

Negotiating a Low Carbon Transition in Asia

NAMAs and MRV

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Introduction

Kentaro Tamura

Being the two most populous and rapidly growing economies, China and India will have significant role in the global efforts towards climate change mitigation. Indeed, both countries are making various efforts to control their rapidly growing greenhouse gas emissions and energy use in line with their national developmental priorities. Simultaneously, there are international efforts to make developing countries' mitigation actions more effective, transparent and accountable. The Cancun Agreements provide an overall framework for measuring, reporting and verification (MRV) of nationally appropriate mitigation actions (NAMAs) undertaken by developing countries. Specific modalities and guidelines will be discussed and hopefully determined in the upcoming negotiations leading up to the seventeenth Conference of Parties (COP17) to the UN Framework Convention on Climate Change (UNFCCC) in December 2011. Thus, it is critical time for international climate negotiations to establish an effective regime to mitigate climate change.

This report is a small step in the direction of improving our understanding of domestic mitigation actions and MRV systems in developing countries, so as better to comprehend the ways in which NAMAs and MRV procedures could be designed at the both domestic and international levels. While domestic mitigation actions and MRV systems have been evolving from specific national circumstances, they were also influenced by developments in the international climate regime. On the other hand, any attempts to design international institutions to promote NAMAs and MRV systems without adequate understanding of what is going on the ground are bound to a failure, because actual implementation will occur at the domestic level. By looking at the two key developing countries, China and India, this volume aims at bridging the gap in understanding of domestic and international efforts.

The report is divided into two Parts. The first, comprising one chapter, puts the issues of NAMAs and MRV into context by looking at relevant institutional developments in the international climate regime¹. The second part, consisting of four chapters, addresses country case studies of China and India. The chapters in Part Two provide assessment of mitigation pledges, as well as explore domestic reasons for taking actions against climate change and improving domestic MRV systems.

The first chapter, by Koji Fukuda and Kentaro Tamura, offers an analysis of NAMAs that developing countries pledged to the UNFCCC in compliance with Appendix II provisions of the Copenhagen Accord. The authors divide submitted NAMAs into four groups: 1) enabling conditions; 2) projects, programs and sectoral measures; 3) carbon neutrality; and 4) national GHG emission reduction targets. The diversity in NAMAs reflects the diverse mitigation needs of non-Annex I Parties and thus calls for a "layering" approach to international support and MRV for NAMAs. The authors further identify remaining designing issues for an MRV framework by exploring what needs to be incorporated in guidelines for MRV and International Consultations and Analysis (ICA) to be adopted by COP. The chapter concludes with policy recommendations for an effective framework for delivering international financial, technology, and capacity building support as well as MRV of GHG emission reductions.

Part two of this report moves from the discussion of international institutions for NAMAs and MRV to domestic fronts. Chapters 2, 3, and 4 discuss China's international mitigation pledges and domestic institutional reforms toward low carbon development. In Chapter 3, Jusen Asuka, Li Zhi Dong, and Lu Xiang Chun analyse the President Hu Jin Tao's speech at the UN Climate Change Summit of September 2009 that "(China is) to drastically reduce CO₂ emissions per GDP (CO₂ intensity) from the 2005 level by 2020." The authors seek to understand what the drastic reduction in CO₂ intensity would mean, by analysing the Scenario Report published by a government-related think tank. The Scenario Report, they find, demonstrates that CO₂ intensity would be reduced by 44% from the 2005 level by 2020 under the energy

¹ A complementary report, *Measurable, Reportable and Verifiable (MRV): Trends and Developments in Climate Change Negotiations*, addresses key issues surrounding MRV at the international level. It is available at <http://enviroscope.iges.or.jp/modules/envirolib/view.php?docid=3060>.

saving scenario, and 57% under the low carbon scenario. The low carbon scenario presumes that China will control CO₂ emissions mainly by iron and steel production adjustment and power system structural reform up to 2020, and by rapid and large scale introduction of advanced technologies after 2030. The authors argue that it is necessary for China to strengthen existing measures and provide economic incentives, together with further international cooperation, in order to promote low carbon development. The authors also highlight the importance of communication between China and the rest of the world, so as better to understand the content of China's domestic mitigation actions.

In November 2009, the Chinese government announced the emission reduction target of reducing CO₂ intensity by 40-45% from the 2005 level by 2020, and submitted the target to the UNFCCC Secretariat in February 2010. The China's 40-45% intensity target caught lots of attention and sparked off debate over its stringency. Some regarded the target as of little value, while others appreciated the level of ambition. In Chapter 4 Asuka and Lu argue that the presumption of China's future economic growth rate is one of key factors for understanding the different assessment of the 40-45% intensity target (i.e., lower the prediction of future economic growth is, smaller the estimate of absolute emissions). They conclude that the assessment of carbon intensity targets by developing countries is not only difficult but also requires due understanding of their domestic situations (for example, low emission or GDP per capita).

In Chapter 5, Jiangwen Guo and Eric Zusman aim to capture China's evolving interests, institutions and actions toward a low carbon transition. They explore the content and incentives for low carbon reforms in China's 11th and 12th Five Year Plans. In particular, it is revealed that China adopted a progressive slate of command-control reforms in the 11th Five Year Plan and strengthened their implementation with performance-based compliance incentives. In the 12th Five Year Plan China appears likely to adopt a more varied set of command-control and market-oriented reforms that would benefit from a more varied set of national and international compliance incentives. They conclude that it is therefore in both China and the international community's interest to come to a mutually agreeable accommodation on the MRVing of unilateral NAMAs. Moreover, the chapter suggests that provisions for ICA and fast track financing in the Copenhagen Accord could help advance climate negotiations at COP 16 and enable a low carbon transition in China.

Chapter 6 shifts to India and discusses some innovative mechanisms, including market-based mechanisms, promoted by the country for energy conservation and energy efficiency, and the domestic policy monitoring and evaluation measures. Nandakumar Janardhanan argues that India's actions towards climate change mitigation and the domestic monitoring and evaluation mechanisms are fast evolving as key parts of the country's climate policy in order to address the growing concerns on climate change. India has developed national missions for addressing climate change concerns; and various monitoring and evaluation mechanisms apart from policies that promote energy efficiency and energy conservation. All these developments, he points out, indicate that despite the domestic contentions regarding certain aspects of international climate change negotiations especially the international consultation and analyses and recommendations for international MRV, India has been taking various steps domestically towards addressing the climate change issues.

Overall this volume is not intended as a comprehensive and in-depth survey of NAMAs and MRV in developing countries. As of writing, 40 countries have submitted their NAMAs, and the carbon intensity target adopted by China and India is only one form of NAMAs. Some developing countries adopt emission reduction targets against future business-as-usual (BAU) emissions, others regard project-based or sectoral policies and measures as their NAMAs. The report is, however, one of the few existing attempts to bring together various energy and climate-related issues in the two largest developing countries with developments in the evolving international climate regime. The resulting analysis of major issues and episodes in the international climate regime, as well as China and India, seeks to further debate about the measures and approaches appropriate to encouraging developing countries' mitigation efforts and making the global governance of climate change more effective.

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Chapter 1

An Analysis of Non-Annex I Parties NAMAs

An Analysis of Non-Annex I Parties NAMAs

Challenges for Designing International Support and Implementing an Effective MRV Framework

Koji Fukuda
Kentaro Tamura

1.1. Introduction

Achieving the ultimate objective of the United Nations Framework Convention on Climate Change (UNFCCC) requires concerted efforts for mitigation by all Parties. While Article 3 of the UNFCCC obliges Annex I Parties to take the mitigation lead, it also suggests non-Annex I Parties have a common but differentiated responsibility (CBDR) for voluntarily taking mitigation actions. Decision 1/CP.16 of the Cancun Agreements has successfully inscribed mitigation pledges of all parties based on this CBDR principle by calling for; Annex I Parties to submit quantified economy-wide emission targets and non-Annex I Parties to submit nationally appropriate mitigation actions (NAMAs) to the UNFCCC Secretariat communicated through the INF.1 documents (UNFCCC 2010b). As of March 2011, 48 non-Annex I Parties submitted their NAMAs to the INF.1 document under the Ad Hoc Working Group on Long-term Cooperative Action under the Convention (AWG-LCA). The contents of these NAMAs build on NAMAs listed in the Appendix II of the Copenhagen Accord from the previous year (UNFCCC 2010a). Against the backdrop of the progress made on the mitigation front of the post-2012 climate regime under the UNFCCC negotiation, this paper analyses NAMAs submitted by non-Annex I Parties to the INF.1 document, and explores potential options for delivering international support to facilitate implementation of NAMAs, as well as for operationalising measurement, reporting, and verification (MRV). Considering Decision 1/CP.16 of the Cancun Agreements leaves uncertain aspects of NAMAs and MRV, the paper also explores remaining design and implementation issues, and attempts to provide potential ways forward.

This paper is divided into sections. The first section provides an overview of the existing literature on NAMAs and MRV. The paper then conducts a detailed analysis of NAMAs based on the INF.1 document categorising NAMAs based on their contents, scope and design features. This is followed by an analysis of potential options for delivering international support and MRV for NAMAs in each of the categories. The paper concludes by exploring remaining design and implementation issues for a MRV framework.

1.2. Previous Studies

The terms Nationally Appropriate Mitigation Actions (NAMAs) and measurable, reportable and verifiable (MRV) originated with the adoption of the Bali Action Plan at the 13th Conference of the Parties (COP13) to the UNFCCC in 2007. Since COP13, both climate change negotiator and researchers have debated to reconcile competing interpretations of these terms. The growing body of literature on NAMAs and MRV attempts to define these yet abstract concepts. The literature can be divided into five groups: 1) overarching analysis, 2) reinforcement of existing MRV-related instruments, 3) in-country analysis, 4) analysis of MRV for support, and 5) role of the carbon market to finance NAMAs.

Studies belonging to the overarching analysis category look at the overall design of NAMA and MRV frameworks, including the scope of support for NAMAs, and low carbon development strategies (Breidenich and Bodansky 2009; Levina and Helme, 2009; CCAP 2009; Ellis and Moarif 2009; Ellis et al. 2010; Fransen et al. 2008). Those classified under the reinforcement of existing MRV instruments category consider how to utilise existing GHG inventories and national communications to build an MRV framework (Fransen et al. 2009; South Centre 2008). Studies concerned with in-country analysis concentrate on how

countries such as China could use their own policies and institutional arrangements to build NAMAs and MRV (Mintzer et al. 2010; Teng et al. 2009), while other studies compile national perspectives on NAMAs and MRV (UNEP 2009). Other studies also focus on major emitting developing countries to explore their mitigation potential, existing policies, and potential linkage between domestic mitigation efforts with international climate regime (Höhne et al. 2008; van Asselt et al. 2010). Studies on an MRV framework for international support look at the challenges associated with tracking, monitoring and reporting various financial flows (World Bank 2009; Corfee-Morlot et al. 2009; Moncel et al. 2009; Tirpak et al. 2010) and explores ways to link NAMAs to international support, including the creation of a registry that would match NAMAs of non-Annex I Parties with support (OECD 2009; Kim et al. 2009; McMahon and Moncel 2009; Muller and Gomez-Echeverri 2009). Studies on the role of the carbon market to finance NAMAs explore how market-based mechanism can leverage private capital to finance NAMAs in association with crediting of emission reductions. (UNEP 2009).

While these studies have outlined possible architectures for NAMAs and MRV, their recommendations remain rather conceptual in nature. This is paralleled by developments in international climate negotiations that have revolved around adding meaning to acronyms. As the progress made in the UNFCCC negotiation provided more clarity to these concepts, a increased number of practical proposals have been put on the table to explore mitigation opportunities on the ground and facilitate implementation. Examples include exploration of developing NAMAs in the transport and building sector for Mexico (Jung et al. 2010), and standardised reporting format and guidelines for review process for international support proposed by Tirpak et al. (2010). An initial attempt to categorise mitigation actions of non-Annex I Parties using the Appendix II of Copenhagen Accord is also observed in Sterk (2010).

If NAMAs and MRV are to be operationalised within the time frame required to meet the expiry of the first commitment period of the Kyoto Protocol, there is an urgent need to ground both the academic literature and negotiations in greater empirical detail. Fortunately, a significant number of countries have pledged and inscribed their NAMAs to the UNFCCC following Decision 1/CP.16 of the Cancun Agreements. Looking at the content of these pledges and exploring the possible framework for international support and MRV can help move this process forward.

This paper builds on the existing literature on overall framework analysis of NAMA and MRV as well as the initial attempt to categorise NAMAs in Appendix II of the Copenhagen Accord by analysing NAMAs, and exploring options that can facilitate the operationalisation of MRV in line with the latest provisions of Decision 1/CP.16 of the Cancun Agreements.

1.3. Categorisation of NAMAs

To analyse the scope, contents, and design features of the 48 non-Annex I Parties mitigation actions, the paper reviews NAMAs compiled in the INF.1 document. The review reveals NAMAs can be categorised into four different groups (See Table 1).

Table 1. Categorization of NAMAs listed in the INF.1 Document (48 Countries)

Category 1	Category 2	Category 3	Category 4			
Enabling Conditions ¹	Projects-level Activities	Sector-level Actions	Economy-wide Targets			
Afghanistan Georgia Tajikistan	Ethiopia Jordan Mongolia Morocco The former Yugoslav Republic of Macedonia	Algeria Argentina Armenia Benin Botswana Cambodia Cameroon Central African Republic Chad Colombia Congo Côte d'Ivoire Eritrea Gabon Ghana Madagascar Mauritania Mauritius Peru San Marino Sierra Leone Togo Tunisia	Intensity targets (GDP)	Absolute targets		
				Base Year	BAU	Carbon Neutrality ²
			China India	Antigua Barbuda (1990) Marshall Islands (2009) Republic of Moldova (1990)	Brazil Chile Indonesia Israel Mexico Papua New Guinea Republic of Korea Singapore South Africa	Bhutan Costa Rica Maldives

Note: ¹ Category I includes such mitigation related actions as preparation of Initial National Communications (INC), GHG Inventories, identification of BAU emission path, and identification of NAMAs itself, among others.

² Carbon neutrality refers to achieving zero net GHG emissions by balancing total anthropogenic GHG emissions and total amount of carbon sequestrations, emission reductions, and offsets.

- **Category 1 (Enabling Conditions):** The non-Annex I Parties in Category 1, represented by Afghanistan and Georgia, envisage readiness activities as the starting point of pursuing their NAMAs, but do not provide concrete emission reduction or control proposals. They seek the establishment of basic enabling conditions to design, formulate and implement mitigation actions as well as countermeasures to meet reporting requirements assigned to Parties in the current climate regime as their NAMAs. The former includes the assessment of mitigation needs, identification of mitigation potential, and formulation of NAMAs and emissions baselines (identification of BAU emission path), whereas the latter includes enabling measures such as the completion of Initial National Communications and GHG Inventories.
- **Category 2 (Project-level Activities):** Those countries whose NAMAs contain lists of specific emissions reduction or removal enhancement projects or actions with numerical targets are classified into this category. Information on projects varies, however. For instance, Morocco and Mongolia indicate estimating mitigation potentials for each project, while Ethiopia provides estimates of installed capacities (MW) of renewable energy-based projects. In addition, Jordan and the former Yugoslav Republic of Macedonia provide lists of specific projects, while offering little information on reduction potential or targets.
- **Category 3 (Sector-level Actions):** In this category, NAMAs provides lists of target sectors and/or technologies, while offering little detail on their emission reduction potential. A good example of countries in this category is Tunisia. Tunisia's NAMAs identify specific sectors and technologies (e.g.,

solar PV and solar water heating), but provide little detail on emission reduction potential. Sectoral policies with specific targets (share of renewable energy in energy supply or forest coverage, etc) are also classified in this category. Colombia set a numerical target for renewable energy promotion, while Sierra Leone, Tunisia and Togo set numerical targets for the forest sector.

- Category 4 (Economy-wide Targets): The 17 non-Annex I Parties in Category 4, including China and India, envisage national-level GHG emission reduction targets by 2020 as their NAMAs. Non-Annex I Parties in this category can be subdivided into two sub-categories; countries pledging intensity targets and absolute targets, where the latter group could be further classified into those using either BAU, a base year, or carbon neutrality as a baseline. Pursuing voluntary emission reduction targets as their NAMAs reflects a willingness to contribute to mitigation. The distinguishing characteristic for countries in this category is that they are either emerging economies or small economies including small island states. Further analysis will be needed to assess the ambition level of numerical targets against their overall mitigation impacts.

The cross-national variation in NAMAs observed above could also be attributed to the ambiguity in how COP defined NAMAs. This ambiguity was likely international in that it helps to promote participation from a wide range of Parties.

Looking closely at countries falling under the Category 4 NAMAs, many of emerging economies or more advanced non-Annex I Parties have already formulated (or are in the process of formulating) national development plans or national climate change strategies or plans, as illustrated by Table 2. Though further research is necessary to examine the level of stringency and progress of implementation and effectiveness of such strategies or plans, it can be inferred from their formulation of these strategies or plans that these countries have begun mainstreaming climate change concerns into development plans. In fact, some countries, including Indonesia and China, have developed detailed action plans for achieving their targets, including listing mitigation activities along with estimated costs and mitigation potentials. Other non-Annex I Parties seem poised to follow the mainstreaming trend, potentially increasing the number of mitigation actions. Progress made for mainstreaming climate change into national development plans could also link to other provisions of Decision 1/CP.16 of the Cancun Agreements, encouraging non-Annex I Parties to develop low carbon developmental strategies or plans. While the precise definition of such Strategies or Plans is not yet clear, national climate strategies illustrated in Table 2 appear likely fill that role.

Table 2. Selected Examples and Current Status of Mainstreaming Climate Change into National Development Plans/Strategies among non-Annex I Parties

Country	Name of National Development Plan	Year of Formulation
China	11 th 5-year Plan (2006-2010) 12 th 5-year Plan (2011-2016) National Climate Change Program	March 2006 March 2010 June 2007
India	National Action Plan on Climate Change (NAPCC)	June 2008
Brazil	National Plan on Climate Change (PNMC)	December 2008
Indonesia	National Action Plan Addressing Climate Change Climate Change in Indonesia National Development Planning Mid-term Development Plan (RPJM 2010-2014)	December 2007 July 2008 May 2010
Israel	National Action Plan on Climate Change	In process (Government Decision passed for implementation (December 2010))
Mexico	National Strategy of Climate Change (ENACC) Special Program on Climate Change (PECC) as part of the National Development Plan (PND, 2007-2012)	May 2007 July 2008 (initial draft), March 2009
Papua New Guinea	Preliminary Climate Compatible Development Plan	December 2009
South Korea	4th Comprehensive National Action Plan for Climate Change (2008-2012) 5-Year National Action Plan for Green Growth Basic Law on Low Carbon and Green Growth	2008 July 2009 January 2010
Singapore	National Climate Change Strategy Sustainable Singapore Blueprint	March 2008 April 2009 (Implementation)
South Africa	National Climate Change Response Strategy Long Term Mitigation Scenarios (LTMS)	2004 October 2007
Marshall Islands	National Energy Policy and Energy Action Plan National Climate Change Framework Policy (NCCFP)	October 2009 (In process as of Nov 2010)

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

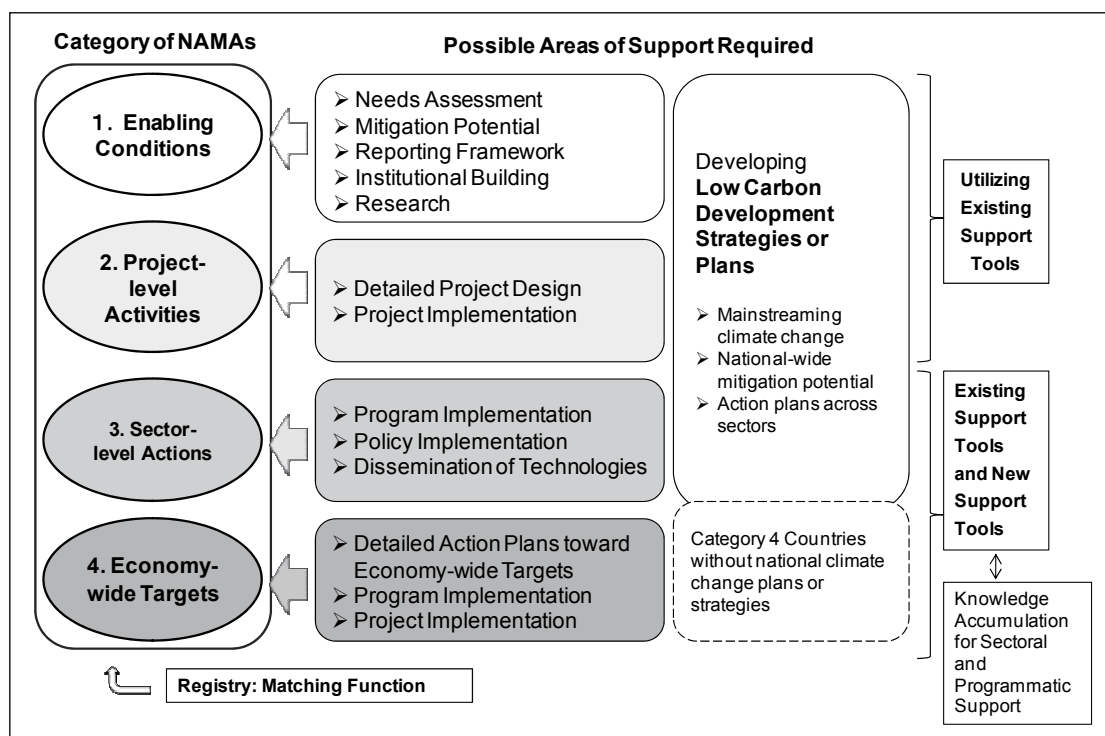
1.4. Implications of the Cross-National Variations in NAMAs

The cross-national variation identified through the categorisation of NAMAs in the INF.1 document suggest diverse mitigation needs and opportunities of non-Annex I Parties at different stages of development, including those that contribute directly and indirectly to GHG emission reduction. In order to meet these diverse needs, the paper proposes a layered and phased approach for international support as well as MRV of mitigation actions by categories of NAMAs. This section explores and analyses how layered and phased approach can fit into the context of international support and MRV for different categories of NAMAs.

1.4.1. Support for NAMAs: How to meet the diverse needs?

The provision of international support in the form of finance, technology and capacity building is crucial to the effective implementation of NAMAs envisaged by non-Annex I Parties. Figure 1 provides potential options of how different categories NAMAs could be efficiently supported while taking into account cross-national variation in NAMAs, stage of economic development, and other national circumstances.

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



To support and strengthen the implementation of NAMAs, both public and private finance, and bilateral and multilateral channels could be considered. In this regard, a combination of conventional ODA tools could provide an effective support framework for the mitigation needs and capture mitigation opportunities for the Category 1 NAMAs, while at the same time facilitating the implementation of the Category 2 NAMAs. Taking the Category 1 NAMAs for instance, domestic mitigation needs and mitigation potential could be assessed through comprehensive development surveys. Likewise, the preparation of NATCOM and GHG inventories could be conducted by using the existing financing channels through the GEF, and other capacity development activities with emphasis on building effective and reliable domestic data collection, storage and assessment systems. Given the financial and capacity constraints facing the countries falling under the Category 1 NAMAs, the provision of public support in the form of grants best matches their needs to enhance preparedness for designing and implementing NAMAs directly dealing with GHG emission.

As for the Category 2 NAMAs, the provision of support can take a variety of forms and sources. For those countries with lists of projects lacking detailed descriptions on their mitigation potential or costs of implementation, feasibility studies and capacity building support could help them determine the scope, design and viability of an individual action. Adding clarity to these aspects of Category 2 NAMAs also paves the way for subsequent MRV process. Indeed, Decision 1/CP.16 of the Cancun Agreements recognises the necessity of greater clarity.

With regard to the source of support, support to improve the scope, design and project viability of the Category 2 NAMAs could come from both public (both bilateral and multilateral) and private sources. A wide variety of forms and sources of support available for project formulation and implementation suggests there is ample opportunity to proceed along these lines. From a practical point of view, however, policy coordination and harmonisation among different donors will be needed for the smooth implementation of projects. In this regard, matching function of the registry between recorded NAMAs and international support, stipulated under Decision 1/CP.16 of the Cancun Agreements along with the recognition function for domestically financed NAMAs, could be harnessed to enhance harmonisation

ex-ante and thus ease bottlenecks on finance flowing to recipient countries.

Unlike the Category 1 and the Category 2 NAMAs where conventional support methodologies from ODA tools could be used, support to the Category 3 NAMAs confronts a significant challenge. Because programs and sectoral policies and measures entail broader coverage and larger implementation costs compared with individual mitigation projects, conventional financial assistance tools for sectoral measures (such as sectoral loans, two-step loans or program loans) may not be applicable for this category. While further clarity is required on the acceptability and functions of loans as part of public finance to mitigation-related programs and sectoral policies and measures, the provision of financial and technical support to subcomponents of such programs and sectoral measures could be one way, along with technology transfer to meet sectoral targets. While the provision of support for the Category 3 NAMAs is a relatively new area for international assistance, increased flexibility and accumulation of expertise from the donor community is anticipated as ODA and other forms of development are scaled up to the programmatic level (World Bank 2009).

With regard to supporting the Category 4 NAMAs, international support could be used to assist in the process of translating or breaking down the economy-wide target into sets of identifiable action plans across all mitigation sectors by estimated cost of implementation. This translation process will require the allocation of sectoral targets within the recipient country. The implementation of an individual action plan for all mitigation sectors could also be supported by financial, technological and capacity building provisions. Such individual actions could take the form of projects or programs and policies and measures, and depending on the form of such actions, support for the Category 2 and the Category 3 NAMAs could be applied.

Aside from category-specific support, technical assistance to help recipient countries shape their low carbon development strategies and plans could be helpful to Category 1, 2, 3 NAMAs, as mitigation impact of their NAMAs are limited to the project or sectoral level. Developing such strategies or plans help these countries identify and elaborate their actions to capture mitigation potential in the national scale.

Another area that requires further consideration in designing support for NAMAs is the frequency of updating and renewing. For instance, the duration of the Category 1 and the Category 2 NAMAs could be a couple of years, indicating the need for the frequent renewal of NAMAs required until 2020. In contrast, the Category 3 and the Category 4 NAMAs with wider coverage will need to renew and update their pledges less frequently. As the Paragraph 59 of Decision 1/CP.16 of the Cancun Agreements grants the updating the mitigation actions of non-Annex I Parties on a regular basis in a separate section of the registry (UNFCCC 2011), continuity of the mitigation actions until 2020 is preserved. In order to maintain the integrity of such renewed and upgraded mitigation actions, quality control mechanism or guidance could be further developed by COP or other appropriate fora to review the renewed and upgraded NAMAs. In order to make this process facilitative, donor countries could provide additional support for the renewed and updated NAMAs as part of the incentive for rewarding mitigation though such efforts are voluntary in nature.

With regard to the effective utilisation of the registry, while beyond the scope of mitigation, a closer analysis of each country's submission for the INF.1 document reveals adaptation measures from some non-Annex I Parties. While no consensus is so far observed as to how to achieve a balanced allocation of resources between mitigation and adaptation, one potential option (to simultaneously ensure provision of international support for adaptation) is to expand existing registry under the UNFCCC Secretariat. This would entail applying both matching and recognition functions to adaptation. Such arrangement could potentially help scale up international support for adaptation. Centralising information on both mitigation and adaptation under a single registry mechanism might also be efficient from an information management perspective.

In sum, international support for NAMAs should be provided through a step-wise framework that tailors support to differences between NAMAs, while providing technical support to develop low carbon development strategies and plans across categories. This approach could help simplify the process at

identifying and capturing mitigation potentials at the national level. In addition to the provision of international support for NAMAs, developing partnerships between non-Annex I Parties such as regional south-south cooperation frameworks that facilitate the exchange of human resources and sharing of best practices (such as in the field of National Communications and GHG inventories preparation) could complement international support by Annex I Parties and enhance the overall effectiveness of NAMAs (Fukuda 2009).

1.4.2. Measurement, Reporting and Verification (MRV) of NAMAs: How to meet diverse needs?

The introduction and implementation of MRV for NAMAs is one of the most contentious issues in the recent climate change negotiations. At its core, the anticipation of MRV is to serve as an instrument to ensure the effectiveness and transparency of mitigation actions, as well as to assess the status of global emission reductions.

The Cancun Agreement has shaped a basic framework for both MRV and ICA processes for non-Annex I Parties' NAMAs. Internationally supported NAMAs will be subject to domestic MRV followed by international MRV whereas domestically supported NAMAs will be subject to domestic MRV, contents of which will be communicated through biennial update reports along with ICA. A detailed process for domestic MRV and international MRV will be based on guidelines to be developed under the Convention in due course. However, the exact expression of "general" guidelines to be applied for domestic MRV as compared to guidelines to be applied for international MRV implies that Parties might simply agree on basic procedural steps but leave a certain degree of freedom to non-Annex I Parties as to how to implement domestic MRV so as to accommodate different national circumstances. On the contrary, guidelines for the international MRV will be a standardised and uniform set of rules.

As far as the contents of information to be MRVed is concerned, Decision 1/CP.16 of the Cancun Agreements stipulates that the contents include national GHG inventory report, detailed information of mitigation actions (inclusive of description, impact analysis, methodologies and assumptions), progress in implementation, information of domestic MRV, and support received. Inclusion of detailed information of mitigation action for the MRV process suggests that for those non-Annex I Parties pledging their NAMAs without detailed descriptions, will need to clarify technical details before proceeding to actual implementation. (i.e., those countries under the Category 3 and some of the countries under the Category 2)

Decision 1/CP.16 also added clarity to the ICA framework by stipulating it for transparency of NAMAs and their effects. ICA is conducted on the submitted biennial report at the Subsidiary Body for Implementation (SBI) in a non-intrusive, non-punitive manner and respecting national sovereignty. Moreover, Decision 1/CP.16 of the Cancun Agreements stipulates the results of exchange of views through the ICA process among technical experts is to be synthesised in summary reports.

With regard to the overall reporting framework, Decision 1/CP.16 of the Cancun Agreements reinforces the existing reporting system, including GHG inventories and NATCOM by setting the reporting frequency of full-fledged NATCOM to every four years, and biennial update reports including information on updates of national GHG inventories, information on a mitigation action, needs and support received. The same paragraph also provides clear differentiation of the level of stringency of reporting requirement by stipulating that both the content and frequency of NATCOM of non-Annex I Parties will not be more onerous than that for Annex I Parties (UNFCCC 2011).

As previously mentioned, the categorisation of NAMAs reflects diverse mitigation needs and opportunities for non-Annex I Parties. This cross-national variation should also be taken into consideration as a one-size-fits-all type of MRV is impractical to cope with the observed diversity. The paper hence proposes to explore a layered, phased approach to MRV provisions by categories of NAMAs. While the extent of MRV depends on whether it aims to achieve actions or their effects, as well as to ensure transparency or credit generation (Sterk 2010), this paper follows Decision 1/CP.16 by considering both the aim of actions

and their effects.

For the Category 1 NAMAs, considering the nature of actions for setting enabling conditions for future mitigation actions, and that such NAMA readiness activities have little or no direct impact on the aim of NAMAs to deviate emissions from BAU by 2020, two potential options can be considered. The first option entails that MRVing the Category 1 NAMAs would take the form of a qualitative assessment of how readiness and level of clarity domestic mitigation needs are improved. Indicators for such assessment needs to be developed for the progress of institutional, regulatory building, needs assessment, and research conducted. The other option would be to apply the concept of a phased approach, thereby offering countries falling into the Category 1 a preparatory phase as a grace period to develop enabling conditions required for implementing mitigation actions that can directly contribute to the deviation of emissions from BAU.

In contrast, the implementation of MRV through a quantitative assessment of contribution toward a deviation from BAU is relatively easy for the Category 2 NAMAs, given clear project boundary and target setting along with years of experiences of donors accrued from conventional development assistance and CDM projects. The estimated GHG emission reductions generated from each project with reference to BAU could be MRVed. The calibration of such GHG emissions, however, should be based on standardised methodologies agreed to by all Parties to be reflected in the guidelines to be adopted by COP, incorporating existing IPCC methodologies and CDM methodologies¹.

In order to apply an MRV process for the Category 3 NAMAs, certain structural barriers need to be addressed. Key barriers include difficulty in setting identifiable quantitative outcomes or effects from program-based or policy-based actions ex-ante, and a lack of established methodologies for quantifying effects of such actions. Given the fact that existing reports on monitoring emission reduction of policy and measures are more illustrative than comprehensive (Ellis and Moarif 2009), it would be suggested that under this Category an MRV process should qualitatively recognise the contribution of NAMAs to both mitigation and sustainable development. A comprehensive approach could be taken to combine both a qualitative assessment of its contribution toward institutional regulatory frameworks in the target mitigation sector as well as qualitative assessment of its effects toward deviation from BAU. To do so, the criteria for such qualitative assessment needs to be established. Lessons can be learned from existing evaluation criteria outside the UNFCCC framework such as OECD-DAC Evaluation Criteria (relevance, effectiveness, efficiency, impact, sustainability).

As for the Category 4, economy-wide targets, regardless of variety of the form of target setting observed among the Category 4 NAMAs, a possible starting point for MRV could be looking over the progress and effects of actual mitigation actions defined across different mitigation sectors under the umbrella of a national target, and observe the aggregate effects of such actions toward the national target and deviation from BAU. A simplified MRV approach may be possible for instance, by tracing time-series transition of GHG emission path or GHG intensity with reference to BAU. However, transparency and accountability need to be ensured by displaying actual contents of actions taken to achieve economy-wide targets. In order to ensure comparability and accuracy of the data provided, standardised methodology or minimum requirements for determining BAU should be identified in guidelines to be developed under the COP.

In sum, a step-wise, layered and phased approach for MRV by categories of NAMAs should meet the diverse scope of mitigation actions of non-Annex I Parties. Guidelines defining standardised methodologies or minimum requirements for each category of NAMAs would help non-Annex I Parties to submit comparable, streamlined information to be MRVed. According to Decision 1/CP.16, MRV for developing countries' NAMAs should exclude the judgment of appropriateness of domestic policies and measures. In order for the MRV process to be facilitative, therefore, the process itself should focus on recognising the effort made by non-Annex I Parties in attempt to achieve NAMAs rather than focusing on attainment or non-attainment of NAMAs.

¹ In the latter case, a question remains on whether the current level of stringency required under the CDM methodology (i.e. additionality test) should be transferred and applied to MRV for NAMAs.

1.5. Remaining Issues Related to the MRV of NAMAs

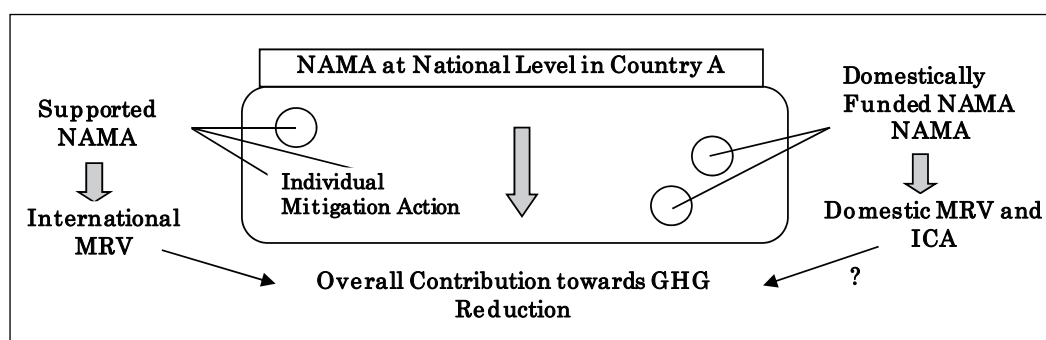
Decision 1/CP.16 of the Cancun Agreements provides a basic framework for NAMAs and MRV, and this article attempts to provide several options for operationalising the NAMAs and MRV framework by exploring potential international support and MRV for actual NAMAs submitted. However, some design issues remain unresolved. This section identifies remaining design issues both from the perspective of an overall framework as well as the individual components of Measurement (M), Reporting (R) and Verification (V). In particular, breaking up MRV into individual component helps Parties understand the current status on each component, and identify what needs to be improved to make the system robust and transparent.

1.5.1. Overall framework of MRV

There is still considerable uncertainty over the design and implementation aspects of overall MRV framework. For example, while Decision 1/CP.16 provides clarity on measurement and reporting aspects, further clarity will be needed on which entity or fora will conduct international MRV. In addition, another practical challenge is human resources. Given the fact that existing review process for GHG inventories for 40 Annex I Parties alone requires approximately 140 experts per year, a similar size of experts might need to be recruited to cover existing NAMAs. On top of that, parallel MRV and International Assessment and Review (IAR) processes for Annex I Parties will require additional human resources.

The implementation of MRV for the economy-wide NAMAs face yet another challenge. It is important to note that national level NAMAs are comprised of many different individual mitigation actions that, in turn, could contain a mixture of domestically funded as well as internationally funded NAMAs. The present multiple different levels of NAMAs could make the MRV process more complicated (Figure 2). Take the non-Annex I Parties with the Category 4 NAMAs seeking international support for sectoral policies and measures for instance, Given the targeted sector already includes other internationally supported and domestically supported mitigation actions within the sector, it will be difficult to quantify the overall impact or effectiveness of such sectoral policies and measures per se while clearly demarcating the impact generated by individual mitigation actions. This raises the risks of double-counting emission reductions.

Figure 2. Complexity over MRVing NAMAs at National Level



At the same time, the cross-cutting nature of NAMAs at the national level raises another challenge: designing and implementation of NAMAs at the national level often requires inter-ministerial coordination. A lack of coordination can be a bottleneck for some non-Annex I Parties in particular when it comes to the burden sharing and respective resource allocation among targeted sectors. For non-Annex I Parties undergoing decentralisation, coordination between central and local governments poses a related barrier (MOEJ 2010). Hence, those non-Annex I Parties envisaging Category 4 NAMAs need a certain degree of preparedness for addressing domestic issues for both vertical (central-local) and horizontal (inter-ministerial) coordination. A consensus on clear division of labor between domestic stakeholders

would further help the smooth operationalisation of MRV.

1.5.2. Measurement (M)

Aside from the issues surrounding the overall framework, the individual components of MRV also raises various design issues. From a measurement (M) perspective, the treatment of qualitative NAMAs and preconditions of NAMAs at the national level pose several challenges. Some of the NAMAs under the INF.1 document include qualitative elements such as a development strategy (i.e. low carbon growth plan), basic research (i.e. scientific, technological, technical, socio-economic and other research related to the climate system) and capacity development (i.e. education, training, and public awareness). While qualitative NAMAs create enabling conditions and strengthen national capacity for mitigation, no clear guidance is available on how their mitigation impacts can be measured and verified, what indicators should be used for the MRV process, and how qualitative NAMAs and quantitative NAMAs can be differentiated. These issues will require further discussion and negotiation.

Similarly, for those non-Annex I Parties submitting numerical economy-wide targets as their NAMAs, while the adoption of a common base-year and standardisation of methodologies might be preferable from a comparability perspective, granting a certain degree of freedom for the base-year and target setting might enhance willingness of non-Annex I Parties to develop the Category 4 NAMAs in the future. In addition, how to set BAU as a point of reference is one of the most crucial issues for the Category 4 NAMAs. Improving transparency to the process of calculating BAU, including disclosure of methodologies and dataset used for such calculation along with underlying assumptions will add clarity and build trust among Parties. If the upcoming UNFCCC workshop following provisions of Decision 1/CP.16 of the Cancun Agreement, it is hoped that the SBI provides further guidance on setting BAU.

1.5.3. Reporting (R)

The form used for reporting, the use and reinforcement of existing reporting tools, as well as standards for reporting international support also merit greater consideration. In this regard, Decision 1/CP.16 of the Cancun Agreements has added clarity to the reporting framework for NAMAs through biennial update reports, including GHG inventories and national communications to be submitted every four years. Decision 1/CP.16 defines the basic reporting criteria for national GHG inventory report, detailed information of mitigation actions, including description, impact analysis, methodologies and assumptions, as well as progress in implementation, information of domestic MRV and support received. It does not, however, specify the level of detail or extent to which criteria should be reported. On this point, a reporting framework allows flexibility for reporting as proposed by Ellis et al. (2010), leaving non-Annex I countries with different categories of NAMAs the discretion to find ways to report along those criteria. One potential remaining issue entails provision of more specific guidance for reporting different types, aspects and extent of reporting details of international support, financial assistance, technology development and transfer, and capacity development.

1.5.4. Verification (V)

In terms of remaining issues surrounding verification (V) for the categorised NAMAs, some design issues remain unsolved for BAU setting for Category 4 NAMAs. While the discussion on appropriateness of domestic policies and measures are excluded from verification process, checking the appropriateness of BAU setting needs to be incorporated in the international verification process, to avoid what Sterk referred to as the political risk of non-Annex I Parties having incentives to inflate their baselines to weaken their level of efforts (Sterk 2010). Whether such technical review process for the appropriateness of BAU setting falls under the category of verification is yet another issue. The key point is that a technical review process needs to be conducted ex ante to implementation of mitigation actions and programs under the economy-wide target, in order to provide sufficient time to adjust contents of mitigation options in case a modification of BAU is required. Dealing with such a review process ex post risk the unattainment of the

target. In this regard, further clarity is required for whether dual application of ex ante verification to appropriateness of BAU setting, and ex post verification of deviation from BAU by mitigation actions taken under the economy-wide target.

As far as other general remaining issues for verification is concerned, while Decision 1/CP.16 of the Cancun Agreement has added clarity to the MRV and ICA process, certain aspects of verification remain uncertain, including the level of stringency, the institutional design of domestic verification, the relationship between domestic verification and international verification, as well as lack of international consensus on the treatment of results of the overall MRV process.

As for setting the level of stringency for verification, while greater accuracy and credibility might result from a more stringent MRV process, a potential drawback could be the increased strain on financial and administrative capacity, as well as on conflict with national sovereignty. For this reason, additional discussion is needed on the level of stringency to maximise accuracy while at the same time minimise transaction costs. As for information disclosure, further discussion is also needed on to what extent the information for MRV should be disclosed as well as how to select information to be disclosed.

As far as interpretation of verification is concerned, interviews with experts in China and India prior to COP16 suggest that domestic verification stands for a technical process to provide rationale (including data) and underlying assumptions for what has been reported upon request, whereas ICA is a process to ensure transparency of domestic MRV, and that ICA should not include a judgmental assessment of the actions reported². Additionally, there is growing concern among non-Annex I Parties that the inclusion of a judgmental assessment in domestic verification and associated ICA processes would translate voluntary targets or actions into legally binding commitments. In this regard, Decision 1/CP.16 of the Cancun Agreements has successfully addressed their concerns by quantifying that the ICA process will be non-intrusive, non-punitive and respectful of national sovereignty. Language suggesting that ICA will be of facilitative nature and involve exchange of views among technical experts, and is also meant to assure developing countries' concerns.

As for the designing institutional arrangements for domestic verification, a possible point of contention is whether a common set of standards of institutional arrangements can be applied to across non-Annex I Parties or should there be flexibility and differentiation in institutions used for verification. As for types of institutions, different options for institutional design may be possible depending on the level of independence and functions entitled to such institution, as well as the choice of utilising existing institution or the creation of new institution. For instance, the level of independence differ depending upon whether non-Annex I Parties envisage a third-party institution or intergovernmental entity, whereas functions could be limited to verification alone, or extended to entire MRV process. While it is the discretion of non-Annex I Parties to determine what type of institution is consistent with national circumstances, upcoming general guideline for domestic MRV should provide criteria or possible options for deciding on domestic institution.

The domestic institution and technical capacity gaps within non-Annex I Parties also remain a challenge, and capacity building needs should be fulfilled by various channels, including international support and south-south cooperation. As far as national capacity to cross-check what has been reported domestically is concerned, some non-Annex I Parties such as China have established a system to cross-check their records for inconsistencies or errors (Mintzer et al. 2010). China also includes a system of cross-checking for domestic policies and programs such as the 1000 Enterprise Program as part of its national energy efficiency program. Yet this cross-checking provision still faces challenges at the provincial and national level (see Teng et al. 2009). The establishment of domestic cross-checking mechanisms is also a stumbling block. In the meantime, these design issues for verification should also be discussed in the context of mitigation actions and commitments of the Annex I Parties, as the verification framework currently has not been fully developed for Annex I Parties.

² Interviews were conducted with Chinese experts including one negotiator, three researchers of a government-affiliated research institute, four researchers of universities and two NGO members (11-15 September 2010, Beijing) and Indian experts including three government officials, three former negotiators, and one researcher of a research institute (25-28 October 2010, New Dehli)

As for the international MRV for internationally supported NAMAs, an agreement is needed on a detailed verification framework and the place of such verification; whether international verification should be conducted where all Parties are involved such as via SBI in line with the ICA process, or among selected members such as an MRV committee. For the latter option, further discussion is required over the selection process and eligibility criteria for committee members.

Another issue involving international MRV is the relationship between domestic verification and international verification. At moment it is not clear to what extent the international verification process can assess results of domestic MRV. In case some questions over the underlying conditions or methodologies for calculating the effects of internationally-supported NAMAs are raised, it is not clear whether the international verification process could extend to actual modification of the result of domestic MRV, or simply be a guidance or request to do so.

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

1.6. Policy Implications

Building on the provision of Decision 1/CP.16 of the Cancun Agreements, the international negotiations at COP17 in Durban, South Africa, will focus on developing and agreeing on modalities and guidelines for various components of mitigation actions including MRV, ICA, international support, and registry requiring technically-oriented discussions. Given the cross-national variation of NAMAs and various remaining issues on MRV identified in this paper, the following recommendations should be considered.

Criteria Setting for BAU Calculation: While the technical discussion surrounding BAU calculation is outside the scope of this paper, the upcoming guidelines should specify potential options for types of methodologies (types of models), underlying assumptions, and types of data needed for calculating projected emissions by 2020. This process might build on findings from the upcoming UNFCCC workshop for BAU calculation for NAMAs as stipulated in Decision 1/CP.16 of the Cancun Agreements.

Criteria Setting for Qualitative Aspect of NAMAs: The upcoming guidelines should also provide guidance on how to treat qualitative aspects of NAMAs by specifying criteria for MRVing qualitative NAMAs by different types, including identification of mitigation potential, needs assessment, research, and building institutional and regulatory frameworks. The development of such criteria should aim to facilitate the comprehensive analysis of impacts of NAMAs.

Enhanced Clarity on Programs and Sectoral Policies and Measures: Establishing an MRV process for programs and sectoral policies and measures should entail the development of a common set of methodologies and assumptions for calculating emissions from selected programs and policies for each mitigation sector for measurement, as well as development of criteria for verification, drawing lessons from existing (development assistance) program evaluation criteria.

Setting Scope for Low Carbon Development Plans and Strategies: Adding clarity to the concept of Low Carbon Development Plans and Strategies by setting the scope (components to be included) and functions would help non-Annex I Parties identify the exact relationship between NAMAs and existing national development plans.

Support to Establish a Sound Domestic Data Management System: Establishing a sound domestic statistics system to collect, assess and manage reliable data serves as the basis for BAU calculation, designing NAMAs and identifying impacts of NAMAs through the MRV process. In this regard, capacity building support will play an integral role in improving the technical aspect. Along with continuing support for GHG inventory, such support also help address the institutional and capacity gaps between non-Annex

I Parties.

Addressing Human Constraint over the MRV Process: Capacity constraint on the international MRV process could be dealt with by several possible options, including applying a phased approach to divide Parties into several groups and MRVing each group in a different period, or limiting the number of technical experts involved in the process by setting up MRV committee. Designing an MRV framework should aim to balance stringency, cost of operationalisation, and timeframe.

Guidance on Building Domestic Institution for Verification: Given that different options for institutional design are possible, the upcoming general guidelines for domestic MRV should define the scope and functions of such institutions. The provision of institutional capacity building for domestic verification on a request basis is also crucial for building and improving overall capacity of such institutions.

1.7. Conclusion

Building on from the successful inscription of mitigation pledges of Parties to the UNFCCC, and the provisions of NAMAs and MRV from Decision 1/CP.16 of the Cancun Agreements, this paper analysed NAMAs submitted by the non-Annex I Parties in the INF.1 document. The analysis explored potential options for delivering international support to facilitate implementation of NAMAs and to operationalise MRV by categorising NAMAs into four groups. The paper further explored remaining design and implementation issues for MRV and provided potential ways forward.

The diversity in NAMAs reflects the diverse mitigation needs and opportunities of non-Annex I Parties and thus calls for a layering and phased approach for the design and implementation of international support and MRV. The paper further proposed include essential components of the upcoming guidelines to be adopted by COP, such as specific guidance to BAU setting and criteria for MRVing qualitative NAMAs and NAMAs at programs and sectoral policies and measures. The paper further suggested a phased or committee approach for operationalising MRV given the existing constraint, the need for guidance to form a domestic verification institution, as well as establishing domestic data management system as an integral part of the international support. While granting a degree of flexibility into the international support and the MRV process is crucial for accommodating the diverse needs and nature of NAMAs, all Parties should make concerted effort to commit in spirit of mutual collaboration to the process of designing and implementing NAMAs, delivering international support and the MRV process in a facilitative manner, this will help build trust among Parties needed to negotiate a successful outcome at COP17.

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Chapter 2

What Constitutes a Meaningful Participation of China?

What Constitutes a Meaningful Participation of China?

Analysis of the Chinese President Hu Jin Tao's speech at UN Climate Change Summit and the "China's path of low carbon development to 2050: Energy demand and supply and CO₂ emission scenario" by the National Development and Reform Commission Energy Research Institute Taskforce

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2.1. Introduction

China's "ambitious commitment" is the prerequisite for several developed countries including Japanese Government's commitment for post 2012 framework. However, the number of officials, who can envisage what will constitute the "ambitious," or provide logical and quantitative explanation on "why China needs to make what commitment," is almost non-existent.

While such incomprehensible situation continues, two significant events have taken place in September 2009: 1) National Development and Reform Commission Energy Research Institute Taskforce published the report titled "China's path of low carbon development to 2050: Energy demand and supply and CO₂ emission scenarios" (hereinafter referred to "Scenario Report") and the report by Development Research Center of the State Council, National Development and Reform Commission Energy Research Institute, and Tsinghua University, titled "China's energy and CO₂ emissions in 2050"⁴ (hereinafter referred to as Energy and CO₂ Emission Report) (on September 16); and 2) China's President Hu Jin Tao's announcement of four targets at the UN Climate Change Summit (on September 22). Immediately before these events, the Standing Committee of China's National People's Congress adopted "Resolution for Active Responses to Climate Change" in August 2009, while the Chinese Government announced their plan for international climate negotiation in May 2009.

President Hu Jin Tao's speech at the UN Climate Change Summit on September 22, 2009, was not widely reported by Japanese mass media, as they emphatically reported Japanese Prime Minister Hatoyama's speech at the same UN Summit. However, most of mass media in Europe and the US reported President Hu's speech favorably. For example, the Times of the US described Japan and China as "new green team" on their Internet publication of September 23, 2009.

Nonetheless, this President Hu's speech and aforementioned Scenario Report are considered as the introduction of Chinese Government's official or non-official commitment as of today. To lead to the success of international climate negotiation, it is necessary to thoroughly understand what the "ball" China is throwing to us contains.

In this report, we shall explain the four targets President Hu describes in section 2, and introduce the history of Chinese discussion on energy consumption per GDP (energy intensity) and CO₂ intensity in

* This is slightly-modified version of the original article which was written before COP 15, 2009.

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⁴ These two reports were published at the same time with some of authors being the same. "China's energy and CO₂ emission report for 2050" has a volume of about 900 pages. The "Scenario Report" can be considered as the extract of scenario analysis part of the aforementioned report, as the State Development Plan Committee Energy Research Institute was mainly responsible to write that part. In regards to the issue of China's participation, refer to Asuka (2008), Li (2009a, 2009b), also.

section 3. Section 4 describes the major conclusions of the Scenario Report, especially about actual quantified targets. Section 5 presents simple international comparison of quantified targets, while section 6 summarizes the conclusion.

2.2. China's targets announced by President Hu Jin Tao at the UN Climate Change Summit

At the UN Climate Change Summit in New York, President Hu Jin Tao of China announced China's four targets on climate change issue: 1) to significantly reduce CO₂ intensity by 2020 from 2005 level; 2) to expand the share of non-fossil fuels in primary energy to 15%; 3) to increase forestry area to 40 million Km², and forestry storage to 1.3 billion m³ by 2020; and 4) to pursue low carbon economy, and promote technology development and dissemination. It is the first time China's president announced the actual contents of global warming measures including concrete figures at the official forum of the UN.

Until then, Chinese Government had not announced any concrete quantified figures that directly included CO₂ as an index, other than indicating individual targets on energy saving, low carbon energy development, afforestation, etc. Moreover, they rather evaded stating the choice of index in developing action targets at the forum of international negotiation on post 2012 framework, although expressing their intention to take "appropriate mitigation actions." President Hu's announcement, therefore, finally revealed the actual image of China's "participation."

We must note, however, that these targets are considered a part of China's Nationally Appropriate Mitigation Action (NAMA), stipulated in the Bali Action Plan adopted at the COP 13, and not only for the Chinese Government but also for the governments of other developing countries, NAMA is recognized as "voluntary actions taken under technological and financial supports of developed countries."⁵

Still, the aforementioned events are the practical declaration of China's commitment, whether obligatory or voluntary. From now on, what constitutes "significantly" or what scope of CO₂ intensity reduction would become an extremely important point in the negotiation and diplomacy toward the successful agreement at the COP 15.

2.3. Past history of climate discussion in China

China has fairly long history of discussions and researches on energy intensities and/or CO₂ intensities. Despite fewer reports on mass media, Chinese and Japanese newspapers reported some comments by government officials on this subject in the past. Following summarizes such reports.

1) February, 2007: on page 378 of "Climate Change State Assessment Report" published by the Climate Change State Assessment Report Editing Committee, the quantified target was described as "50% reduction of CO₂ emissions per GDP by 2020 from 2000 level, and 85% reduction by 2050."

2) August, 2008: Zai Yande, Vice President of the Energy Research Institute of China National Development and Reform Commission, with other authors published the report titled "Paths and measures to realize the reduction target of energy consumption per unit GDP" from the China Measurement Publisher. The report is voluminous with about 400 pages, and provided quantitative discussion on actual policies and measures and their feasibilities at each industry sector and region.

3) March 5, 2009: Article on Xin Hua Press; "2009 Report on China's Sustainable Development Strategy" published by Chinese Academy of Social Science on March 5, 2009, presented the strategic targets of China toward low carbon economy, and stated that carbon dioxide emissions shall be reduced by around 50 % per 10,000 Yuan of GDP by 2020."

4) May 31, 2009: Article on Nihon Keizai Shimbun; "Chinese Government began the review of their energy

⁵ Bali Action Plan described the actions to be taken by developing countries as follows: "nationally appropriate mitigation actions by developing countries in the context of sustainable development, supported and enabled by technology, financing and capacity building, in a measurable, reportable and verifiable manner. (Advance unedited version, Decision -/CP.13: Bali Action Plan)

efficiency improvement target, assuming the period of 10 years or longer, in preparation for the international negotiation on global warming framework after 2012 (post-Kyoto framework. Actual measure is likely to be based on 40% reduction of energy consumption used to produce a certain amount of Gross Domestic Products (GDP) by 2020 from 2010 level. China has already set the energy efficiency improvement target of 20% by 2010 from 2006 level. Gan Qing Tai, Special Representative for Climate Change negotiation at Chinese Ministry of Foreign Affairs told Nihon Keizai Shimbun that “academic experts are reviewing the actual measures for the future. China will continue the efforts to improve efficiency.” ...

As these media reports indicated, there have been many reports and studies on energy intensities and CO₂ intensities in China, with extensive discussion of actual numbers ongoing within the Chinese Government. In other words, the Scenario Report and President Hu Jin Tao’s statement discussed earlier had sufficiently backed by numerous studies and discussions based on quantitative analysis.

2.4. Details of the Scenario Report

1) Four scenarios

The Scenario Report analyzed the following four scenarios.

a. Reference scenario

This is so-called baseline or BAU (Business as usual) and presumes that by 2050, 1) per capital GDP will reach middle developed county level; 2) per capital energy consumption will be 4 tce; 3) energy efficiency will be 10% below the global top level of today; and 4) energy consumption will be 7.8 billion tce.

b. Energy saving scenario⁶

Under this scenario, China shall further pursue existing measure of prioritizing energy saving. It will not implement high-cost climate change measures, such as Carbon Capture and Storage (CCS).

c. Low carbon scenario

This is a scenario to pursue low carbon society, and presumes the introduction of carbon tax, CCS and Integrated Coal Gasification Combined Cycle Combustion (IGCC) by 2020-2030.

d. Enhanced low carbon scenario

This scenario considers technological and financial support from developed countries and China’s contribution to the international community, and presumes the introduction of carbon tax as well as the early dissemination of CCS and IGCC technologies.

Following table 1 and 2 indicates the presumptions, and necessary policies and measures of each scenario.

⁶ The relationship between this energy saving scenario and reference scenario is not clear in the Scenario Report. Considering the numerals given and other references (Hu et., al., 2009) of the same authors (researchers at the State Development Plan Committee Energy Research Institute), energy saving scenario seems to be fairly close to the reference scenario.

Table 1. Contents and presumptions of each scenario (outline)

Scenario	Contents
Reference scenario	Per capita energy consumption to reach middle developed country level of today by 2050. Energy efficiency shall be 10% lower than that of world's top level as of 2005. Industrialization further advances and energy use efficiency will improve to a certain level by technological development but overall energy consumption will reach 7.8 billion tce.
Energy saving scenario	Government will not implement the measure specifically targeting climate change issue, although considerable attention will be given to energy saving and emission reduction. Economic growth method may change, and for short to mid-term, production of high efficiency products will increase, leading to a certain growth in energy saving equipment manufacturing, nuclear power generation, and renewable energy sectors. However, the situation continues for: 1) under-development of public transportation system as the public emphasizes speed and comfort in transportation; 2) innovative energy saving technology and emission reduction technology will not be developed, while CCS will not disseminate; and 3) energy-saving life style will not disseminate, and the public retains the notion of "first pollution, then fixation."
Low carbon scenario	Comprehensively integrate the considerations of sustainable development, energy security, international competitiveness, energy saving, emission reduction potentials, etc. Shift in production and consumption patterns and technology development help advances low carbon society. Accelerate the development of energy saving equipment manufacturing, nuclear power generation, renewable energy industry, etc. CCS technology is disseminated in power industry. Expand investment for low carbon economic development. Disseminate energy saving production and life style.
Enhanced Low Carbon scenario	Realize sophisticated low carbon society under international cooperation. Progress in the cooperation between developed and developing countries. New technology development. Cost reduction in existing technologies. Dissemination of low carbon technologies. Research and development and capital investment to support low carbon society. Advanced energy diversification. Chinese Government to expand investment on low carbon economy. Significant dissemination of clean coal technology and CCS.

Table 2. Contents and presumption of each scenario in details

Item	Energy saving scenario	Low carbon scenario	Enhanced low carbon scenario
GDP growth rate	Realize the State “three phase” target: Average growth in 2005-20: 8.8%, in 2020-35: 6%, and in 2035-50: 4.4%	Same as Energy saving scenario	Same as Energy saving scenario
Population growth	Peaked in 2030-40 at about 1.47 billion, and 1.46 billion in 2050	Same as Energy saving scenario	Same as Energy saving scenario
Per capita GDP	200,000 Yuan in 2050 (25,000 US\$ at 2005 fixed rate)	Same as Energy saving scenario	Same as Energy saving scenario
Industrial structure	Drastic growth of tertiary industry after 2030, but heavy industry continues to play a key role.	Industrial structure will become equivalent to those of developed countries today. Accelerated industrialization and tertiary industry development. Information industry to share important position.	Industrial structure will become equivalent to those of developed countries today. Accelerated industrialization and tertiary industry development. Information industry to share important position.
Urbanization rate	72% in 2030, and 79% in 2050	Same as Energy saving scenario	Same as Energy saving scenario
Export / Import	By 2030, primary industry products gradually lose international competitiveness. Energy consuming products are solely for domestic market.	By 2020, primary industry products gradually lose international competitiveness. Energy consuming products are solely for domestic market. Significant growth in the export of high-value-added products and services.	By 2020, primary industry products gradually lose international competitiveness. Energy consuming products are solely for domestic market. Significant growth in the export of high-value-added products and services.
Natural environment of the nation	Improved, but the notion of “first pollution, then improvement” will not change. First phase of Kuznets Curve.	Improved. Peak value of Kuznets curve is lowered.	Improved. Peak value of Kuznets curve is lowered.
Energy technology	Dissemination of advanced energy technology by 2040, making China the world technology leader in this field. Technology efficiency will be 40% higher than today.	Dissemination of advanced energy technology by 2030, making China the world technology leader in this field. Technology efficiency will be 40% higher than today.	Dissemination of advanced energy technology by 2030, making China the world technology leader in this field. Technology efficiency will be 40% higher than today.
Unconventional Energy resources	After 2040, need to explore unconventional gas and coal.	After 2040, need to explore unconventional gas and oil.	No need to explore unconventional gas or oil resources.
Solar power wind power	Power generation unit price of solar power will be 0.39 Yuan/ /kWh in 2050. Land-based wind power will be disseminated.	Power generation unit price of solar power will be 0.27 Yuan/ /kWh in 2050. Dissemination of land-based wind power and large scale development of off-shore wind power.	Power generation unit price of solar power will be 0.27 Yuan/ /kWh in 2050. Dissemination of land-based wind power and large scale development of off-shore wind power.

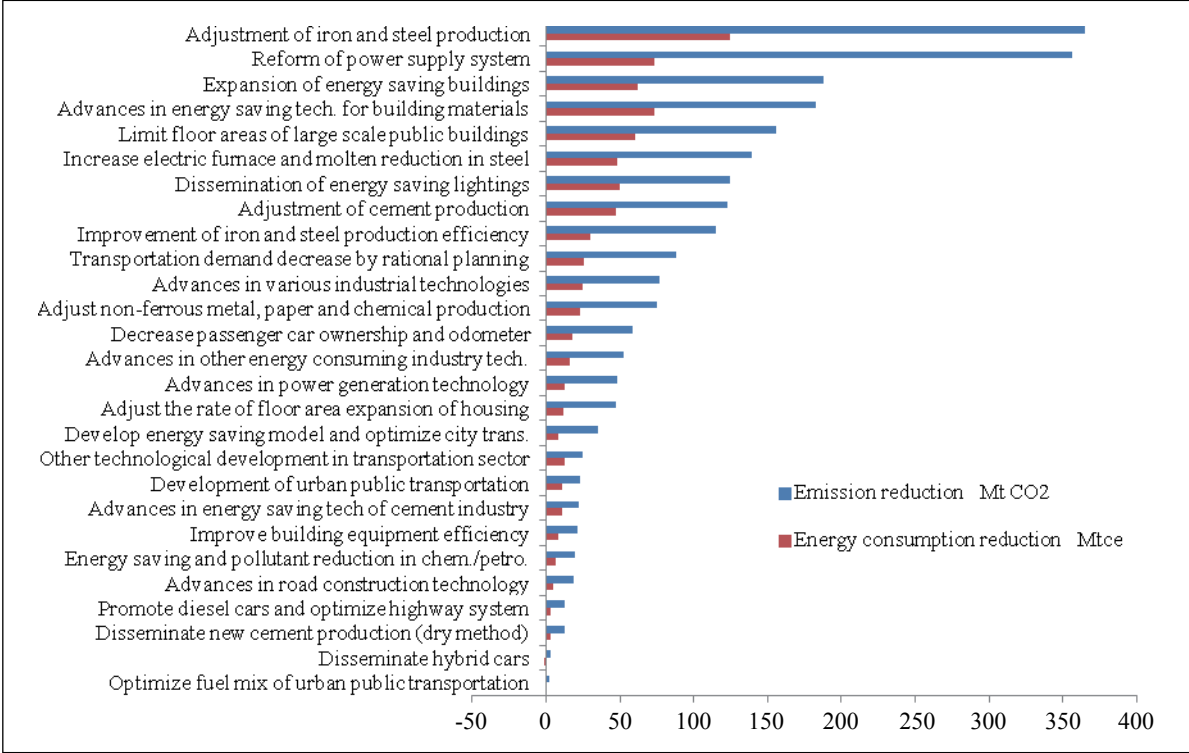
Table 2. Contents and presumption of each scenario in details (continued)

	Energy saving scenario	Low carbon scenario	Enhanced low carbon scenario
Nuclear power	Total capacity of nuclear power generation to be 300 million kW by 2050. Unit price of power generation to be lowered from 0.33 Yuan/kWh in 2005 to 0.24 Yuan/kWh in 2050.	Total capacity of nuclear power generation to be 350 million kW by 2050. Unit price of power generation to be lowered from 0.33 Yuan/kWh in 2005 to 0.22 Yuan/kWh in 2050. Major shift to large scale development of the fourth generation nuclear power plant after 2030.	Total capacity of nuclear power generation to be 400 million kW by 2050. Unit price of power generation to be lowered from 0.33 Yuan/kWh in 2005 to 0.20 Yuan/kWh in 2050. Major shift to large scale development of the fourth generation nuclear power plant after 2030.
Coal thermal power generation	Main stream technologies include super-critical state power generation and ultra-super critical state power generation.	Main stream technologies include super-critical state power generation and ultra-super critical state power generation until 2030. Afterward IGCC will be the main stream technology.	IGCC will be the main stream technology after 2020.
CCS	Will not be introduced.	Pilot project to start from 2020. All new IGCC power plants to introduce IGCC after 2050.	CCS to be introduced to all new IGCC power plants. At the same time, CCS technology to be introduced to industrial sectors of iron and steel, cement, aluminum, ammonia, ethylene, etc. Disseminate technology after 2030.
Hydro power	Power capacity to reach 400 million kW by 2050. Actual power generation to exceed 1320 billion kWh.	Power capacity to reach 450 million kW by 2050. Actual power generation to exceed 1485 billion kWh.	Power capacity to reach 470 million kW by 2050. Actual power generation to exceed 1551 billion kWh.
Biomass	100 million tce biomass usage by 2050. Average cost will be less than 430 Yuan/tce.	260 million tce biomass usage by 2050. Average cost will be less than 370 Yuan/tce.	270 million tce biomass usage by 2050. Average cost will be less than 370 Yuan/tce.
Residential sector	Dissemination of energy saving appliances, commercialization of renewable energy (for example biomass) supply to villages	Dissemination of energy saving thermal insular housing	Dissemination of energy saving thermal insular housing
Transportation	Dissemination of public transportation. Development of rail transportation in big cities	Development of environmental-friendly rail transportation	Development of public transportation in big cities with population of more than one million. Non-automobile accesses from mid-size cities to villages.
Automobiles	Fuel cost efficiency to increase by 30%.	Fuel cost efficiency to increase by 60%.	Fuel cost efficiency to increase by 60%.

Reference: Scenario Report p.44 Table 3-3

The following Figure 1 indicates energy consumption reduction and CO₂ emission reduction by specific measures up to 2020 under low carbon scenario.

Figure 1. Energy consumption reduction and CO₂ emission reduction up to 2020 under low carbon scenario

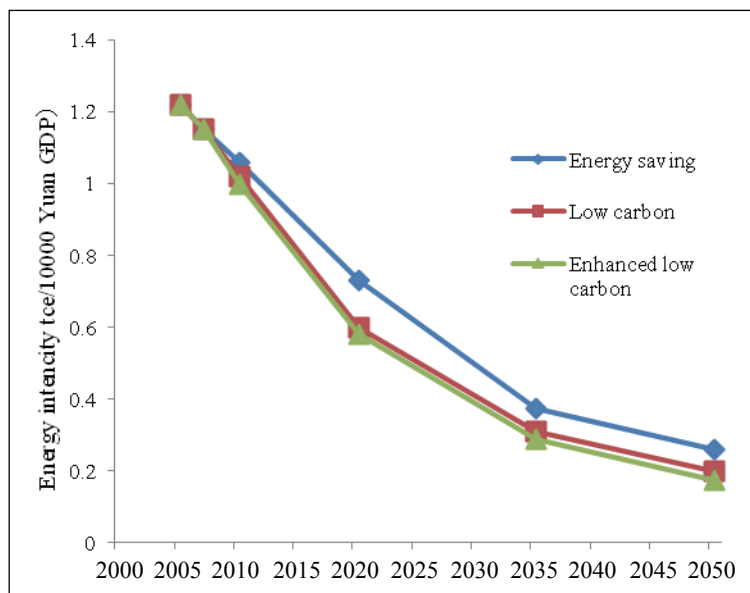


From above, we find that two factors of production adjustment in iron and steel industry and reform in power supply system (reform in power source mix and efficiency improvement in power generation technology) will contribute significantly to emissions reduction until 2020. The “Energy and CO₂ Emissions report” introduced in the section 1 argues that China needs to review the introduction of more cost efficient measures such as carbon tax and emissions trading system to minimize cost required to achieve the targets, in addition to enhancing current policies (such as closure of inefficient production sites, provision of subsidies and imposing energy tax).

2) Energy intensity

Figure 2 shows the trends of energy intensities (energy consumption per 10,000 Yuan GDP) for each scenario given in the Scenario Report.

Figure 2. Changes in energy intensities under each scenario



Reference: Scenario Report p.84 Figure 3-28

Table 3 indicates the ratio of changes in each period under scenarios.

Table 3. Energy intensity reduction rates (%) of each scenario

Scenario	2005-2010	2010-2020	2005-2020	2020-2035	2035-2050
Energy saving	2.7	3.7	3.4 (40.5 % reduction)	4.4	3.4
Low carbon	3.6	5.0	4.6 (50.7 % reduction)	4.4	3.4
Enhanced low carbon	3.9	5.1	4.7 (51.5% reduction)	4.5	3.7

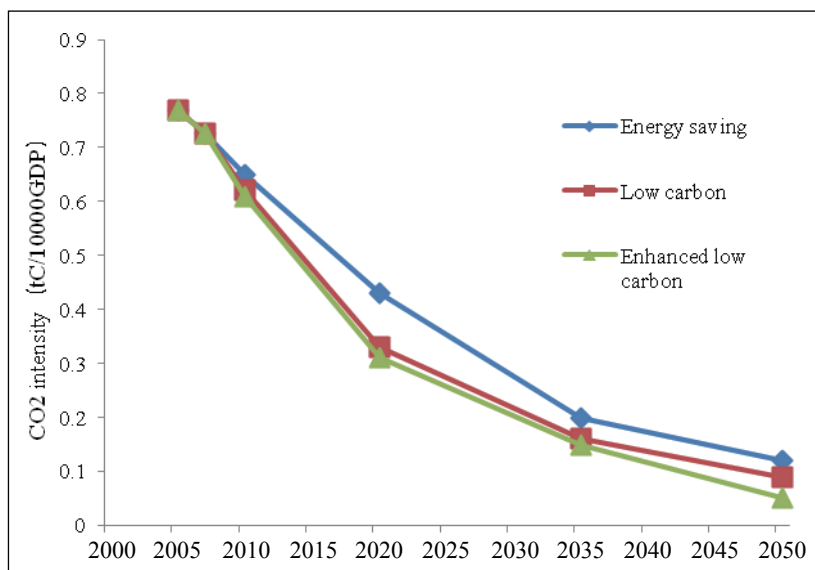
Reference: Scenario Report p.85 Table 3-59

According to the Scenario Report, the energy intensity reduction rate during the 11th five-year plan period (2005-2010) will be about 16-17%, in view of current situation, far below the national target of 20% reduction.

3) CO₂ intensity

Figure 3 indicates the changes in CO₂ intensities (carbon emissions per 10000 Yuan GDP)

Figure 3. Changes in CO₂ emissions under each scenario



Reference: Scenario Report p.86 Figure 3-30

Table 4 is prepared by authors based on Figure 3, showing the changes in CO₂ intensities under each scenario.

Table 4. Fossil-fuel origin CO₂ intensities under each scenario (CO₂ emissions per 10000 Yuan GDP)

Scenario	2005	2010	2020	2035	2050
Energy saving	0.77	0.65	0.43 (44% reduction)	0.20	0.12
Low carbon	0.77	0.62	0.33 (57% reduction)	0.16	0.09
Enhanced low carbon	0.77	0.61	0.31 (60% reduction)	0.15	0.05

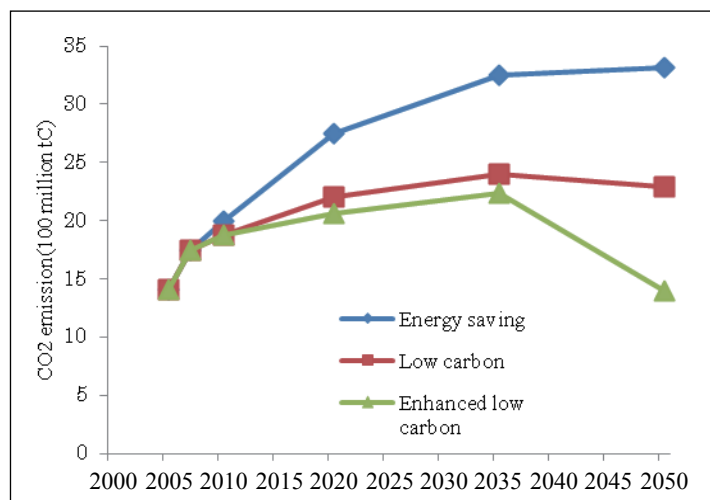
Note: As the values were read from Figure 3, error range can be ± 0.01 .

Figure 3 and Table 4 indicate that CO₂ intensity will be reduced by 44% from 2005 level by 2020 under energy saving scenario, and 57% under low carbon scenario. These values are consistent with the results of other studies in China mentioned in section 3, as well as the statements given by government officials in the past.

4) CO₂ emissions

Figure 4 indicates the changes of CO₂ emissions under each scenario

Figure 4. Changes in CO₂ emissions under each scenario



Reference: Scenario Report p.86 Figure 3-29

Table 5 is prepared by authors based on Figure 4, and indicates the changes in CO₂ emissions under each scenario.

Table 5. Fossil-fuel origin CO₂ emissions under each scenario (100 million tC)

Scenario	2005	2010	2020	2035	2050
Energy saving	14.09	20.00	27.50	32.50	33.15
Low carbon	14.09	18.76	22.00	23.98	22.90
Enhanced low carbon	14.09	18.75	20.60	22.37	13.95

Above Figure 4 and Table 5 clearly show the following two findings.

First, low carbon scenario projects CO₂ emissions to peak out around 2035. Peak out time is drawing attention in international negotiation as one of short to mid-term reduction targets, and an actual “requirement item” of China. Therefore, it is quite significant that China officially disclosed a scenario that identifies peak out time, even though the disclosure is made in a form of publishing a report.

Secondly, the scale of emission reduction from the reference scenario (BAU) is large enough to satisfy EU’s request to China. The EU commission requests developing countries as a whole to reduce emissions by 15-30% from BAU scenario by 2020, in order to limit temperature increase within 2 degrees C above the pre-industrial level, and asks China, especially, to make 16% emission reduction in its stuff working

document, which is calculated from a certain differentiating standards.⁷ Although China’s Scenario Report does not provide emissions under BAU scenario in 2020, we use the EU Commission’s projection⁸ on China’s emission volume (6 billion tCO₂ in 2005→BAU: 12 billion tCO₂ in 2020), to estimate their BAU in 2020 as two times the value of 1.409 billion in 2005 or .818 billion tC. In that case, reduction from BAU scenario will be 2.41%, 21.93%, and 26.90% for energy saving scenario, low carbon scenario and enhanced low carbon scenario, respectively. The quantity of reduction for each scenario will be 68 million tC, 618 million tC, 758 million tC, respectively. This means that the projected reduction under low carbon scenario will fully satisfy the EU’s request to China. Furthermore, if China is to achieve 16% reduction, they need to reduce CO₂ intensity by 53% from BAU.⁹

5) Iron and steel industry’s intensity target

The Scenario Report indicates actual target for each industry. These targets are so-called sector-specific targets, which developed countries led by Japan has been asking China to commit themselves for the last several years.

Table 6 indicates the target values of energy intensity in iron and steel industry as well as the dissemination rates of their technologies.

Table 6. Technology dissemination rates and energy consumption in iron and steel industry (Low carbon scenario)

Index	2005	2020	2035	2050
Cokes Dry Quenching (CDQ) dissemination rate (%)		60	80	100
Ratio of smelting reduction method introduction (%)		5	15	50
Pulverized coal injection to blast furnace (kg/t iron)		200	220	230
Top pressure Recovery Turbine (TRT) dissemination rate (%)		95	100	100
Converter gas recovery volume (m3/t steel)		90	100	100
Weight of electric furnace steel (%)		25	45	60
Ratio of iron and steel (%)		0.75	0.65	0.60
Rolling advanced technology dissemination rate (%)		70	80	100
Energy intensity ¹ (kgce/t)	760	650	564	525
Comparison with international level	To attain internationally highest level efficiency by 2030			

Reference: Scenario Report p.151 Table 5-3

For reference, the following outlines the current situation and future challenges of iron and steel industry in China.

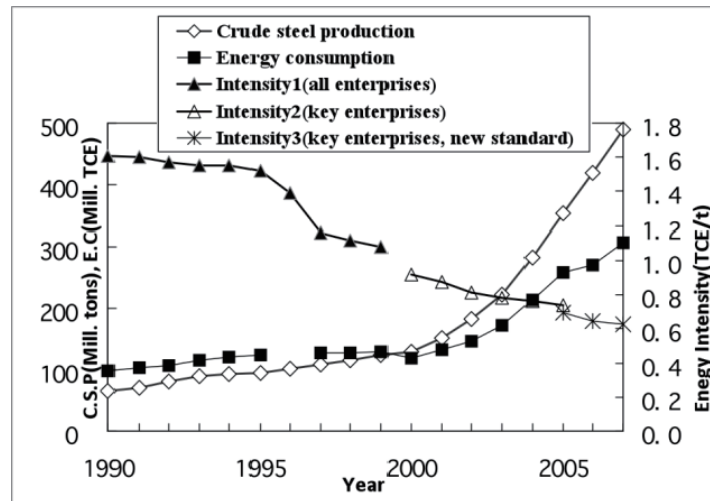
⁷ EU Commission (2009a, p.77). The value was obtained by applying the quantified targets differentiating indexes on three factors of per capita GDP, per capita GHG emissions, and the population increase.

⁸ EU Commission (2009b, p.57)

⁹ According to the Scenario Report p.46 Table 3-4, CO₂ intensity in 2020 should be 0.365 (tC/10000 Yuan GDP), assuming their GDP to reach 65 trillion Yuan by 2020. This CO₂ intensity is 53% reduction from 2005 level.

Figure 5 indicates the changes of energy consumption and energy intensity (energy consumption volume per unit crude steel production) of iron and steel industry in China. As seen here, energy consumption in China has been increasing as their production quantity expands, but the energy intensity has actually decreased

Figure 5. Energy consumption and energy intensity of iron and steel industry in China



Reference: Kawabata and Chao (2009)

As seen here, energy saving activities in the iron and steel industry of China are mostly for large to mid-scale firms. Table 7 compares energy intensities of Japanese and Chinese industries as of year 2004.

From this table, we find that: 1) energy efficiency of the highest level iron works in China is better than the average efficiency of Japanese iron works; 2) The Bao Shan Iron Works, which is at the highest level in China, has reached the level of most advanced iron works in the world, and the difference between major Chinese iron works and the China's highest level iron works has shrunken to 10-15%; 3) considering that the major competitor of Japanese corporations are the highest level iron works in China (that are manufacturing high tech iron and steel products equivalent to Japanese products), their production increase does not necessarily lead to significant increase of global emissions.¹⁰

At the background of such trend is the rapid introduction and nationalization of energy saving technologies. For example, the most typical energy saving device in iron and steel field, Cokes Dry Quenching (CDQ), has been installed or to be installed in 45 % or more of coke ovens in Chinese iron and steel corporations. (Dan 2008) As shown in Figure 7, the result shows internationally high dissemination rate.

¹⁰ There is a concern about carbon leakage where emission reduction in one country leads to emission increase in another country. In the case of high tech steel discussed in this section, however, there is not much difference in energy consumption per unit production. Therefore, global emissions increase will not be so large, if we do not consider the differences in emission intensities of power generation industries.

Table 7. Comparison of energy intensities between Japanese and Chinese iron and steel industry

		Energy consumption intensity	Cokes production process	Sintering steel production process	Pig iron production process	Converter steel production process	Roll formed process
1	Major Chinese companies	20.64	4.16	1.94	13.65	0.99	2.72
2	Smaller Chinese companies	30.59	6.71	3.18	17.32	2.20	8.40
3	The highest level in China	17.45	2.58 (Bao Shan)	1.52 (Hang Zhou)	11.57 (Bao Shan)	-0.11 (Wu Han)	1.57
4	Average in Japan	19.20	2.78	1.55	11.59	-0.08	1.81
Gap within China	2 - 1	9.95	2.54	1.24	3.68	1.21	5.68
	2 - 3	13.14	4.13	1.65	5.75	2.31	6.83
	1 - 3	3.19	1.58	0.42	2.07	1.10	1.15
Difference between China and Japan	1 - 4	1.43	1.38	0.39	2.05	1.07	0.90
	2 - 4	11.39	3.93	1.63	5.73	2.28	6.58
	3 - 4	-1.76	-0.20	-0.03	-0.02	-0.03	-0.24

Reference: Ning Ya-Dong and Yutaka Tonooka 2008

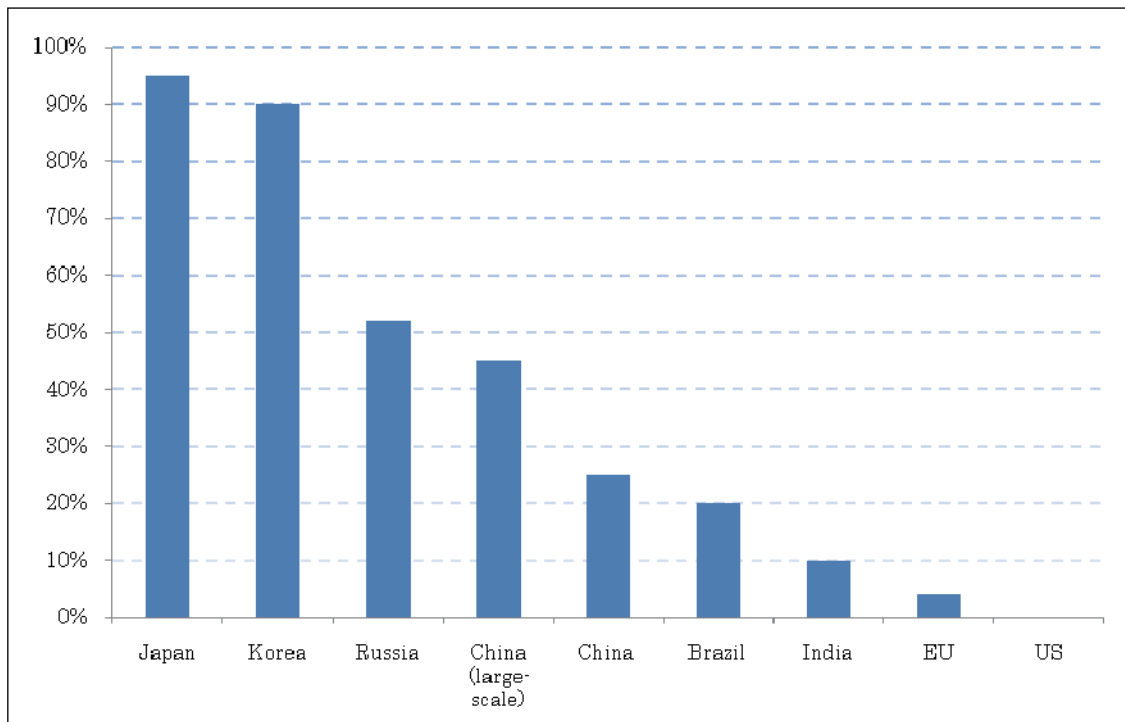
In other words, we find that, in regards to CDQ: 1) its installation is more advanced in China than EU, the US, or other developing countries¹¹; and 2) 60% CDQ installation rate in 2020 means that China is to double its current 30% rate in 15 years.

In regards to another typical energy saving technology in iron and steel industry, Top-pressure Recovery Turbine (TRT) for blast furnaces, 49 out of 56 blast furnaces in China have TRT installed presently. (Dan 2008).

Therefore, the remaining challenges Chinese iron and steel industry faces in terms of energy saving activities are: 1) strong growth of market demands for iron and steel products; 2) dominance of smaller scale blast furnaces; 3) higher ratio of converter processes, and even electric furnaces use greater amount of pig iron raw materials. (Kawabata and Zhao 2009)

¹¹ CDQ is the technology to recover sensible heat from cokes to generate power. As it was originally invented in Russia, its dissemination rate is quite high in Russia. The reason of lower dissemination in Europe and the US can be varied, but the major reason is their lower energy prices.

Figure 7. International comparison of Cokes Dry Quenching (CDQ) dissemination rates in iron and steel works (Year 2006)



Reference: IEA (2006)

To overcome such challenges, options may include demand restraints, unification and abolition of small scale blast furnaces, increased use of scrap irons, etc., but in China, it is essential to avoid options that may lead to unemployment and hence to social instability.¹² In addition, to accumulate proper amount of scrap irons will take time. What China needs for the future is the introduction of advanced technology that has not been commercialized or thoroughly disseminated even in Japan (such as molten reduction process or CCS). Therefore, Chinese situation is not so simple that “everything will be resolved if Japan transfers its technologies.”

6) “Potential” CO₂ emissions in major countries in 2050

The Scenario Report actually contained the following numerical and discussions of interests, as seen in the Table 8, based on the IPCC scenario to cap atmospheric concentration of 550ppm (CO₂eq) that aimed to limit temperature increase within 3 degrees C rather than 2 degrees C from the pre-industrial level. The table was prepared by the National Development and Reform Commission Energy Research Institute Taskforce. In the Scenario Report, the task force argued that “considering the tardy pace of developed countries’ responses, stabilization at 500-550 ppm (i.e. 2.8 to 3.2 degrees C temperature increase since pre-industrial) will be more realistic.”

¹² Still, ambitious efforts to merge, abolish, and close plants and corporations of energy consuming industry are ongoing in China. According to the Chinese Government, for example, thermal power plants closed between January and May of 2008 were 868 units with combined capacity of 5.79 million KWh. Among them, 133 units (4.49 million KWh) was coal fired plants, 681 units (0.83 million KWh) petroleum fired plants with average capacity of 6700 KWh per unit. Average capacity of closed coal power plants was 34000 KWh. Total asset of closed thermal power plants was 11.7 billion Yuan (or about 175.5 billion Yen), with debt amount of 6.7 billion Yuan (or about 100.5 billion Yen). Number of people affected by the closures is 56000, and 39000 among them are employees. Closure of small scale thermal power plants was implemented in 18 provinces and autonomies. In view of regional distribution of plant closures, the ratio was much higher among private companies in remote regions with the total of 3.69 million KWh capacity closed, which shared 64% of the total (China Information Agency SearChina, July 1, 2008)

Table 8. CO₂ emissions potential for major countries in 2050 (assuming 550ppm CO₂)

	EU (100 million tCO₂)	Annex 1 countries (100 million tCO₂)	China (100 million tCO₂)
1990	40.05	171.48	36.5
1994	38.80	162.67	56
2020	28 - 32	120 -137	91.39 (Note)
2050	8 - 16	34 - 69	Reduction
2020 (from 1990 level)	20% - 30% reduction		60% increase
2050 (from 1990 level)	60% - 80% reduction		Reduction

Note: This number is in between the one for energy saving scenario (10.08 billion tCO₂) and the one for low carbon scenario (8.067 billion tCO₂).

Reference: Scenario Report p.130

2.5. International comparison of commitments

In the case of international comparison of “participation” or “efforts” for the international framework on global warming, key points will be whether national commitments are fair or not, i.e. whether nations are differentiated on the basis of equal criteria. Among researchers, at least, there is a consensus that the differentiation criteria need to involve the following three elements: 1) accountability (for example: per capita emissions; 2) capability (for example: per capita GDP); and 3) potentials (for example marginal reduction costs or cost vs. GDP).¹³

Let us take up these three elements of accountability, capability and potential of China’s quantified target. First of all, in terms of accountability and capability, China’s per capita emissions are about a half of those in developed countries at present, while per capita GDP is less than one-tenth. (Considering historical accumulation of emissions, the gap between China and developed countries becomes even wider.) About the potential, the Scenario Report has no reference to the number of marginal reduction cost in China. Whether such number is available or not, however, it is difficult to use marginal reduction cost alone as the differentiation criteria to differentiate developed and developing countries, considering the large difference in their per capita GDP and disposable income.

Let us now consider domestic energy prices. For the last several years, China had drastic rise in domestic energy prices. For example, the Shanxi Province, which is considered as energy base of China, implemented various new taxes or tax increase in 2007 to 2008 that included: 1) establishment of trade market; 2) new tax of 15 Yuan/ton imposed as the reserve fund for Maintenance Cost Fund; 3) resource tax was raised by 2.5 to 3.2 Yuan/ton; 4) resource compensation cost was raised from 1% of sales revenue to 3-6%; 5) payment per ton of mining right establishment was auctioned off (6 Yuan/ton of reserve in average); 6) new tax was imposed as the contribution for Coal Sustainability and Development Fund, which was 14 Yuan/ton for ordinary coal, 18 Yuan/ton for anthracite, and 20 Yuan/ton for coking coal; 7) new tax of 10 Yuan/ton was imposed as environmental cost; and 8) new tax of 5 Yuan/ton was imposed as

¹³ The Mid-term Target Review Committee of Japan held in 2008 and 2009 addressed such emission reduction potential as a sole differentiation criteria. This was because: 1) the Review Committee’s main task was to make international comparison of potentials among developed countries, such as EU and the US; and 2) in the calculation of reduction potential, Japan had comparatively smaller reduction requirement than other developed countries. However, the Committee’s work was undoubtedly insufficient in determining reduction target, as it over-emphasized the comparison of cost burdens, while failing to address the issues of accountability and institution. In regards to the comparability of reduction targets of developed countries, refer to Elzen et al. (2009) and Asuka (2009).

Coal Industry Conversion Fund. Because of these new taxes and tax increase, it was estimated that the production cost of coal rose 70-80 Yuan. (Horii 2008) After July 2008, China implemented further drastic price increases, such as 16.7% price increase for gasoline, 18.1% for light oil, and 0.25 Yuan/kWh in average electric power prices (about 4.7% increase).

Because of these tax burdens, today's domestic energy prices in China are not lower but higher than those of developed countries in many cases. According to the data given in the Scenario Report, for example, the end price of coal for power station as of 2006 was 62.3 US\$/ton for China, while those for the US and Japan were lower than China at 38.6 US\$/ton and 51.5 US\$/ton, respectively.¹⁴ the exchange rate of 1 US\$ = 7.979 Yuan). In addition, electric power price for industrial use as of 2006 was 0.065 US\$/KWh for China, 0.061 US\$/KWh for the US, 0.051 US\$/KWh for France, and 0.065 US\$/KWh for Korea.

Furthermore, Chinese Government has already implemented voluntary export control for energy consuming industry and their product. To be specific, their measures include: 1) from July 2007, 2831 items of energy consuming industries were excluded from export promotion tax rebate system; 2) from August 2007, the taxes on lead, zinc, copper, tungsten, etc, were increased by three to sixteen folds; 3) from July 2007, 15% export tax was imposed on certain aluminum products; 4) from January 2008, export tax on semi-products of iron and steel industry, such as steel rods, reinforcing rods, thin plates, etc. was increased by 15%; and 5) from January 2008, export tax on iron and steel products, ferrous alloy, cokes, steel billet, etc was increased by 25%.

Actually, trade friction has already occurred between China and the US over iron and steel products.¹⁵ According to Chen (2008), the number of anti-dumping lawsuits in the US against China was largest in iron and steel products and their industry, with 23 cases from 1990 till 2006. (As a single country, China received the largest number of anti-dumping lawsuits.) In a way to avoid trade frictions, China's iron and steel industry is exploring new markets other than the US, and China's share in the iron and steel imports to the US has declined from 11% in 1998 to 7% in 2005.

Nevertheless, the Chinese Government adopted above measures to reinforce export control over energy consuming and less value-added products, while avoiding their trade partners imposing trade restriction against China.¹⁶ These measures are as effective as having the EU and the US imposing border tax adjustment to Chinese products, which is what EU and the US are reviewing to adopt as a measure to address the issue of losing international competitiveness due to international asymmetry in global warming measures.¹⁷ In fact, the implementation of such export restriction measure introduced by the Chinese Government has led to actual decrease in the Chinese export amount.¹⁸ Wang and Voituries (2009) estimated that "voluntary export control China implemented from 2006 to 2008 in the form of new tax and tax increase would be equivalent to 30-40 Euro/t-CO₂ of national border tax adjustment implemented by importers for iron and steel products, and 18-26 Euro/t-CO₂ for aluminum products." In other words, these Chinese export products already have their carbon priced at the level equivalent to EU ETS prices.

Considering the above discussion as well as the equity in the international community, it is not easy, in terms of justification, to single out China to commit to quantified targets, rather than Korea and Singapore with more advanced economies. China is a developing country and has already imposed policies that practically restrict carbon emissions. Still the pressure from the international community is mounting

¹⁴ Calculated with the exchange rate of 1 US\$ = 7.979 Yuan, which is approximate to the current exchange rate. In regards to the international comparison of energy prices, Hoshino et al., (2009) noted the low energy prices in the US.

¹⁵ It was often said that trade friction between US and China transferred from the fiber industry to the steel industry.

¹⁶ The purposes of introducing these measures include not only climate change measure and air pollution prevention measure, but also tax revenue increase for an exporter country. Since their purposes and effects will differ depending on price elasticity and market situation (for example: price determinant or price follower?), it is difficult to determine what is the primary purpose. It must be determined case by case. In the case of China, however, their primary purpose is likely be energy saving.

¹⁷ Muller and Sharma (2005) identified the significance of voluntary export control introduced by developing countries as a form of their commitment.

¹⁸ However, following global economic crisis started in 2008, China has reviewed the exceptions to the rebate system. Drogue (2009) indicated that "China's voluntary export control is a practical carbon constraining measure, but the problem is that the measure is not permanent and not transparent."

against China, and China itself is stepping to the announcement of quantified commitment, in today's dynamics of international politics.

For reference, Table 9 indicates international comparison of today and year 2050 in various indices given by the Scenario Report.

Table 9. Comparison of China in 2050 and Japan and the US of today

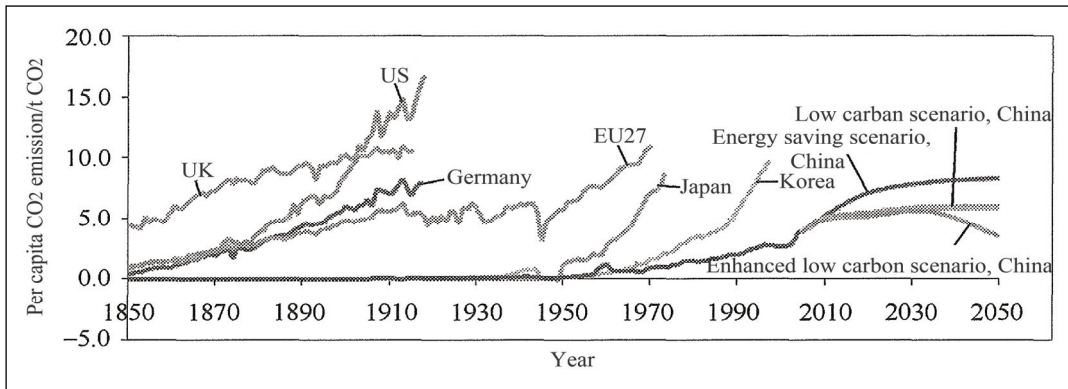
	US (2006)	Japan (2007)	Chinese scenario		
			2008	Energy saving scenario (2050)	Low carbon scenario (2050)
GDP/cap (US\$)	37842	39748	3236	24921	24921
Energy consumption/cap (tce)	7.75	4.38	1.50	3.21	2.67
Power usage/cap (kWh)	14295**	8520*	2463	7305	6751
Residential power usage/cap (kWh)	4598*	2688**	161	1209	874
CO ₂ emissions /cap (t CO ₂)	19.3	9.7	4.3**	8.3	6.0
CO ₂ storage/cap (t CO ₂)	1110*	335*	71	383	310
Iron and steel production/cap (t)	0.33	0.95	0.4	0.29	0.21
Cement production/cap (t)	0.32	0.52	1.1	0.68	0.48
Iron and steel stock/cap (t)	22.5	36.5	3.7	22.0	18.0
Cement production stock/cap (t)	15.3	27.4	10.9	52.1	42.8
Passenger cars per 1000 persons	808	440	38.4	415	382

Reference: Scenario Report p.147

Note: For calculating GDP in 2050, Yuan/US\$ exchange rate used was 1:8.2. For calculating GDP in 2005, it was 1:7.

* - Value for year 2005, ** - value for year 2006, and *** - value for year 2007.

Figure 8. Trends of CO₂ emissions per capital in various countries



Reference: Scenario Report p.86 Figure 3-29

Figure 9. (a) Per capita CO₂ accumulation various countries

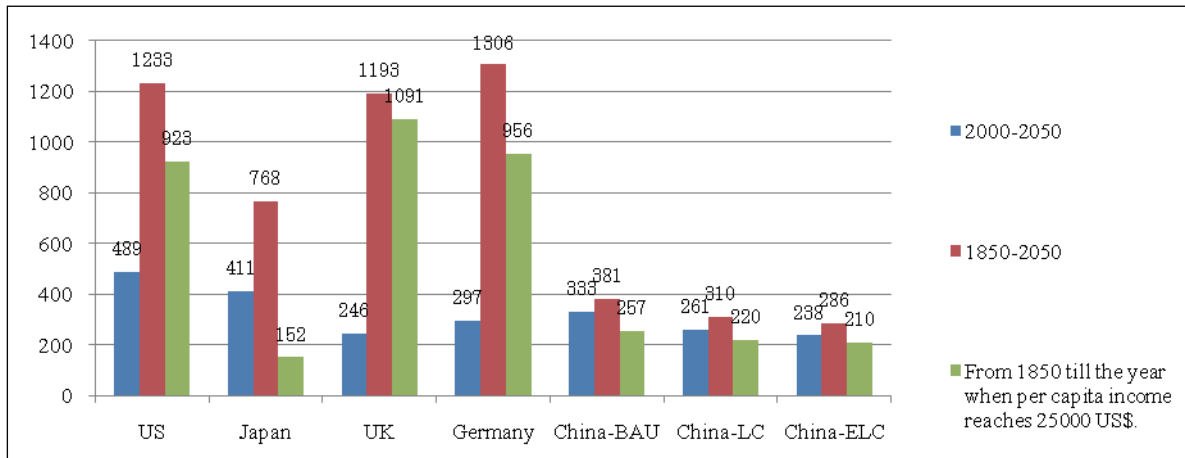
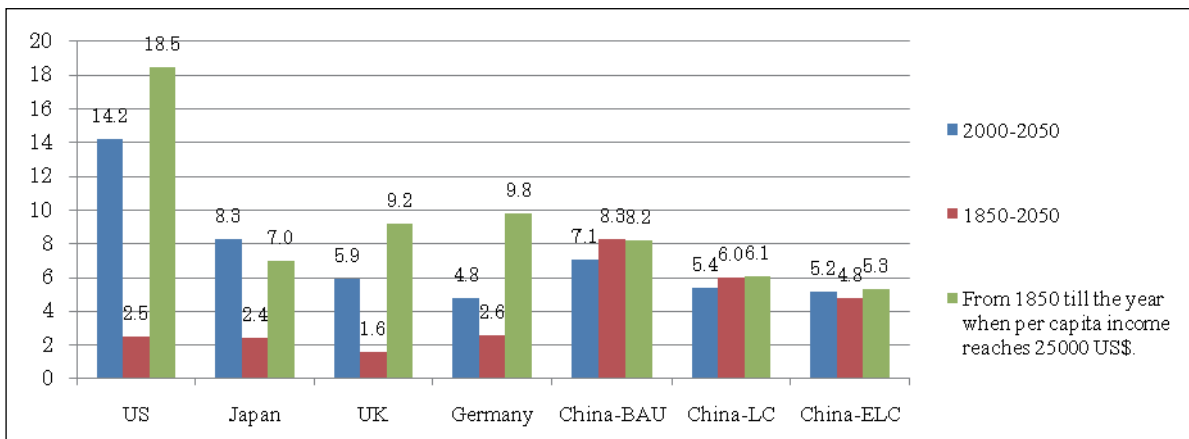


Figure 9. (b) Per capita CO₂ emissions of various countries



Reference: Scenario Report p.140 Figure 4-62

Values and numbers discussed hereunder can be interpreted in various ways. First of all, it is difficult to estimate how fast technology advances, or the world changes several decades later.

After interviewing several policy makers in China, what the people of developing world including China feel would be summarized as following: “It will take us 50 years to catch up today’s developed countries in terms of per capita GDP. Yet, we are asked to make the commitment that our per capita energy consumption, CO₂ emissions, electric power usage, and production and stock of iron and cement of 50 years from now to be lower than the current level of those in developed countries. The ones to suffer the most from global warming are those of us. (In the case of China, even population control measure is implemented.) Commitments made by developed countries today are far below the level required to limit temperature increase to less than 2 degrees C from the pre-industrial level (i.e. emission reduction target of 20-45% from 1990). Moreover, developed countries have not fully met their existing commitments on financial and technological support. Considering these facts, it is totally unfair to us”.

Of course, whether the amount of iron and cement production can correlate to the degree of affluent living or development of civilization is another matter. There is no easy answer to it. In addition, commitments made by developed countries differ significantly from a nation to another nation, so that one cannot make generalized criticism of these countries. According to Figure 9, China’s per capita CO₂ emissions in 2050 will be more than those of developed countries, if these countries are to drastically reduce their emissions by 80% from 1990 level, reaching twice as much as global average. The authors of the Scenario Report were fully aware of such fact, and argued that “the pressure to China will even increase by then, so China needs to make further reduction after 2050.” Nonetheless, these are difficult issues linked to value judgment of individuals, such as “what is prosperity”, and “what is fair.”

2.6. Conclusion and future prospects

As discussed here, China has taken extensive discussions on the issue of CO₂ intensity for a long time at the researcher and policy-maker levels. Moreover, President Hu Jin Tao proposed four targets in his speech at the UN, which were in accordance with “basic elements of commitment the US is asking China to adopt” proposed at the US-China negotiator dialogue held several times since the inauguration of Obama administration.¹⁹ Considering these developments, therefore, it was anticipated that China would very likely announce actual number for their commitment as the form of statement by Chinese top officials at certain time.

However, the fact that Chinese Government announced these numbers despite the risk of “stand alone” at this timing of three months before COP 15 can be construed as Chinese Government forestalling negotiation trump card before developed countries especially the US would show their cards.

Authors believe that Chinese Government judged that the merit of sending out positive message depicting actual commitment number would surpass any risks of having their target and number go out of control. This is similar to the situation where Japanese Prime Minister Hatoyama sent out the message to the international community that he would take initiative in this issue, by drastically changing the commitment made by the past administrations.

Still, the Scenario Report discussed in this report is merely the calculation result based on a certain assumption, and no one is sure what kind of numbers or values Chinese government official would announce in the future. Whatever their number would be, the introduction of various technologies and policies and measures is a must and essential. China cannot “achieve anything by not doing anything.”

Whatever the case may be, the time remaining for negotiation is limited. Further acceleration of the dynamics of international politics toward positive direction and deepening communication between China and the international community is expected.

¹⁹ From the author’s interview of Chinese government official.

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Chapter 3

Quantified Emission Reduction Target of China

Quantified Emission Reduction Target of China

Assessing the announced Chinese target of 40-45% reduction in CO₂ intensity

Jusen Asuka¹
Lu Xiang Chun²

On November 26, 2009, Xie Zhen Hua, Vice Minister of the National Development and Reform Commission announced Chinese Government's emission reduction target of "40-45% reduction in CO₂ intensity by 2020 from 2005 level", which received opposite reviews.

Cons say such target is too low. This viewpoint is typical among the developed countries policy makers and mass media in general.

Pros say the target can be highly valued. For example, International Energy Agency (IEA) 's chief economist Fatih Birol says that "to achieve 2 °C target, 3.8 billion CO₂ equivalent ton reduction of global emissions from Business as usual (BAU) scenario by the year 2020 is needed, and this quantified emission reduction target of China is equivalent to about 1 billion tons reduction or approximately one fourth of above, when converted to absolute emission quantity, which is almost the same level as the total emission quantity of 8.4 billion CO₂ equivalent ton IEA (2009) is asking China to adopt as the absolute emission cap for 2020. (AFP 2009)

What attributes to such totally opposite reviews?

Those criticizing Chinese target seems to base their reasons as: 1) intensity target is no good whatsoever; 2) as it is the opening position of China in climate negotiation, it must be too low; 3) by criticizing Chinese target, the quantified emission reduction target of one's own nation can stand out; and 4) it looks lower than the number in "low carbon scenario" (57% reduction) of the Energy Research Institute (ERI) taskforce of China's National Reform and Development Committee (NRDC) referred in Asuka et al. (2009). Obviously such reasoning needs more quantitative analysis.

We believe that the assumption on China's economic growth rate in the future is key factor for understanding the different assessment of the China's target. (Fig.1, Table 1, and Table 2)

* This is slightly-modified version of the original article which was written before COP 15, 2009.

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Figure 1. Energy-origin CO₂ emission of China under different scenarios

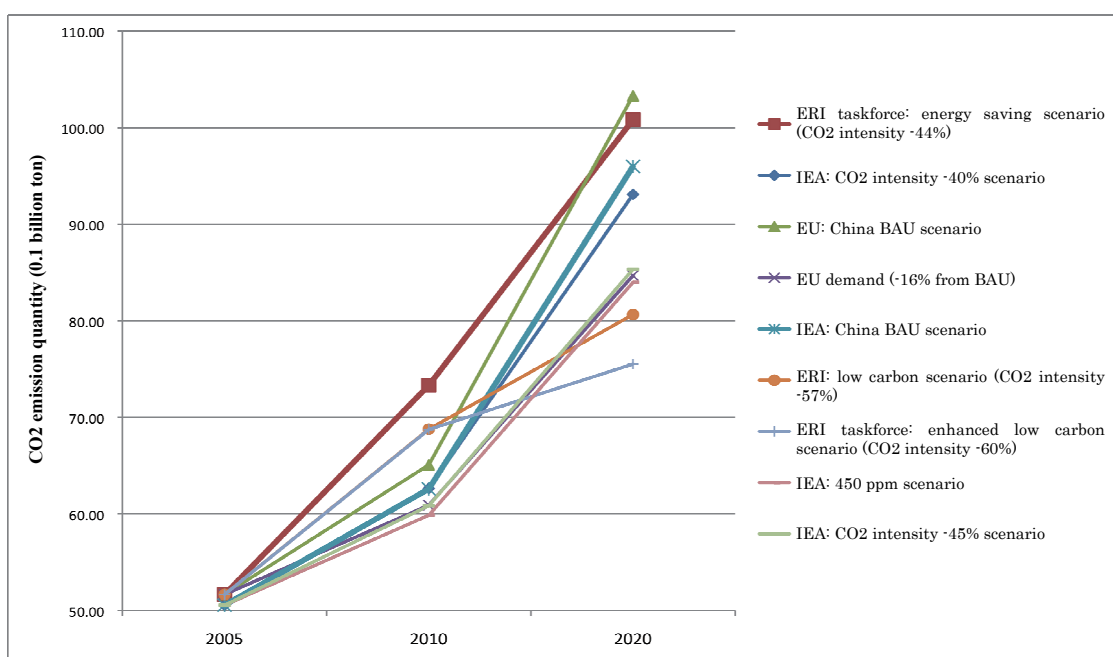


Table 1. Emission quantities of China under different scenarios (0.1 billion tons CO₂)

Scenario	2005	2010	2020	2020, with 2005=1
ERI taskforce: Energy saving scenario (CO ₂ intensity -44 %)	51.66	73.33	100.83	1.95
ERI taskforce: Low carbon scenario (CO ₂ intensity -57 %)	51.66	68.79	80.67	1.56
ERI taskforce: Enhanced low carbon scenario (CO ₂ intensity -60 %)	51.66	68.75	75.53	1.46
IEA: China BAU scenario	50.55	62.60	96.00	1.90
IEA: 450ppm scenario	50.55	59.87	84.00	1.66
IEA: CO ₂ intensity -40 % scenario	50.55	62.65	93.11	1.84
IEA: CO ₂ intensity -45 % scenario	50.55	60.86	85.35	1.69
EU: China BAU scenario	51.66	65.09	103.33	2.00
EU demand to China: (16 % reduction from BAU)	51.66	60.92	84.70	1.64

Table 2. Trend of GDP and growth rate under each scenario

	2000	2005	2010	2020
GDP: ERI taskforce (0.1 billion Yuan)		183217.00	290505.00	649852.00
GDP: ERI taskforce (billion \$ 2005)		1893.40	3002.14	6715.71
ERI taskforce, with 2005=1		1.00	1.59	3.55
Average growth rate of GDP: Energy Research Institute of China (%)	10.45	9.58	9.67	8.38
GDP: IEA (billion \$ 2005)	1198.50	1893.40	2782.03	6006.19
IEA 2005=1	0.63	1.00	1.47	3.17
Average growth rate of GDP: IEA (%)		8.00	8.00	8.00

Note 1: EU's China BAU scenario was obtained on the basis of China's BAU emissions (including non-energy origin emissions) as shown in EU Commission (2009, p. 57) (6 billion tCO₂ in 2005→ 12 billion tCO₂ in 2020 under BAU), calculating energy origin CO₂ emissions to become two-fold in 2020 from 2005).

Note 2: The number reported by the ERI was obtained from "China's path for low carbon development in 2050: Energy supply and demand and analysis of CO₂ emission scenarios" by the ERI taskforce of the National Development and Reform Commission (2009), Science Press.

Under IEA scenario that assumes lower growth rate for China's GDP growth rate, absolute emission quantity (8.535 billion ton CO₂) in 45 % CO₂ intensity reduction scenario approximates the value in 450 ppm scenario (8.4 billion ton CO₂) which is similar amount which the EU demanded for China (-16% from BAU, EU Commission 2009), enabling them to consider the target of the Chinese Government as a very ambitious one. Under the scenario of ERI taskforce of China, on the other hand, the absolute emission quantity will be larger as they assume higher GDP growth rate. According to authors' estimate, about 53% reduction in CO₂ intensity will be needed to achieve the absolute emission quantity under IEA's 450 ppm scenario. As seen here, the difference in the assumption of GDP growth rate may radically change the significance of Chinese Government's target of "40-45% reduction in CO₂ intensity".

Nevertheless, how we assess China's quantified emission reduction target will, in the end, depend on many difficult-to-discern notions, such as the appropriateness of GDP growth rate we discussed above, rightness of perpetual economic growth and population increase (which is a factor of economic growth), and how to define BAU which has fundamental problem such as the existence of the perverse incentive to have less ambitious domestic target.

Unlike the case of comparison between quantified emission reduction targets of developed countries, it is not so simple or easy to evaluate the quantified targets of developing countries, which national situation is drastically different from developed countries in terms of per capita emission quantity and population increase. It is inevitable to have value judgment to seep in, and we must be fully aware of such fact.

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Chapter 4

Negotiating a Low Carbon Transition in China

Negotiating a Low Carbon Transition in China

Aligning Reforms and Incentives in the 12th Five-Year Plan

Jiangwen Guo
Eric Zusman

4.1. Introduction

Last year's 16th Conference of the Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) in Cancun, Mexico solidified China's status as a pivotal player in climate negotiations. But with growing recognition of China's ascendance came contrasting reviews of its negotiating positions. For some observers, China's voluntary pledge to reduce the carbon intensity of its greenhouse gas (GHG) emissions between 40-45% by 2020 was a welcomed step forward. For others, China's reluctance to accept international measurement, reporting and verification (MRV) of unilateral nationally appropriate mitigation actions (NAMAs) was an unwelcomed step back (Broder and Kanter 2009; Hood 2009; Levi 2009).¹

This paper seeks to reconcile these contrasting views by analyzing the content and incentives for low carbon reforms in China's 11th (2006-2010) and 12th Five-Year Plan (2011-2015). The paper shows that China adopted a progressive slate of command-control reforms in the 11th -Five-Year Plan and strengthened their implementation with performance-based compliance incentives. In the 12th -Five-Year Plan, China appears likely to adopt a more varied set of command-control and *market-oriented* reforms that would benefit from a more varied set of national and *international* compliance incentives. The paper therefore concludes recent progress made narrowing differences on international consultation and analysis (ICA) for the MRV of unilateral NAMAs and fast track financing could help advance climate negotiations at COP 17 in Durban, South Africa and enable a low carbon transition in China.

The paper is the latest in a series of publications on climate change policy in Asia developed by the Institute for Global Environmental Strategies (IGES).² The paper draws upon both recent literature and interviews IGES researchers conducted with 20 stakeholders on climate and energy policy in China during the fall of 2010. Interviews were carried out in Chinese and English, focusing on the questions listed in Appendix 1; related issues were raised during the course of the discussions.

The paper proceeds as follows. The first section outlines key command-control reforms and related compliance incentives during China's 11th -Five-Year plan. The second section examines likely energy reforms and potential compliance incentives for the 12th -Five-Year plan. The final section concludes with recommendations for aligning institutional incentives at the national and global level.

4.2. The 11th -Five-Year Plan

Over the past five years, China has taken a series of high-profile steps to address climate change consistent with leadership support for a "scientific development perspective" (科学发展观). These steps include the submissions of China's Initial National Communication (INC) to the UNFCCC in 2004 and the preparation of a second national communication due in 2012; they also include China's National Climate Change program

¹ For instance, Broder and Kanter cite the remarks from the United States congressman Edward Markey, co-sponsor the American Clean Energy and Security Act of 2009, that "If China or any other country wants to be a full partner in global climate efforts that the country must commit to transparency and review of their emissions-cutting regime."

² Previous publications include *The Climate Regime Beyond 2012*, *Asian Aspirations for Climate Regime Beyond 2012*, *IGES Briefing Notes on the Post-2012 Climate Regime*. Previous publications can be downloaded at the IGES Enviroscope: <http://enviroscope.iges.or.jp/modules/envirolib/index.php>

(CNCCP) released in June 2007 and the White Paper on Climate Change released in 2008. Many of China's national level mitigation actions are listed in the INC, the CNCCP and the White Paper, yet arguably the most important actions were those in its 11th-Five-Year Plan (See Fei et al. 2009).

China's Five-Year Plans are comprehensive planning documents that provide overall guidance for economic growth, environment and resources, and public goods. Approved by China's chief legislative body, the National People's Congress (NPC), Five-Year Plans often contain goals but rarely detailed implementing rules. Rather the implementing details are left to the State Council (China's cabinet), relevant line ministries, and their subnational subordinates. Metrics for MRV have been developed for reporting for the national plan itself and sector-specific programs with some variation across sectors and regions. In the typical case of energy efficiency reforms, the MRV process begins with provincial governments preparing and submitting a self assessment report to the State Council and the National Development and Reform Commission (NDRC); the NDRC and other related departments then verify implementation of reported through spot checks and on-site investigations; finally the NDRC submits an examination report to the State Council before energy savings are shared with the general public (Teng et al. 2009)

In 2005, the National people's Congress approved its 11th Five-Year Plan (2006-2010). Near the end of the 10th Five-Year Plan, the Chinese leadership had become increasingly concerned with the energy security implications of an abrupt change in growth trends. Since the start of China's reform era in the late 1970s, structural changes across the economy and efficiencies gains within industries led to steady improvements in energy efficiency. But by 2000, increased demand for energy-intensive exports and expanded production in heavy industries began to erode efficiency gains (Zhang 2010). Concerns over the lost momentum resulted in an 11th Five-Year Plan that called for "push(ing) forward the optimization and upgrading industrial structure", "constructing a resource efficient and environmental friendly society" and a series of more concrete energy conservation targets.

In terms of the concrete targets, the 11th Five-Year Plan specified goals to increase the share of non-fossil fuel use for primary energy from 7.5% to 10% as well as corresponding jumps in hydro, wind, solar, biomass, and nuclear production capacity. The objective in the 11th Five-Year Plan that deservedly received the most attention was a reduction of 20% in energy use per unit of gross domestic product (GDP) between 2005 and 2010 (from 1.22 tonnes to 0.97 tonnes of coal per CNY 10,000 of GDP). The 20% goal "was the first time that a quantitative and binding target ha[d] been set for energy efficiency, and... [it would] translate into an annual reduction of over 1.5 billion tons of CO₂ by 2010, making the Chinese effort one of most significant carbon mitigation efforts in the world today" (Jiang et al. 2007).

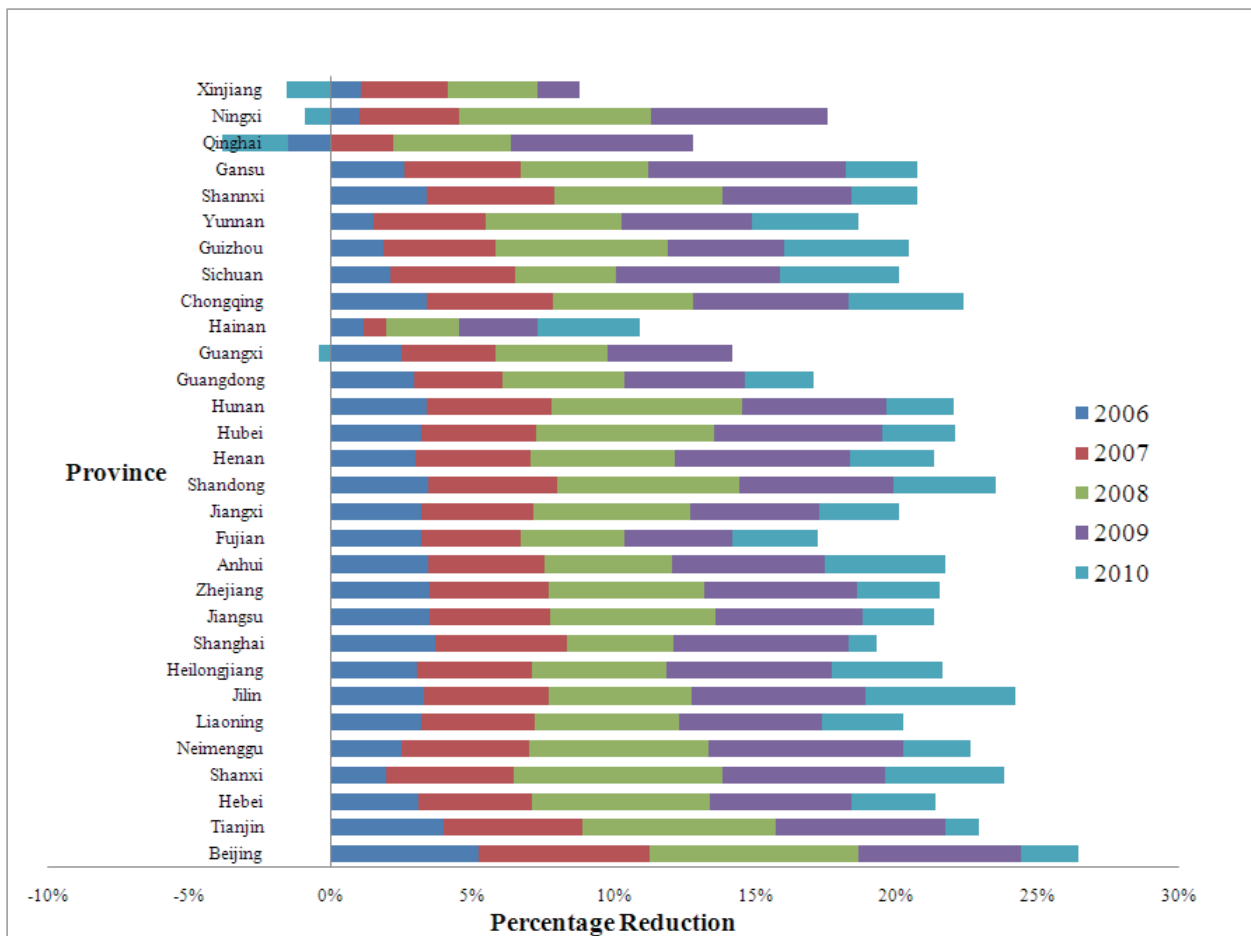
Table 1. China's Climate Related Targets in the 11th Five-Year Plan

	Target	Current status
Energy saving	2010, per unit energy consumption reduced by 20% on the base of 2005	Up to 2009 reduced by 15.61%
Non-fossil fuel use	2010, non-fossil occupy the primary energy consumption reach at 10% which was 7.5% in 2005	Up to 2008 raised to 8.9%
	Hydropower installed capacity	2010, 190 million KW
	Wind power installed capacity	2010, 5 million KW
	Solar PV generation installed capacity	2010, 0.3 million KW
	Biomass generation installed capacity	2010, 5.5 million KW
	Yields from bio-ethanol	2010, 3.02 million tons
	Rural methane use	2010, 190 million cubic meter
	Nuclear power capacity	2006-2010, constructing 12.44 million KW
Forest coverage	Raise the rate from 18.2% in 2005 to 20% in 2010	2009, 196.79 million KW
		2009, 25.58 million KW
		2008, 0.15 million KW
		2008, 3.15 million KW
		2008, 1.6 million tons
		2008, 120 million cubic meter
		Sep. 2010, constructing 27.73 KW
		end of 2008, 20.36%

Source: Li, 2010.

Above and beyond its magnitude, China's 20% energy intensity target was important for two reasons. The first is it offered a tangible goal against which to monitor and evaluate progress. This would become increasingly important as the national target was allocated to provincial governments and then became part of the criteria in China's leadership performance evaluation system. The evaluation system used a 100 point scale to rate how well provincial leaders performed in meeting energy efficiency targets (see Table 2). It also encouraged provincial governments to develop their own evaluation system for lower level city and county governments. The results of these evaluations would then be used to determine promotions, honorary titles, and other rewards at both the provincial and lower levels (Wang 2009; APERC 2009). Less than a decade ago the same performance system encouraged subnational leaders to pursue growth at all costs. Now it was being used to hold leaders accountable for limiting the externalities of that growth.

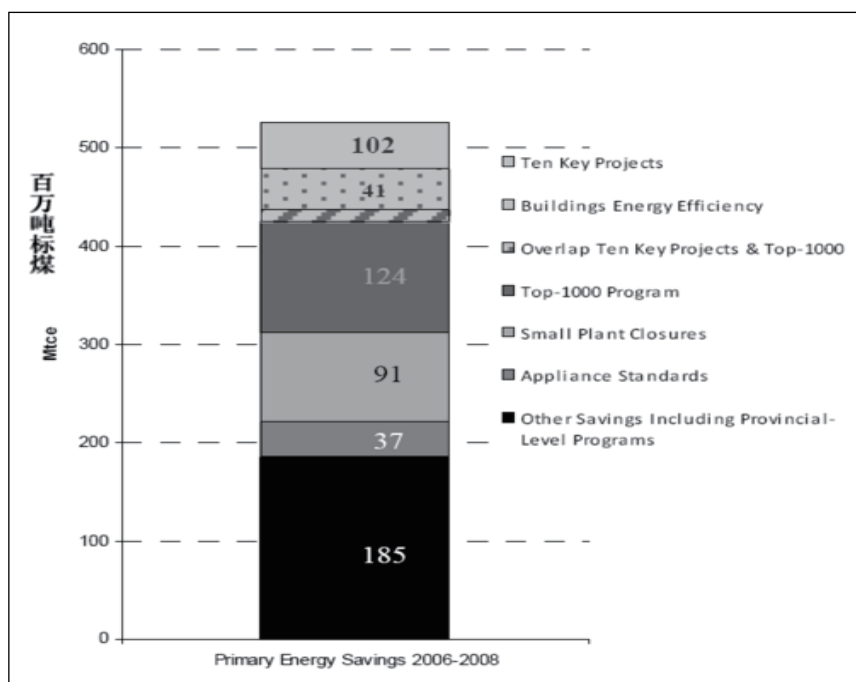
Figure 1. China's Energy Intensity Targets by Province



Source: China's Statistical Yearbook, 2007, 2008, 2009, 2010.

The second reason the 20% target merited attention was the sector-specific programs adopted to support it, especially programs for energy-intensive industries. The industrial sector accounts for about 70% of China's total energy consumption. Hence policies and measures to support industrial emissions reductions such as the program to close small enterprises, the energy conservation power generation dispatch program, and the top 10 energy conservation projects were integral to the energy efficiency target. This applied most notably to the program that led to the greatest reductions in GHG emissions, the 1000 Energy-Consuming Enterprises Program (Top-1000 Program).

Figure 2. China's Energy Savings in the 11th Five-Year Plan-Featuring the Top 1,000 Program



Source: Price et al. 2007

The Top-1000 Program was an initiative intended to improve efficiencies in large scale industries. The program allocated China's 1000 highest energy-consuming enterprises energy-saving targets. In line with these targets, selected enterprises were called upon to establish an energy conservation organization, energy efficiency goals, energy utilization reporting systems, energy conservation plan, energy conservation incentives, and energy efficiency improvement options. Further strengthening the 1,000 enterprise program was that participating entities were required to make quarterly energy consumption reports to the National Bureau of Statistics (NBS) and sign conservation agreements with local governments. Achievement of the energy-saving targets was also linked to the aforementioned performance evaluation system. As such, the program was embedded in a mutually reinforcing set of performance incentives that boosted compliance up and down the chain of command.

Table 2. Energy Efficiency Elements of China's Evaluation System for Provincial Leaders

Assessment Indicator	Points	Examination content	Scoring Standards
Energy Intensity Target	40	Reduction of Energy Consumption per 10,000 RMB of GDP	<p>If the annual target is reached, 40 points will be allocated; if 90% of the target is reached, 36 points will be allocated; if 80% of the target is reached, 32 points will be allocated; if 70% of the target is reached, 28 points will be allocated; if 50% of the target is reached, 20 points will be allocated</p> <p>If the target is exceeded, then for every 10% above target, 3 additional points will be awarded</p> <p>This target takes precedence over the energy consumption targets below</p>
Energy Savings Measures	2	The Energy Efficiency Work of Organizations and Officials	<ol style="list-style-type: none"> 1. Establishing the region's energy intensity statistics, monitoring and evaluation system: 1 point 2. Establishing an energy-efficiency coordination mechanism, a clear division of responsibilities, and regular meetings to study the major issues: 1 point
	3	Allocation and Implementation of Energy Efficiency Target	<ol style="list-style-type: none"> 1. Allocation of energy savings target: 1 point 2. Carrying out an investigation and evaluation of progress in achieving the energy savings target: 1 point 3. Regularly publishing energy consumption indicators: 1 point
	20	Adjusting and Optimizing the Condition of the Industrial Structure	<ol style="list-style-type: none"> 1. If the service sector accounted for an increased proportion of the region's GDP: 4 points 2. If the high tech industry accounted for an increased portion of value-added production: 4 points 3. Developing and implementing energy efficient and review procedures for fixed asset investment projects: 4 points 4. Completing the year's goal of eliminating retrograde production capacity: 8 points
	10	Energy Savings Investment and Implementation of Key Projects	<ol style="list-style-type: none"> 1. Establishing special funds for energy efficiency and sufficient implementation: 3 points 2. Increasing the proportion of fiscal revenue allocated for special energy efficiency funds: 4 points 3. Organizing and implementing key energy efficiency projects: 4 points
	9	The Development and Expansion of Key Enterprises and Industries	<ol style="list-style-type: none"> 1. Including the energy efficient technologies in the annual and science technology plan: 2 points 2. Increasing the annual proportion of fiscal revenue spent on energy efficiency R & D: 3 points 3. Implementing energy efficient technology demonstration projects: 2 points 4. Organizing and developing mechanisms to promote energy-efficient products and technologies and energy efficient services: 3 points
	8	Managing the Energy Efficiency of Key Enterprises and Industries	<ol style="list-style-type: none"> 1. If key energy-intensive enterprises (including the Top-1000 program) meet their annual energy intensity targets: 3 points 2. Implementing the annual energy saving monitoring plan: 1 point 3. Meeting the annual energy efficiency target rate of minimum energy efficiency in newly constructed buildings: 4 points if 80% of the target is achieved than 2 points; if less than 70% of the target is achieved then no points

Table 2. China's Performance Evaluation System (Continued)

Assessment Indicator	Points	Examination content	Scoring Standards
Energy Savings Measures	3	Implementing Laws and Regulations	<ol style="list-style-type: none"> 1. Issuing and improving supporting regulations for the Energy Conservation Law: 1 point 2. Monitoring and enforcing the law with respect to energy efficiency: 1 point 3. Implementing standards that limit energy consumption for energy-intensive industries: 1 point
	5	Implementation of Basic Energy Efficiency Work	<ol style="list-style-type: none"> 1. Strengthening energy-efficiency modeling teams and institutional capacity: 1 point 2. Improving the system for energy statistics and institutional capacity building: 1 point 3. Installing energy measuring devices in accordance with the market mechanisms: 1 point 4. Carrying out energy efficiency awareness and training: 1 point 5. Implementing the energy efficiency incentive system: 1 point

Source: Wang, 2009

At the end of 11th Five-Year Plan, China had improved its energy intensity by 19.06%, and this figure will need to be adjusted to account for the increases in GDP that were more than 11% (the planned 20% energy intensity was based on GDP increasing at 7.5% annually). That China has made significant progress toward the goal is also evident in more general trends. For instance, energy consumption per unit gross domestic product fell by 2.74% in 2006 and then dipped sharply in 5.04% in 2007 and 5.20% in 2008. The latest 2009 figures show a reduction summing to 15.61%. These reports are supported by data suggesting that demonstrate from 2006 to 2009, China eliminated 60.06 million kilowatts worth of small scale thermal power plants, 81.72 million tons of backward production facilities in the iron sector, 60.38 million tons in the steel sector, 2.14 hundreds million tons in the cement sector. China has cut emission of carbon dioxide by about 1.5 billion tonnes because of energy-saving and emission-reduction measures in its 11th Five-Year (2005-2010) Plan, with the investment in energy-saving and emission-reduction projects reached about 2 trillion yuan (\$301 billion), more than 200 billion yuan of which came from the Chinese government, according to NDRC statistics.

But even as China made progress toward the goals in its 11th Five-Year Plan it also confronted several new challenges. For instance, some of the interviewees for this project noted that local level leaders pursued their energy intensity targets with too much enthusiasm.³ In the case of Hebei and Jiangsu provinces, for instance, heightened pressure to reach the goals led to energy being cut off from residential users in a series of rolling blackouts. In the cases of Zhejiang province, industries were forced to ration their power and alter production schedules to keep up with pressures to conserve energy (Interview File 1, 2010). These examples suggest a clear determination to achieve delegated targets, especially when linked to a performance evaluation system; however they also demonstrate the power of incentives. For what were primarily command-control programs, compliance incentives structured around China's performance evaluation system were clearly effective (in some cases too effective). This raises the question of whether China would be able to get the incentives right in the 12th Five-Year Plan as the orientation of its energy reforms begins to change.

³ Chinese Premier Wen Jiabao recently ramped up pressure on carbon-intensive factories to meet the targets with shut down orders and production reduction targets for small coal-fired plants, iron smelting plants, steel production and cement production.

4.3. The 12th Five-Year Plan

There were important parallels between the events accompanying the 11th and the 12th Five-Year Plan. For instance, there is currently discussion over a “Law of Addressing Climate Change” suggesting leadership support for proactive steps on climate change. This discussion has been accompanied by efforts to improve a national GHG inventories and creating a statistical system capable of measuring emissions at different levels and within industrial sectors. Yet perhaps the most significant parallel between the 11th and 12th Five-Year Plan is the emphasis on changing the energy structure and improving energy efficiency.

As mentioned at in the introduction, in the lead up to the COP 15 Hu Jintao announced that China would reduce its carbon intensity by 40-45% by 2020 off a 2005 base year. This goal has since been submitted to the UNFCCC, making China one of the over 100 parties listed in the chapeau of the Copenhagen Accord. Though the Copenhagen Accord was a political document, China has indicated its intention to pledge the same figures to a registry in the UNFCCC as spelled out in COP 16’s Cancun Agreements.

Though there are still debates on how this goal will be broken down in the years between now and 2020, interviews for this project suggest the likely goal will vary that the 12th Five-Year Plan period China would set use a bit lower target than 11th Five-Year Plan around 16% for reductions in energy consumption per unit GDP (in the 13th Five-Year Plan the figure would be 16.6%). This would be accompanied by reductions in the percentage of coal use as a proportion of primary energy from the 70% to 62% and a greater reliance on hydro-power (to reach 380 million KW by 2020), nuclear power (to reach 80 million KW by 2020), as well as wind, solar, and biomass (to collectively reach 200 million KW by 2020). (Qin 2010)

Even with these parallels, there are also important differences that are likely to become more apparent in the transition to 12th Five-Year Plan. Among these differences is a discernible effort to reduce fast growing emissions at the individual household and consumer level exemplified by the low carbon provinces and cities pilot program.⁴ In August 2010, the NDRC issued “The notice to establish and develop low-carbon pilot provinces and cities.”⁵ The notice clarified China would set up low-carbon models in five provinces (Guangdong, Liaoning, Hubei, Shanxi, Yunnan) and eight cities (Tianjin, Chongqing, Shenzhen, Xiamen, Hangzhou, Nanchang, Guiyang and Baoding). Each province/cities was then called upon to implement plans based on different regional characteristics. For instance, Guangdong province released a series of targets and tasks compatible with its energy structure. Other participating governments have been requested to submit implementation plans that accelerate low carbon industries, establish GHG emission data systems, and advocate low carbon lifestyles and consumption patterns.

Though the low carbon city pilot project has been launched in Guangdong and other pilot provinces and cities are working on implementation plans, many challenges remain. First, there is lack of standards for low carbon development (though the NBS is working on a monitoring system for carbon emissions, low carbon technology, and industrial standards). This will become increasingly important as governments move from low carbon concept to sector specific actions. Second, since pilot regions have different geographic features, development levels and industrial structures, programs will need to be tailored to regional circumstances. In this connection, a lack of planning experience and administrative capacity at the local level may hinder progress. Third, since many of the emissions at the urban level are in the transportation and infrastructure sectors, both standards and monitoring protocols will have to accommodate a wider range of smaller emissions sources. Again sufficient administrative capacity may be at issue as emissions sources become more diffuse.

Another critical difference from the 11th Five-Year Plan is China is the consideration of market-driven mechanisms to help reach the new targets. The decision to introduce a trading program was made at a meeting hosted by the NDRC in 2010 (though China’s has piloted emissions trading programs for SO₂ at the city and regional level). The proposed system would begin as a pilot on a selected industry such as coal-fired power generation or a defined area such as the coal-dependent Northeast (some of the more developed regions would consider instituting total emission control which was equivalent to a cap). By

⁴ Some of these programs had already begun at the end of the 11th five year plan.

⁵ China has also begun experimenting with low carbon buildings and low carbon transportation systems.

relying on the market clearing prices rather than planning and orders, a carbon pricing scheme would be a potentially cost savings departure from current efforts to cut emissions and raise energy efficiency with command-control targets negotiated between the central and regional government (Li 2010; Carbonpositive 2010).

But emissions trading also present a series of challenges. First, there will be a need to build system for creating, allocating, and enforcing emissions permits. The design of this supporting infrastructure can be an easily overlooked element of a trading program. Second, carbon intensity target will have to be converted to carbon-related allowances for trading. This will also require some difficult calculations and likely result in hard fought negotiations with participating sources, especially when the current system has focused more on command-control measures. Third, there must be a large enough number of participants with varying abatement costs to ensure the purchase and trading of emissions. The limited number of sources and demand hampered China's piloting of SO₂ emissions trading program over the last decade (Interview File 10, 2010). Finally, there are still significant differences between the parties on how to handle these issues. The difficulties of finding an acceptable compromise could delay program roll out, which could undercut faith in the program.

A final area where there may be a departure from the current set of command-control regulations is a carbon tax. As part of the 12th Five-Year Plan, China may start levying a carbon tax and further boost prices of fossil fuel for the next five years to cut GHG emissions. The recommended approach is to begin with a levy at \$1.45 per tonne of CO₂ emitted, rising incrementally to between \$7.30 a ton and \$59 per ton by 2020. A portion of the revenue would then be funneled back into energy-saving investments and local governments for their own low carbon initiatives (Young 2010). The tax reforms may also include concessions for vulnerable industries.

Yet the carbon tax too appears likely to encounter challenges. These include that the tax must be set at a low level enough to be politically acceptable but raised high enough to induce changes in behavior. Second, it is still not clear whether the tax would be on the energy source such as the power plant or further upstream on the resources themselves such as at the coal mine—for instance, a resource tax is currently being piloted on fossil fuels in Xinjiang (Interview File 1, 2010). Finally, the tax will have to be accommodated to a regulatory framework that could include command-control regulations on large industrial sources, low carbon pilots in select cities and provinces, and emissions trading programs at the source or regional level. The sheer number of programs presents a non-trivial coordination problem.

This final challenge is worth highlighting because it applies to not only carbon taxes, but the list of options being considered for the 12th Five-Year Plan. To a certain extent, the variety of approaches is necessary in view of expectations for steeper reductions. But to a certain extent, they converge on one central difficulty—namely that the diversity in approaches and sources will make it difficult to align existing institutional incentives with emerging low carbon reforms. Fortunately, this paper will argue that developments at the international level may help strengthen this alignment. Transitioning from the “visible hand” of the government to the invisible hand of the market will not be easy; but it may be feasible with support from the international community and a clear vision on what will be needed to attain steep reductions.

4.4. The Way Forward: From Cancun to Durban

The decade between 2010 and 2020 will be critical juncture for China. Decisions on industrialization, urbanization and consumption patterns will influence energy consumption for years to come. Some studies have shown that it may be possible for to organize these decisions around a low carbon path that diverges sharply from business-as-usual (BAU) projections over this period. The most optimistic of these studies sketches an enhanced low carbon (ELC) scenario that entails emissions rising through 2030 and then dropping sharply thereafter. Driving this scenario are the following factors: 1) new technology development, expanded dissemination of low cost technologies, and lower efficiency losses in existing technologies; 2) research and development and capital investment to support LCS; 3) advanced energy diversification; 4) significant dissemination of clean coal technology and CCS; and 5) enhanced

international cooperation (Jiang et al. 2009; Asuka, Li and Lu 2010).

While it is clear that the first four elements of this scenario will be crucial to China's low carbon transition, the remainder of the paper focuses on the importance of the fifth factor: international cooperation. At last year's COP 16 negotiations in Cancun, there was a general sense that negotiations had made progress on the key elements of a future climate regime.

To understand the progress it is important to highlight that many of the issues confronting China in its 12th Five-Year Plan involve compliance incentives for low carbon reforms. It is further noteworthy that many of the programs that China is contemplating for the 12th Five-Year plan will not be compatible with the current performance evaluation systems wherein officials' promotional prospects are based on meeting energy efficiency targets. As China's low carbon strategies tackle more diffuse sources and employ more market-oriented mechanisms, it will need to develop more precise measures of emissions and, most importantly, economic forces to drive reductions. To illustrate, under an emission trading scheme a province that fell short of an assigned target would be expected to purchase an offset from another source rather than suffer a for the provincial governor to suffer a reduction in his performance rating.

Moreover, as these incentives change in nature it will be increasingly important for China's emissions trading scheme or taxes to be linked with other schemes and standardized measurement rules.

This leads to the potential for climate negotiations to facilitate that process. The Cancun Agreements—the series of decisions resulting from COP 16 negotiations—outline a work program for several critical elements of a post-2012 climate agreement. Among the more important issues on this program is operationalizing language that suggests non-Annex Parties will take unilateral Nationally Appropriate Mitigation Actions that will be MRVed according to domestic rules with provisions for International Consultation and Analysis. The definition of ICA has been contested in negotiations with much of discussion focusing on whether the actual GHG emissions or the process behind calculating them are subject to ICA (Interview File 7, 2010). In Cancun it was agreed that developing countries will increase reporting of progress of NAMAs with “a process for ICA of biennial reports in the Subsidiary Body on Implementation, in a manner that is non-intrusive, non-punitive and respectful of national sovereignty.” These developments augur well for the gradual harmonization of measurement and reporting protocols between China and the international community.

Another area where there was progress in Cancun was the pledge of financing. Developed countries reaffirmed their intention to provide 30 billion US dollars in fast track financing between 2010 and 2012 to be scaled up to 100 billion US dollars annually by 2010. Following through on this financial commitment will not only increase the amount of resources to support mitigation and adaptation, but also build confidence for other issues such as MRV and ICA.

Clearly these developments at the international level will not be sufficient to generate incentives for compliance with energy reforms. China has already begun considering ways to refine its performance evaluation system so as to avoid some of the more undesirable consequences. Yet as China begins to develop a more varied regulatory landscape over the next decade it will be important to have a source of finance and standards outside the domestic policymaking apparatus strengthening compliance..

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Energy Policies and Measures

1. What is the implementation status of China's energy efficiency/renewable energy targets in the 11.5 plan? Which government agencies monitor and evaluate progress toward achieving those targets? What is the process through which these agencies monitor and evaluate progress?
2. Which actions and policy measures in the 12.5 plan will be most important to achieving China's 45% carbon-intensity target? Which government agencies are involved in developing those key actions? What is the process through which those actions are developed?
3. What is the status of China's 1,000 enterprise program? What are the key challenges to implementing the 1,000 enterprise program? How can those challenges be overcome?
4. What is the status of China's pilot low carbon cities program? What are the key challenges to implementing the pilot cities program? How can those challenges be overcome?
5. What is the status of China's pilot emissions trading programs/carbon taxes? What are the key challenges to implementing emissions trading programs/carbon taxes? How can those challenges be overcome?

NAMA MRV

1. Which existing institutional arrangements, incentive structures and data systems could support MRVing of NAMAs (including GHG inventories and NATCOM)? Which arrangements, structures and systems will need to be developed?
2. Might information sharing between central and local governments be a barrier to developing/ implementing NAMAs? Might it be a barrier to MRVing NAMAs? Might information sharing across line ministries/ agencies be a barrier to developing/ implementing NAMAs? Might it be a barrier to MRVing NAMAs?
3. Could international support help overcome barriers to the development of NAMAs? Could international support help overcome barriers to MRVing of NAMAs? Could "international consultation and analysis" help overcome barriers to the MRVing of NAMAs?
4. What are the key challenges to using a new market mechanism such as credited NAMAs to finance low carbon energy resources and technologies? How can those challenges be overcome? What are the key challenges to MRV at the policy, programmatic or sectoral level in the energy sector? How can those challenges be overcome?

Chapter 5

Shaping the Climate Change Agenda in India

Shaping the Climate Change Agenda in India

Nationally Appropriate Mitigation Actions (NAMA) and Measurement, Reporting and Verification (MRV)

Nandakumar Janardhanan

5.1. Introduction

The Nationally Appropriate Mitigation Actions (NAMA) after being formally introduced by the Bali Action Plan¹ has been seen as one of the important processes that provide a platform for the developing countries to put forward their share of mitigation actions. The NAMAs are voluntary measures towards climate change mitigation adopted by countries. The broadest definition is that NAMAs should be the actions proposed by [developing] countries to significantly reduce emissions below business-as-usual (BAU) levels.² These will be guided by the national priorities relating to long term development goals and the environmental health. While the developing countries will not have any internationally legally binding mitigation commitments, NAMAs give flexibility to these nations in identifying appropriate measures that would minimize the impact of the country's economic trajectory on the climate patterns. While the NAMAs are classified broadly as unilateral, conditional and credited NAMAs based on the type of actions planned by the countries there can be mitigation measures that could potentially be a mix of components of either of the previous types, which can be termed as Hybrid NAMAs.³

Measurable Reportable and Verifiable mitigation action are the key pillars of mitigation commitments towards global mitigation efforts. However, it is too early for many of the developing countries to have a streamlined MRV system for tracking the mitigation actions common to all countries. As the communications regarding mitigation action plans were done only in the early 2010, detailed NAMA action plans or MRV measures in many of these countries are yet to evolve to a full scale operational mechanism. Only those countries which have taken some noticeable measures for addressing climate issues in the previous years are in a position to present their efforts with some clarity to the international community.

With a population reaching above 1 billion and with GDP growth rate targeted at 9-10 percent, India is a leading player in the economic development of the global east. This also makes the country to be a responsible player in the global efforts towards climate change mitigation, through developing adequate domestic measures as well as promoting a sustainable development path while targeting to achieve its long term and short term economic goals. In this regard NAMAs and the MRV of the mitigation action are key steps towards ensuring the progress of the domestic efforts towards addressing the climate change issues. India has been taking mitigation and adaptation measures in various key sectors in the country, and mainstreaming these actions have begun in the post-Bali period, with the formation of Prime Minister's Panel for National Action Plan for Climate Change (NAPCC). The NAPCC recommended actions in 8 key sectors in order to address the climate change issues. These actions gained significant momentum in the post-Copenhagen period following the carbon emission intensity reduction pledge India made to the UNFCCC. Some of the unique measures such as Perform, Achieve and Trade (PAT) and Renewable Energy

¹ Bali Action Plan,

² NAMAs and the NAMA Registry: Key Issues to be Resolved for an International Agreement at Copenhagen, (Draft paper prepared for discussion) Centre for Clean Energy Policy, Washington, 2009, p-2, Accessed: <http://www.ccap.org/docs/fck/file/NAMA%20Paper%20July%2010%20Final%20%20draft%20for%20meeting.pdf>, 01 Aug 2010

³ NAMAs and the NAMA Registry: Key Issues to be Resolved for an International Agreement at Copenhagen, (Draft paper prepared for discussion) Centre for Clean Energy Policy, Washington, 2009, p-3, Accessed: <http://www.ccap.org/docs/fck/file/NAMA%20Paper%20July%2010%20Final%20%20draft%20for%20meeting.pdf>, 01 Aug 2010

Certificate (REC) are expected to be the key catalysts for the country's climate mitigation measures in the energy front. While there are various factors adversely affecting the progress, growing government attention evinces that climate mitigation is increasingly being a priority in India.

This study explores the climate change agenda in India and its institutional set-up, development of key mitigation actions in the pre-Copenhagen and post-Copenhagen period. It also highlights the country's approach towards Measurement, Reporting and Verification of the domestic mitigation efforts and portrays the potential MRV mechanism for the domestic actions and the key challenges to the climate policy development which needs to be addressed by the country in the years to come. The study points out the fact that despite the adverse domestic contentions about global climate change negotiation; the country has been making fast progress in climate mitigation measures.

5.2. India's Domestic Actions towards Climate Change Mitigation

The economy of the country is traditionally agriculture based which makes it significantly vulnerable to climate change impacts. This indicates that the assessments of impacts of climate change to various sectors of the economy are very essential for devising approaches, strategies and action plans to respond to the challenges.⁴ However, any significant steps towards climate assessment were not taken place in the country until the beginning of 1990s. Subsequently India has put forth various domestic measures to combat climate change which is in tune with the international mitigation efforts. As a step towards the country's long term mitigation strategy to address the issue of climate change, the Ministry of Environment and Forests under the Government of India communicated the country's domestic mitigation actions to UNFCCC in accordance with the Copenhagen Accord in January 2010. This action specifies that, *India will endeavour to reduce the emissions intensity of its GDP by 20-25% by 2020 in comparison to the 2005 level.*⁵ This target has been largely shaped by various ongoing policy measures in the country. As the economic growth at magnitude closer to double digit could increase the anthropogenic emissions, India needs to develop measures that could balance between economic goals and long term environmental health.

One of the key questions among scholars across the world is: what are the specific mitigation actions India has been adopting in order to ensure its participation in the global efforts towards climate change mitigation. As NAMAs is defined as Nationally Appropriate Mitigation Actions, it ideally represents an action or a set of actions that contribute to the climate change mitigation efforts which are appropriate with regard to the long term economic goals of the country. While India's communication to UNFCCC sets a target of reducing its carbon emission intensity to a certain level by the end of next decade, there are several measures that are required to ensure that the target will be met. This includes potential actions which are proposed through various policy recommendations and mission plans. There are four important components in the climate change related policy for India. First, a clear vision and commitment towards a mitigation target, Second, mitigation processes which would help the country achieve the commitments, Third, domestic review processes to ensure that the implementation of these actions are meeting the expected results, and fourth, coordinating and aligning with international efforts. For India the first two components are in place, which include its long term mitigation targets and actions plans. However, systematic tracking of mitigation measures domestically and the coordination of actions with the international efforts are yet to take clear shape. As India so far only have voluntary measures towards mitigation actions, the measurement, reporting and verification of these actions will only be done by domestically planned mechanisms. It is understood to a great extent that for a country like India which made its national communication on intended emission intensity cuts only in January 2010, shaping the legal and institutional structure for domestic MRV will be a time consuming effort.

⁴ Climate change and India: Towards Preparation of a Comprehensive Climate Change Assessment, MoEF, Govt of India, October 2009, p-7

⁵ India's Official Communication of Domestic Mitigation actions made to the (Executive Secretary) UNFCCC

Table 1. Key Components of Climate Change Policy

Mitigation Target	Mitigation Actions	Reviewing Measures	Aligning with International Efforts
Copenhagen Pledge “India will Endeavour to reduce the emissions intensity of its GDP by 20-25% by 2020 in comparison to the 2005 level”	<p>Actions planned under National Action Plans for Climate Change</p> <p>Action Planned under Post Copenhagen Domestic Actions</p> <p>State action plans on Climate Change</p>	Domestic monitoring and evaluation of voluntary climate change action plans	<p>Mitigation actions/its operation will be communicated through NATCOMs</p> <p>International Consultation and Analyses (IC&A) only under clearly defined guidelines which ensures that sovereignty is respected</p>

5.2.1. Climate Change Policy Making in India: Institutional Structure

The environment and climate related actions plans in the country gained significant importance in the policy making during the past many years. The Planning Commission which plays an integrative role in the development of a holistic approach to the policy formulation in critical areas of human and economic development in the country has been giving significant importance to the environment and climate related matters planning. Unlike previous times where environment related plans were largely a policy exercise of Ministry of Environment or Planning Commission (which makes the financial allocation plans) the formation of Prime Minister’s Council on Climate Change gave significant momentum to the climate change agenda especially because of the involvement of Prime Minister and the key ministries. Often the media points out that the initiatives taken by the Ministry of Environment and Forests under the leadership of Union Minister Mr Jairam Ramesh have positively contributed to strengthening the climate agenda. The key institutional organs that are involved in the climate policy making in the country are Prime Minister’s Council, Ministry of Environment and Forests, Planning Commission, Ministry of Finance and other respective Ministries which are linked to the Action Plans prescribed under the NAPCC. While the Ministry of Environment and Forests act as the nodal agency of coordinating the mitigation actions, the Department of Science and Technology oversees various climate programs in the country and promotes coordination among various ministry action plans.

5.2.2. Climate Change Mitigation Actions and Five Year Plan (FYP) in India

Environment and emission related action plans, though fragmented, have been present in the FYPs in the country. Some of these were found present in the country’s plans since the beginning of last decade. According to the 8th FYP (1992-1997) a framework of policies pertaining to forestry and Environment already exists in the form of policy documents, Acts and guidelines. This include the National Forest Policy 1988, Draft Policy Statement for Abatement of Pollution, 1991, The Forest (Conservation) Act, 1980, as amended in 1988, National Wildlife Action Plan, Draft National Conservation Strategy and Policy Statement on Environment & Development, the Environment Protection Act of 1986, the Water (Prevention and Control of Pollution) Act of 1974, and the Air (Prevention and Control of Pollution) Act 1981.⁶ However, the 8th FYP did not contain any specific steps towards climate change mitigation efforts.

Unlike the previous one, 9th FYP (1997-2002) gave significant importance to addressing issues relating to air quality, water quality, solid waste and hazardous chemicals, land degradation and soil loss, and forests and bio diversity. The FYP stated that India is an insignificant contributor to the GHG emissions, and the global environmental issues, such as ozone depletion, climate change due to accumulation of Greenhouse

⁶ Eighth FYP, Planning Commission, Government of India

Gases (GHGs), bio-diversity loss etc. are largely due to the rapid industrialization of the developed nations.⁷ The tenth FYP (2002-2007) plan evinced significant progress in the government’s perception and need actions towards climate related issues. The government of India planned for a number of schemes during the Tenth Plan under eco-restoration, watershed management, water and energy sectors, bio-diversity, climate change, ozone layer protection, land degradation etc. with the financial and technical help from India Canada Environment Facility (ICEF), Global Environment Facility (GEF) and Indo-German Technical Cooperation which were having schemes since Ninth Plan.⁸ The plan identified that the issue of climate change as critical to the global community and actions plans such as improving efficiency of energy conversion and utilization, afforestation, stabilizing population growth, limiting methane emissions through proper waste management and phasing out subsidies on power utilization are required as part of the developing countries’ efforts. As per the tenth FYP An outlay of Rs 5945 Crore (1.32 Billion USD) was allocated for the Ministry of Environment and Forests which looks after the environment related activities.

Significant progress in the FYP witnessed in the 11th Plan which has been running for the period 2007 -2012. Unlike the previous plan documents, the 11th plan discussed climate change issues in detail in the Chapter 9 of the first Volume, which brings in various actions plans. The plan suggests a greater role for all levels on government –national, state and local- in handling the responsibility of climate mitigation actions.

Table 2. Impact and Implications of Climate Change- Eleventh FYP

Key Challenges identified	Summary of Planned Responses
<ul style="list-style-type: none"> • The impacts and implications of climate change on India are manifold • Increasing global temperature and resultant faster retreat of most glaciers is expected to affect the snow fed perennial water regimes. • Changing environmental attributes are sure to affect the species spectrum and the profile and composition of forests is also likely to change. • The climate change will adversely affect agricultural sector. Even though increased CO₂ concentration can stimulate crop growth and yield, this benefit may not always overcome the adverse effects of excessive heat and drought. • There will also be health consequences of population displacement and economic disruption. • An increase in temperatures of 0.5°C to 1.5°C could produce a decline of between 2.5% in wheat and maize production in India. 	<ul style="list-style-type: none"> • As contribution to the global emissions reduction effort, the Eleventh Plan would focus on efforts to ensure that the emissions intensity of India’s GHG continues to decline. • Recognizing the importance of climate change issues, the Prime Minister established a Council on Climate Change under his chairmanship in June 2007 to co-ordinate national action for assessment, adaptation, and mitigation of climate change. • Eleventh Plan aims to reduce the energy intensity per unit of GHG by 20% from the period 2007–08 to 2016–17. • The total projected GBS in the Eleventh Plan for the MoEF is Rs 8842 crore (\$ 1.96 billion at 2006–07 price).

Source: Eleventh FYP, Government of India

⁷ The Ninth FYP (1997-2002), Planning Commission, Government of India.

⁸ The Tenth FYP (2002-2007), Planning Commission, Government of India

5.2.3. National Action Plans on Climate Change (NAPCC)

Considering the importance of addressing issues related to climate change, in 2008, India charted out its plan for domestic actions towards climate change mitigation taking into account its need for sustainable development, under the high level government council headed by the Prime Minister. The council prepared the National Action Plan for Climate Change which has been considered as one of the key pillars of the climate change agenda in the country. The council proposed actions in eight areas such as solar energy, energy efficiency, sustainable habitat, water, Himalayan ecosystem, green India, sustainable agriculture, strategic knowledge for climate change, running through the year 2017 with an aim to support country's actions towards climate change mitigation, while also keeping in view the long term economic development. The most important aspect of the NAPCC council is that the actions have been proposed to be in a mission mode with tangible targets.

(i) National Solar Mission

The national solar mission is aimed at promoting solar power generation in the country. Due to India's geographical position on the planet, the country receive about 5000 trillion kWh/year equivalent energy through solar radiation which can be utilised for developing efficient solar power generation facilities. The country targets to have 20 Giga Watt of installed solar power generation facilities by the 2022. 'The mission plans include adopting a 3-phase approach, spanning the remaining period of the 11th Plan and first year of the 12th Plan (up to 2012-13) as Phase 1, the remaining 4 years of the 12th Plan (2013-17) as Phase 2 and the 13th Plan (2017-22) as Phase 3. At the end of each plan, and mid-term during the 12th and 13th Plans, there will be an evaluation of progress, review of capacity and targets for subsequent phases, based on emerging cost and technology trends, both domestic and global.⁹ According to the mission plan, the aim would be to protect Government from subsidy exposure in case expected cost reduction does not materialize or is more rapid than expected.

(ii) National Mission for Enhanced Energy Efficiency

Improving energy efficiency in the country is one of the key elements in the climate mitigation efforts. Since fossil fuel burning has been one of the major sources of anthropogenic emissions in India, the mission plan for enhancing energy efficiency will play a key role in the climate policy. The key institution responsible for promoting energy efficiency standards in the country is the Bureau of Energy Efficiency (BEE).

(iii) National Mission on Sustainable Habitat

The national mission on sustainable habitat aims to improve energy efficiency in buildings, management of solid waste and promoting public transport systems. 'This mission will broadly cover extension of the energy conservation building code - which addresses the design of new and large commercial buildings to optimize their energy demand; Better urban planning and modal shift to public transport - make long term transport plans to facilitate the growth of medium and small cities in such a way that ensures efficient and convenient public transport; Recycling of material and urban waste management - a special areas of focus will be development of technology for producing power form waste. The National Mission will include a major R&D programme, focusing on bio-chemical conversion, waste water use, sewage utilization and recycling options wherever possible'.¹⁰

(iv) National Water Mission

The national water mission targets integrated water resource management towards water conservation, minimising wastage and ensuring equitable access to water resources within and across the states. The five identified goals of the Mission are: (a) comprehensive water data base in public domain and

⁹ JNNSM: Towards Building Solar India, Ministry of Renewable Energy, Government of India, Accessed: <http://mnre.gov.in/pdf/mission-document-JNNSM.pdf>, 02 Aug 2010

¹⁰ India Environmental Portal, Accessed: <http://www.environmentportal.in/content/national-mission-sustainable-habitat>, 02 Aug 2010

assessment of impact of climate change on water resource; (b) promotion of citizen and state action for water conservation, augmentation and preservation; (c) focused attention to over-exploited areas; (d) increasing water use efficiency by 20%, and (e) promotion of basin level integrated water resources management.¹¹

(v) National Mission for Sustaining the Himalayan Ecosystem

The mission on sustaining Himalayan ecosystem is aimed at evolving measures for safeguarding Himalayan glaciers and mountain ecosystems.¹² As Himalayan glaciers are considered to be the critical source for the major rivers, this mission would explore the potential adverse impacts of the climate change on the glaciers. The key measures adopted in the mission will be in tune with the relevant proposals under the National Environment Policy of 2006.

(vi) National Mission for a Green India

The primary aim of the green India mission is to develop carbon sinks, preservation of ecological balance and maintenance of bio-diversity. The mission proposes to act upon the recommendations of Working Group on Forests for the 11th FYP. The mission will also seek to implement of the National Biodiversity Conservation Act, 2001.

(vii) National Mission for Sustainable Agriculture

The sustainable agriculture mission addresses some of the major concerns in the country regarding the impact of climate change on agriculture. The mission aims to make the Indian agriculture sector more resilient to the adverse impacts of climate change. There are four key areas of thrust under the mission, such as prompting dry land agriculture for increasing the agricultural potential, strengthening adaptation measures, promote access to information and promote use of biotechnology in the agricultural sector.¹³

(viii) National Mission on Strategic Knowledge

According to the mission plan, as a key step to promote research and studies for developing strategies towards addressing climate change a knowledge mission platform is required. The mission on strategic knowledge envisages promoting high quality research on climate change impacts and would promote necessary measures to combat the issues.

According to the NAPCC the climate change mitigation efforts in the country is currently at its rudimentary stage and will continue to evolve based on new scientific and technical knowledge.

5.2.4. Post Copenhagen Domestic Actions

After Copenhagen the time to time domestic actions that were taken by the government were consolidated to form the ‘Post Copenhagen Action’. These actions are largely a reflection of the NAPCC recommendations which are moulded in tune with the long term mitigation targets in the country.

¹¹ National Water Mission (Under the NAPCC), Ministry of Water Resources, Government of India, April 2009.

¹² National Mission for Sustaining the Himalayan Ecosystem, Government of India, June 2010

¹³ National Action Plan on Climate Change, p-35

Table 3. Post Copenhagen Climate Mitigation Actions in India

Key Measures	Mechanisms
An Expert Group on A Low Carbon Strategy for Inclusive Growth	A multi-stakeholder group with representation from industry, leading think tanks, research institutions, civil society and government with a mandate to develop a roadmap for India for low carbon development. This will be implemented in the twelfth FYP (2012 onwards)
A “Carbon Tax” on Coal to Fund Clean Energy	Levy on coal, at the rate of Rs. 50 (~USD 1) per ton. This money will go into a National Clean Energy Fund that will be used for funding research, innovative projects in clean energy technologies, and environmental remedial programmes (Earning will be around \$ 500 million for FY2010-11)
Perform, Achieve & Trade (PAT) Mechanism for Energy Efficiency	Cabinet approved the National Mission on Enhanced Energy Efficiency (NMEEE) which follows the mechanism of Perform, Achieve and Trade (PAT). Under this, about 700 of the most energy intensive industrial units and power stations in India would be mandated to reduce their energy consumption by a specified percentage.
Release of India’s National GHG Inventory 2007	On 10th May 2010, India released its Greenhouse Gas (GHG) Emissions Inventory for 2007. With this publication, India has become the first “non-Annex I” (i.e. developing) country to publish such updated numbers
National Mission on Sustainable Habitat (NMSH)	The NMSH was recently approved as one of the eight National Missions under the Prime Minister’s National Action Plan on Climate Change (NAPCC). This will promote energy efficiency in residential and commercial sectors, promote water and waste management and improve urban transportation.
Jawaharlal Nehru National Solar Mission (JNNSM)	The JNNSM mission aims at generating 20,000 mw of solar power by 2022 and targets for 2000 mw of off-grid solar plants, and 20 million sq meters of solar collectors to be installed.
Green India Mission (GIM)	The overarching target of the GIM is to double the area to be taken up for afforestation/eco-restoration in India in the next 10 years, taking the total area to be afforested or eco-restored to 20 million hectares.
REDD+	A Technical Group has been set up and a National REDD+ Coordinating Agency has been given in-principle approval
Regional and International Cooperation	Plans to promote regional cooperation with SAARC countries. An Intergovernmental Expert Group on Climate Change to develop clear policy direction for regional cooperation on climate change is under planning. India announced \$1 billion each to SAARC forestry centre in Timphu and SAARC costal management centre in Mali.
Sub-National State-level Actions	Promoting state specific action plans on climate change. Delhi and Orissa states already launched their climate change action plans.
Climate Change Science	The Indian Network for Climate Change Assessment (INCCA) is undertaking a major “4X4” assessment of the impacts of climate change on four sectors – water resources, agriculture, forests and human health – in four critical regions of India – the Himalayan region, North east, Western Ghats and Coastal India.
India’s First CDM PoA (Bachat Lamp Yojana)	The Bachat Lamp Yojana (BLY) conceived as CDM Programme of Activity (PoA) for mass distribution of Compact Fluorescent Lamps (CFLs) in India has been registered successfully by the CDM-Executive Board.
Himalayan Ecosystem	This Mission focuses on evolving suitable management and policy measures for sustaining and safeguarding the Himalayan glacier and mountain ecosystem
Contributions to International Negotiations	India’s Environment Minister, Mr Jairam Ramesh made detailed submission on how to operationalise MRV to MEF and UNFCCC

Source: Ministry of Environment and Forests, Government of India

Some of the actions specified above have already been in progress for the past few years, though not as part of any climate change agenda. Especially the energy efficiency efforts, reducing coal consumption by implementing coal tax and afforestation have been part of the government policies. Some of the recent actions taken by the government towards strengthening climate change mitigation framework in the country are as follows:

Table 4. Recent 24 actions taken by the Government of India towards climate change mitigation efforts

Area	Initiative / Event	Contribution
Science & Research	1. Indian Network for Climate Change Assessment (INCCA)	Network of 120 research institutions and 250 scientists launched; major conferences planned in May and November 2010
	2. Himalayan Glaciers Monitoring Programme	Comprehensive programme to scientifically monitor the Himalayan glaciers – Phase I completed; Phase II launched; Discussion Paper on State of Himalayan Glaciers released
	3. Launch of Indian Satellite to Monitor Greenhouse Gases	ISRO to launch a micro-satellite in 2010 to study aerosols (soot particles), followed by a comprehensive satellite in 2011 to monitor GHG gases; India to join elite club of countries to do so
	4. India's Forest and Tree Cover as Carbon Sink	Research estimates the value of India's forests as a carbon sink – assessment shows that they neutralize 11% of India's annual GHG emissions
	5. India's GHG Emissions Profile	India's GHG Emission Pathways until 2030 under different assumptions made public; shows India will remain a minor per capita emitter even in 2030
Policy Development	6. Expert Group on Low Carbon Economy	Planning Commission-led Group set up to develop strategy for India as a low carbon economy; to feed into twelfth plan process
	7. State Action Plans on Climate Change	Delhi becomes first State to release Climate Change Action Plan; other States finalizing their Plans
	8. National Policy on Bio fuels	National Policy on Bio-fuels approved by Cabinet to promote cultivation, production and use of Bio-fuels for transport and in other applications
Policy Implementation	9. National Missions under National Action Plan on Climate Change	Mission plans have already received approval.
	10. First National Conference on Green Building-Materials and Technologies	Conference to stimulate green building sector; to set an example the Government proposes that all its new buildings will be GRIHA 4 (green building rating) compliant subject to site conditions
	11. 30 "Solar Cities"	In-principle approval given to 30 'Solar Cities' with aim of 10% deduction in projected demand of conventional energy through a combination of energy efficiency and renewable
	12. Energy Efficiency Standards for Appliances	Energy efficiency ratings made mandatory for 4 key appliances – refrigerators, air conditioners, tube lights and transformers from January 7, 2010; more to follow through 2010
	13. Fuel Efficiency Norms	Plan for fuel economy norms for vehicles announced; to be made operational in two years
	14. CDM Program	India assessed as Best CDM Country; Indian projects to neutralize 10% of emissions by 2012
International Cooperation	15. India to host 'Rio+20'	India to host 11th COP of Convention on Biodiversity (CBD) in 2012, mark 20th anniversary of Rio
	16. UN Climate Technology Conference	India successfully hosts global Conference on technology, Delhi Statement adopted
	17. SAARC Environment Ministers Conference	India successfully hosts SAARC Ministers Conference and agrees joint actions on Climate Change; 2010 SAARC Summit to be on the theme of Climate Change
	18. India's Submissions to UNFCCC	Report documenting India's 12 proactive submissions to UNFCCC released
Forestry	19. State of Forests Report 2009	Latest State of Forest Report released; shows continued rise in India's forest cover
	20. Launch of CAMPA	Ambitious Rs 11,700crore (USD2.5Bn) Programme for forest conservation launched
	21. Green India Mission	New mission under NAPCC to fast-track re-forestation being finalized
	22. Capacity Building in Forestry Scheme	New Rs 369 crore (USD 80Mn) scheme for HRD for forest personnel
	23. Intensification of Forest Management	New Rs 600 crore (USD 125Mn) scheme to improve forest management, infrastructure, fires, etc.
	24. Inclusion of Forestry within NREGA	Forestry related activities included as part of India's flagship employment guarantee scheme to fast-track reforestation; Pilots being implemented

Source: Ministry of Environment and Forests, Government of India

5.2.5. Implementation of Mitigation Actions in Energy Sector

Energy is a key sector that requires immediate actions as part of the mitigation efforts, primarily to reduce the anthropogenic emissions emanating from it. The two major actions planned in this sector are the energy efficiency mission and solar energy mission. Energy efficiency mission has a wider applicability across various sub-sectors which are major consumers of energy. The national mission on solar energy will give focus on expanding the solar thermal power generation and solar photovoltaic power generation. These actions will be guided by the target of achieving a total installed capacity of 20,000 MW by the year 2022.

Regarding Energy Efficiency, the Bureau of Energy Efficiency in India sets standards for efficiency in various consuming sectors and also promoting labelling system for many of the electrical equipments. Comparative labelling system for electrical appliances such as fluorescent tube lights, refrigerator, distribution transformers and air conditioners has already been implemented in India. Promotion of renewable energy production and usage, and increasing nuclear energy production are also part of the agenda in reducing the reliance of conventional fossil fuels. The monitoring on solar energy development will be done mostly by Indian Renewable Energy Development Agency (IREDA) which will make suitable arrangements to monitor the progress and performance of the grid interactive solar PV power generation projects. The agency will also conduct occasional inspection at solar plants and the Ministry of renewable energy will make field evaluations for solar power generations.

Apart from the mitigation initiatives in various sectors the government of India has proposed additional measures which are aimed at improving the energy efficiency and energy conservation in the industrial, commercial and residential sectors. The three key measures such as Perform Achieve and Trade (PAT), Renewable Energy Certificates (REC) and the CDM Program of Activity (CDM PoA) have also gained significant attention from the industrial and commercial players in the country. Though many of them have been in discussion in rudimentary stage, they have gained government approval and wider public recognition in the post-Copenhagen period. The PAT scheme and REC are gaining importance among the industrial as well as commercial sectors.

(i) 'Perform, Achieve and Trade' (PAT)

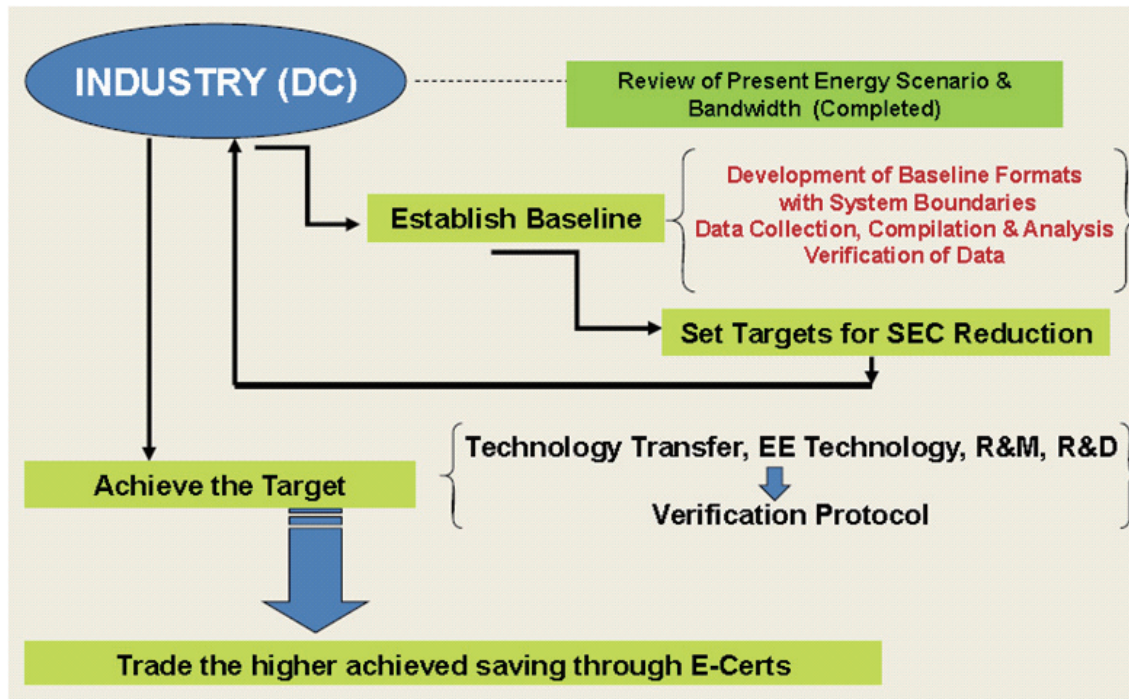
In order to tackle the energy inefficiency issues, the government has proposed various measures of which PAT and REC have been gaining significant momentum in the policy implementation. The PAT scheme, as specified under the post-Copenhagen actions, is a market-based mechanism to enhance energy efficiency of the major energy consumers in the industrial sector, termed as 'Designated Consumers' (DC). The designated consumers have a wide bandwidth of specific energy consumption which is indicative of large energy-savings potential among these units.¹⁴ This is also a reflection of the differences in the energy-saving possibilities amongst plants. The current 714 energy intensive units which are originally identified as DCs under the Energy Conservation Act 2001 belong to key energy consuming sectors such as Aluminium, Cement, Iron & Steel, Chlor Alkali, Thermal Power Plants, Fertilizer, Pulp & Paper, Textiles and Railways.

The PAT scheme is aimed at identifying the energy saving measures of the DCs. Each unit is to file their energy returns (estimate of energy consumption audit) to the designated agency. Based on the energy audit the energy conservation can be estimated at units of oil equivalent or coal equivalent by each unit during a given time frame. The government proposes to issue Energy Saving Certificates (ESCerts) to the units that are over achieving the energy efficiency targets and these ESCerts can be traded with those units which are unable to meet Specific Energy Consumption (SEC) targets. As an innovative measure to promote energy efficiency, the PAT is a self rewarding system which not only recognises the energy efficiency improvement in an industrial unit but also gives monetary benefit based on the trading of ESCerts. The PAT system has significant potential as an energy saving measure which can be promoted among various levels of industry units especially due to the tradability of the energy certificates. The tradability concept expected to promote energy efficiency which

¹⁴ PAT Consultation Document, Bureau of Energy Efficiency, Government of India, p-15

would help cut down about 5 per cent of the total energy consumption by 2015. The PAT scheme is expected to be operational from April 2011.

Figure 1. Perform, Achieve and Trade (PAT) Mechanism

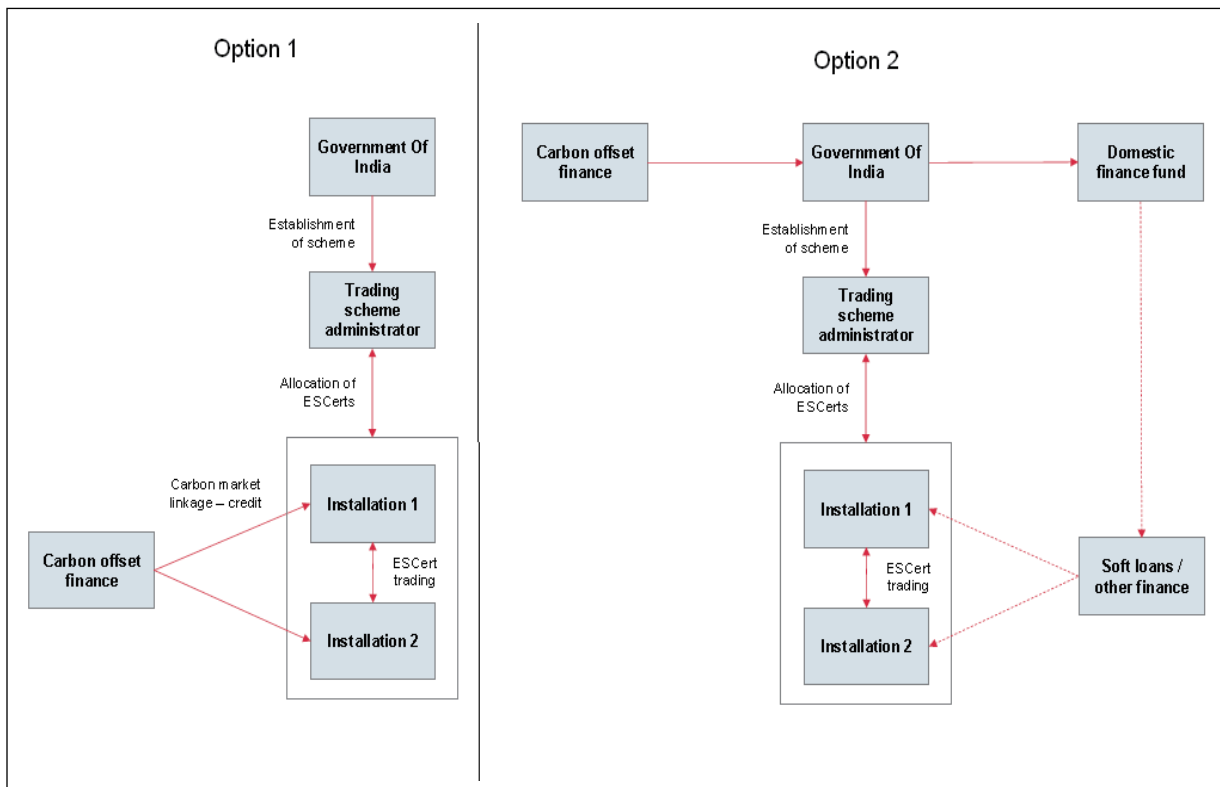


Source: AK Asthana, Approach for Target Setting in PAT Scheme, http://abpsinfra.com/downloads/2010_03_Workshop_Perform_Achieve_Trade_Mechanism_MrAsthana.pdf

The PAT mechanism is designed as a national scheme for improving industrial energy efficiency. Moreover, the energy consumption reduction targets under the PAT mechanism neither create any international obligations nor has any linkage to international financial instrument for emission reductions. According to the Energy Efficiency Services Limited (a Joint Venture Company of 4 Central Public Sector Undertakings of Ministry of Power, Government of India) 'PAT has no relationship with CDM or any such international scheme to incentivise emission reduction. Specific Energy Consumption (SEC) reduction targets under the PAT mechanism do not create any international obligations and must not have any relationship with them. These targets also do not intend to put any overall cap on energy consumption, consistent with the Indian stand in the ongoing climate change negotiations'.¹⁵ However, there have been various thoughts from industry experts about exploring options to tap the international finance options. The two prominent methods discussed by experts for making the international finance available to PAT scheme are: first, the international finance can be directly utilised for the trading the ESCerts and second, the use of carbon offset fund can help the Indian government to create a domestic fund which can help finance the energy efficiency projects through providing soft loans. The possibilities of international finance opportunities in PAT scheme will be further explored once the program will begin in April 2011.

¹⁵ PAT Scheme, Accessed, 2 Nov 2010, <http://www.eesl.co.in/website/PAT.aspx>

Figure 2. Perform, Achieve and Trade (PAT) Mechanism



Source: Keith Regan, Potential benefits of Indian Industry by the PAT Scheme, <http://cii.in/WebCMS/Upload/Keith%20Regan%20-%20Camco%2018th%20presentation.pdf>

Though the PAT scheme design is a possible tool for obtaining international finance which could help the Indian industries in meeting the energy efficiency investment cost, as of now there are no clear plan from the government on how and when to link international finance with the program. However, PAT scheme will be an attractive option to the industry due to its various features such as, fungibility with Renewable energy certificates (which is discussed below), potential to tap international finance and incentive for enhancing energy efficiency.

(ii) Renewable Energy Certificates

In order to meet the long term mitigation targets in India, renewable energy generation needs to grow significantly. Renewable Energy Certificate (REC) mechanism is a market-based instrument to promote renewable energy generation and facilitate renewable energy purchase obligations amongst various stakeholders.¹⁶ As directed by the Electricity Act 2003, renewable energy generation needs to be promoted at national as well as state levels. As part of this, the State Electricity Regulatory Commissions (SERC) are obligated to purchase certain percentage of renewable energy to meet its Renewable Purchase Obligation target (RPO). Under the scheme a renewable power supplier may sell units of electricity fed to the grid and is eligible for certificates against each unit of electricity fed into the grid. These certificates can be sold to companies or SERCs to help them meet their RPO targets. The REC can help states which do not have sufficient renewable energy generation capacity but need to meet the RPO targets.

¹⁶ Renewable Energy Certificate Mechanism in India, ABPS Infrastructure Advisory Private Limited, Accessed, 20/09/2010: http://mnre.gov.in/pdf/MNRE_REC_Report.pdf

(iii) CDM Program of Activity

The government of India has also initiated a plan to promote CFL lamps under the Bachat Lamp Yojana CDM PoA (CDM Program of Activity). The Bachat Lamp Yojana (BLY) conceived as CDM Programme of Activity (PoA) for mass distribution of Compact Fluorescent Lamps (CFLs) has been registered successfully by the CDM-Executive Board on 29 April 2010.¹⁷ Under the program, the state level electricity distribution companies will distribute high quality CFL lamps for Rs: 15 (~\$ 0.35). This is primarily aimed at reducing the incandescent lamp usage which currently meets 80 percent of the total lighting in the country. The Programme would not only help the reduction of peak load in the country but also lead to a potential reduction of over 6,000 MW in electricity demand.¹⁸

5.3. MRV: India's perception and Approach to International Negotiation

The missions under the national action plan have proposed to include specific monitoring and evaluation mechanisms. However the approach of the country towards MRV of climate changes mitigation actions are yet to gain a significant institutional structure and are largely limited to rudimentary policy levels. Probably, one of the major factors that adversely affect the development of any clear institutional structure is the conflicting perceptions on MRV by different parties in the international negotiation. However, MRV will be a critical aspect in India's climate change mitigation actions and needs greater clarity regarding the processes, mechanism and institutional set up. Regarding the institutional development for MRV, India has already made some progress towards monitoring and evaluation of the climate mitigation actions. These are for the evaluation of the missions proposed under the NAPCC and are called monitoring and evaluation mechanisms.

5.3.1. Monitoring and Evaluation of Mitigation Actions in India

As a follow up of the proposed mitigation actions, the government has been considering domestically accountable mitigation outcomes in different sectors such as industry, energy, transport, building and forestry. Some of the key measures being adopted by the government are launching of Solar mission targeting to achieve installed capacity of 20,000 MW by 2022, the deployment of new emission reduction technologies in coal based power plants and mandatory fuel efficiency standards in transportation sector. The government has been promoting various measures to fulfil the mitigation commitments such as 'national development objectives with co-benefits of mitigating climate change'¹⁹ aimed at improving access to clean energy. Other key domestic monitoring approaches the Indian government so far has been taking include: plans for a Climate Observatory Network for continuous measuring, monitoring and modelling of the impacts from climate change on different sectors and in different regions and plans for developing its own satellite for monitoring GHG and aerosol emissions.²⁰ The government has also been strengthening its environment related legal measures. On 2 June 2010, the National Green Tribunal Act 2010 was approved by the President of India, which is aimed at the establishment of National Green Tribunal- a special fast-track court for speedy disposal of environment-related civil cases.²¹ The green tribunal is aimed at dealing with environmental laws, on air and water pollution, the Environment Protection Act, the Forest Conservation Act and the Biodiversity Act will help faster disposal of cases relating to environmental issues. The NAPCC will continue to be the key organ in coordinating the climate change actions in the country. The Council will also provide guidance on matters relating to coordinated national action on the domestic agenda and review of the implementation of the National Action Plan on Climate Change including its R&D agenda.²²

¹⁷ India's First CDM PoA (Bachat Lamp Yojana) registered, Accessed 02/07/2010: <http://moef.nic.in/downloads/public-information/bachat-lamp-yojana.pdf>

¹⁸ India's First CDM PoA (Bachat Lamp Yojana) registered, Accessed 02/07/2010: <http://moef.nic.in/downloads/public-information/bachat-lamp-yojana.pdf>

¹⁹ UNDP-MNRE Project for Enhancing Access to Clean Energy, This project would cover 35 villages in seven states in India which are facing energy access issues. Accessed: <http://www.winrockindia.org/HomePage.htm>, 23 June 2010

²⁰ Speech of Mr. Jairam Ramesh, the Minister of State for Environment and Forests, Government of India, at the high level segment of the UN Climate Conference at Copenhagen, 16 Dec 2009

²¹ News on National Green Tribunal Act, 2010, Accessed: <http://www.indiaenvironmentportal.org.in/content/the-national-green-tribunal-act-2010>, 24 June 2010

²² National Action Plan on Climate Change, p-6

Table 5. Climate Change Data Sources and Reporting Agencies in India

Database	Data collecting and Supplying Agency	Facilitator Reporting to
Oceans Sea surface temperature Salinity Sea level rise	Ministry of Earth Sciences	Secretary, Ministry of Earth Sciences
Cryosphere Snow cover Glacier data	National Remote Sensing Agency (NRSA) Geological Survey of India Snow and Avalanche Studies Establishment (SASE) Defence Research and Development Organization	Secretary, Department of Space Secretary, Ministry of Mines Secretary, Department of Defence Research and Development
Meteorology Precipitation Humidity Surface temperature Air temperature Evaporation data	India Meteorological Department, Ministry of Earth Sciences.	Secretary, Ministry of Earth Sciences
Land Surface Topography Erosion Imagery (vegetation map) Forest cover	Survey of India National Remote Sensing Agency (NRSA)	Secretary, Department of Science and Technology Secretary, Department of Space
Hydrological Ground water Water quality River water Water utilization	Central Water Commission State Water Resource Organizations	Secretary, Ministry of Water Resources Chief Secretaries of the respective States
Agriculture Soil profile Area under cultivation Production and yield Cost of cultivation	Ministry of Agriculture	Secretary, Department of Agriculture and Co-operation Secretary, Department of Agricultural Research and Education
Socio-Economic Demography Economic status	Census of India	Registrar General India, Ministry of Home Affairs
Forests Forest resources Plant and animal species distribution	Forest Survey of India State Forest Department Botanical Survey of India Zoological Survey of India Department of Space	Secretary, Ministry of Environment and Forests Chief Secretaries of the respective States Secretary, Ministry of Environment and Forests Secretary, Ministry of Environment and Forests Secretary, Department of Space
Health Related Data	Department of Health Research	Secretary, Department of Health Research

Source: National Action Plan on Climate Change

The monitoring and evaluation of the mitigation actions in the country will be done by several institutions. The Ministry of Environment & Forests (MoEF) is the designated nodal ministry responsible for national environmental policies, programmes and priorities for implementation, and for overall coordination of

projects related to environment.²³ Various ministries such as Ministry of Power, the Ministry of New and Renewable Energy resources are part of the policy implementing team. 'Appropriate executing agencies and departments in the state government carry out implementation of environmental policies and programmes formulated by the MoEF, whose role consists of coordinating funds, providing guidance and technical expertise and undertaking monitoring and evaluation. MoEF is assisted by a number of national as well as state level development institutions, non-governmental organizations, industry associations, and private consultancy firms, etc. Several international organizations, research laboratories, and other such agencies also provide the inputs, as may be required, for facilitating the decision-making process of the Government of India.'²⁴

There have been proposals for specific monitoring and evaluation mechanisms for specific mission programs which are coordinated and reported back to the central authorities such as the MoEF which is the Nodal Ministry and to the Prime Minister's council on Climate Change. As mentioned earlier, various ministries are in charge of the climate change mitigation actions according to the type and area of mitigation. Responsibilities of overseeing the progress in some of the mitigation actions such as energy efficiency mission are entrusted on various ministries. The mitigation actions will be monitored at regular intervals by committees in the ministry which is in charge of that specific mission. There is also think tank support and specific divisions or committees to manage funding or financing the mitigation actions.

(i) National Solar Mission: Institutional Mechanism for Monitoring and Evaluation

The national solar mission, most popularly known as the Jawaharlal Nehru Solar Mission (JNSM), plans for a three phase solar energy development and aims to set up an enabling environment for solar technology penetration in the country both at a centralized and decentralized level as its immediate priority.²⁵ As per the mission the key objective is to create conditions through rapid scale-up of capacity and technological innovation to drive down costs towards grid parity. This mission will be implemented by Solar Energy Authority or an autonomous body of Solar Mission under the renewable energy Ministry.

The broad contours of an autonomous and enabled Mission would comprise of:²⁶

A Mission Steering Group, chaired by the Minister for New and Renewable Energy and composed of representatives from all relevant Ministries and other stakeholders, will be set up to oversee the overall implementation of the National Solar Mission. A Mission Executive Committee, chaired by the Secretary of Ministry of New and Renewable Energy will periodically review the progress of implementation of the projects approved by the Mission Steering Group. An empowered Solar Research Council headed by an eminent scientist will advise the Mission on all R&D, technology and capacity building related matters. In addition, Industry Advisory Council will advise the Mission on all matters relating to industrial development, technology transfer/absorption/joint ventures, incentives and investment related matters. A Mission Director, with the rank of an Additional Secretary, would head the Mission secretariat and will be responsible for day to day functioning and also achieving the implementation goals. The Mission Secretariat will also have Joint secretary/ Scientist G level officers including other scientists, experts and consultants to ensure the smooth functioning of the planned actions.

This mission states that the funding for the activities will be primarily formed from two sources, first, the budgetary support from Ministry of New and Renewable Sources and second, international funds under UNFCCC framework. The mission implementation will be monitored by the government and the funding for the subsequent phases will be based on the progress of the mission.

²³ UNDP Global Environmental Facility, Project document on "Enabling Activities for the preparation of India's Initial National Communication to the UNFCCC", Accessed: <http://www.natcomindia.org/activities/natcom-project-document.pdf>, 28 Jul 2010

²⁴ UNDP Global Environmental Facility, Project document on "Enabling Activities for the preparation of India's Initial National Communication to the UNFCCC", Accessed: <http://www.natcomindia.org/activities/natcom-project-document.pdf>, 28 Jul 2010

²⁵ Jawaharlal Nehru Solar Mission, Ministry of New and Renewable Energy Sources, Government of India, Accessed: <http://mnre.gov.in/pdf/mission-document-JNNSM.pdf>, 14 July 2010.

²⁶ Jawaharlal Nehru Solar Mission, Ministry of New and Renewable Energy Sources, Government of India, Accessed: <http://mnre.gov.in/pdf/mission-document-JNNSM.pdf>, 14 July 2010

(ii) Enhanced Energy Efficiency Mission: Institutional Mechanism for Monitoring and Evaluation

The implementation of the mission targets will be done by various sectors/organisations in close coordination with the Bureau of Energy Efficiency. The mission implementation will be managed by the mission secretariat which is headed by a Mission Director General. The team will also include two Deputy Director Generals and 27 other posts to support Mission implementation. Monitoring of the mission will have a three tier structure including Quarterly monitoring by Prime Minister's Office, monthly monitoring by Secretary (Ministry of Power), and fortnightly monitoring by DG, BEE.²⁷

(iii) National Mission on Sustaining Himalayan Ecosystem: Institutional Mechanism for Monitoring and Evaluation

The proposed monitoring and evaluation process for the national mission on sustaining Himalayan ecosystem are as follows:²⁸

The National Mission on Sustaining Himalayan Ecosystem would be monitored periodically, at least twice in a calendar year, by a High Powered Committee (HPC) under the Chairmanship of the Minister for Science and Technology and Earth Sciences. The National Advisory Council for National Mission on Sustaining Himalayan Eco-system would form the think tank and give inputs to the Monitoring committee and evaluate the progress of work. A mechanism for the PM's council for periodical and scheduled reporting of progress to the Prime Minister's Office would be developed and implemented.

An Advisory Council will provide think tank functions on technical areas and various work elements. The mechanism for input approvals and funding decisions will involve a Committee of Secretaries of the participating departments with the Secretary of the administrative department of the nodal institution chairing the meeting. A dedicated Mission Cell will be responsible for coordination with nodal institutions coordinating thematic work elements and report to the Committee of Secretaries as well as submit periodic reports to the PMO.

(iv) National Water Mission: Institutional Mechanism for Monitoring and Evaluation

It is proposed that the National Water mission need to have a two-tier monitoring and evaluation set-up one each at the central level and at the state level. There will be a mission secretariat headed by a mission director who has necessary financial & administrative powers and would be accountable for implementation of the identified programme.²⁹ The mission director will also be supported by advisors for technical evaluations, coordination and monitoring. Similar monitoring and evaluation committees will also be present at state level which will be a part of the state level climate change committee.

(v) National Mission on Green India: Institutional Mechanism for Monitoring and Evaluation

The institutional structure towards mission implementation and monitoring includes a National Advisory Council, chaired by the Minister for Environment and Forests which would provide overall guidance. 'A National Steering Committee will be constituted to provide direction and management to the Mission. The Secretary/DGF, of the Department of Forest and Wildlife, Government of India will be the Chair. Members would include certain of the State Principal Chief Conservators of Forests (PCCFs) by rotation, representatives from related divisions in MoEF and related Ministries, eminent experts and representation of civil society organizations.³⁰ A similar monitoring structure will be set up at the state level as well for providing guidance to the mission.

²⁷ National Mission on Enhanced Energy Efficiency, Government of India, Accessed: <http://www.indiaenvironmentportal.org.in/files/NMEEE.pdf>, 21 July 2010

²⁸ National mission for sustaining the Himalayan eco-system, Department of Science & Technology Ministry of Science & Technology, Government of India, Accessed: http://www.dst.gov.in/scientific-programme/NMSHE_June_2010.pdf, 21 July 2010.

²⁹ National Water Mission, Ministry of Water Resources, Government of India, April 2009, p-23

³⁰ National Mission for Green India: National Consultations, Ministry of Environment and Forests, Government of India, February 2010, p-20

(vi) National Mission on Sustainable Habitat: Institutional Mechanism for Monitoring and Evaluation

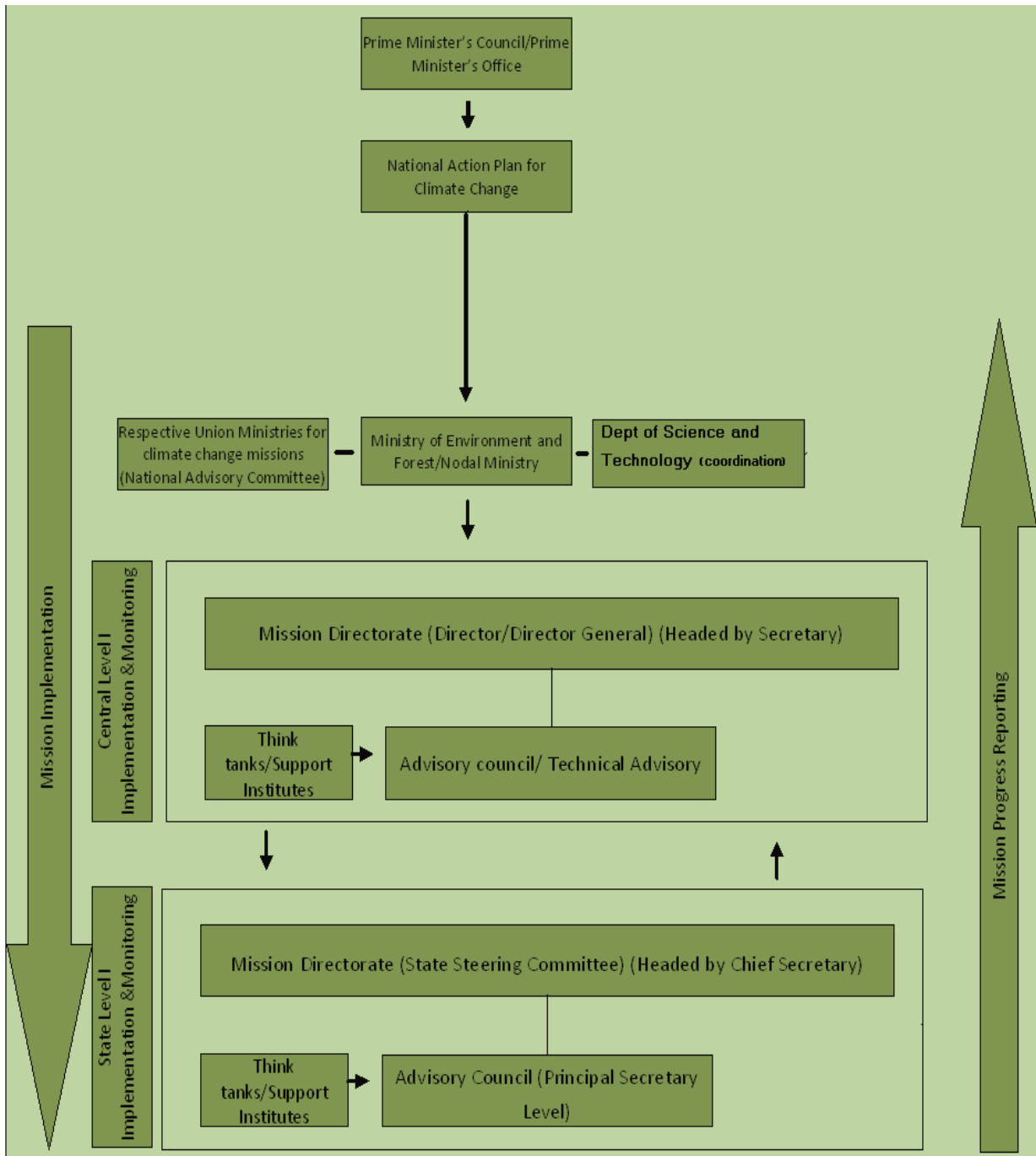
The national mission for sustainable habitat proposed to be headed by an inter-ministerial group (IMG) chaired by the Secretary of Union Ministry for Urban Development. The IMG will be responsible for implementation, monitoring and review of the planned actions under the mission. A state level Apex Coordination Committee will be responsible for the mission implementation and review at the state level. There will also be district level committees which will be key body for implementation and capacity building. While the mission implementation and review process will be in tune with the similar set up of other missions, the involvement of district level bodies will give way for greater decentralization of mission plans.

(vii) National Mission on Strategic Knowledge for Climate Change

In order to implement the various mission elements and activities indicated in the project proposal, a dedicated programme office with adequate supporting and supervising scientific and technical staff is essential for coordination with nodal officers of various partnering agencies and departments. The national strategic knowledge mission while promoting the network of various knowledge institutions to ensure data sharing and cooperation will also play a coordinating role among various missions. According to the mission, there will be four elements such as (a) monitoring mechanism that would report to Prime Minister about the progress of the mission, (b) an approval mechanism which coordinates among the sub-missions and verifies the progress, (c) a mission director who will be responsible for the overall deliverables of the mission and (d) a Coordination Mechanism through a Coordination Cell in DST headed by a Mission Director with two mirror sites in Ministry of Environment and Forestry and Ministry of Earth Sciences. The overall structure and institutional framework of the mission will be similar to that of other missions.

The figure below presents a schematic representation of the common institutional structure of the mission monitoring and evaluation. The overall institutional structure for monitoring and evaluation of the missions are similar. While majority of the mitigation actions will be coordinated among the union and state ministries and affiliated agencies, some missions such as Mission on Sustaining Himalayan Ecosystem will require coordination of the Ministry of External affairs which will primarily oversee the necessary cross border cooperation on the required actions from neighbouring countries.

Figure 3. Potential Institutional Framework for Monitoring and Evaluation of Mitigation Actions



Source: Various National Missions

5.3.2. Second National Communication (SNC) and Indian Network for Climate Change Assessment (INCCA)

First national communication, known as Initial National Communication (INC) to the UNFCCC was submitted in 2004 and now the Second National Communication (SNC) is being prepared under the direction of Ministry of Environment & Forests. This is aimed at major periodic inventory & assessment exercise for reporting to the UNFCCC. The NATCOM process now renamed as Indian National Network for Climate Change Assessment (INCCA), is important as a stock-taking exercise and for meeting our obligations under the UNFCCC, draws from, and depends on, the wide base of knowledge institutions and networks.³¹ Currently, 127 institutions are working on different aspects of climate change in India under the network³² which are involved in climate change assessment, providing recommendations to the government and planning for effective mitigation efforts. The key function of INCCA will be to 1) Assess the drivers and implications of climate change through scientific research, 2) Prepare climate change assessments once every two years (GHG estimations and impacts of climate change, associated vulnerabilities and adaptation), 3) Develop decision support systems and 4) Build capacity towards management of climate change related risks and opportunities.³³ To a great extent this network will be one of the key instruments in keeping track of the mitigation actions and giving appropriate feedback to the government on the progress.

The NATCOM reports will undergo a multi level scrutinising before getting finalised. According to experts, the data regarding emission at various sectors and the level of mitigation implementation will be collected which will be subjected to intensive quality check by various agencies including the institutions in the network. The data in the report will also be compared to various other data sources including the IPCC estimates. The NATCOM report will also be subjected to domestic peer reviewing and examination by various ministries responsible for different sectors under study. A final submission of the report to UNFCCC will be done only after a cabinet approval.

While these efforts are made at national levels, it is difficult to point out distinct monitoring measures associated with specific mitigation actions. However, as key elements of climate change mitigation plans the Indian government has given importance to various actions in the areas of Water Resources, Agriculture, Natural Ecosystems and Forestry, Sea Level and Coastal Zones, Human Health and Energy. There have been institutional arrangements for assessing the impacts, vulnerability and adaptation relating to these sectors. Various institutions working in the above mentioned areas are part of the INCCA network.

(i) Green House Gas Emissions Assessment and Measurement in Key Sectors

In May 2010, India published the report on Green House Gas emission, which looks at the emission assessment and information collection from the key sectors in the country. The total GHG emission in the country in 2007 was 1721.71 million tons of CO₂ equivalents of which about 1221.76 million tons was CO₂. The emission share of various sectors such as Energy, Industry, Agriculture, and Waste sectors constituted 58%, 22%, 17% and 3% of the net CO₂ eq respectively.³⁴ The GHG inventory making process in the country is dependent on the methodology used in estimating the emissions from various emitting sectors in the country. Currently three types of methodologies have been used in various sectors to estimate the GHG emission which are as follows.³⁵ Tier I methodology uses emission factors sourced from IPCC publications for estimation of carbon emission. Tier II approach has been used for estimating emission from electricity generation, road transportation, agricultural soils, industrial waste water and municipal solid waste. These estimates have been made using relatively detailed data on type of vehicles and country specific emission factors for some of their components. On the other hand Tier III estimations have been data intensive and emission factors mentioned are very closely representing the emission per unit of activity. The data collection has been done to a large extent by extensive survey conducted at the sources.

³¹ National Mission on Strategic Knowledge for Climate Change, p-5, Accessed 12/Aug/2010: http://www.dst.gov.in/scientific-programme/NMSKCC_July_2010.pdf

³² India: Greenhouse Gas Emissions 2007, Ministry of Environment and Forests, Government of India, p-2

³³ India: Greenhouse Gas Emissions 2007, Ministry of Environment and Forests, Government of India, p-4.

³⁴ India: Green House Gas Emissions, Ministry of Environment and Forests, Government of India, May, 2010, p-1.

³⁵ India: Green House Gas Emissions, Ministry of Environment and Forests, Government of India, May, 2010, p-52

5.4. Challenges to Implementation of Mitigation Actions

The climate change mitigation actions in India face various challenges at the policy formulation, development and implementation stages. The challenges at the policy formulation level are mostly due to the overriding priority given to traditional issues in the developmental context such as poverty. Moreover, the perception on the historic responsibility of Annex I parties and the increasing pressure on the developing countries to cut down the energy related emissions adversely contributed to the pace of coordinating the domestic climate change agenda with international efforts. This is primarily due to the general perception that the epicentre of climate change debate has been moving from developed countries to developing countries in the recent years and there is a deliberate attempt from the Annex I parties to press for more commitments from developing world. To some extent, the United States' stance towards climate change negotiations, and its position regarding developing countries like India and China are shaping the perception in India. Often this perception influenced the approach of India towards international climate change, leading to some level of resistance against any pressure of Annex I countries.

5.4.1. Concerns about International Negotiation on MRV and Key arguments from India

There are major concerns continue to exist about MRV of the climate change mitigation actions in India as in other developing countries. India maintains that the voluntary actions of developing countries should, under no circumstances, be seen as taking on internationally legally binding commitments. The mitigation actions should be in conformity with national development priorities and in the context of sustainable development and poverty eradication.³⁶ The country also asserts that unsupported NAMAs in developing countries will be subject only to domestic MRVs and a regime of MRV or international consultation and analysis for developing countries should be accompanied by a similar compliance regime for enforcement of the commitments of Annex I countries. The MRV of Annex I commitments should apply to the degree, ambition and implementation of the emission reduction commitments.³⁷

It is difficult to assume that the international negotiation has gained the confidence in developing world, especially in the case of those in the Asian region. There have been widespread disagreements on the direction of the international negotiation on climate change among the Indian intelligentsia, whose arguments are largely based on common but differentiated responsibilities, and equity of carbon space and development space. Many perceive that the international debate and negotiation on MRV have been largely become developing world centric over the past few years. The Indian environment Minister Mr Jairam Ramesh has mentioned at the 7th MEF (Major Economic Forum) meeting held in Rome early 2010, that Para 4 of the [Copenhagen] Accord enjoins the CoP to develop appropriate guidelines for MRV of actions of developed country parties. This is important to recall and stress since the entire focus in the MRV debate over the past year has been developing country mitigation actions.³⁸ While the Copenhagen brings forth four key points relating to MRV, Indian Minister has provided ways to operationalise the process for the developing countries.

³⁶ India's submissions to the United Nations Framework Convention on Climate Change, Government of India, August 2009, p- 18,

³⁷ Submission of India to AWG-LCA, Organization and Methods of Work in 2010, <http://moef.nic.in/downloads/public-information/india-awglca.pdf>

³⁸ Statement of Mr Jairam Ramesh, Minister of Environment and Forests, Government of India, at the 7th MEF meeting, Rome, 30 June 2010.

Table 6. India's Perception of MRV Operationalising

Key Points on MRV in Copenhagen Accord (Para 5)	India's Perception on operationalising MRV
<ol style="list-style-type: none"> 1. Mitigation actions of non-Annex I Parties to be communicated through NATCOM (Article 12.1(b)), every two years. 2. Mitigation actions taken by Non-Annex I Parties will be subject to their domestic measurement, reporting and verification (DMRV); the result will be reported through NATCOMs. 3. Non-Annex I Parties will communicate information on the implementation of their actions (NAMAs) through NATCOMs, with provisions for international consultations and analysis under clearly defined guidelines that will ensure that national sovereignty is respected. 4. NAMAs seeking international support will be recorded in a registry along with relevant technology, finance and capacity building support. They will be subject to international measurement, reporting and verification in accordance with guidelines adopted by CoP. 	<ol style="list-style-type: none"> 1. International consultations and analysis must be based on country implementation reports (NATCOM) so as to "respect the national sovereignty" 2. The frequency of international consultations and analysis can be similar to the graded system adopted by the WTO trade policy reviews —countries get reviewed depending on share of world trade. 3. There has to be a multilateral anchor for the international consultations and analysis process and the Subsidiary Body on Implementation (SBI) of the UNFCCC should be responsible for this task.

Source: Statement of Mr Jairam Ramesh, Minister of Environment and Forests, Government of India, at the 7th MEF meeting, Rome, 30 June 2010.

The key point highlighted by India is that the domestic mitigation measures only be subjected to domestic MRV. A stronger position of India has been expressed by the government on the issue of equity of carbon space. According to the environment Minister Mr Ramesh, MRV must include a determination of an allocative principle and an equitable allocation of carbon space and is particularly relevant in the context of the adequacy of actions of developed countries.³⁹ The argument on the issue of equity is based on the perception that carbon space is development space and therefore [countries] need to agree on an appropriate methodology to determine carbon space that has been used up and that can be used in the future.⁴⁰

5.4.2. Challenges to Mitigation Policy Development and Implementation

The democratic political nature of the country and the practice of subjecting national policies to domestic discussion and debate have significant role in the policy development. Unlike China where the centre decides and implements without taking into consideration the democratic decision, the policy development face a much slower pace in India. With the multi party system in the country the governments at the centre have always been sensitive to the demands of various political sections. There have been instances where certain political sections have campaigned against the central government policies as the submission of national interest to international pressure. One of most recent example was the recent India-US Civil nuclear cooperation agreement, during which the communist party which was the then ruling coalition pulled out their support as a protest against agreement. Though the international climate change negotiation has not been viewed as critical as the nuclear energy cooperation agreement, the concerns about the persisting gap between developed world and developing world have always influenced the domestic debate on climate change. Among the academia and intelligentsia in the country, issues regarding poverty, threats to national security and economic development have often gained greater importance than climate change debate.

³⁹ Statement of Mr Jairam Ramesh, Minister of Environment and Forests, Government of India, at the 7th MEF meeting, Rome, 30 June 2010.

⁴⁰ Statement of Mr Jairam Ramesh, Minister of Environment and Forests, Government of India, at the 7th MEF meeting, Rome, 30 June 2010.

Most significant challenges to climate change mitigation process in the country was due to the lack of an already existing institutional infrastructure for collecting data and information. This has often contributed to inefficient data collection and data verification. This points to the fact that there needs to be greater thrust on the data collection and verification to ensure that clean and reliable data is available for developing strategies and policies. The formation of INCCA and the network of various key institutions specialising on the climate related aspects will help achieve this target in the years to come.

The Centre-State relation is one of the other major factors influencing the climate change mitigation policies in the country. Though the state governments are mandated to formulate appropriate state specific mitigation actions only very few has developed plans for mitigation actions. Among the 28 states and 7 union territories, so far Pondicherry and Chandigarh, Haryana, Orissa, Delhi, Karnataka, Uttaranchal and Himachal Pradesh have developed action plans for climate change mitigation. While the plan is largely in tune with the NAPCC, the states have focused on specific areas that are applicable to the specific region. The capital, New Delhi proposed to have six action plans such as energy efficiency, sustainable habitat, green India, water mission, strategic knowledge and solar mission. The major actions planned for Chandigarh, a Union Territory, is Green India which aims at promoting the green coverage in the state while the major action plans recognised for the state of Haryana is Agricultural mission. There are detailed climate plans from some of the states such as Orissa where the agriculture often suffers from severe damage caused extreme weather conditions. The action plans for other states are currently being developed according to the priorities of the areas where attention need to be paid as part of addressing climate change issues. The relations between the political leadership in centre and that in the state will be a determining factor in the development and implementation of the state level mitigation actions as well as coordinating with the national level policies.

5.5. Conclusions

The domestic mitigation actions in India are voluntary measures which are not supported by any international financing. The country neither has any mitigation measures registered in the UNFCCC registry nor any credited NAMAs. This is primarily because the fact that NAMAs for financial support or the credited NAMAs could naturally be considered for international MRV measures while the domestic NAMAs require only domestic measurement and verification. However, in future international funding might play a potential role as some of the mission plans such as solar mission indicated the potential usage of the international funds for the implementation of the solar energy targets. While voluntary measures towards mitigation actions within India have been gaining momentum significantly over the past few years, there is a visible reluctance from the government in making any major commitments at the international platform, which may affect the developmental targets. To a certain extent this can be attributed to the growing concerns among the political, academic and research circles about the international climate negotiation. Three factors have played a significant role in shaping India's concern about the direction of climate change negotiation. First, the perception that the epicentre of the climate change negotiation in the world has been largely shifted from the developed world to the developing world, leading to increasing pressure on the developing economies to take policies that could be detrimental to the development goals. Second, the concern about the adherence of the some of the developed world parties to Kyoto Protocol and the subsequent international agreements. Third, domestically developing countries need to have a significant level of economic growth to meet the long term economic targets towards raising the living standards of its people and poverty alleviation. While the climate policy in the country has been fast evolving, there are many areas which still need greater attention from the policy makers to have significant impact on mitigation efforts.

Despite these concerns, India has adopted various measures towards climate change mitigation. The climate change related strategies and financial planning done through various FYPs, exclusive measures towards addressing climate change related issues taken under the National Action Plan for Climate Change, plans for post-Copenhagen actions are the key elements in the climate policy that would guide the country in making significant steps towards mitigation. While these mitigation actions are more or less in place it is important to note that the monitoring and evaluation of these actions are largely fragmented. There is a

need for a well structured institutional as well as policy mechanism to ensure that these actions are measurable, reportable and verifiable. The proposed institutional structure of the missions and the measurement and evaluation of the progress are important steps towards this.

