other side of the responsibility of industrialised countries in combating climate change. Receiving financial support is therefore a key condition for developing countries to commit to mitigation actions.

Despite the existence of different negotiation items, all negotiations relevant to the finance issue have focussed on addressing either one or both of two topics: mobilisation of the needed amount of financial resources and the institutional structure of funding.

On the mobilisation issue, a report on financial flows produced by the UNFCCC Secretariat put the financial resources needed in 2030 at 130 billion USD for mitigation activities and several tens or possibly hundreds of billions for adaptation in developing countries only (UNFCCC 2008). Other estimates come to similar or even higher results (UNFCCC 2008; United Nations Department of Economic and Social Affairs 2009). These figures go far beyond the total amount of resource flows provided by the existing mechanisms within the climate regime – apart from the CDM, these are the Global Environment Facility (GEF) Trust Fund, the Special Climate Change Fund, the LDC Fund, and the Adaptation Fund – and the resources provided through the funds established outside of the Convention, most notably the World Bank's Clean Technology Fund and Strategic Climate Fund/Pilot Program for Climate Resilience.

One of the main causes of the lack of sufficient resources is that under the current climate regime Annex II Parties provide financial contributions on an ad hoc basis, through replenishment negotiations in the case of the GEF Trust Fund and on a pledge basis in the case of the other funds. Various proposals have been made by Parties, researchers and non-governmental organisations to in future generate a more "automatic" and self-financing funding basis for the climate regime. These include for example international auctioning of assigned amount units as proposed by Norway, a global CO_2 tax as proposed by Switzerland, or the introduction of a levy or emissions trading for international maritime transport and aviation, as proposed by the EU and others. Depending on the design, each of these options could mobilise dozens of billions of Euros per year (Harmeling/Bals/Sterk/Watanabe 2009). Developing countries have demanded that industrialised countries provide a fixed percentage of their GDP annually as the main basis for financing. Industrialised countries generally expect that market-based mechanisms such as the CDM, new sectoral mechanisms or crediting of NAMAs will be able to deliver most of the necessary funding.

Regarding the institutional structure, a broad range of options for the future funding regime can be envisaged and have been proposed. These can be described in terms of three descriptive dimensions (Müller 2009):

- Fragmented or consolidated flows, that is, whether funds flow through one or multiple channels;
- Centralised or decentralised decisions, that is, whether funding decisions are taken by a central body or not;
- Devolved or retained, that is, whether funding decisions are made by recipients themselves or not.

On the first two dimensions, developing countries and industrialised countries have still not overcome the conflict they have had since the establishment of the GEF. Annex II Parties want to provide financing through bilateral or established multilateral channels such as the World Bank and the GEF. They argue that the expertise of these institutions should be used and point to the costs and effort involved with establishing new institutions. By contrast, developing countries perceive the existing institutions to be donor-dominated.

They also complain that the procedures to access funding through these institutions require too much effort. They have therefore proposed to establish a new fund that would be fully accountable to the COP and have a balanced governance structure. Furthermore, in their view only resources provided through such a new fund should be counted towards industrialised countries' financing commitments under the UNFCCC and the Bali Action Plan.

The third dimension is equally controversial. Donor countries want to maintain tight control over expenditures. By contrast, developing countries have requested "direct access" to funds, meaning direct responsibility for the programming of resources at country level. This would allow national and sub-national institutions to directly enter into grant and loan agreements with a funding body without having to rely on implementing agencies. Experience from environment and development financing has shown that assistance is often more effective when the host country government has ownership of the project (Levina/Helme 2009). The Kyoto Protocol's Adaptation Fund has recently agreed on modalities for direct access which may offer important experience for the further development of the UNFCCC's financial architecture as a whole.

Negotiations on new carbon financing mechanisms have largely stalled so far. While in particular industrialised countries have proposed several new concepts such as sectoral crediting, sectoral trading, or crediting of NAMAs, most developing countries have so far not reacted positively. The current negotiation text has little detail of how such new mechanisms would work.

Some progress on the above issues was made in the Copenhagen Accord. The Accord foresees USD 30 billion of "new and additional resources" for adaptation and mitigation activities in the period 2010-2012. In addition, industrialised countries commit to a goal of mobilising jointly USD 100 billion a year by 2020. The funding is supposed to come "from a wide variety of sources, public and private, bilateral and multilateral, including alternative sources of finance." (para. 8) The CA envisages the establishment of a "High Level Panel" to study the potential contributions from different sources of revenue (para 9). Such a panel has in the meantime been established by UN Secretary-General Ban Ki-moon.

The CA also establishes a "Copenhagen Green Climate Fund". The Accord decides that the Copenhagen Green Climate Fund shall be established as an operating entity of the financial mechanisms of the Convention to support projects, programmes, policies and other activities in developing countries related to mitigation including REDD-plus, adaptation, capacity building, technology development and transfer (para. 10).

However, the CA contains no details on the implementation of the fund. In addition, the negotiations since Copenhagen have made clear that the fundamental differences still persist. The negotiations in June 2010 again saw significant controversy around the role of the World Bank, to what extent the COP should have oversight etc.

4.2 Technology

Similar to the finance issue, technology transfer was treated as a low-priority topic in the climate negotiations until Bali, where it became one of the building blocks of the Bali Action Plan.

The controversies on technology have been similarly structured as those on finance. Here as well developing countries have demanded a dedicated mechanism to promote technology transfer that would be funded by

industrialised countries. Industrialised countries have in essence argued that technologies follow investments and have put the onus on developing countries to improve their national framework conditions to attract foreign direct investment.

Negotiations accelerated in 2009, leading to high expectations for Copenhagen to reach an agreement. Even though a final agreement could not be reached in the end, most of the different options in the text could be deleted. According to the final technology text from Copenhagen (UNFCCC 2009d), a technology mechanism will be established. It will consist of a permanent Technology Executive Committee, which will replace the current Expert Group on Technology Transfer, and a Climate Technology Centre.

The Executive Committee will act as oversight board to the mechanism, and will, inter alia, provide analysis on policy and technical issues, prepare criteria for support eligibility, consider actions to remove barriers to technology transfer, as well as monitor and assess technology-related action and support both for adaptation and mitigation. Decisions on guidance, membership and voting rules of the committee have not yet been taken.

The Technology Centre will, inter alia, provide advice for the preparation of Technology Needs Assessments in developing countries as well as training, information and workforce development programmes, improve access to publicly available information, and establish national and regional technology innovation centres. The Technology Centre will get support by regional units and by a climate technology network that is to be established to facilitate cooperation, e.g. with national institutions or other international technology centres. The details of establishing the centre and its network structure as well as financing modalities will be covered in future negotiations.

Disagreement remains on the relationship of the technology mechanism with the future financial mechanism under the Convention. The two options currently present in the text would give either the technology mechanism or the financial mechanism more leverage over funds.

Further disagreements revolve around intellectual property rights (IPRs). IPRs were firstly raised by China as one of the barriers preventing smooth technology transfer, which has since been taken up by many developing countries. By contrast, developed countries stress the necessity to keep strong IPR protection to encourage research, development, dissemination, and deployment.

In summary, the technology negotiations have advanced significantly but there are still substantial differences to be overcome in the further negotiations.

5 Conclusions

According to the Bali Action Plan (BAP), the current negotiations on the future climate regime include consideration of "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." However, neither the Bali Action Plan nor the subsequent negotiations have provided a specific definition of NAMAs. It seems likely that in the end a very broad approach will be used where any action will in principle be eligible as long as it can be shown that it reduces emissions.

The highly diversified nature of the actions developing countries are probably going to take poses substantial challenges to the MRV of NAMAs as called for in the Bali Action Plan. Accurate MRV will be especially difficult if several actions overlap. A fundamental question is whether MRV is for the purpose of transparency or for the purpose of generating tradable emission reduction credits. If the purpose is transparency, it may suffice to focus on whether actions are actually implemented and MRVing intermediate indicators that have a positive correlation to GHG emissions. The overlap of actions would probably also not cause much difficulty in this case. By contrast, if NAMAs are supposed to generate credits, a detailed assessment of emissions and reductions will be necessary for each NAMA that is to be credited to safeguard the environmental integrity of the market.

Generally, how to MRV NAMAs does not yet seem to be well understood. While the literature does go into some details of possible options, the negotiations have so far mainly focused on the broad outlines of the MRV mechanism: Whether to MRV nationally or internationally, how often to MRV and through which channels reporting should take place. However, there has been little consideration of the details of what parameters should be MRVed in what way. It will therefore be necessary to further investigate how NAMAs could actually be MRVed on the ground and how to accommodate the broad range of actions developing countries are probably going to take.

While the provision of finance and technology formerly used to be treated as a marginal agenda item by developed countries, under the Bali Action Plan it has become one of the key building blocks of the negotiations. However, the negotiations have so far mainly focused on the broad institutional outlines rather than specific delivery mechanisms. While developing countries have demanded centralised mechanisms under the authority of the COP and the possibility of direct access to funding, industrialised countries prefer bilateral channels or established multilateral institutions such as the World Bank. The Copenhagen Accord brought some convergence of views in deciding that a new fund and a technology mechanism shall be established. However, the exact scopes and mandates of these institutions are yet to be determined. In particular the question what specific activities the technology mechanism should undertake is not yet well-defined.

The relationship between NAMAs and the carbon market is so far unclear. Industrialised countries envisage the carbon market as main vehicle to finance NAMAs and urge developing countries to adopt sectoral targets as basis for sectoral trading mechanisms. However, many developing countries so far resist the use of emission reductions from NAMAs as a means for Annex I countries to comply with their targets.

The relationship between NAMAs and the carbon market is equally unclear in practical terms. To prevent double counting of emission reductions, the determination of additionality and baselines for any generation of credits, be it credited NAMAs or CDM projects, would in principle need to take into account all the related unilateral and supported NAMAs. According to the current CDM rules, however, new emission reduction policies do not need to be taken into account when determining the baseline of a project. This rule, however, has the effect that eventually, as more and more ambitious policies are getting implemented, any project could pass the additionality test

The current CDM rules may therefore need to be revised if developing countries start to introduce comprehensive NAMAs at an aggregate level and these are funded by industrialised countries. The result of such a rule change might be to severely restrict the scope of the CDM as probably only reduction options with relatively high costs would remain eligible. At a recent workshop attended by the author an industry representative voiced the fear that the implementation of comprehensive NAMAs might “throw the CDM completely

out of whack." From the perspective of effectiveness, though, comprehensive approaches that aim at a sector-wide transformation are usually preferable to individual lighthouse projects.

However, here as well the exact impact will depend on the specific NAMAs a country is implementing. If a country just sets a target, for example a target of x GW installed renewable electricity capacity, the CDM may actually be used as vehicle to meet that target. Also, many of the very specific actions submitted by many of the less developed countries, such as Ethiopia's aim to install 150,000 solar home systems starting from 2010 up to 2015, may easily be conceived in the form of programmatic CDM projects. It will therefore probably be necessary to examine for each specific case what NAMAs a country is implementing and whether these might be compatible or interfere with carbon market mechanisms.

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