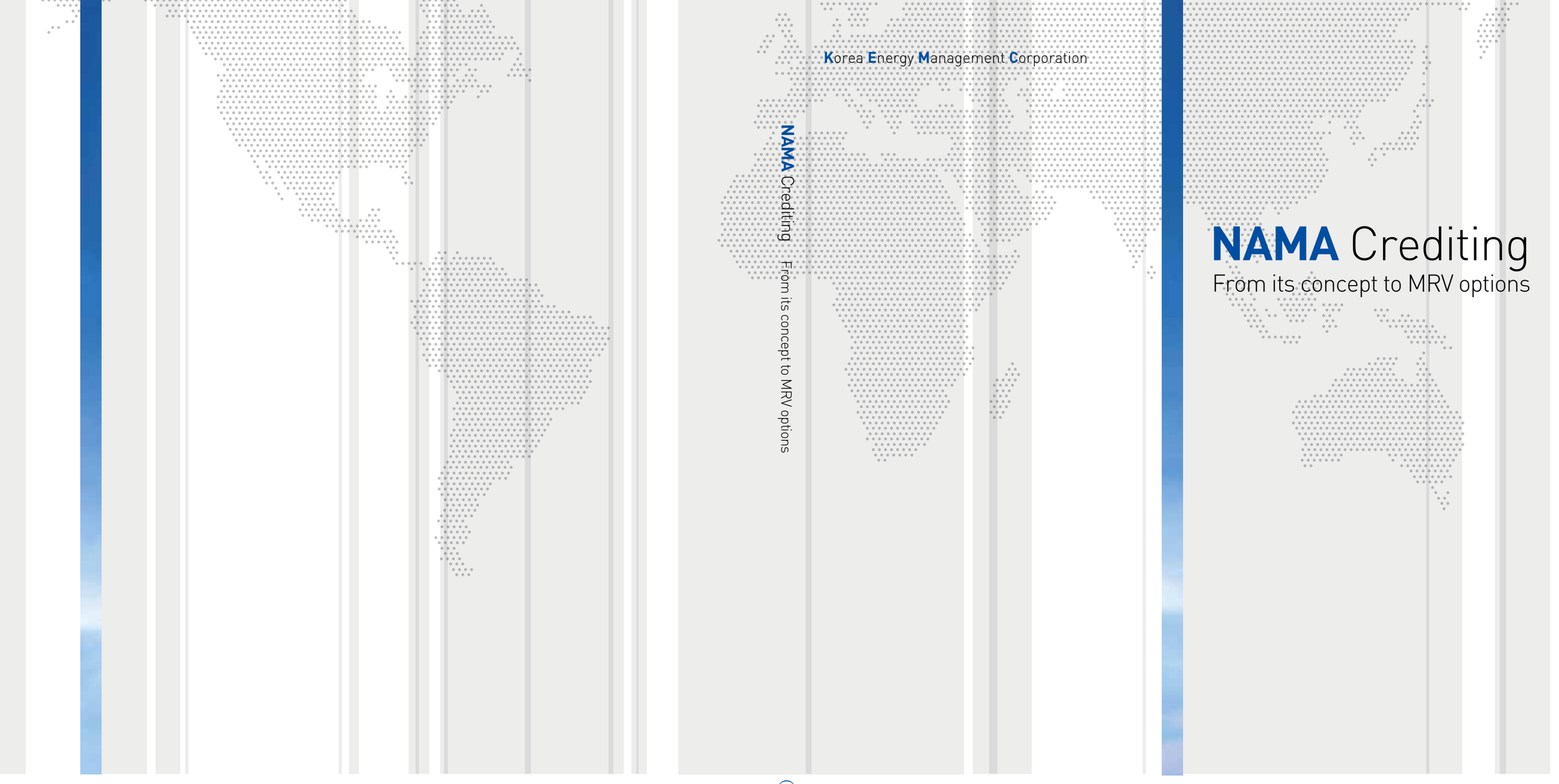

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Korea Energy Management Corporation

NAMA Crediting
From its concept to MRV options

KOREA ENERGY MANAGEMENT CORPORATION

NAMA Crediting

From its concept to MRV options

KEMCO GHG Certification Office

NAMA Crediting:
From its concept to MRV options

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I CONTENTS I

I ABBREVIATION I

CDM	Clean Development Mechanism
CER	Certified Emission Reduction
FIT	Feed-in-tariff
GHG	Greenhouse Gas
IET	International Emissions Trading
KEMCO	Korea Energy Management Corporation
KEPCO	Korea Electric Power Corporation
KPX	Korea Power Exchange
LFG	Landfill Gas
MRV	Measurement, Reporting, and Verification
MSW	Municipal Solid Waste
NAMA	Nationally Appropriate Mitigation Action
NMM	New Market Mechanism
NLDC	National Load Dispatch Center
RDF	Refuse Derived Fuel
REC	Renewable Electricity Certificate
RPO	Renewable Purchase Obligation
RPS	Renewable Portfolio Standard
SLDC	State Load Dispatch Center
SMP	System Marginal Price
UNFCCC	United Nations Framework Convention on Climate Change

I FORWARD I

Looking back to more than a decade ago when its major standards and procedures were being shaped, it was most uncertain to us what was likely to be CDM. The current number of registered CDM projects could not have been imagined even then without the belief in its considerable potentials. Though it is still facing several challenges, no one can deny the past remarkable outcomes of CDM. More importantly, CDM has given us many invaluable lessons from what we have so far experienced through the learning-by-doing processes.

NAMA crediting is currently at its concept stage. In the context of its comprehensive and performance-based nature, some are talking about great potentials for NAMA crediting, but such potentials look not clear to others. This paper aims to assist these international discussions about what should be NAMA crediting by emphasizing its positive effects with the belief that its unseen barriers could be possibly overcome through what we have learned, for example, from CDM as well as other voluntary crediting schemes. In addition, particular attentions are paid to what roles NAMA crediting could play and how it could be evaluated under various conditions.

To this end, this paper explores underlying concepts and MRV options of NAMA crediting, particularly highlighting what is different from CDM, with the aim of, not replacing but complementing CDM. To find the applicability of NAMA crediting to real situations, some regulatory policies to promote renewable electricity generations are focused on, especially in terms of whether their baseline scenarios and monitoring systems are acceptable in the regime of international emissions trading. Though it looks a little early to conclude, it can be seen that those policies have great potentials for NAMA activities and thus can be emulated by other developing countries which have not yet considered such kind of policies.

Finally, we would like sincerely to thank all the authors for taking time to contribute to this paper. Special thanks to Dr. Axel Michaelowa from Perspectives and University of Zurich for providing insightful views on future potential of NAMA crediting; Mr. Swapan Mehra from IORA Ecological Solutions for providing comprehensive information on RPO in India including its potentials as a NAMA activity; and Mr. Inchul Hwang from KEMCO for putting forward more specific concepts on what should be NAMA crediting in the future.

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A TYPOLOGY OF POLICY INSTRUMENTS AND THEIR APPROPRIATENESS FOR NAMA CREDITING

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ABSTRACT

The mitigation impact of policies was excluded from crediting under the CDM, with the programmatic approach being provided as "alternative". While the concept of NAMAs has never been defined and ranges from projects to sectoral and national emissions commitments, the most innovative approach to NAMAs would be introduction of policy instruments that regulate or incentivise emissions reductions. Whether the emission impacts of such policy instruments can be credited depends on the nature of the policy instrument. Moreover, in order to ensure environmental credibility, the additionality of policies needs to be assessed. This means that mitigation costs of the policies need to be positive, taking into account co-benefits of mitigation.

Critics of NAMA crediting say that setting of robust baselines is impossible. This is not true, as defining national commitments is routinely done on the basis of similarly uncertain baselines. For all policies, baseline determination becomes more difficult the longer the crediting period is. Thus, an update of baselines should be undertaken in regular intervals; also countries without mitigation policies could serve as baseline proxies. Emissions impacts of direct regulation of technologies and policies directly providing monetary incentives in form of a carbon tax or a production subsidy for low-carbon technologies can be determined, monitored and verified in a relatively simple fashion. Policies with highly lagged, indirect emissions impacts should not be credited. Eventually, policy crediting should co-exist with project-based crediting.

1. The glaring gap: excluding policy crediting from the CDM

The Kyoto Protocol's most innovative element was the definition of three market mechanisms. The Clean Development Mechanism (CDM) and Joint Implementation (JI) are based on projects that generate offset credits. These credits can be used by industrialized countries to fulfil their emissions commitments under the Kyoto Protocol. CDM is limited to projects in developing countries without emissions commitments, JI to projects in countries with such commitments. International Emissions Trading (IET) allows countries with commitments to sell surplus emissions budget to countries whose emissions exceed their budget.

While policies incentivizing or mandating emissions reductions are crucial to free emissions budget for sale under IET, they were a key bone of contention in CDM rulemaking at an early point in time. This is due to the concept of "additionality" which requires that projects are not "business-as-usual". Should the introduction of a mitigation policy now change the business-as-usual path? Initially, CDM regulators thought so regarding all policies mandating a mitigation technology, e.g. landfill gas recovery. Baseline methodologies required such policies to be taken into account as soon as they were introduced. If this approach would have been extended to all mitigation policies the CDM could become an obstacle to the introduction of such policies. Already in March 2004, the CDM Executive Board decided that policies should not be taken into account in the baseline if this created perverse incentives to delay introduction of these policies. Therefore, in November 2005, it decided that this would apply to "national and/or sectoral policies or regulations that give comparative advantages to less emissions-intensive technologies over more emissions-intensive technologies" introduced after 11 November 2001. These policies were called "E-" policies. Essentially the decision meant that any financial incentives for mitigation projects would not jeopardize their additionality under the CDM even if they were hugely attractive due to the incentive. It is no surprise that a massive volume of renewable power projects from countries with feed-in tariffs flowed into the CDM.

At the same meeting in November 2005 on which the decision on E- policies was taken, the CDM Executive Board discussed whether "local/national/regional policy, standards and programmes" could become CDM projects but could not come to an agreement (UNFCCC 2005a, para 22). It thus asked the COP to decide on this issue. In its decision 7/CMP.1, the COP decided that a local/regional/national policy or standard "cannot be considered as a clean development mechanism project activity" (UNFCCC 2006, para 20). As an alternative it introduced the concept of "Programme of activities" (PoA). PoAs allow to bundle an unlimited number of projects or a duration of 28 years under one registration. While initially, the uptake of PoAs was slow, they took off after the EU introduced the rule that projects registered after the end of 2012 could not export credits into the EU emissions trading scheme. PoAs also managed to mobilize small-scale, dispersed projects in rural settings. Nevertheless, they did not lead to the development of policies aiming at triggering PoAs.

When in 2007 the concept of voluntary Nationally Appropriate Mitigation Actions (NAMAs) by developing countries was introduced in the Bali Action Plan, the definition stated that NAMAs should be "supported and enabled" by financing. The Republic of Korea (2008) proposed that financing could be mobilized by awarding credits to NAMAs. This would replicate the incentive of the CDM where projects could pay back loans using credit revenues. The proposal stressed that the introduction of NAMA crediting would require a significant strengthening of industrialized country commitments. Alternatively, credits should be discounted. In 2011, Costa Rica, Colombia and Peru also mentioned the possibility to use revenues from market mechanisms for financing their NAMAs. Current proposals under the FVA include elements of NAMA crediting such as the Japanese bilateral mechanism, a Swiss

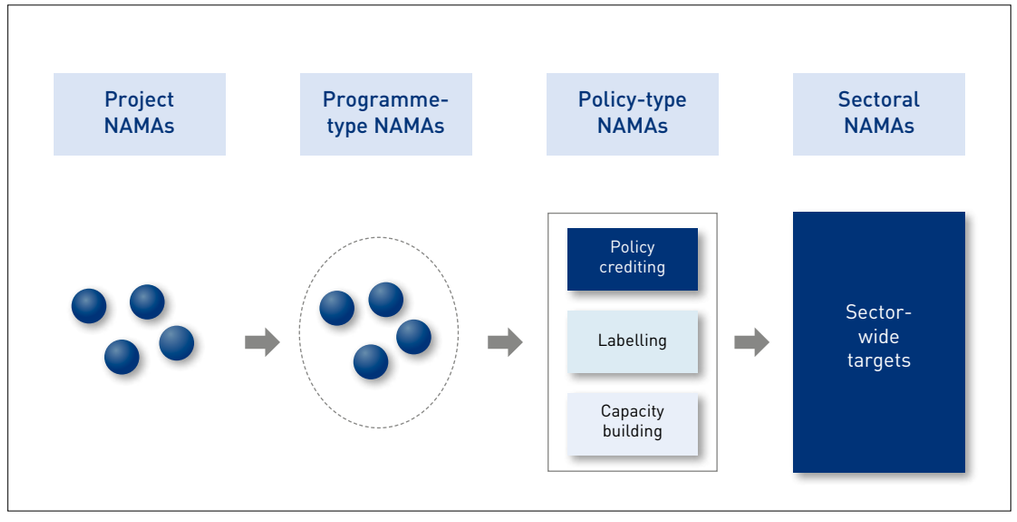
proposal for sectoral crediting with a unilateral NAMA component and a Norwegian proposal for results-based payments for sectoral action (Röser and de Vit 2012).

So far, no definition of NAMA has been provided by the UNFCCC process. This has been deliberate to ensure that the broadest possible range of mitigation is covered. Conceptualization of NAMAs thus ranges from specific mitigation projects similar to the CDM over PoA-type arrangements over policy instruments to sectoral or even national mitigation commitments (see Figure 1).

In the remainder of the paper, I will focus on policy instruments given that project- and PoA crediting is well known, whereas sectoral crediting has been analysed in detail (see e.g. Dransfeld et al. 2011). It should be noted that Röser and de Vit (2012) criticize project-based crediting for excluding certain sectors and not achieving a transformation of the economy.

With the downturn of the global carbon markets since 2011, the concept of NAMA crediting has become increasingly opposed. South Pole (2011, p. 6) thus proposes to use PoAs for "de facto" NAMA crediting, by issuing CERs to the PoA.

Figure 1. **Different types of NAMAs according to scale**



Note. **All NAMAs in dark blue are principally amenable to crediting.**

Röser and de Vit (2012, p. 5) state bluntly that policy crediting is "unlikely to be feasible due to the difficulties of setting boundaries and baselines". The expectation that NAMA crediting will not become a reality is also illustrated by Seppänen et al. (2013) who do not discuss NAMA crediting in their study on fragmented carbon markets in the future. One key reason for opposing crediting of NAMAs is the fear of double counting – the emissions reduction would be accounted both by the credit buyer as well as the credit seller.

The IPCC (2013, p. 20) calculates the remaining emissions budget to reach the agreed goal to limit global warming to 2°C from preindustrial levels at just around 1 billion t CO_2 eq.. This will be exhausted in 20 years at current emissions levels as calculated by UNEP (2012). Therefore, we will need all mitigation options at our hand to reach an emissions path consistent with the 2°C target. NAMA crediting needs to play a key role in harnessing these options.

2. NAMA crediting: key criteria

The decision rejecting policy crediting under the CDM (UNFCCC 2006, para 20) specifies criteria for good CDM: the use of approved baseline and monitoring methodologies that "define the appropriate boundary, avoid double counting and account for leakage, ensuring that the emission reductions are real, measurable and verifiable, and additional to any that would occur in the absence of the project activity". These criteria have been retained by the UNFCCC in the design of

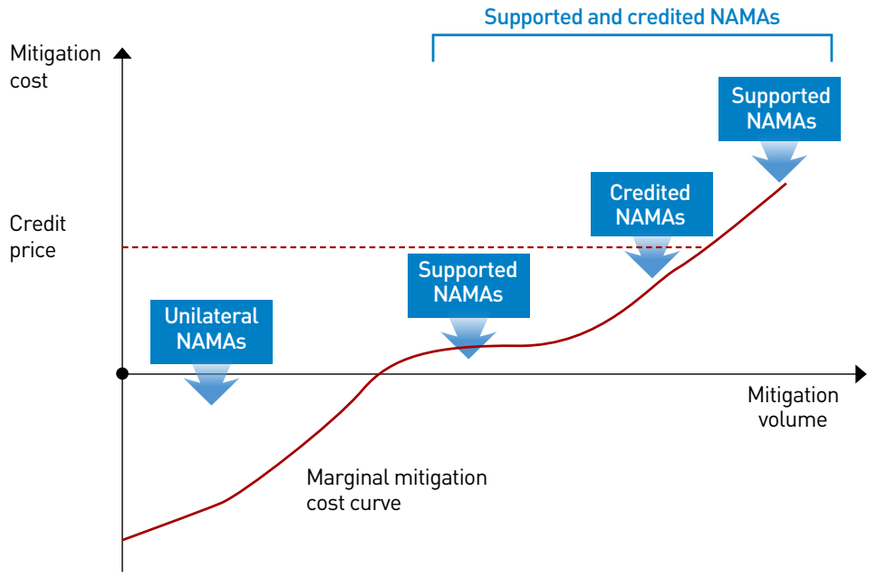
new market mechanisms. So if these criteria can be adhered to by credited NAMAs, they should be acceptable to the global climate policy community.

Michaelowa (2012) sees the main interest of NAMA crediting in governments hoping that they could recoup part of or the entire policy instrument cost through the sale of the credits. Partial recouping of costs would be sufficient if policy implementation generates externalities such as reduction of local pollution or improvement of infrastructure.

In order to safeguard additionality, NAMAs should theoretically be differentiated according to their marginal abatement cost. NAMAs with negative marginal abatement costs should not be creditable. Those with very low marginal abatement costs (e.g. industrial gas reduction in emerging economies) as well as costs above the credit price should be candidates for direct financial support through grants from industrialized countries. NAMAs with positive costs that remain below the credit price would be the ideal candidates for crediting (see Figure 2).

Of course, reality is more complicated, as externalities have to be taken into account and non-monetary barriers may prevent mitigation at seemingly negative costs. Okubo et al. (2011) stress that compared to concrete emission reduction projects, assessment of the additionality of NAMAs is difficult. Nevertheless, additionality needs also be taken into account to assess the stringency of national emissions commitments of industrialized countries. So we cannot argue that the basis for policy crediting is unavailable while we take implicit decisions on additionality of policies in the negotiation of country-level commitments....

Figure 2. **Differentiation of NAMAs according to additionality**



3. Typology of mitigation policies and their appropriateness for crediting

Given the opposition to NAMA crediting generated by the potential of double counting as well as the possibility to open the floodgates for generation of emissions credits, it is crucial that NAMAs are only credited if it can be convincingly be shown that the emission reductions underlying the credits are real. Therefore, I assess different classes of policy instruments with regards to their appropriateness to generate NAMA credits. This builds on the assessment by Okubo et al. (2011) who see a challenge to define procedures that are conservative and still provide incentives to embark on policies with long-term and indirect effects, given only a subset of policy options leads to directly quantifiable emission reductions.

Mitigation policies can take the form of direct regulation. This can come in several forms:

- Prohibition of the use of highly emitting technologies, like the prohibition of incandescent light bulbs in the EU
- Mandating of low-emission technologies, like carbon capture and storage for new coal power plants
- Efficiency standards, like car fuel efficiency standards
- National or sectoral emissions cap-and trade systems

The emissions level after introduction of the policy can principally easily be determined as the number of technology applications times their energy use times the emissions factor per energy unit. Identifying the baseline is relatively easy at the start of the policy as the emissions intensities of the existing technologies are known. However, defining the baseline will become more difficult over time. While in some possible futures, low-carbon technologies would have diffused substantially, in others they would not have been taken up. An approach to solve this dilemma would be to look at a country of similar characteristics that has not introduced any regulation as a "baseline control case". Moreover, baselines should be updated in regular intervals to take into account technology developments. As in the case of additionality determination, baseline definition is difficult, but will not be more difficult than assessing baselines underpinning national emissions commitments. So policymakers either have to give up on both policy baselines and baselines for national commitments, or accept the uncertainties equally in both cases.

A mandatory national or sectoral emissions trading system's difference between baseline emissions and allowance volumes would be a highly credible NAMA credit provided the baseline is realistic. The history of domestic emission trading systems is littered with overestimated baselines, so checking realism of the baseline is paramount for credibility of the mitigation outcome.

Financial incentives – "sticks" and "carrots" - for mitigation can take a number of forms. They range from emissions taxes over investment subsidies to production subsidies (such as renewable electricity feed-in tariffs). Emissions under emission taxes are extremely easy to monitor if the tax base is assessed correctly, but determination of baseline emissions is as difficult as in the case of a domestic emissions trading system. Investment subsidies requires monitoring of several parameters while emissions from production subsidies are easier to assess (see Table 1).

R&D support and Information instruments such as labels are extremely difficult to evaluate with regards to their impact on emissions. They are thus no candidates for creditable NAMAs. While this is criticized by Röser and de Vit (2012) who hope that "transformational policies" with indirect emissions impact would be promoted by NAMAs, in my view most policies of this type do not really depend on the availability of financial resouces.

Butzengeiger et al. (2012) see the differing legal character of emitters - state-owned companies, public-private entities, or private businesses – as crucial when it comes to their reactions on the same type of policy. Public actors can be directed to apply certain mitigation measures, whereas private emitters need monetary incentives or strong regulation to mitigate emissions compared to business-as-usual. So policy instruments will lead to different mitigation impact under different circumstances.

4. MRV options for NAMA crediting

From the genesis of the concept of NAMA crediting, robust MRV has been seen as key element of NAMA crediting (Republic of Korea 2008). Given that since then the support for NAMA crediting has visibly waned, a credible MRV is the key to rally support for NAMA crediting. In the context of additionality determination, policy implementation costs, i.e. the government outlays for administering the policy and providing incentives should be compared with the projected mitigation in order to derive marginal mitigation cost. If there is agreement on baseline setting, monitoring parameters of policies should be relatively easy.

Table 1. **Key parameters monitored for mitigation policies**

Policy	Parameters	Frequency
Technology prohibition, technology mandate, efficiency standards	Enforcement of prohibition/mandate, number of installations of new technology (differentiated in technology classes), energy/fuel use of installation (default value possible), emissions intensity per unit of energy/fuel (default value possible)	Annually
Cap and trade system	Allocation level, emissions of covered installations	Annually
Emission tax	Emission tax payment	Annually
Investment subsidy	Installations receiving the subsidy, output, emissions intensity per unit of output	Annually
Production subsidy	Subsidized output, emissions intensity per unit of output	Annually

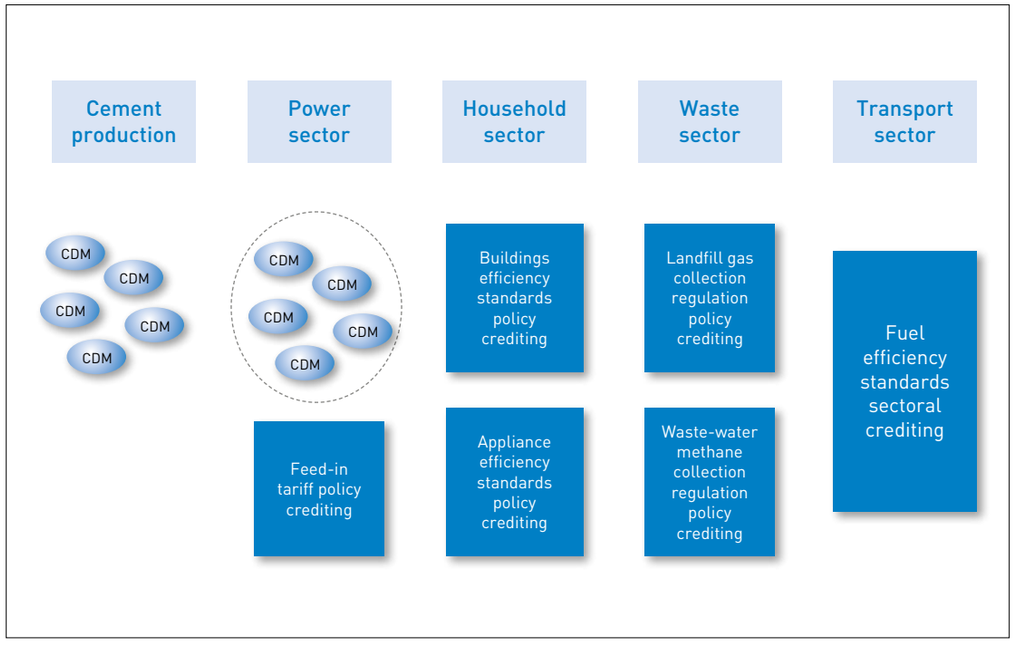
Okubo et al. (2011) analyse a renewable energy feed-in tariff in Korea and a nationwide demand-side management program in Thailand. For the former, they find that additionality and emission impacts can be assessed, but require centralized, transparent data collection systems, and an effective sector organization. In their view, the Thai energy efficiency policy would not suitable for NAMA crediting under a stringent approach.

As learned under the CDM, independent verification is crucial to safeguard environmental integrity of credits. Ideally, CDM-accredited verifiers would check the parameters applied for monitoring of NAMA success.

5. Conclusions

NAMAs are extremely diverse and thus not all of them are appropriate for crediting. As with all crediting mechanisms, determination of baseline emissions is a challenge, especially with growing duration of the crediting period. Michaelowa (2012) sees standards promoting household energy efficiency as ideal policies for a NAMA crediting approach. Also, the transport and waste sector are promising targets for NAMA crediting. However, the current tendency to re-label CDM projects as NAMAs does not really make sense; it would be better to revive the CDM market instead of generating vague hopes for NAMA crediting resolving the crisis on the international carbon market. Figure 3 shows an ideal coexistence of mechanisms for different economic sectors.

Figure 3. Coexistence of NAMA crediting with the CDM



References

Butzengeiger, Sonja; Dransfeld, Björn; Cames, Martin; Michaelowa, Axel; Healy, Sean (2012): New market mechanisms for mitigation: Getting the incentives right, in: Michaelowa, Axel (ed.): Carbon Markets or Climate Finance? Low carbon choices for the developing world, Routledge, New York, p. 146–167

Dransfeld, Björn; Michaelowa, Axel; Cames, Martin; Healy, Sean (2011): Design of the post-2012 climate regime: Sectoral approaches for greenhouse gas mitigation. Incentives for mitigation investments, Climate Change 14/11, German Federal Environment Agency, Dessau

IPCC (2013): Climate Change 2013: The Physical Science Basis. Summary for Policymakers, Stockholm

Michaelowa, Axel (2012): Can New Market Mechanisms Mobilize Emission Reductions from the Private Sector?, Discussion Paper ES 12-1, Harvard Project on Climate Agreements

Okubo, Yuri; Hayashi, Daisuke; Michaelowa, Axel (2011): NAMA crediting: how to assess offsets from and additionality of policy-based mitigation actions in developing countries, in: Greenhouse Gas Measurement & Management, 1, p. 37–46

Republic of Korea (2008): Market-based Post-2012 Climate Regime: Carbon Credit for NAMAs, non-paper for UNFCCC negotiations

Röser, Frauke; de Vit, Caroline (2012): Nationally Appropriate Mitigation Actions (NAMAs) and Carbon Markets, Policy Update IV, Ecofys

Seppänen, Sampo; Ahonen, Hanna-Mari; Ollikainen, Juha; Viljaranta, Suvi; Hoogzaad, Jelmer; Huber, Suzy; Conway, Darragh; Chagas, Thiago; Fernandez, Mercedes (2013): Demand in a Fragmented Global Carbon Market: Outlook and Policy Options, TEMA Nord 2013:525, Copenhagen

South Pole (2011): How to develop a NAMA by scaling up ongoing programmatic CDM activities on the road from PoA to NAMAs, Frankfurt

UNEP (2012): The emissions gap report, Nairobi

UNFCCC (2005a): Executive Board of the Clean Development Mechanism. 22nd meeting, CDM EB 22, Montreal

UNFCCC (2005b): Clarifications of the consideration of national and/or sectoral policies and circumstances in baseline scenarios, EB 22 report, Annex 3, Bonn

UNFCCC (2006): Decision 7/CMP.1. Further guidance relating to the clean development mechanism, in: UNFCCC: Report of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol on its first session, held at Montreal from 28 November to 10 December 2005. Addendum. Part Two: Action taken by the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol at its first session. Decisions adopted by the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol, FCCC/KP/CMP/2005/8/Add.1, Bonn, p. 93-99

C-NAMA: A NEW PERSPECTIVE ON MARKET MECHANISM

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KEMCO

ABSTRACT

Republic of Korea submitted its view on New Market Mechanism (NMM) in June 2013. It proposed C-NAMA as a form of NMM. It is an updated version of NAMA crediting which was previously submitted in 2009. C-NAMA has a hybrid framework of central credit management by Facilitative Body and decentralized methodology determination by host country. And it satisfies all the principles of NMM specified in COP decisions. It is a host country-friendly mechanism with its flexible MRV scheme of Performance Indicator and Tiered Approach. Policy-based NAMAs will be the main target of crediting. Wider participation by developing countries will be ensured with flexible MRV. And it guarantees the environmental integrity by following the process of CDM and pursuing central management of NAMA credits. Many questions have been raised about the detailed design of C-NAMA, which were not specified in Korea's submission. This paper is trying to provide more clarifications, elaborations and recommendations on C-NAMA. The author hopes this paper help Parties to better understand C-NAMA and provide food for thought about what NMM will be and how it will be like.

1. Introduction

The 21st Century has witnessed a never-heard-of new market - carbon market. Its commodity is invisible but produces a considerable wealth. Carbon market was once hailed as "goose that lays golden eggs" since it brought a huge amount of earnings to investors and created new businesses such as carbon finance and carbon project developer. This carbon rush originates from the demand by developed countries to meet their GHG emissions reduction commitment under the Kyoto Protocol. The Kyoto Protocol created market mechanisms called Kyoto Mechanisms to help developed countries meet their commitment in cost-effective way. Among Kyoto Mechanisms, CDM (Clean Development Mechanism) has played a key role in expanding global carbon market. Also it has been criticized for their limits such as uneven project distribution, higher transaction cost and long project cycle. But now the carbon market has been turned to "ugly duckling" as carbon price has been plummeted due to the lack of demand by developed countries and plethora of supply by developing countries. Now a magic wand may be needed to turn the golden goose back. New Market-based Mechanism (NMM) has been discussed as a would-be magic wand to revitalize the carbon market and achieve scaled-up GHG mitigation in cost-effective way. The discussions on NMM started at COP 13 in Bali with Bali Action Plan 1 (b) (v) paragraph - "various approaches, including opportunities for using markets, to enhance the cost-effectiveness of, to promote, mitigation actions, bearing in mind different circumstances of developed and developing countries." "Opportunities for using markets" is interpreted as mentioning NMM. According to the paragraph, NMM needs to be cost effective and promote mitigation actions and bear in mind different circumstances of developed and developing countries. General understanding on NMM is that it needs to be scaled-up mitigation actions and build upon experiences from existing Kyoto Mechanisms. This means that NMM will go beyond project level and be designed to overcome the limits of Kyoto Mechanisms. There have been several submissions on NMM by Parties and NGOs such as European Union's Sectoral Crediting/Trading and Republic of Korea's Credited NAMA Mechanism (C-NAMA). This paper is trying to provide explanation, clarification and further elaboration about C-NAMA.

2. C-NAMA: Korea's Idea on New Market Mechanism

Republic of Korea submitted its view on NMM in June 2013. It proposed C-NAMA as a form of NMM. C-NAMA is an updated version of NAMA Crediting which was submitted in 2009. The basic idea behind C-NAMA is that the best candidate activity for NMM is NAMA and NAMA can be credited. The fundamental difference between Kyoto Mechanism and NMM is their size of mitigation actions. NMM is a scaled-up mitigation action. Therefore it needs to go beyond project-based scale. NAMA is eligible for this requirement. The definition and scope of NAMA is various. But it is widely accepted that NAMA is domestic policies and programs to reduce GHG emissions. Each Party has its NA-

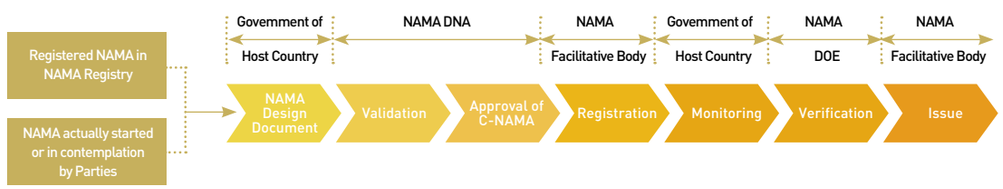
MAs in its own way. So if we have a system to recognize the emission effect of NAMAs, then every Party will have access to carbon credits from NAMAs. Korean submission provides the ideas on the very system and proposes to capture the opportunities arising from NAMAs. NAMA is literally "nationally appropriate" action. It has a wide spectrum of form, scope and governance under different national circumstances. NMM needs to reflect these differences. So, NMM should be designed in a nationally appropriate way. A new perspective and approach for NMM is needed the same way as new wineskins are needed for new wine. Unlike Kyoto Mechanism, the main actor in C-NAMA is public sector since the government and public agencies are implementing NAMAs. C-NAMA is built on the trust in sovereignty of Parties and respect for nationally appropriateness of each NAMA. The details of C-NAMA are described as below.

2-1. Governance of C-NAMA

There are four actors in C-NAMA: Government of Host Country; NAMA Designated National Authority (DNA); Facilitative Body; NAMA Designated Operational Entity (DOE). Governments of Host Country are central (local) ministries or authorized agencies which are in charge of implementing NAMA activities. They make NAMA design document (NDD), implement and monitor C-NAMA activities and get NAMA credits. NAMA DNA is a national authority on C-NAMA. It receives, validates and approves NDDs submitted by NAMA-implementing Ministry. Facilitative Body is a central body established under the COP which registers NDD, approves new methodology, manages (issues, transfers and retires) NAMA credits and supports host countries by providing various capacity building. Lastly, NAMA DOE is a third-party verifier which verifies monitoring reports submitted by NAMA-implementing Ministry. The process of C-NAMA is much the same as the one of CDM. The whole flow of C-NAMA process is depicted in figure 1. First, Government of Host Country makes NDD and submits it to NAMA DNA. NAMA DNA reviews, validates and approves the NDD. The validation by DNA will be more cost effective and time efficient than the one under CDM. The validation by DNA will shorten the whole duration of C-NAMA since the validation will be simpler and involves no hassle for validation contract. And furthermore, it will reduce the whole transaction cost since there will be no validation charges. The rationale behind the validation by DNA is that NAMA is sovereign action by host government so that it is trustworthy and does not need third-party involvement. After completing NDD approval, DNA requests the registration of the C-NAMA activity to Facilitative Body. Facilitative Body reviews the request and registers the activity in the NAMA Registry. The NAMA-implementing Ministry will monitor the emission reductions of its NAMA activity and make monitoring report. After a certain monitoring period, a monitoring report will be submitted to DOE for verification. After a successful verification, DOE will request the issuance of credits to Facilitative Body. The Facilitative Body will check the request documentation and issue the credits to NAMA-implementing Ministry. Finally, the credits will be distributed among NAMA participants or retained by the Ministry under host country's own scheme.

For successful C-NAMA, close cooperation between a central body and DNA is crucial. Especially, the role of a Facilitative Body is important. In case of CDM Executive Body, it has an authoritative role and burdened with too much work since it has authority on almost every issue. We need a new type of central body, in line with strengthened role of DNA under NMM. Facilitative Body will put its focus on the supportive role such as assisting capacity building of host country and facilitative role such as creating initial credit demand through cooperation with international investors. Facilitative Body will be under the guidance of COP and be the same body which will be in charge of Framework for Various Approaches (FVA) to ensure transparency and consistency of various approaches.

Figure 1. **C-NAMA operational procedure (Submission by Republic of Korea, 2013)**



2-2. MRV of C-NAMA: Performance Indicator and Tiered Approach

The key component of NMM is its MRV system because the amount of credits is determined according to the result of MRV. Kyoto Mechanisms have strict MRV system as a means to safeguard environmental integrity. But it is noticeable that the stricter rules of Kyoto Mechanisms have functioned as barriers for many developing countries to their access to carbon market. New perspective is needed in developing and application of MRV standards. The principle of CBDR can be applied in MRV standards of NMM. Each Party has different capability and unique circumstances. In that regard, we cannot require all Parties to be equipped with the same level of MRV standards. It will discourage many developing countries, especially LDCs and SIDs, reducing the scope of Participants. We need to seek differentiated and customized standards, taking into account of national circumstances without hurting the basic rules of real, permanent, additional and verified mitigation outcomes. C-NAMA is unique with its flexible MRV system which includes Performance Indicator and Tiered Approach which are explained in detail in Korea Carbon Finance research report (published in Korean, 2012). Performance indicator can be used for NAMA activities which have difficulties to express their GHG emission reductions such as building sector or transport sector. For example, the number of 1st and 2nd grade Energy Performance Certificates (EPCs) can be used as the performance indicator for EPC NAMA in building sector. In a joint research with Korea Carbon Finance, Swapan Mehra et al (2012) recommended CO2 per square feet - second as emission factor for building NAMA. In case of transport sector, market penetration rate of high-mileage car may be used as performance indicator. And REDD+ may be considered as candidate for C-NAMA activities.

Yuri Okubo et al (2011) pointed out that the stringency level of MRV will be crucial for the credibility and political viability of NAMA crediting. And they also argued that only a small subset of policies remains available for crediting if high stringency level is pursued. Korea suggested Tiered Approach to resolve this stringency issue. We don't need to stick to fixed level of MRV stringency. The level of stringency can be variable and the decision on the level should be left to host country. The basic idea is that different level of data availability and national capability needs to be considered in applying baseline and monitoring methodologies. The host country can choose the appropriate tier among various levels of tier, taking into account of its national circumstances and capacities. The example of tiered approach and tier decision-making is shown in table 1 and figure 2. The COP will provide common minimum MRV requirements which functions as guidance to Parties on developing nationally appropriate methodologies, customized to their own unique NAMAs.

The different quality of credits resulting from flexible MRV needs further discussions and research. But a simple Tiered Discounting Factor may be an option to resolve this issue. Parties will be required to agree on the factor value for different tiers. For example, Tier 3-C (see figure 2) may get discounting value of 1.0 and Tier 1-A may get discounting value of 0.5. Andre Marcu suggested the similar idea of multiplication factor in his recent paper. Basically market will judge the environmental in-

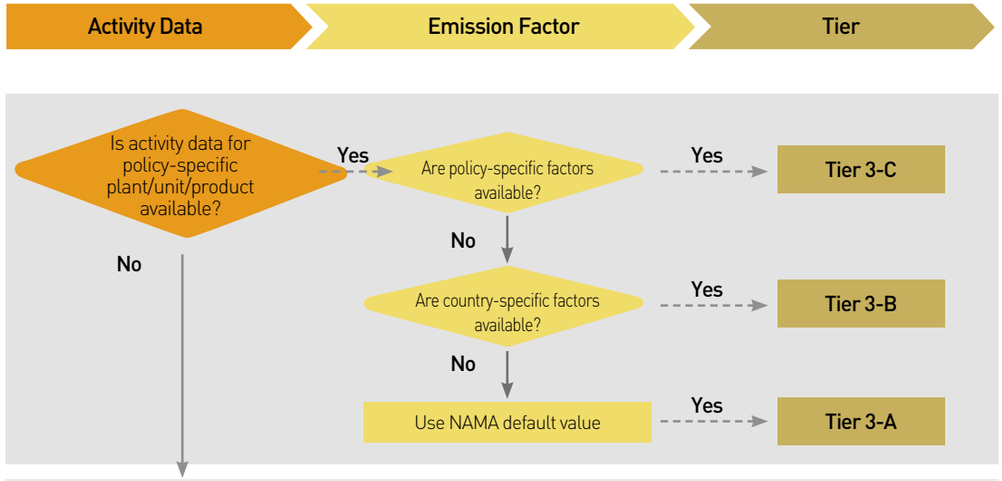
tegrity of each NAMA credit and thus different quality of credits will result in different price.

The two main MRV tools of Performance Indicator and Tiered Approach will pave the way for wider participation of developing countries and bigger mitigation outcomes. Especially LDCs and SIDs will be the very beneficiaries of flexible MRV system of C-NAMA. LDCs and SIDs do not have big manufacturing industry or power industry which is the most common host of CDM projects. But they have building and transport sector to which Performance Indicator can be applied. Performance Indicator will open new opportunities for building and transport sector which have been less represented in carbon market due to the complexity of methodologies. Chi-Chin Cheng and Xianli Zhu (2009) suggested various indicators for MRV in building NAMA: representative/average energy performance of buildings and their estimated number/floor area; percentage of new buildings built according to minimum energy performance standards; percentage of existing building retrofitted according to minimum energy performance standards and others. And Tiered Approach will be stepping stones toward carbon market for Parties with less data capabilities and human capacities.

Table 1. **Example of tiered approach (Submission by Republic of Korea, 2013)**

Activity Data		Emission Factor	
Tier 1	• sector-general aggregate/average data	Tier A	• IPCC Default Value
Tier 2	• Category/Type level aggregate/average data	Tier B	• Country-specific Factor
Tier 3	• Participant/Unit level data	Tier C	• Participant -specific Factor

Figure 2. **Example of flowchart for C-NAMA methodology decision making (Submission by Republic of Korea, 2013)**



3. Further Clarifications on C-NAMA

Many questions have been raised about C-NAMA such as the demand, relationship with Kyoto Mechanisms and role of private sector. The answers are presented as below.

3-1. Who gets credits?

Basically NAMA-implementing Ministry will get credits since it is the Ministry which makes NDD and manages C-NAMA activities. But it is private entities which reduce real GHG emissions under the C-NAMA scheme. DNA and the Ministry will need to decide on the means to compensate private entities for participating in the C-NAMA. It can be credit distribution among entities or special fund to be used for improving the infrastructure or enhancing the human capacity in the subsector or sector. The daunting job of the distribution scheme will be how to make fair distribution, fending off free-riders who make little contribution in the GHG mitigation.

3-2. Where's the demand?

There has been continuous criticism on the demand issue of NMM. It may be meaningless to talk about NMM in this time of dormant carbon market with low demand and oversupply. Furthermore, NMM will definitely saturate the carbon market with its bigger scale of GHG emission reductions. That means sufficient demand is the indispensable ingredient of NMM. And that's why we need to wait for the outcome of climate change negotiation. Sufficient demand will be possible after a new agreement takes effect under the expectation that the target is shared among more Parties. Basically, developed (or some advanced developing countries?), international organizations and private investors can be buyers of NAMA credits under the contracts with host country governments. International investors such as World Bank and ADB may need to participate in the initial investment in NMM to create initial demand.

3-3. Where's the relationship with Kyoto Mechanisms and Supported NAMA(S-NAMA)?

Some Parties have expressed their concerns about the replacement of Kyoto Mechanisms by NMM. Anyhow, Kyoto Mechanisms and NMM will go hand in hand until 2020 since the second commitment of the Kyoto Protocol was agreed in Durban. The future relationship after 2020 will be decided according to the results of climate change negotiation. The pilot phase will be helpful to understand the possibilities of coexistence of the two mechanisms. It may be decided in the market during the pilot phase which might start from 2014. If the coexistence is possible and mutually beneficial, then cohabitation will be pursued. The cohabitation will require resolving the issue of double counting of Kyoto credits and NAMA credits. In this case, NAMA registry and International Transaction Log (ITL) will be key tools to check the flow of credits and prevent the double counting.

As for the relationship with S-NAMA, it will be totally up to Parties to decide which NAMA they will pursue. The main criteria of decision may be the timing of financing. If Parties pursue up-front financing in case of infrastructure or capacity building, they may go for S-NAMA. If they want bigger financing and are comfortable with ex post financing, they may go for C-NAMA.

3-4. What's the role of private sector in C-NAMA?

Private sector has expertise in MRV and investment. What host country lacks and needs the most is MRV capacity. Therefore private sector may consider providing consultancy to DNAs and NAMA-implementing Ministries. Also private sector may participate in C-NAMA design. They might be allowed to participate in designing country-specific NAMAs, writing NDDs, monitor NAMA activities and get paid for their service. One of key functions of Facilitative Body will be to provide capacity building to DNAs in designing their own NAMA schemes. But Facilitative Body may not be able to meet all the demands by DNAs. Then private sector can fill the gap and help DNAs or Ministries design C-NAMA scheme. According to Korean submission (2013), host country can add participants to its C-NAMA activities at its discretion. Private investors can be involved in C-NAMA activities as investors and get credits later.

3-5. More ideas on C-NAMA design

C-NAMA might consider introducing premium values on co-benefits such as technology transfer. If there is technology transfer in C-NAMA activities, then an incentive of additional credits may be awarded. Host country will have authority in deciding the level of technology transfer. Deeper level of technology transfer will get bigger credits. This premium credit scheme may contribute to boosting C-NAMA and technology transfer at the same time. Namely, the scheme will catch two birds of technology transfer and mitigation with one stone. And C-NAMA might consider strengthened environmental integrity by introducing stringent local stakeholder consultation process and Sustainable Development Index, benchmarking Gold Standard rules.

4. Conclusions

Fair and equitable access to NMM needs to be guaranteed to learn from Kyoto Mechanism experiences and overcome the limits of Kyoto Mechanisms. To secure more voluntary participation by developing countries, NMM needs to reflect host countries' needs and circumstances. Under new era of NMM, every Party should be given opportunity of access to market mechanism. For that purpose, easier, simpler and nationally appropriate MRV rules will be needed to ensure wider participation of Parties. In that sense, Performance Indicator and Tiered Approach of C-NAMA will help Parties with less MRV capabilities have access to NMM. And the unexplored areas such as building, transport and EE improvement should be promoted. The GHG reduction potential of these sectors is huge but was not explored just because of MRV complexity. We need to excavate the humongous potential of these sectors and provide opportunities to much wider spectrum of Parties. Performance Indicator and Tiered Approach will significantly contribute to the exploration of those potentials. And also they will help Parties with less industrial infrastructures such as LDCs have opportunities to participate in NMM. Every Party has its own building and transport sector with a huge EE improvement potential. What we need to do is just to let Parties pursue carbon revenues in those sectors by deciding on easier, simpler and nationally appropriate MRV rules of NMM. We need to bear in mind that stricter MRV rules will scare many developing countries away and lead to inactive and insipid carbon market. As Andre Marcu (2013) put it, what is needed is flexibility built into the regulatory framework. C-NAMA meets this requirement. It is a hybrid framework of bottom-up MRV with flexibility and top-down regulatory management of credits. This hybrid framework will ensure both environmental integrity and sovereignty of host countries.

NMM is a scaled-up mechanism, compared to Kyoto Mechanism. The amount of GHG emission reduction will be bigger. Naturally, bigger supply requires bigger demand. And that point means that some advanced developing

countries might be called upon to participate in NMM as investors. The current deep slump of carbon market caused by oversupply will be settled only by bigger demand. And that's why we need a breakthrough deal on a new climate change agreement which is expected to create much bigger demand by ensuring all Parties to contribute to global GHG mitigation to some degree.

Currently pilot phase is being discussed as a way of learning by doing on NMM and Framework for Various Approaches (FVA). Pilot activities will be beneficial for Parties to get a glimpse on how NMM will work and design details of NMM. There are already several multilateral initiatives going on NMM and NAMA such as World Bank's PMR, CCAP's MAIN in which donor countries are supporting developing countries to establish their market mechanisms or NAMAs. Korean government might consider initiating these kinds of international pilot program on C-NAMA or cooperating with the above initiatives.

References

Andre Marcu (2013): The Role of Market Mechanisms in a Post-2020 Climate Change Agreement, in Elements of a New Climate Agreement by 2015(June 2013, UNEP Risø Centre), p.35-51, http://www.uneprisoe.org/~/media/Sites/Uneprisoe/Publications%20(Pdfs)/Perspectives_2013_WEB.ashx

Chia-Chin Cheng, Xianli Zhu (2009): NAMas for dispersed energy end-use sectors: Using the Building Sector as an Example, NAMAs and the Carbon Market (2009, UNEP Risø Centre), p.78-95, http://www.unep.org/sbci/pdfs/Singapore-NAMAs.pdf

Inchul Hwang (2012): NAMAs and New Market Mechanism, UNIDO-KEMCO Technical Workshop on Sustainable Energy and Carbon Finance: Accelerating Market Transformation in East Africa (November 2012, Ethiopia and Tanzania)

Inchul Hwang (2013): C-NAMA: New Market Mechanism for Post-2020, the Fourth workshop on enhancing the regional distribution of CDM projects in Asia and the Pacific organized by ADB, IGES and UNFCCC (September 2013, Manila), http://www.iges.or.jp/files/research/climate-energy/mm/PDF/20130904/S5_4_InchulHwang.pdf

Okubo, Yuri; Hayashi, Daisuke; Michaelowa, Axel (2011): NAMA crediting: how to assess offsets from and additionality of policy-based mitigation actions in developing countries, in: Greenhouse Gas Measurement & Management, 1, p. 37–46, http://www.zora.uzh.ch/52842/1/Okubo_Accepted_version.pdf

Soonchul Park et al (2012): A study on MRV methodology for a pilot NAMA crediting project, Korea Carbon Finance

Submission by Republic of Korea (2009) on NAMA Crediting "Crediting Mechanism for Nationally Appropriate Mitigation Actions by the Parties Not Included in Annex I of the United Nations Framework Convention on Climate Change"(FCCC/AWGLCA/2009/MISC.4 (Part II)), http://unfccc.int/resource/docs/2009/awglca6/eng/misc04p02.pdf

Submission by Republic of Korea (2013) on modalities and procedures for a new market-based mechanism "Credited NAMA Mechanism as a New Market-based Mechanism: New Wine in New Wineskins" (FCCC/SBSTA/2013/MISC.9/Add.2), http://unfccc.int/resource/docs/2013/sbsta/eng/misc09a02.pdf

Swapan Mehra, Prabhat Upadhyaya, Kaushik Hazarika (2012): MRV feasibility for C-NAMAs: Final report, in the study on MRV methodology for a pilot NAMA crediting project (Korea Carbon Finance, 2012)

RENEWABLE PURCHASE OBLIGATION AS A NAMA ACTIVITY

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ABSTRACT

This study is an assessment of the potential of implementing Renewable Purchase Obligation (RPO) as a Nationally Appropriate Mitigation Actions (NAMAs) in India in the renewable energy sector. The study provides an overview of India's climate change mitigation approach and major national policies. It also looks at the emergence of NAMA as a global instrument for climate change mitigation and analyzes the applicability of NAMAs for RPO in India. The study also assesses the viability of setting up a robust Monitoring, Reporting and Verification (MRV) system for RPO as NAMAs through development of a pilot NAMA Design Document (NDD).

1. Introduction

Green house Gas (GHG) emissions are generally associated with the process of development of a country in various sectors, including energy, transport, agriculture and household. Despite the potential climate change impacts that developing countries may suffer, there is a fear that the policies and measures that are needed to reduce GHG emissions may impede developing countries' economic growth. Hence, controlling GHG emissions without negative impacts on the economy is a major bottleneck. The concept of NAMAs has been introduced in order to address this concern. NAMAs are expected to play a vital role in addressing both climate change and national development strategies. NAMAs may either be supported externally or may be unilateral in nature. In addition to being in line with national strategy and priority, a NAMA should also be 'MRVable'.

The key objective of supported NAMAs is to promote broad-based actions in one or more industry sectors that promise to contribute significantly to achieving developing country emission reduction targets. The NAMA framework offers a more sustainable and long-term strategy

for reduction in global GHG emissions than the previous project-based funding mechanism, the CDM.

The Renewable Purchase Obligation (RPO) of India, a national instrument that aims to support Renewable Energy (RE) deployment in the country forms an ideal candidate for a Nationally Appropriate Mitigation Action (NAMA) based on these requirements.

The main objectives of choosing RPO under NAMA in India are:

1. The NAMA financing will promote RPO compliance in India through use of various fiscal instruments, capacity building and research.
2. It can help India mobilize support for moving away from unsustainable carbon pathways towards low-carbon development while contributing to improvement in energy availability.
3. The concept of REC under NAMA recognizes the importance of sustainable development benefits, such as environmental, social and economic benefits.
4. The NAMA will help India achieve its voluntary target to reduce the emission intensity of its GDP by 20-25% by 2020[1] .
5. The NAMA will serve to scale up the activities of existing economic instruments e.g. Clean Development Mechanism and access potential new funding sources.

2. RPO Background: Policy Design and Regulatory Initiative

Under the Electricity Act 2003 of India[2] , various State Electricity Regulatory Commissions (SERCs) set targets for distribution companies in their respective states to purchase certain percentage of their total power requirement from renewable energy sources. This target is termed as Renewable Purchase Obligation (RPO). However, there are certain limitations of State specific approach when RE development strategies are to be deployed at national level. Existing legal framework under EA 2003 puts responsibility for promotion of renewable energy on SERCs. As a result, the regulations developed by the SERCs differ on many counts.

However this approach is limited by RE resource constraints across respective states while setting targets and hence may not lead to an optimum national target. States with very high potential end up not utilizing fully while States with lower RE potential have to keep their RPO target at lower level.

1 http://unfccc.int/files/meetings/cop_15/copenhagen_accord/application/pdf/indiacphaccord_app2.pdf

2 http://powermin.nic.in/acts_notification/electricity_act2003/pdf/The%20Electricity%20Act_2003.pdf

In June 2008, the Prime Minister of India announced the National Action Plan for Climate Change (NAPCC)[3] RPO is one amongst the several measures that the NAPCC envisages to address the challenge of climate change. NAPCC had set a national target of 5% renewable energy purchase for FY 2009-10 against current level of around 3.5%. Further, NAPCC envisaged that the proposed target will increase by 1% each year for next 10 years. This would lead to renewable constituting approx 15% of the energy mix of India eventually and would warrant a quantum jump in deployment of renewable energy across the country. To achieve these targets, NAPCC mandates an instrument called Renewable

3 http://pmindia.gov.in/climate_change_english.pdf

Figure 1. **Roles of various institutions in the RPO**

Central Government	■ Electricity Act 2003 ■ National Electricity Policy ■ National Tariff Policy ■ National Action Plan on Climate Change
Central Electricity Regulatory Commission	■ Regulations for Preferential Tariff for Renewable Energy ■ Renewable Energy Certificate Mechanism ■ Implementation Framework
State Electricity Regulatory Commission	■ Preferential RE Tariff Orders by SERCs ■ Over 19 States have mandated Renewable Purchase Obligations ■ Modification to RPO and adoption of REC framework

Energy Certificate (REC), which is a cap and trade system.

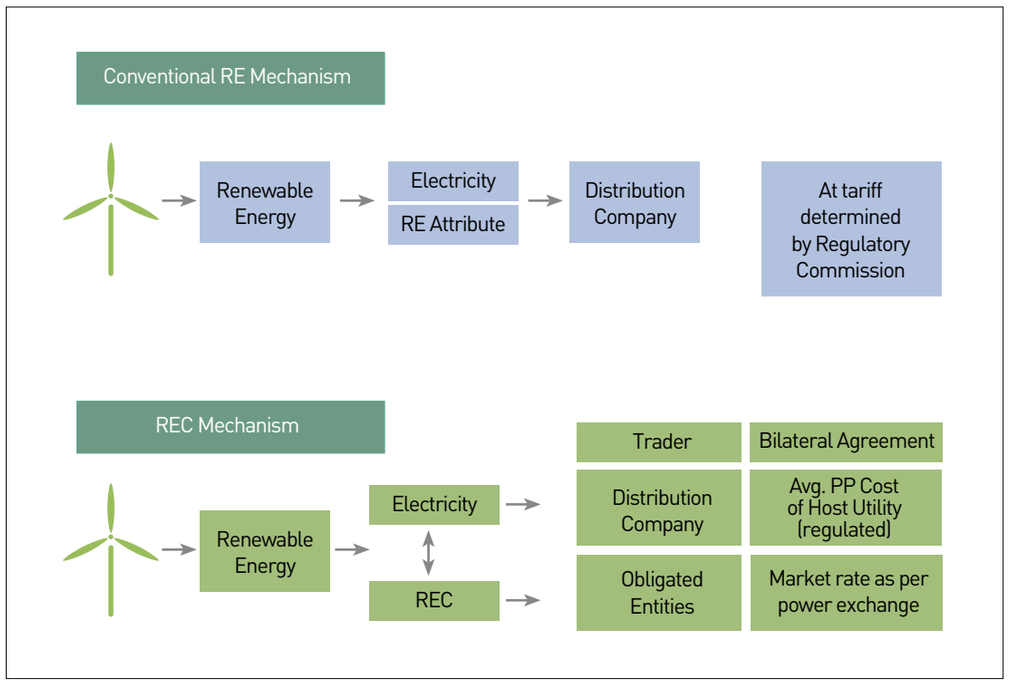
Every state has a specific RPO as set by its SERC, which can vary among the categories of, obligated entities. There are three categories of Obligated Entities (OE):

a) DISCOMs
b) Captive Power Producers
c) Open Access Consumers

Within the state, the 3 categories of power consumers may have the same or different RPOs. RPO can be met through any of the following three routes:

a) Generating RE
b) Purchasing RE from Generators
c) Purchasing RECs by trading at Power Exchange.

Figure 2. **Comparison of the conventional RE and REC mechanism**



2.1 REC mechanism

The energy generated by the renewable energy sources is split into two components namely the 'Electricity Component' and the 'Green Attribute'. The price of renewable energy units generated under this scheme is the sum of the cost of electricity generation equivalent to conventional energy sources and the cost of environmental attributes. The environmental attributes can be exchanged in the form of Renewable Energy Certificates (REC). Renewable Energy (RE) Generators in India hence have the option to sell the energy generated under preferential Tariff or monetize the 'Green Attribute' premium under the REC Mechanism.

Each REC represents one MWh of an eligible renewable energy source (solar, wind, small-scale hydro i.e. capacity below 25MW, biomass based power, bio-fuels and municipal solid waste based power) and the purchase of RECs is treated as the consumption of the corresponding quantity of renewable power. As a result, states are able to meet their renewable energy targets even if the local resource potential is low. The REC system enables obligated entities to weigh the costs and benefits of achieving their renewable energy commitments by selling electricity from renewable sources or by purchasing RECs.

Hence, the REC mechanism is a market-based instrument, to promote renewable sources of energy and development of market in electricity, leading to the sustainable development of the country. Recognizing that the renewable resources are not evenly distributed across the country, it encourages setting up of large generation capacities at resource rich locations and, through a process of certification creates

a market based instrument which can be traded on CERC approved power exchanges, to obligated entities or voluntary buyers to fulfill their Renewable Purchase Obligation / Social Responsibility.

Under the REC implementation framework, The Central Electricity Regulatory Commission (CERC) of India, the nodal agency for RPO compliance has designated the National Load Despatch Center (NLDC) as the Central Agency for implementation of REC Mechanism in India. In accordance with these regulations, the Central Agency has laid down the following Procedures for REC Mechanism, duly approved by CERC:

(a) Procedure for Registration of Renewable Energy Generation Project
(b) Procedure for Issuance of Renewable Energy Certificates
(c) Procedure for Redemption of Renewable Energy Certificates

2.1.1 REC process

The REC process comprises four stages i.e. Accreditation, Registration, Issuance and Redemption[4] .

Accreditation: The State Agencies, as may be designated by the SERCs, act as the agency for accreditation and recommending the renewable energy projects for registration, subject to fulfillment of eligibility conditions for participating in REC mechanism in accordance with conditions outlined under the CERC REC Regulations. The process of accreditation is normally completed within 30 days from date of receipt of complete information by State Agency.

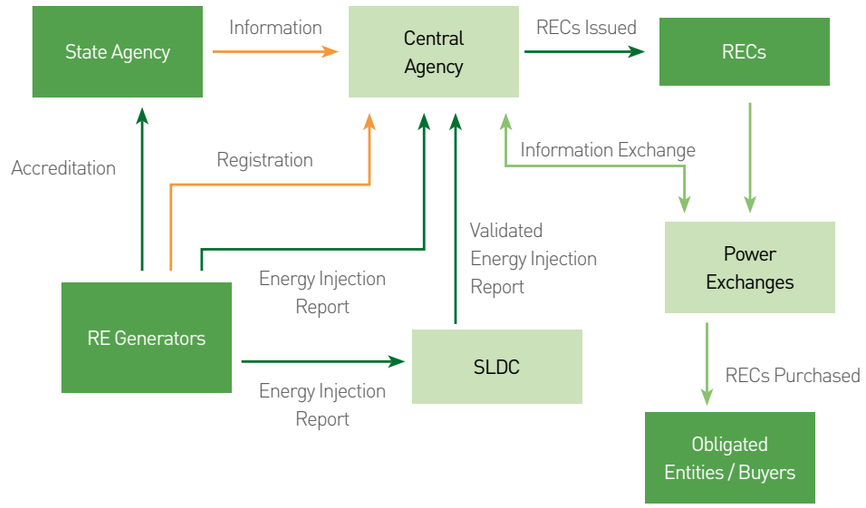
Registration: After accreditation, an application for availing registration is made by the RE Generator to the Central Agency. The Central Agency, after duly inspecting/verifying conditions, grants 'Certificate for Registration' (valid for five years unless revoked) to the concerned Applicant as 'Eligible Entity'. The process of registration is normally completed within 15 days from date of receipt of complete information by Central Agency.

Issuance: the Eligible Entity makes an application for issuance of Renewable Energy Certificate to the Central Agency. The application for issuance of certificate includes Energy Injection Report duly certified by the concerned State Load Despatch Centre (SLDC). The application for issuance of Renewable Energy Certificates may be made on a fortnightly basis, i.e., on the first day of the month or on the fifteenth day of the month. The Central Agency issues RECs to the Eligible Entity after confirming the claims made by the Eligible Entity, with the Energy Injection Report submitted by the State Load Despatch Center.

Redemption: The Eligible Entity may place for dealing the RECs, both 'Solar' and 'Non-Solar' Certificates, on any of the eligible Power Exchanges. Successful trades are intimated to the Central Agency for redemption and extinguishing of the RECs. RECs are currently traded on two power exchanges, Indian Energy Exchange and Power Exchange of India Ltd.

4 https://www.recregistryindia.nic.in/index.php/general/publics/ProcedureIssuanceREC

Figure 3. **REC process**[5]



3. Current status of RPO in India

In the few years of trading so far, participation in the REC markets, mainly solar has been low and the REC mechanism has failed to attract large amounts of investment.

Till date, 27 states (except Arunachal Pradesh and Sikkim) have issued RPO/REC regulations and have specified RPO targets, specified in the table below[6] :

5 https://www.recregistryindia.nic.in/index.php/general/publics/StepsRegistration

6 http://www.greenpeace.org/india/Global/india/report/2013/powering-ahead-with-renewables.pdf

S No.	State	Status / Year of Issue	Technology (Non-solar / Solar)	RPO Trajectory (in percent)								
				FY 12	FY 13	FY 14	FY 15	FY 16	FY 17	FY 18	FY 19	FY 20
1	Andhra Pradesh	Final (2012)	Non-solar	4.75	4.75	4.75	4.75	4.75	4.75			
			Solar	0.25	0.25	0.25	0.25	0.25	0.25			
			Total	**5.00**	**5.00**	**5.0**	**5.00**	**5.00**	**5.00**			
2	Arunachal Pradesh	Not Issued										
3	Assam	Final (2010)	Non-solar	2.70	4.05	5.40	6.75					
			Solar	0.10	0.15	0.20	0.25					
			Total	**2.80**	**4.20**	**5.60**	**7.00**					
4	Bihar	Final (2012)	Non-solar	2.25	3.75	4.00	4.25					
			Solar	0.25	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00
			Total	**2.50**	**4.00**	**4.50**	**5.00**					
5	Chhattis-garh	Final (2011)	Non-solar	5.00	5.25							
			Solar	0.25	0.50							
			Total	**5.25**	**5.75**							
6	Delhi	Final (2012)	Non-solar	1.90	3.25	4.60	5.95	7.30	8.65			
			Solar	0.10	0.15	0.20	0.25	0.30	0.35			
			Total	**2.00**	**3.40**	**4.80**	**6.20**	**7.60**	**9.00**			
7	JERC (Goa + UTs)	Final (2010)	Non-solar	1.70	2.60							
			Solar	0.30	0.40							
			Total	**2.00**	**3.00**							
8	Gujarat	Final (2010)	Non-solar	5.50	6.00							
			Solar	0.50	1.00							
			Total	**6.00**	**7.00**							
9	Haryana	Final (2011)	Non-solar	1.50	2.00	3.00						
			Solar	0.00	0.05	0.10						
			Total	**1.50**	**2.05**	**3.10**						
10	Himachal Pradesh	Final (2010)	Non-solar	10.00	10.00	10.00	10.0	11.0	12.0	13.0	14.0	15.0
			Solar	0.01	0.25	0.25	0.25	0.25	0.25	0.50	0.75	1.00
			Total	**10.01**	**10.25**	**10.25**	**10.25**	**11.25**	**12.25**	**13.50**	**14.75**	**16.00**
11	Jammu & Kashmir	Final (2011)	Non-solar	2.90	4.75							
			Solar	0.10	0.25							
			Total	**3.00**	**5.00**							
12	Jharkhand	Final (2010)	Non-solar	2.50	3.00							
			Solar	0.50	1.00							
			Total	**3.00**	**4.00**							
13	Karnataka	Final (2011)	Non-solar	10[12]/ 7.0[13]								
			Solar	0.25								
			Total	**10.25 &7.25**								
14	Kerala	Final (2010)	Non-solar	3.35	3.65	3.95	4.25	4.55	4.85	5.15	5.45	5.75
			Solar	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
			Total	**3.60**	**3.90**	**4.20**	**4.50**	**4.80**	**5.10**	**5.40**	**5.70**	**6.00**

Table 1. Current RPO targets set by the CERC in accordance with the NAPCC target

S No.	State	Status / Year of Issue	Technology (Non-solar / Solar)	RPO Trajectory (in percent)								
				FY 12	FY 13	FY 14	FY 15	FY 16	FY 17	FY 18	FY 19	FY 20
15	Madhya Pradesh	Final (2010)	Non-solar	2.10	3.40	4.70	6.00					
			Solar	0.40	0.60	0.80	1.00					
			Total	**2.50**	**4.00**	**5.50**	**7.00**					
16	Maharash-tra	Final (2010)	Non-solar	6.75	7.75	8.50	8.50	8.50				
			Solar	0.25	0.25	0.50	0.50	0.50				
			Total	**7.00**	**8.00**	**9.00**	**9.00**	**9.00**				
17	Manipur	Final (2010)	Non-solar	2.75	4.75							
			Solar	0.25	0.25							
			Total	**3.00**	**5.00**							
18	Mizoram	Final (2010)	Non-solar	5.75	6.75							
			Solar	0.25	0.25							
			Total	**6.00**	**7.00**							
19	Megha-laya	Final (2010)	Non-solar	0.45	0.60							
			Solar	0.30	0.40							
			Total	**0.75**	**1.00**							
20	Nagaland	Final (2011)	Non-solar	6.75	7.75							
			Solar	0.25	0.25							
			Total	**7.00**	**8.00**							
21	Odisha	Final (2010)	Non-solar	4.90	5.35	5.80	6.25	6.70				
			Solar	0.10	0.15	0.20	0.25	0.30				
			Total	**5.00**	**5.50**	**6.00**	**6.50**	**7.00**				
22	Punjab	Final (2011)	Non-solar	2.37	2.83	3.37	3.81					
			Solar	0.03	0.07	0.13	0.19					
			Total	**2.40**	**2.90**	**3.50**	**4.00**					
23	Rajasthan	Final (2011)	Non-solar	5.50	6.35	7.20						
			Solar	0.50	0.75	1.00						
			Total	**6.00**	**7.10**	**8.20**						
24	Sikkim	Not Issued										
25	Tamil Nadu	Final	Non-solar	8.95								
			Solar	0.05								
			Total	**9.00**								
26	Tripura	Final (2009)	Non-solar	0.90	1.90							
			Solar	0.10	0.10							
			Total	**1.00**	**2.00**							
27	Uttara-khand	Final (2010)	Non-solar	4.50	5.00							
			Solar	0.03	0.05							
			Total	**4.53**	**5.05**							
28	Uttar Pradesh	Final (2010)	Non-solar	4.50	5.00							
			Solar	0.50	1.00							
			Total	**5.00**	**6.00**							
29	West Bengal	Draft (2012)	Non-solar			3.75	4.70	5.60	6.50	7.40		
			Solar			0.25	0.30	0.40	0.50	0.60		
			Total	**3.00**	**4.00**	**4.00**	**5.00**	**6.00**	**7.00**	**8.00**		

Table 1 contd. : Current RPO targets set by the CERC in accordance with the NAPCC target

S No.	State	Total Non-solar power Require-ment (MUs)	Total Non-solar Genera tion (MUs)	Non-solar Power Deficit(+)/ Surplus(-) (MUs)	Non-solar RPO Targets (%)	Non-solar RPO Com-pliance Achieved (%)	Non-solar RPO Deficit(+) / Surplus (-) (%)
1	Andhra Pradesh	4357	2931	1426	4.75%	3.20%	1.55%
2	Arunachal Pradesh	0	3	-3	N.A.	0.50%	N.A.
3	Assam	163	7	156	2.70%	0.12%	2.58
4	Bihar	322	144	178	2.25%	1.01%	1.24
5	Chhattisgarh	751	716	35	5.00%	4.77%	0.23
6	Delhi	508	0	508	1.90%	0.00%	1.90
7	JERC (Goa & UT)	204	0	204	1.70%	0.00%	1.70
8	Gujarat	4108	4008	100	5.50%	5.37%	0.13
9	Haryana	553	374	179	1.50%	1.01%	0.49
10	Himachal Pradesh	816	856	-40	10.00%	10.49%	-0.49
11	Jammu and Kashmir	413	0	413	2.90%	0.00%	2.90
12	Jharkhand	157	0	157	2.50%	0.00%	2.50
13	Karnataka	6083	7626	-1543	10.00%	12.54%	-2.54
14	Kerala	666	551	115	3.35%	2.77%	0.58
15	Madhya Pradesh	1045	412	633	2.10%	0.83%	1.27
16	Maharashtra	9543	5027	4516	6.75%	3.56%	3.19
17	Manipur	15	0	15	2.75%	0.00%	2.75
18	Mizoram	23	22	1	5.75%	5.54%	0.21
19	Meghalaya	9	79	-70	0.45%	4.10%	-3.65
20	Nagaland	38	74	-36	6.75%	13.21%	-6.46
21	Odisha	1129	422	707	4.50%	1.83%	2.67
22	Punjab	1071	400	671	2.37%	0.89%	1.48
23	Rajasthan	2831	2883	-52	5.50%	5.60%	-0.10
24	Sikkim	0	0	0	N.A.	0.00%	N.A.
25	Tamll Nadu	7669	16389	-8720	8.95%	19.13%	-10.18%
26	Tripura	9	0	9	0.90%	0.00%	0.90%
27	Uttarakhand	473	646	-173	4.50%	6.14%	-1.64%
28	Uttar Pradesh	3660	1729	1931	4.50%	2.13%	2.37%
29	West Bengal	1160	116	1044	3.00%	0.30%	2.70%
	Achievements vis-a-vis SERCs PRO targets	**47787**	**45415**	**2361**	**5.19%**	**4.94%**	**0.26%**
	Achievements vis-a-vls NAPCC & NTP targets	**62050**	**45415**	**16635**	**6.75%**	**4.94%**	**1.81%**

** Figures in positive shows that respective states have not been able to meet their non-solar RPO targets.*

Table 2: State wise success/failure in fulfillment of Non-solar RPO in India

S No.	State	Total So-lar power Require-ment (MUs)	Total Solar Genera tion (MUs)	Solar Power Deficit(+)/ Surplus(-) (MUs)	Solar RPO Targets (%)	Solar RPO Compli-ance Achieved (%)	Solar RPO Deficit(+) / Surplus (-) (%)
1	Andhra Pradesh	229	86	143	0.25%	0.09%	0.16%
2	Arunachal Pradesh	0	0	0	N.A.	0.00%	N.A.
3	Assam	6	70	6	0.10%	0.00%	0.10%
4	Bihar	36	0	36	0.25%	0.00%	0.25%
5	Chhattisgarh	38	0	38	0.25%	0.00%	0.25
6	Delhi	27	2	25	0.10%	0.01%	0.09
7	JERC (Goa & UT)	36	0	36	0.30%	0.00%	0.30
8	Gujarat	373	167	206	0.50%	0.22%	0.28
9	Haryana	0	2	-2	0.00%	0.01%	-0.01%
10	Himachal Pradesh	1	80	1	0.01%	0.00%	0.01%
11	Jammu and Kashmir	14	0	14	0.10%	0.00%	0.10%
12	Jharkhand	31	0	31	0.50%	0.00%	0.50%
13	Karnataka	152	8	144	0.25%	0.01%	0.24%
14	Kerala	50	0	50	0.25%	0.00%	0.25%
15	Madhya Pradesh	199	0	199	0.40%	0.00%	0.40%
16	Maharashtra	353	8	345	0.25%	0.01%	0.24%
17	Manipur	1	0	1	0.25%	0.00%	0.25%
18	Mizoram	1	0	1	0.25%	0.00%	0.25%
19	Meghalaya	6	0	6	0.30%	0.00%	0.30%
20	Nagaland	1	0	-1	0.25%	0.00%	0.25%
21	Odisha	23	46	-23	0.10%	0.20%	-0.10%
22	Punjab	14	4	10	0.03%	0.01%	0.02%
23	Rajasthan	257	276	-19	0.50%	0.54%	-0.04%
24	Sikkim	0	0	0	N.A.	0.00%	N.A.
25	Tamll Nadu	43	8	35	0.05%	0.01%	0.04%
26	Tripura	1	0	1	0.10%	0.00%	0.10%
27	Uttarakhand	3	1	2	0.03%	0.01%	0.02%
28	Uttar Pradesh	407	13	394	0.50%	0.02%	0.48%
29	West Bengal	0	0	0	0.00%	0.00%	0.00%
	Achievements vis-a-vis SERCs PRO targets	**2,302**	**621**	**1681**	**0.25%**	**0.07%**	**0.18%**
	Achievements vis-a-vls (NTP) (Amendment) targets	**2,298**	**621**	**1677**	**0.25%**	**0.07%**	**0.18%**

** Figures in positive shows that respective states have not been able to meet their Solar RPO targets.*

Table 3: State wise success/failure in fulfillment of Solar RPO in India

The following two figures shows that electricity utilities of only seven states meet their Non-Solar RPO targets and only three states meet their Solar RPO targets.

4. RPO as a NAMA

As is evident from the above figure, even though the RPO is key to India achieving it's RE goals and hence in its fight against climate change, the compliance level is low. Although the preferential tariff is seeing a successful uptake in the country, the REC mechanism, central to success of the RPO is not as successful as envisaged. This forms a case for potentially supporting stakeholders engaged in the REC process in achieving their RPO goals through a supported NAMA. The activities that could be supported to achieve this goal include:

1. Further research on the viability of REC and its concept to showcase it as a cost-effective approach to achieve RPO compliance.

2. Further capacity building of the state level monitoring committees.

3. Financial support to promote transactions and liquidity in the REC markets including a potential viability gap fund for obligated entities and also a stabilization fund. This can bridge gaps in the procurement price of the RECs and the cost recovery that is allowed to Obligated Entities.

The NAMA would have a multi tiered structure (Fig. 4). The central agency for hosting the NAMA could potentially be the Ministry of New and Renewable Energy, mandated to promote RE in India. The MNRE would receive financial and technical support from international funders and win return would submit monitoring reports displaying current status of RPO compliance. The monitoring reports would be subjected to national or international third party verification, as is agreed upon. The financial support that arises, as part of the NAMA, would be used to fund activities listed above. Hence the funding would eventually flow through as support to the Obligated Entities and REC based project generators, who can finance their project more easily if there is a very liquid REC market.

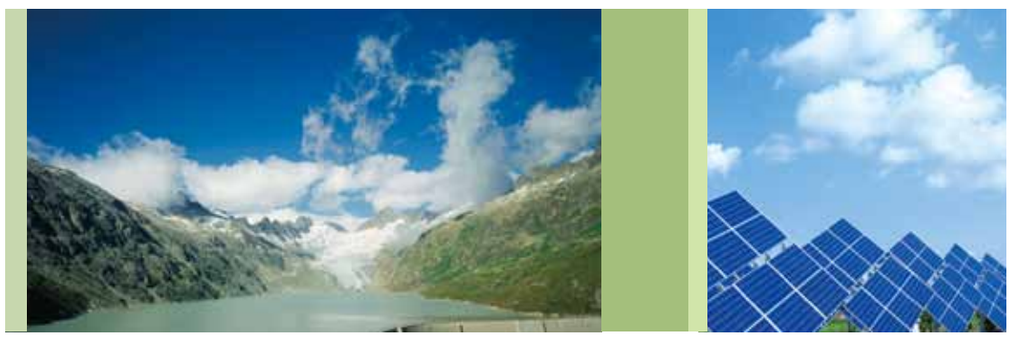
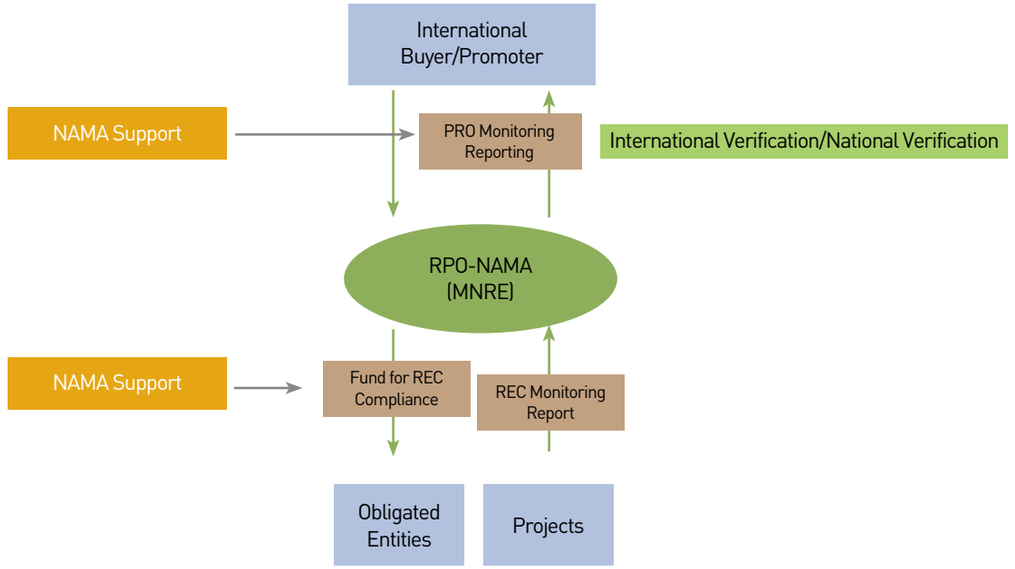


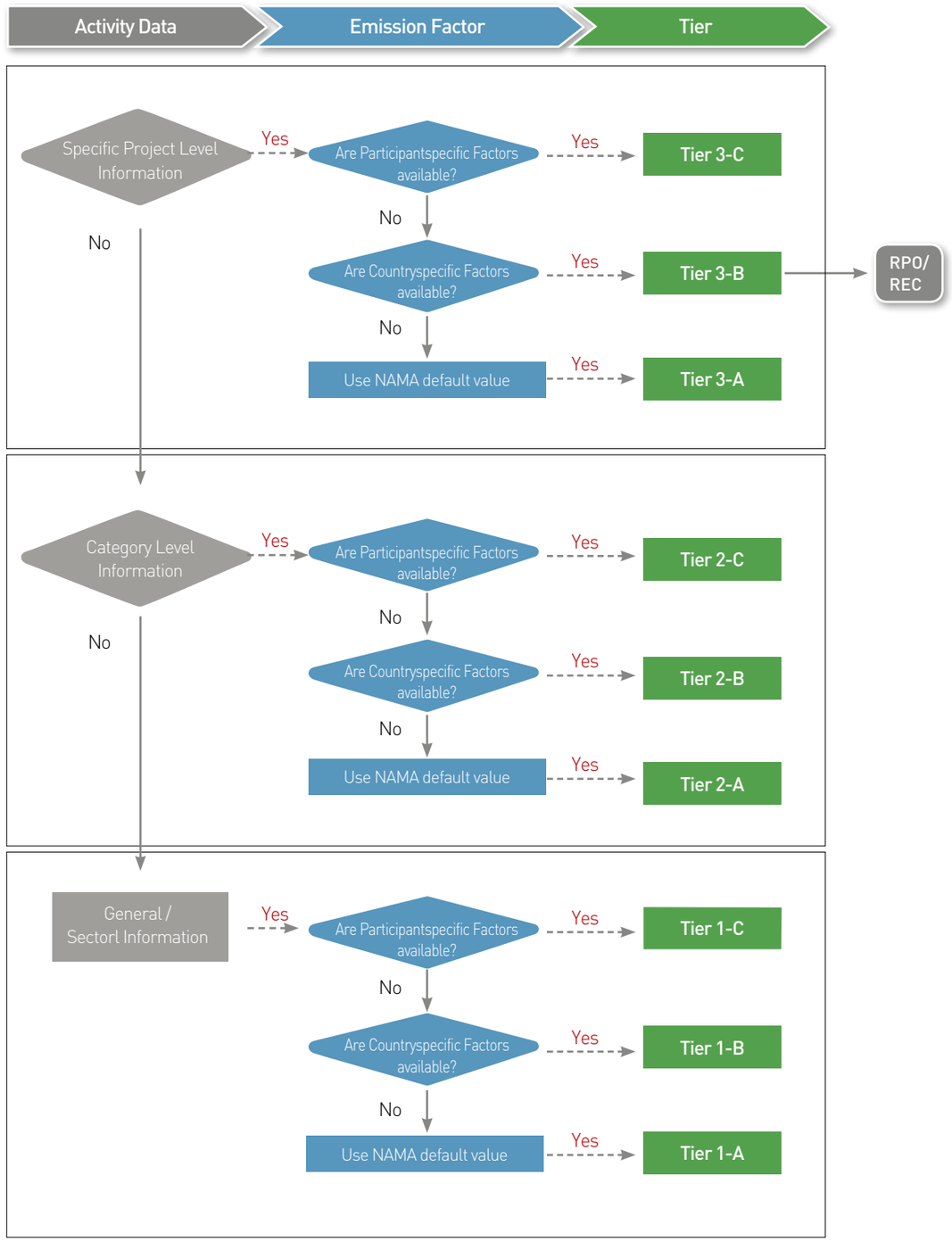
Figure 4. **RPO as NAMA**



5. RPO as a Credited NAMA

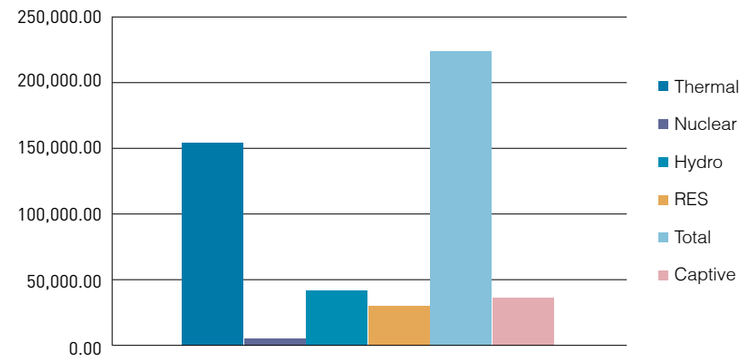
The technical requirements for MRV of a NAMA are based on two broad aspects i.e. choosing an appropriate Emission Factor and identifying the variables pertaining to the activity data for the NAMA. As displayed in Figure 5 below the higher the accuracy in measuring both of these the better is the 'MRVability' of the NAMA. The researchers feel that any NAMA, which scores in the Tier 3, can be credited.

As seen in the figure below RPO as a NAMA fulfills the requirements of the Tier 3-B, hence it can also be developed as a credited NAMA. The credits would be issued against the RECs generated and extinguished under the NAMA.



5.1 Baseline for crediting against RECs under the NAMA

In India, the power generation is principally fossil fuel based. Additional planned power generation is likely to follow this trend and fossil fuel use would therefore be prevalent in the regional grids. At present, India's installed power capacity is 227,357 MW with renewable energy contributing 28,184 MW or 12.4% .[7]

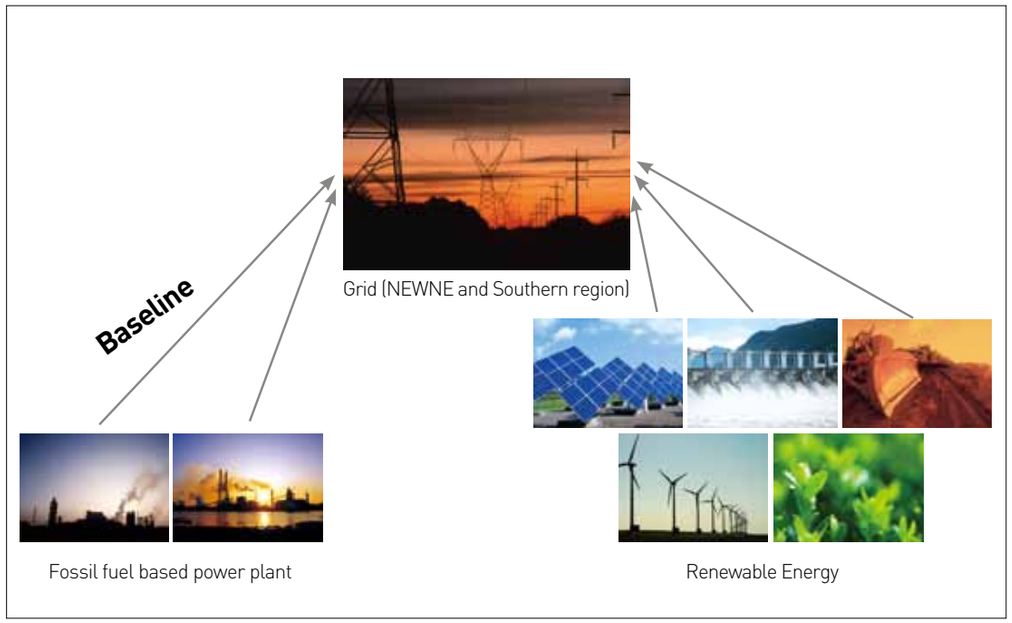


All India Generating Installed Capacity

The project activities under RECs are connected to the North East West-North East (NEWNE) grid and Southern regional grid system. Hence the electricity delivered by the project activities would have otherwise been generated by the operation of grid connected power plants and by the addition of new generation sources based on the conventional mix into the grid in the NEWNE and Southern grid system, which have been taken as the baseline.

7 http://www.cea.nic.in/reports/monthly/executive_rep/installedcap_allindia.pdf

Figure 5. **Baseline scenario**



5.2 Applicability of CDM methodologies

The existing structures of CDM can provide a foundation for crediting baselines for the RPO NAMA. The applicable CDM methodologies that are important from this perspective belong to the Category 1 i.e. "Energy Industries (renewable / non-renewable sources)"

The eligible renewable energy sources under RECs are solar, wind, small-scale hydro, biomass, bio-fuel and municipal solid waste. Also only Grid connected RE technologies are eligible under REC scheme[8] . Hence, we can use the most widely accepted UNFCCC CDM methodology to calculate the GHG emission reduction estimation. In the context of the RPO as a NAMA, the methodologies that would be most relevant are AMS I.C, AMS I.D and ACM0002 described below:

8 https://www.recregistryindia.nic.in/index.php/general/publics/faqs (Accessed on June 28, 2013)

The eligible UNFCCC methodologies which can be used under NAMA are:

Methodology	Description
AMS I.C	Thermal energy production with or without electricity
AMS I.D	Grid connected renewable electricity generation
ACM0002	Consolidated baseline methodology for grid-connected electricity generation from renewable sources

6. Environmental Integrity of the NAMA

In addition to carbon emission reduction, the NAMA, promoting RE would provide other major environmental benefits as follows:

- Environmental Protection
- Sustainability
- Energy Security
- Economic Stimulus

Environmental Protection: RE sources have the ability to reduce the air pollution that results from combustion of fossil fuels like coal, oil and natural gas? Fossil fuels contribute significantly too many environmental problems - greenhouse gases, air pollution, and water & soil contamination - while renewable energy sources primarily do not result in any pollution or contamination of the environment.

Sustainability: Unlike fossil fuels, RE sources are sustainable and not diminishing on use. According to the World Commission on Environment and Development[9] , sustainability is the concept of meeting "the needs of the present without compromising the ability of future generations to meet their own needs." Hence, actions taken today to use renewable energy technologies provide benefits now, and will also benefit generations to come.

Energy Security: India imports large quantities of fossil fuel and a shift to RE would have a positive impact on India's energy security by reducing our demand on foreign resources.

Economic Stimulus: RE technologies are labor intensive. The NAMA could promote jobs in manufacture, design, installation, servicing and marketing of renewable energy products. Jobs even arise indirectly from businesses that supply renewable energy companies with raw materials, transportation, equipment and professional services, such as accounting and clerical services.

9 http://public.wsu.edu/~susdev/WCED87.html

7. Monitoring

7.1. MRV requirements for the RPO as NAMA

The Measurement, Reporting and Verification (MRV) is a key element of NAMA. It enhances the sustainable policy making.

The monitoring plan for RPO as NAMA is as follows:

- To assess the details of the projects registered under REC as well as in the CDM and VCS which will help to avoid the double counting of emissions reductions
- To assess the total generation capacity of the projects registered under the REC (excluding the projects registered under CDM and VCS)
- Regular validation of the REC registry
- Calculation of the NEWNE and Southern grid emission factor provided by Central Electricity Authority (CEA) in each year

DATA and parameters to be monitored under NAMA are:

- Number of Solar REC registered
- Number of Non-Solar REC registered
- Emission Factor of both NEWNE and Southern Grid which are provided by the Central Electricity Authority (CEA) every year

8. Conclusion

The RPO is an important instrument to promote compliance with India's national goals on clean development and the objectives of the NAPCC. The RPO will also result in a substantial reduction in GHG emissions by promoting RE source-based generation. However the current levels of RPO compliance indicate a potential need to support the stakeholders concerned in achieving the laid out goals. RPO compliance based supported NAMA can potentially play this role. The NAMA can be credited, based on the superior monitoring structure and availability of Tier 3 data for the RPO scheme in India. The NAMA would focus on promoting the REC mechanism, which in many ways is key to the overall compliance of the RPO. The NAMA would involve a multi tiered organizational structure, with the MNRE as the national focal point and a multi level monitoring system, supplementing the existing setup with more enhanced sampling of REC projects. The support received for the NAMA can be used to build awareness about the merits of the REC scheme amongst the obligated entities, finance capacity building of the state level monitoring committees and also constitute a viability gap/ stabilization fund to assist obligated entities in purchase of RECs, promoting liquidity in the market and making REC based project bankable.

EXPLORING OPTIONS TO EVALUATE NAMA ACTIVITIES

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ABSTRACT

This paper aims to explore options to evaluate NAMA activities particularly in terms of stringent baseline determination and rigorous monitoring arrangements. For this purpose, this paper takes for example the mandatory scheme of two countries, both Korea and India, to supply renewable-based electricity under the pre-determined target. Given that as part of RPO, REC trading in India builds on rigorous monitoring arrangements and premium prices determined by the analysis of project viability, RECs submitted by entities under obligation therefore looks eligible to carbon markets. On the other hand, with robust monitoring systems RPS in Korea set up more elaborated eligibility criteria and annual targets for renewable electricity generation which give various options to determine the stringent baseline scenario. As such, it can be argued that RPS in Korea also has great potentials for a NAMA activity. The overall conclusion of this paper is that those two policies represent many of key elements for a potential NAMA activity which could be emulated later by other developing countries.

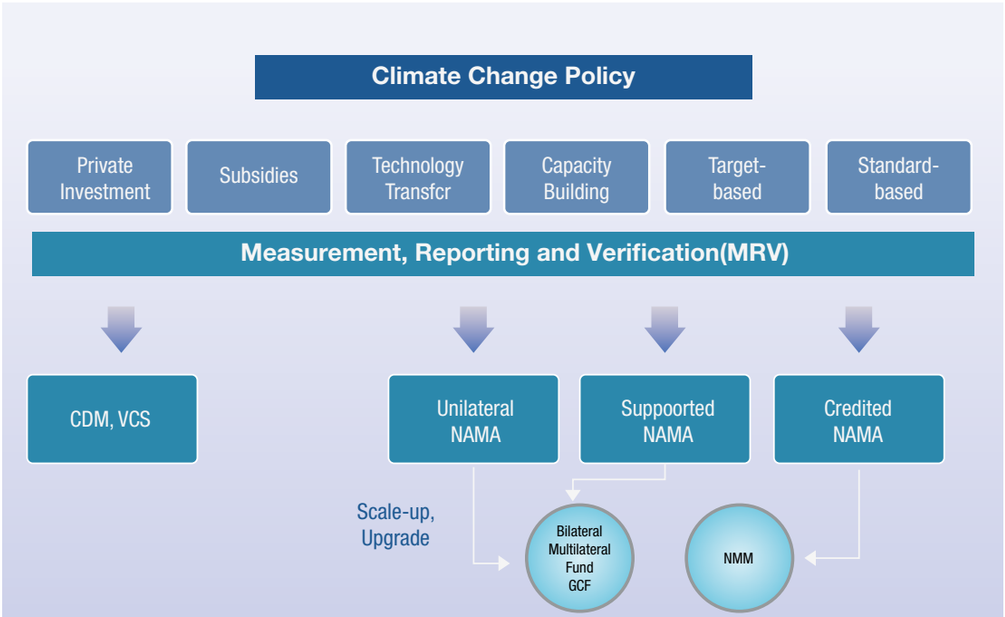
1. Introduction

Many agree that performance-based incentives can bring more confidence in the effectiveness and visibility of national policies and bilateral cooperative programmes to reduce GHG emissions. For the last decade CDM (Clean Development Mechanism) has successfully demonstrated that this can be true in the actual circumstances although at present sharply falling prices of carbon credits may raise some doubts on its long-term effects. According to the results of the recent conception survey which was conducted by the CDM Executive Board[1], many seems to feel that CDM has contributed significantly to quantification of GHG emission reductions and establishment of MRV (Measurement, Reporting, and Verification) systems which consequently ensure the quality of carbon credits.

One of reasons why NAMA (Nationally Appropriate Mitigation Action) attracts a great deal of attentions from policymakers worldwide can be the widespread belief that NAMA would extend the scope of GHG abatement actions into diverse

1 CDM Executive Board (2013). Executive Board of the CDM: Progress update. http://unfccc4.meta-fusion.com/kongresse/sb38/pdf/CDM_EB_Q&A_June_2013_rev_wlog_FINAL.pdf.

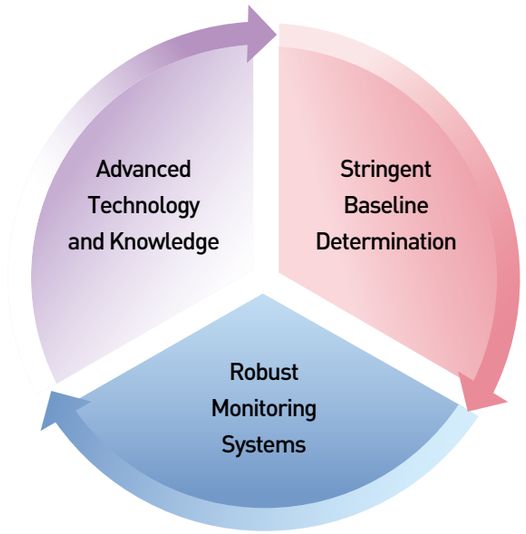
Figure 1. Conceptual Framework and MRV of NAMA



areas which could have not claimed carbon credits without more systematic supports especially from the public sector. In other words, NAMA can pave the way for developing countries to take external supports into diverse areas, particularly including regulatory policy and standards, by showcasing their GHG abatement potentials. However, one can doubt whether NAMA can overcome such hurdles as ensuring its environmental integrity, i.e. stringent baseline scenario and rigorous monitoring system which entailed a lot of costs and times in the case of CDM. No one can certainly guarantee that NAMA will avoid these same difficulties that CDM has so far suffered from. Nevertheless, it is evident that NAMA can serve as a basis on which developing countries sustain its mitigation actions appropriately to its specific situations irrespective of fluctuating carbon markets.

Market mechanisms by nature build on the principle that when they compete with each other participating people achieve more efficiently. As such, they are highly likely to concentrate on the areas where they can act efficiently. This is especially true of CDM where only a few countries have represented the majority of CERs actually generated though not intended in the beginning.

Figure 2. Key Elements to be assessed for NAMA Activities



But emphasizing the efficiency only without caring about the regional balance tends to give rise to another problem like social and environmental issues in a city which is over-populated to maximize the efficiency of resources available. For this reason it is diversity that should be always kept in parallel when pursuing efficiency. In ecological terms, the recent shrinking carbon markets also tell us that their diversity is not so high as to make themselves susceptible to change of external environments. This looks why market mechanisms should continue to be overhauled in order to be sustainable.

Indeed, equipped with its reliable MRV systems, NAMA can play a key role in promoting a variety of GHG abatement activities worldwide. In spite of many challenges ahead of NAMA, what has been so far experienced in the regime of international emissions trading suggests that learning-by-doing processes are very instrumental in formulating internationally acceptable rules. Learning from experiences with CDM, i.e. taking full advantage of lessons learned from a lot of trial and error in developing CDM, could also reduce significantly unnecessary costs which could otherwise be incurred in developing the framework for NAMA.

In this respective, this paper aims to explore options to evaluate NAMA activities particularly in terms of stringent baseline determination and rigorous monitoring arrangements. For this purpose, this paper takes for example the mandatory scheme of two countries, both Korea and India, to supply renewable-based electricity under the pre-determined target[2] which looks outside the scope of CDM or seems difficult to be covered by CDM[3]. In other words, in the context of E- policy[4] this scheme can be seen within the boundary of CDM whereas its mandatory nature seems on the opposite side of CDM which is clearly required to be on the voluntary basis[5]. So, this regulatory policy may be considered as a good example which can be addressed within the wider scope of NAMA. In addition, this paper will bring special focus on its robust MRV system as a prerequisite for ensuring that participating entities achieve their own targets. Furthermore, it will be particularly interesting to compare the similar policies of two countries and find differences in levels of assurance for each policy.

In Korea, it was the preferential FIT (Feed-in-tariff) policy that initially boomed renewable electricity generation across the country. Like other countries, the premium prices for each renewable energy source were determined on the basis of its unit generation cost. The Korean government raised special fund to serve this purpose and subsidized individual renewable energy projects on an ex-post basis, i.e. the amount of actual electricity generations. This preferential FIT policy was regarded as an E-policy under CDM rules because the policy provides subsidies for less carbon-intensive activities whereas some are confused with the assumptions that such incentives under E- policy can be excluded from the baseline scenario which can have some financially attractive projects like wind power look additional. It can be thus said that the preferential FIT policy was indirectly within the scope of CDM even though it was an individual project, not policy itself that was eligible for CERs. From 2012, the Korean government upgraded this preferential FIT policy into the mandatory scheme, so-called, RPS (Renewable Portfolio Standard) whose concept originated from the Western countries, but has been appropriately transformed fitting into the country- specific circumstances.

It is certainly true that RPS is more complicated than the preferential FIT policy in that the price for unit electricity generation can be negotiable and REC (Renewable Electricity Certificate) can be traded among participants who are required to bear its own targets for renewable electricity generation. Comparing to the FIT policy, the strength of RPS lies in its cost-down effects over time through competitions among power generators. However, setting the annual targets is really challenging for RPS thereby necessarily requiring the government to estimate renewable energy potentials in advance and be familiar with trends on development of renewable energy technologies. Apart from such aspect as cost compensation for renewable electricity generation, it seems that both policies are composed of similar elements, particularly in terms of MRV systems. Specifically, the Korea Power Exchange (KPX) collects data of electricity generation and confirms the data through double checks with the data internally recorded by generators. Then the data will be the basis for the cost compensation in the FIT policy and the compliance of targets in

2 UNEP Risoe Center (2011). Low Carbon Development Strategies, p.8.

3 UNFCCC (2005). Decision 7/CMP.1, Paragraph 20: COP/CMP1 decides that a local/regional/national policy or standard cannot be considered as a clean development mechanism project activity.

4 CDM Executive Board (2005). EB 22 report, Annex 3, Clarifications on the Consideration of National and/or Sectoral Policies and Circumstances in Baseline Scenarios: E- policy is defined as a national and/or sectoral policy or regulation that give comparative advantages to less emissions-intensive technologies over more emissions-intensive technologies.

5 UNFCCC (2005). Decision 3/CMP.1, Annex, Paragraph 28: Participation in a CDM project activity is voluntary.

Table 1. **Annual Target of RPS in Korea**

Annual volume = Total amount of power generation* × Annual target(%)

* excluding new & renewable power generation

YEAR	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022~
Target(%)	2.0	2.5	3.0	3.5	4.0	5.0	6.0	7.0	8.0	8.0	10.0
	0.5%p ↑					1.0%p ↑					

Source: http://www.knrec.or.kr/knrec/12/KNREC120700_02.asp

RPS respectively.

On the other hand, India took the slightly different path than RPS in Korea. The RPO (Renewable Purchase Obligation) scheme was first introduced in India without REC trading, only imposing state-specific targets on distribution companies, captive generators, and open access users[6]. RPO was then updated into the scheme combined with REC trading which allow participating generators to choose their ways to sell renewable electricity, either directly sell renewable electricity to entities under obligation or sell renewable electricity in the REC market. Of course, the direct contract with fixed prices is more profitable to the generators, whereas REC trading is more beneficial to entities under obligation, especially entities which are located in the states with lower renewable energy potentials.

6 http://www.iexindia.com/rec.htm

Table 2. **Comparison between RPS in Korea and RPO in India**

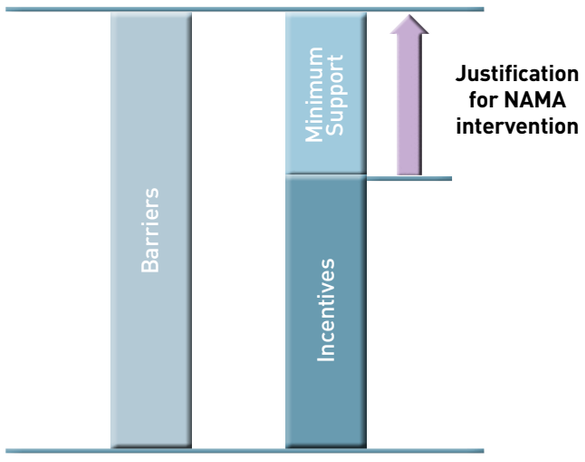
	RPS in Korea	RPO in India
Eligible Renewable Sources	Wind, Solar, Hydro, Biomass, LFG, Bio gas, Tidal, MSW, RDF	Wind, Solar, Small Hydro (~25MW), Biomass, Bio fuels, MSW
Entity under~ obligation	More than 500 MW power generators (In total 13 entities)	Distribution licensees (27), Captive generators (1,130), Open access users (46)
Target	2.0% of each generation in 2012 increasing by 0.5% per year until 2016 then 1% until 2020 (10% from 2020 onwards)	Each SERC sets its own target ranging from 1% to 10%. National Target is 5% in 2010, increasing annually by 1% for 10 years (15% by 2020)
Price Cap	No, Indirect intervention is made by the government with designation of eligible PV generators and supply of its own RECs	Yes, Forbearance price and floor price are determined by CERC
Methods to meet the obligation	1. Installation 2. Direct contract 3. Purchase REC from the market 4. Long-term contract with PV generators	1. Purchase renewable energy directly 2. Purchase REC from the market
Penalty	150% of the average market price	No

2. Assessing the stringency of baseline scenarios

Quantification of baseline emissions is certainly beyond simple verification of emission sources and relevant data. The definition of additionality for CDM projects, i.e. being additional to the baseline scenario, represents this complexity which has brought more attentions to economical and policy aspects rather than engineering aspects of CDM projects. The concept of additionality has gradually evolved over time, getting more and more familiar to global stakeholders, especially with the interpretation that in order for them to be additional CDM projects should not be included in the baseline scenario. Subsequently step-wise barrier approaches was adopted so as to standardize the process to demonstrate the additionality of CDM projects in a logical and transparent manner. Among them an investment analysis for demonstration of investment barriers has been such a favorite one for most of project developers that a number of projects were successfully registered using the method. With this barrier approach, the stringency of baseline scenario can be ensured mainly by including more and more economically viable or commercially available technologies in the baseline scenario and regularly updating the list of those technologies. It looks relatively simple in this sense for RPO in India and RPS in Korea as well to ensure the stringency of its baseline scenario because it covers renewable energy technologies including PV, wind, hydro, and biomass which are generally regarded as not economically feasible but certainly replacing fossil fuel-based power generation in most of developing countries.

However, the barrier approach in itself does not concern how the barrier actually was jumped over by relevant CDM projects, just assuming that revenues from selling credits could have, to some extent, positive impacts on initiating and sustaining the CDM projects. In other words, more focus is placed on the negative side of why the project under consideration would have not occurred in the absence of CDM revenues, which, more or less, lead project developers to simply highlight their difficulties investing in potential projects, not specifying in detail how such difficulties could be actually overcome. To address this limitation of the barrier approach, this paper instead tries to look at the positive side of baseline scenarios while assessing their stringency. Though it looks the same as the barrier approach, this assessment aims to highlight the positive side of baseline scenarios, i.e. which kind of "minimum supports" are needed to actually implement the potential NAMA activities under consideration.

Figure 3. **Concept of Minimum Support**



For example, RPO in India is a target-based policy, whose implementation is currently on a voluntary basis without any specific provisions on penalty. As such, its compliance rate has not been so high. Specifically in FY 2013 only a small number of states have met their own targets under RPO. Mainly, financial difficulties of distribution companies are considered as a key factor leading to such weak compliance of their targets. Impractical monitoring of compliance is also viewed as one of main reasons why RPO is not properly implemented. In addition, state-specific targets which are arbitrarily determined are more or less distracting entities under obligation like distribution companies from meeting the targets. These drawbacks, though seen as a barrier on the one hand, can be, on the other hand, justification for minimum supports in urgent need to properly implement RPO. In other words, such identification of minimum supports necessary for RPO implementation will justify NAMA interventions including financial supports and capacity building from developed countries, of course, only if those effects of minimum supports should be under robust MRV throughout an implementation period. Particularly, in determining the stringent baseline scenario for RPO, minimum supports could be quantified based on the floor prices, i.e. minimum prices of solar and non-solar RECs which are determined by considering the gap between the average power pool cost and minimum requirement for renewable project viability. In other words, the renewable energy generations which are eligible for REC trading would have not occurred anyway because its generation costs are exceeding the average power pool cost as analyzed by the Indian government.

On the other hand, it is assessed that RPS in Korea has more options to ensure the stringency of its baseline scenario. RPS in Korea has a couple of criteria for the eligibility of renewable energy technologies. Firstly, the Korean government has set the specific weights for each renewable technology taking into consideration their environmental impacts, unit power generation costs, renewable energy potentials, and GHG mitigation effects. Having said that, the stringent baseline can be determined, for example, by

making eligible for credits, renewable energy generation with more than 1.0 of weights only, i.e. excluding PV installed at rice fields or forest land, and waste incineration and LFG use whose weights are determined as below 1.0. Secondly, RPS in Korea compensates power generators under obligation for their additional costs for renewable electricity generation or purchasing RECs at the REC market. The level of cost compensation is usually determined using the average REC price. However, some renewable technologies such as more then 5MW hydro power and tidal power on the existing bank are not eligible for the cost compensation due to their economic viability. In this regard, the stringent baseline can be also determined by making eligible for credits, renewable energy generation which can benefit from cost compensations from the government. Finally, RPS in Korea had been initiated in 2012 with the target of providing 2.0% of total power generation of each entity under obligation with renewable energy. The Korean government then set up an ambitious plan to increase the target by 0.5% annually until 2016 then 1% until 2020 and maintain the 10% target from 2020 onwards. Under this scenario, the most stringent baseline can be selected by making eligible for credits, renewable energy generation which is achieved exceeding the 2.0% baseline target.

Table 3. **Weights for Renewable Energy Sources in RPS of Korea**

- Photovoltaic power -

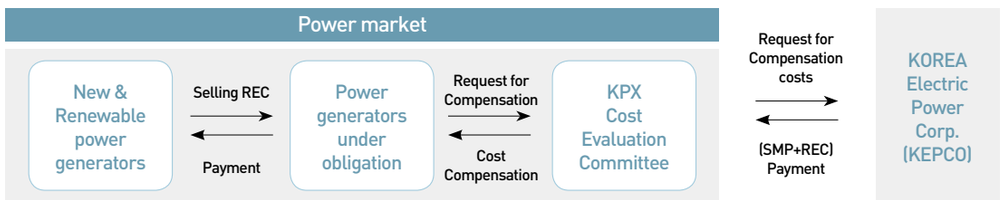
Weights	Standard criteria		
	Installation tupe	Land type	Capacity
0.7	No use of the existing facilities (including buildings etc.)	5types (farmland, rice paddy, orchard, pasture, forest land)	
1.0		Other(23)	Above 30kW
1.2			Below 30kW
1.5	Use of the existing facilities (including buildings etc.) Installation on the surface of inland waters		

- Non-photovoltaic power -

Weights	Standard criteria
0.25	IGCC, Off gas-fired power
0.5	Waste, Landfill gas
1.0	Hydro power, Onshore-wind power, Bioenergy, RDF-fired power, Waste gasification power, Tidal power(with seawall)
1.5	Woody biomass-fired power, Offshore-wind power(within 5km to the grid)
2.0	Offshore-wind power(within 5km to the grid) Tidal power(without seawall), Fuel-cell

Source: http://www.knrec.or.kr/knrec/12/KNREC120700_02.asp

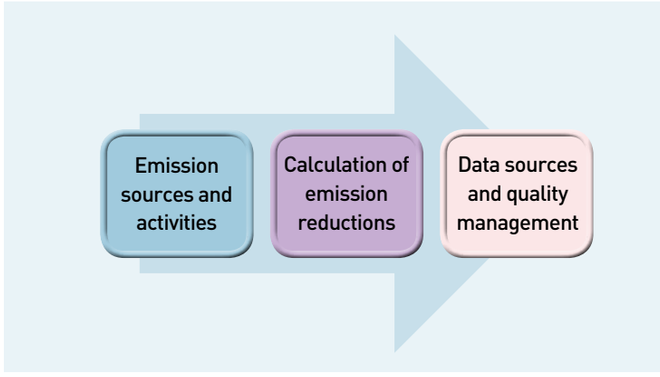
Figure 4. **Compensation for Renewable Power Generation in RPS of Korea**



3. Ensuring robust monitoring systems

The robust monitoring system for NAMA activities is an essential element for supported or credited NAMA activities to demonstrate that they are real. Performance of NAMA activities therefore needs to be evaluated as transparently and systematically as possible. In general, the first step to evaluate the monitoring system for NAMA activities is to define a geographical boundary for their monitoring practice, for example, ranging from the level of individual homes, buildings or industrial plants to municipality, provincial or national levels. The next step is to identify emission sources and GHG abatement activities within the defined boundary which affect the amount of emission reductions attributable from relevant NAMA activities. Then the amount of emission reductions is scrutinized by assessing the process of calculation and aggregation.

Figure 5. **Evaluation of Monitoring Systems**



Finally, it is assessed whether relevant data records are traceable and their quality is regularly managed.

The robustness of monitoring systems for NAMA activities can vary mainly depending on correlation between the costs and uncertainty, which would be the case with other emissions trading schemes. In theory, the less uncertainty are required in conducting monitoring processes the more costs are incurred by such operation of monitoring systems. So, keeping the balance between the two axes is one of challenges which need cautions in talking about the requirements for monitoring of NAMA activities. From this viewpoint, this paper pays particular attentions to how to assess the robustness of monitoring systems for NAMA activities in terms of three components of monitoring systems, i.e. metering method, quality check, and data collection.

First, the uncertainty of metering methods can be minimized by automated transmission of directly metered data while the cost of installing the metering systems can increase high. On the other hand, the installation and maintenance costs

Figure 6. **Robustness of Monitoring Systems**

Components	Level	Cost	Uncertainty
Metering Methods	No Measurement, Indirect Estimation	Low	High
	Direct Metering Manual Recording	↓	↑
	Automated Data Transmission	High	Low
Quality Check	Self-check	Low	High
	Cross-check, Joint Reading	↓	↑
	Third-party Audit	High	Low
Data Collection	Modeling with limited data	Low	High
	Statistical Sampling	↓	↑
	Collection of Whole Data	High	Low

can be reduced by manually recording directly measured data while this method is more likely to increase recording errors. In certain cases where no measurement is possible, indirect estimates with reasonable assumptions could be used as a proxy for the required data though the uncertainty range could be wider than former methods. Secondly, joint meter reading or cross-checks with other sources are typical of quality assurance for data on purchased electricity or steam. However, a small-sized industrial plant could not afford to do this practice and thus prefer self-check of data records due to increased costs though the reliability of measured data are to some extent hampered. Meanwhile, a third-party audit will be the most reliable one to ensure the accuracy of metered data though incurring more time and costs. Finally, whereas a single project can readily secure 100% of metered data with moderate costs, some policies or programmes which are composed of a number of activities could not afford to do so due to huge burdens of time and costs. Unless mandatory reporting processes are in place, statistic sampling will be the second best for collection of the whole data with reasonable costs. In cases where data availability is limited a modeling approach can be also a good proxy on condition that historical data or default data are readily available for this approach.

To sum up, it is desirable that monitoring of NAMA activities be performed at the medium level or more in terms of monitoring components above in order to be credited internationally whereas other standards like ISO50001 may allow lower levels of monitoring for their requirements. In addition, taking into consideration that strong incentives

for ex-post performance of NAMA activities can be created by crediting them, it can be also suggested that less rigorous monitoring practices could be credited by discounting their economic values of emission reductions at internationally acceptable levels.

In the case of RPS in Korea the accuracy of electricity generations under RPS is ensured by on-site metering, automated recording, and cross-checks in the following steps: first, electricity generations are measured with the on-site meter; then the electricity generations measured are stored in the monitoring system on-site and transferred to KPX on-line; after that power generators can compare their own data and KPX data in the webpage of KPX; in order to issue REC for the electricity generations under application, the New and Renewable Energy Center of KEMCO first receives relevant data from KPX; Subsequently, the Center conducts cross-checks of the data with those informed by power generators and then finally issues REC.

Meanwhile, the monitoring of compliance with RPO targets is partly being implemented in India. SLDC (State Load Dispatch Center) plays a key role in ensuring the accuracy of electricity generation data. SLDC conducts meter reading automatically with confirmation by electricity generators on the website. The metered data are periodically reported and confirmed by SLDC and finally approved by NLDC (National Load Dispatch Center) which operates the REC registry. However, the accuracy of electricity generation data is ensured within the REC registry only while the whole monitoring of compliance with RPO targets has not consistently been carried out. This lack of consistency in monitoring its performance could be on the list of minimum supports for proper implementation of RPO in India.

4. Conclusions

Although a wide range of GHG mitigation policies, from subsidies for low-carbon emission technologies to energy labeling and performance standard, are considered in many of developing counties, the question still arises as to whether those policies can really lead to tangible emission reductions. Difficulties in addressing this question partly justify the necessity of minimum supports through bilateral or multilateral cooperation as well as establishment of appropriate MRV systems to trace the results of such policies.

This is especially true of RPO in India. Low compliance rate with state-specific renewable energy targets and incomplete monitoring of electricity generations in RPO constitutes what to be improved in the next few years. Looking at the other side of the coin, this insufficient implementation may make RPO in India eligible for a NAMA activity. In other words, NAMA can help to properly implement RPO by providing various supports including financial, institutional, and technical supports to improve its performance. It is not obvious which supports are more appropriate to RPO in India. However, given that as part of RPO, REC trading builds on rigorous monitoring arrangements and premium prices determined by the analysis of project viability, RECs submitted by entities under obligation looks eligible to carbon markets.

Compared to RPO in India, RPS in Korea currently represents relatively higher compliance rate, but still facing uncertainty about compliance

with increasing targets in the future. In addition, burdens on the compensation for renewable electricity generation are sorely born by one government-sponsored power distribution company, KEPCO. It is obviously worth noting that RPS in Korea set up more elaborated eligibility criteria and annual targets for renewable electricity generation. This strength will give various options to determine the stringent baseline scenario for RPS in Korea. As for monitoring of emission reductions, it is noted that RPS in Korea is ensuring their quality through on-site measurement and automated transmission of electricity generation data, and cross-checks between KPX and power generators. Having said that, it can be argued that RPS in Korea has great potentials for NAMA activities.

However, realizing those potentials still looks not straightforward. Many questions have yet to be addressed particularly as to what the stringent baseline is and how rigorous the monitoring systems should be. Therefore no one can deny that specific guidelines to MRV options and baseline determination are in the most urgent need in order to leverage GHG mitigation potentials of developing countries in the near future. Just based on the results of reviewing two mandatory policies above, it seems desirable that monitoring of NAMA activities be performed at the medium level or more in terms of metering method, quality check, and data collection in order to be credited internationally. However, it also looks possible that less rigorous monitoring practices could be credited by discounting their economic values of emission reductions at internationally acceptable levels. In other words, it can be suggested that stronger incentives for ex-post performance of NAMA activities could be created by reflecting the level of monitoring, and possibly minimum supports as well, in the price of credits.

On the other hand, it should be particularly noted

that all the power generations under two policies may not lead to GHG emission reductions. This is mainly because both target-based schemes include other energy sources than renewable. For example, RPO in India makes cogeneration eligible for meeting the targets whereas RPS in Korea include a couple of advanced technologies like fuel cell and IGCC (Integrated Gasification Combined Cycle) within its scope. In addition, MSW or RDF-based power generations may not be considered as renewable if composed of fossil fuel-based wastes mostly. In this respective, particular care need to be taken of calculation of GHG emission reductions attributable to renewable power generation only.

Besides, like a programmatic CDM, NAMA has a similar risk of double counting of its emission reductions due to its relatively large scope. For example, at the project level many renewable energy projects under RPO in India as well as RPS in Korea have a possibility of overlapping with CDM projects in the pipeline or already registered. It is therefore suggested that double counting of emission reductions and/or financial support in relation to NAMA activities should be precluded via a transparent tracking system[7]. Further, one of features for NAMA activities compared to CDM is that the roles of governments in their implementation are of more importance. Given that NAMA activities can reach the policy level, it seems that the number of sub-activities can dramatically increase thereby incurring considerable time and costs for distribution of corresponding credits. To prevent this inefficiency,

7 High-Level Panel on the CDM Policy Dialogue (2012). Climate Change, Carbon Markets, and The CDM: A Call to Action, p.35: Recommendation 3.4.

it can be argued that granting credits to the government[8] would be more suitable especially for target and standard-based regulatory policies.

Finally, no one can say that there is only one right answer to the given questions, which does not necessarily mean that we can never find an answer to the questions. Rather, we have seen in many cases that it is more time-consuming to find the most appropriate one among many possible answers. However, our experiences often tell us that what we have felt and experienced while looking for something is more rewarding than what we have eventually found itself. In this context, continually sharing what has been found and learned in various country-specific situations will be more than useful for further works to find how to properly evaluate NAMA activities.

8 Andrew Prag and Gregory Briner (2012). Crossing The Threshold: Ambitious Baselines for the UNFCCC New Market-based Mechanism, OECD/IEA, p.24.

Reference

Andrew Prag and Gregory Briner (2012). Crossing The Threshold: Ambitious Baselines for the UNFCCC New Market-based Mechanism. OECD/IEA.

CDM Executive Board (2005). EB 22 report, Annex 3, Clarifications on the Consideration of National and/or Sectoral Policies and Circumstances in Baseline Scenarios.

CDM Executive Board (2013). Executive Board of the CDM: Progress update. http://unfccc4.meta-fusion.com/kongresse/sb38/pdf/CDM_EB_Q&A_June_2013_rev_wlog_FINAL.pdf.

High-Level Panel on the CDM Policy Dialogue (2012). Climate Change, Carbon Markets, and the CDM: A Call to Action.

UNEP Risoe Center (2011). Low Carbon Development Strategies.

UNFCCC (2005). Decision 3/CMP.1, Annex.

UNFCCC (2005). Decision 7/CMP.1.

NAMA Crediting

From its concept to MRV options