

Shaping the Climate Change Agenda in India: *Nationally Appropriate Mitigation Actions (NAMA) and Measurement, Reporting and Verification (MRV)*

Nandakumar Janardhanan¹

December 2010

Abstract:

As the largest developing country with about one sixth of global population and as a leading economy in South Asia, India has a key role in addressing the climate change issues. The country's growing fossil fuel consumption and increasing carbon emission are key factors that necessitate considerable efforts towards climate change mitigation. The various Five Year Plans and the specific actions prescribed under the National Action Plan for Climate Change formed subsequent to the Bali Action Plan gives significant importance to the domestic mitigation actions in the country. The country has developed national missions for addressing climate change concerns; measurement, reporting and verification (MRV) mechanisms apart from various policies that promote energy efficiency and energy conservation. All these developments indicate that despite the domestic contentions regarding certain aspects of international climate change debate especially the international consultation and analyses and recommendations for international MRV, India has been taking various steps domestically towards addressing the climate change concerns. Some of the innovative mechanisms promoted by the country for energy conservation and energy efficiency, and the domestic MRV measures proposed indicate that India has been paying significant attention towards developing an efficient climate change policy. The paper 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.

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

¹ Policy Researcher, Climate Change Group, Institute for Global Environmental Strategies. Author can be reached at janardhanan@iges.or.jp

Table of Contents

1.	INTRODUCTION.....	4
2.	INDIA’S DOMESTIC ACTIONS TOWARDS CLIMATE CHANGE MITIGATION.....	5
2.1.	CLIMATE CHANGE POLICY MAKING IN INDIA: INSTITUTIONAL STRUCTURE	6
2.2.	CLIMATE CHANGE MITIGATION ACTIONS UNDER FYP IN INDIA	6
2.3.	NATIONAL ACTION PLANS ON CLIMATE CHANGE (NAPCC).....	8
2.3.1	<i>National Solar Mission</i>	<i>8</i>
2.3.2	<i>National Mission for Enhanced Energy Efficiency].....</i>	<i>8</i>
2.3.3	<i>National Mission on Sustainable Habitat</i>	<i>8</i>
2.3.4	<i>National Water Mission</i>	<i>9</i>
2.3.5	<i>National Mission for Sustaining the Himalayan Ecosystem</i>	<i>9</i>
2.3.6	<i>National Mission for a Green India</i>	<i>9</i>
2.3.7	<i>National Mission for Sustainable Agriculture</i>	<i>9</i>
2.3.8	<i>National Mission on Strategic Knowledge</i>	<i>9</i>
2.4.	POST COPENHAGEN DOMESTIC ACTIONS	9
2.4.1.	<i>Implementation of Mitigation Actions in Energy Sector</i>	<i>12</i>
2.4.2.	<i>Implementation of Mitigation Actions in Industrial Sector.....</i>	<i>12</i>
2.4.3.	<i>Implementation of Actions in Agricultural Sector.....</i>	<i>12</i>
2.4.4.	<i>Implementation of Mitigation Actions in Forestry Sector</i>	<i>13</i>
2.5.	NEW MEASURES TO PROMOTE ENERGY EFFICIENCY AND ENERGY CONSERVATION	13
2.5.1.	<i>‘Perform, Achieve and Achieve’ (PAT).....</i>	<i>13</i>
2.5.2.	<i>Renewable Energy Certificates.....</i>	<i>15</i>
2.5.3.	<i>CDM Program of Activity</i>	<i>16</i>
3.	MRV: INDIA’S PERCEPTION AND APPROACH TO INTERNATIONAL NEGOTIATION	16
3.1.	MEASUREMENT, REPORTING AND VERIFICATION OF MITIGATION ACTIONS IN INDIA	16
3.1.1.	<i>National Solar Mission: Institutional Mechanism for Monitoring and Evaluation.....</i>	<i>18</i>
3.1.2.	<i>Enhanced Energy Efficiency Mission: Institutional Mechanism for Monitoring and Evaluation ...</i>	<i>19</i>
3.1.3.	<i>National Mission on Sustaining Himalayan Ecosystem: Institutional Mechanism for Monitoring and Evaluation</i>	<i>19</i>
3.1.4.	<i>National Water Mission: Institutional Mechanism for Monitoring and Evaluation</i>	<i>19</i>
3.1.5.	<i>National Mission on Green India: Institutional Mechanism for Monitoring and Evaluation</i>	<i>20</i>
3.1.6.	<i>National Mission on Sustainable Habitat: Institutional Mechanism for Monitoring and Evaluation ..</i>	<i>20</i>
3.1.7.	<i>National Mission on Strategic Knowledge for Climate Change.....</i>	<i>20</i>
3.2.	SECOND NATIONAL COMMUNICATION (SNC) AND INDIAN NETWORK FOR CLIMATE CHANGE ASSESSMENT (INCCA).....	22
3.2.1.	<i>Green House Gas Emissions Assessment and Measurement in Key Sectors.....</i>	<i>22</i>
4.	CHALLENGES TO IMPLEMENTATION OF MITIGATION ACTIONS	23
4.1.	CONCERNS ABOUT INTERNATIONAL NEGOTIATION ON MRV AND KEY ARGUMENTS FROM INDIA	23
4.2.	CHALLENGES TO MITIGATION POLICY DEVELOPMENT AND IMPLEMENTATION	24
5.	CONCLUSIONS	25

List of Tables

Table 1: Key Components of Climate Change Policy	6
Table 2: Impact and Implications of Climate Change, Observations in Eleventh Five Year Plan	7
Table 3: Post Copenhagen Climate Mitigation Actions in India.....	10
Table 4: Recent 24 actions taken by the Government of India towards climate change mitigation efforts	11
Table 5: Climate Change Data Sources and Reporting Agencies in India	17
Table 6: India's Perception of MRV Operationalising	24

List of Figures

Figure 1: Perform, Achieve and Trade (PAT) Mechanism.....	14
Figure 2: Perform, Achieve and Trade (PAT) Mechanism.....	15
Figure 3: Institutional Framework for Monitoring and Evaluation of Mitigation Actions	21

List of Abbreviations

BAU	Business as Usual	IREDA	Indian Renewable Energy Development Agency
BEE	Bureau of Energy Efficiency	KWh	Kilowatt Hour
CO ₂ eq	Carbon dioxide equivalent	MRV	Measurement, Reporting and Verification
FYP	Five Year Plan	Mt	Million Metric Tons
GEF	Global Environment Facility	NAMA	Nationally Appropriate Mitigation Action
GHG	Green House Gas	NAPCC	National Action Plan for Climate Change
ICEF	India Canada Environment Facility	NATCOM	National Communications to UNFCCC
INCCA	Indian Network of Climate Change Assessment	NMEEE	National Mission on Enhanced Energy Efficiency

1. Introduction

The Nationally Appropriate Mitigation Actions after being formally introduced by the Bali Action Plan² 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. Nationally appropriate mitigation actions (NAMA) are voluntary measures towards climate change mitigation adopted by countries. The broadest definition is that NAMAs should be the actions proposed by [developing] countries that significantly reduce emissions below business-as-usual (BAU) levels.³ 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.⁴

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. As the communications regarding mitigation action plans were done only recently, 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 to 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. Though India has been taking mitigation and adaptation measures in various key sectors in the country, streamlining of these actions have began only in the post-Bali period, with the formation of Prime Minister's Panel for National Action Plan for Climate Change (NAPCC). The NAPCC recommended mitigation actions in 8 key sectors in order to address the climate change issues. The mitigation 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 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, its institutional set-up. It examines the climate policy making in India and the 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. The paper also highlights the key challenges to the climate policy development which needs to be addressed by the country. The study

² Bali Action Plan,

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-2, Accessed:

<http://www.ccap.org/docs/fck/file/NAMA%20Paper%20July%2010%20Final%20draft%20for%20meeting.pdf>, 01 Aug 2010

⁴ 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%20draft%20for%20meeting.pdf>, 01 Aug 2010

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.

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 of for devising approaches, strategies and action plans for respond to the challenges.⁵ However, any major 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 county'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.*⁶ This target has been largely shaped by various policy measures such as Five Year Plans (FYP) and the NAPCC. As the economic growth at such magnitude 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 NAMAs India has adopted or has been considering 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. The India's Copenhagen pledge can be seen as a key mitigation action plan for the country. While the pledge 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 through consultation and review of mitigation actions and its progress. 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 measure towards mitigation actions, the measurement, reporting and verification of these actions will only be done by domestically planned mechanisms. Some Indian experts are of the view 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.

⁵ Climate change and India: Towards Preparation of a Comprehensive Climate Change Assessment, MoEF, Govt of India, October 2009, p-7

⁶ 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	International Review
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) (international consultation and analysis under clearly defined guidelines that ensures sovereignty is respected)</p>

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 past few FYPs. 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 Ministers Council on Climate Change gave significant momentum to the climate change agenda especially because of the involvement of Prime Minister and the key ministries. Experts also points out 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 Office (PMO), 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.

2.2. Climate Change Mitigation Actions under FYP in India

Environment and emission related action plans, though fragmented, have been present in the FYPs in the country. Some of these plans 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 1981.⁷ However, the 8th FYP did not contain any specific steps towards climate change mitigation efforts.

⁷ Eighth FYP, Planning Commission, Government of India

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. However 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 Gases (GHGs), bio-diversity loss etc. are largely due to the rapid industrialization of the developed nations.⁸ The tenth FYP (2002-2007) plan evinced significant progress in the government's perception and actions towards climate related issues. The government of India planned for more 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.⁹ 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. An outlay of Rs 5945 Crore (1.32 Billion USD) was fixed 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, Observations in 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

⁸ The Ninth FYP (1997-2002), Planning Commission, Government of India.

⁹ The Tenth FYP (2002-2007), Planning Commission, Government of India

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.

2.3.1 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 keeps a target of having 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.¹⁰ The aim would be to protect Government from subsidy exposure in case expected cost reduction does not materialize or is more rapid than expected.

2.3.2. 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 greenhouse gas 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).

2.3.3. 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.¹¹

¹⁰ 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

¹¹ India Environmental Portal, Accessed: <http://www.environmentportal.in/content/national-mission-sustainable-habitat>, 02 Aug 2010.

2.3.4. 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 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.¹²

2.3.5. National Mission for Sustaining the Himalayan Ecosystem

The mission on sustaining Himalayan ecosystem is aimed evolving measures for safeguarding Himalayan glaciers and mountain ecosystems. 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.

2.3.6. 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.

2.3.7. 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.

2.3.8. National Mission on Strategic Knowledge

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.

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 emission reduction targets in the country.

¹² National Water Mission (Under the NAPCC), Ministry of Water Resources, Government of India, April 2009.

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 in 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 are in final stages of preparation; some 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

2.4.1. 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 either consumers or part of the energy production and process. The national mission on solar energy will give focus on expanding the solar thermal power generation and solar photovoltaic power generation. These will be guided by the target of achieving a total installed capacity of 20,000 MW by the year 2022. Regarding the conventional energy sectors, various low carbon energy technologies have been promoted apart from the increased focus given on energy efficiency. The Bureau of Energy Efficiency in India sets standard on energy 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 energy sources which are responsible for carbon emission. The monitoring on solar energy 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 solar plants and the Ministry of renewable energy will make field evaluations for solar power generations.

2.4.2. Implementation of Mitigation Actions in Industrial Sector

One of the major goals of the enhanced energy efficiency mission is to improve the energy efficiency in industrial sector. Industry sector is one

of the largest energy consuming sectors in the country comprising large, medium, and small enterprises registered significant growth. The mitigation options in the industrial sector are grouped under 1) sector specific technological options, 2) cross-cutting technologies options and 3) fuel switching options. Under the Energy Conservation Act (2001), 9 energy intensive industrial sectors, i.e. thermal power stations, fertilizer, cement, iron and steel, chlor-alkali, aluminium, railways, textile and pulp and paper, are required to employ a certified energy manager, conduct energy audits periodically, and adhere to specific energy-consumption norms that may be prescribed.¹³

2.4.3. Implementation of Actions in Agricultural Sector

As agriculture sector is a vital sector to the country as it contributes to about 20 percent of the total GDP. The agricultural sector is given great importance in the national climate change actions plans with a proposal for mission for sustainable agriculture, primarily aimed at developing appropriate adaptation measures. This mission will focus on four areas crucial to agriculture in adapting to climate change namely dry land agriculture, risk management, access to information, and use of biotechnology.¹⁴ For in-depth study on the impact assessment, adaptation and mitigation in agricultural field the government of India launched a network of climate change and agriculture early this decade where more than 20 specialised institutes are involved in the network. The key institutions responsible for the mission will be the Department of Agriculture and Cooperation under the government of India. According to the National Policy for Farmers, the country will develop various plans for addressing the climate change adaptation measures. 'Based on simulation models, contingency plans and alternative land and water use strategies will be developed for each major agro-climatic zone. In drought and flood prone areas, experienced farmers would be trained as

¹³ National Action Plan on Climate Change, p-24

¹⁴ National Action Plan on Climate Change, p-35

“Climate Managers”, in the art of managing drought, flood and aberrant monsoons.’¹⁵

2.4.4. Implementation of Mitigation Actions in Forestry Sector

The forest cover in the country is capable of offsetting the complete emission from all residential and transport sectors together. Under the Green India mission India targets to increase the forest cover in the country from the current 23 percent to 33 percent. The Mission on Green India will be taken up on degraded forest land through direct action by communities, organized through Joint Forest Management Committees and guided by the Departments of Forest in state governments.¹⁶ The Ministry of Environment and Forests will be the key central ministry in charge of ensuring the mitigation actions in this sector.

2.5. New Measures to Promote Energy Efficiency and Energy Conservation

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 as market based mechanisms.

2.5.1. ‘Perform, Achieve and Achieve’ (PAT)

In order to tackle the major energy inefficiency in India the government has proposed various measures

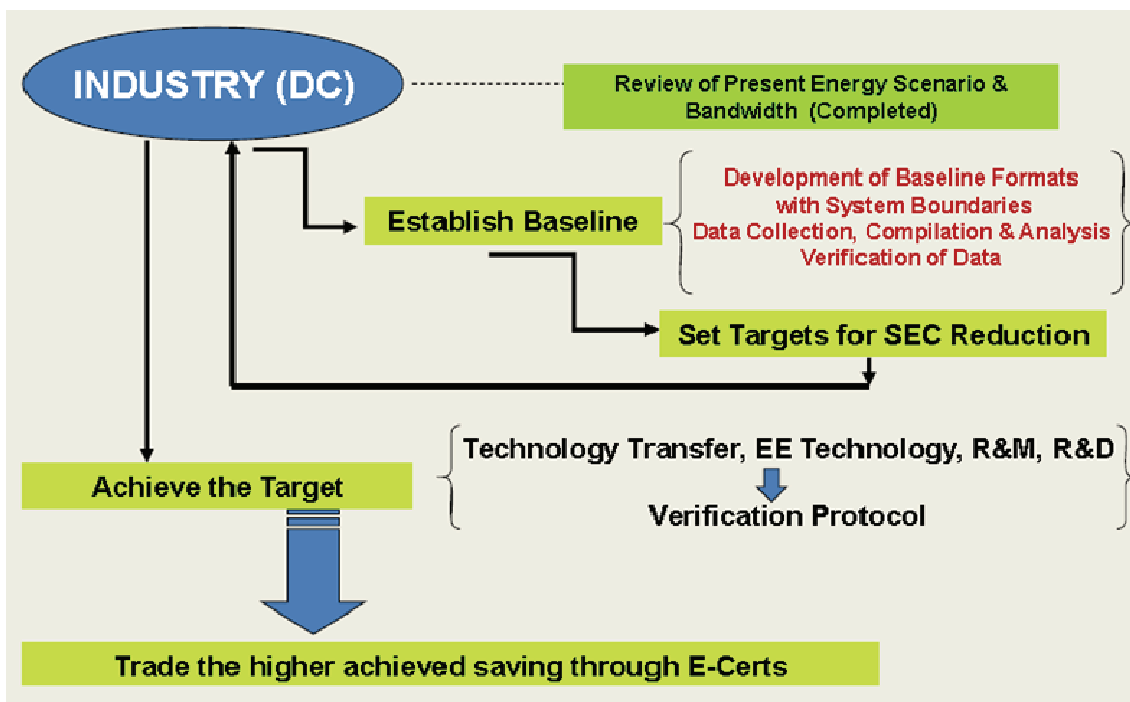
of which PAT and REC have been gaining significant momentum in the policy implementation. The PAT scheme, as specified under the post-Copenhagen actions, is a market-based mechanism to enhance energy efficiency of the ‘Designated Consumers’ (DC). The designated consumers have a wide bandwidth of specific energy consumption which is indicative of large energy-savings potential among these units. 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 Aluminum, 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 are 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 by 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 gives monetary benefit to an energy efficient industrial unit but also recognises its energy efficiency improvement. 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 would help cut down about 5 per cent of the total energy consumption by 2015. The Bureau of energy efficiency will announce the PAT scheme in December 2010 which is expected to be operational from April 2011.

¹⁵ National Policy for Farmers, Department of Agriculture and Cooperation, Government of India, Accessed:

<http://agricoop.nic.in/NPF/Draftplan.pdf>, 10 Aug 2010

¹⁶ National Action Plan on Climate Change, P-5

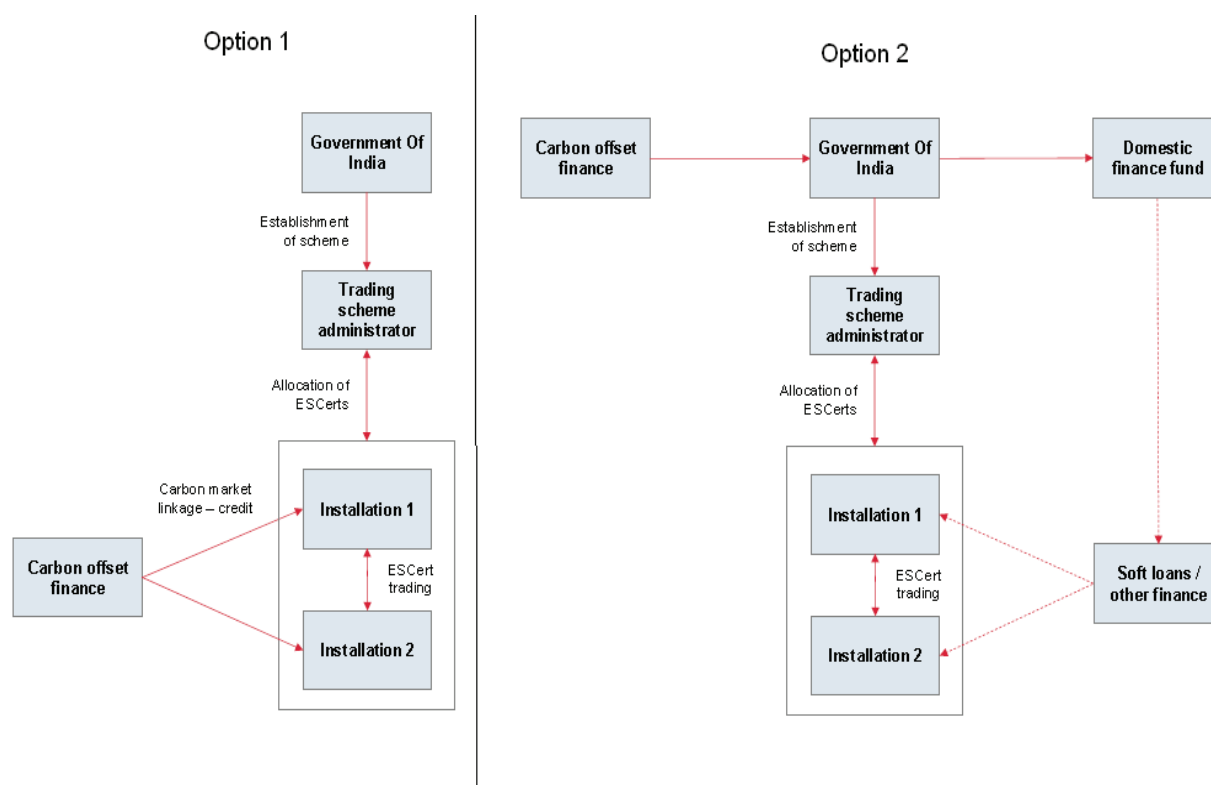
Figure 1. Perform, Achieve and Trade (PAT) Mechanism

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 to be a national scheme to contribute to the energy efficiency. Moreover, the energy consumption reduction targets under the PAT mechanism neither create any international obligations nor has any linkage to any international financial instrument for emission reductions. According to the Energy Efficiency Services Limited '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'.¹⁷ However, there have been various thoughts from industry experts about exploring options to tap the international finance options. The two prominent methods suggested by experts for making the international finance available to PAT scheme are: first, the international finance can be directly utilised for the trading the Ecerts and second, the use of carbon offset fund can help the domestic 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.

¹⁷ 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 proposed to be issued by the government), potential to tap international finance and incentive for enhancing energy efficiency.

2.5.2. 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 and facilitate renewable energy

purchase obligations amongst various stakeholders.¹⁸ 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 Commission (SERC) are obligated to purchase renewable energy to meet its Renewable Purchase Obligation target (RPO). Under the scheme a renewable generator may sell units of electricity fed to the grid as well as eligible for certificates for each MWh of electricity, which 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.

¹⁸ Renewable Energy Certificate Mechanism in India, ABPS Infrastructure Advisory Private Limited, Accessed, 20/09/2010: http://mnre.gov.in/pdf/MNRE_REC_Report.pdf

2.5.3. 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) in India has been registered successfully by the CDM-Executive Board on 29 April 2010.¹⁹ 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.²⁰

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

As per the Minister of Environment and Forests in India, *Measure Model and Monitor* will be the essence of sound policy towards environment. 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.

3.1. Measurement, Reporting and Verification 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'²¹ aimed at improving access to clean energy. Other key domestic MRV 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.²² 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.²³ 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

¹⁹ India's First CDM PoA (Bachat Lamp Yojana) registered, Accessed 02/07/2010: <http://moef.nic.in/downloads/public-information/bachat-lamp-yojana.pdf>

²⁰ India's First CDM PoA (Bachat Lamp Yojana) registered, Accessed 02/07/2010: <http://moef.nic.in/downloads/public-information/bachat-lamp-yojana.pdf>

²¹ 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

²² 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

²³ News on National Green Tribunal Act, 2010, Accessed: <http://www.indiaenvironmentportal.org.in/content/the-national-green-tribunal-act-2010>, 24 June 2010

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.²⁴

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

²⁴ National Action Plan on Climate Change, p-6

The monitoring and evaluation of the mitigation actions in the country are done by several institutions working in various sectors. 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.²⁵ Various ministries such as Ministry of Power, 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.'²⁶

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 among various ministries. The mitigation actions will be

monitored at regular intervals by committees which are chaired by the ministers of the key ministry 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.

3.1.1. 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.²⁷ As per the mission 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:²⁸

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,

²⁵ 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

²⁶ 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

²⁷ 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.

²⁸ 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

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.

3.1.2. 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.²⁹

3.1.3. 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:³⁰

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.

3.1.4. 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.³¹ 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

²⁹ National Mission on Enhanced Energy Efficiency, Government of India, Accessed: <http://www.indiaenvironmentportal.org.in/files/NMEEE.pdf>, 21 July 2010

³⁰ 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.

³¹ National Water Mission, Ministry of Water Resources, Government of India, April 2009, p-23

will be a part of the state level climate change committee.

3.1.5. 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.³² A similar monitoring structure will be set up at the state level as well for providing guidance to the mission.

3.1.6. 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.

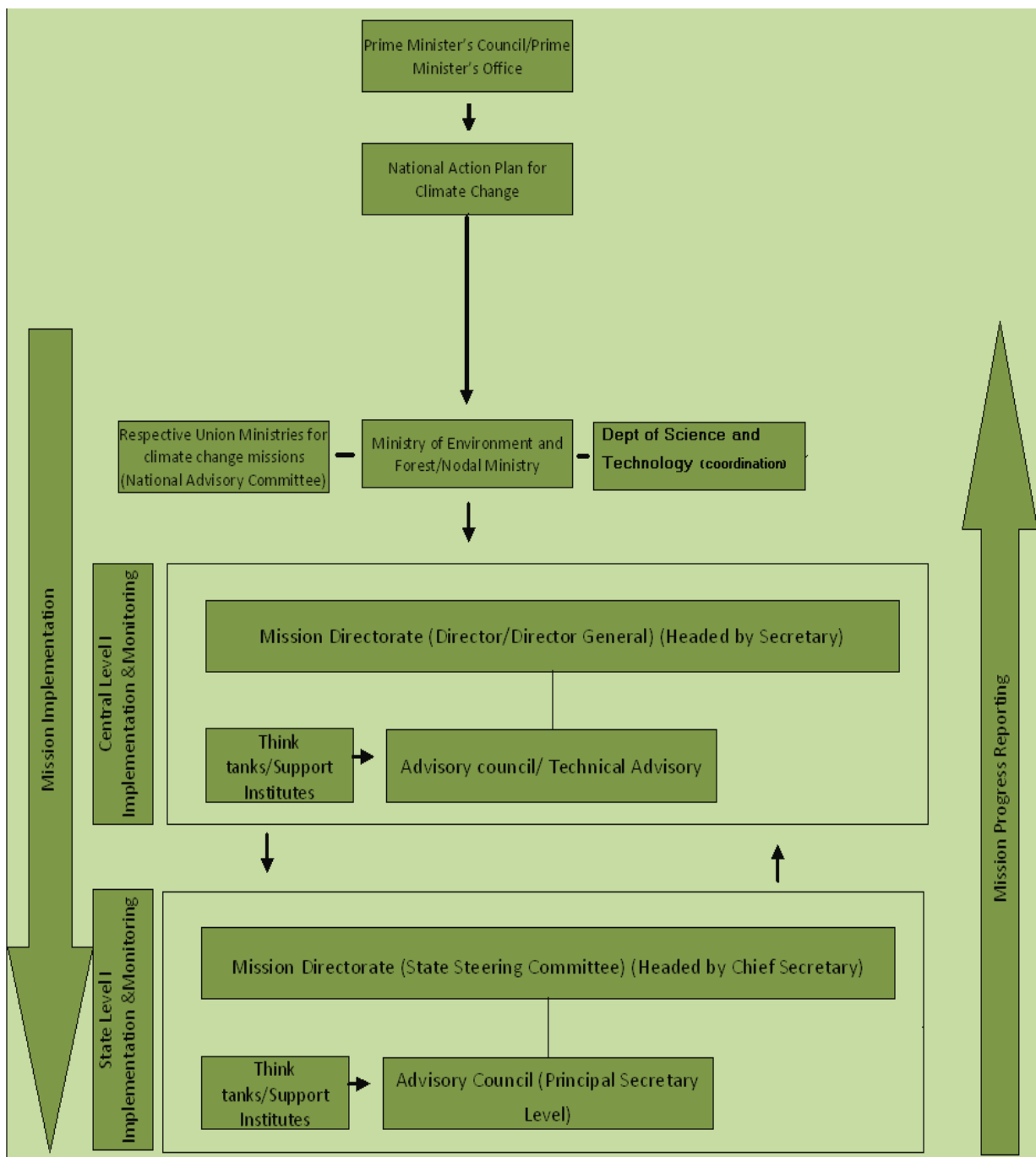
3.1.7. National Mission on Strategic Knowledge for Climate Change

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. The mission will primarily have 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.

³² National Mission for Green India: National Consultations, Ministry of Environment and Forests, Government of India, February 2010, p-20

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



Source: Various National Missions

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.³³ Currently, 127 institutions are working on different aspects of climate change in India under forms the network³⁴ which is 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.³⁵ 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 MRV measures associated with specific mitigation actions. What is more prevalent about MRV is lack of a clear understanding on how the MRV should be conducted domestically. 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.

3.2.1. 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.³⁶ 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.³⁷ Tier I methodology uses emission

³³ 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

³⁴ India: Greenhouse Gas Emissions 2007, Ministry of Environment and Forecasts, Government of India, p-2

³⁵ India: Greenhouse Gas Emissions 2007, Ministry of Environment and Forecasts, Government of India, p-4.

³⁶ India: Green House Gas Emissions, Ministry of Environment and Forests, Government of India, May, 2010, p-1.

³⁷ India: Green House Gas Emissions, Ministry of Environment and Forests, Government of India, May, 2010, p-52

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. As of now, the type of methodologies used for 2007 GHG profile estimation include Tier I (21%), Tier II (67%), and Tier III (12%).

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 related to the perception of climate change negotiation in the world. 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. Often this perception influenced the approach of developing countries like India towards international climate change.

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.³⁸ The country also asserts that unsupported NAMAs in developing countries will be subject only to domestic MRVs. 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.³⁹

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 this year, 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.⁴⁰ While the Copenhagen brings forth four key points relating to MRV, Indian Minister has provided ways to operationalise the process for the developing countries.

³⁸ India's submissions to the United Nations Framework Convention on Climate Change, Government of India, August 2009, p- 18,

³⁹ Submission of India to AWG-LCA, Organisation and Methods of Work in 2010, <http://moef.nic.in/downloads/public-information/india-awglca.pdf>

⁴⁰ 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 and international consultation and Analysis can only be based on the NATCOM communications. 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.⁴¹ 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.⁴²

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 adversely affected the pace of the climate change policy development in the country. 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 enjoyed greater

⁴¹ Statement of Mr Jairam Ramesh, Minister of Environment and Forests, Government of India, at the 7th MEF meeting, Rome, 30 June 2010.

⁴² Statement of Mr Jairam Ramesh, Minister of Environment and Forests, Government of India, at the 7th MEF meeting, Rome, 30 June 2010.

importance than climate change debate.

Most significant challenges to climate change mitigation process in the country was due to the lack of 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 reliable data is available for developing strategies and policies.

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 plans 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. 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. To a certain extent this can be attributed to the growing concern 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 mission and the measurement and evaluation of the progress are important steps towards this. The second NATCOM report expected to be published later next year will bring a clearer picture of the various mitigation efforts and the associated MRV mechanism in the country.

CONTACT **Institute for Global Environmental Strategies**
2108-11 Kamiyamaguchi, Hayama, Kanagawa, Japan 240-0115
Tel: 81-46-855-3860 Fax: 81-46-855-3809
URL: <http://www.iges.or.jp>
Email: janardhanan@iges.or.jp