

# A Discussion Paper On India's Intended Nationally Determined Contributions (INDCs)

A Civil Society Perspective

July 2015 | New Delhi, India







**A Discussion Paper On India's  
Intended Nationally  
Determined Contributions (INDCs)**  
A Civil Society Perspective

**July 2015 | New Delhi, India**

**Publisher:** GreenWorks Consulting and Indian Network on Ethics & Climate Change, INECC



**Authors:** Kamlesh Kumar Pathak, Mrinmoy Chattaraj & Ajita Tiwari Padhi

**Co-authors:** Gargi Sharma, Meera Sankaran

**Edited By:** Ajita Tiwari Padhi, National Facilitator, INECC

**Copyright:** GreenWorks Consulting & Indian Network on Ethics & Climate Change (INECC) 2015

**Design:** Kailash Kumar (kkcreative86@gmail.com)

**Disclaimer:** This report is intended as a basis for key discussions in the area of Intended Nationally Determined Contribution (INDCs). While every effort has been made to ensure the correctness of data/information used in this report, neither the authors nor GreenWorks Consulting and Indian Network on Ethics & Climate Change (INECC) accept any legal liability for the accuracy or inferences drawn from the material contained therein or for any consequences arising from the use of this material. No part of this report may be disseminated or reproduced in any form (electronic or mechanical) without prior permission from or intimation to GreenWorks Consulting and Indian Network on Ethics & Climate Change (INECC) Permission and information may be sought at [info@greenworks.co.in](mailto:info@greenworks.co.in) and [inecc1996@gmail.com](mailto:inecc1996@gmail.com).

**The full report should be referenced as follows:** A Discussion Paper on India's Intended Nationally Determined Contributions (INDCs) - a Civil Society Perspective: Text from this report can be quoted provided the source and authors are acknowledged.

This study has been supported by MISEREOR, Germany.

# Contents

Foreword .....	05
Executive Summary .....	07
<b>Chapter 1</b> : Introduction.....	11
<b>Chapter 2</b> : Scope of the INDC for India.....	13
<b>Chapter 3</b> : National Priorities and Opportunities for Transitioning to an Equitable Low Carbon Pathway .....	15
<b>Chapter 4</b> : Towards an Ambitious, Inclusive and Equitable INDC for India.....	19
<b>Chapter 5</b> : The Planning Process-Top Down or Bottoms-Up? .....	23
<b>Chapter 6</b> : Need for Equity Indicators.....	27
<b>Chapter 7</b> : Elements of India's INDC .....	31
<b>Chapter 8</b> : Adaptation .....	41
<b>Chapter 9</b> : Climate Finance .....	49
Conclusion .....	55
<b>List of Tables Main Report</b>	
<b>Table 1:</b> Possible Areas of Enhancement measures in India .....	21
<b>Table 2:</b> Equity Assessment for India, Stockholm Environment Institute, SEI .....	29
<b>Table 3:</b> NAPCC mission objective, Targets and Projected Emission Reduction .....	35

<b>Table 4:</b> Life and Monetary loss and Damages from Disaster occurrence (2012-2014), India	46
<b>Table 5:</b> Statement showing State-wise details of damage due to Cyclone/ flash floods/ floods / landslides/ cloudburst etc. during 2014-15	47
<b>Table 6:</b> Status of memoranda received from the State Governments seeking additional Central assistance from National Disaster Response Fund (NDRF) during 2014-15	51
<b>Table 7:</b> Budget Under National Action plan on Climate Change	52

### List of Tables in Annexure

<b>Table 1:</b> Change in Generation of Fuel mix (Projected 2030)	57
<b>Table 2:</b> Renewable Electricity Generation in India in 2030 in BU	57
<b>Table 3:</b> State-wise Actual Gross Fiscal Deficit, Gross State Domestic Product, Fiscal Deficit @ 4% and state-wise per cent distribution of RE procurement	58
<b>Table 4:</b> Transportation plan of India, 2030	59

### List of Figures

<b>Figure 1:</b> Contributions of Enhanced Reduction measures per sector for India	24
--	----

### List of Figures in Annex

Proposed MRV feasible options for India	60
---	----

# Foreword

Countries across the globe have committed to create a new international climate agreement by the conclusion of Conference of the Parties (COP21), United Nations Framework Convention on Climate Change (UNFCCC) in Paris in December 2015. In preparation, countries have agreed to publicly outline what is known as their Intended Nationally Determined Contributions (INDCs) post-2020. The INDCs will largely determine whether the world achieves an ambitious 2015 agreement and is put on a path toward a low-carbon, climate-resilient future.

So far 40 countries have submitted their INDCs. India is yet to submit its INDC.

This discussion paper entitled “A Discussion Paper on India’s Intended Nationally Determined Contributions (INDCs) - A Civil Society Perspective” has been a joint collaboration between INECC, Laya Resource Centre and GreenWorks Consulting. The purpose is to create an opportunity for informed discourses on INDCs among civil society. It gives background information and presents a perspective for the development of INDCs for India. The paper makes an attempt to discuss the various aspects and elements towards developing an Ambitious, Comprehensive, Equitable and Balanced INDC for India, aligned with sustainable development goals of the country and contributing to a climate resilient future for the nation.

Since INDCs are nationally determined they offer a huge opportunity for India to facilitate a paradigm shift that would be in line with sustainable development imperatives. More specifically, the paper advocates the need for adoption of domestic legislation on adaptation to support climate vulnerable communities and seriously consider the loss and damage component in the light of a series of extreme events. Further, it calls upon India to develop its own equity indicators that expresses the principles of the convention internationally, while also responding to the equity issue nationally. On the Climate Finance front, where the global landscape is ambiguous and complex, it suggests that India should overcome barriers to access and leverage national and international funds created for intensive adaptation actions at the grass roots.

We hope that this paper will feed into the discussions of CSOs and other interested groups working on issues of sustainable development and climate change, particularly in view of the global efforts that are going into the development of indicators for Sustainable Development Goals (SDGs).

**Dr. Nafisa Goga D’Souza**  
Executive Director, LAYA





# Executive Summary

## Background and Context

Climate change is a global challenge posing varied consequences to all nations of the world and the gravity of the challenge has only been intensified in last few years with research proving the 'Limited Time' and 'Limited Carbon' space available for the world to contain global temperature within 2 degrees Celsius. The international community during COP 17 in Durban agreed on negotiating a comprehensive climate regime by 2015. Subsequent to it, for the first time in the history of climate negotiations, an ex-ante process was launched at COP 19 in Warsaw which showcased the intention to bind together all the nations to build an effective long term path to prevent the dangerous climate change. Thus, all Parties to the Convention were invited to prepare a 'intended nationally determined contribution' (INDC) for the period post-2020 by the first quarter of 2015, giving adequate time for scrutiny before 2020. The main aim of INDCs is to enable the preview of aggregate effect of contributions from all Parties and thereby assess if such contributions are adequate to limit global average temperature rise to 2 degree Celsius. The role of INDC holds potential for a clear concise and committed movement towards a climate resilient future.

Through the Lima Call for Action, the Conference of the Parties agreed that the information to be provided by Parties communicating their intended nationally determined contributions, in order to facilitate clarity, transparency and understanding, may include, the following:

- Quantifiable information on: reference point
- Time frames and/or periods for implementation
- Scope and coverage
- Planning processes

Assumptions and methodological approaches including those for estimating and accounting for anthropogenic greenhouse gas emissions and how the Party considers that its intended nationally determined contribution is fair and ambitious, in light of its national circumstances, and contributes towards achieving the objective of the Convention as set out in its Article 2.

Globally, there has been a lot of curiosity around India's INDC Post the US – China Climate deal. However India does not consider itself to fall in the league of large emitters as its emissions per capita is about 30% of that of China and 13% of that of the US.

## Purpose of the Discussion Paper

The purpose of this paper is to discuss the various aspects and elements towards developing an Ambitious, Comprehensive, Equitable and Balanced INDC for India, one which should be built upon national priorities, development trajectory, socio-economic challenges, inclusivity, projected long-term economic growth and related GHG emissions.

## INDC Framing-Perspective

Set in the above context, the national priorities that should be in the foreground while framing the INDC should factor in - energy access, balancing import, reducing inequality and inequity, reducing inflation, water security, food-security, poverty reduction. With large number of ecosystem dependent communities, it is also be among the most vulnerable countries from the impacts of climate change. Overall, India has to think of a pathway that is transformational- which brings the marginalized majority into to the fold of real development which is sustainable and climate resilient in

the long run. This we propose should be the perspective around which the INDCs should be anchored.

The INDC perspective should identify key parameters for assessing the progress of socio economic development of the poor and marginalized. Robust adaptation measures should be more focused for socio economic development in the major poor states and poorer communities of the country. Mitigation plans for India should be tailored in a way that creates employment for its vastly unemployed youth, bringing about an equitable income distribution. This could play a vital role in reducing poverty and bringing about development.

A robust INDC for India could be one that aligns with national priorities, addresses the urgent development requirements of the country, which integrates policies already addressing these requirements, which works out how can these policies be strengthened by incorporating GHG emissions reductions, which is fair and equitable in national context without undermining the fairness and equitability in an international context and that which is in line with the new regime nationally and new climate regime internationally.

For developing countries like ours future commitment will also be determined by the nature and extent of financial support, capacity building, and other support that would be provided by developed countries.

## Scope, Coverage and Approach to INDC

The paper discusses the scope and coverage of gases and sectors and elements of mitigation, adaptation, loss and damage and climate finance. We suggest that the coverage of gases and sectoral scope to be included in the INDC should be drawn from its National Communications. The main factor in having common sectoral scope and coverage is that it helps to set baseline, benchmark and a comparability criteria.

Further, it is felt that the base year for INDC should be the year for which the latest national GHG emissions are available and the target year should be 2030. Although peaking year concept is not aligned with India's position, yet it is felt that a target year of highest emissions and highest development in business as usual could provide strategic direction for an ambitious roadmap towards achieving maximum

low carbon transition for that specific year or its immediate future years.

It is very likely that after the service sector, it is the industry sector which will become a major contributor to the development profile of India. With the new government's push for manufacturing, the emissions for India is likely to shoot up.

Although globally India's emissions are much lower as compared to nations such as China, yet, the future rate of growth in emissions may be significantly more for India than China. This underscores the need for India for an adequate carbon space to accommodate its emissions. Thus, while formulating the INDC, it should be kept in consideration that the INDC is coherent with the development targets of India, its relative emission intensity and its space in global carbon budget.

India should decide upon the type of modeling approach which needs to be followed and executed in their INDC communications to mitigate climate change. There are two types of approaches which can be followed- the top-down approach or bottom-up approach. A bottom-up approach is more suitable for India and can be built upon already existing studies. The Report on Low Carbon Strategy shows that through strict adherence to low carbon transition, a possible reduction of 42 percent over 2007 levels by 2030 is achievable in a LCIG (Low Carbon Inclusive Growth) scenario. This possibility can be analysed and further enhanced to a higher reduction say 50% through backcasting methodology. The concept of backcasting is central to a strategic approach to planning for sustainable development and innovation. The report<sup>1</sup> on low carbon society in Japan provides insight to using the same approach for India which rides in the term of sustainable development.

Further a need for equity that properly expresses the principles of CBDR-RC is of utmost importance. As long as there are natural limits, there needs to be a fair distribution of benefits and costs within societies, between nations and between present and future generations. Clarifying these equity indicators is now a top priority than ever before. As per experts, a greater agreement on equity would certainly be a game changer for the entire Climate negotiation process. Agreement on convention-based equity indicators,

<sup>1</sup> A roadmap towards a low-carbon society in Japan using backcasting methodology: Feasible pathways for achieving and 80% reduction in CO<sub>2</sub> emissions by 2050-Ashina et.al.

in particular, would enable real comparability of the efforts, and thus a regime in which free riders can be clearly identified.

The equity that India talks about at international levels in relation to the climate debate calls upon the country to practice the same principles at home. Therefore irrespective of global equity, an Indian response to Climate Crisis has to be situated in the context of the national inequity and justice framework within our country.

## Elements of India's INDC

Elements of India's INDC should include all key pillars of mitigation, adaptation, Loss and damage finance, technology transfer and capacity building. These elements could be drawn from numerous plans/policies/schemes to seek a potential/promising transition pathway.

## Mitigation

Mitigation under INDC should present a clear roadmap for a low carbon trajectory in order to achieve India's development priorities. The indicators for this would be those which link to the 1.5 and 2 deg temperature targets which should also help in identifying existing mitigation gap.

For this, the articulation of the following is suggested- Projected emission pathway with clear emission milestone:

- GHG emission budgets
- Indicative global emissions pathways (including peaks years) that conform to those budgets.

The major mitigation elements that can be integrated are- NAPCC, NAMAs, Low Carbon Strategy, existing national policies, plans and schemes which can be strengthened with quantified emission reductions secured with a transparent MRV system. The detailed paper illustrates how programs of the government can be integrated, for example- Smart cities, Smart grid, Waste-NAMA, Swachh Bharat Abhiyan, BRTS & MRTS and anti-black carbon scheme may be incorporated along with already existing ECBC in the National Mission on Sustainable Habitat. Each of these programs except Swachh Bharat Abhiyan, can be quantified in terms of emission reductions and

brought under an MRV system in order to enhance the effectiveness and efficient implementation of these programs from a Climate perspective. The second major element that the INDC should take up next to mitigation is Adaptation.

## Adaptation

India's climate response will be grossly inadequate without serious consideration of Adaptation to climate change. Though it is difficult to identify specific indicators for adaptation as any given temperature target could imply a certain level of global impacts, and thus a need for global adaptation. Therefore, one must look at it from a global mitigation point of view. As it clearly relates to mitigation ambition – the lower the global level of ambition, the greater the adaptation need.

Moreover, adaptation need will tend to accrue to communities that are lower in capability and higher in development need. Given this, the future climate regime must support higher levels of ambition, while accounting for adaptation need in a meaningful way.

While the government maintains that National Action Plan on Climate Change (NAPCC), State Action Plan on Climate Change (SAPCC), Union budgets and India's five-year plans have addressed adaptation, it is fairly obvious that ground level implementation and its progressive output is absent in even the most vulnerable regions and sectors. Some concerns that need to be addressed urgently are:

- Assessment of Adaptation Deficit Gap
- Identification and prioritizing Vulnerable ecosystems and communities
- Evaluation of current technologies for resilience building
- Development of adaptation strategies for each sector, and region
- Strengthening natural resource management practices from a climate perspective;
- Climate Education/ Capacity development Programme with diverse stakeholders
- Creating viable demonstrative models on adaptation
- Monitoring and Evaluation of adaptation actions and practices

This discussion paper identifies two existing missions that should be taken up for immediate manifestation of adaptation practices and results viz: National

Mission on Sustainable Agriculture (NMSA) and Green India Mission (GIM). The NMSA does not categorically distinguish between mitigation and adaptation actions but lays down interventions for achieving climate resilient agriculture. While climate resilient agriculture is the core objective of the mission, yet the mission has not defined adaptation parameters to achieve the same, resulting in inadequacy of the mission to address adaptation needs of the agriculture sector. Moreover, there has been criticism in the past about the mission being primarily mitigation focussed, techno-centric and market driven and failing to address farm ecology and farmers well-being. The focus of the mission seems to anchor on one stop BT solution and PPP in agriculture with minimal allocation to capacity building and results in overlooking the wellbeing of small and marginal farmers. Recommendations such as development of Resource Conservation Technologies and Conservation Agriculture practices, valuing and integrating indigenous technical knowledge of men and women farmers, etc. have been made in the past and are discussed in the paper. Similarly, there have been concerns regarding counter-productivity of GIM and apprehensions regarding increased land grabbing, violation of people's rights, environmental destruction, loss of common lands and livelihoods based on them, probability of industrial monocultures, commoditization of forests, conversion of areas such as pastures, grazing areas and other common lands. Such concerns regarding GIM may be eliminated by focusing on the adaptation component of vulnerable communities GIM should thus strengthen its adaptation component such that it builds resilience of the forest ecosystem and community therein.

## Loss and Damage

Another critical aspect that is mostly overlooked but is increasingly getting significance in the context of climate change is that of loss and damage. India has witnessed many instances of extremes of temperature, rainfall in recent years, the intensity and frequency of such weather-induced climate hazard's going much beyond the adaptation threshold of communities and societies. India faces huge losses due to climate change-induced disasters, so much so that the expenses on adaptation amounted to 6 per cent of the country's GDP in 2014. India still has been unable to put together its Loss and damage numbers from several small and big disasters (from across all areas and intensities). Though Government of India has a process - of enlisting disaster event and to calculate relief and

compensation measure, but the method, tools and mechanisms are not systematic. Additionally, the data is not readily available in the public domain. Some numbers that have been provided in this discussion paper have been sourced from several other public domain. Thus, this element needs to be factored into the making of an Indian INDC, else the long term vision of resilient development will be far-fetched. The current mechanisms for dealing and coping with disasters in India are not yet sufficient or capable to deal with future impacts. Furthermore, India will have to update its legal and policy frameworks and procedures. The country will also need to introduce new measures to assess and address loss and damage associated with climate change and disaster risks in order to protect the lives and well-being of those most vulnerable. It is in the interest of the nation if GOI, works with various stakeholders to create a comprehensive mechanism on loss & damage. The state-wise loss and damage cost incurred and funds allotted for natural disasters may provide input to increasing/ regulating the budget of the adaptation fund and requesting international support for enhancing the fund. India will need to have a candid discussion about the possible mechanisms for structuring the response to loss and damage internationally, both in the short term and as part of the post-2020 climate regime that is to be negotiated at Paris in 2015. A strategy for availing international support to some percentage of loss and damage due to climate change hazards should be aspired in the INDC.

## Conclusion

Although the INDC is compliance to the Convention, yet it can act as one big umbrella to develop a national framework for sustainable development in India. While it may seem that the implementation of INDC will be an added weight for developing countries, yet it may in fact be a boon in disguise. The idea of an INDC could rather be transformative in an Indian context. A smart strategic way for a robust INDC lies in coupling it with ongoing development priorities and SDGs of the country. INDCs could be treated as vehicle for countries to define their goals/targets for mitigation and adaptation with the overarching goal of sustainable development. It can then be expected for India to be able to achieve significant climatic as well as non-climate domestic benefits (co-benefits) through INDC development and implementation.

# Introduction

## The Climate Urgency

Climate change is a global challenge posing varied consequences to all nations of the world; whether for the developed countries to sustain their development, for developing countries to achieve their requisite economic growth or for least developing island countries to save their existence.

And the gravity of the challenge has only been intensified in last few years with research proving the 'Limited Time' and 'Limited Carbon' space available for the world to contain global temperature within 2 degrees Celsius. The changes have already started appearing in form of extreme weather events and natural calamities. And this change is increasing exponentially through lack of action in tackling the problem.

India, with a population over 1.2 billion in 2015, is facing highly complex economic and social challenges. Further, because of its ecosystem dependent communities it will also be among the most severely hit countries from the impacts of climate change. In light of this reality, its development imperatives, its rising contribution to global greenhouse gas emissions, and its roadmap to achieve resilience to climate change are the key parameters vital for India in responding urgently to the crisis. The upcoming CoP at Paris where a new climate architecture is expected to be rolled out, is therefore crucial from this perspective.

## The INDC story so far - A macro Perspective

The international community during COP 17 in Durban agreed on negotiating a comprehensive climate

regime by 2015. Subsequent to it, for the first time in the history of climate negotiations, an ex-ante process was launched at COP 19 in Warsaw which showcased the intention to bind together all the nations to build an effective long term path to prevent the dangerous climate change.

At the Warsaw conference all the parties and observers delineated the necessity of an individual country specific national communications (Intended Nationally Determined Contributions (INDCs)) to build a transparent and a strong Agreement which should be practically enforceable; which yields on ground reduction in Temperature below 2 degree celsius and also mutually benefiting the developing nations macroeconomic indicators like GDP and achievement of the Millennium Development Goals (MDG)/SDGs.

Thus, all Parties to the Convention were invited to prepare their 'Intended Nationally Determined Contribution' (INDC) for the period post-2020 by the first quarter of 2015, giving adequate time for scrutiny before 2020.

Communication of INDCs will help the Convention/ climate community to preview the aggregate effect of contributions from all Parties and thereby assess if such contributions are adequate to limit global average temperature rise to 2 degree Celsius<sup>2</sup>. *The role of INDC thus fulfills this need of a clear concise and committed movement towards a climate resilient future.*

There is intense global curiosity on what India's INDC would be like. After China and the US, India is the

<sup>2</sup> Source: A discussion paper on the links between INDCs, NAMAs and LEDS by the GIZ TUEWAS NAMA Working Group in collaboration with the UNEP DTU Partnership First Draft for Consultation.

world's third largest emitter of greenhouse gases (GHG) – though its emissions per head are 30% of that in China and 13% of that in the US. COP 20 at LIMA, showed the world for the first time on what was expected as a comprehensive INDC. Although the 'Lima call for Action' delineates the point of information, yet INDC has immense scope for being custom-made through a country's own requirements. These are for example:

- Individual national circumstances
- Development trajectory
- Socio-economic challenges
- Projected long-term economic growth and related GHG emissions

## Purpose of the Discussion Paper

The purpose of this paper is to discuss the various aspects and elements towards developing an

Ambitious, Comprehensive, Equitable and Balanced INDC for India; an INDC, which is aligned with the development goals of the country and contributing to a climate resilient future for the nation.

The paper aspires to provide key inputs into the development of India's final INDC. The paper explores some of these vital aspects and provides an overview of the projected greenhouse gas emissions in India upto 2030. It also attempts to identify the key elements under adaptation needs for India. It also explores some of the national priorities for India and identifies the urgent development requirements of the country from a climate lens, and suggests integration of policies addressing these requirements.

***Overall the study is an attempt to capture the essence on how India's INDC should bridge the existing gap within the country - which is fair and equitable in national context without undermining the fairness and equitability in an international context.***

# Scope of the INDC for India

“Transparency and clarification of post-2020 contributions is one of the main levers to encourage greater ambition and accountability in the 2015 Agreement.”

**T**hough the new agreement is applicable to all Parties, there is an inherent understanding it does not imply that national commitments are similar for all countries. Each country take mitigation actions in accordance with the principle of equity as well as common but differentiated responsibility and respective capability (CBDR&RC).

The new agreement may have commitments that can range from quantified absolute economy-wide targets (compulsory for developed countries) to GHG intensity reduction targets or deviation from BAU (for developing countries with higher capability and responsibility) to other types of commitments, such as policy targets, RE/EE targets for developing countries with lower capability and responsibility.

Countries could also submit more than one target, including several of the above mentioned to allow for realistic targets and more ambitious voluntary ones as well as short-term and long-term targets.

The new climate agreement precisely delineates from the post 2020 activities and proposes to be decided upon in 2015. Bearing the signs of being a binding agreement to all Parties to and to the Convention.

Therefore, one can conclude from the above scope that declared INDC by countries has the potential to be converted to the Nationally Determined Contribution (INDC) of the same country.

## What does this Mean for India?

**Mahatma Gandhi the father of the nation in 1928 had once said;** “God forbid that India should ever take to industrialisation after the manner of the West. The economic imperialism of a single tiny island kingdom (England) is today keeping the world in chains. If an entire nation of 300 million took to similar economic exploitation, it would strip the world bare like locusts.”

**Similarly, Ramachandra Guha, one of India’s prominent historians, once commenting on the issue of social justice and sustainability had said;** “In the West, the environmental movement had arisen chiefly out of a desire to protect endangered animal species and natural habitats. In India, however, it arose out of the imperative of human survival. This was an environmentalism of the poor, which married the concern of social justice on the one hand with sustainability on the other.”

Much over the last six decades since India’s independence, the development trajectory of the country has resulted in skewed development without due consideration to equitable growth, environmental integrity and soundness.

This is quite evident from history of wide spectrum of natural resource conflicts in the 1970s and 1980s — conflicts over forests, fish, and pasture; conflicts about the siting of large dams; conflicts about the social and environmental impacts of unregulated mining.

In all these cases, the pressures of urban and industrial development had deprived local communities of access to the resources necessary to their own livelihood and crucial for their survival. Meeting the unmet needs of these populations demands a pathway away from the mainstream.

Based on such past experience, providing billions of aspiring people a quality living standard by 2030, will undoubtedly challenge India's predominant capacity and ability to change, innovate, manage the system while restoring those natural assets on which all life depends.

Further it will challenge India's ability on how it marries modern science with sustainability. On how it seeks to design, and implement, forest, energy, water and transport policies that would augment economic productivity and human welfare without causing environmental stress? One can conclude from this, that India needs to develop its own unique pattern of development, which is quite unlike the western economies.

Considering this fact, it is in favor of India to give concrete targets which are already in vision documents/planning stage. This will not only be a concerted move towards achieving those targets in national development interest but also in complying to emission reduction targets that may become mandatory under the new binding agreement.

## **Approach to Development in the Current Indian Context**

The current Indian government has an ambitious and aggressive agenda of development with several schemes and plans launched just within one year of coming to power.

Schemes such as 100 smart cities are expected to change the demographic and lifestyle pattern of many and will result in more urbanization more consumerism and rise in overall GDP.

According to Price Waterhouse Coopers (PWC) report <sup>3</sup>, there are three possible scenarios for India's economic growth:

- "Pushing old ways faster"
- "Turbocharging investment" and
- "Winning Leap"

According to the report India stands on the cusp of major change: a transformation that could lead to unprecedented economic growth paired with radical improvements in the nation's Human Development Index (HDI). The "Pushing old ways faster" scenario focuses on investment in education, health and other dimensions related to human capital and leads to a 6.6 per cent CAGR in GDP between now and 2034. While the scenario 'Turbocharging investment' outlines the impact of rapid and significant investment in physical infrastructure and envisions a 7 per cent CAGR for GDP leading up to 2034.

The third scenario envisages 9 per cent GDP growth rate and states that it will require require new solutions and concerted effort—from businesses, entrepreneurs, investors, and government leaders. This being the most aggressive growth scenario.

It is important to note that there are several roadblocks to building up India's physical capital which include -water scarcity, insufficient food, energy security, disasters and climate change. Although climate change risk is difficult to mitigate, businesses, insurance companies and government leaders should factor it into their decisions regarding long-term investments in Winning Leap solutions. An integration of these Climate risks into development plans by stakeholders could go a long way in delivering a robust Indian INDC.

Under the existing scenario the GOI, has asked the 'Niti Ayog' (earlier the Planning Commission) to come up with National Development Goals (NDG). However, one can question as to what extent these development goals will consider climate concerns or a low carbon development pathway.



# National Priorities and Opportunities for Transitioning to an Equitable Low Carbon Pathway

India is undergoing rapid development and transformation. Several analysis seem to indicate that the transformation underway has a significant potential to generate much higher per capita income for India.

Furthermore, the IMF has forecasted that India will become a US \$2 trillion economy this year, and will surpass the US \$3 trillion boundary by 2019<sup>4</sup>.

In this context, it is of utmost significance, that India allows for a paradigm that fosters growth alongside equitable and climate resilient development. For instance, India still needs to light up nearly **300 million** households which are without access to basic electricity, address issues of sanitation, water, literacy, health services, housing, mobility etc. This would require even more services, more buildings, roads and infrastructure, all of which will increase emissions.

Overall, India has to think of a pathway that is transformational-which brings the marginalized majority into the fold of real development which is Sustainable in the long run. This offers India, important opportunities and significant challenges to build a better, inclusive low-carbon societies and a low carbon economy.

Set in this context the national priorities that should be in the foreground while framing the INDC are:

## Energy Access

Energy access is considered to trigger development. Despite India being the fourth-largest energy

consumer in the world in, it still has **300 million** without access to it a number equivalent to the entire population of the U.S.A. A recent report by Council of Energy, Environment and Water CEEW states that even by 2030, a good 30 % of India's poor population would find energy 'unaffordable'. This is to be understood in perspective. A bulk of its power generation comes from coal-based set ups. These power plants account for over 60 per cent of the total carbon emissions from India. Yet about 45% of households do not have access to electricity. Further, only 11% use more than 100 units per month and around 75% are still dependent on biomass cooking fuel.

Hitherto, India's per capita energy consumption is around one third of world's average per capita energy consumption the year 2012, India's per capita primary energy consumption was 32 Quadrillion BTU (EIA, June 2014), compared to world's per capita primary energy consumption stands one third of global average (EIA May 2014). According to the Information (EIA), US Energy information Administration, per capita energy consumption will grow at an average annual rate of 2.8 % per year through 2040 in India.

While it is true that India's energy emissions will have to grow it is also crucial that equity in use has to be assured.

Meeting the basic needs of access to its energy deprived populace whilst also addressing the growing concerns of climate change is a challenge for India. While enhancing energy access and energy supply are the key objectives of national development strategy, yet at the same time reducing energy intensity and enhancing energy efficiency are also key strategic areas that have been seriously emphasized upon since

<sup>4</sup> <http://www.india-briefing.com/news/balancing-climate-change-economic-growth-india-9275.html/#sthash.107VkpSe.dpuf>

recent past. However, this needs to have an 'emissions perspective' and should not be limited to energy savings only.

According to the ex Planning Commission, India's primary energy use is projected to expand to deliver a sustained GDP growth rate of 9 per cent through 2031-32 even after allowing for substantial reduction in energy intensity. In order to fuel this expected growth on a sustained basis, a growth of around 5.8 percent per year in terms of primary energy supply will be required. This does provide an opportunity for India to leapfrog and embark on a robust renewable energy framework.

## Balancing Import

India is one of the largest petroleum importers in the world. The country depends heavily on imported crude oil, mostly from the Middle East. The significant supply and demand gap poses considerable energy security concerns for India in this direction. Nevertheless, demand supply gap for the crude oil is increasing year on year. These imports contribute to the current account deficit that worries investors and governments.

Under BAU scenario, India used to import 76 per cent of the crude consumption in 2005-06; thereby the import share has increased to 84 per cent of total consumption in year 2012-13. Last financial year (2013-14) the net energy imports in India was recorded at 6.3 per cent of the GDP. In economic terms such trend is dangerous as it continues to be a threat for foreign direct and institutional investors. Making them reluctant to continue financing the current account deficit, and thus forcing India to draw down its foreign reserves.

Meanwhile under the current BAU scenario, there is lesser chance that India will be ever able to decrease its reliance on imported energy in the future. Oil import dependency, for example, is forecasted to grow another 10 percentage points to exceed 90 per cent by 2031<sup>5</sup>.

Therefore while making long term energy plans, it is in India's own interest to acknowledge and prioritise this

area by taking up reform measures in order to reduce import and encourage clean energy based alternatives.

## Reducing Inequity and Inequality

Carbon emissions increases with growing income (IBRD 1992; Holtz-Eakin & Selden 1995). One of the first IPCC assessments made a strong case for the correlation between carbon emissions and economic growth (measured in GDP) (IPCC 1992; IPCC 2007a)<sup>6</sup>.

This theory reflects more on countries like India, which is increasingly polarized and where a vast population still live below poverty line. With limited income, comes low purchasing power for basic lifeline services like electricity and food.

While India's poverty rate has declined since 1981, absolute poverty and income inequality have stayed roughly the same or increased.

Today, on the one hand India has an emerging middle class with high aspirations and living beyond its means on a speculative credit-based economy, and on the other hand the farmers are being pushed out as farming is becoming more difficult in the context of commercialization of the farming economy.

A large number of lower income populations therefore translate to large-scale inequality in the society where a certain percentage of people own majority of economic income in the country. The equity that India talks about at international levels in relation to the climate debate calls upon the country to practice the same principles at home. Any attempt in reducing this income inequality, could result in lowering overall per capita emissions.

Mitigation plans for India should be tailored in a way that creates employment for its vastly unemployed youth, bringing about an equitable income distribution. This could play a vital role in reducing poverty and bringing about development. India should not lose sight of this, while framing its INDCs.

5 <http://www.ft.com/intl/cms/s/0/c20792e2-1b84-11e3-b678-00144feab7de.html#axzz3cYJFMsDj>

6 Rennkamp, B, Moyo, A, Wills, W & Grottera, C 2012. Reducing inequality and poverty while mitigating climate change. MAPS Research Paper. Rio de Janeiro, Cape Town: LIMA/COPPE/UCT, MAPS.

## Reducing Inflation

The inflation rate in India was recorded at 5.25 per cent in March 2015. A much better state from where it was in 2012-15 (average 8.78 per cent). However, this fall is much credited to the dramatic fall in global oil prices.

Understanding of inflation therefore, in terms of energy import and climate change and overall transition to a low carbon economy, is an concept of significant national importance in terms of India's INDC. More so as it has potential to diminish purchasing power of people below poverty line making basic life service like electricity and food grains unaffordable for the poor. As per studies<sup>7</sup>, it shows that growth in inflation has direct impact on income inequality.

In 2013, the consumer price index replaced the wholesale price index (WPI) as a main measure of Inflation. In India, the most important category in the consumer price index is Food and beverages (45.86 per cent of total weight). Housing accounts for 10 per cent; Transport and communication for 8.6 per cent; Fuel and light for 6.84 per cent; Clothing and footwear for 6.5 per cent; Medical care for 5.9 per cent and education for 4.5 per cent.

Consumer price changes in India can be very volatile due to dependence on energy imports, the uncertain impact of monsoon rains on its large farm sector, difficulties transporting food items to market because of its poor roads and infrastructure and high fiscal deficit.

Rain and weather patterns in India have been extremely unpredictable over the past three to four years. The distribution tends to be erratic both geographically and temporally. This introduces intrinsic volatility in to the Consumer Price Index (CPI) base inflation numbers.

Thus, climate change impacts on agriculture will have high weightage on inflation in coming future.

## Water Security

Problems of water security will be more pronounced with the impacts of climate change. According to

Earth Security Index (ESI) 2014, India will suffer acute shortages of clean, safe water starting as early as 2025.

Due to imbalance in volume of water extraction and replenishment rate of groundwater, water table is being depleted at a faster rate, affecting water quality. This ultimately is leading to the consumption of more energy for pumping out the water from deeper water tables. However, what needs mention here is the fact that a significant quantum of this precious resource is pumped for meeting industrial requirement, at the cost of drinking water. In some larger Indian cities, water scarcity is already eroding the quality of daily life and wellbeing. Water availability is also hampering industrial growth, as evidenced by the shortage of water in power plants and other industrial facilities.

## Climate Sensitive Agriculture and Food Security

With an already large and growing population, food security is an intensifying concern in India. Low crop yields and concerns about the security of land tenure make it difficult for landowners to make sustainable investments in agriculture. Rapidly growing urbanization and industrialization are further increasing the demand for agricultural land to be used for non-farming activities such as development of urban housing or manufacturing facilities. Also, as a consequence of overuse of fertilizers, almost one-third of India's farmland has become overly concentrated with salt, and thus less productive. There is also a growing out-migration from agriculture as has been concluded from the recent census data. A recent report by UN body Food and Agriculture Organisation (FAO) titled 'The State of Food Insecurity in the World 2015' states that India is home to the highest number of hungry people in the world at 194 million.

Food production, security, and distribution as well as related areas of water management for agriculture therefore needs to be carefully considered in developing a food security plan.

Additionally, the vulnerability of the Indian agriculture system to climate change due to its heavy dependence on monsoon has already started

<sup>7</sup> Albanesi, S., Inflation and inequality. *Journal of Monetary Economics* (2006), doi:10.1016/j.jmoneco.2006.02.009

posing severe risk. The recent aberration events in north and central India being a case in point. India therefore needs a creative envisioning of climate resilient agriculture and food security system in the context of climate crisis.

## Poverty

People in India are afflicted with multi-dimensional poverty. They suffer from overlapping deprivations in education, health, living standards etc. The Human Development Index (HDI) India is ranked at 135 among 187 countries indicating the level of human development based on the above

mentioned indicators, with mostly African countries under it.

Although India has made substantial progress in dealing with poverty, yet according to the MDG India Country Report, India is yet to meet the target of eradication of extreme poverty and hunger.

Widening of gap between the rich and the poor is a stark picture of the Indian social scenario. The poor and marginalized are most vulnerable to climate change, whether it is because of the effects of climate change or the costs for mitigating the same. Thus abstract poverty should be factored in the making of Indian INDC.

# Towards an Ambitious, Inclusive and Equitable INDC for India

## Scope and Coverage of INDC

The coverage of gases and sectoral scope to be included in the INDC should be drawn from its National Communications. The main factor in having common sectoral scope and coverage is that it helps to set baseline, benchmark and a comparability criteria. Moreover, estimates of National GHG emissions available Communications could feed into the INDCs and would verifiable to a large extent.

Thus in future, reduction in emissions from a sector and parallel mitigation activities in that sector through INDC will lead to transparency and feasibility in estimation of progress.

Moreover, one major outcome of such an approach would entail streamlining the procedure of climate actions in India.

At a given time, there may be several activities in the country – by the government/ private/ PSU in India, sometimes in parallel, sometimes in conjuncture and sometimes in duplicity etc. This leads to a scattered disjoint approach towards resolving one issue. Bringing initiatives under one umbrella will be one big step towards securing future. A baby step to this may be developing an additional climate template and enforcing each sector/ industry to routinely provide inputs in this template and maintain record. While deciding on the scope and coverage of INDC, such a foresight should be one criteria, as the INDC will be implemented for a period of a decade or even more.

## Base Year, Target Year, Peaking Year

India's greenhouse gas inventory as submitted by the Government of India is available for the years 2000 (Second National Communication), 2007 (INCCA report on "India: Greenhouse Gas Emissions 2007") and latest to be the reporting year of first Biennial Update report (BUR) to the UNFCCC. (According to UNFCCC guidelines, the GHG inventory of BUR should be for the calendar year no more than four years prior to the date of submission or more recent years) thus giving latest available date for minute.

The INCCA report- 4x4 assessment projects climate scenarios and impacts for 2030s. The low carbon development study considers 2007 as base year and makes projections upto 2030. The WGIII contribution to the IPCC AR5 projects emission allowances in 2030 relative to 2010 emissions by effort-sharing category for mitigation scenarios reaching 430-480 ppm CO<sub>2</sub>e in 2100.

Considering the above facts, it is felt that the year of GHG inventory in India's first Biennial Update report should be considered as the base year for INDC and the target year should be 2030. The several reasons being:

- Biennial Update Report (BUR) will have the latest information available in terms of GHG emissions profile of the country and it will thus be a fit baseline and reference point to assess sectors and required activities under INDC.
- The target year if considered 2030 will be 3 decades from second national communication

and or at least two decades from last reporting of the INCCA study<sup>8</sup>.

- Considering a rapidly developing country as India, keeping base year and target year multiple decades apart will only incur additional burden of curtailing or limiting GHG emissions. This is also supportive of the fact that India has not yet made any declaration on a peaking year or peaking target.

Thus, the base year is best to be the year for which GHG emissions profile is available for the nearest past. The target year is best to be kept at the nearest future (in INDC case it is 2030) in the allowed time frame under the commitment phase

### Peaking Year

The peaking year target caught wide attention over the world when China announced its peaking of emissions in 2030, however the announcement was not adequate as China did not mention the level at which it will peak nor the cumulative impact on the global world pushing towards curtailing emissions to sustain 2°C. According to a report<sup>9</sup> India is in a different league than China and the “peaking year” is not seen as an important issue from an Indian perspective. It is not adequate too for India, as under current BAU scenario there is a dire need to delineate activities that swiftly stabilize GHG emissions to a significantly low level while at the same time pursue the sustainable development goals (SDG). However, a peaking year may provide some insight into correlating the speed of development and its other relative impacts.

India's current industrial growth comes at an increased use of coal, with more coal generation/usage now and in the probable future.

India is endowed with sizable coal resources that are yet to be commercially utilized. Considering the same, it is unlikely that India would accept deep emission cuts by a decade or so while bearing a colossal cost burden of low carbon technologies (which is anyway not forthcoming from the Annex 1 countries.) Nevertheless, it is always favourable for country's to peak early and attain development goals before severe carbon budget restrictions are imposed.

8 The inventory year of second national communication was 2000, thus it if taken as base year will be 3 decades back from 2030.

9. Energy Emission trends and policy landscape for India.

## Need for an Adequate Carbon Space for Development

Indian Government believes that is only through sustained rapid growth in coming years that India will be able to overcome its development deficits. It is very likely that apart from the service sector, it is the industry sector that will play a major role in defining the Indian development landscape in the near future. With the new government's ambitious plans to turn India into a global manufacturing hub, schemes are underway such as “Make In India” programme. Although globally India's contribution to global emissions are much lower as compared to nations such as China, yet, the future rate of growth in emissions may be significantly more for India than China. This underscores the need for an adequate carbon space.

*Thus, the INDC should be in coherence with the development targets of India, its relative emission intensity and its space in global carbon budget.*

A target year of highest emissions and highest development in BAU could thus provide some key input to an ambitious roadmap towards achieving maximum low carbon transition for that year or its immediate future years. An ambitious INDC will be one that assesses emissions due to development activities alleviated by stringent mitigation policies on a year to year basis, thereby contributing towards equitable development and securing stability of low carbon transition.

### A robust INDC will thus be one which is:

1. In consideration with national development goals across sectors.
2. Which maps the development priorities of the country from a peoples' perspective.
3. Which integrates policies already addressing development priorities from a Climate lens i.e integrates GHG emissions reduction perspective.
4. Which is fair and equitable in national context without undermining the fairness and equitability in an international context.
5. Which is in line with the National adaptation needs of the vulnerable regions and communities, while also respecting the SDG framework internationally.

**Table 1** Possible Areas of Enhancement Measures in India

Area	Access to renewable energy electricity	Transport efficiency	Efficiency of building envelope	Efficiency of appliances
Implications for the energy mix and greenhouse gas emissions	- Power sector has increasing share of emissions	- Roughly 10% share of total emissions	- Small share of energy consumption	- Increasing share of emissions
Mitigation potential and costs	- Significant renewable energy potential available, also for small-scale solar power	- Transport emissions can stabilize under sustainable scenario	- Potential to avoid lock-in inefficient structures	- Major source of potential in residential sector
Co-benefits	- Access to electricity for poor population	- Decreased oil import dependency - Reduced air pollution and air-quality-related mortality - Energy security through fuel saving - Reduce smog-related respiratory and visibility problems	- Increased quality of housing - Reduce air-quality-related mortality - Job growth	- Electricity saving
Importance on national level	- High suppressed demand - Access to energy a priority of government	- High expected growth rates of vehicle ownership - Fuel efficiency standard already discussed for 2016	- Little floor space currently], but expected to increase	- Adds to existing labeling system

**\*Main sources:** *Grantham Institute for climate change (2010), IRENA (2011b), Ernst & Young (2013), International Transport Forum (2010), Shukla (2013), ICCT (2014b), IEA (2012b;2013c); \*\* World Bank and Climate Works Foundation (2014).*





# The Planning Process - Top Down or Bottoms-Up?

UNFCCC ties equity with climate change mitigations. Equity stands as “Common but differentiated responsibilities and respective capabilities (CBDR-RC).” There are many legitimate views of what equity means in the context of the UNFCCC, reflecting sharp contrasts on how to share the burden and opportunities. Some countries explain “responsibilities,” as the historical responsibilities of the developed countries for their large contribution to greenhouse gases emissions as part of their development pathway

Other countries focus on “capabilities,” the capacity countries have now to deal with climate change, such as their economic growth (GDPs) financial health and technological resources to reduce domestic emissions or support adaptation research and related activities. Further, several options for “differentiation” have been suggested, including historical responsibility, levels of economic development, vulnerabilities and needs.

*“The current approach to equity has become a tug-of-war between countries that are reluctant to make greater climate change action commitments without assurances that others will also act.”*

The risk of climate change is largely a function of total cumulative GHGs in the atmosphere. IPCC AR5 has estimated that for temperature increase to remain below 2°C of pre-industrial levels the world can emit only about 2,900 Giga tonnes (Gt) of CO<sub>2</sub> from all sources from the industrial revolution till 2100.

Till 2011, the world has emitted 1,900 Gt of CO<sub>2</sub>, thus already consuming around two-thirds of this budget. This means that out of the budget of 2,900 Gt, only 1,000 Gt remains to be used between now and 2100.

India’s contribution to cumulative global CO<sub>2</sub> (1850-2011) was a meager 3 per cent as against 21 per cent by the USA and 18 per cent by the EU. The sustainability of the world economic system also needs to be analyzed through the lens of social justice and equity.

For developing countries, their future commitment will also be determined by what kind and level of financial, capacity building, and other support is provided by developed countries that have contributed most to cumulative global GHG emissions.

India should decide upon the type of modeling approach which needs to be followed and executed in their INDC communications to mitigate the climate change. There are two types of approaches which can be followed:

- Top-down approach, such as allocation of mitigation efforts based on equity indicators
- Bottoms-up approach, such as technology-based energy system modeling, this can also serve as complementary sources of information in understanding INDCs

## Top-down Approach

The equity-based, top-down approach could provide benchmarks guiding the assessment of each Party’s relative contribution to the global 2°C target in terms of equity and sufficiency. From this perspective, the regional effort-sharing ranges presented in the Working Group III Contribution to the 5th Assessment Report (AR5) of the Intergovernmental Panel on Climate Change would be even more

useful if they are disaggregated to the country level for major emitting countries.

While there are various formulas for effort-sharing, they are usually based on one or more of the following four basic indicators:

1. Responsibility (historical emissions)
2. Capability (capacity to pay for mitigation)
3. Equality (emission rights per person) and
4. Cost-effectiveness, of which the first three are explicitly equity principles

### Analysis

However, the major constraint of this approach is political unwillingness, considering the dubiousness of biggest emitters United States and China accepting any externally determined emission-cuts.

As for developing countries, an externally determined percentage of emission cut is not only unfair but also impractical. Rather the approach should be from the perspective of different nationally circumstances. The emphasis should be more on the need for development space and adaptation needs in developing economies.

For India the policy questions would involve the mitigation effort to ensure equity i.e what Should those responsible for high emission levels do in order to mitigate?

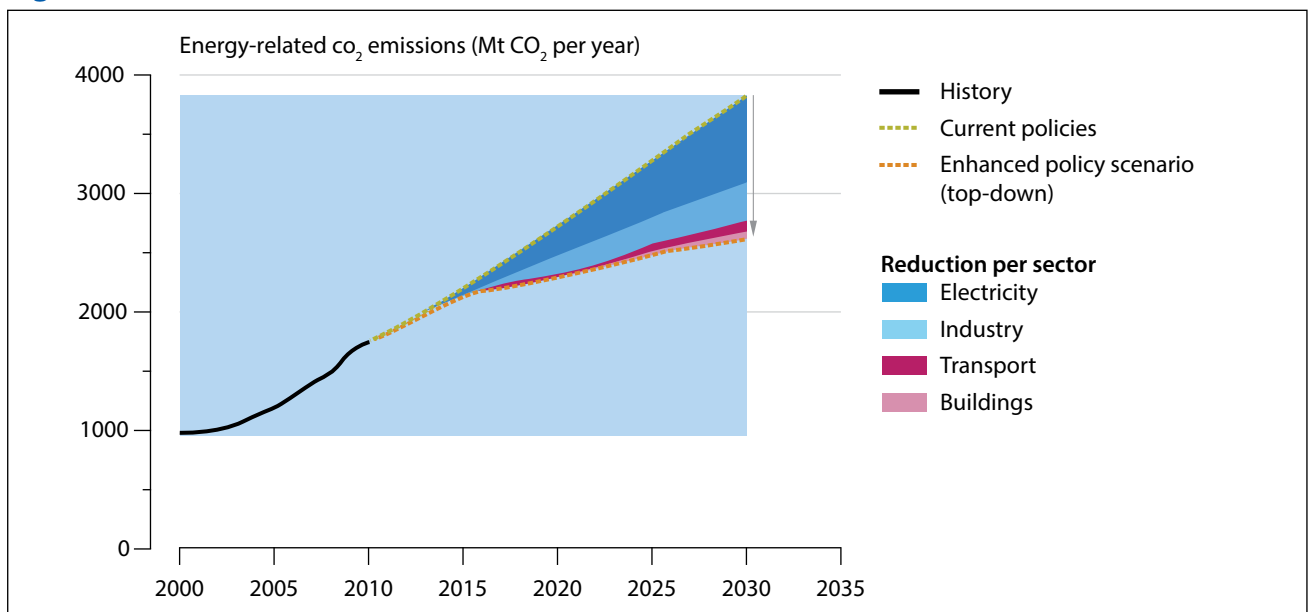
Thus although ambitious, the top-down approach is unlikely to achieve political consensus on criteria for defining how the principles of equity and CBDR&RC can be operationalized, as has been obvious over the last two-decades of international negotiations.

As per an independent analysis done by NEEAA<sup>10</sup> (Netherlands Environmental Assessment Agency). Enhanced mitigation measures under the current climate policies of the GOI, is likely to help achieve its pledge for 2020. Mostly with policies consisting of renewable energy targets and the market-based mechanism Perform Achieve and Trade (PAT) scheme for energy efficiency.

The analysis further explains that full implementation of the top-down mitigation measures could decrease

<sup>10</sup> PBL Netherlands Environmental Assessment Agency This report provides an overview of projected greenhouse gas emissions in 13 major emitting countries/regions (Australia, Brazil, Canada, China, European Union, India, Indonesia, Japan, Mexico, the Russian Federation, South Korea, Turkey, and the United States) up to 2030, taking into account the emission trajectories based on current and planned policies, and selected enhanced mitigation measures.

**Figure 1: Contribution of Enhanced Reduction Measures Per Sector for India.**



**Source:** PBL Timer Model  
Impact of policies analysed in the enhanced top-down policy scenario, per sector, on energy-related CO<sub>2</sub> emissions in India. Reductions in this figure are relative to the current policies scenario.

all greenhouse gas emissions in India by about 460 MtCO<sub>2</sub>e by 2020 and 1,270 MtCO<sub>2</sub>e by 2030, compared to the current policies scenario. The impact of the mitigation options on the energy related CO<sub>2</sub> emissions is illustrated in figure 1.

## The Bottoms-Up Approach

A Bottoms-up approach is based on technology-based energy system models which underpin the techno-economic feasibility. In case, if bottoms-up approach is chosen, the INDC must reflect the methodologies for calculating the GHG emissions across diverse sectors including, technological and financial requirement across all the sectors.

The Report on Low Carbon Strategy shows that through strict adherence to low carbon transition, a possible reduction of 42 percent over 2007 levels by 2030 is achievable in a LCIG (Low Carbon Inclusive Growth) scenario.

This possibility can be analysed and further enhanced to a higher reduction say 50% through backcasting methodology. The concept of backcasting is central to a strategic approach to planning for sustainable development and innovation. The report<sup>11</sup> on low carbon society in Japan provides insight into using the same approach for India which rides on the term of sustainable development.

However, the bottoms-up approach does not reflect historical emissions explicitly, thus only taking up the part "respective capabilities" and not "Common

But Differentiated Responsibilities" of the UNFCCC principle.

Moreover, country specific bottoms-up approach may not necessarily be consistent with specific 2 degree target of the world as a whole.

Nevertheless, a bottoms-up approach which considers low carbon path, development and equity will create a win situation. It could translate into a neat picture on the Government's INDC communications with clear short term and long term goals development.

Technologies and measures have to be taken into account at sectoral and regional level to attain an achievable INDC and a credible realistic scenario of containing the Global Temperature rise below 2°C.

As per its analysis of Netherlands Environmental Assessment Agency (NEEAA) Analysis based on enhanced bottom-up policy scenario, the enhancement measures identified could reduce emissions by 270 to 305 MtCO<sub>2</sub>e by 2020 and 510 to 700 MtCO<sub>2</sub>e by 2030, compared to the current policies scenario. Compared to the planned policies scenario, emission reductions are about 40 to 200 MtCO<sub>2</sub>e by 2020 and 180 to 490 MtCO<sub>2</sub>e by 2030.

Absolute remaining emissions would be about 3,265 to 3,650 MtCO<sub>2</sub>e by 2020 and 4,270 to 4,775 MtCO<sub>2</sub>e by 2030. This is a strong increase compared to current emission levels, but still keeps per-capita emissions at a relatively low level (2.8-3.2 tCO<sub>2</sub>e/cap by 2030).

11 A roadmap towards a low-carbon society in Japan using backcasting methodology: Feasible pathways for achieving and 80% reduction in CO<sub>2</sub> emissions by 2050-Ashina et.al



# Need for Equity Indicators

**A**s long as there are natural limits there needs to be a fair distribution of benefits and costs within societies, between nations and between present and future generations. The need for equity indicators that properly express this principles therefore is of utmost importance. Clarifying these equity indicators is now a top priority than ever before. As per experts, a greater agreement on equity would certainly be a game changer for the entire negotiation. Agreement on convention-based equity indicators, in particular, would enable real comparability of the efforts, and thus a regime in which free riders can be clearly identified.

Five high-level equity indicators that would support a more ambitious and viable climate regime<sup>12</sup> could consider the following:

- Adequacy
- Historical responsibility
- Capability
- Development need
- Adaptation need

## International Equity Reference Framework

### Mitigation

Within this the most relevant indicators here for India, clearly, are those which help them relate to the 1.5°C and 2°C temperature targets. The indicator should also help in identifying existing mitigation gap:

- Projected emission pathway with clear emission milestone
- GHG emission budgets,
- Indicative global emissions pathways (including peaks years) that conform to those budgets.

### Adaptation

It is difficult to identify particular indicators for adaptation as any given temperature target could imply a certain level of global impacts, and thus a need for global adaptation. Therefore, one must look at it from a global mitigation point of view. As it clearly relates to mitigation ambition – the lower the global level of ambition, the higher the level of adaptation needed.

Moreover, adaptation need will tend to accrue to communities that are lower in capability and higher in development need. Given all this, any true equity reference framework must support higher levels of ambition, while accounting for adaptation need in a meaningful way.

## Intra Country Equity

India's action towards climate change depends on the various action it takes to reduce its share of greenhouse gas emissions in the world. At the same time, in India, we are faced with the challenge of development and poverty alleviation, which is closely linked with providing energy access to millions.

It is also now well recognised, that the people have contributed the least to climate change will be among the most severely affected. The Indian government has a primary obligation to its own people, if not to

the global community, to do all that is possible to minimize the impacts.

Meeting India's development goals are not divergent, as is often portrayed. Findings from various studies clearly illustrate that there is 'widening electricity divide between urban and rural India'. Yet, there already exists a great disparity in energy access within India: between the rich and poor, and between the urban and rural communities.

A 2007 report by Greenpeace named 'Hiding Behind the Poor', revealed that a small section of the population - those in the highest income group - emitted about 1,500 kg per capita of CO<sub>2</sub>, four and a half times more than the many in the lowest income group (335kg), and almost three times more than the average Indian (501kg).

To address this divide is crucial, not only because approximately 70 per cent of the country's population is still rural, but also because there are already sustainable, climate friendly solutions that should define India's energy growth plans in form of decentralized renewable energy applications.

***India needs to place its argument on common but differentiated responsibility and respective capabilities (CBDR-RC) which it strongly advocates for at the international negotiation, from an intra-country perspective and address common but differentiated responsibility within the country too. The phenomenon of climate change and the response of India to the climate crisis have to be situated in the context of the global and local inequity and justice frame work.***

## Areas of Improvement

Away from this reality on one hand, while India is asking for adequate carbon space for its poor to develop, and yet finding it impossible to provide electricity to those same poor. This is despite pouring money into building additional conventional technology power stations as well Renewable Energy (RE) based mega projects.

Under the current scenario, where India has announced ambitious RE targets to be met by 2020, there is speculation around on its real impacts in terms cost implication and a larger question on its real beneficiaries.

## Energy for Whom ?

As per a study done by CEEW, the renewable energy contribution to electricity will be extremely low by 2030 in India. This is accompanied with an increase in the average electricity price, making an annual threshold household consumption of 2,000 kWh unaffordable for the bottom 30% of households under the BAU scenario.

The study further states that an incremental cost of approximately INR 24,842 billion (2010, INR) (2010, US\$ 452 billion) would be imposed during 2015-30. The incremental cost indicated not only the capital cost required to set up the infrastructure, but also the accompanying need for grid integration to ensure the stability of the grid.

As per the final conclusion from the study, threshold level of annual household electricity consumption would remain unaffordable for the bottom 20% of households in 2030. Thus establishing the fact that despite ambitious clean energy generation targets, electricity would be unaffordable to a large section of its population.

This will add up more to the existing disparity between states, raising a scenario where at one extreme, 40% population has no access to electricity, whilst the industrialized states would consume much more than their fair share.

If we are to address climate change, one of the principles must be equity and fairness, so that the benefits of energy services – such as light, heat, power and transport – are available for all - this is may old terms nology, rich and poor. Only in this way can we create a energy security, as well as the conditions for genuine human wellbeing.

Set in this context is it not the obligation of the Indian government, which demands larger carbon space for its people in the international arena, to provide such a space for the rural poor within India ?

Are there not better options than polluting coal based power plants for India to bring energy justice to its poor and rural population without adding to the carbon emission build-up in the atmosphere?

The current GOI's rush for domestic coal will accelerate large-scale addition of coal power plant mostly by

private entities. This might lead to a profound impact on social, environmental and economic aspects of our society.

The amount of coal burning, and fresh water and land required to support such expansion plan in the name of additional power capacity, will not only devastate our already fragile environment but will also push those last left vulnerable sections of our society to destitution.

Based on this it can be concluded that the intra country equity issue on energy, needs to be carefully understood and any formulation of INDC should be governed by certain framework, that would serve the objective of achieving the national targets in a more equitable manner.

Within such framework, states will not only compete with each other but also support and share each others burden. In such environment, rich states would support poorer states and share their financial, social and environmental responsibilities. This can be further enhanced by making provisions whereby financially healthier states can make investments in financially weaker states. (refer Annex 2.) ANNEX: State-wise Actual Gross Fiscal Deficit, Gross State Domestic Product, Fiscal Deficit @ 4% and state-wise per cent distribution of RE procurement

## Equity Assessment for India

India needs to develop its own equity indicators which are missing to inform policy options. In a situation where it does not have its own set of indicators, the equity assessment for can be done from climate equity calculator developed by Stockholm Environment Institute, SEI. The climate equity calculator calculates our country's projected GHG emissions by 2020 and the equity assessment of our country with reference to development indicators like GDP and India's conditional pledge (20% reduction by 2020 and unconditional pledge is mentioned as 25% reduction by 2020).

These are fixed constant and not variables in the assumption input parameters. The other varying parameters which is selected for our assessment includes:

- Capacity and responsibility ratio;
- GHG mitigation pathway (either strong 2°C reduction, weak 2°C reduction or projected G8 pathway)
- Baseline Year and Type of emissions (inclusive or exclusive of Land emissions and trade).

The results obtained are mentioned below table 2.

**Table 2 Equity Assessment for India, Stockholm Environment Institute, SEI**

India												
	Low equity settings				Middle equity settings				High equity settings			
Projected % of global RCI in 2025	4.6 %				0.6 %				0.1 %			
Support Contributor or Recipient	Support Recipient				Support Recipient				Support Recipient			
	Mt CO <sub>2</sub> e	% reduction relative to:			Mt CO <sub>2</sub> e	% reduction relative to:			Mt CO <sub>2</sub> e	% reduction relative to:		
		1990	2013	2025		1990	2013	2025		1990	2013	2025
Mitigation 'fair share'	1,600	+212%	+5%	-32%	215	+341%	+48%	-4%	21	+359%	+54%	-0.4%
Total domestic mitigation	2,700	+111%	-29%	-54%	2,700	+111%	-29%	-54%	2,700	+111%	29%	-54%
Internationally	1,100	-101%	34%	22%	2,485	-231%	-77%	-50%	2,679	-249%	-83%	-54%

From above analysis, India has a fair share of mitigating climate change only under low equity settings (i.e. 32%) with both domestic and internationally supportive mitigation. This is when compared with medium progressive and highly progressive countries. This is because India is assumed to be one of the countries

with still very low income in 2020. Therefore as discussed before in this discussion paper, improvement in the per capita income in an equitable manner is an important indicator which should be assessed and policies for the same must be made transparent to an extent in the INDC which will be projected till 2030.



# Elements of India's INDC

India has taken several voluntary steps towards addressing climate change. The most prominent being the National Action Plans on Climate Change launched in 2008 and the study of Low Carbon Strategy for Inclusive Growth released in April 2014. Several new schemes that have been launched in the past year such as: high speed rail, smart cities, Swacch Bharat, etc. seemingly have a climate connect.

Any strategy for developing a robust INDC should be anchored on intelligence, understanding and expertise developed during formulation of these key actions. The approaches should be based on:

- Socio-economic analysis of impact of proposed actions/ policies on climate change
- Role of new and efficient technologies
- Constraints, barriers and most importantly on the financial requirements in adopting these technologies.

Key challenge is to align and associate existing numerous plans/policies/schemes to seek a potential/promising transition pathway.

It should focus on what the actions are which of these are already addressing both former parameters (e.g. energy efficiency, renewable energy, waste management, etc.), and how can these actions be quantified in terms of GHG mitigation/reductions. As long as the GHG emissions are reduced compared to expected or projected emissions they should be accounted.

Therefore, any strategy for India has to be much more pragmatic which seeks to carefully understand the true potential of the transition pathways,

analyze the role of key technologies and investment requirements, while addressing the real impact on India's energy systems and emissions. The idea could be to have a potential framework, which integrate India's concerns and develop a strategy, which would focus on energy access, resource efficiency and environmental externalities within the climate negotiation agenda<sup>13</sup>.

## Key Elements of INDC:

1. Mitigation
2. Adaptation
3. Loss & Damage
4. Climate Finance
5. Technology Transfer & Capacity Building

The mitigation perspective of the INDCs could be drawn from the following:

1. National Action Plan on Climate Change (NAPCC)
2. Nationally Appropriate Mitigation Actions (NAMAs)
3. Low Carbon Strategy
4. Mapping of existing National Policies/Plans/ Missions
5. Transparent MRV and quantifiable emission reductions

## National Action Plan on Climate Change (NAPCC)

NAPCC was launched with a national strategy framework and work note to addresses India's development concerns along with mitigation potential of climate related risks by the Prime

13 CEEW paper: Cliff Conference

Minister's Council for Climate Change, Government of India (2008).

The NAPCC was a decisive document outlining the existing and future policies and programmes addressing climate change mitigation and adaptation. NAPCC is governed by the following principles:

- To protect the poor and vulnerable sections of society through an inclusive sustainable development strategy that takes climate change into account
- To achieve national growth objectives with a distinct change in direction that enhances ecological sustainability, while reducing greenhouse gas emissions
- To devise efficient and cost effective strategies for end user demand side management
- To deploy appropriate technologies for adaptation and mitigation of greenhouse gas emissions
- To engineer new and innovative forms of market, regulatory and voluntary mechanisms to promote sustainable development
- To implement programmes through unique linkages as required with civil society, local governments and through public-private-partnership and
- To welcome international cooperation for research, development, sharing and transfer of technologies supported by additional funding and a global Intellectual Property Rights regime that facilitates technology transfer to developing countries.

The NAPCC guidelines describe the needs and deeds of our development and put forward 8 National Missions for development:

1. Jawaharlal Nehru National Solar Mission (JNNSM)
2. National Mission on Enhanced Energy Efficiency (NMEEE)
3. National Mission on Sustainable habitat
4. National Water Mission
5. National Mission for Sustainable Agriculture
6. National Mission for a Green India
7. National Mission on sustaining the Himalayan Ecosystem
8. National Mission on strategic knowledge for climate change

**Concerns:**

The NAPCC aims to address the nexus between GHG reduction goals and development, and it suggests strategies to achieve both without compromises or trade-offs. Of the eight missions, only two i.e. Jawaharlal Nehru National Solar Mission (JNNSM) and National Mission on Enhanced Energy Efficiency (NMEEE) have been able to achieve some quantifiable actions.

However, there have been larger concerns over the urgent need to revise existing Renewable Purchase obligations (RPO) targets issued by CERC (Central Electricity Regulatory commissions to increase uptake of renewable sources of energy of the states, to comply with the envisaged production of 15% of the country's electricity with renewable energy sources by 2020.

Over the years, most states have failed to achieve their targets, while some do not have targets at all. The lack of a specific compliance mechanism makes the RPO less effective than it was originally intended to be.

Meanwhile, the renewable energy industry has also matured and grown and there is a need for revised and ambitious statewide RPO targets

The National Mission on Sustainable Habitat lacks clear policies and measures. It also fails to provide associated implications for GHG reductions. The only concrete lines of action are the three initiatives mentioned in the mission document, the Energy Conservation Building Code, recycling of material and urban waste management, and improved urban planning and modal shift to public transport<sup>14</sup>.

The policies related to Agriculture, water management are broadly scoped. It fails to address the real farming issues and identifies technologies and unsuitable processes for agriculture. It also faults in providing a clear vision on its interrelation to climate change.

The policy on Himalayan habitat faces difficulty in implementation across the whole Himalayan region. Lack of proper coordination of ministries and its research wing, lack of clear-cut strategy for all the policies makes the NAPCCC policies sluggish.

<sup>14</sup> WRI working Paper: GHG Mitigation In India: An Overview Of The Current Policy Landscape

Given India's federal structure, the Indian Ministry of Environment, Forests and Climate Change (MoEFCC) asked all State governments in 2010 to develop climate action plans, defining how they would tackle the threats of climate change within their States. These State Action Plans on Climate Change (SAPCCs) were expected to be in line with the then eight National Missions of the National Action Plan on Climate Change (NAPCC). The SAPCCs were to focus primarily on climate change adaptation though some emphasis has also been given on mitigation. The SAPCC were to assess and address vulnerable sectors and communities to usher in climate-proof development. However the states failed to anchor the SAPCCs in climate science and to correctly assess local vulnerabilities and risks. SAPCCs don't seem to be 'transformational,' to respond to long term development goals.

The SAPCCs are being reviewed in the context of the INDCs as SAPCCs are expected to feed into the making of an Indian INDC.

Climate change mitigation and adaptation strategies and its interlinking with country's and states economic development still remains complex for the policy makers to address.

Despite limitations, India's communication to UNFCCC on climate change mitigation has been mainly dependent on NAPCC schemes;

The caveats on the NAPCC could be addressed in a meaningful way, such that the INDC could draw from the NAPCC in order to pave way for a resilient and equitable INDC

## Nationally Appropriate Mitigation Actions (NAMAs)

Any INDC may be a short term, medium term or long term goal or it may be a target-oriented pledge to implement Low Carbon Pathways in nations. In this context, a NAMA as a country's pledge is similar to the mitigation component of INDC<sup>15</sup>.

Matter of fact, INDCs should be a more comprehensive measure to include mitigation, adaptation, national circumstances, which makes justification for

consolidating NAMAs as ambitious elements for its formulation. India has launched two NAMAs - NAMA Forestry and NAMA waste.

Feasibility studies including stakeholder consultation has already taken place for both these NAMAs. The above mentioned two NAMAs along with any other proposed NAMA viz energy access should form elements of INDC due to the following reasons:

- Process of identification, development of system, and plans of implementation are underway. These could facilitate identifying other or more ambitious opportunities and potentials for mitigation in the country, as well as feed into the preparation and submissions of INDCs.
- MRV systems will have to be developed and implemented for NAMAs. This in turn will lead to transparency on progress reported on achieving the goals of INDCs.
- NAMAs are meant to be ambitious yet build upon nationally appropriate actions towards sustainable development. Incorporation into INDC will only catalyze the development and implementation of NAMA which will thus serve as means of achieving targets outlined for INDC and beyond in timeframe
- A well designed NAMA will attract international support in order to scale up the level of finance and facilitate transfer of technologies for high priority projects It could also provide opportunity to accelerate many GHG mitigational projects with very high cost, by acting as an additional funding sources inorder to overcome financial barrier.
- Competition for international support is becoming tougher day by day. In such face, goals of INDC can be met only when some supported NAMAs are contributory to it.
- Coherence of plans can be assessed nationally and internationally
- Enhanced coordination at the national and sub-national level on climate change

Thus, NAMA as country pledge should be seen as national goals along with the INDCs. These too are national short/medium term (until 2025 or 2030) mitigation goals that countries will have to submit as part of ADP (Durban Platform for enhanced Action) based on countries capability and responsibility.

Based on this, countries can make use of NAMAs as an implementation tool to achieve goal/target included

15 A discussion paper on the links between INDCs, NAMAs and LEDS by the GIZ TUEWAS NAMA

in INDCs. In this context present NAMAs that will go beyond 2020 could be continued to be implemented as part of INDCs post-2020.

## Low Carbon Strategy

The low carbon strategy report has been discussed based on two scenarios:

- Baseline Inclusive Growth (BIG)
- Low Carbon Inclusive Growth (LCIG).

In BIG scenario, an average 7% GDP growth is sustained up to 2030. In LCIG Scenario, although the average long term GDP growth is only marginally lower at 6.9 percent, low carbon strategies require an additional investment worth 834 billion US dollars at 2011 prices. As per the study:

- Total power demand remains unchanged between the two scenarios, emission intensity of GDP declines by 22 percent, over 2007 levels (by 2030) in the BIG scenario, as compared to 42 percent, over 2007 levels (by 2030) in the LCIG scenario.
- Further, due to a massive change in the energy mix by 2030, demand for coal comes down from 1,568 Mt in the BIG to 1,278 Mt in the LCIG scenario.
- Demand for crude oil comes down from 406 Mt in the BIG to 330 Mt in the LCIG scenario, while demand for gas marginally rises from 187 bcm in the BIG to 208 bcm in the LCIG scenario.
- At the same time, the installed wind and solar power capacities need to be increased to 118 GW and 110 GW respectively, by the year 2030, in the LCIG scenario.
- Despite the expected growing demand from fast growing economy. It is estimated that in the LCIG scenario, India could keep its electricity requirement down to 3,200 Billion kWh by 2030 (less than an earlier figure of 3,600 Billion kWh projected in the Twelfth Five Year Plan Document).
- Coal will continue to be the dominant source of power, and even in the LCIG scenario, will have a 65 percent stake in power generation. However, super-critical coal plants, which presently account for only 6-7 percent of the installed coal based generation capacity, should account for more than half of such capacity by the year 2030.
- The study suggests that as far as implementation is concerned, a two pronged strategy is

recommended; first, that chases the explicit low carbon targets, and second, that combines policy instruments like energy pricing, carbon tax, cap and- trade, subsidies and regulation in the right mix.

- The study in overall concludes that a low carbon transition pathway is highly feasible in India.

## Mapping of Existing Policies/ Mechanisms

There are numerous policies, schemes and programs that are existing in the pursuit of sustainable development in India. The most relevant in context of climate change are the NAPCCs which are under implementation. According to sources, India will be able to achieve its Copenhagen pledge through the NAPCCs alone. However, till date there has been no communication from the government on the quantification of GHG reductions from the NAPCC.

Therefore it is still not clear as to how the progress of NAPCC is being correlated with the target of the voluntary pledge. While a transparent process is not mandatory for 2020 pledge, however the INDC communicated should facilitate clarity, transparency, understanding and as appropriate quantifiable information.

Keeping this in view, the strategic approach towards preparing an INDC which facilitates quantifiable mitigation should be mapping of all existing activities/ plans with focus to mitigation of GHG emissions and transition to a low carbon pathway while equally contributing to resilient development. The mapping should be based on parameters which define the key objectives:

- What are the success indicators for these key objectives?
- Do these key objectives contribute towards reduction in GHG?
- If yes can these GHG reduction be quantified and subjected to MRV?
- What additional capacity is required to achieve rigorous progress and the tracking of it ?
- What are the co-benefits? How positively is it affecting GDP, HDI and wellbeing?

A starting point may be to assess the objectives and progress of these policies till date and also to link

<b>Table 3 NAPCC mission objective, Targets and Projected Emission Reduction</b>					
NAPCC	Mission Objectives	Mechanism existing and that which can be integrated	Targets, Progress, Timeline	Co-benefits	Abatement of CO2
National Solar Mission	To install 20,000 MW and 2,000 MW of grid and off-grid solar power respectively and 20 million sq. m of solar thermal collector area by 2022.	100 GW of solar power	Installed capacity till February 2015 -3382.78MW of grid-connected solar generation capacity -364.27 MW of off-grid solar generation capacity -8.76 million sq. meters of solar thermal 99533 MW to be achieved by 2022	Energy-security Mitigation Reduction in GHG emissions	Approximately 84 million tonne* CO <sub>2</sub> , considering commissioned 100,000 MW capacity by 2022 and operating till 2030
National Mission for Enhanced Energy Efficiency	To achieve growth with ecological sustainability by devising cost effective and energy efficient strategies for end-use demand side management. Focuses on following initiatives  Perform Achieve and Trade (PAT): A market based mechanism to facilitate energy efficiency improvements in large energy intensive industries and facilities, by issuing energy saving certificates that can be traded  <ul style="list-style-type: none"> <li><b>Market Transformation for Energy Efficiency (MTEE):</b> Accelerating the shift to energy efficient appliances and equipments in designated sectors through innovative measures that make such products more affordable</li> <li><b>Energy Efficiency Financing Platform (EEFP):</b> Creating mechanisms to finance demand side management programmes in all sectors of the economy by capturing future energy savings</li> </ul>	Perform Achieve and Trade	Perform, Achieve and Trade (PAT) cycle-1 is being implemented covering 478 major consumers in 8 energy intensive industrial sectors  It is expected that around 50 lakh CFLs will be replaced in each DISCOM area. Under the scheme approximately 600,000 CFLs can be distributed within a single Small-Scale Programme of Activities (SSC-CPA) with a limit of 60 GWh.  136835 million kWh energy saving by 2030	Energy Security Economic trading  Reduction in energy consumption  Energy savings Market development	For NMEEE, the annual reduction in carbon dioxide emissions is estimated to be around 98.55 million tones of CO <sub>2</sub> 26 million ton CO <sub>2</sub> reduction by end of first Phase 1 of PAT  31,668 tonnes CO <sub>2</sub> e per annum <sup>16</sup>  134 million t CO <sub>2</sub> /Annum
		Super-Efficient Equipment Programme (SEEP)	Savings of 60 billion kWh and peak capacity avoidance of 20,000 MW can be achieved by 2020 under a moderate standards and labels (S&Ls) scenario if 60 percent of the stock of only four appliances (room air conditioners, refrigerator, fans, TVs) is super-efficient (Prayas Energy Group, 2012)	Reduction in energy consumption	58 million t CO <sub>2</sub> /Annum;

16 A discussion paper on the links between INDCs, NAMAs and LEDs by the GIZ TUEWAS NAMA

NAPCC	Mission Objectives	Mechanism existing and that which can be integrated	Targets, Progress, Timeline	Co-benefits	Abatement of CO2
	<ul style="list-style-type: none"> <li><b>Framework for Energy Efficient Economic Development (FEEED):</b> Developing fiscal instruments to promote energy efficiency Energy Efficiency in Industry</li> </ul>	EE in Cement Industry	Replacement of the existing fan with high efficiency fans Use of high efficiency crushers before the cement mill grinding High level control system for kiln operations Reduction of RPM (Rotation Per Minute) of the Centrifugal Silo Installing high efficiency fans at the clinker cooling section Increasing the grinding chamber size Replacement of the air-lift with bucket elevator for raw metal transport to the silo	Reduction in energy consumption Reduction in use of fossil fuel Reduction in air pollution	23.3 MtCO2 by 2030 <sup>#</sup>
		Iron and Steel Industry	Coke Dry Quenching (CDQ) Injection of Pulverized Coal into Blast Furnace Top Pressure Recovery Turbines Recovery of Blast Furnace Gas: Preheating of Steel Scraps	Reduction in air pollution Reduction in energy consumption	74.6 MtCO2 by 2030 <sup>#</sup>
National Mission on Sustainable Habitat	Promotes energy efficiency in buildings, management of solid waste and modal shift to public transport including transport options based on bio-diesel and hydrogen	Smart Grid: Timeline 2012-2027	To achieve multiple functionalities in the power sector. Help in ensuring lifeline supply Prevent T&D losses Shift to electric lighting from kerosene lamps and other carbon emitting forms of lighting.	Energy Security Clean Energy Access Employment generation	Approximately 0.10 Gt (100 million tonnes) CO2 per year from direct reductions and enabled reductions <sup>17</sup>

17 IEA-“Technology Roadmap Smart Grids” 2011  
# Final report of the expert group on Low Carbon Strategies for Inclusive Growth044

NAPCC	Mission Objectives	Mechanism existing and that which can be integrated	Targets, Progress, Timeline	Co-benefits	Abatement of CO2
	<p>Extension of the Energy Conservation Building Code. Better urban planning and modal shift to public transport by making long term transport plans .Recycling of material and urban waste management and development of technology for producing power from waste</p>	<p>SMART Cities</p>	<p>100 cities have been identified for the smart city initiative to be completed by 2022. City development plans are no more adequate enough to achieve the increasing need of city planning. Discussions and planning is undergoing for framework of smart-cities However, in terms of INDC, smart cities can take up direct mitigation measures such as MRTS &amp; BRTS, Building codes such as ECBC, RE such as solar roofs, solar streetlights, Waste Management, Smart Grid, LED lighting, Electric vehicles</p>	<p>Improved</p>	<p>Emission reductions may be estimated for each smart cities in accordance with the technologies and adopted. The government must keep provisions for emission estimation/reductions in the planning document of each SMART cities.</p>
		<p>Energy Conservation Building Code 2007 made mandatory for new as well as old buildings</p>	<p>Prescribes a minimum standard for energy use in new buildings and major retrofits (BEE, 2009). The load requirement for buildings to comply is 100 kW or 120 kilovolt-amps (kVA), which enables commercial and high-rise residential buildings (approximately five stories or higher) to come under the code's purview. The ECBC establishes minimum requirements for energy-efficient building design and construction</p>		<p>131 million tons per year by 2030<sup>#</sup></p>
		<p>BRTS &amp; MRTS</p>	<p>• 10,000 buses have been provided in 2014-15 to promote public transport DPRs for 5 metro projects under consideration</p>		<p>93 million t CO2/Annum<sup>18</sup></p>
		<p>NAMA Waste</p>	<p>MoEF&amp;CC with partner GIZ is engaged in Development and management of nationally appropriate mitigation actions (NAMAs), the project time period being 2013-2017. In July 2014, the Ministry decided to produce NAMA plans for the waste which have been deemed feasible, affordable and realistically formulated through joint activities and consultations.</p>		<p>There has been no announcement yet for quantified reduction from the waste NAMA. It kept as an element for INDC will not only strengthen the INDC but also lead to robust implementation and of the NAMA</p>

18 Sanjay Kumar Singh

# Report on The demand for road-based passenger mobility in India: 1950-2030 and relevance for developing and developed countries

NAPCC	Mission Objectives	Mechanism existing and that which can be integrated	Targets, Progress, Timeline	Co-benefits	Abatement of CO2
Green India Mission	To increase forest cover on 5 million hectares (ha) of forest/non-forest land and improve the quality of forest cover on another 5 million ha. Improved ecosystem services including biodiversity, hydrological services and carbon sequestration as a result of treatment of 10 m ha.  3. Increased forest-based livelihood income for 3 million forest dependent households	Swacch Bharat Abhiyan	Elimination of open defecation Conversion of insanitary toilets to pour flush toilets Eradication of manual scavenging 100% collection and scientific processing/disposal/reuse/recycling of municipal solid waste Behavioral changes in people Supporting urban local bodies in designing, executing and operating waste disposal systems Facilitating private sector participation in capital expenditure and operation and maintenance costs for sanitary facilities		There has been no linkages to GHG reduction yet, however, 100% processing of municipal waste will definitely lead to reduction in GHG emissions
		Anti-black carbon scheme			0.66 Gt CO <sub>2</sub> -eq. per year from black carbon emission in Agriculture alone, which is 2 % of Annual GHG emissions <sup>19</sup>  0.35 kg/CO <sub>2</sub> /kwh <sup>20</sup>
		NAMA Forestry CAMPA JFM New-National Action Program to Combat Desertification Agroforestry	Increased forest/tree cover on 5 m ha of forest/non-forest lands and improved quality of forest cover on another 5 m ha (a total of 10 m ha)	Livelihood enhancement	50-60 million tonnes by 2020 from GIM

19 Wikipedia  
20 <http://www.cundall.com/Cundall/fckeditor/editor/images/UserFiles/Upload/file/WCIYB/IP-5%20-%20Emission%20factors%20for%20black%20carbon.pdf>



NAPCC	Mission Objectives	Mechanism existing and that which can be integrated	Targets, Progress, Timeline	Co-benefits	Abatement of CO2
National Renewable Mission (can be taken up as a new national action plan)	Wind Power		Wind Power 60,000 MW by 2022		129.24 million tonnes by 2030
	Small Hydro Power		Small Hydro Power 5000 MW by 2022		23 million tonnes by 2030
	Bioenergy-biogas		Biomass 10, 000 MW by 2022		170 million tonnes
	Energy from agricultural crop residue		47.5 Lakh biogas plants installed 31st March, 2014. Revised 2014-15 target 1,10,000 2016-16 target 1,1,000 NBMMP		84 million tonnes
	Biomass gasifiers		Biogas and Manure Management Programme		93 million tones/Annum
	Waste to energy		Unnat Chulha Abhiyan (UCA) Programme for 12th Five Year Plan Period- A target of 2.75 million improved cookstoves/chulhas will be disseminated/installed in the remaining period of the 12th Plan Period		3 million tonnes
National Biogas and Manure Management Programme (NBMMP)- MNRE					
	Biomass cookstoves				
	National Biofuel Mission		National Biofuel Mission		12.92 million tonne at 20% blending

them with new schemes for a more concerted and streamlined approach. The table below attempts to bring a concerted perspective for different schemes.

The table tries to give a snapshot and attempts at inter-relating the various available mitigation options. Emission reductions available through different studies have been used while for some it has been estimated. For schemes such as smart cities, emission reductions could not be undertaken for the present discussion; however it is felt that if detailed targets are available for Smart Cities, it may form a core element in the INDC.

## **Transparent MRV and quantifiable emission reductions**

It is seen that although mitigation actions are wide spread, yet there is lack of transparent MRV and quantifiable targets in terms of GHG emission reduction. The major breakthrough that INDC can bring into existing sustainable development initiatives is a transparent MRV and quantifiable emission reductions.

Rather than developing new schemes or mechanism, the existing can be strengthened through the INDC by incorporating more ambitious targets coupled with proper MRV processes. The rationale of this approach is that it will not only help closing the gaps in implementation but also streamline the cost and technology transfer required for achieving the ambitious targets.

Literature review shows several studies which deal with modelling of future energy mix, energy security, related emissions of India's development trajectory and emission intensity and overall emission reduction estimations of some major schemes.

However, it is felt that there should be more studies on estimations from national schemes and development initiatives. Therefore, a scope may be kept in the INDC communication for further R&D till 2018-2020 for development of a robust methodology, and MRV framework for quantifiable emission reduction and transition to a low carbon economy in post 2020 activities.

# Adaptation

India is often considered to be one of the most vulnerable countries to climate change (Brenkert and Malone 2005). India is also notorious for its difficulties in efficiently implementing environmental policies (Greenstone and Hanna 2011), which are at least partially related to the size of its territory, the size and heterogeneity of its population, and its institutional complexity (Lijphart 1996).

It is the varied climatic and physiographic zones of India which brings it at par to a continent thereby rendering more vulnerability to the Indian subcontinent.

## Understanding the subcontinent adaptation needs

The Indian subcontinent faces both extremes of temperature and rainfall, with variations of temperature and rainfall notable on the entire subcontinent. The minimum temperature during winter may range from below 5°C in the North to about 24°C in the extreme South, while the maximum temperature during summers varies from more than 48°C in the North west to less than 38°C in the north east.

Apart from these variations, a common effect over the entire country is that the annual mean temperature of the country has increased by 0.56 °C over the years 1901 to 2009, much of this increase since 1975 (IMD, 2010).

According to the report, Mainstreaming Adaptation to Climate Change in Indian Policy planning, IPCC projected a global average temperature rise of 4.2°C under the BAU emissions scenario (A1B) towards the

end of the 21st century, while new studies project a warming of more than 6°C under the current BAU emissions scenario over the same period (IEA, 2011).

Climate change affects the balance of natural eco-systems (i.e. forests, river basins, sea level) and socio-economic systems (i.e. agriculture, fisheries, irrigation and power projects). The impacts arise through changing temperature patterns, rising sea-levels, and the intensification of natural disasters, affecting livelihood systems including agriculture, water resources and sanitation, forests and biodiversity. These therefore impact the ecosystem communities who are the most dependent on natural systems for their survival.

## Projected Impacts on the Subcontinent<sup>21</sup>

**1. Temperature variability:** An overall warming with a net increase in annual temperatures in the 2030s ranging between 1.7°C and 2.2°C, with extreme temperatures increasing by 1–4°C, with maximum increase in coastal regions.

**2. Seasons may be warmer by around 2°C towards the 2030s:** The extreme maximum and minimum temperatures are also projected to increase in the 2030s. The variability of seasonal mean temperature may be more in winter months.

**3. Precipitation Variability:** All the regions are projected to experience an increase in precipitation in the 2030s and the increase is highest in the Himalayan

<sup>21</sup> Source: Information derived from INCCA (2010); IIED (2009); Parry et al (2007)

region and lowest in the North Eastern region. Gosain et al (2011).

A decline in rainfall in 14 out of the 17 river basins towards the 2030s (mid century) and the 2080s (end century). In almost all river basins rainfall declines from 4% to 23%, following changes in precipitation. As a result of the decline in basin level rainfall, water yield in most of the river basins will decline by the 2030s and almost all (except the Krishna and Cauvery basins) by the 2080s.

**4. Mean increase of 7–20% in annual precipitation**

**5. 10–15% increase in monsoon precipitation in many regions**

**6. Number of rainy days:** The number of rainy days is projected to decrease, in most parts of the country, except in the Himalayas, the North-western region and the Southern plateau; however intensity is set to increase the occurrence of extreme events.

**7. Drought:** A sharp drop in groundwater tables across the entire Indo–Gangetic plain. The Ganga, Narmada, Krishna and Kaveri rivers are expected to experience seasonal or regular water stress, impacting western, northern and eastern India.

**8. Extreme Events:** Flooding, All the regions are likely to experience flooding exceeding the existing magnitude by 10–30%.

**9. A sea surface temperature rise of 2–4°C:** As anticipated in the Indian Ocean is expected to induce a 10–20% increase in cyclone intensity. The East Coast is likely to face more intensity and the frequency of cyclones is likely to decrease in the 2030s, with increase in cyclonic intensity.

**10. Rising Sea-Level:** Sea level along the Indian coast has been rising at the rate of 1.3mm/year and is likely to rise in consonance with the global sea level rise (SLR). Significant coastal inundation seen with a 1m sea level rise, especially in low-lying areas.

**Concerns & Way forward**

While the government maintains that National Action Plan on Climate, Change (NAPCC), State level Action plans (SAPCC), Union budgets and India's five-year plans have addressed adaptation, it is fairly obvious

that ground level implementation and its progressive output is absent in even the most vulnerable regions and sectors. Some concerns that need to be addressed urgently are:

**1. Prevalence of Adaptation Deficit Gap:** The level of expenditure on adaptation for climate change effects are inadequate (latest figures indicate about a 6% of the GDP). There is significant adaptation deficit/gap that remains in the country. India already faces a considerable adaptation deficit for its existing climate vulnerabilities. This has to be addressed nationally and internationally. Proper assessment, cost analysis and a comprehensive funding strategy is required to be taken up.

**2. Identification and prioritizing the Vulnerable Region:** India should Identify the vulnerable regions which will be affected by the climate change such as agriculture and prioritise it for full study for identifying the most vulnerable areas which will be affected by climate change such as:

- Identification of the vulnerable cropping systems;
- Identification of vulnerable forest types, and forest areas.
- Identification of vulnerable river basins and watersheds etc

While some degree of macro vulnerability assessments have been done for the purpose of the SAPCC, it is important to have downscaled data at the micro level on vulnerabilities of communities and ecosystems.

**3. Evaluate the current technologies,** and practices for their ability to adaptation particularly for the vulnerable communities.

**4. Develop adaptation strategies for each sector,** and each region based on scientific studies while having a participatory approach involving all stakeholders at local levels (including district and Panchayat levels) for implementing relevant resilience building practices.

**5. Strengthen natural resource management practices from a climate perspective:** The focus should be placed on adaptation practices such as soil water conservation, watershed management, biodiversity conservation, development and use of drought resistant varieties of seeds, development of shelter belts and agro-forestry

**6. Climate Education/Capacity development**

**Programme:** There is an imminent need to build capacities of diverse stakeholders at different levels ranging from Govt. Department to Panchayats in order to educate them to recognize vulnerabilities, streamline policies and take adequate actions

**7. Create viable demonstrative models on**

**adaptation:** There is an apparent lack of demonstrative models which showcases a package of practices for holistic resilience building across different ecosystems/ subsystems. This needs to be encouraged by government as well as by other actors.

**8. Monitoring and Evaluation of adaptation actions and practices:**

As per Tiwari et al (2011), there is a need to assess the implementation of current climate change programs and practices. This can be done with monitoring mechanism to study the present status, its implementation and lacunae faced if any while adopting such in a measure. It is established that monitoring and evaluation need to be continued over long term– so that the impact of policy could be discerned over long term.

The concerns raised above have to be categorically addressed and adaptation measures implemented across sectors and communities throughout the country. These element need to be built into the framing of adaptation in INDCs.

Further it is important to give a deeper look at those sectors which entails critical engagement of vulnerable ecosystem communities.

## Strengthening Adaptation in Agriculture

According to Kulkarni et al (2012) the Indian summer monsoon rainfall series depicts a decreasing tendency of stability during the last three decades of the 20th century. Krishnan et al (2013) reported a decreasing monsoon rainfall trend over the Western Ghats and parts of northern and central India.

The primary impact of such variation of temperature and rainfall is on the agrarian-economy of India. Thus, vulnerability of India to climate change is more perilous due to its ever-increasing dependency on agriculture, excessive pressure on natural resources, poor coping mechanisms and inability to attain food-security despite development in several other sectors.

According to Indian Council of Agricultural research, if no measures are taken, there will be a reduction of upto 4.5-9% of agriculture yields in the medium term (2010-2039). This translates upto a 2% fall in GDP growth in medium term, and greater than 25% reduction of agriculture -yield in long term (2040 and beyond). [NNPCC, ICAR, 2009]. Rain and weather patterns in India have been extremely unpredictable over the past three to four years. The distribution tends to be erratic both geographically and temporally. This introduces intrinsic volatility in to the Consumer Price Index (CPI) base inflation numbers since food comprises nearly half of the basket.

Such impact of climate change will have detrimental effects on food-security, livelihood and overall economy, the worst sufferers being the small and marginal farmers Intensity of natural causes will become more pronounced in future due to climate change which may get further aggravated if adequate policies and economic facilities are absent.

What is required therefore are detailed assessment of reported loss of lives, livelihood, livestock and the cost incurred due to damage of crops due due to climate change impacts.

This cost can be strategically extrapolated for coming years. The costing thus obtained will provide input to the budget of adaptation fund in India and also assess the amount of international finance required to rigorously and urgently implementing adaptation measures. The cost which is now being incurred by SDRF (state disaster relief fund) will then be sourced from the adaptation fund. Technical and fiscal solutions with clear MRV process under this should form an adaption framework. The priority therefore should be to strengthen adaptation measure in the agriculture sector.

Based on this the adaptation measures should be comprehensive to tackle both natural and other human intended factors. The progress indicator of such adaptation measure should be linked with HDI of the farmer's community as well.

## Why National Mission on Sustainable Agriculture (NMSA) should form part of Adaptation element in INDC

The NMSA does not categorically distinguish between mitigation and adaptation actions but lays

down interventions for achieving climate resilient agriculture. While climate resilient agriculture is the core objective of the mission, yet the mission has not defined adaptation parameters to achieve the same, resulting in inadequacy of the mission to address adaptation needs of the agriculture sector.

There has been criticism in the past about the mission being primarily mitigation focused, techno-centric and market driven and failing to address farm ecology and farmers well-being. The focus of the mission seems to anchor on one stop BT solution and PPP in agriculture with minimal allocation to capacity building and results in overlooking the wellbeing of small and marginal farmers.

It is feared that the NMSA may inevitably lead to the consequence of green revolution that happened in Punjab to other states of the country. Some key concerns that need to be analyzed are the ill effects of BT, increase in mono-cropping, affecting the diversity of seed and crop which is in direct opposition to the concept of adaptation; failure of BT in India (Field level assessments conducted by teams comprising government officials, Mahyco staff and agricultural scientists revealed that the loss due to failure of BT cotton extended to about 54,000 hectares — INR 230<sup>22</sup> crore); the rise in number of suicides of farmers across the country with poor coping ability of farmers to the increasing unpredictability of weather.

Some recommendations<sup>23</sup> that were suggested by experts to the NMSA include:

- Focusing on the significance of agro-ecological approach for small and marginal farmers, Increasing diversity of seed and crop;
- Capacity building of farmers;
- Rationalizing allocation for infrastructure development
- Post-harvest mechanism along with technology and R&D;
- Maintenance of traditional water bodies;
- Decentralized planning;
- Emphasis on rainfed areas;

- Access of small farmers to common property resources and prevention of encroachment of the same;
- Expansion of weather based insurance;
- Incentives for organic farming, Bio fertilizers, nutrient and non pesticidal management;
- Precautionary principle for genetically modified foods.

The aim therefore should be to develop climate resilient agriculture, through adaptation strategies such as Development of Resource Conservation Technologies and Conservation Agriculture (CA) practices, judicious and managed rain-water harvesting and efficient use of harvested water to avoid the risk of altering natural flow, drainage and seepage; Crop diversification, Post-harvest management and finally valuing and Integrating indigenous technical knowledge of men and women farmers.

The above mentioned points translates into a strengthened Sustainable Agriculture mission which could inform the adaptation component of the INDCs.

## Forestry

Green India Mission is a flagship program in the forestry sector in India, which envisages a holistic view of mitigation and adaptation focusing on multiple ecosystem services.

The Green India Mission Aims at responding to climate change by a combination of adaptation and mitigation measures, which would help:

- Enhancing carbon sinks in sustainably managed forests and other ecosystems;
- Adaptation of vulnerable species/ecosystems to the changing climate; and
- Adaptation of forest dependent local communities in the face of climatic variability.

### The Objectives of the Mission are:

- Increased forest/tree cover on 5 m ha of forest/non-forest lands and improved quality of forest cover on another 5 m ha (a total of 10 m ha)
- Improved ecosystem services including biodiversity, hydrological services and carbon sequestration as a result of treatment of 10 m ha.

22 Crop failure BT cotton –Bangalore-<http://www.gmwatch.org/index.php/news/archive/2014/15368-karnataka-bans-mahyco-s-bt-cotton-seeds-after-crop-failure>.

23 National Mission for Sustainable Agriculture and Climate Resilience of Small and Marginal Farmers- Beyond Copenhagen Collective India. Published By Public Advocacy Initiatives for Rights and values in India (PAIRVI)

- Increased forest-based livelihood income for 3 million forest dependent households
- Enhanced annual CO<sub>2</sub> sequestration of 50-60 million tonnes by the year 2020

Recently the Government of India reinforced this mission by converging it with the Mahatma Gandhi National Rural Employment Guarantee Scheme (MNREGS). MNREGS provides guaranteed employment to rural households, and emphasizes on afforestation, tree plantation, horticulture, watershed management etc. Such a move by the government shows vision in developing climate resilient vulnerable and poor communities based on forests.

However, there have been concerns on the counter-productivity of the mission. There have been protests that the Green India Mission (GIM) goes against the Forest Rights' Act (FRA) by seeking to empower Joint Forest management Committees (JFMCs) instead of gram sabhas, and that it will lead to increased land grabbing, violation of people's rights, environmental destruction, and loss of common lands and livelihoods based on them, without in any way genuinely responding to the burning problem of climate change<sup>24</sup>.

Further concerns are regarding the probability of industrial monocultures, commoditization of forests, conversion of areas such as pastures, grazing areas and other common lands. Such concerns regarding GIM may be eliminated by focusing adaptation of vulnerable communities, and transparent mandates on livelihood enhancement along with the mission.

The empowerment should not be limited to JFMCs but to the JFM concept which leads to conversion of low-productivity forests to productive forests. Over the years, the involvement of the local communities in the management of forest has increased manifold due to setting up of JFMCs in many parts of India.

The engagement of communities should be further strengthened through provision of alternate livelihood among these schemes along with the main mission (GIM) thereby reducing their vulnerability in case of any impact of climate or policy on their lands and livelihood.

GIM should thus strengthen its adaptation component and deliver more opportunities at the forest ecosystem and community level.

## Loss and Damage

*(This aspect is being covered under adaptation as part of this paper. However the authors are completely in agreement that loss and damage comes in where adaptation is no longer possible and therefore loss and damage should be a stand alone aspect and not subsumed into the adaptation pillar.)*

India has witnessed many instances of extremes of temperature, rainfall in recent years for example, Uttarakhand floods in 2013 and Kashmir floods in 2014 & 2015, Super cyclone Hud Hud in Orissa and Andhra Pradesh (2014). It has been noted that intensity and frequency of weather-induced climate hazard's intensity and frequency is going much beyond the adaptation threshold of communities and societies. The IPCC Fifth Assessment Report confirms this and also points out the alarming rates with which this is occurring India is at risk of enduring losses and damages from both slow-onset events (such as loss of agriculture due to drought and salinity ingress) as well as extreme events. Weather-disasters has serious impact on infrastructure (i.e. houses, roads, schools and hospitals) and on capacity of communities to adapt and sustain livelihoods.

In view of the recent climate hazards faced by the country and the poor coping mechanisms, makes it clear that assessing cost and benefits of a low carbon economy without coupling it with the costs and losses to be incurred due to climate vulnerability in future will only lead to a weak foundation for climate resilient activities.

India faces huge losses due to climate change-induced disasters, so much so that the expenses on adaptation increased from 2.6 per cent in 2012 to 6 per cent of the country's GDP in 2014. India is still unable to put together its Loss and damage numbers from several small and big disasters (from across all areas and intensities). This element needs to be factored into the making of an Indian INDC, else the long term vision of resilient development will be far fetched.

In absence of government data of cost incurred, some statistics of the loss and cost sourced from other public domain is provided below for four disasters of the last two years.

24 Forest Movements' Joint Statement: A Formula for More Land and Resource Grabbing: Dangers of the Green India Mission

## Concerns

India has failed to take common cause with developing world. In October 2013 in India, Cyclone Phailin caused damage worth billions of dollars in the east of India, however, government of India failed to highlight the need for compensation from rich nations against loss and damages incurred.

On the contrary Philippines when devastated by Typhoon Haiyan sought compensation from rich nations for the loss and damage on its soil. Unlike the government of Philippines however, recovery and rehabilitation of national disasters in India has not generated widespread international support but, instead, has been primarily the responsibility of national government. This puts considerable strains on resources and capabilities.

The governments in many countries are following the Philippines' lead. India, however, is walking another track. Though flash floods in Uttarakhand killed

thousands in northern India and Cyclone Phailin and Hudhud caused damage worth billions of dollars in the east of the country, the Indian government has not sought any compensation for the same.

Indian environmentalists who had gathered at the UN Framework Convention for Climate Change (UNFCCC) summit at Poland's capital Warsaw could not understand why "India, which has faced two mega climate disasters in the last few months –Uttarakhand disaster and Phailin in Orissa – and perhaps suffered greater impacts (than the Philippines), has so far failed to even raise the issue in the Warsaw meeting.

Thus, there is clear incentive to promote better understanding of loss and damage in India but the focus has to remain on targeting those most vulnerable at the local level.

In last few years, loss and damage issue took the central stage of discussion among policymakers and

**Table 4** Life and Monetary loss and Damages from Disaster occurrence (2012-2014), India

Type of Disaster	Year of Occurrence	Loss (Life and Monetary)	Funding mechanism
Heavy rainfall, floods and landslides in Uttarakhand	2013	10000 human life PWD loss-USD 23 million Tourism loss-USD 8 million	USD 157 million-Central fund  USD 400 million -International Banks
Very severe cyclone storm "Phailin" in Odhisa	2013	Damaged crops over 500,000 hectares of agricultural land. Estimated loss of 1 million tonnes of rice output due to the cyclone and heavy downpour	USD 157 million-Central fund
Heavy rainfall and flood in Jammu and Kashmir	2014	Floods in Jammu and Kashmir have caused an immediate loss of USD 849 -896 million  Loss of life - 215	USD 250000- America  USD 62 million- Central Fund
Cyclone HudHud affecting coastal area of Andhra Pradesh	2014	USD 3400 million loss; Human loss -61	USD 157 million Central Fund
Unseasonal rains in central and northern India, March 2015	2015	.....	.....

*Though Government of India has a process - of enlisting disaster event and to calculate relief and compensation measure, but the method, tools and mechanisms are not transparent. Additionally, the data is not readily available in the public domain*



**Table 5** Statement showing State-wise details of damage due to Cyclone/ flash floods/ floods / landslides/ cloudburst etc. during 2014-15

(Provisional) As on 19.11.2014 S/No.	State/UT	No. of human lives lost	No. of cattle heads lost	No. of houses damaged	Cropped area affected (lakh hectares)
1	2	3	4	5	6
1	Andhra Pradesh	61	4,777	40,379	3.30
2	Arunachal Pr.	61	1,992	2,742	0.224
3	Assam	90	8,962	1,38,000	3.67
4	Bihar	144	28	5,621	1.16
5	Chhattisgarh	27	199	6,053	0.004
6	Goa	--	--	41	--
7	Himachal Pr.	45	698	1,963	0.136
8	J & K	282	61,326	2,53,184	6.48
9	Karnataka	27	85	11,338	0.58
10	Kerala	132	527	8,392	0.20
11	Maharashtra	151	53	44	--
12	Meghalaya	66	8,822	10,701	0.159
13	Nagaland	17	2,860	14,537	0.18
14	Odisha	50	672	83,140	3.65
15	Punjab	30	127	14,494	1.06
16	Tripura	21	--	1,139	0.015
17	Uttar Pradesh	132	107	75,564	5.00
18	Uttarakhand	66	348	1,824	0.013
19	West Bengal	169	145	33,621	0.508
<b>Total</b>		<b>1,571</b>	<b>91,728</b>	<b>7,02,777</b>	<b>26.34</b>

negotiators. India needs to detail out approaches and methods to deal with loss and damage which would be important for investment decision-making in mitigation and adaptation

Though a range of methodologies are available for carrying out traditional risk assessment, but the methodologies of climate-related assessment of loss and damage is still under development and have yet to be integrated into national policies. The key challenge with Government is to develop a system to estimate full range economic and monetary losses. No comprehensive risk assessment model for climate change loss and damages exists.

The IPCC has already stated (with high certainty) that the frequency and magnitude of extreme events will increase as climate change worsens. Further given

these grim future projections, disaster risk reduction and adaptation efforts will not be enough to prevent losses and damages in India.

This calls for a much more comprehensive and integrated approach of disaster risk reduction and adaptation, including risk retention and risk transfer would be required to reduce avoidable and unavoidable losses and damages.

The current mechanisms for dealing and coping with disasters in India are not yet sufficient or capable to deal with future impacts. Furthermore, India will have to update its legal and policy frameworks and procedures. The country will also need to introduce new measures to assess and address loss and damage associated with climate change and disaster risks in order to protect the lives and well-being of those most vulnerable.

It would be very much in order and in the interest of the nation if GOI, will work with various stakeholders to create a comprehensive mechanism on loss & damage. India will need to have a candid discussion about the possible mechanisms for structuring the response to loss and damage internationally, both in the short term

and as part of the post-2020 climate regime that is to be negotiated at Paris in 2015. A strategy for availing international support to some percentage of loss and damage due to climate change hazards should be aspired in the INDC.

# Climate Finance

**A**s the world grapples with the scope of the climate crisis, climate finance for developing countries is becoming even important than ever. Within this the need to support finance is recognised as a key element for India's INDC.

A combination of national and international financial resources, drawn from public and private climate finance sources is a key enabler for the country's ambition and action.

It is therefore important for India to define its - climate finance resources. This should also be seen as crucial element for India to scale up its efforts and help meet its global goal in a clear and transparent manner.

However, under the current budget scenario, the size of public climate finance available to meet global goal, is considerably small for India. Additional finance would be required to protect long term interest based on its national priorities According to the Ministry of Environment, Forest and Climate Change (MoEFCC), an estimated amount ranging over US \$ 600 to \$ 1500 billion per year would be required by the developing countries every year to deliver real climate actions.

The Green Climate Fund started with the goal to mobilise US \$ 100 billion / year by 2020 has only reached 10.2 billion Dollar, and has a long way to go. This size cannot meet the envisaged costs in delivering real climate actions. Therefore, the need of the hour is to enhance actions towards a robust Global Climate Finance Framework (GCLFF) lasting till 2030, which clearly outlines the funding pathway till 2030.

With limited public finance being mobilised so far, the responsibility seems to be shifting towards private

entities for playing an important role in addressing the climate challenges and perceived risks. Drawing from the CDM experience, the civil society is very sceptical of the role that the corporates would play for Sustainable development with admittance of fact that, the motivation of commitment on clean energy investment has gone down in post-2012

## Learnings from Clean Development Mechanism

The Kyoto Protocol had created and institutionalized an international market based regime for reducing GHG called the Clean Development Mechanism (CDM). The market route was primarily conceived as mechanism by which industrialized countries can offset a part of their emission reduction obligation by investing in low carbon projects in developing countries, while at the same time, creating pathways of sustainable development in developing countries where such projects come up.

Some of the key issues related to the CDMs in the Indian context have been those related to projects being cornered by giant corporations who skirt sustainable development objectives. Further, the process of stakeholders' consultation has been heavily flawed, not to miss that the 'Designated National Authority' (DNA), which is the key holder for CDM projects in india, lacks a clear perspective on sustainable development.

It is to be noted that the difficulty of defining, 'sustainable development' at the national as well as global level has resulted in delivering skewed 'development' where benefits have not been shared with the communities even within the CDM project

boundary, which means that sustainable development concerns have become marginalized in India.

This needs to be urgently addressed and therefore reforms related to CDM architecture, implementation, role of communities, penalties for project holders for non-compliance and embedding human right safeguards in the follow up regime to be arrived at Paris is of vital significance.

This would also require the global market to play a major role and how it can recognise and tap the various commercial opportunities existing in developing countries like India. However earlier learnings from Clean Development Market Mechanism needed to be taken into consideration during the planning process of the framework.

Therefore while conceiving of any financial framework; it is in India's own interest to mainstream the interests of the marginalized majority while creating various innovative market mechanisms which supports its national priorities and the global principles of finance.

**Global finance principles are driven by the following indicators:**

- Ownership
- Polluter pays
- Additionality
- Adequacy
- Accountability
- Predictability
- Transparency
- Timeliness

**Leveraging Finance through domestic policies and Concerns**

The Govt of India recent announcements on its plans to scale up its national climate actions

1. **On Clean Energy:** the Government has jumped many folds to 100,000 MW from 20,000 MW. This equates to \$100 million investment and 145 million tons of carbon emission saved per year. This is possible because how India has brought down the price of solar from INR 18 per unit to INR 6 per unit.
2. **Prime Minster Climate Council:** Decision on how

Sun Rise Countries can come together in similar lines of OPEC countries and do more collaborative research in solar energy.

3. **National Clean Energy Fund:** The corpus of the fund is built by levying a cess of INR 50 (subsequently increased to INR 100 in 2014) per tonne of coal produced domestically or imported. Total collection so far (till 2014-15) under the Fund is ` INR 17,084.45 crore (Budget Estimates—BE) and 46 clean energy projects worth ` INR 16,511.43 crore have been recommended for funding out of the NCEF till September 2014.
4. **National Adaptation Fund:** An allocation of INR 150 crore (USD 16.67 million) now increased to 160 crore towards National Adaptation Fund. This fund will assist national and state level activities to meet the cost of adaptation measures in areas that are particularly vulnerable to the adverse effects of climate change.
5. **Afforestation:** More accelerated afforestation through CAMPA funds (\$6 billion) and create a carbon sinks.

**Concerns**

**Inadequate adaptation fund**

A specific commitment through INDC may be to increase the budget of the adaptation fund. The National Bank for Agriculture and Rural Development (NABARD) is India's National Implementing Entity (NIE) for the Adaptation Fund created under the UNFCCC. The Adaptation Fund Board has recently sanctioned the first set of two projects submitted by NABARD with an outlay of US\$ 3.2 million for promoting climate resilient agriculture systems in West Bengal and enabling the fisheries sector in Andhra Pradesh.

NABARD has sanctioned a pilot project of ₹21 crore on climate change adaptation in Maharashtra to develop knowledge, strategies, and approaches that will enable vulnerable Development Assistance, it is financing green investments in solar power generation and improvement of electricity distribution networks which includes India's first 1MW canal-top solar power project in Gujarat.

As per the announcement in Budget 2014-15, a 'National Adaptation Fund' with an initial corpus of ₹100 crore was set up to support adaptation

actions to combat the challenges of climate change in sectors like agriculture, water, and forestry. This fund announced in July 2014 was allotted ₹160 crore for the 2015 Budget, which is deemed inadequate for the country's adaptation challenges. Proper estimation is required for budgeting the adaptation fund which can be leveraged to access funding from

other sources as well.

The state-wise loss and damage and funds allotted for natural disasters may provide input to increasing the budget of the adaptation fund and requesting international support for enhancing the fund.

**Table 6** Status of memoranda received from the State Governments seeking additional Central assistance from National Disaster Response Fund (NDRF) during 2014-15

(₹ in crore) Sl. No.	State	Type of disasters	Assistance projected by the State [₹ in crore]	Status of assistance from NDRF
1	2	3	4	5
1.	Kerala- (1st memo)	Flood/ landslide-14	141.65	₹38.77 crore from NDRF subject to the adjustment of 75% of the balance available in the SDRF account for the instant disaster.
2.	Nagaland	Flood/ landslide-14	271.03	The Inter Ministerial Central Team (IMCT) has assessed the damages as per norms. The Sub-Committee of National Executive Committee (SC-NEC) will consider the assessment report and place their report before the High Level Committee (HLC) for approval.
3.	Karnataka	Flood -14	266.76	The IMCT has assessed the damages as per norms. The SC-NEC will consider the assessment report and place their report before the HLC for approval.
4.	Uttar Pradesh	Flood -14	457.30	The IMCT has assessed the damages as per norms. The SC-NEC will consider the assessment report and place their report before the HLC for approval.
5.	Arunachal Pradesh	Flood/ landslide-14	2420.29	The IMCT has assessed the damages as per norms. The SC-NEC will consider the assessment report and place their report before the HLC for approval.
6.	J & K	Flood/ landslides -14	43959.56	The IMCT has assessed the damages as per norms. The SC-NEC will consider the assessment report and place their report before the HLC for approval.
7.	Kerala- (2nd memo)	Flood/ landslide-14	258.32	The IMCT has assessed the damages as per norms. The SC-NEC will consider the assessment report and place their report before the HLC for approval.
8.	Meghalaya	Flood/ landslide-14	422.30	The IMCT has assessed the damages as per norms. The SC-NEC will consider the assessment report and place their report before the HLC for approval.
9.	Andhra Pr.	Cyclone hudhud/ flood -14	21640.63	The IMCT constituted for an on-the-spot assessment of the damage and it is likely to visit shortly in consultation with the State.
10.	Himachal Pr.	Flood/ landslide/ cloudburst-14	832.67	The IMCT constituted for an on-the-spot assessment of the damage and it is likely to visit shortly in consultation with the State.
11.	Odisha	Cyclone hudhud/ flood -14	777.12	The IMCT has assessed the damages as per norms. The SC-NEC will consider the assessment report and place their report before the HLC for approval.
12.	Assam	Flood/ landslide-14	2534.88	The IMCT constituted for an on-the-spot assessment of the damage and it is likely to visit shortly in consultation with the State.

Disaster across 12 states with total expenditure

## National Budget Action

The national budget is seen as the key mechanism towards addressing the needs of a National Climate Fund (NCF). An overview of the earmarked resources for the climate actions under the missions is provided in the table low.

Besides, public finance available domestically, India also needs to enhance its mitigation action target post 2020. This would facilitate identification of finance that would be required for meeting set targets.

At the same time, India must also outline their adaptation finance needs in light of the adaptation action.

There could be many possible strategies that could be undertaken by the Government of India to mobilise additional finance; shift domestic investment patterns and tap the financial market;

1. Setting up a clear and measurable policy frameworks or deploying public finance.
2. Reforming conventional fossil fuel subsidies
3. Levying Carbon Tax

**Table 7 Budget Under National Action plan on Climate Change**

Mission	Budgetary Requirements and Allocations
Jawaharlal Nehru National Solar Mission	Allocation for the 12th five year plan (2012-2017) is INR 8,795 crore (approx. USD 1.4 billion).
National Mission for Enhanced Energy Efficiency	The total funding requirement assessed for the 12th five-year plan period (2012-2017) is INR 190 crore (approx. USD 31 million).
National Mission on Sustainable Habitat	The total funding requirement assessed for the 12th five year plan period (2012-2017) is INR 950 crore (approx. USD 153 million), which is to be met from existing budget of the Jawaharlal Nehru National Urban Renewable Mission (JNNURM).
National Water Mission	Requires budgetary support of INR 89,101 crore (approx. USD 14.4 billion) during the 11th (2007-2012) and 12th (2012-2017) five year plan periods. Proposals for INR 196 crore (approx. USD 31.6 million) have been approved.
National Mission for Sustainable Agriculture	Requires budgetary support of INR 1,08,000 crore (approx. USD 17.4 billion) up to the end of 12th five year plan period (2011-2017). Proposals for INR 13,034 crore (approx. USD 2.1 billion) have been approved.
National Mission for Sustaining the Himalayan Ecosystem	The total funding requirement for 2010 to 2017 is INR 1,695 crore (approx. USD 273 million). Proposals for INR 500 crore (approx. USD 81 million) have been approved.
National Mission for a Green India	The total mission cost is estimated to be INR 46,000 crore (approx. USD 7.4 billion). Funding of INR 13,000 crore (approx. USD 2.1 billion) has been approved for implementation of various activities under the mission.
National Mission on Strategic Knowledge for Climate Change	The total funding requirement for the 12th five year plan period (2012-2017) is INR 2,500 crore (approx. USD 403 million). The allocations to undertake these mission activities will be met out of the budget allocation of the existing scheme of the Department of Science and Technology, Government of India.
State Action Plan on Climate Change (SAPCC)	A common framework for the preparation of SAPCC was developed to harmonise national and state level actions. A combined budgetary requirement of INR 11.32 lakh crore (USD 188.66 billion) has been assessed for implementation of SAPCCs across 30 states.

4. Changing the investment guidelines for national banks.

## Carbon Tax

As discussed before in this paper that climate change is much of an economic problem which needs economic solution too. Based on this theory.

**Government needs to start looking seriously at shifting the burden of taxation away from income and more toward carbon emissions.**

As per analyst price of energy has been traditionally unrealistic in many countries. One of the main reason being that they are set at levels that do not reflect environmental damage, notably climate change, air pollution, and various side effects of motor vehicle use, Whether on energy or any other product, prices should provide consumers with an accurate assessment of the actual costs associated with the product.

As per International Monetary Fund (IMF), a number of countries rely too much on general income, payroll, and consumption taxes for their fiscal objectives, and too little from taxes on energy use. IMF further states that moving from existing to efficient fuel prices, at a global level, would reduce pollution-related deaths from fossil fuel combustion by 63 percent, mostly from reduced coal deaths, reduce energy-related carbon emissions by 23 percent, and raise revenues equal to 2.6 percent of GDP.

## Analysis

As per common assumption, climate is a global public good. One tonne of carbon dioxide emitted in New Delhi has exactly the same effect on global warming as one tonne of carbon dioxide emitted in Paris or Beijing. Or one tonne carbon dioxide emitted in Chhattisgarh or Orissa has exactly the same effect as one tonne from Mumbai or New Delhi.

Therefore, those who do something to decrease their GHG emissions are working for those who reap the benefits of that action while doing nothing. And the negative impacts of climate change on those who are particularly affected by them have no direct link with the latter's level of GHG emissions.

**Therefore what is required is a national and an international agreement that gives Government and businesses an assurance that their competitors will play by the same law. This will enable every decision maker, public or private to take the true cost of global warming into account.**

As per analysts, carbon taxes work best when there is an ample supply of clean, renewable energy. Going by this, it offers India immense opportunities to leapfrog while also fostering inclusive Sustainable development.





# Conclusion

**A**lthough the INDC is compliance to the Convention, yet it can act as one big umbrella to develop a national framework for sustainable development in India.

While it may seem that the implementation of INDC will be an added weight for developing countries, yet it may in fact be a boon in disguise. The idea of an INDC could rather be transformative.

A smart strategic way to a robust INDC is coupling it with ongoing development priorities and SDGs of the country. INDCs could be treated as vehicle for countries to define their goals/targets for mitigation with the overarching goal of sustainable development. Based on this INDC does present an unique opportunity for countries to lead their climate actions whilst setting a path towards a resilient future. More specifically, for India, the INDC should provide an indication of timeline for phasing out fossil fuels and policies to that extent; the peak year for emissions; its roadmap for upscaling RE for the period 2020-2030-2050 with sources of finance and most importantly including of adaptation as part of their broader intended contribution and how much of international support will be needed for the portion of adaptation responses that cannot be implemented without external assistance.

Further, the INDC should not miss out on the core issue – the issue of equity: elements like carbon levy, carbon tax and operationalisation of the same in order to address inclusive climate proof development of its people and communities

Political willingness and commitment to work out a meaningful INDC for India would help build an inclusive low carbon economy which could lead to emissions reductions, sustainable economic development and poverty reduction at the same time.

It can be expected that India will be able to achieve significant non-climate domestic benefits (co-benefits) through INDC development and implementation. For an Indian federal system of governance, it is important for all states to play an active role in engaging with the INDC preparation process as national Contributions would be added up from the federal level. This engagement would provide valuable insights towards understanding key vulnerabilities, climate risks, emission intensive sectors and opportunities that lie before the states. All in all the process of manufacturing an Indian INDC would be a no regrets process which would pave a roadmap for developing a climate resilient nation.



# Annexure

## Annex-I

Fuel Type	Capacity (%)			Generation (%)		
	2012	2017	2030	2012	2017	2030
Coal	56	57	42	70	69	58
Oil	1	1	0	0	0	0
Gas	9	6	3	7	5	3
Hydro	20	15	13	14	12	11
Renewables	12	17	33	6	9	16
Nuclear	2	4	9	3	5	12
<b>Total(Clean Energy)</b>				<b>23</b>	<b>26</b>	<b>39</b>

Source: Report on Twelfth Five Plan Period

Re Source	Low Carbon Growth Report	Bottoms-up Analysis
Solar	275	356
Hydro	230	239
Wind	279	371
Biomass	70	59
Others		16
<b>TOTAL</b>	<b>854</b>	<b>1041</b>

### According to India's foreign policy priorities 2015, activities for energy securities include:

- Expedition of investments in hydropower in Nepal in order to develop it as a long term source of hydropower for India.
- To Push for Financial closure and the completion of nuclear power plants planned with Russia, the U.S. and French companies.
- To diversify away from West Asia and crude oil and tie up natural gas supplies from the U.S., Canada, Russia and Australia

## Annex-II

**Table 3 State-wise Actual Gross Fiscal Deficit, Gross State Domestic Product, Fiscal Deficit @ 4% and state-wise per cent distribution of RE procurement**

S. No.	State	Gross Fiscal Deficit (as % of GSDP)	Gross State Domestic Product (INR bn)	Fiscal Deficit (INR bn)	Fiscal Deficit @ 4%	Deficit @ 4% - for states having less than 4% F.D. (INR bn)	%distribution of expensive RE
1	Andhra Pradesh	3.50%	5,676	198.673	227.05	28.38	10.03%
2	Arunachal Pradesh	3.80%	73	2.760	2.91	0.15	0.05%
3	Assam	11.50%	1,042	119.851	41.69	0.00	0.00%
4	Bihar	6.30%	299	18.820	11.95	0.00	0.00%
5	Chhattisgarh	2.90%	1,297	37.618	51.89	14.27	5.04%
6	Delhi	1.80%	2,588	46.585	103.52	56.94	20.13%
7	Goa	6.70%	299	20.015	11.95	0.00	0.00%
8	Gujarat	3.30%	4,818	158.983	192.71	33.72	11.92%
9	Haryana	4.00%	2,578	103.117	103.12	0.00	0.00%
10	Himachal Pradesh	5.40%	524	28.310	20.97	0.00	0.00%
11	Jammu & Kashmir	5.80%	477	27.671	19.08	0.00	0.00%
12	Jharkhand	2.10%	1,067	22.406	42.68	20.27	7.17%
13	Karnataka	3.80%	3,989	151.579	159.56	7.98	2.82%
14	Kerala	3.10%	2,682	83.137	107.27	24.14	8.53%
15	Madhya Pradesh	3.40%	2,402	81.681	96.10	14.41	5.10%
16	Maharashtra	3.70%	10,296	380.960	411.85	30.89	10.92%
17	Manipur	4.80%	92	4.415	3.68	0.00	0.00%
18	Meghalaya	5.60%	146	8.201	5.86	0.00	0.00%
19	Mizoram	9.10%	62	5.623	2.47	0.00	0.00%
20	Nagaland	12.10%	109	13.229	4.37	0.00	0.00%
21	Odisha	3.70%	1,864	68.952	74.54	5.59	1.98%
22	Punjab	3.40%	2,213	75.253	88.53	13.28	4.69%
23	Rajasthan	4.50%	3,034	136.511	121.34	0.00	0.00%
24	Sikkim	12.00%	57	6.782	2.26	0.00	0.00%
25	Tamil Nadu	3.40%	5,473	186.071	218.91	32.84	11.61%
26	Tripura	13.20%	163	21.553	6.53	0.00	0.00%
27	Uttar Pradesh	4.90%	5,885	288.349	235.39	0.00	0.00%
28	Uttarakhand	8.30%	776	64.391	31.03	0.00	0.00%
29	West Bengal	6.70%	4,436	297.241	177.46	0.00	0.00%

Source: Planning Commission and Infraline Analysis

## Annex-III

The below table gives details on the present transport development trend in India and Requirement for 2030 long lasting transport plan.

Transportation system	Present Status	Motivating Policy	Recommendations for Efficiency Transportation by 2030
Indian Railways	Third largest, with 7500 railway stations, 55339 passenger coaches with 239321 freight cars and dedicated freight corridor under development.	No	Investment should be increased from Rs 2.2 trillion to 14 trillion  Railways – investment should rise to 4 trillion
Road ways (National / State and Public works/ Rural roads)	4.7 million kms of Road	PMGSY and JSY	Increase in Public sector investment to 4.3 %
Civil Aviation	162 million passenger throughput with 75 % domestic		
Ports (Freight Transport)	12 major and 200 notified non major ports		

## Annex-IV

### ISSUES with MRV

In practice, the specific design of MRV will differ depending on the specific functions for which the MRV system shall serve. India as a country should decide what goals and level of activity are appropriate in each category. Monitoring (or measuring) involves the methods used to track specific activities and impacts. Reporting refers to the approach used to transparently communicate selected information to national stakeholders and/or the international community. Verification aims to ensure that selected reported information is accurate and complete.

- The reference point (including, as appropriate, a base year)
- Time frames and/or periods for implementation
- Scope and coverage
- Planning processes
- Assumptions and methodological approaches including those for estimating and accounting for anthropogenic greenhouse gas emissions and, as appropriate, removals -IPCC, CDM meths can be used
- How the Party considers that its intended nationally determined contribution is fair and ambitious, in light of its national circumstances, and how it contributes towards achieving the objective of the Convention as set out in its Article 2
- Other information

## Annex-V

### Paragraph 14 of the lima call for action states

The Conference of the Parties...Agrees that the information to be provided by Parties communicating their intended nationally determined contributions, in order to facilitate clarity, transparency and understanding, may include, as appropriate, inter alia, quantifiable information on:

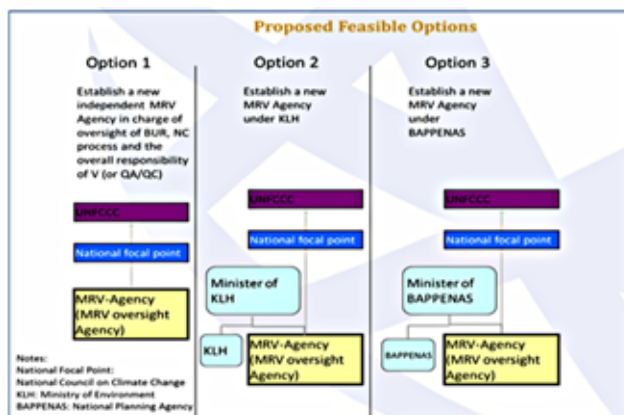
“The INDCs for the participatory nations were decided as a precise, transparent and achievable communications with detailed scope; sectorial coverage; methodology followed for calculating the GHG emissions and its attributes to climate change and most importantly some insight and guidance on the Monitoring and Verification protocol (MRV).

Governments of all nations should also communicate the present status and timeline for the initiatives, which was planned as a National long-term goal or policies to mitigate the future climate change hazards.

## Setting Up Domestic MRV System

Setting up a domestic MRV system would be one of most essential element for success and compliance of targets as laid out in National INDCs. It would be interesting to see what does a domestic MRV system will include at national level. There is need to create an MRV system framework which emulates the learning and outcome of UNFCCC-CDM/PoA/JI schemes. However, the scope of UNFCCC-Market schemes shall be extended to cover policy, finance, technology and capacity building programmes.

Successful set-up and operation of a national MRV system requires resources that are available over a longer timeframe. National and potentially also sectoral circumstances have to be considered when developing a domestic MRV system. The suggestive model of Government of Indonesia for designing Domestic MRV systems can be a good source of inspiration.



Indonesia published an assessment for a potential institutional structure related to MRV in April 2012. A clear need is seen to designate or establish an agency/department responsible for the oversight of the MRV processes of the national inventory, mitigation actions and tracking support as well as overall QA/QC.

Government of India can consider following 3 options:

- Establish a new independent MRV agency in charge of the oversight of Biennial Update Reports, the National Communication process and overall responsibility for Verification (or QA/QC)
- Establish a new MRV agency under the Ministry of Environment, widening the responsibility of the current Agency of Inventories under the Environment Ministry.
- Establish a new MRV agency under the Niti Ayog

## References

1. Johann Dupuis and Peter Knoepfel. *The Adaptation Policy Paradox: the Implementation Deficit of Policies Framed as Climate Change Adaptation*
2. Yukari TAKAMURA. *How to Enhance the effectiveness of International Regime on Climate Change: Challenges Towards Post--2020*
3. Kelly Levin and David Rich -*INDCs: Bridging the Gap Between National and International Climate Action*
4. Axel Michaelowa. *The INDC and NAMA landscape – where do we stand after Lima?*
5. Kelly Levin and Jared Finnegan, *Designing National Commitments to Drive Measurable Emissions Reductions after 2020*
6. MNRE, Government of India- *Cost of 1 MW programmes and Technologies*
7. Darshini Ravindranath, Rajiv Kumar Chaturvedi. *Mainstreaming Adaptation to Climate Change in Indian Policy Planning*
8. Sudatta Ray, Vaibhav Chaturvedi
9. Karthik Ganesan, And Arunabha Ghosh, *Ceew policy brief India's Intended Nationally Determined Contributions Renewable Energy and the Pathway to Paris*
10. *Planning Commission Government of India The Final Report of the Expert Group on Low Carbon Strategies for Inclusive Growth.*
11. *The Final Report of the Expert Group on Low Carbon Strategies for Inclusive Growth*
12. K.Sudhakar, Trishna Anand, Tulika Srivastava, M.Premalatha. *Assessment of carbon mitigation potential of various Biofuels in Indian Context*
13. World Research Institute. *Draft list of detailed upfront information for consultation*
14. *International Partnership on Mitigation and MRV. Process guidance for Intended Nationally Determined Contributions (INDCs)*
15. *National Transport Development Committee. Macroeconomic investment Requirements 2012-2032*
16. *National Transport Development Committee. India Transport Report, Moving India to 2032*
17. *NAPCC Evaluation Report. An Evaluation of Indian National Action plan on Climate change*
18. GIZ. *How are INDCs and NAMAs linked?*
19. Kelly levin, david rich, Jared finnegan, and yamide dagnet. *Ex-ante clarification, transparency, and understanding of intended nationally determined mitigation contributions.*
20. *Asian Development bank. Climate Proofing ADB Investment in Transport Sector*
21. *United Nation Framework Convention on Climate Change. <https://cdm.unfccc.int/>*
22. *Elements and Options for National MRV Systems based on the Autumn School of the International Partnership on Mitigation and MRV "MRV – today, tomorrow and the future"*





**Indian Network on Ethics & Climate Change (INECC)**

**Ph. No.:** +91 9899451979

**E-mail:** [inecc1996@gmail.com](mailto:inecc1996@gmail.com)

**Website:** [www.inecc.net](http://www.inecc.net)



**GreenWorks Consulting**

**Ph. No.:** +91 1146120706

**E-mail:** [info@greenworks.co.in](mailto:info@greenworks.co.in)

**Website:** [www.greenworks.co.in](http://www.greenworks.co.in)



**Laya**

**Ph. No.:** +91 8916539729

**E-mail:** [layarc@gmail.com](mailto:layarc@gmail.com)

**Website:** [www.laya.org.in](http://www.laya.org.in)