PARTNERSHIP FOR MARKET READINESS (PMR)

Market Readiness Proposal (MRP)
India

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pmr
PARTNERSHIP FOR
MARKET READINESS

Contents

List of Figures

List of Tables

List of Abbreviations

BUR	Biennial Update Report
CAGR	Compounded Annual Growth Rate
CDM	Clean Development Mechanism
CDP	Carbon Disclosure Project
CEMS	Continuous Emission Monitoring Systems
CER	Certified Emission Reduction
CERC	Central Electricity Regulatory Commission
CPCB	Central Pollution Control Board
CPLC	Carbon Pricing Leadership Coalition
CPPs	Captive Power Plants
DC	Designated Consumers
EESL	Energy Efficiency Services Limited
ESCerts	Energy Savings Certificates
ETS	Emissions Trading Scheme
GDP	Gross Domestic Product
GHG	Green House Gas
IEX	Indian Energy Exchange
IMG	Inter-ministerial Group
INDC	Intended Nationally Determined Contribution
LCCR	Low Carbon Committee Report
LULUCF	Land Use, Land Use change and Forestry
MBMs	Market Based Mechanisms
MOEFCC	Ministry of Environment, Forest and Climate Change
MoF	Ministry of Finance
MTOE	Million Ton of Oil Equivalent
MWh	Megawatt Hour
NAAQS	National Ambient Air Quality Standards

NAF	National Adaptation Fund
NAMA	Nationally Appropriate Mitigation Action
NATCOM	National Communications
NCEF	National Clean Energy Fund (now National Clean Environment Fund)
NLDC	National Load Dispatch Center
NMEEE	National Mission for Enhanced Energy Efficiency
PAT	Perform-Achieve-Trade
PM	Particulate Matter
PXIL	Power Exchange India Limited
R&D	Research and Development
RE	Renewable Energy
REC	Renewable Energy Certificate
REDD+	Reducing Emissions from Deforestation and Forest Degradation “plus”
RHI	Renewable Heat Incentive
RPO	Renewable Purchase Obligation
SAPCC	State Action Plan on Climate Change
SEC	Specific Energy Consumption
SERCs	State Electricity Regulatory Commissions
SNA	State Nodal Agency
SPCB	State Pollution Control Boards
UNFCCC	United Nations Framework Convention on Climate Change
VCM	Voluntary Carbon Market

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Executive Summary

India is one of the largest emerging economies with a population of over one billion. Currently, it is grappling with several economic and developmental challenges. Despite these challenges, India has consistently shown leadership in global efforts to limit climate change. While absolute GHG emissions show a rising trend, India's per capita emissions continue to be one of the lowest in the world. India proposed an ambitious target of reducing its GHG emission intensity by 33-35% by 2030 relative to 2005 in its Intended Nationally Determined Contributions (INDCs). To achieve this goal, India needs ambitious and aggressive domestic policies that facilitate a shift into low carbon societies but at the same time ensure India's developmental priorities are met. In addition to regulations and policies, instruments like carbon pricing and ETS could be implemented. In this context, India seeks a grant through PMR for preparatory work to implement market based mechanisms (MBMs).

Building Block 1 (BB1) provides an overview of the country's development objectives along with an introduction to its key national policies and plans focusing on climate change mitigation. The broad climate policy framework is laid down by the National Environment Policy (NEP) and the National Action Plan on Climate change (NAPCC), which is based on the co-benefits approach[1] and provide strategic guidance to implement actions with both development and climate objectives. BB1 will provide a summary of trends in the country's rising greenhouse gas (GHG) emissions. India's GHG emissions are projected to continue increasing due to the economic growth required to address its developmental challenges. However, domestic efforts to transition towards a low carbon trajectory have already been initiated, as detailed by an expert group in the Low Carbon Committee Report (LCCR).[2] The LCCR identifies priority areas and suggests a range of mitigation options across various sectors up to 2030. In the international context, as discussed above, India has set ambitious INDC targets.[3] BB1 also provides a brief overview of India's experience with international carbon market and domestic market based mechanisms and pricing instrument.

Building Block 2 (BB2) elaborates on three existing domestic market instruments in India, namely the Perform, Achieve and Trade (PAT) mechanism, the Renewable Energy Certificate (REC) mechanism and a carbon pricing instrument, namely the National Clean Energy Fund (NCEF). The section elaborates on the current status, achievements, and challenges for these instruments.

- The PAT scheme is an example of an innovative regulatory instrument linked with a market mechanism through specific energy consumption (SEC) reduction targets and Energy Saving Certificates (ESCerts). Under this scheme, targets are unit specific[4] but promote relative responsibility as more efficient units

[1] The co-benefits approach allows unbundling of the additional positive externalities or co-benefits associated with climate mitigation actions. In its Five Year Plan, India provides a co-benefits framework as a guidance for formulating policy and decisions for sustainable growth. Please see Twelfth Five Year Plan 2012-17 (2013). Planning Commission, Government of India. p. 141. Retrieved from http://planningcommission.gov.in/plans/planrel/12thplan/pdf/12fyp_vol1.pdf

[2] The Final Report of the Expert Group on Low Carbon Strategies for Inclusive Growth (2014). Planning Commission, Government of India. Retrieved from http://planningcommission.nic.in/reports/genrep/rep_carbon2005.pdf

[3] India's Intended Nationally Determined Contribution (2015). UNFCCC. Retrieved from http://www4.unfccc.int/submissions/INDC/Published%20Documents/India/1/INDIA%20INDC%20TO%20UNFCCC.pdf

[4] The PAT scheme establishes plant-specific targets rather than a sectoral target. In other words, the specific energy consumption norm is specified for each designated consumer in the baseline year and the target year. For more information, please see Shakti Sustainable Energy Foundation (2014). The PAT Scheme: Analysis, Insights and Way

will have lower targets relative to less efficient units. It also provides a domestic MRV system. The design of the scheme has evolved through multiple iterations since its launch in 2008. The PAT scheme is an example of inclusive policy making through a consultative approach at each stage of policy development, with inputs from various ministries, designated consumers (DCs), industry associations, financial institutions, and research organizations that contributed to its robustness. The scheme has faced implementation issues due to institutional capacity constraints. One of the key challenges for domestic expansion of PAT is setting energy efficiency targets that avoid penalizing efficient industries and setting lower targets for non-compliant industries. The scheme is yet to generate adequate trading volumes for market liquidity.

- The REC mechanism is a market-based instrument that facilitates trading for the fulfillment of Renewable Purchase Obligations (RPO) by Obligated Entities, which comprise distribution utilities, captive power producers and open access consumers. Technologies such as wind, solar PV, solar thermal, biomass, and small hydro are eligible to earn RECs. There are two categories of REC certificates, namely solar RECs and non-solar RECs. There are, however, several barriers such as the lack of market aggregators (since trading is only allowed through energy exchanges), and the lack of a stringent and effective compliance mechanisms.
- India established a carbon pricing instrument in the form of the National Clean Energy Fund (NCEF) through a levy on coal. However, the fund is largely underutilized, partly due to the lack of clarity on eligibility criteria for projects that can be funded by the NCEF, and limited institutional capacity for project development. In July 2015, the NCEF had already grown to over US$2.5 billion.

The PMR grant is sought to assess the current status and barriers of effective implementation of PAT and REC, as well as key challenges in the NCEF. This will provide recommendations to improve the design elements of the existing schemes, and enhance preparedness for scaling-up these schemes. The most important objective of this exercise is to offer key lessons for the development of the new Market Based Mechanism (MBM) pilot which is planned in BB4.

In its first biennial update report (BUR), India recognized the challenges of establishing a National Inventory Management System (NIMS) and implementing a domestic Measurement, Reporting and Verification (MRV) system. The establishment of a strong MRV system is one of the key capacity building needs for the development of MBMs and would also support India's GHG reporting, including BURs. Building Block 3 (BB3) focuses on the development of a registry to link domestic MBMs and the National Inventory Management System (NIMS) in order to provide a supporting framework for the design, piloting, and scaling-up of MBMs. One of the proposed market readiness components aims to build a registry system that records GHG emission data and implements MBMs by supporting issuance, transfer and cancellation of credits. This section describes the broad design requirements for a centralized data management and registry platform for India. This platform will form the foundation for capturing the country's action on climate change mitigation. This will be developed by looking at international best practices of designing and implementing registries. A phased and integrated approach to design and implement the registry is suggested to allow for flexibility and scalability.

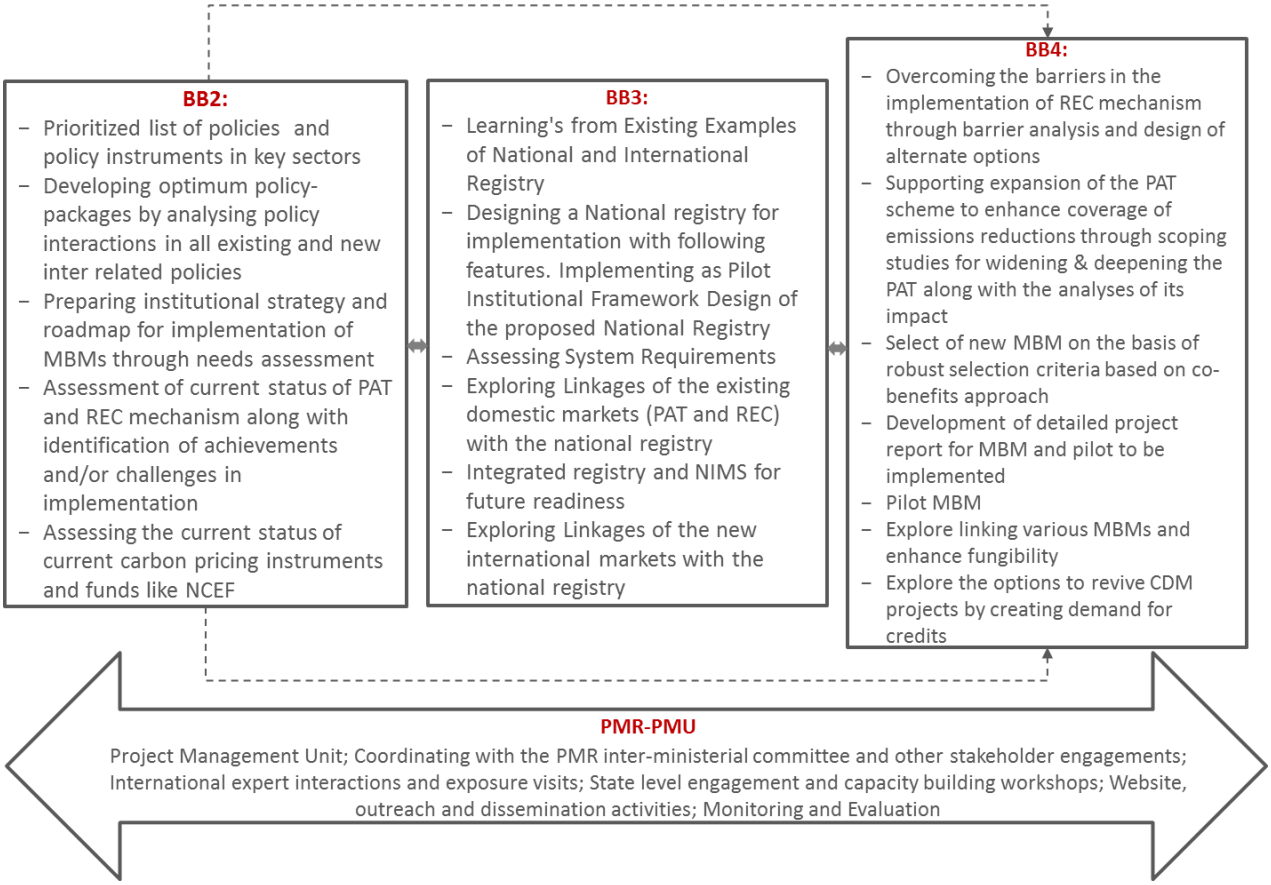
Forward. p. 52. Retrieved from http://shaktifoundation.in/wp-content/uploads/2014/02/The-PAT-scheme-Analysis-Insights-and-Way-Forward1.pdf

Building Block 4 (BB4) outlines the framework for designing new MBMs in the sector(s) identified in BB1. Augmenting sector-specific policies with climate co-benefits encourages reduction of emissions and mitigation of climate change impacts without hindering economic growth and development. This section builds on BB2 and outlines activities that help overcome barriers of effective implementation of existing schemes and support scaling up of existing schemes. Further, this section explores the potential opportunities for market linkages and synergies between existing and future mechanisms in India. Linking these MBMs and NIMS in the developed registry in BB3 is also considered.

Building Block 5 (BB5) identifies the main institutions and stakeholders who will contribute to the development of market readiness components described in the MRP. This section describes the proposed governance structure for managing the activities discussed above. This section also details additional project management and outreach activities proposed for the PMR implementation phase.

Building Block 6 (BB6) summarizes the schedule of activities and the proposed budget for each of the activities.

Figure 1: Summary of MRP Building Blocks



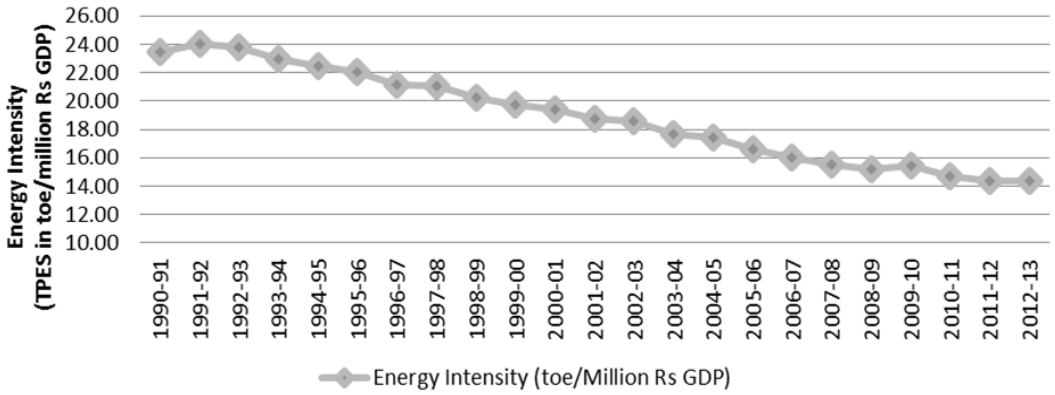
1 Building Block 1. Big Picture: Policy Context

This section provides an overview of development objectives of the country along with an introduction to its key national policies and plans focusing on climate change mitigation. It provides a summary of India's greenhouse gas (GHG) emission trends and briefly describes projected emissions. BB1 also outlines the policy-making process in India in the context of climate change. While the climate policies are guided by the PM's Council on Climate Change and require cabinet approval, they are implemented by relevant ministries. Some of the policies are mandated by the central government but implemented by the state governments. This section also briefly discusses the country's experience with international and domestic Market Based Mechanisms (MBMs). Lastly, BB1 highlights India's voluntary international pledges.

1.1 Climate change mitigation and development policy objectives

India is a unique country with a diverse geography ranging from vast coastline to the great Himalayan mountain range in the north. India accounts for about 17.5% of world's total population, and over 2.4% of the total surface area. India has considerable natural and mineral resources. However, it is still grappling with several developmental challenges such as poverty, paucity of basic infrastructure, and limited energy access. 30% of India's population is still extremely poor, about 20% lack proper housing, over 25% lack access to electricity and about 70% lack access to safe drinking water. To balance its economic objectives with climate change concerns, India aspires to enhance its Human Development Index (HDI) from 0.586 in 2015 to 0.9 in the future while limiting per capita energy consumption to 1.5 – 2 toe[5]/year, in contrast to developed countries where high HDI levels are typically accompanied by per capita energy consumption levels of at least 2.5 – 3 toe/year.

Figure 2: Energy intensity (TPES in toe/INR Million GDP)



Source BEE (2014)

The Indian economy has grown rapidly at an annual average rate of 7.3% per annum over the last 15 years while the energy sector has grown at a rate of 5.8% per annum. It is projected that the economic growth rate will escalate to 8-10% by 2030 due to advances in manufacturing. The increased growth of the economy will consequently demand an expansion of the energy sector. Expansion of the energy sector will most likely be accompanied by increased GHG emissions, especially from the industrial sector where emissions are expected

[5] Tons of oil equivalent

to increase to 448 mtCO_2 in 2020 and 806 mtCO_2 in 2030. Relative to 2005 levels, India's emission intensity dropped by 12% in 2012 to 0.36 kg CO_2/$. India has also seen a steady decline in its energy intensity as shown inFigure 2: Energy intensity (TPES in toe/INR Million GDP)

India is extremely vulnerable to climate change, particularly due to the increased variability in weather patterns, increased floods, and droughts. Over 50% of the population is dependent on agriculture, a predominantly rain-fed sector. Sea-level rise also poses a risk to the country considering the fact that 1.3% of the total land and 3.8% of the total population is below the elevation of 5 meters.

Despite these challenges, India has put forth an ambitious set of goals in its INDCs as illustrated below (see

Box 1: India's INDC goals). On the mitigation side, it has four key goals, namely:

i) Reduce the emissions intensity of its GDP by 33 to 35 % by 2030 relative to 2005 levels;
ii) Achieve about 40% cumulative electric power installed capacity from non-fossil fuel based energy resources by 2030;
iii) Create an additional carbon sink of 2.5 to 3 billion tons of CO_2 equivalent through additional forest and tree cover by 2030; and
iv) Propagate a healthy and sustainable way of living based on traditions and values of conservation and moderation.

In order to achieve these goals, India proposes a host of measures, including deepening and broadening the scope of its existing policies. In addition, India seeks support in the form of technology transfer and low cost climate finance, from international parties as well as sources such as the Green Climate Fund (GCF).

Box 1: India's INDC goals

1. To put forward and further propagate a healthy and sustainable way of living based on traditions and values of conservation and moderation.
2. To adopt a climate friendly and a cleaner path than the one followed hitherto by others at corresponding level of economic development.
3. To reduce the emissions intensity of its GDP by 33 to 35 percent by 2030 from 2005 level.
4. To achieve about 40 percent cumulative electric power installed capacity from non-fossil fuel based energy resources by 2030 with the help of transfer of technology and low cost international finance including from Green Climate Fund (GCF).
5. To create an additional carbon sink of 2.5 to 3 billion tonnes of CO2 equivalent through additional forest and tree cover by 2030.
6. To better adapt to climate change by enhancing investments in development programmes in sectors vulnerable to climate change, particularly agriculture, water resources, Himalayan region, coastal regions, health and disaster management.
7. To mobilize domestic and new & additional funds from developed countries to implement the above mitigation and adaptation actions in view of the resource required and the resource gap.
8. To build capacities, create domestic framework and international architecture for quick diffusion of cutting edge climate technology in India and for joint collaborative R&D for such future technologies.

Source: India's Intended Nationally Determined Contributions

India has already instituted many domestic measures to tackle climate change. The key policy objective is to remove the "development deficit", which will be achieved by simultaneously addressing climate change and development challenges using a co-benefits approach. Poverty alleviation and socio-economic development remain priority areas for India. Therefore, there is an urgent need to design and fund ecologically-sustainable programs that generate income and reduce poverty. This need is reflected in the overall framework for climate policy in India under the National Environment Policy (2006) and the National Action Plan on Climate Change (NAPCC, 2008). The NAPCC notes that "India's development path is based on its unique resource endowments, the overriding priority of economic and social development and poverty eradication, and its adherence to its civilizational legacy that places a high value on the environment and the maintenance of ecological balance".

The NAPCC highlights India's most pressing climate concerns and outlines several strategies for climate change action. These goals can be achieved through a new development approach that enhances ecological sustainability and emphasizes climate co-benefits. Guided by the principles of sustainable development, NAPCC aligns economic and social objectives with environmental ones. It highlights key principles for protection of poor and vulnerable communities, effective implementation of policies, and promotion of sustainable development through market, regulatory, and voluntary mechanisms. The action plan consists of eight national missions (see Table 1): the National Solar Mission, the National Wind Energy Mission, the Energy Efficiency Mission, the Sustainable Habitat Mission, the Sustainable Agriculture Mission, the Mission on Sustainable Himalayan Eco-systems, and the National Mission for a Green India.

Each individual mission provides overarching adaptation and mitigation objectives in relevant economic sectors. After the launch of NAPCC, some existing policies were amended in order to strengthen individual missions. Further, Indian government formulated new policies, identified capacity building and institutional needs, designed incentive structures, and identified key stakeholders. A range of policy instruments were identified to create an impetus for mitigation in all target economic sectors. Some of the policy instruments identified to address climate change mitigation were price instruments (such as the coal cess and feed-in-tariffs), regulatory instruments (legislations), market based instruments (Renewable Purchase Obligation (RPO), Renewable Energy Certificate (REC), Perform-Achieve-Trade (PAT), voluntary instruments (awareness building programs and labelling of appliances), targeted research and development (R&D), and policy support instruments for different sectors. NAPCC was the first step that allowed stakeholders and state governments to address climate change concerns in order to build, develop, expand, enable, and implement required programs and strategies on climate change, as summarized in Box 2.

While the central government formulates policy at the national level, implementation is facilitated through state and local authorities in their respective jurisdictions. India assumes this approach as a critical intervention in translating national level policies and objectives into local contexts for effective delivery. Through states governments, national policies percolate to a large number of state level sectors and actors thereby addressing national priorities on a state scale. This is important because disaggregated climate data, vulnerabilities and opportunities are better understood at the state and local levels rather than at the country level. In addition, measurement and monitoring at the state level can be taken up more efficiently. Hence, many of the national policies in India are implemented through the states.

Table 1: Snapshot of Eight Missions of NAPCC

Mission	Aim	Date	Implementing agency
National Solar Mission	To increase the share of solar energy in the total energy mix and to achieve grid parity by 2022. To add 100 GW solar capacity in the country by 2022.	2010	Ministry of New and Renewable Energy
National Mission for Enhanced Energy Efficiency	To promote energy efficiency through demand-side management program and supply-side energy efficiency shifts	2010	Ministry of Power, Bureau of Energy Efficiency
National Mission for Sustainable Habitat	Promote energy efficiency in buildings, management of solid waste, and GHG mitigation in the transportation sector	2010	Ministry of Urban Development, Ministry of Housing and Urban Poverty Alleviation
National Water Mission	Conservation of water, minimizing wastage, and ensuring equitable distribution between states	2011	Ministry of Water Resources
National Mission for Sustaining the Himalayan Ecosystems	Management measures for sustaining and safeguarding the Himalayan glacier and mountain ecosystem	2014	Ministry of Science and Technology
National Mission for Green India	Enhancing ecosystem services and carbon sinks through afforestation on degraded forestland and expansion of forest and tree cover.	2011	Ministry of Environment, Forests and Climate Change
National Mission for Sustainable Agriculture	Ensuring food security and protecting land, water, biodiversity, and genetic resources for sustainable production of food	2010	Ministry of Agriculture and Cooperation
National Mission on Strategic Knowledge on Climate Change	Research and technology development into various aspects of climate change	2010	Ministry of Science and Technology, Ministry of Environment, Forest and Climate Change, Ministry of Earth Sciences

Source: Government of India

In 2009, all the state governments were asked to prepare their State Action Plan on Climate Change (SAPCC), by adapting and contextualizing NAPCC objectives to the state-specific circumstances. 32 States have developed SAPCCs that seek to integrate climate change concerns in their planning processes. States have

included ambitious adaptation and mitigation measures which are, in most cases, sector-specific as well as cross-sector time-bound priority actions in their respective SAPCCs. For the actions to feed into developmental planning, the States have also indicated budgetary requirements, supplemented with details of the necessary institutional and policy infrastructure to support the operationalization of actions.

In this context, it is useful to understand the Indian federal structure where the constitutional demarcation of responsibilities and areas of jurisdiction play an important role in defining the contours of environmental federalism and climate policy. The Indian Constitution places some of the sectors directly related to natural resources, such as agriculture, water, fisheries, mines, and land use, under the jurisdiction of individual States. Additionally, sectors that are of particular concern to policy makers by virtue of being energy- and emission-intensive in nature (e.g. selected industries and transport sectors) are also included in the State list. At the other end of the spectrum, several areas relevant to climate policy, including trade representation, agreements and conventions, atomic power, mineral and oil resources, fall within the purview of the Union government. This division of responsibility highlights the magnitude of influence States could potentially exert on climate policy and environmental decision-making in general. While adaptation is a priority for the states, mitigation measures, especially in the area of renewable energy and energy efficiency, have gained support from programs initiated by the central government.

The role of state governments in policy-formulation is particularly important in a country like India where socio-economic and climate-geographic vary widely across the nation. As a result of these varied socio-economic and geographic scenarios, mitigation responsibility, mitigation potential and capacity will also vary, thereby making it necessary to tailor policies to local circumstances. Further, state governments have access to unique information pertinent to ground realities that may not be available at national levels. Almost all of these programs are now collated within the larger umbrella of state action plans. Some of the other standalone programs implemented through the states are renewable purchase obligations (RPO), feed-in-tariffs, state energy conservation funds, small and hybrid hydroelectric systems, and energy conservation building codes. At the same time, states face several constraints such as limited capacity for science-based planning, target formulation, and availability of funds and affordable technology, among others.

The overall approach towards climate change policy making in India is to prioritize policies that yield greater de-carbonization without compromising the developmental imperatives of the country. This two-fold objective is reflected in the co-benefits approach, which accounts for the full range of co-benefits and co-costs associated with the spillover effects of the key policies. Under the co-benefits framework outlined in the low carbon committee report (LCCR) four major co-benefits can be sought, namely economic growth, inclusion (equality), local environment, and GHG mitigation. The LCCR identified a menu of options for a low carbon development path for India. This list of options requires further study to identify the appropriate policy instrument for each sector to deliver high emission reductions. Identifying the multiple benefits and development linkages of policies is crucial for analysis in light of the broader developmental objectives such as growth, inclusion, and local environment, and carbon mitigation gains that the government seeks to achieve.
The LCCR found that energy efficiency in households, buildings, industry, and transport plays an important role. In addition, low carbon supply technologies (e.g. solar and wind technology) and increased use of public transport and non-motorized transport are critical. Increased sequestration through enhanced green cover under the Green India Mission would also contribute towards the low carbon transition. Reduced local

environmental pollution and reduced dependence on imported energy were also identified as benefits of a low carbon strategy.

Box 2: National Action Plan on Climate Change – A Summary

India released the National Action Plan on Climate Change (NAPCC) in June 2008 to outline its national strategy that aims to enable the country adapt to climate change and enhance the ecological sustainability of India's development path. It stressed that maintaining a high economic growth rate is essential for increasing living standards of a vast portion of the population and reducing vulnerability of communities to the impacts of climate change. While maintaining high economic growth rates as a priority, the plan "identifies measures that promote our development objectives while also yielding co-benefits for addressing climate change effectively." Eight National Missions form the core of the National Action Plan, representing multi-pronged, long term and integrated strategies for achieving key goals in the context of climate change. The eight National Missions are the National Solar Mission, National Water Mission, and National Mission on Sustaining Himalayan Eco-system, National Mission on Enhanced Energy Efficiency, National Mission on Strategic Knowledge for Climate Change, National Mission for a Green India, and National Mission on Sustainable Habitat. These Missions are in the process of being institutionalized by the respective Ministries and operationalised through inter-sectoral groups. Nodal ministries for each of the missions are directed to develop objectives, implementation strategies, timelines, and monitoring and evaluation criteria, to be submitted to the Prime Minister's Council on Climate Change. The Council will also be responsible for periodically reviewing and reporting on each mission's progress. To be able to quantify progress (in the form of reduced emissions and adaptation benefits), appropriate indicators and methodologies will be developed.

The LCCR emphasizes the need for developing new market based mechanisms (MBMs) for sectors that are not covered by existing mechanisms. In addition to highlighting the importance of existing MBMs, the report discusses the possibility of considering a new MBM similar to the Renewable Heat Incentive (RHI) that was introduced in the United Kingdom. The expert group also notes the lack of clarity on the potential for linking such domestic measures, as well as the potential for linking with global carbon markets. The report points out that India must be prepared to link its markets.

India's policy framing process iterates the need for a unified framework for measuring, pursuing, and achieving faster, sustainable and more inclusive growth. More recently, the Government of India's 12th Five Year Plan acknowledges the need for adopting low-carbon strategies to improve the sustainability of the growth processes, with carbon mitigation being an important co-benefit (Planning Commission, 2013). In order to build domestic capacity to take low carbon development actions within the country, the Indian government has also set up two important funds: the National Clean Energy Fund (NCEF) established in 2010 through a cess on coal production and imports, and the National Adaptation Fund (NAF) on Climate Change to support the country's adaptation requirements.

In summary, India has implemented two types of policy instruments over the years, namely:

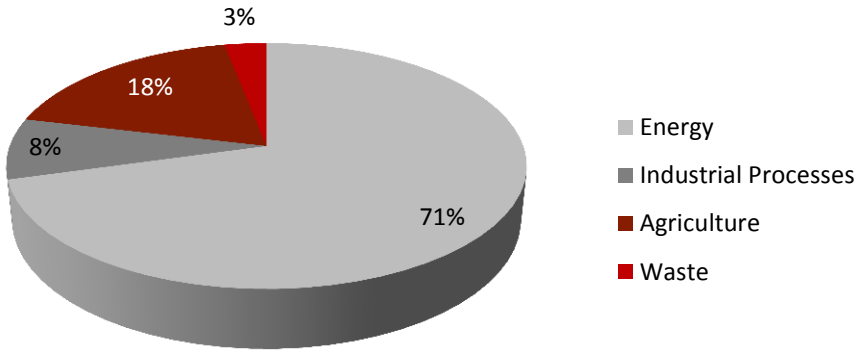
i) Domestic market mechanisms such as the renewable energy certificates markets (REC) and energy efficiency certificate markets (PAT), and;
ii) Carbon pricing policies such as carbon tax in the form of coal cess.

India's participation in the Clean Development Mechanism (CDM) of the Kyoto Protocol since 2005 demonstrates India's interest in MBMs for climate action, and the large number of CDM projects indicates interest from the private sector in capitalizing on this opportunity.

1.2 Trends in India's GHG emissions

India had one of the lowest contributions to historical greenhouse gas (GHG) emissions, and its per capita emissions are among the lowest in the world. India submitted its first biennial update report (BUR) to UNFCCC in January 2016 to fulfill reporting requirements under the Convention. The report presents the national GHG inventory for 2010, prepared in accordance with IPCC guidelines. India's per capita GHG emissions in 2010 were 1.56tCO_2 equivalent, which is less than one-third of the world's per capita emissions. India also achieved a reduction in GDP emission intensity of 12% between 2005 and 2010. This is consistent with India's voluntary pledge to reduce the emissions intensity of its GDP by 20-25% by 2020, compared to 2005 levels (BUR, GOI 2015). For the year 2010, India's total GHG emissions are estimated to be 1,884.31 million tons, including Land Use, Land Use Change, and Forestry or LULUCF (Biennial Update Report, 2015).

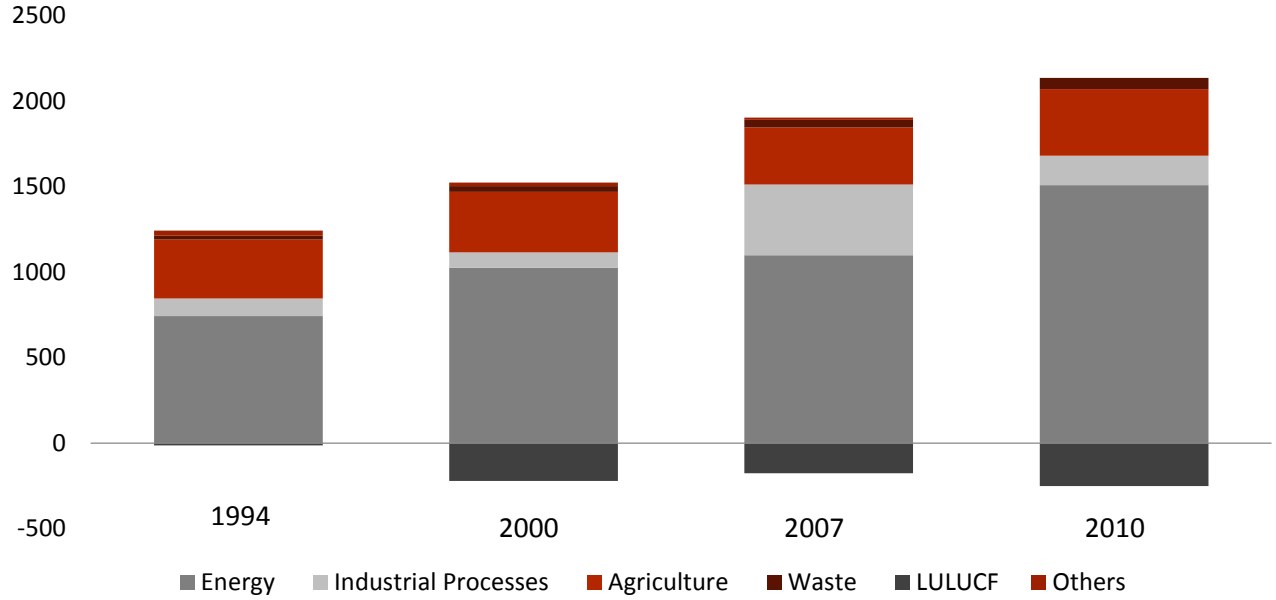
Figure 3 GHG Emissions of India by Sector for the year 2010 (LULUCF not included)



Source: Biennial Update Report, 2015

Prior to this, detailed emissions inventory for all sectors was produced under the Second NATCOM published in 2012, the Indian Network for Climate Change Assessment published by the Ministry of Environment in 2010, and the First NATCOM published in 2004. India's net GHG emissions have grown from 1,228.54 million tons of CO_2e in 1994 to 1,884.31 million tons of CO_2e in 2010. Between 2000 and 2010, total GHG emissions (including LULUCF) grew at an average compounded annual growth rate (CAGR) of 3.71% relative to 2000 levels. The overall GHG emissions trend since 1994 is presented in Figure 4 below. It suggests that sectoral emissions have increased from 1027.01 MtCO_2e in 2000 to 1501.1 MtCO_2e in 2010 for the energy sector, indicating a compounded annual growth rate (CAGR) of 7.2%, with industrial emissions growing at a CAGR of 5.3%, agricultural emissions at a CAGR of 1.2%, and emissions from waste at a CAGR of 2.2% during this period.

Figure 4 GHG Emissions Trend for India from the year 1994 to 2010



Source: Compiled from INC, SNC, INCCA and BUR

1.2.1 GHG emission projections

There are a number of studies that project India's GHG emissions. In 2008, the Ministry of Environment, Forests and Climate Change (MOEFCC) compiled the results of five independent modelling studies[6] that used different techniques and assumptions. According to the MOEFCC report, estimates of India's GHG emissions in 2031 vary between 4.0 x 10^9 -7.3 x 10^9 tons of CO_2e, with four of the five studies estimating that, India's GHG emissions will remain below 6 billion tons two decades from now. The most recent projections of India's GHG emissions are presented in the LCCR. This report estimates the projected GHG emissions for India by 2030, providing a range of emission possibilities. Two policy scenarios are discussed in the LCCR:

(i) Baseline, Inclusive Growth (BIG) scenario; and

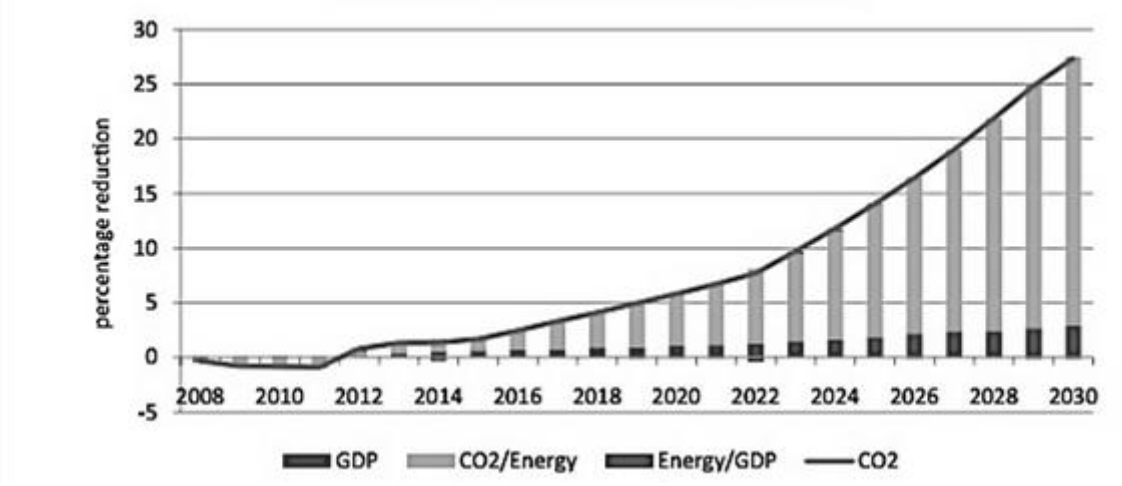
(ii) Low Carbon, Inclusive Growth (LCIG).

According to the BIG scenario, aggregate CO_2 emissions are expected to rise from 1,429 Mt in 2007 to 5,271 Mt in 2030, and per capita emissions are expected to rise from 1.3 tons of CO_2 per year to 3.6 tons of CO2 per year by 2030. The total energy demand is expected to rise from 400 Mtoe in 2007 to 1,146 Mtoe in 2030, while power demand is expected to increase from 837 billion kWh in 2007 to 3,371 billion kWh in 2030. The total demand for fossil fuels is expected to be 1,568 Mt of coal, 406 Mt of crude oil, and 187 bcm of natural gas in 2030, which is a significant increase compared to 556 Mt of coal, 156 Mt of crude oil and 43 bcm of natural gas in 2007. Emissions intensity in terms of kg CO_2 $ per GDP (2005 PPP) is expected to decrease from 0.43 in 2007 to 0.33 in 2030, a reduction of 22% relative to 2007 levels.

[6] In terms of broad approach and methodology, amongst the five studies, the India's National Council of Applied Economic Research (NCAER) used a computable general equilibrium (CGE) model, The Energy & Resources Institute (TERI) used A MARKet ALlocation (MARKAL) model, the Integrated Research and Action for Development (IRADe) used an activity analysis model, another TERI study used MARKAL, McKinsey conducted a detailed sector by sector analysis of GHG emissions.

According to the LCIG scenario, total CO_2 emissions increase much more moderately to 3,830 Mt and per capita emissions to 2.6 tons by the year 2030. The decline in emissions intensity of GDP nearly doubles to 42% by 2030 relative to 2007 levels. An emission accounting exercise shows that of this total reduction, 3% is contributed by the GDP, 10% from energy efficiency, and 29% from less carbon intensive energy sources (See Figure 5). The total energy demand, in 2030, will be lower at 1,108 Mtoe, while the power demand would still rise to 3,466 billon kWh due to improved access and modal shifts. About one third of power supply should be fossil free and aggregate demand of fossil fuels would be much lower at 1,278 Mt of coal, 330 Mt of crude oil and 208 bcm of natural gas. According to this scenario, although average long term GDP growth is only marginally lower at 6.9%, low carbon strategies require an additional investment of US$834 billion (2011 prices). Cumulative investment in the energy sector between 2007 and 2030 is almost 50% higher in the LCIG scenario as compared to the BIG scenario. Sufficient funding for these scenarios will be difficult to mobilize, particularly if the high national growth is not sustained in the long run and adequate international financial and technological assistance are not forthcoming.

Figure 5: Decomposition of Emission Reductions between the BIG and LCIG Scenarios



Source: LCCR (2016)

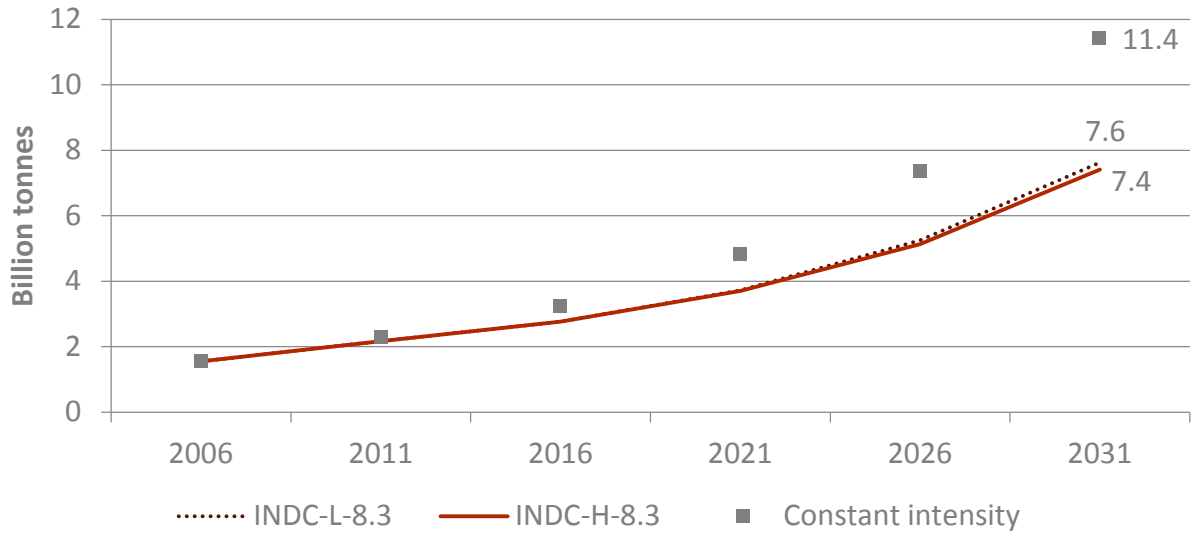
1.3 Pledged mitigation actions and its plan for their implementation

India is Party to key international agreements such as the Stockholm Declaration in 1972, United Nations Framework Convention on Climate Change (UNFCCC) in 1992, and the Kyoto Protocol ratified in 2002. Two landmark agreements were made in 2015: the climate change agreement under the UNFCCC in Paris at the Conference of Parties (CoP21) in December 2015 and the adoption of the Sustainable Development Goals (SDG) in September 2015; India was an active participant to both agreements. As discussed earlier, INDCs were a part of India's contributions to global efforts. The INDCs set out the following targets:

i) Reducing the emissions intensity of its gross domestic product (GDP) by 33-35% by 2030 as compared to 2005 levels;
ii) Achieving 40 percent cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030; and
iii) Creating carbon sinks of 2.5 to 3 billion tons of CO_2e through additional forest and tree cover by 2030. The INDC is estimated to reduce 3.5 billion tons of emissions as compared to business as usual scenario (see Figure 6).

India's INDC commitment builds on the voluntary Copenhagen pledge submitted in 2010, to reduce GHG intensity by 20%–25% by 2020 from 2005 levels (emissions from the agriculture sector were excluded from assessments of emissions intensity). These commitments demonstrate India's leadership in global climate change cooperation and commitment to addressing climate change while it faces serious developmental challenges.

Figure 6: Projected GHG emissions for India



Source: TERI, 2015

To support and facilitate the achievement of India's ambitious mitigation targets, aggressive domestic policies that balance climate and developmental goals are required. There is a well-designed policy formulation process for climate change in India. The cabinet is responsible for approving all climate policies and actions, while the Prime Minister's Council on Climate Change (or PM's council) provides guidance and advice. The council was established as part of the NAPCC to discuss and formulate the Indian response to climate change. It is an inter-sectoral forum established to develop a national agenda for climate change through the assessment of climate change impact and to formulate suitable adaptation and mitigation strategies. The national agenda is to be built on India's existing policy framework, which is already following a low energy intensity pathway, and to develop the climate change agenda without compromising on India's poverty alleviation and other developmental goals.

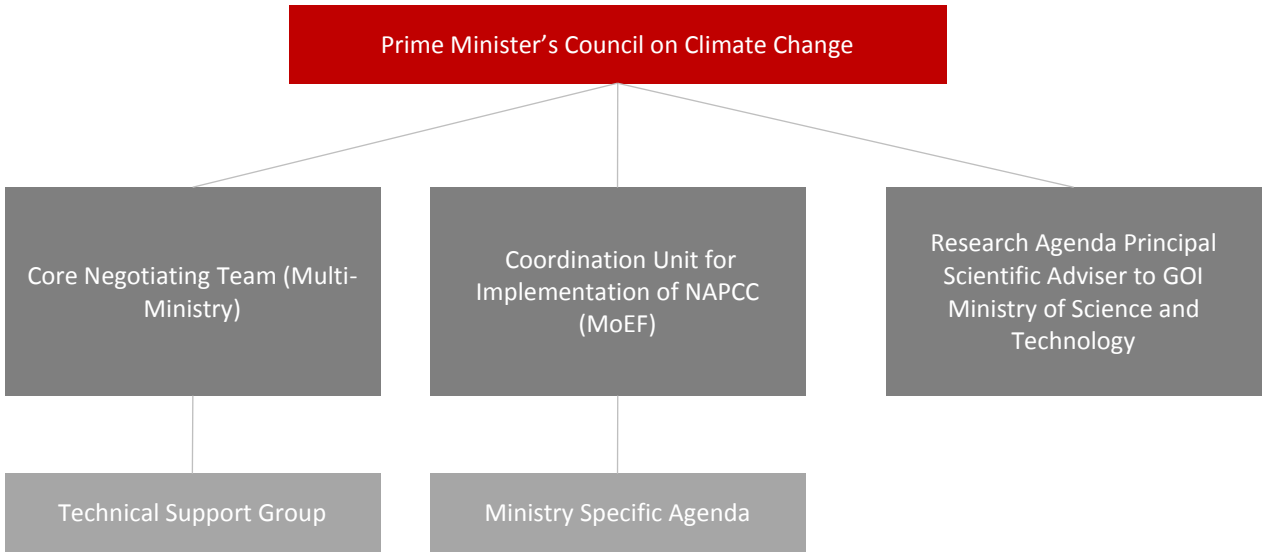
Figure 7 depicts the composition of the Prime Minister's Council on Climate Change. According to the Council's charter, it will focus on:

i) Evolving a coordinated response to issues relating to climate change at the national level;
ii) Providing oversight for formulation of action plans in the area of assessment, adaptation and mitigation of climate change; and
iii) Periodically monitoring key policy decisions.

Thus, the PM's council is involved at the policy-making and strategic guidance stage, while the cabinet is a key stakeholder at the implementation stage of climate policy in India. Various committee approvals are sought at

interim stages. Often, the Parliament is also apprised of the proposed policies and plans, if required. In addition, some of the policies are implemented at the state level where Interstate councils and National State councils have an important role. Some policies like PAT and REC, for example, were created through a national mandate but are implemented state-wise.

Figure 7: Composition of PM's council



Source: NAPCC, MoEF

In context of the new climate policy landscape in India, India's PM called for a paradigm shift in global attitudes towards climate change by focusing on "green credits" instead of "carbon credits", which would mean an emphasis on clean energy generation, energy conservation and energy efficiency, instead of focusing only on emissions and cuts. He also emphasized on the need for innovative and effective models for implementation of clean energy strategies. One such flagship initiative is the International Solar Alliance (ISA) which was launched in Paris in 2015. Led by India, the ISA will serve as a platform for cooperation among countries with large solar resources, and aims to include all countries located fully or partly between the tropics of Cancer and Capricorn. India's ambitious INDCs can be achieved through a combination of policies which are Specific, Measurable, Assignable, Realistic and Time-related (SMART). Therefore, the INDC needs to be disaggregated into several distinct policy objectives building on the existing programs and policies. This activity is envisaged to be undertaken in depth under Building Block 2. Mitigation Policy Landscape

Table 2: Low Carbon Strategy Options by 2030 and Status

Low Carbon Strategy	Present Status	Target by 2030	Stakeholders	Policy Instruments
Advanced Coal Technologies	11 Super Critical Units with an installed capacity of 7.4 GW, which is only 6 percent of the coal-based generation capacity	Super Critical and Ultra Super Critical Coal Plants should account for at least half of the coal based power generation capacity	Ministry of Power, Ministry of Coal, CSIR, NTPC and other PSUs, CEA, State Utilities, Private Power Developers, PGCIL	**Energy Pricing**, **Coal Cess, PAT**
Hydroelectric Power Generation	Installed capacity of 40 GW	Installed capacity of 75 GW	Ministry of Power, Ministry of Water Resources, , MoEF, CSIR, NHPC, PGCIL, CEA, Private Developers, State Utilities	**Energy Pricing**, Grid Balancing, Environment Regulation
National Wind Mission	Installed capacity of 20 GW	Installed capacity of 120 GW	Ministry of New and Renewable Energy, Ministry of Power, CSIR, , CEA, Private Developers, CWET, PGCIL, State Utilities	Capital Subsidy, Interest Subvention, FiT, GBI, **RPO, Energy Pricing**
National Solar Mission	Installed capacity of 2 GW	Installed capacity of 100 GW	Ministry of Power, CSIR, Ministry of New and Renewable Energy, CEA, State Utilities, NISE, Private Developers	Capital Subsidy, Interest Subvention, FiT, GBI, **RPO, Energy Pricing**

Nuclear Power	Installed capacity of 4.8 GW	Installed capacity of 40 GW	Department of Atomic Energy, CSIR, PGCIL, CEA	Government Budgetary Support, **Energy Pricing**, Liability Law
Dedicated Freight Corridors (DFCs)	The Delhi-Mumbai Corridor is under construction.	DFCs along the quadrilateral linking the four metropolitan cities and their diagonals	Ministry of Railways, International Funding Agencies, State Governments, Private Developers	Independent tariff regulatory authority
Urban Public Transport	Only metropolitan cities have been taken up for modern public transport	All cities should be covered with efficient means of public transport	Ministry of Transport, State Transport Authorities, Urban Local Bodies, Local Transport Corporations	Independent Tariff Setting Mechanism, Government Budgetary Support
Efficiency of Vehicles	Only private vehicles are currently compliant to Euro 4 standards	Both private and commercial vehicles should be compliant to Euro 6 standards	BEE, Ministry of Transport, Department of Science and Technology	Fuel Efficiency Standards
Energy Efficiency in Industry	About 478 industrial units are notified as Designated Consumers for PAT	PAT Scheme for designated consumers only and Energy Conservation Fund for all non PAT industrial units	Industry Associations, Ministry of Commerce and Industry Corporations, BEE, Private Industries, PSUs	**PAT, Energy Conservation Fund**

Energy Conservation and Building Codes	For commercial buildings only: Rajasthan, Odisha and Puducherry have notified ECBC; other states like Chhattisgarh, Karnataka, and Uttarakhand & Uttar Pradesh have notified amended ECBC	All States and Urban Local Bodies to mandate ECBC for commercial buildings and residential apartments	BEE, State Governments and Urban Local Bodies	**ECBC**, Property tax, Floor Area Regulations
Appliance Labelling Programme	The Star Labelling Programme is only applicable to Ceiling Fans, Air Conditioners, Refrigerators and Color Televisions.	The Star Labelling Programme to cover all electrical appliances. Near Universal Coverage of SuperEfficient Lighting (CFLs+LEDs).	BEE, Private Industries, DIPP	Mandatory Standards, Information Labelling
GHG Inventory and Data Management System	India's GHG inventory preparation and reporting has been rather infrequent. The last GHG inventories were prepared only in 1994 and 2007	Inventories of GHG gases such as CO_2, CH_4, N_2O, HFCs, PFCs and SF_6 should to be prepared and reported annually	Ministry of Environment and Forestry, Niti Aayog, Ministry of Statistics and Programme Implementation	Mandatory Reporting Requirements, Independent Inventory Agency

Source: Low Carbon Committee Report (2014)

As noted in Section 1.1, the Expert Group on Low Carbon Strategies for Inclusive Growth presented a report outlining the roadmap for India's low carbon growth. The Expert Group submitted its Interim Report in May 2011, made contributions to India's Twelfth Five Year Plan (2013), and presented its Final Report in 2014. The report provides several potential policy options and indicative targets in various sectors/sub-sectors that could be implemented by 2030. Some of these targets/options are listed in Table 2 below along with the current status of these targets, highlighting market based policy or pricing instruments. However, a roadmap to evaluate and select the policies to be implemented, the precise structure and form of these policies, and measures to ensure their efficacy are yet to be developed.

In order to achieve INDC goals through SMART policies, India will have to make use of its existing policy and regulatory environment and experience with economic instruments and voluntary initiatives. Some of these experiences are described in the following sections.

1.4 Experience with markets and pricing instruments

1.4.1 Clean Development Mechanism

The Clean Development Mechanism (CDM) established under the Kyoto Protocol has been very successful in India. This mechanism allows a country with an emission-reduction commitment under the Protocol to implement an emission-reduction project in developing countries. Such projects then earn saleable certified emission reduction (CER) credits, each equivalent to one ton of CO_2. Since 2005, India has been an active participant in the Clean Development Mechanism (CDM) and represents a significant component of the global CDM market, registering the second highest number of projects for any country. This represents 15.98% of CDM projects in Asia and 12.7% of global CDM projects. Industries like Cement, energy generation and use, fossil fuel switch, HFC, Hydro, Wind and biomass energy registered most projects in the CDM market. The CDM offers many lessons for market readiness activities in India. Firstly, there may be useful lessons and information for new domestic market mechanisms in India from the CDM market, particularly with respect to institutional mechanisms for leveraging private sector finance. Second, there are existing CDM projects which are eligible to earn CERs but are unable to find suitable buyers. These projects offer a ready pipeline of carbon offsets for any future domestic or international market based mechanism, and may be taken into consideration in designing new MBMs under the market readiness activities supported by PMR. This may be done in two ways:

i) Create supply aggregators who can find suitable buyers in existing or new international mechanism; and
ii) Create a domestic mechanism where existing projects, institutions and infrastructure could be used as suppliers for the new MBM.

In this regard, a detailed study is suggested as part of Building Block 4. Framework for Designing New MBMs

1.4.2 Voluntary Carbon Market

Voluntary carbon markets (VCM) emerged in parallel with compliance markets such as CDM. VCMs comprise all voluntary emissions trading schemes established either with the objective of mitigating emissions or with objective of meeting corporate social responsibility goals, offering product or service differentiation, brand building etc. The participants in VCM range from private individuals and corporates to governments.

A few countries, including India, have received the most voluntary carbon finance over the years. Globally, popular offset supply countries include Brazil (US$233 million), Turkey (US$207 million), India (US$205 million), Kenya (US$154 million), and China (US$153 million). As in the CDM, India has served as a primary source of offset supply. The reason for this was also closely tied to India's experience with compliance markets, as CDM project registration delays often led project developers to seek cash flows while waiting in line by certifying first to voluntary standards and selling to voluntary buyers. Yet, it brings together important experiences with respect to MBMs to the Indian industry and other institutions.

1.4.3 Domestic Carbon Markets with direct/indirect GHG benefit

There have been a number of actions on the domestic front to create carbon markets. An important one is the Perform, Achieve & Trade (PAT) scheme which is being implemented for the designated industries under the National Mission on Enhanced Energy Efficiency. The activities under the PAT scheme provide opportunities for new markets as PAT devises cost effective energy efficient strategies for end-use demand-side management leading to ecological sustainability. The PAT scheme covers 478 plants (designated consumers) in eight energy-intensive industrial sectors accounting for one-third of total energy consumption in the country. The target for reduction in average specific energy consumption under PAT is 4.05% during PAT Cycle 1 (1 April 2012 to 31 March 2015).

Another scheme is the Renewable Energy Certificate (REC) mechanism, which is also being implemented to promote further investment and development of renewable energy sources in India. This is complimentary to the state-wise targets for Renewable Purchase Obligation (RPOs) mandated by the Government with an aim to increase the share of renewable energy in India's energy mix. The REC mechanism is a market-based instrument which can be traded and provides means for fulfillment of Renewable Purchase Obligations (RPO) by Obligated Entities.

These two mechanisms are currently being implemented in India. While there are opportunities to scale-up these mechanisms, they also offer lessons for any new mechanism that is proposed. This aspect is discussed further in Building Block 2. Mitigation Policy Landscape

1.4.4 National Clean Energy Fund

India established a carbon pricing instrument in the form of the National Clean Energy Fund (NCEF) through a levy on coal. The fund was established in 2010 and is used to provide viability gap funding to support clean energy technologies. The clean energy cess on coal has been increased from about 0.75 USD to about 6 USD per ton of coal produced. In July 2015, the NCEF had over US$2.5 billion.

1.4.5 Pilot Emissions Trading Scheme (ETS) for air pollutants

India's two-year pilot ETS mechanism began in 2011 in three states – Gujarat, Tamil Nadu, and Maharashtra. The states received government mandates to implement programs focusing on particulates, such as, SO_2, NOx, and SPM. The pilot ETS was launched by MOEFCC together with the country's Central Pollution Control Board (CPCB) and relevant State Pollution Control Boards (SPCB). Under this mechanism, SPCBs will determine which pollutants to regulate for industrial facilities based on targeted overall pollutant concentration. State regulators will distribute emission permits to capped facilities, which have the option of complying with their caps and selling extra permits or buying permits from the market. The objective of the scheme was to improve the air quality, incentivize facilities to reduce air pollution and help states meet their National Ambient Air Quality Standards (NAAQS). Under this scheme, all three capped states exceeded their prescribed NAAQS – 2009 norms. The system covered nearly 1,000 industrial facilities under the scheme where SPCB determined the eligibility criteria.

The MOEFCC is currently testing the feasibility of the trading scheme through baseline studies in industries, with the fundamental objective of undertaking rigorous surveys and evaluating whether

such innovative interventions can successfully deliver improved environmental outcomes (in the form of lower particular matter emissions) at a reduced cost. The activity aims to complement and enable the critical objectives of the existing Pilot Project to evaluate Continuous Emission Monitoring Systems (CEMS) and Emission Trading of Particulate Matter (PM) in these states.

1.4.6 Experiences with NAMAs and REDD+

With global developments in the Nationally Appropriate Mitigation Action (NAMA) mechanism (i.e., the NAMA registry prototype, NAMA facility) and global progress made through experimentation with NAMA projects, the Indian government prepared itself to undertake NAMAs as a means to reduce its greenhouse gas emissions. An institutional mechanism including a coordinating office for implementing NAMAs was established in the MOEFCC as the NAMA committee. Through bilateral cooperation on technical issues, a feasibility study is being conducted by GIZ aimed at exploring the opportunities in implementing NAMAs in waste and forestry sectors. Ideally, they would build on existing Indian Government programs and policies along with developing innovative financial solutions, which identify the use of nationally – and potentially internationally – available funds as a catalyst for investments in NAMA activities.

However, whether NAMA activities should be developed as a domestic, supported or market based mechanism is still under consideration. In 2013, the MOEFCC constituted an Expert Committee with leading experts on REDD+ (Reducing Emissions from Deforestation and Forest Degradation "plus") to formulate the National REDD+ policy and strategy, lay down the broad contours of the policy, processes, methodologies, responsibilities and list institutions essential for implementing REDD+ in the country. There have been few studies (for example, the TERI study supported by the Royal Norwegian Embassy) where small pilots were undertaken as demonstration projects, and methodologies were developed to determine baseline and sequestration potential in REDD+ projects. However, implementation of large scale REDD+ projects require global agreement on financing and strategic guidance to enhance local capacities.

1.5 Relevant voluntary initiatives with climate mitigation objectives

The Indian industry has also participated in voluntary carbon disclosure programs whereby they report their carbon management strategy and GHG emissions. The latest report by the Carbon Disclosure Project – India indicates a reduction of 165 million metric tons of CO_2e by Indian industries[7]. The India GHG Program, as discussed below, is a voluntary program to support the development of India-specific emission factors, and to enable corporates to measure their carbon footprints.

1.5.1 India GHG Program

The India GHG Program is an industry-led voluntary framework to measure and manage GHG emissions. The program builds comprehensive measurement and management strategies to reduce emissions and drive more profitable, competitive and sustainable businesses and organizations in

[7] India's Intended Nationally Determined Contribution (2015). UNFCCC. Retrieved from http://www4.unfccc.int/submissions/INDC/Published%20Documents/India/1/INDIA%20INDC%20TO%20UNFCCC.pdf

India. It also broadens the engagement between policymakers and the business sector in supporting the overall advancement of national goals and is expected to create a pool of well-trained and certified GHG practitioners and management professionals. The program aims to help companies in India monitor their progress towards voluntary reduction goals in a consistent and credible manner by providing companies the necessary tools and technical assistance to build inventories, identify reduction opportunities, establish annual and long-term reduction goals, and track their progress based on the GHG Protocol. The total inventory managed by businesses under this program ranges from 300 to 360 $MtCO_2e$. This is equivalent to 15 – 25% percent of India's total emissions.

1.5.2 Carbon Disclosure Project (CDP)

CDP works with 3,000 of the largest corporations in the world to help them ensure that an effective carbon emissions/reductions strategy is made integral to their businesses. The collection of self-reported data from thousands of companies is supported by 822 institutional investors with US$95 trillion. Over the past few years, many Indian companies have begun disclosing their climate change and sustainability related data to CDP. Nearly 32 Indian companies currently report their climate change and sustainability performances to CDP.

1.5.3 Carbon Pricing Leadership Coalition (CPLC)

The Carbon Pricing Leadership Coalition (CPLC) is a voluntary partnership of national and sub-national governments, businesses, and civil society organizations that agree to advance the carbon pricing agenda by working with each other towards the long-term objective of a universal carbon price. This agenda will be actualized by (1) strengthening carbon pricing policies to redirect investment commensurate with the scale of the climate challenge (2) strengthening the implementation of existing carbon pricing policies to better manage investment risks and opportunities (3) enhancing cooperation to share information, expertise and lessons learned on developing and implementing carbon pricing through various "readiness" platforms. Several Indian companies have partnered with CPLC for building readiness towards carbon pricing.

Table 3 Coverage of Key voluntary initiatives with GHG benefits

Initiative	Entities Covered	Institutions Responsible	Direct or Indirect mitigation benefit
India GHG Program	Industry	WRI, TERI, CII	GHG Inventory platform, Financial Climate Risk Disclosure, Tools for GHG measurement and management
Carbon Disclosure Project	Industry	CDP program Secretariat	Sustainability reporting
CPLC	Industry	World Bank	Carbon Pricing readiness building

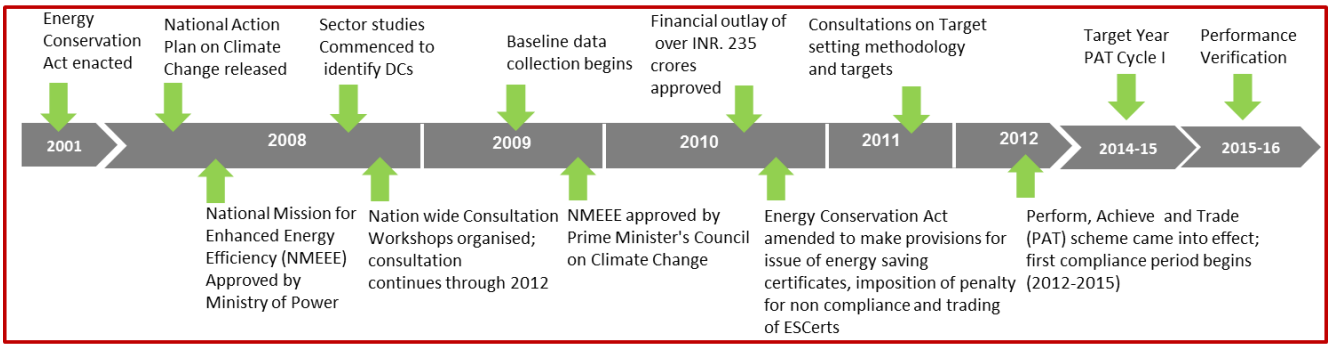
2 Building Block 2. Mitigation Policy Landscape

Building Block 2 (BB2) provides an overview of the two domestic market instruments in India, namely the PAT mechanism and the REC mechanism and a carbon pricing instrument, NCEF. This section elaborates on the current status, achievements, and challenges of the two mechanisms. The PMR grant seeks to identify barriers of effective implementation of these schemes. This will help develop recommendations to improve design elements of existing schemes and to enhance preparedness for further scale-up of these schemes. BB2 also seeks assistance to identify SMART policies for the achievement of India's national and international goals.

2.1 Perform Achieve and Trade (PAT) mechanism

The 'Perform, Achieve and Trade' (PAT) mechanism is an innovative energy efficiency scheme introduced under the National Mission for Enhanced Energy Efficiency (NMEEE). The PAT framework has been developed considering the legal requirement under the Energy Conservation (EC) Act, 2001, and by analyzing energy intensive industries in India. The PAT scheme is a market-based mechanism to enhance cost effectiveness of improvements in energy efficiency in energy-intensive large industries and facilities, through the certification of energy savings that could be traded. As briefly described in BB1, PAT scheme establishes unit-specific targets rather than sectoral targets. In other words, Specific Energy Consumption (SEC) target is specified for each Designated Consumer (DC) in the baseline year and the target year. The mandatory reduction targets are in the range of 2-10% over a period of 3 years. The implementation phase for PAT targets began in April 2012. Companies that exceed their targets will be awarded Energy Savings Certificates (ESCerts) to the extent of targets overachieved; for example, if a company achieves 5% SEC reduction against a target of 4%, it will be awarded ESCerts for the additional 1% achievement. Figure 8 outlines the timeline for the PAT scheme.

Figure 8: Timeline for India's PAT Scheme



Source: Adapted from BEE, 2015

The Bureau of Energy Efficiency (BEE) has implemented this scheme in eight industrial sub-sectors, namely Thermal Power Plants, Aluminium, Pulp & Paper, Chlor- Alkali, Cement, Iron & Steel, Textile, and Fertilizer for the first PAT Cycle, where 478 designated consumers (DCs) are required to reduce the Specific Energy Consumption (SEC) from their baseline values. Based on the assessment of 427 DCs, the energy saving from this cycle is about 8.67 million tons of oil equivalent (mTOE). The over achievers will earn tradable Energy Saving Certificate (ESCerts) whereas under achievers will have to purchase ESCerts for the deficit.

Table 4: PAT scheme sectors and targets for first cycle

Designated industries	Annual Energy Consumption Norm of be DC (MTOE)	No of DCs	Annual Energy consumption (MTOE)	Energy saving targets (MTOE)
Aluminum	7,500	10	7.71	0.456
Chlor Alkali	12,000	22	0.88	0.054
Thermal Power Plant	30,000	144	104.56	3.211
Textile	3,000	90	1.20	0.066
Pulp & Paper	30,000	31	2.09	0.119
Iron & steel	30,000	67	25.32	1.486
Fertilizer	30,000	29	8.20	0.478
Cement	30,000	85	15.01	0.815
Total		**478**	**164.97**	**6.686**

Source: BEE, 2015

Some of the key features of the PAT scheme are:

- Based on reported data for each sector between 2005 and 2009, sector-wide energy consumption targets have been identified on the basis of SEC.
- The overall goal for each sector's energy reduction under PAT is about 5% and within each sector the individual targets depend on relative efficiency, i.e. if the unit is already more efficient than most, it is issued a lower reduction target, whereas if the unit is highly inefficient, it is issued a higher target.
- When industrial units achieve and surpass their targets, they can sell their excess in the form of ESCerts. If industrial units fail to achieve their targets, they must purchase the appropriate number of ESCerts to 'meet' their target, or pay the penalty.
- The face value of each ESCert is one metric ton of oil equivalent (mtoe).
- Trading is limited to DCs, and no outside entities such as ESCOs or financial institutions can purchase and sell ESCerts.
- ESCerts issued in the current PAT Cycle can be banked for compliance purposes for the next PAT Cycle. Measuring, monitoring, reporting, and verification (MRV) will take place in the last year of the compliance period by auditing agencies empaneled by BEE.
- In case of a default, a unit will be fined penalty of INR 1 million (US$ 15,000). Penalties are uniform across all sectors, even though compliance costs vary.

The PAT scheme is an example of an innovative regulatory instrument linked to market mechanism through SEC reduction targets and certification of energy saving. It is also a scheme where targets are unit specific to motivate increase in efficiency (as more efficient units will have lower targets than less efficient units). PAT also offers a domestic MRV system. The scheme has evolved its design over the years through consultation with various ministries, DCs, industry associations, financial institutions and research organizations.

BEE has set up the overall framework for PAT scheme and Energy Efficiency Services Limited (EESL), a body established under the National Mission for Enhanced Energy Efficiency (NMEEE), will work as an implementation and monitoring agency. ESCerts will be traded on a special trading platform to be created on two power exchanges operating in India: IEX or Indian Energy Exchange and PXIL or Power Exchange India.

Box 3: Summary of the PAT scheme

Notification: The Ministry of Power, Government of India notified the Perform Achieve and Trade (PAT) scheme on 30th March, 2012 as one of its innovative trading mechanisms for energy efficiency under the National Mission on Enhanced Energy Efficiency.

Regulation: The PAT scheme derives its modalities from the Energy Conservation Act, 2001, which empowers the Central Government to implement the PAT scheme and other such measures in India.

Objective: The PAT scheme is designed to accelerate implementation of cost effective measures in large energy consuming industries (designated consumers).

Approach: PAT establishes a market to reduce the cost and compliance of energy efficiency targets for industries through certification of energy savings that can be traded. There are large variations in the energy intensity of different units within the same industries. The scheme builds on this data and allows trade between the units that are able to achieve improvements in their energy intensity matching industry standards.

Baseline: The energy intensity reduction target for each designated unit is based on the level of its current efficiency as compared to the industry average – more efficient units would be given a lower target to meet as compared to inefficient units. Each DC will be prescribed a reduction in its specific energy consumption target in a PAT cycle.

Reporting and Verification: At the end of the target year for each PAT cycle, DCs will submit performance assessment documents to the State Designated Agency and designated energy auditors on the PAT registry, with a copy to BEE for issuance of energy savings certificates.

Verification: The reports on specific energy consumption submitted by each DC will be duly verified by the empanelled Measurement and Verification Agency through a Certificate of Verification submitted through the registry.

Issuance: On the basis of the details provided on the registry, for DCs that have achieved more than their notified target will be issued certificates called Energy Savings Certificates (ESCerts) in proportion to the difference in the target SEC and their achieved SEC. A unique ESCert number shall be assigned and maintained for each certificate issued to the DCs in each PAT cycle, and maintained on the online registry.

Trading: Trading of ESCerts will take place over power exchanges – IEX and PXIL on the second Tuesday of every month, or as per Central Electricity Regulatory Commission (CERC) order.

Banking: ESCerts issued in a cycle period shall remain valid until the completion of next compliance cycle.

Trading is expected to begin in November 2016. Although the PAT scheme does not explicitly target carbon emission reduction, lower energy intensity will directly impact national emissions. The mechanism is now moving into its second cycle, i.e. PAT Cycle II (2016 – 2019), as notified by BEE on 31st March, 2016. In addition to the eight Designated Consumers (DCs) listed above, three new industries have been introduced – refinery, electricity distribution companies (DISCOMs), and railways, which will result in a total of 621 DCs for PAT Cycle II. The DCs from these 11 industrial sectors have to achieve a reduction of about 8.869 million tons of oil equivalent (mtoe) in their energy consumption during PAT Cycle II period. Upon completion of PAT Cycle I, a

series of stakeholder consultations were organized by BEE and PXIL to discuss issues and challenges faced during the first phase. This was also an attempt to build consensus among targeted industry sectors by addressing their concerns and providing clarity on the PAT scheme and its implementation for future cycles. The DCs from the eight sectors of the PAT scheme also participated in the consultations. Common issues faced by the DCs include (1) the lack of technical knowledge required to understand and implement the PAT scheme, (2) the possibility of technology suppliers increasing the price of the technology and (3) the possibility of low ESCert prices. Other barriers include lack of financing, unavailability of high quality fuel, long pay-back period for energy efficient technology equipment, lack of clarity on system boundaries and procedure for the calculation of energy inputs; and lack of floor and forbearance price. Besides, it was highlighted that the mechanism could be further widened through the inclusion of Non-compliance players such as financial institutions, traders, other entities to buy or sell ESCerts. This will also provide the market players more liquidity through wider demand for sale of the issued certificates.

2.2 Renewable Energy Certificate (REC) mechanism

Recognizing the importance of energy security for sustained growth, development and conservation of limited fossil fuel resources, India has instituted policies to harness and promote renewable energy (RE). The REC scheme was introduced on 18th November, 2010 to enhance share of renewable energy in the energy mix. The REC mechanism is a market-based instrument which facilitates trading and provides means for fulfillment of Renewable Purchase Obligations (RPO) by the Obligated Entities. Obligated Entities include distribution utilities, captive power producers, and open access consumers. The mechanism is designed to address the issue of scarcity of RE sources in some states. Even for RE rich states, this mechanism reduces the risk for obligated entities in continued procurement of renewable power beyond their RPO targets.

REC is a certificate that indicates the generation of one megawatt hour (MWh) of electricity from an eligible source of renewable power. Each REC states the underlying generation source, location of generation, and year of generation. RECs are often considered to represent a claim to the environmental attributes associated with renewable energy generation. Technologies such as wind, solar PV, solar thermal, biomass and smaller hydro are eligible to earn RECs. There are two categories of certificates in RECs, namely solar RECs and non-solar RECs. The REC mechanism will help to achieve the following objectives:

i) Effective implementation of RPO in all Indian states;
ii) Increased flexibility for participation to carry out RE transactions;
iii) Overcoming geographical constraints to harnessing available RE source;
iv) Reduction in transaction costs for RE based power; and
v) Creation of competition amongst different RE technologies.

The key driver for implementation of the REC mechanism in India is the Renewable Purchase Obligation (RPO) mandated by SERCs (State Electricity Regulatory Commissions) for power utilities. The Electricity Act (EA), 2003 mandates that SERCs promote renewable energy within their respective state. Under EA 2003, the SERCs set targets for obligated entities to purchase a certain percentage of their total power requirement from RE sources. This target is termed as the Renewable Purchase Obligation (RPO). Entities with an RPO target, which are required to purchase RE, are called 'Obligated Entities'. The following entities are generally obligated in the State, namely: (i) Distribution Licensees, (ii) Captive Consumers, and (iii) Open Access users. The RE generator may sell the associated RECs to any distribution company or other obligated entity across India. The purchase

of RECs will be seen as a purchase of power generated from renewable sources and accordingly will be admissible for compliance with the RPO target. The REC mechanism will enable obligated entities in any state to procure RECs from any approved RE generator in any state in India, in order to meet its RPO target.

Important features of the REC mechanism are:

- There will be a central agency to be designated by the Central Commission for registration of RE generators participating in the scheme. Central Electricity Regulatory Commission (CERC) has designated the National Load Dispatch Center (NLDC) as the Central Agency.
- RE generators will have two options - either to sell renewable energy at a preferential tariff fixed by the concerned Electricity Regulatory Commission or to sell electricity generation and environmental attributes associated with RE generation separately.
- On choosing the second option, the environmental attributes can be exchanged in the form of REC. The price of the electricity component would be equivalent to the weighted average power purchase cost (APPC) of the distribution company[8], including short-term power purchase but excluding renewable power purchase cost.
- The Central Agency will issue the REC to RE generators maintained through a common registry called the REC Registry.
- The value of the REC will be equivalent to 1 MWh of electricity injected into the grid from renewable energy sources.
- The REC will be exchanged only in Power Exchanges approved by CERC within the band of a floor price and a forbearance (ceiling) price to be determined by CERC from time to time.
- The distribution companies, Open Access consumers and Captive Power Plants (CPPs) will have the option of purchasing RECs to meet their Renewable Purchase Obligations (RPO).
- There will also be compliance auditors to verify generation of RE by scheme participants.

The REC once issued shall remain valid for one thousand and ninety-five days (or three years) from the date of issuance of such Certificate, or up to 31.03.2017, whichever is later. The steps involved in the REC mechanism are:

i) Accreditation of RE generator with the State Nodal Agency (SNA);
ii) Registration with Central Agency;
iii) Issuance of RECs from Central Agency; and
iv) Redemption of RECs to RE generator.

RECs are traded at power exchanges (IEX: Indian Energy Exchange and PXIL: Power Exchange India Limited) following a well-defined procedure for application and trading. 1,135 RE Generators have been registered under the REC mechanism (a total 1,215 were accredited) as of June 2016.[9] The details of RECs issued and redeemed are available transparently to all stakeholders through a common web portal and the websites of the Power Exchanges.

[8] APPC is determined by computing the average of APPC of all States and Union Territories, weighted by volume of conventional power purchased by the respective State/UT as per the CERC order of 3rd December 2015 accessed at < http://www.cercind.gov.in/2015/orders/SO15.pdf>

[9] Based on REC Registry data retrieved from www.recregistryindia.in. Accessed on 24th June 2016

There are a number of factors that have limited the effectiveness of the current REC market in India, such as:

- 8% of solar RPO is expected to be added by 2020 as per the revised targets under the National Solar Mission,[10] but all states are yet to align their targets accordingly.
- There is a lack of RPO compliance data for several states, limiting the important role that REC can play towards the fulfillment of RPOs.
- Non-compliance is not penalized effectively; and if penalized, the penalty would have to be paid by mostly indebted state DISCOMS/utilities.
- The REC market has its own challenges, over and above the unpredictable demand from RPOs, such as the shortage of electricity where DISCOMs prefer to go through long-term PPA arrangements rather than the REC route. This leads to a mismatch in REC supply and demand.
- There is an illusionary off-take stability built in to the mechanism given the floor and forbearance prices of traded RECs. As prices are fixed, volumes traded become volatile. Only about 50% of RECs are actually sold, and trading languishes during the early months of a financial year. This makes RECs non-bankable due to fixed validity.

Most developers pursuing REC projects achieve returns through the accelerated depreciation benefit. There are a number of additional bottlenecks such as the lack of market aggregators (since trading is only allowed through energy exchanges) and the lack of clarity regarding the inclusion of off-grid renewable energy plants under the REC mechanism. Furthermore, off-grid projects are typically very small scale and generate low volumes individually, but can be bundled to reduce transaction costs. Forum of regulators in India is considering developing a mechanism similar to REC for off-grid energy since remote monitoring has become technologically feasible. However, this remains a proposal that requires further development. Various public institutions, including CERC, the State Electricity Regulatory Commissions (SERCs), the Ministry of Power, the Ministry of New and Renewable Energy, NITI Aayog (the erstwhile Planning Commission), and the Prime Minister's Office (PMO) are working to address the various challenges associated with the REC mechanism. The following barriers need to be addressed to make REC an effective mechanism:

- At present, there is overdependence on state level policy and compliance. In other words, the system requires stronger and more credible RPO goals from the state governments than those observed to date.
- Stricter compliance laws and enforcement of RPO goals will increase confidence in the nation's commitment to these goals, and can help develop and support stable, long-term REC markets. Incentives for enforcement agencies and states could encourage state agencies to support RPO goals.
- DISCOMS' inability to meet power demand in the state discourages them from moving towards REC for renewable energy compliance.
- The lack of long-term price signals, contracts, and other commitments greatly increases the risk associated with energy sales beyond year one for potential investors. Creating secondary markets can reduce some of the long-term price risks that investors perceive in RECs by providing some future price certainty. States' commitment to long-term targets along with yearly targets would encourage developers to invest in RECs and, in the long run, would also limit boom and bust cycles.

[10] For details, please see Tariff Policy, 2016 As retrieved from < http://pib.nic.in/newsite/PrintRelease.aspx?relid=134630>

- There is insufficient market transparency. A lack of certainty about pricing and market signals increases investor risk. Single window counters for accreditation, registration, and issuance of RECs can decrease the time taken to procure RECs and encourage participation in REC markets.
- There is insufficient information on obligated entities besides the state DISCOMS. The monitoring, verification and registry mechanism could be enhanced to cover all OEs within the system.

Box 4: Summary of the REC scheme

Notification: The Ministry of New and Renewable Energy, Government of India introduced the Renewable Energy Certificate mechanism (REC) on 18th November, 2010 as a trading mechanism for the uptake of renewable energy in India under the National Action Plan on Climate Change (NAPCC).

Regulation: The REC scheme derives its modalities primarily from the Electricity Act, 2003; National Tariff Policy 2006 and National Electricity Policy 2005 for the implementation of the scheme in India.

Objective: The REC scheme is designed to accelerate uptake of renewable energy production and consumption in all states in India.

Approach: REC establishes a market to facilitate trade and provide means for fulfilling Renewable Purchase Obligations (RPOs) by the obligated entities, which comprise distribution utilities, captive power producers, and open access consumers. There are large variations in renewable energy potential between different states. The scheme builds on this data and allows for trade between state obligated units to meet their RPO compliance through the purchase of REC certificates.

Baseline: The RPO targets mandated by the respective State Electricity Regulatory Commissions (SERCs) for obligated entities determine the demand for REC certificates in the renewable energy market. This may differ across states. An RE generator may sell associated RECs to any distribution company or any other obligated entity across India.

Reporting: An application for issuance of REC is made by the eligible entity to the Central Agency on Web based application/ Registry stating the amount of renewable energy produced and supplied to the grid.

Verification: Upon submission, the report on renewable energy produced and injected into the grid is duly verified by the concerned State Load Dispatch Center (SLDC).

Issuance: The Central Agency issues RECs to eligible entities after confirming claims made by the eligible entity, with the energy injection report submitted by the State Load Dispatch Center (SLDC). Application for issuance of REC can be made on a fortnightly basis. One REC certificate is equivalent to 1 MWh of renewable energy produced and injected into the grid.

Trading: Trading of RECs takes place over two power exchanges – IEX and PXIL the last Wednesday of each month (1300 hrs to 1500 hrs). Participation is voluntary and RE generators may choose any of the exchanges for the sale of REC. Successful trades are intimated to the Central Agency for redemption and extinguishing of the RECs.

Banking: An REC issued will remain valid for 1,095 days (or 3 years) from the date of issue, or up to 31.03.2017, whichever is later.

2.3 National Clean Energy Fund (NCEF)

The National Clean Energy Fund (NCEF), a carbon pricing mechanism, based on the ”polluter pays” principle, is a unique mechanism which taxes traditional fossil fuel (in this case, coal) to create a positive impetus for the development of clean energy.

The mechanism was proposed in Union Budget 2010-11 in the form of a Clean Energy Cess or levy on coal to be used to create a non-lapsable corpus under the Public Accounts of India that would fund research and innovative projects in clean energy technology. The Clean Energy Cess came into effect in July 2010 at INR 50 per ton on coal produced domestically as well as coal imported to India. The cess is collected by the Central Board of Excise & Customs (CBEC). It was increased in each budgetary announcement and has now been quadrupled from 2010 levels to INR 400 per ton in 2016-17. The corpus of funds created through the cess was renamed the National Clean Energy Fund (NCEF).

The Ministry of Finance (MoF) acts as the Secretariat for the NCEF and is the agency responsible for disbursing NCEF funds. The NCEF corpus as of July 2015 was approximately INR 170 billion (US$ 2.5 billion). With the recent hike in the cess, the total size of the NCEF is expected to increase to INR 260 billion (US$ 3.89 billion) per year in 2016-17.

Table 5: Details of NCEF Fund (INR Million)

Year	Coal Cess Collected	Amount transferred to NCEF
2010-11	10,664.6	0.00
2011-12	25,795.5	10,664.6
2012-13	30,531.9	15,000.0
2013-14	34,719.8	16,500.0
2014-15	53,934.6	47,000.0
2015-16 (Estimated)	126,233.3	47,000.0
2016-17 (Estimated)	261,482.0	84,470.0

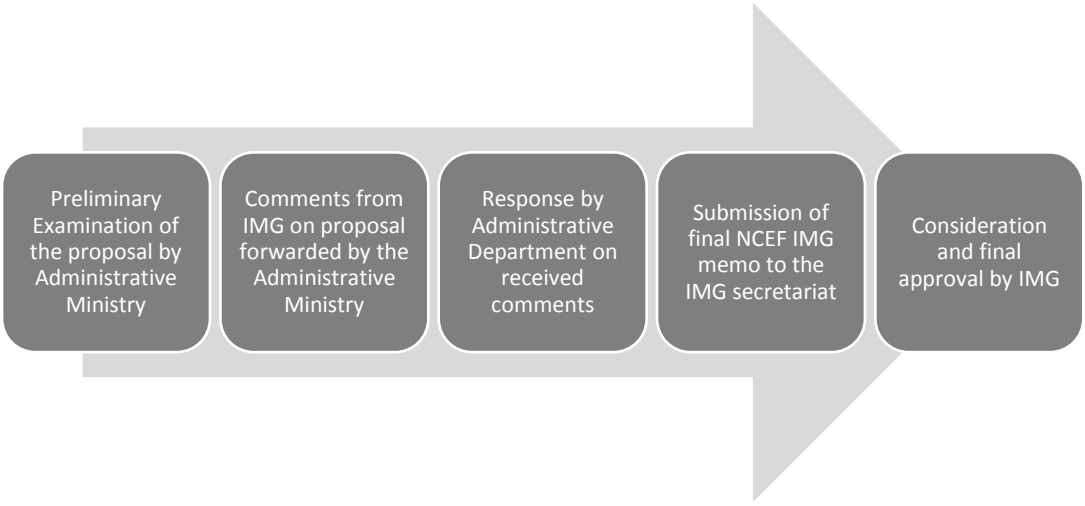
Source: Ministry of Finance, 2016

An inter-ministerial group (IMG) was formed in 2011 to appraise and approve projects eligible for funding under NCEF (not exceeding 40% of the total project cost). Projects are eligible to receive support in the form of a loan or viability gap funding. Projects funded by any other arm of the government or those that have received grants from any other national/international bodies are ineligible for funding by NCEF. Acceptance and review of proposals is an on-going process. Proposals are submitted in the proposal template prescribed by the Ministry of Finance in consultation with the relevant line Ministries. Proposals are received by the line ministry that will be responsible for administering the project. Proposals are initially appraised by the line ministry, then by the Ministry of Finance, and finally by the IMG. These proposals include innovative schemes like the Green Energy Corridor for boosting the transmission sector, Jawaharlal Nehru National Solar Mission (JNNSM)’s installation of solar photovoltaic (SPV) lights and small capacity lights, installation of SPV water pumping systems, SPV Power Plants, Grid Connected Rooftop SPV Power Plants, pilot project to assess wind power potential etc.

So far, IMG has recommended 55 projects with total viability gap funding (VGF) of INR 348.1 billion (US$5.2 billion). Proposals/ projects from the Ministry of New and Renewable Energy (MNRE), the Ministry of Water

Resources, River Development & Ganga Rejuvenation, the Ministry of Drinking Water and Sanitation (MoDWS), the Ministry of Environment, Forests and Climate Change (MOEFCC), the Ministry of Power (MoP), and the Ministry of Heavy Industries and Public Enterprise are approved or currently under consideration for funding from NCEF. For the year 2016-17, INR 84.47 billion (US$ 1.26 billion) have been provided for in the Union Budget for NCEF projects.

Figure 9: Process of appraisal of proposals under NCEF



The authority for disbursal of funds rests with three different approval forums depending upon the proposed budget of the project. If the approval limit is less than INR 1.5 billion, the approval will rest with the Minister-in-Charge of the Sponsor Ministry/Department. If the approval limit of funding is between INR 1.5 billion and INR 3 billion, the approval will rest with the Minister-in-Charge of Sponsor Ministry/Department and the Minister of Finance. Finally, if the approval limit exceeds INR 3 billion, the approval for funding will rest with the Cabinet Committee on Economic Affairs.

However, NCEF has received much criticism and is largely under-utilized. Some of the reasons for this are:

- Limited information on operational issues of NCEF is available in the public domain. There is also limited capacity building or awareness generation in this context.
- Furthermore, there is a lack of a system recording details of projects that have applied for and/or availed NCEF funding.
- Proposals for funding under NCEF lack quality and innovation, possibly due to the lack of capacity of proposal developers as well as line ministries to appraise proposals of the quality and size required.

In order to make this carbon pricing instrument successful in achieving its goals, it is important to provide an initial thrust through capacity building and awareness generation activities. NCEF could also learn from other mechanisms and try to involve more stakeholders, including industries and research organizations, in the process.

Box 5: National Clean Energy Fund

Origin: Announced in Union Budget 2010-11, NCEF is a non-lapsable corpus under the Public Accounts of India, formed through the levy of a Clean Energy Cess of INR 50 per ton of coal (both domestically produced and imported). In the budgetary announcement of 2016-17, the cess was raised to INR 400 per ton of coal.

Objective: The fund was created to fund research and innovative projects in clean energy technologies.

Eligibility: The Fund is open to all. Project proposals can be submitted by individual/consortium of organizations in the government/public sector/private sector. However, all projects must be sponsored by a Ministry/Department of the Government.

Funding: Projects are eligible to receive support in the form of a loan or viability gap funding. However, NCEF assistance shall not exceed 40% of the total project cost. For the year 2016-17, INR 84.47 billion has been provided in the Budget for NCEF projects.

Project Approval/ Appraisal: Proposals are received by the line ministry that will be responsible for administering the project. They are initially appraised by the line/sponsor ministry and later by the Ministry of Finance, NITI Aayog (the erstwhile Planning Commission), other relevant ministries and departments and finally by the Inter-Ministerial Group (IMG). As per the application form for proposals, it takes roughly three months from the time a proposal is received by a line ministry to it being presented before the IMG for consideration and final approval.

Disbursal of funds: The authority for disbursal of funds rests with three different approval forums depending upon the proposed budget of the project.

MRV Mechanism: The monitoring of NCEF supported projects will be carried out in line with the result based monitoring and evaluation guidelines of the NCEF. Monitoring & Evaluation (M&E) will be carried out both at the level of specific projects funded under NCEF as well as at the level of fund at a whole. Besides, select NCEF supported projects and the overall fund will be evaluated ex-post by an independent external agency annually.

2.4 SMART policies for climate action

India's ambitious INDCs can be achieved through a combination of SMART policies. There is a need to disintegrate INDC into several distinct policy objectives based on existing programs and policies. Policy decisions are influenced by various national considerations, circumstances, opportunities, benefits and costs. Such decisions need to consider how to optimally balance different goals (such as economic, environmental, and social goals) and assess potential trade-offs. This can be achieved through robust analysis of different options and implementation strategies, as well as a deep understanding of their respective implications. While LCCR provides a number of policy options to be implemented by 2030 as discussed in BB1, there is need to revisit similar exercises to identify SMART policies in view on India's INDC. This activity is envisaged to be undertaken in depth in BB2. In order to achieve its INDC goals through SMART policies, India will make use of its existing policy and regulatory environment and leverage its experience with economic instruments and voluntary initiatives including private sector.

The exercise will also be useful to identify a sector where an MBM could be designed in BB4. The first step is to identify the sector, relevant policy instrument and scale coverage for designing any such policy instrument. There are three dimensions that need to be specified, (1) the scale at which it will be implemented, (2) the

sectors which will be covered and (3) the nature of the policy instrument. The selection of sector(s) and market instruments will depend on criteria such as mitigation potential, non-GHG and sustainable development impact, experience from existing markets (national/international), ease of implementation including issues such as baseline determination, stakeholder acceptance, among others. These criteria will build on those used in the LCCR, which included growth (economic), inclusion (equality), local environment and GHG mitigation in the framework of co-benefits.

In order to take these options forward through market based policy instruments, following questions need to be addressed:

- What will be the role of market instruments in achieving INDC targets?
- What will be the GHG mitigation potential of such market instruments?
- What is the link between sectoral mitigation policies and achievement of future NDCs.

These will be followed by an assessment of institutional, legal and infrastructural capacity assessment, which is detailed further in subsequent BBs.

Furthermore, it is important for India to progress toward a policy package of integrated energy, climate and economic policies that optimizes the intended benefits at low costs. Since national circumstances affect the optimum combination of policies for each country, there is no single formula for integrating them as policy packages. It is therefore important to clearly establish the conditions of applicability of identified policies and their interaction with other policies and instruments that govern various sectors of the national economy.

2.5 ToR(s) and Proposed Budget

The PMR grant is sought to identify options to scale-up the PAT and REC schemes and further build the NCEF. This might be through recommendations to improve the design elements in order to enhance preparedness for further scale-up of the existing three schemes.

2.5.1 Objectives and Rationale

Objective:

i) To identify SMART policies to achieve India's low carbon development goals including Market Based Mechanisms (MBMs).
ii) To undertake analysis of policy interactions amongst the current and planned policy to develop optimum policy packages to achieve India's low carbon development goals.
iii) To assess the current experience from PAT, REC and NCEF in order to provide learnings to improve scale-up of schemes and for subsequent phases/cycles.

Rationale: This will help the government make an informed decision on sector, scale, and scope of new policies and policy instruments. It will also help define the scope for market based instruments or pricing instruments in key sectors. The work on existing instruments will facilitate improved implementation and expansion of the existing mechanisms. This will also help make domestic pricing instruments more capable in, reducing emission at the source and collecting and channelizing funds toward clean energy activities.

The above objectives will be achieved by undertaking following activities:

Output 2.1: Prioritize a list of SMART policy instruments in key sectors after detailed evaluation of co-benefits and GHG reductions. This will include identification of an MBM which could be piloted in BB4.
Output 2.2: Develop and select optimal policy packages by analyzing policy interactions in all existing and new policies and their interactions. This will include identification of a MBM which can be piloted in BB4.
Output: 2.3: Assessment of technological, infrastructural, legal and regulatory needs at the national level to implement the identified MBM in India. This will include an analysis that will feed into activities under BB3 and BB4.
Output 2.4: Assessment of the current status of the PAT scheme along with identification of achievements and/or challenges in implementation
Output 2.5: Assessment of the current status of the REC mechanism along with identification of achievements and/or challenges in implementation
Output 2.6: Assessment of the current status of the existing carbon pricing instrument, i.e. NCEF

Activities: The activities to be undertaken under BB2 may be categorized in two major categories:
1) **Research and Technical Analysis**

- Studies to identify and prioritize the use of MBMs in key sectors. Modeling based analysis will be conducted.
- Assessment of the technological, infrastructural, legal and regulatory needs at the national level needed to implement the identified MBMs will be conducted. This assessment will provide a clear indication of timelines for implementation along with details such a nodal entity, scope, coverage etc.
- Assessment of policy interactions to maximize the benefits at low costs to avoid duplication of impacts.
- Assessment of PAT and REC mechanisms to understand their achievements and/or challenges/barriers, and potential for expansion of scope and scale-up.
- Assessment of current status of carbon pricing instruments to understand issues, and develop recommendations to effectively meet its stated objective of supporting clean energy.

2) **Stakeholder engagement**

- Several national and sub-national level stakeholder workshops focusing on the prioritization of MBM will be conducted to build consensus and buy-in from all relevant stakeholders. It is essential that the MBM be designed in a manner that provides incentive for participation and meets the objectives of relevant stakeholders.
- These activities will also be carried out at the sectoral level and have active participation from the Private Sector.
- Several Stakeholder consultations and workshops for gap assessment in the existing mechanisms will be conducted.

2.5.2 Activities, Deliverables and Timelines

Table 6: Terms of Reference for BB2

ToR for BB2						
Objective	1) To assess the existing policy environment and develop a roadmap for a new Market Based Mechanism 2) To assess the experiences of Carbon Pricing and Market Mechanisms in India					
Output	**Rationale**	**Activities**	**Description**	**Deliverables**	**Responsibility**	**Timeline**
Output 2.1	The output will help the government to make an informed decision on sector, scale, scope of policy instruments like markets or pricing	Identification and prioritization of policy instruments like markets and pricing in key sectors	1) This will be undertaken on the basis of modelling based analysis	1) Modelling based analysis results	MOEFCC, Niti Ayog, Relevant sectoral ministry, PMR-PMU	Q1-Q2
Prioritized list of policies (regulatory and economic) and policy instruments in key sectors prepared after detailed evaluation of co-benefits and GHG reductions.			2) Selection of important sectors will be on the basis of criteria such as mitigation potential, non-GHG and SD impact, experience from existing markets (national/international), ease of implementation including issues such as baseline determination, stakeholder acceptance amongst others	2) Report highlighting the rationale for forming the basis for selecting key sectors		6-8 months
						Interim report by end of Q1
Output 2.2	This will help government to make an informed decision on sector, scale, scope of new	Assessment of optimum policy packages for achieving India's goals to benefit from policy	Assessment of the interaction of such mitigation instruments with selected instruments in place or planned	1) Modelling based analysis of policy interactions and identification of policy-packages	MOEFCC, Niti Ayog, PMR-PMU	Q1-Q2

Develop and select optimum policy-packages by analysing policy interactions in all existing and new inter related policies	policies and policy instruments	interactions and reduce costs and other trade-offs	domestically/internationally (e.g., the CDM, PAT, REC), including double accounting risks and potential synergies	2) Report highlighting the policy packages and nature of interactions amongst policy instruments		6-8 months
						Interim report by end of Q1
Output 2.3	This will help the government assess important issues related to governance, policy and regulations in designing and implementing MBMs in the identified sectors	1) Assessment of technological, infrastructural, legal and regulatory needs at the national level to implement the identified MBMs in India. This will also give a clear indication of implementation timelines along with details such a nodal entity, scope, coverage etc.	1) Through this activity a MBM roadmap will be developed for India with priority MBMs for implementation.	1) A Market based Mechanism roadmap for implementation	MOEFCC, Niti Ayog, Relevant sectoral ministry, PMR-PMU	Q1-Q3
Needs assessment for implementation of MBMs and pricing Instruments in India			2) This activity will undertake evaluation of processes and institutional arrangements in India for implementation of identified MBMs	2) Assessment report on the institutional arrangements and infrastructural requirements in India for implementing an MBM		
			3) Will suggest a framework, including capacity building requirements to facilitate the development and implementation of identified MBMs			6-8 months

						Interim report by end of Q2
Output 2.4	This will help government to take an informed decision relevant to implementation and expansion of the existing mechanisms	1) Assessment of PAT mechanisms: its achievement of targets, stakeholder engagement etc.	Through this activity, an assessment of the existing markets mechanism would be carried out along with highlighting the key achievements and challenges.	1) Assessment report on PAT along with the key achievements & challenges	MoP, BEE, NLDC, PXIL, IEX, PMR-PMU	Q1-Q2
Assessment of current status of PAT scheme along with identification of achievements and/or challenges in implementation		2) Assessment of challenges and barriers and need assessment for improvisation		2) Needs assessment workshops		4-6 months
						Interim report by end of Q1
Output 2.5	This will help the government take an informed decision on implementation and expansion of the existing mechanisms	1) Assessment of REC mechanisms-its achievement of targets, stakeholder engagement etc.	Through this activity, an assessment of the existing markets mechanism would be carried out along with highlighting the key achievements and challenges.	1) Assessment report on REC along with the key achievements & challenges	MoP, MNRE, NLDC, PXIL, IEX, PMR-PMU	Q1-Q2
Assessment of current status of the REC mechanism along with identification of achievements and/or challenges in implementation		2) Assessment of challenges and barriers and need assessment for improvisation		2) Needs assessment workshops		4-6 months
						Interim report by end of Q1

Output 2.6	This will help in making domestic pricing instruments more dynamic and assist in two ways: a) to reduce emission at source and b) to collect funds to clean energy activities.	1) Assessment of current status of carbon pricing instrument and its effectiveness.	An impact assessment of the various carbon pricing initiatives of the Government of India will be carried out and an analysis of the best international practices of carbon pricing and market mechanisms will be conducted to identify what is best suited to the Indian context.	1) Analyses of the carbon pricing initiatives of India, its impact and utilisation along with recommendations to enhance the effectiveness of carbon pricing initiatives	MoP, BEE, Niti Aayog, MOEFCC, MNRE, NLDC, PXIL, IEX, DISCOMS, PMR-PMU	Q1-Q4
Assessing the status of current carbon pricing instruments and funds like NCEF		2) Analyses of the best international practices of carbon pricing and market mechanisms and identifying what suits best to the Indian context		2) Analyses of the best international practices of carbon pricing and market mechanisms and identifying what suits best to the Indian context		10 months
						months
						Interim Report in Q2

2.5.3 Budget

Budget for BB2						
Output	**Estimated Cost (in US$)**				**Funding Source (in US$)**	
	Year 1	**Year 2**	**Year 3**	**Total**	**PMR**	**Govt**
Output 2.1	150000	0	0	249500	150000	99500
Output 2.2	150000	0	0	249500	150000	99500
Output 2.3	100000	0	0	133000	100000	33000
Output 2.4	100000	0	0	193000	100000	93000
Output 2.5	100000	0	0	193000	100000	93000
Output 2.6	100000	0	0	193000	100000	93000
Total	**700000**	**0**	**0**	**1211000**	**700000**	**511000**

3 Building Block 3. Core Market Readiness Component

This section outlines the required framework for the National Registry, which will form the backbone of any market-based mechanism. This section describes the broad design requirements for a centralized data management and registry platform for India. This core infrastructure will form the foundation for capturing the country's action on climate change mitigation. A robust data management and registry framework is needed to incorporate international best practices and take consideration of future trends. A phased and integrated approach will allow for flexibility and scalability.

In its first biennial update report (BUR), India recognized the challenges associated with establishing a National Inventory Management System (NIMS) and implementing a domestic Measurement, Reporting and Verification (MRV) system, highlighting the need for capacity building in this area for India's future communications and BURs. This building block focuses on creating a Registry to support all domestic MBMs and provide relevant data to the NIMS. The objective of this core market readiness component is to leverage PMR support to meet the capacity building needs identified in India's first BUR, and to create an effective centralized data management and registry system to capture GHG emissions data, which in turn would enable implementation of MBMs. Since India already has existing MBMs and domestic MRV requirements, investing in infrastructure for creating a registry is a no-regret option.

3.1 National Registry

An important building block for keeping track of emissions and avoiding double counting across MBMs is the emissions trading registry. The registry is key to ensuring the environmental integrity of MBMs. The registry would function as an online database that issues, records and keeps track of tradable units. Since registries typically require significant technical and financial capacity for their design and implementation, it is essential to plan their specific regulatory, administrative, functional and technical roles while designing MBM. This BB seeks support to design and pilot a national registry. Each market mechanism would have the ability to generate units that can be traded. However, in order to maintain environmental integrity, databases need to complement the MBMs by recording the issuance, transfer, and retirement of tradable units generated. This will ensure compliance in market-based programs. It will also make it possible to link different MBMs. Linking the registry with a national inventory management system (NIMS)[11] will enhance the robustness of GHG accounting by creating bottom-up data. The objectives of the registry and data management system are:

- Develop **systems and processes** to collect, organize, report, and analyze the necessary data to support the MBMs
- Implement **hosting infrastructure** with specific functional and non-functional requirements including adequate security controls

[11] Interim report of Low Carbon Strategies for Inclusive Growth (2011, Pg.26) calls for setting up of a National GHG Inventory Management System (NIMS) which will be used for archiving, updating and producing information on GHG emissions or removals. Retrieved from < http://www.moef.nic.in/downloads/public-information/Interim%20Report%20of%20the%20Expert%20Group.pdf> on 24th June 2016

- Provide **adequate flexibility provisions** to support future MBMs, link various MBMs together, and to link the registry with the NIMS.

This proposal is designed to build a robust and 'future-proof' the system. This system can be developed to track energy and GHG emissions progress across the Indian economy over time, and be used to help inform future policy decisions. In order to fulfill the short, medium, and long-term objectives, the design and implementation of the data management and registry system will follow a phased approach, comprising i) design, ii) prototype, and iii) pilot.

Box 6: Rationale for a National Registry

What type of National Registry is proposed? The proposed registry will serve a dual purpose: 1) as a **data management system** to maintain a database that records information about emission reductions and/or tradable units that could be used for bottom-up data generation for the domestic MRV system (as the registry will have individual units that are part of MBMs, relevant information may be collected with ease), 2) A **transaction registry** to maintain a record of tradable units and allow their transfer across multiple units.

What types of functions will it support? The registry will support functions that are common to all MBMs and use PAT and REC as examples to determine usage. It will allow issuance of tradable units, transfer of tradable units, retirement, cancellation, banking, and borrowing. Additionally, it will also have provisions to allow for conversion from one tradable unit to the other so as to link various mechanisms. For example, the registry may link the units being generated under PAT scheme with the REC mechanism and allow transfer of units generated under PAT to REC, or vice versa.

What will be its jurisdiction? The national registry in its pilot phase will link domestic MBMs. However, it will be adaptable and flexible for linkages with international market mechanisms. Hence, a no-regret infrastructure will be created, which remains relevant and usable if there are new international market mechanisms by facilitating international transfer of tradable units.

3.1.1 Implement using a phased delivery approach

To create the core components of the domestic MBMs, technical delivery will comprise a phased delivery approach whereby core modules are delivered in an iterative manner following a design ->prototype -> pilot model.

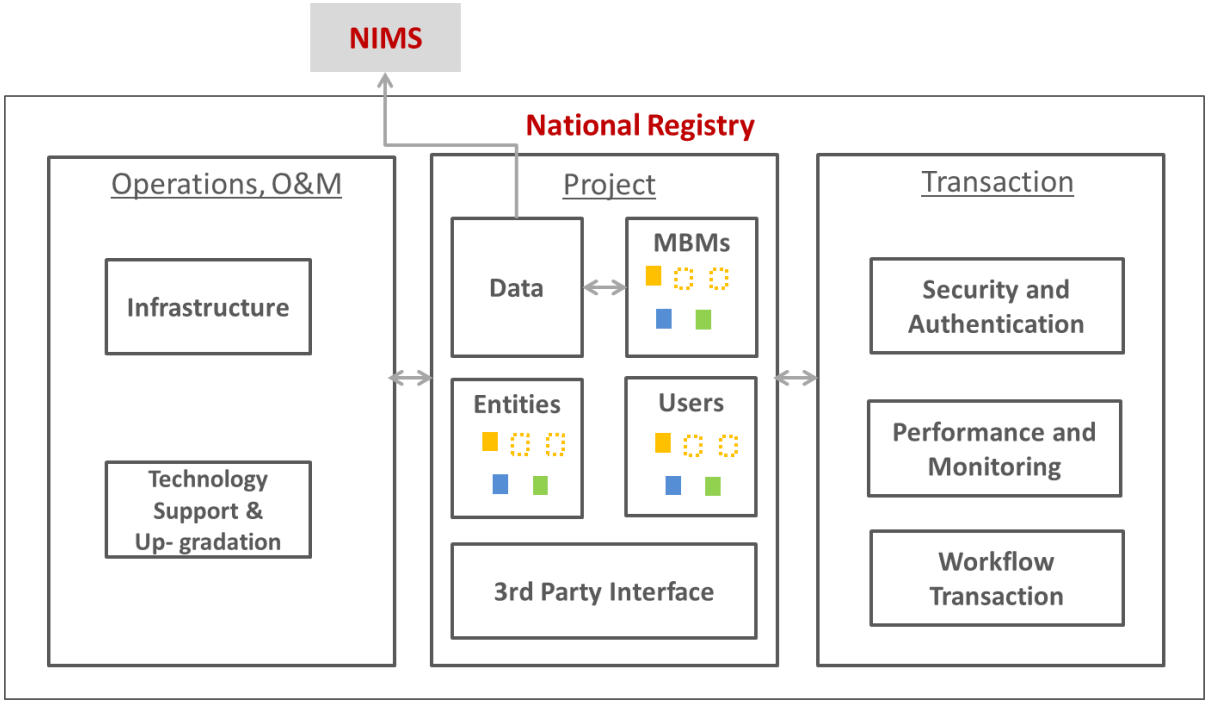
When considering the registry and GHG data management system design, it is important to take future policies into consideration. This is essential for India to develop the core GHG Registry and Data Management infrastructure. This future state could be the co-existence of a number of different MBMs, all managed through a central platform including a CDM market, the PAT scheme, the REC mechanism, and other potential future market-based mechanisms. This would depend on the development of other key components (institutional, legal and operational). When designing the core infrastructure-the backbone of the market-based mechanism- international practices and future trends have to be considered to allow for flexibility, scalability and interoperability.

3.1.2 Components of the Registry

The term 'registry' refers to the complete system, including recording project details, project registration and approval, reporting of monitoring data, and the transactional features of carbon units. The registry is an essential tool through which the success of the mechanism will be measured and improved. It will be used for all reporting, collecting, and checking purposes, storing compliance data and identifying any cases of enforcement. It will also track the emissions and trading activity for registered users over the life of a particular scheme. The integrated system will include three major components: (i) Operations, (ii) Project and (iii) Transaction.

- **Operations component** will include modules on infrastructure and technology, and support up-gradation.
- **Project component** will be linked with various MBMs and include modules on data management and third party interface of all MBMs. Data management module is critical to and provides avenue for linking NIMS. This also ensures transparency and consistency in the way mechanisms are implemented and minimizes reporting requirements for market participants by collating data through an integrated system.
- **Transaction component** will key operational modules such as security, performance monitoring, and workflow module.

Figure 10: Framework for National Registry



3.1.3 Registry Modules

As highlighted above three components will have further modules which are described in Table 7.

Table 7: Registry modules

S.No	Module	Description
1	Project Module	This module will be responsible for implementing the business processes behind the creation, verification, validation, and monitoring of projects leading to the issuance of carbon credits.
1.1	3rd Party User Interface	This will be the interface through which all relevant entities (MOEFCC, NGOs, companies, etc.) will carry out the required functions.
1.2	Data Management Module	This module will be responsible for implementing the rules associated with the receipt and processing of data from scheme participants.
1.3a	MBM- User Module	This module will implement user groups and users along with roles and permissions for sectors, industrial participants, and the MOEFCC.
1.3b	MBM- Entity Module	This module will focus on entities and entity management for sectors, industrial participants, and the MOEFCC.
2	Transaction Module	The transaction module will implement the following functions: i) **Transaction Management:** These are the functions associated with the creation, movement, and retirement of carbon assets. Such functions will include issuance, transfer, and retirement; ii) **Unit Management:** These are the functions associated with the identification and rules of unit types, unit blocks and serial numbers along with management of parameters associated with units such as issuance limits and validity; iii) **Compliance and Enforcement:** These are the functions associated with managing compliance activities and rules
2.1	Performance, Monitoring and Compliance Module	This module will implement data reporting for MOEFCC. It should provide a mechanism to report data contained in Project Registrations along with issuance, transaction, and compliance information.
2.2	Workflow/Transaction Module	This module will implement the rules for any relevant business processes.
2.3	Authentication and Security Module	This module will implement security controls such as user registration, password rules and protection of submitted data. As schemes mature, the value of assets tends to increase and robust security becomes paramount. Security includes defining how users are granted access to the system (Registration or Know Your Customer), mitigating the risk of leakage of 'live' data from operational and technical staff and minimizing the risk of 'Denial of Service' attacks on the infrastructure. Building in security from the start maximizes trust in the system.
3	Operations, O&M Module	Day to day infrastructure requirement, technology support and up-gradation

3.1.4 NIMS and Registry

Data management refers to the development, execution and supervision of plans, policies, programs and practices that control, protect, deliver and enhance the value of data and information assets. Extending this definition to GHGs or MBMs means, that data management is the development, implementation and management of policies, practices and systems that manage, streamline, secure, deliver and maximize the value of data for end-users. Data management will also provide bottom-up inputs to the NIMS.

In order to implement good data management practices, the 'Data Value Chain' needs to be elaborated. The 'Data Value Chain' has three components:

1. Data management
2. Data taxonomy
3. Data flow

3.1.4.1 Data management plan

The data management plan will focus on defining the information and business requirements, the concepts to be reported, the relations between them, the main users in the data value chain, and the functions that users will execute at each step of the value chain. Additionally, the plan will specify quality controls, procedures, and overall management of the data, how it will be validated and stored, and how the security controls will be implemented.

Table 8: Technical data taxonomy

Data attribute	Description	Examples
Category	Defines where the data should reside	Project Design Template Verification Statement
Format	Defines what the data item is	String (Letters Only), Alpha Numeric (Letters & Numbers)
Validation rule	Defines what quality checks are in place to ensure that the data item is valid	Date (dd-mm-yyyy) Whole Number (N)
Condition	Specifies whether the data item is mandatory	Mandatory Optional
Data source	Specifies where the data item originates from	Reference Data Set Project Monitoring Report
Accuracy	Specifies the expected accuracy of the data item	+/- x%
Dependency	Specifies if the data item depends on another data item or vice-versa	Specify the relevant data items
Access	Specifies who has access to the data item	Administrator, Regulator, NGO, Company

3.1.4.2 Data taxonomy

The data requirements will stem from the policy and technical standards (Legal Infrastructure). The data requirements need to be specified in the form of technical data taxonomy. This will take the form of a data dictionary, whereby each data item within the scheme is categorized, named, and assigned certain attributes. Table 9 table presents a sample data dictionary.

Table 9: Example of data dictionary

Category	Name	Format	Validation Rule	Condition	Data Source	Accuracy	Dependency	Access
Emissions Report	Total Reportable CO_2 emissions (tCO_2 eq.)	Integer	2 decimal places	Mandatory	Emissions Report	+/- 0%	Fossil Material Emissions plus Inherent/Transferred Amount	All
	Source Stream Type	String	Fuel or Material	Mandatory	Reference Data	N/A	Source Stream Type in Monitoring Plan	All
Monitoring Plan	Source Stream Type	String	Fuel or Material	Mandatory	Reference Data	N/A	Source Stream Type in Emissions Report	All
Registry	Unit Block	String	Country Code-Unit Type-Start Serial-End Serial-Project Code	Mandatory	Registry	N/A	N/A	Account Holder and System Administrator
	Company Name	String	N/A	Mandatory	Company Register	N/A	Registry Monitoring Plan Emissions Report	All

3.2 Assessing current capability

A current system analysis has been conducted to assess whether there are any assets that can be re-used for the proposed data management and registry system.

Based on the four key MBM components the following capability and capacity has been identified.

Table 10: Organizational capability for key mechanisms

Scheme	Institutional Infrastructure	Legal Infrastructure	Operational Infrastructure	Registry and Data Management Infrastructure
PAT	◑	●	◑	○
REC	◑	◑	◑	◑
CDM	●	●	●	○
CDP	◑	N/A	N/A	◑

● **Meets All**: All expected implementation elements are in place and are robust and proven

◑ **Meets Some:** Some expected implementation elements are in place but are not fully proven

○ **Meets None**: No expected implementation elements are in place

The best example of data management in India is the Climate Change Reporting Taxonomy (CCRT)[12] and the GRI XBRL taxonomy developed by CDP and Climate Disclosure Standard Board (CDSB).[13] While developing these taxonomies, CDP and CDSB have followed the global trend of integrated reporting where organizations have a single repository from which they fulfill all their reporting obligations. Furthermore, these taxonomies follow the approach adopted in the financial sector (XBRL) where financial institutions around the world can transmit financial data in a standardized form. By moving towards integrated reporting, the proposed system will have the ability to develop a data management plan for future voluntary carbon markets and mechanisms.

[12] http://www.cdsb.net/priorities/xbrl/cdsb%E2%80%99s-xbrl-project
[13] https://www.globalreporting.org/REPORTING/REPORTING-SUPPORT/XBRL/Pages/default.aspx

3.3 Key considerations for proposed core components

In summary, this section has presented an approach for developing core components and specifically building a data management and registry infrastructure that meets the short-term objective of implementing a new market-based mechanism and delivering a platform upon which future scheme elements can be incorporated and/ or integrated.

The following considerations should be taken into account for the proposed core components:

- **IT plays a critical part** in ensuring high efficiency and low transaction costs for the implementation of MBMs with a registry as one of the core component.
- **MBMs cannot be designed and built in isolation**. India will need to have plans and resources in place for all three MBM components (see Section 3.1.2) and interlink the various domestic and international MBMs.
- **An integrated solution approach is needed**. The global carbon market players are all converging towards the integrated solution approach; e.g. New Zealand has integrated its emissions trading and registry platforms, the European Commission has integrated all national registries into a single system.
- **Utilization of a phased delivery approach through pilots as a risk minimization strategy.** The delivery of market-based mechanisms can be costly and time consuming. However, using a phased delivery approach will reduce many risks and issues.
- **Understanding the data is essential**. Carbon markets can place undue burden on industries but by using effective data management practices, negative impact can be minimized.
- **It is critical to implement strong governance controls and compliance procedures** with potential participants and public stakeholders.

The PMR grant is requested to provide the resources to help design and develop a robust data management and registry system for India. Resources need to be dedicated to future-proof the system and support the registry platform so that it will be capable of managing India's GHG emissions and supporting the development, implementation and scaling up of new or existing MBMs.

3.4 ToR(s) and Proposed Budget

Suggested areas the PMR can support for the development and implementation of a registry and GHG data infrastructure are outlined in Table 11 below.

3.4.1 Objectives and Rationale

Objective:

i) To develop a national registry that will serve the dual purposes of data management and transaction registry. The design of a national registry should draw on lessons from existing international experience.
ii) To provide the option of linking existing domestic MBMs and new MBMs. This implies that the registry should also allow conversion of tradable units from one MBM to another.
iii) To explore linkages with NIMS and the domestic MRV system.
iv) To provide the opportunity of linking with any new international registry of a new market based mechanism.

Rationale: This will ensure the creation of the required infrastructure to implement a national registry where different MBMs and NIMS can be linked. A registry will also help ensure that there is no double counting and that infrastructure exists to support linking various MBMs.
These objectives will be achieved by undertaking following activities with two major outputs.

Output 3.1: Lessons from Existing Examples of National and International Registry
Output 3.2: Institutional Framework Design of the proposed National Registry
Output 3.3: Assessing System Requirements
Output 3.4: Exploring linkages of the existing domestic markets (PAT and REC) with the national registry
Output 3.5: Integrated registry and NIMS for future readiness
Output 3.6: Exploring linkages of the new international markets with the national registry

Activities: The set of key activities to be undertaken under BB3 can be divided into three major categories:

1) Technical Assessments

- Assessment of institutional capacity and identification of roles and responsibilities for the national registry.
- Evaluation of institutional capacity building requirements for operating the GHG registry, including training programs and delivery platforms, guidelines for recruitment of key staff, work plan and timelines, etc.

2) Stakeholder engagement

- Several stakeholder consultations and workshops will be held for disseminating information on the new registry system and obtaining feedback.

3) Core Market Readiness Component

- Definition of system requirements for Registry and GHG data management system and procurement of all relevant infrastructure.
- Pilot the registry with linkages to MBMs and NIMS.

3.4.2 Activities, Deliverables and Timelines

Table 11: Terms of Reference for BB3

ToR for BB3						
Objective	1) To develop a national registry based on lessons drawn from existing international experience. 2) To provide possibility to link existing domestic MBMs and also link new MBMs. Further to allow conversion of tradable units from one MBM to other. 3) To explore linkages with NIMS and domestic MRV system. 4) To provide possibility to link with any new international registry of a new market based mechanism.					
Output	**Rationale**	**Activities**	**Description**	**Deliverables**	**Responsibility**	**Timeline**
Output 3.1 Lessons from Existing Examples of National and International Registry	In order to make an informed choice it will be important to learn from the best existing practices and examples from operational registries along with the domestic assessments as part of other outputs of this BB. This will help the government learn from the best international practices.	1) Desk reviews, surveys and interviews with international experts 2) In-country site visits to learn from best practices	This will undertake with the help of PMR secretariat and assistance of other country experts. Questionnaire survey will be administered online and will seek participation from experts	A report highlighting international best practices in design and implementation of a registry.	MOEFCC, PMR-PMU	Q1-Q2 4-6 months Interim Report Q1
Output 3.2 Institutional Framework Design of the proposed	The government will need a broad assessment of the institutional capacity to	1) Identification of roles and responsibilities of various institutions	This will be undertaken with a political economy analysis of existing institutions	A report with institutional design of the national registry. The report would be	MOEFCC, PXIL, IEX, relevant ministries, PMR-PMU	Q1-Q6 16-18 months Interim Report in Q2,Q4

National Registry	help implement all domestic markets. A registry will also help in ensuring there is no double counting and the infrastructure to link various MBMs exists	2) Assessment of institutional capacity to support and monitor implementation of the GHG data management system 3) Evaluation of institutional capacity building requirements for operating the GHG registry, including training programs and delivery platforms, guidelines for recruitment of key staff, work plan and timelines, etc. 4) Technical support on strategy for MBMs and stakeholder engagement plan	and their capacities. In depth interviews will be conducted with individual stakeholders.	built on an assessment of capacities required and stakeholder engagement.		
Output 3.3 Assessing System Requirements	This will ensure that there exists required infrastructure to implement a national	1) Definition of system requirements for Registry and GHG data management system	On the basis of output 3.1 and 3.2 an assessment of infrastructure and	A detailed project report of the design of a national registry. This will include	MOEFCC, PXIL, IEX, relevant ministries, PMR-PMU	Q1-Q6 16-18 months Interim Report in Q2,Q4

	registry where different MBMs and NIMS could be linked. This will act as one stop information source for market mechanisms and build institutional capacity through the development of guidelines and operating procedures	2) Development and implementation of a procurement plan to select software vendor for the system 3) Development of data taxonomy for GHG data management (in line with CDP/GRID, etc.) 4) Preparation of IT documents for setting up the system, including security requirements and specifications, user scenario description, transition plan towards scalable MBM	system requirement will be undertaken. This will be followed by appointing a technical expert to develop a detailed project report for the national registry	infrastructure, design and system requirements.		
Output 3.4 Exploring linkages of the existing domestic markets (PAT and REC) with the national registry	This activity will put all the information on tradable units in a single platform and hence make it easy to track progress. This will also ensure there is no double counting.	Exploring infrastructural, legal and regulatory requirements to link the respective domestic market mechanism's registry with the national registry	These activities would ensure that all the facets of linking are assessed including legal, regulatory and infrastructural aspects	Assess the feasibility of domestic linkage opportunities in India	MoP, BEE, Niti Aayog, MOEFCC, MNRE, NLDC, PXIL, IEX, DISCOMS, PMR-PMU	Q5-Q7 6-8 months

Output 3.5 Integrated registry and NIMS for future readiness	This will ensure that the proposed registry and NIMS are implementation-ready and aligned with the government's plans	Primary and secondary research to design integrated registry and NIMS within the anticipated policy framework, with stakeholder engagement and capacity building where necessary	This activity would ensure that all the facets of linking are assessed. These include legal, regulatory and infrastructural aspects of linking such market mechanisms. The data management of the national registry will be designed in a way to also address the data needs of the NIMS.	Assess the feasibility of linkage with NIMS. This will be ensured while designing the data management module of the national registry in a way that it addresses the needs of NIMS along with that of MBM.	MOEFCC, NATCOM Cell, PMR-PMU	Q4-Q6 6-8 months Interim report in Q5
Output 3.6 Exploring linkages of the new international markets with the national registry	This will open the window of using international markets, and convert all information into tradable units on a single platform, making the progress easy to track progress. This will also ensure there is no double counting.	Exploring infrastructural, legal and regulatory requirements to link the international market mechanism's registry with the national registry	This activity would ensure that all the facets of linking are assessed. These include legal, regulatory and infrastructural aspects of linking such market mechanisms	Assess the feasibility linkage opportunities with international markets	MOEFCC, NATCOM Cell, PMR-PMU	Q4-Q6 6-8 months Interim report in Q5

3.4.3 Budget

Budget for BB3						
Output	**Estimated Cost (in US$)**				**Funding Source (in US$)**	
	Year 1	**Year 2**	**Year 3**	**Total**	**PMR**	**Govt**
Output 3.1	150000	0	0	199500	150000	49500
Output 3.2	150000	150000	0	399000	300000	99000
Output 3.3	450000	650000	250000	1795500	1350000	445500
Output 3.4	150000	50000	0	326000	200000	126000
Output 3.5	150000	50000	0	326000	200000	126000
Output 3.6	150000	50000	0	266000	200000	66000
Total	**1200000**	**950000**	**250000**	**3312000**	**2400000**	**912000**

4 Building Block 4. Framework for Designing New MBMs

This section outlines the framework for designing new MBMs in the identified sector as per the analysis undertaken in BB2. Supporting sector-specific policies with climate co-benefits allows consideration of emission reductions and mitigation of climate change along with other immediate priorities such as energy security, growth and development in the country. This section builds on BB2 and outlines activities to facilitate overcoming barriers to effective implementation of existing schemes and to support scaling up of existing schemes. Further, this section explores the potential opportunities for market linkages and synergies between existing and future mechanisms in India. This section also discusses linking these MBMs and NIMS through the registry developed in BB3.

For India to move to a low carbon development trajectory, a mix of actions will be required. These include developing clean energy and preserving existing natural forests to facilitate overall de-carbonization of the economy. A mix of policy instruments such as regulations, standards, incentives, awareness programs, and capacity building initiatives are required. Two kinds of policy instruments, MBMs and carbon pricing/taxes, can enable the achievement of climate change objectives through (i) technology innovation, (ii) behavioral change, and (ii) additional government revenues. While the two policy instruments differ in design and impact, they are built on a set of common principles. This section discusses how a future market based instrument could be designed in India.

4.1 Expanding the scope of existing MBMs

India has experimented with market based mechanisms in the past through PAT and REC mechanisms, and has achieved mixed outcomes. In a post Paris scenario, where India has to meet very ambitious goals as listed in its INDC, it is important to focus on the existing MBMs. Outputs from BB2 will help identify options for scaling up and/ or implementing existing schemes effectively. In this context, the following section discusses the future cycles of PAT and barriers to REC. Given that there is an implicit alignment between MBMs and India's climate change mitigation targets, it is important to address issues in existing schemes and expand their scope to achieve greater coverage and efficacy.

4.1.1 Future PAT Cycle

BEE announced PAT Cycle II (2016-19) on 31st March, 2016. PAT Cycle II notifies 621 Designated Consumers under 11 energy intensive sectors with a national energy savings target of 8.869 mtoe by 2019. The current total consumption from the 11 sectors is 227 mtoe. Three new sectors have been introduced in Cycle II, namely refinery, DISCOMs, and railways. The table below presents the number of new DCs added in existing and new sectors.

Table 12 Number of DCs in existing and new sectors

S. No	Sector	No. of DCs in PAT I	Additional DC in PAT Cycle-II	Total no. of DCs PAT -2
1	Aluminum	10	2	12
2	Chlor-Alkali	22	3	24
3	Textile	90	14	99
4	Pulp & Paper	31	4	29
5	Iron & Steel	67	9	71
6	Fertilizer	29	8	37
7	Cement	85	27	111
8	Thermal Power Plants	144	22	154
9	Refinery	NA	18	18
10	DISCOMS	NA	44	44
11	Railway	NA	22	22
Total				621

Source: BEE

Table 13 Comparison of PAT Cycle I and Cycle II

PAT Cycles	No. of Units	Share of total energy consumption (2009-10 Level)	Sectors covered
Cycle I (2012-13 to 2014-15)	478 DCs	36%	8
Cycle II (2016-17 to 2018-19)	621 DCs	50%	11

Source: BEE

The analysis undertaken under BB2 and BB4 will support the successful implementation of PAT Cycle II. BEE's announcement of the new cycle and identification of designated consumers indicates strong institutional interest and commitment towards the activities proposed for scaling up the PAT scheme. Options for successful implementation and expansion of the PAT mechanism include:

i) **Deepening the PAT scheme:** As the PAT scheme progresses, the threshold level for identifying designated consumers can be lowered further to deepen the ambit of the PAT scheme.

ii) **Broadening the PAT scheme:** During the first phase just 8 energy efficient sectors have been included. The PAT scheme has the potential to be broadened beyond the proposed 11 sectors in Cycle II, including other energy intensive sectors (e.g. automobile, food and drink, commercial buildings, glass and mining).

Other opportunities to enhance PAT include measures to maintain market stability and liquidity for ESCerts, to provide fiscal incentives for the promotion of energy efficient technologies, and other financial support mechanisms like research and development funds for high efficiency technologies. Detailed feasibility studies are required to assess the potential for such expansion.

4.1.2 Off-grid REC mechanism

India has vast potential to generate electricity from renewable energy sources, estimated at 89,774 MW, which includes 49,130 MW (54.73%) of wind; 15,399 MW (17.15%) of SHP (small-hydro power); 17,538 MW (19.54%) of biomass; and 5,000 MW (5.57%) from bagasse-based cogeneration in sugar mills. In addition, India is endowed with vast solar energy potential with an average of over 300 sunny days annually. About 5,000 trillion kWh energy is incident over India's land area each year, with most parts of the country receiving 4-7 kWh per sq. m per day. The state of Gujarat has the highest share of renewable resources (13.91%, or 12,489 MW), followed by Karnataka (12.3%, 11,071 MW), and Maharashtra (10.69%, 9,596 MW), with a majority contributed by wind.

At the same time, India faces significant challenges in providing access to adequate, affordable, and clean sources of energy to a large section of its population, most of which lives in rural areas. Removing the bottlenecks in energy supply to people remains one of the key priorities in order to achieve India's projected growth rates. In spite of significant growth in electricity generation over the years, electricity continues to be in short supply, primarily because expansion of the energy sector has failed to keep pace with growing demand.

India has made gradual progress towards addressing this challenge. The energy deficit in the country dropped to 2.1% in financial year 2015-16 from 3.6% in 2014-15 and 4.2% in 2013-14.[14] Access to electricity has also improved over the last two decades, with 95% of census villages being electrified and rural electrification rising from 36% to 56%. However, about 74 million rural households still lack access to modern lighting services. It may also be noted that census villages exclude other types of settlements, such as *bastis, padas,* and hamlets, which remain un-electrified. As reported in Census 2011, a third of all households in India depend on kerosene and other inefficient sources for lighting. One of the potential, cleaner options for overcoming the current deteriorating environment is the promotion of renewable energy, especially off-grid generation for enhancing energy access.

4.1.2.1 Drivers to develop and stimulate the off-grid market in India

Despite several efforts through various programs undertaken by the Ministry of New and Renewable Energy (MNRE) and the Ministry of Power (MoP) in the past, significant renewable energy potential remains untapped. Much of the renewable energy capacity creation has been in the form of grid connected power, primarily through wind energy. Recently, grid connected solar has shown growth driven in part by the National Solar Mission. However, there is vast untapped potential for off-grid renewable energy, which could be used to address energy security issues and provide electricity access in rural areas to facilitate sustainable growth.

An estimated 74 million households still lack electricity access. Assuming consumption at 240 W per household (as per revised RGGVY guidelines), there is a technical requirement of 17,760 MW. Even with assuming relatively low annual per capita consumption levels of 96kWh for rural areas, the total annual power requirement would be about 35,000 million units. There are several potential large-scale applications for off-grid RE such as telecom towers, irrigation pump sets, rural drinking water pumping systems, and energy for public health centers.

[14] Power Minister Piyush Goyal's written reply to Lok Sabha

The Electricity Act, 2003 mandated the formulation of a national Rural Electrification Policy in 2006 and India's major rural electrification program, Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY), began in 2005 (now subsumed under the Deen Dayal Updhyay Gram Jyoti Yojana (DDUGJY). The unit of electrification under RGGVY is an individual village: the program uses the threshold percentage of 10% of the village population having access to electricity to designate a village as 'electrified.' Yet, electrification does not imply a steady, minimum level of electricity supply. Moreover, RGGVY focuses only on household supply and does not address the need for providing electricity for other sectors such as small industries and agriculture. This, in turn, requires strengthening of the rural network and not just last mile connectivity to households, which is now covered under the larger DDUGJY scheme.

The Jawaharlal Nehru National Solar Mission (JNNSM) has a strong focus on providing solar energy in rural areas. As solar power can be generated on a stand-alone basis and can be installed close to the residents in remote areas, off-grid and mini-grid solar power is an economical option that does not require grid-connection. In addition to the JNNSM scheme, MNRE promotes power generation programs based on other renewable sources, including small hydro, biomass, and bagasse cogeneration. For areas struggling with issues such as tough geographical terrain, which make grid access difficult, the government has launched several programs and schemes, including decentralized distributed generation (DDG), remote village electrification (RVE), Village Energy Security Program (VESP), and solar home lighting systems (SHS), which have tried to achieve deliver cost-effective off-grid renewable energy, but with limited success. The Smart Grid Vision and Roadmap for India, which was recently published by the Ministry of Power, identifies energy access as a major thrust area.

The limited penetration of these schemes highlights the need to develop new business models to help deliver off-grid renewable energy at the scale required. The Forum of Regulators has taken the initiative to identify "Policy and Regulatory Interventions for Promotion of Community Level Off-grid Projects" in 2010-11. This study helped identify barriers in promotion of renewable energy, analyzed the prevailing policy and regulatory scenario, devised innovative models to support community level off-grid renewable power projects, and proposed a new business model which could be implemented as a new regulatory mechanism – Renewable Energy Certificate (REC) model for implementation of off-grid RE projects. This allows off-grid projects to earn Renewable Energy Certificates under the CERC's REC mechanism.

4.1.2.2 Challenges on integrating off-grid REC into the prevailing framework

The following challenges and issues need to be overcome and resolved before deciding whether to initiate integration of off-grid RECs into the existing REC mechanism, or evolve a separate tailor-made mechanism for off-grid REC:

i) **Identifying the qualifying criteria for RE source and technology for participating in the REC mechanism:** Under the prevailing REC mechanism, only grid-connected renewable energy technologies approved by MNRE are eligible for the REC mechanism.

ii) **Need for a specific category for off-grid REC:** A separate classification of REC for off-grid RE-based applications is advisable in light of the inherent disadvantages of such small RE projects in terms of the economies of scale enjoyed by large RE projects. There is also a need for separate

off-grid RPOs to be mandated (similar to the separate solar RPOs designed to promote solar within the state RPO target) even if states have 100% or near-100% electrification status.

iii) **Regulatory intervention for metering arrangement for off-grid renewable energy generation:** Under the prevailing REC mechanism, State Load Dispatch Centres (SLDCs) are responsible for reporting energy injected to the grid to the Central Agency (CA), and RECs are issued based on these reports. Hence, off-grid renewable energy generation can qualify under the REC framework provided such generation is appropriately metered, verified, and certified by approved agencies.

iv) **Pricing of REC for off-grid renewable energy:** A pricing mechanism for the off-grid REC may have to be evolved in due course. However, since the cost of generation and supply of electricity varies widely with scale as well as technology, a major challenge is to develop price bands for various combinations of technology and scale for off-grid power generally instead of the present categories of solar and non-solar.

v) **Financial assistance, if received, to be considered while assessing eligibility for participation in REC mechanism:** Unlike the prevailing REC mechanism in India, off-grid REC revenue can be given as additional promotional incentive (like RECs allowed even for registered CDM projects or open access projects) over and above preferential tariff/FIT to give a needed boost to the off-grid RE market.

Further work and engagement is required to explore development of the off-grid mechanism. Given that there exists huge RE potential, it is important that India exploits the RE sources under the existing and new versions of the REC scheme. This will not only lead to climate change mitigation but also energy security co-benefits. The envisaged off-grid scheme also has numerous other co-benefits which align with national interests. For example, it provides access to clean energy in the remotest of locations that are not connected to the grid and creates livelihood opportunities. There may be challenges in implementation of the new scheme in the form of market instability, lack of demand, etc. which can be addressed by creating potential methods to link the mechanism with other markets or initiatives. PMR support is sought to understand how this potential mechanism can be developed, integrated into the existing REC scheme/ evolved as a separate tailor-made REC mechanism, and linked to carbon markets. The associated activities are summarized in the following sections.

4.1.3 Reviving CDM projects and creating new demand

India was a leading global player in the international CDM market and accounted for the second largest number of projects. This represents 15.98% of CDM projects in Asia and 12.7% of global CDM projects. Industries like cement, energy generation and use, fossil fuel switch, HFC, hydro, wind, and biomass energy registered the most projects in the CDM market. CDM offers many direct learnings for any market readiness activity in India. Due to the unfortunate turn of events in the global market, the proponents of existing CDM projects that are eligible to earn CERs are unable to find suitable buyers. These projects offer a ready pipeline of carbon offsets for any future domestic or international market based mechanism. This can be done in two ways: 1) create supply aggregators who can find suitable buyers in existing or new international mechanisms, and 2) create a domestic mechanism where existing projects, institutions and infrastructure could be used as suppliers of offsets for the new MBM. PMR support is sought to create suitable MBMs that could potentially

generate demand for the many stranded CDM projects in India. Some of the ways in which demand can be generated include:

i) The Ministry of Corporate Affairs has issued guidelines for companies to invest 2% of the average net profits of the company during the three preceding financial years in Corporate Social Responsibility (CSR) activities. This may be examined to design mandatory provisions for the companies to enable them to participate on the demand side in domestic carbon market mechanisms. Such demand could be met using offsets from existing CDM projects, new projects, or from value generated through PAT and/or REC. Various possibilities and scenarios could be explored to potentially develop a new MBM.
ii) Various options to scale up the CDM mechanism in India need to be studied. PAT, REC and CDM projects can be linked with any domestic MBM. However, a common unit for trading needs to be developed. Therefore, the value of ESCerts, REC credits and CERs need to be aligned, preferably be in CO_2 terms.
iii) Options of using NCEF as a possible avenue for demand generation could also be studied.

The feasibility and potential of these options need to be studied further, and new options may be explored, to identify the sectors to be included in the market mechanism.

4.2 Framework of designing Market-Based Mechanisms

The analytical work under this BB will enable the identification and design of an MBM that meets national objectives and has a strong implementation framework. The studies undertaken in BB2 will review existing literature on low carbon growth pathways for India and conduct analyses to identify and prioritize low carbon options for the Indian economy. These studies will also provide an indicative list of possible MBMs or pricing instruments in the identified sectors. Thus, this building block would take one of the identified options forward and design the elements relevant for implementation. The design of a new MBM would be based on an evaluation of various low carbon alternatives, an analysis of their cost-benefit, and relative merits and demerits. The design of a new MBM will include **elements** on:

i) Institutional setup and governance
ii) Modalities and procedures, detailing potential operational elements
iii) Approaches to assess the GHG and SD benefits of the proposed MBM
iv) Possible timelines and targets
v) Relationship with existing MBMs and the overall policy framework

4.2.1 Selection of a new MBM

Based on the analysis conducted in BB2, a list of possible MBMs will be chosen for further review. The potential options will be presented to various stakeholders and analyzed on the basis criteria for selection of an appropriate MBM. Selection criteria may include elements such as:

i) Ease of Implementation: including issues such as availability of data in the sector and MRV ability, determination of baseline, etc.
ii) Political and social acceptance: Acceptance by all relevant stakeholders, including the private sector.
iii) GHG mitigation potential, Other SD and environmental benefits: Potential to mitigate GHG emissions from the MBM and achieve other co-benefits is important.

iv) **Cost Effectiveness:** The MBM should impose the least possible burden on the economy.
v) **Policy interaction:** It is important to assess if there are possible trade-offs with other policies.
vi) **Alignment with national targets:** The MBM must contribute towards fulfillment of national objectives and priorities.

Upon developing suitable selection criteria, a shortlisted set of MBMs will be identified, analyzed and developed further. The shortlisted options will be discussed with relevant stakeholders who may be expected to be involved in the implementation. The final choice of MBM will depend on stakeholder response, analytical rigor of the proposed MBM, and support from relevant line ministries.

Therefore, activities under BB5 will help in the selection of a new MBM, which may then be developed further and piloted. The activities in this BB include secondary research and analysis of various options, continuous stakeholder engagement, including institutions involved in design and implementation of the MBM, the private sector, and/ or units directly involved in the MBM at the user level. In addition, assessing each MBM based on selection criteria will lead to an assessment of institutional capacity and technical readiness to implement the mechanism.

The relevant line ministries will be responsible for coordinating committee approvals, for the new MBM. Approval from the PM's council on climate change and cabinet approval would be required for implementation of the MBM. In order to ensure alignment with national goals and political support for the proposed new MBM, members of the council and key ministries will be involved in each stage of MBM development through inclusion in the steering committee for the PMR grant.

4.2.2 Design of a new MBM

The new MBM selected through BB4 activities would be analyzed and developed further for piloting/ implementation. The MBM will be designed on the basis of the following principles:

i) Objectives of the new MBM **align** with the existing national policies and priorities; and aim to contribute to India's low carbon development pathway.
ii) Design of the new MBM is most efficient and **cost effective** option to ensure low carbon development in India.
iii) The MBM designed should be a stable and **predictable mechanism** that provides positive market signals to the private sector and contributes in accelerating growth in India through private sector participation.
iv) The new MBM builds local **capacities and** creates job opportunities in India such that the economy transitions towards an inclusive growth pattern.
v) The new MBMs ensures **environmental integrity** by avoiding double counting of emission reductions.
vi) The new MBM is informed globally but **designed locally**
vii) It is flexible and has **adaptability** to changing circumstances that might result from the evolving international climate regime.

The overarching objective of the new MBM will be to support India's policy objectives and deliver on social, economic, and environmental elements. These broad objectives will be ensured at the

selection as well as the design stage. More specifically, the MBMs will seek to fulfil the following objectives:

i) Help India move to a low carbon development trajectory at a low cost
ii) Drive economic transformation built on innovative clean technologies in India
iii) Build local institutional capacity to develop, implement and participate in such markets
iv) Meets national developmental priorities and enhance local environmental benefits in India

Based on the design of the MBM, relevant states and interstate councils may be engaged in MBM design and development at an early stage to ensure stakeholder buy-in. The design stage will also serve as an opportunity to ascertain the length of the pilot, and the criteria and methodology for evaluating the pilot. Ensuring continuous stakeholder engagement at all levels of government and the private sector will ensure continuity of the mechanism beyond PMR support.

Past experience with the PAT and the REC mechanisms has also shown that the process of designing a new MBM must necessarily be an iterative and consultative process. Therefore, MBM development has been planned under a phased approach involving design>pilot>improve, which offers flexibility in design, capacity building, and inclusion of complex sectors. The following steps will be undertaken:

i) **Defining the scope**: This is the first step which has also been also discussed in BB1. The emphasis would be on identifying sectors to be covered under the new MBM and the tradable units. The immediate next step would be to identify the point of regulation or the entity which would set targets. The availability of data and the ease of implementation and monitoring would influence decision-making at this stage. Given the heterogeneity inherent in the Indian scenario, it would be difficult to implement a mechanism where downstream users are the point of regulation as the number of such users would be large, making implementation and monitoring challenging.
ii) **Identifying the regulator**: On the basis of the sector chosen, entities or existing institutions may be identified to regulate the MBM. For the MBM to be successful, a strong foundation of data and institutions would be required. One of the important aspects in identifying a regulator will be its policy mandate, ability to generate data, build stakeholder consensus, and exert authority. Hence, the regulator should be an authority that can play regulatory, legislative, and administrative roles.
iii) **Setting a baseline and targets**: The most critical part is to determine the baseline and targets, where an analytically rigorous and transparent approach should be followed. Historical data would be used to set baselines, and current data will help measure compliance. Targets can be set in a top-down or bottom-up approach. In the Indian scenario a mix of both should be adopted. While the sector can be identified by making high-level assessment of mitigation potential, these need to be allocated in a bottom–up a manner given the level of heterogeneity across sectors in India.
iv) **Robust data management and registry**: As discussed in BB3, data management and registry forms an important aspect of the MBM. While data is important for setting targets and baseline determination, regular flow of data and data management will also be required to assess and ensure compliance. Compliance may be monitored easily through the registry. The second purpose of the registry is to facilitate transactions of tradable units.

v) **Trading and offsets**: The design of the MBM should identify the tradable units. If linkages are to be explored with other MBMs as offsets (especially in the case of REC), a common value should also be assigned to allow such trading. A common registry, as discussed in BB3, would facilitate this.

vi) **Time-period of each cycle**: While each cycle could be short-term so that future cycles can be improvised, the overall vision of the scheme should be long-term, in line with national policy objectives (perhaps to correspond to consecutive FYPs) and provide stability by reducing risk and uncertainty.

vii) **Price predictability and market stability**: For an MBM to be successful, it is important that it is designed to provide long-term price signals and reduce uncertainty among market participants. A long-term approach would provide confidence to market participants. At the same time, there should be room for flexibility so that the MBM can be adapted quickly to any external/internal changes that may arise.

viii) **Regulatory and legislative changes**: In order to ensure compliance, it is important to embed the MBM in the regulatory and legislative framework. If required, timely provisions of changes and amendments may be made through new directives and legislations. Such changes would ensure that a regulator has full oversight of the MBM and can exert penalties in case of non-compliance.

ix) **Engage stakeholders and build capacities**: Stakeholders must be involved during the design process to obtain feedback and buy-in. Once designed, the scheme and its various provisions should be made visible through regular outreach and dissemination. This outreach will facilitate compliance and improvisation. For improvisation, an open window of opportunity should be given to stakeholders to provide inputs to improve the scheme. Therefore, continuous stakeholder interaction and engagement is essential.

x) **Pilot, evaluate and improve**: Before implementing the scheme at its full-scale, it is important to pilot it at a small scale. This will offer scope for improvement in the design of the scheme.

4.2.3 Piloting new MBM

After the selection and design of a new MBM, it will be piloted at a small scale. Since relevant stakeholders will be engaged in the process of designing the MBM, it is envisaged that there will already be institutional readiness to implement the pilot.

However, before a pilot can be implemented due policy approval process needs to be followed, as discussed in BB1 and earlier in this section, which involves relevant line ministries that also coordinate various committee approvals. The proposed pilot will then be put-up at the PM's council on climate change and for cabinet approval. Political support can be mobilized from the very beginning by involving members of the council and key ministers as members of the steering committee of the PMR grant. If the pilot has to be implemented at the state level, involvement of relevant state governments and interstate councils in the formulation step is also important. It will also be important to ascertain what will be the expected length of the pilot and the process for assessing the pilot during the design stage.

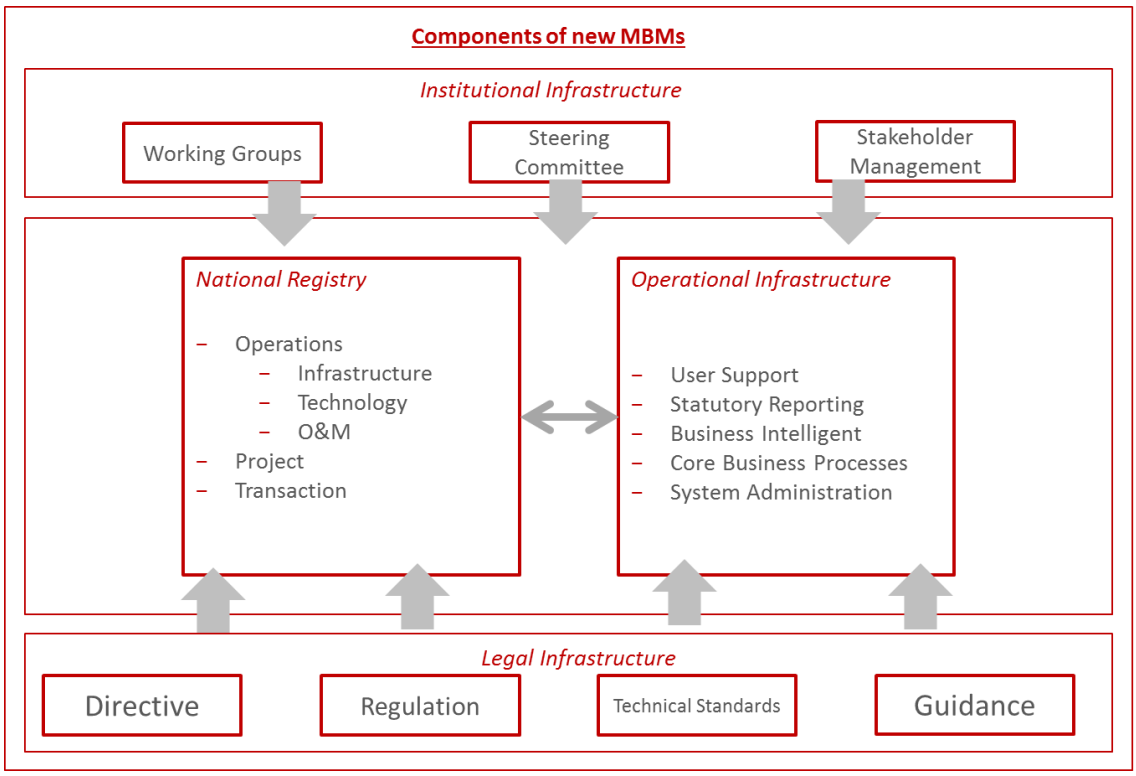
While existing pilots may be implemented for a short duration under the PMR activities, the approvals received at the highest level through the cabinet and PM's council and the alignment of

new MBM with broader climate policy objectives of India will ensure that the activities will continue even beyond the PMR support.

4.2.4 Components of MBM

The MBM comprises four key components, namely (i) institutional, (ii) legal and regulatory, (iii) operational, and (iv) data management and registry. The interaction between these four key MBM components is illustrated in Figure 11. The definition and planning of each component will be critical for establishing a successful MBM. The data management and registry system is developed in greater detail in BB3, given its importance in increasing India's market readiness. Other components will be focus of activities under this BB.

Figure 11 Components of new MBMs



4.2.4.1 Legal Infrastructure

The necessary legal infrastructure to support the new MBM is expected to fulfill the following objectives: (i) implement Acts/ Directives that set out short, medium and long-term objectives; (ii) devolve appropriate operational and enforcement authority to government departments; (iii) set out regulations; (iv) specify technical standards from which systems can be implemented; and (v) provide guidance documents for the implementation elements. This aspect will be developed for the pilot as part of activities under this BB.

The legal infrastructure covers following aspects:

i) **Directives**: the overarching legal structure from which regulations, technical design and operational procedures that can be developed. These are often used to align different national laws, and are particularly common in matters that affect the operation of a single market.

ii) **Regulations:** focused on specifying the legal obligations of enforcing ministries and scheme participants, and the business processes required to fulfil the requirements set out in the legal directive.
iii) **Technical standards**: focused primarily on the implementation elements. They define any protocols, procedures, practices, and approaches as to how to deliver systems that will ultimately meet the objectives and principles of the regulation/ scheme rules.
iv) **Guidance:** aimed at scheme participants specifying what they need to do from a legal and operational perspective. They highlight areas of particular complexity or uncertainty and provide advice on how to deal with them. Guidelines are normally issued to make the actions of its user base more predictable and improve quality.

4.2.4.2 Institutional Infrastructure

The objectives of the institutional infrastructure include: (i) implement the overarching policy and regulation in a consistent and transparent manner, (ii) establish appropriate governance control, (iii) manage on-going feedback with all stakeholders, (iv) provide a platform to analyze and implement regulation change, and (v) establish working groups and taskforces. This aspect will be developed for the pilot as part of activities under this BB. The relevant implementation elements include:

i) **Working Groups:** Defined working groups are needed for each core element of the MBM. Nominated business representatives and defined rules are required for each working group.
ii) **Steering Committee**: An established steering committee is responsible for governance and oversight.
iii) **Stakeholder management**: A forum through which stakeholders are engaged and feedback incorporated.

4.2.4.3 Operational Infrastructure

The objectives of the operational infrastructure include: (i) implement business processes based on regulation, and (ii) build appropriate capacity and capability to implement the regulation. This aspect will be developed for the pilot as part of activities under this BB. The relevant implementation elements include:

i) **Core business processes:** The administering or regulating body needs to understand and define the core business processes underpinning the mechanism. Through the elaboration process, a better understanding will be obtained of the operational impact from a process, procedural, capacity and capability perspective. The process definitions will be used to assist in the technical implementation elements of the scheme along with definition of capacity and training needs.
ii) **Statutory reporting**: Reporting of data typically falls into four categories:
    - Statutory reporting: The domestic and international legal obligations placed on administrators to report specific data at specific times within the 'compliance' cycle.
    - Data reporting: The schemes' own need to collect and report data.
    - Activity reporting: The reports that show level of activity in the scheme such as number of participants, pending work activities, etc.
    - Ad-hoc reporting: The day to day requests from internal or external parties interested in specific data queries.
iii) **Business intelligence**: Business intelligence means understanding the behavior of scheme participants and data in the system. Using modeling scenarios, defined business rules, and

robust data within the system, critical actions or suspicious behavior can be flagged to the administrators.

iv) **User support**: User support is needed through a centralized helpdesk where scheme participants can raise issues. This is ideally linked to a knowledge management system for updating and sharing resolutions to common issues. The purpose is to troubleshoot problems and provide guidance about services. Various communication channels such as email, websites and telephone services can be provided.

4.2.4.4 Registry Infrastructure

Each MBM will have its own data management system. Data for the national registry (discussed in BB 3) will be drawn from individual data management systems for each MBM (existing and new). This will help in linking the MBM to the national registry. This is discussed in detail in Figure 10 of BB3.

4.2.4.5 Policy Interaction between existing and new MBMs

The policy interaction work will be undertaken under output 2.2 of the BB2. A similar exercise needs to be conducted for the new MBM to build synergies and avoid negative externalities.

4.3 Linking of domestic MBMs

Many developed and emerging economies have acknowledged the value of engaging in market-based mechanisms for carbon emission reductions with approaches tailored to suit a country's specific economic situation and context. Countries may adopt a carbon policy to be designed as a standalone instrument. Such a policy will often put a price on GHG emissions, providing a financial incentive to engage in climate change mitigation activities. Alternatively, policy could be designed for a sector linked to carbon and reduce emissions indirectly, whilst tackling other related environmental or natural resource issues. India is an emerging country that needs to develop policies to meet the immediate priorities of energy security, growth, and development. It is therefore important for India to continue to develop policies that meet national priorities, while simultaneously capturing co-benefits of such actions in the form of sustainable development and local environmental benefits.

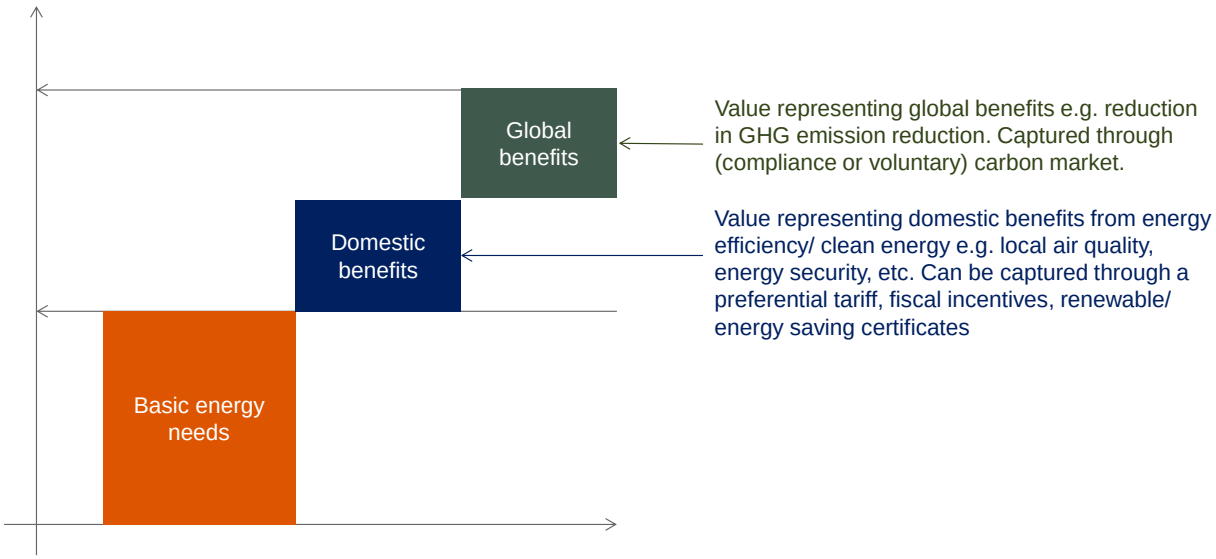
Although sectoral approaches may differ, there are synergies in terms of common benefits which can be explored in detail as a crucial step in linking carbon markets. This will be explored in detail under BB4.

4.3.1 Co-benefits approach to link carbon market

Sectoral policies with climate co-benefits can theoretically be unbundled through the environmental services they provide. Various policies in emerging countries are primarily driven to meet basic energy needs and deliver important domestic benefits such as improving air quality and increasing energy security. These policies can encourage activities focused on energy efficiency and generating clean energy, which will also deliver global benefits in the form of GHG emission reductions. India can attempt to unbundle these benefits and monetize the value of these benefits at the domestic

and global level[15]. This can help further incentivize low carbon activity, as demonstrated in the following figure.

Figure 12 Capturing domestic global benefits



GHG reduction is the ultimate implicit goal of many MBMs. If there is a common unit, the trading units from one mechanism can be used for other mechanisms. However, some schemes may offer multiple benefits, which are of great importance as well, and may fulfill a different set of goals or needs. For example, the PAT scheme has the potential to induce positive behavioral shift, technology development, and enhanced capacities. At the same time, REC offers clean energy solutions. India recognizes the importance of capturing global benefits of various actions/ schemes by linking existing policies in India with carbon markets in the future. For various MBMs to be fungible, the climate co-benefits would need to be un-bundled, and a common value would need to be developed through rigorous economic evaluation of each tradable unit. Important policies in India that can potentially link to future carbon markets include the PAT and the REC schemes, and a potential new MBM.

There are two potential ways to in which this unbudling the co-benefits can be used to explore linking of domestic MBs to carbon markets.

i) **Option 1:** Same supply generates two assets; for example, ESCert from PAT can generate an Escert value (in mtoe) and Carbon asset value (in tCO_2e). This carbon asset value is the quantified unbudled co-benefits. Now, these two assets could be used in two different markets. In this case Escert value can be used in the PAT scheme and Carbon asset value in carbon maket. However, this needs to be developed in a way that it avoids double counting; there is no negative policy interaction; and there is synergistic price interaction between the two assets.

[15] In this approach different co-benefits may be unbundled, evaluated, wherever feasible, quantified in terms of a carbon asset value. The unbundled co-benefits could potentially be sold in one or more markets. It will be designed in a way to ensure that there is no double counting by selling same asset in two markets.

ii) **Option 2:** In this approach only one asset is generated from one unit. For example a unit under PAT scheme has an option to either utilise their asset in PAT scheme as ESCerts (in mtoe) or in carbon markets as carbon asset value (in tCO_2e). The conversion is further discussed in the following sections. However, this needs to be developed in a way that there is no negative policy interaction; and there is synergistic price interaction between the two assets.

4.3.2 Linking the PAT scheme with carbon markets

The PAT energy efficiency scheme is likely to have a carbon emission reduction potential. Indian industry will be able to reduce emissions if increased access to capital for clean technology investment were available.

The PAT scheme covers sites that, in total, consume approximately 160 million mtoe. The carbon intensity of the mix of fuels behind this energy use is approximately 3-4 tons carbon dioxide equivalent (CO2e)/ton oil equivalent. A 6.686 million ton (Mt) reduction target in the first cycle of the PAT scheme would likely reduce carbon emissions by 20-27 million tCO2e over the three year implementation period.

Given the high economic growth forecasts, it is possible to explore expansion of the scheme and tighten targets over time. The PAT scheme has the potential to scale up quickly towards covering 300 million mtoe, and reduce CO_2 emissions by 25-50 million tCO2e per year, depending on efficiency improvement targets. This is of similar magnitude as the first cycle, with additional scope for deepening and broadening by increasing the number of DCs and setting tighter targets helping to increase the potential energy and emissions savings. This is of a smaller, but not incomparable, scale to the EU ETS with 2 billion tons of CO_2 covered with savings of up to 70-80 million tCO_2e annually anticipated in its 2013-20 phase.

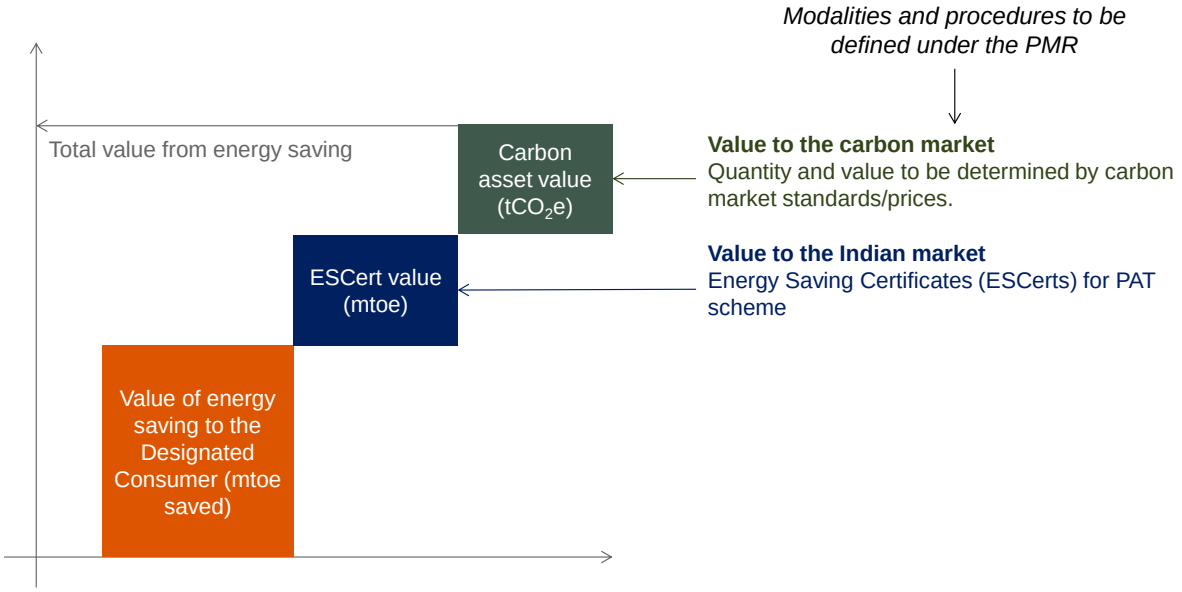
Figure 13 illustrates how domestic and potential global benefits may be unbundled with carbon linkages to the PAT scheme.

In order to assess the feasibility of linking the PAT scheme with carbon markets, further research is required to address the following aspects:

- Understand the linkage between the benchmark targets for the PAT scheme and proposed baseline for creating a carbon asset
- Linkages of the MRV system for a carbon asset with the PAT scheme
- Ensure environmental integrity and avoid double counting
- Interaction between the market for domestic PAT and carbon market such that there are no unintended consequences of linking the two.

A feasibility assessment is required to analyze and evaluate different options for potential linkages with carbon markets for the PAT scheme. This will also require deeper engagement and discussion with relevant stakeholders (including BEE, Indian industry, finance sector etc.)

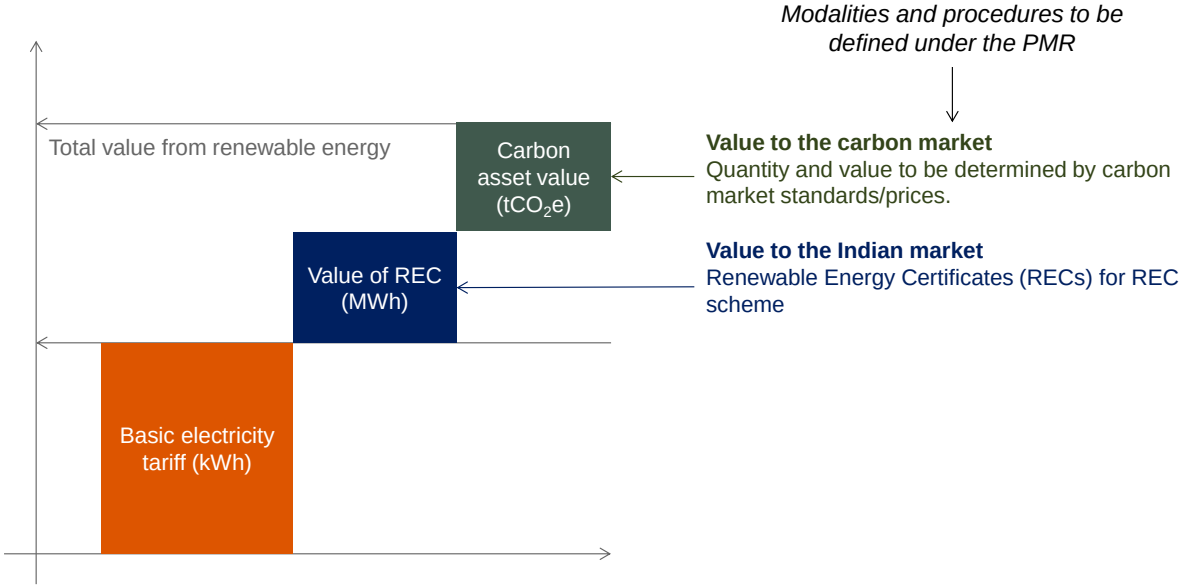
Figure 13 Linking the PAT scheme with carbon markets



4.3.3 Linking the REC scheme with carbon markets

Renewable Energy Certificates (RECs) provide a virtual mechanism for energy transactions, which can address the issues of imbalance of RE resources across states. A REC is a certificate that indicates the generation of one megawatt hour (MWh) of electricity from an eligible source of renewable power. RECs are often considered to represent a claim to the environmental attributes associated with renewable energy generation. Technologies such as wind, solar PV, solar thermal, biomass, and hydro are eligible to earn RECs.

Figure 14 Linking the REC scheme with carbon markets



A REC is not a carbon credit that represents one ton of CO2e emissions, rather it is a unit that relates to how much CO_2e is saved by the adoption of renewable energy, and how efficiently one megawatt hour (MWh) of electricity can be produced. This can vary from as little as 500kg of CO_2e, to nearly

two tons from older, less efficient power stations. RECs provide financial subsidies for the power sector to improve the financial viability of renewable energy projects.

In order to convert RECs into an offset, clean energy must be translated into carbon reductions by assuming the displacement of an equivalent amount of conventionally produced electricity. Figure 14 illustrates how domestic and potential global benefits may be unbundled with carbon linkages to the REC scheme.

Presently, only grid connected RE generators are eligible to receive RECs while off-grid renewables are not included under the prevailing REC mechanism. However, developing an off-grid REC mechanism is under consideration as discussed above. Capturing the benefits from the potential off-grid mechanism will also involve similar challenges.
Further research is required help assess the linkage of the REC scheme and the potential off-grid REC scheme with carbon markets:

- Understand the linkage between the benchmark targets for the REC scheme and proposed baseline for creating a carbon asset
- Assess linkages of the MRV system for a carbon asset with the REC and potential off-grid REC scheme
- Evaluate options to ensure environmental integrity and avoid double counting

A feasibility assessment is required to analyze and evaluate possible linkages with carbon markets to the REC and potential off-grid REC schemes. Deeper engagement and discussion with relevant stakeholders will also be required (including MNRE, power and renewable industry, finance sector etc.)

4.4 ToR and budget

The following table summarizes the main work packages the PMR can help support to assess future carbon market linkages.

4.4.1 Objectives and Rationale

Objectives:

1. To support effective implementation and scale-up of existing domestic mechanisms such as PAT and REC
2. To select, design, and pilot a new MBM
3. To explore linking various MBMs and enhance fungibility
4. To explore options to create demand for offsets from stranded CDM projects

Rationale:

Amongst the existing schemes, BB2 identifies barriers to the effective implementation of REC and opportunities for scaling up PAT. The PMR grant is sought to provide an impetus to (i) evaluate various design alternatives to remove barriers in implementation of the REC mechanism; and (ii) help in scaling-up of existing schemes like PAT and REC. While studying the existing schemes, the role of NCEF in supporting domestic actions will be evaluated based on the learnings from BB2 such as barriers affecting the utilization and deployment of NCEF. Role of NCEF and other possible options

will also be looked into in order to review CDM projects in India. It will also help the government understand the feasibility of various design alternatives of MBMs in different sectors, and to select one or more of the MBMs for implementation at a pilot scale. This will help make domestic markets more dynamic and liquid. Possibilities for future trading with various units will also help in stabilizing the price of a unit. Lastly, the activities presented in BB4 will also help capture the social benefits/costs. This will be an initial step for setting up a domestic MRV framework for the country, which will be useful for tracking GHG emissions and fulfilling international requirements, as relevant.

Outputs

Output 4.1: Overcoming the barriers in the current schemes

Output 4.2: Supporting the expansion of existing mechanisms to enhance coverage

Outputs 4.3: Designing of a new MBM

Output 4.4: Piloting the new MBM

Output 4.5: 'Networking' of various domestic markets

Output 4.6: Reviving projects in the CDM pipeline and creation of demand for credits from existing projects

Activities: Two categories of activities will be undertaken under BB4:

1) Technical Assessments

- Assess the impact of the REC scheme and its contribution towards INDC targets.
- Assessment of various options to enhance coverage in subsequent PAT cycles.
- Development of a national strategy for MBMs
- Detailed technical and financial feasibility studies for the various MBM options
- Development of a methodology to ascertain the 'common value' of tradable units of various domestic markets to allow for future trading
- Design a roadmap to link domestic markets to carbon markets
- Design demand options for use of supply from existing CDM projects in India

2) Stakeholder engagement

- Regular stakeholder consultations and workshops for existing mechanism and new MBMs

3) Core Market Readiness Component

- Piloting of selected MBM(s)
- Linkages with registry and NIMS
- Fungibility of tradable units
- Demand generation for credits from CDM projects.

4.4.2 Activities, Deliverables and Timelines

Table 14: Terms of Reference for BB4

ToR for BB4						
Objective	1. To support effective implementation and scale-up of existing domestic mechanism like PAT an REC 2. To select, design and pilot new MBM on the basis of robust selection criteria 3. To explore linking various MBMs and enhance fungibility 4. To explore the options to revive CDM projects by creating demand for credits					
Output	**Rationale**	**Activities**	**Description**	**Deliverables**	**Responsibility**	**Timeline**
Output 4.1 Overcoming the barriers in the current scheme	This will be used to evaluate various design alternatives to remove the barriers to implementation of the REC mechanism and help improvise the design of the mechanism	1) Analyse the impact of the REC scheme and its contribution towards INDC targets	Through this activity a barrier analysis would be carried out for REC and provide recommendations to enhance the design of the current scheme to enhance its effectiveness	1) Barrier analysis of REC mechanism which would include recommendation to highlight the alternatives to enhance the existing mechanism	MNRE, NLDC, PXIL, IEX, DISCOMS, PMR-PMU	Q1-Q6 16-18 months Interim Report in Q2,Q4
		2) Design alternatives to the REC mechanism		2) Identify alternatives to the REC mechanism along with the key indicators and rationale to enhance the impact of the REC scheme as it stands today.		
		3) Build capacity of the new entrants in the REC mechanism		3) Needs assessment workshops & dissemination workshops		
Output 4.2 Supporting the expansion of existing	This will help government in its efforts to scale-up the existing domestic	1) Study various options to enhance the coverage in subsequent PAT cycles	An analysis of the impacts of deepening & widening the existing schemes will be	1) Scoping study for widening & deepening the PAT along with the analyses of its impact	MoP, BEE, MNRE, NLDC, PXIL, IEX, DISCOMS,	Q1-Q6 16-18 months Interim Report in Q2,Q4

mechanisms to enhance coverage	markets thereby facilitating the government achieve its mitigation goals.	2) Build capacity of the new entrants of the subsequent PAT cycles	conducted along with identifying various options through which this could be achieved. Capacity building of new entrants into the ambit shall also be done as a part of these activities.	2) Development of generic & sector specific training modules with possibilities of tool development for creating inventories 3) Domain specific capacity building activities using the modules developed.	PMR-PMU	
Outputs 4.3 Designing of a new MBM	This will help the government understand feasibility of various design alternatives of MBMs in different sectors and to select one or more of the MBMs to implement at a pilot scale.	1) National Strategy for Development of MBMs	1) This will help provide strategic guidance to various stakeholders in designing and implement MBMs. This will also address various governance issues that may be encountered while implementing MBMs.	1) Strategic plan for a market based mechanism and its potential contribution & effectiveness in achieving the INDC targets for India	MOEFCC, PXIL, IEX, relevant ministries, PMR-PMU	Q4-Q7 10-12 months Interim report in Q6
		2) Designing new MBM (one or more) on the basis of criteria developed in the national strategy and portability on the national registry		2) Implementation plan of (one or more) MBMs, based on the strategy developed		
		3) Stakeholder consultations and engagement in the context of new MBM in the form of one to one interactions and FGDs to inform the design to new MBMs		3) Multiple stakeholder consultations to understand the requirements and concerns of all the relevant stakeholders		

Output 4.4 Piloting the new MBM	Based on the strategic plan & the implementation plan, the government of India will pilot the new MBM before rolling it out on a large scale	1) Preparation of detailed technical and financial feasibility studies for the various MBM options 2) Finalised and approved design of the MBM and piloting the MBM based on the identified jurisdiction within India	1) This will help the government highlight the positive impacts of market based mechanisms and also understand the nuances before a large-scale roll out.	1) Technical & Financial feasibility reports for various MBMs identified 2) Detailed piloting plan along with MRV modalities 3) Piloting the MBM 4) Impact assessment report of the pilot		
Output 4.5 Linking of various domestic markets	This will help make the domestic markets more dynamic and lucrative. Possibilities of future trading with various units will also help in stabilising the price of a unit. It will also capture the social benefits/costs in its value.	1) Development of a methodology to ascertain common 'credit value' of the tradable units of various domestic markets so as to allow for future trading 2) Design a roadmap to link domestic markets to carbon markets	To enhance the transparency and comparability of climate actions, and ultimately facilitate the “linking” or "networking" of carbon markets	1) Review the PAT and REC schemes. 2) An approach paper to assess the climate change mitigation impact 3) Identifying rationale of selecting the proposed key indicators, data and methodology, and discuss the costs and benefits 4) Provide policy recommendations for PAT and REC schemes 5) Assess the feasibility of domestic linkage opportunities in India	MoP, BEE, Niti Aayog, MOEFCC, MNRE, NLDC, PXIL, IEX, DISCOMS, PMR-PMU	Q1-Q6 16-18 months Interim Report in Q2,Q4

Output 4.6 Reviving CDM projects and creating new demand	This will help government benefit the proponents of the CDM projects who do not have buyers and are facing losses owing to the sunken carbon market. It will also help create a strong market signal and aid India's efforts in de-carbonization	1) Market readiness activities to create supply aggregator who can find suitable buyers in existing or new international mechanism.	1) This will be done by creating web-based portal of suppliers and aggregators. The aggregators will also be linked to the international market.	1) Web-portal for supply aggregators	MOEFCC, MoP, MNRE, NATCOM cel, PMR-PMU	Q4-Q7 10-12 months Interim report in Q6
		2) Analyze various options to create a domestic mechanism where existing projects, institutions and infrastructure could be used as suppliers for the new MBM	2) Desk based studies combined with stakeholder engagement with CDM project owners, consultants, DOEs etc will be undertaken to determine various options.	2) Report on various options to generate demand of the credits from the CDM projects.		
		3) Analyze options to create institutional structure like the UNFCCC's CBM EB to issue CERs	3) Stakeholder engagement and interactions with the ministry responsible for HCA and maintaining registry.	3) A institutional strategy to revive CDM in India		

4.4.3 Budget

Budget for BB4						
Output	**Estimated Cost (in US$)**				**Funding Source (in US$)**	
	Year 1	**Year 2**	**Year 3**	**Total**	**PMR**	**Govt**
Output 4.1	150000	150000	0	459000	300000	159000
Output 4.2	50000	50000	0	193000	100000	93000
Output 4.3	250000	250000	0	665000	500000	165000
Output 4.4	0	850000	750000	2128000	1600000	528000
Output 4.5	150000	150000	0	399000	300000	99000
Output 4.6	350000	250000	0	858000	600000	258000
Total	**950000**	**1700000**	**750000**	**4702000**	**3400000**	**1302000**

5 Building Block 5. Project Management and Outreach

This section outlines the main institutions and stakeholders that will contribute to the development of market readiness components described in previous building blocks. This section describes the proposed governance structure for managing the activities listed above in previous BBs. This section also outlines the additional project management and outreach activities proposed for the PMR implementation phase.

5.1 Grant Management Arrangements

On receipt of the PMR grant, the project will be implemented by the Ministry of Environment, Forests & Climate Change (MOEFCC), which will assume the overall responsibility for the achievement of project results as the Implementing Agency. MOEFCC will designate a senior official as the National Project Director (NPD) for the project. The NPD will be responsible for overall guidance for project management, including adherence to the Annual Work Plans (AWP), achievement of planned results as outlined in the MRP, and for the use of PMR funds through effective management and well-established project review and oversight mechanisms. The NPD will also ensure coordination with various ministries and agencies and provide guidance to the project team to coordinate with PMR, to review reports, and to look after administrative arrangements required under Government of India rules.

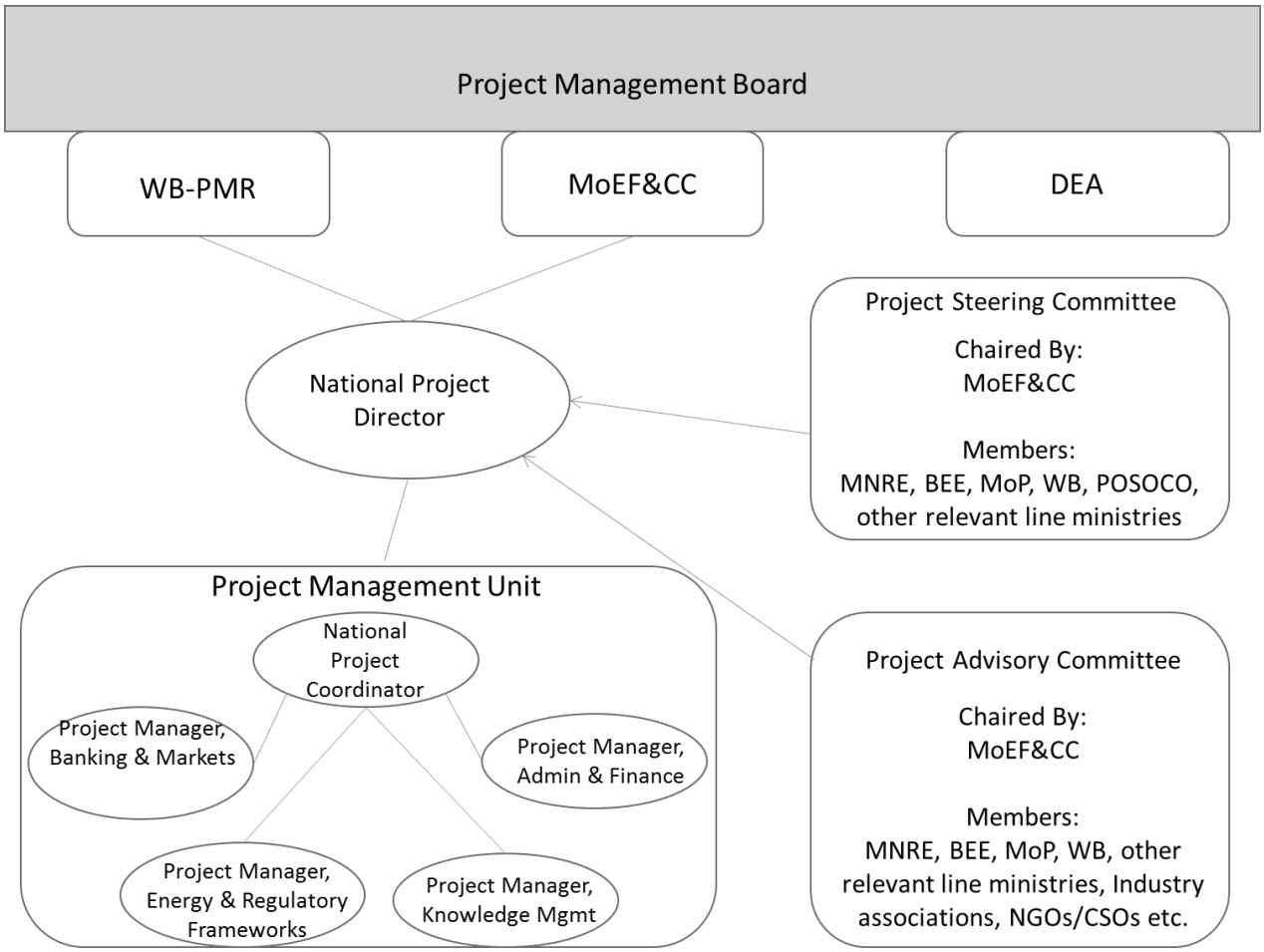
A Project Management unit (PMU) will be established to implement the project. The structure of the PMU is provided in Figure 15. The PMU shall be headed by a National Project Coordinator (NPC) and be responsible for implementing day-to-day activities in coordination with the NPD. Efforts shall be made to mobilize the project team for the full project tenure to ensure the availability of experts and consultants until project completion. The NPC will be supported by four project managers and one administrative/finance staff. As needed, technical experts in different disciplines and project management consultants with expertise in project, finance, legal matters, etc. will be engaged for the necessary duration to meet the work load.

The Project Steering Committee (PSC) will be responsible for making management decisions for the project, particularly when guidance is required by the NPC. The PSC would play a critical role in project monitoring and evaluations by conducting quality assurance for the processes and products, and using evaluations to improve performance, accountability, and learning. This will ensure that the required resources are committed. The PSC will also arbitrate any conflicts within the project and negotiate solutions to any issues faced with external bodies.

The PSC will be composed of MOEFCC, Ministry of Power, BEE, MNRE, and other relevant line ministries, as well as representatives from the PMR Secretariat. Other members (e.g. financing institutions, power trading organizations, regulators, associations, research institutes, etc.) may be invited by the decision of the PSC on an as-needed basis, provided that the PSC remains operational by its size.

MOEFCC, under the chairmanship of the NPD, will establish and institutionalize a Project Advisory Committee to provide technical advice, and to support teams and any other committees as and when needed with the approval of the PSC. The team members will include distinguished stakeholders such as PXIL, IEX, POSOCO,[16] relevant public sector undertakings (PSUs), other relevant line ministries, industry associations, NGOs/CSOs, etc. The technical advisory committee will provide guidance and advice to the project team on technical issues.

Figure 15 Project Management Unit (PMU)



5.2 Role of PMU

The PMU will play a key role in coordinating the management of the PMR grant. Some of the major activities that the PMU will undertake on a regular basis will fall under the following categories:

i) Governance activities, including preparation of ToRs, shortlisting consultants, monitoring sub-contracted activities, etc.;
ii) Relationship management activities, which would include coordinating regular meetings of inter-ministerial committee;
iii) Liaising role will include updating relevant line ministries, relevant committee, and preparing document briefs for the PM Council's meeting, etc.;

[16] POSOCO or Power System Operation Corporation is a wholly owned subsidiary of the Power Grid Corporation of India Ltd. (PGCIL), and is responsible for carrying out PGCIL's power management functions.

iv) Support activities, such as identification of international experts for need-based technical support, arranging learning/ knowledge sharing visits, etc.; and
v) Capacity building, outreach, and dissemination activities, which would also include state level activities.

The following section describes the envisioned project management activities and the associated budgetary allocations. However, it may be noted that this list is not exhaustive.

5.2.1 PMR Steering Committee

As mentioned above, since most of the activities would require coordination and proactive engagement across several ministries and departments, an inter-ministerial committee will be set-up. The PMU will assume the responsibility of organizing regular meetings for guidance and advice on issues pertaining to PMR activities, and to update stakeholders on the progress made with on-going activities. The agenda items will be set by the PMU in consultation with the MOEFCC. Such meetings will ensure ownership of all the relevant ministries and departments.

5.2.2 National and International expert interactions

The PMU will also be responsible for identifying relevant national experts to undertake technical research studies to support /undertake the identified activities as per the ToRs. These studies will then be sub-contracted based on a predetermined procedure approved by MOEFCC. In some cases, international experts may only be involved to build capacity among domestic experts on the relevant issue. The PMU will identify such experts to ensure that national expertise is systematically built and strengthened through this process.

5.2.3 Exposure visits/learning Visits

If the teams working on a set of activities express interest in learning from an international best practice, suitable exchange visits will be planned by the PMU so that teams are able to share knowledge through such visits. This may also include participation in fora where relevant activities are under discussion. One such activity may be envisaged as part of Output 1.1, where visits can be organized to learn from international best practices.

5.2.4 Communication, outreach and dissemination activities

Communication will be a crucial aspect of the PMU as it will be responsible for press releases and briefings based on project output. Moreover, such activities will be publicized using all relevant media so that there is wider dialogue, feedback, and buy-in for outputs. The PMU will also be responsible for coordination and conducting national outreach and dissemination activities with regard to MBMs and PMR related activities. This will ensure that stakeholders remain informed of progress and continuous engagement for stakeholder buy-in for all key activities. A national level website can also be planned under this activity. Communication and outreach will include preparation of relevant material for dissemination in the form of white papers, working papers, policy briefs, and information notes. Large-scale national events will also be important and will be used as a key outreach strategy.

5.2.5 State level engagement and capacity building workshops

As discussed in BB2 and BB4, many policies in India are mandated by the central government but implemented at the state level. Therefore, outreach is important at the state level as well. Furthermore, it is important to build capacities at the state level so that some of these activities, including registry and MBMs can also be developed at the state level. The PMU may conduct state level outreach and capacity building activities to ensure readiness across relevant institutions for implementing PMR related activities.

5.2.6 Stakeholder engagement

The PMU will continuously engage with relevant stakeholders, including the private sector, think tanks, government departments, civil society organizations, etc. In addition, need-based engagement and regular dialogue through round table discussions, etc. will be carried out. These activities will be supported under this budget.

5.2.7 Website management

A website will be developed as a one-stop access for the India's PMR participation and activities. This website will host all important information such as documents produced, ToRs, contact information, recent events, and proceedings of meetings held as part of PMR activities. This website will also provide links to other deliverables such as the registry. Platforms such as the one discussed in output 4.6 (creating demand for offsets from CDM projects) will be developed as part of the PMR-India website. The website would require constant updating and technical support. Therefore, suitable staff will be recruited to maintain web content.

5.2.8 Monitoring and Evaluation

The PMU will ensure that the outputs are useful, time-bound, and can realistically be achieved within the proposed time frame. Thorough monitoring and evaluation (M&E) of deliverables and outcomes will be conducted every six months. M&E reports so generated will be submitted to the board for necessary action. Action points will thereafter be approved by the board. This process will, therefore, ensure that the activities are implemented in timely manner and that the timelines and milestones presented in the Gantt chart are met. In case of delays, explanation on the reasons of delay and expected timelines for completion of task will be sought. These reports will ensure that there is the regular oversight by the board, and allow early course correction. Regular interaction with the steering committee will also ensure that the deliverables are in the right strategic direction in order to follow a low carbon growth pathway for India.

5.2.9 Risk Management

A number of risks may emerge during the implementation phase, as highlighted by the M&E reports. For example, there can be barriers for MBM pilot implementation due to the lack of buy-in from relevant stakeholders. It is therefore important that the PMU sets up regular meetings with the board, steering committee, and other relevant stakeholders to avoid such risks. The PMU will identify suitable risk mitigation strategies; for example, regular consultation and engagement with key stakeholders in the selection and design of a new MBM.

5.3 ToR and budget

The table below summarizes the main work packages for the PMR-PMU that can help in successful management of the PMR grant.

Table 15:Activities for BB5

Output	Rationale	Activities	Description	Deliverables	Responsibility	Timeline
Activity 5.1 Project Management Unit	To assist in management of the PMR grant	1) coordination of all activities listed above	1) Key governance activities which would include preparing the ToRs, shortlisting the consultants, monitoring the sub-contacted activities etc, 2) key relationship management activities which would include coordinating regular meetings of inter-ministerial committee etc, 3) key liaising role will include updating relevant line ministries, relevant committee and preparing document briefs for PM Council's meeting etc, 4) Key support activities such as identification of international expert for need based technical support, arranging exposure visits etc and 5) key capacity building, outreach and dissemination activities which would also include state level activities	1) Timely meetings with the board and steering committee, 2) Timely M&E reports with action points, and 3) timely completion of other tasks like website development etc. This will happen only if consultants are shortlisted and contracted to perform tasks as per ToRs. Most important task is stakeholder management and Liaoning.	PMR-PMU	Q1-onwards

Activity 5.2 PMR inter-ministerial committee	Regular meetings will be essential to provide strategic guidance to implement activities under the PMR activities.	For this purpose an inter-ministerial committee will meet under the chairmanship of MOEFCC to discuss the issues pertaining to PMR activities	1) These meetings will be organized every quarter to monitor and discuss progress and make amendments if required.	At least 1 meeting every quarter	PMR-PMU	Q1-onwards
	Some of the expertise may or may not be available in the country. This grant will be used to access technical international expertise and learn from them.	1) Joint ventures 2) Training programmes and seminars organized by invited experts on the basis of need	This will be done in three ways 1) sub-contracting relevant activities to the international expert, 2) seeking possibilities of joint ventures with mandatory participation of national experts, 3) seeking training programmes and guidance from international experts.	This is need based	PMR-PMU	Q1-onwards
Activity 5.4 Exposure visits/learning Visits	Some of the activities may require exposure visits of experts to learn from international best practices.	PMU will identify such need and arrange for such visits	Exposure visit to learn from international experts	This is need based	PMR-PMU	Q1-onwards

Activity 5.5 Outreach and dissemination activities	More outreach would mean more uptake and social acceptance.	Coordination and conducting national outreach and dissemination activities with regard to MBMs and PMR related activities. Large scale national events will also be important and used as key outreach strategy.	Communication will be a crucial aspect of the PMU as it will be responsible for press releases and briefings of various outputs. Moreover, such activities will be publicized using all relevant media so that there is larger uptake of outputs. PMU will also be responsible for coordination and conducting national outreach and dissemination activities	Continuous	PMR-PMU	Q1-onwards
Activity 5.6 State level engagement and capacity building workshops	More outreach would mean more uptake and social acceptance.	PMU may also conduct state level outreach and capacity building activities. Such activities will ensure readiness at the state level to implement the PMR related activities.	State level workshops and capacity building events	Continuous	PMR-PMU	Q1-onwards

Activity 5.7 Stakeholder engagement	Many activities and the PMU will require constant engagement with relevant stakeholders including private sectors, think tanks, government departments, civil society organizations etc.	need based engagement regular dialogues will be required in the form of round table discussions etc.	need based engagement regular dialogues will be required in the form of round table discussions etc.	Continuous	PMR-PMU	Q1-onwards
Activity 5.8 Website Management	More outreach would mean more uptake and social acceptance.	Developed as a one stop access to the PMR and its activities	website will host all important information such as documents produced, ToRs, contact information, recent events, and proceedings of the meeting amongst other this. This website will also provide links to other deliverables such as the registry	Continuous	PMR-PMU	Q1-onwards
Activity 5.9 Monitoring and Evaluation	To monitor progress and track as per the gnat chart	This will be prepared by the PMU and submitted to the board	Board will take necessary action	Once every six months	PMR-PMU	Q1-onwards
Activity 5.10 Risk Management	NA	NA	NA	NA	PMR-PMU	Q1-onwards

5.4 Budget

Budget for BB5						
	Estimated Cost (in US$)				Funding Source (in US$)	
Activity	Year 1	Year 2	Year 3	Total	PMR	Govt
Activity 5.1	250000	250000	250000	1252500	750000	502500
Activity 5.2	2000	2000	2000	27980	6000	21980
Activity 5.3	150000	150000	50000	465500	350000	115500
Activity 5.4	50000	50000	50000	199500	150000	49500
Activity 5.5	20000	20000	20000	139800	60000	79800
Activity 5.6	5000	5000	5000	79950	15000	64950
Activity 5.7	15000	15000	15000	119850	45000	74850
Activity 5.8	25000	25000	25000	99750	75000	24750
Activity 5.9	20000	25000	35000	106400	80000	26400
Total	**537000**	**542000**	**452000**	**2491230**	**1531000**	**960230**

6 Building Block 6. Summary of Activities, Timelines and Budget

This section provides a summary of key activities that will be undertaken in India's MRP. The Gantt chart in Table 16 provides a snapshot of the planned activities.

Table 16: Summary of Planned Activities

Activity	Description	Q*[17]	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
Activity 2.1	Prioritize list of policy instruments in key sectors											
Activity 2.2	Develop and select optimum policy-packages by analysing policy interactions											
Activity 2.3	Assessment of technological, infrastructural, legal and regulatory needs at the national level											
Activity 2.4	Assessment of current status of the PAT scheme											
Activity 2.5	Assessment of current status of the REC scheme											
Activity 2.6	Assessment of current status of NCEF											
Activity 3.1	Learnings from international best practices											
Activity 3.2	Institutional Framework Design of the proposed National Registry											
Activity 3.3	Assessing System Requirements for registry											
Activity 3.4	Exploring Linkages of the existing domestic markets (PAT and REC) with registry											
Activity 3.5	Exploring Linkages with NIMS through DBMS of registry											
Activity 3.6	Exploring Linkages of the new international markets											
Activity 4.1	Overcoming the barriers in the current scheme											
Activity 4.2	Supporting the expansion of existing mechanisms to enhance coverage											
Activity 4.3	Designing new MBM											
Activity 4.4	Piloting the new MBM											
Activity 4.5	Linking of various domestic markets											
Activity 4.6	Reviving CDM projects and creating new demand											
Activity 5.1	Project Management Unit											

[17] Time taken in grant approval, various clearances and setting up of PMU

Activity 5.2	PMR inter-ministerial committee											
Activity 5.3	National and International expert interactions											
Activity 5.4	Exposure visits/learning Visits											
Activity 5.5	Outreach and dissemination activities											
Activity 5.6	State level engagement and capacity building workshops											
Activity 5.7	Stakeholder engagements											
Activity 5.8	Website											
Activity 5.9	Monitoring and Evaluation											
Activity 5.10	Synthesis Report											

6.1 Budget

Summary						
Building Block	**Estimated Cost (in US$)**				**Funding Source (in US$)**	
	Year 1	**Year 2**	**Year 3**	**Total**	**PMR**	**Govt**
BB 2	700000	0	0	1211000	700000	511000
BB 3	1200000	950000	250000	3312000	2400000	912000
BB 4	950000	1700000	750000	4702000	3400000	1302000
BB 5	537000	542000	452000	2491230	1531000	960230
Total	**3387000**	**3192000**	**1452000**	**11716230**	**8031000**	**3685230**

6.2 Other Bilateral and Multilateral Cooperation Projects on Climate Change

6.2.1 Indo-German Bilateral Cooperation Projects

The Government of Germany under Bilateral Cooperation Agreement provided Technical assistance for various activities relating to climate change thorough following projects:

- **Development and Management of Nationally Appropriate Mitigation Actions (NAMAs) in India, Duration- 2013-2017, Funding- 3 Million Euro.** The Project provides technical assistance for enhancing the institutional capacity for development of NAMA projects on Forest Sector and Waste Sector in the beginning, and to develop the Monitoring, Reporting and Verification (MRV) mechanism for the respective sectors. The NAMAs will be designed for wide-scale impacts and seek international support through bankable NAMA concepts for the waste and forest sector including MRV. The concepts would seek international support for the implementation of the Forest and Waste NAMA e.g. via NAMA Facility, Green Climate Fund etc. Additionally, the project strengthens the institutional capacities on NAMAs and MRV.
- **Global Carbon Market Project (GCM), Duration- 2015-2018, Funding- 1 Million Euros.** The project aims to build capacities of national and state governments on carbon market instruments, including NCDMA to participate in relevant international events and engage with international peers. The project will focus on (i) capacity building of national and State governments on the emerging carbon market (ii) encouraging private sector and civil society in the development and implementation of carbon market and climate finance instrument (iii) promoting Indian partners, including NCDMA to participate in relevant international events and engage with international peers. The project further focuses to carry out the feasibility studies and market analysis on the emerging carbon market including Market and non-market Mechanisms.
- **Climate Change Adaptation in Rural Areas-India (CCA-RAI), Duration- 2015-2017, Total Budget- 3 Million Euro.** The project titled 'Climate Change Adaptation in Rural Areas-India (CCA-RAI)' implemented under the bilateral cooperation and was completed in December 2014. The Phase II of the project CCA RAI has been initiated in January 2015 with an aim to integrate climate adaptation measures into the national and state development planning. The project aims to develop concrete pilot experiences on adaptation measures together with the Indian state development programmes and supports up-scaling of successful technical and financial adaptation approaches in the State of Punjab, Himachal Pradesh, Tamil Nadu and Telangana.

6.2.2 United Kingdom, Department for International Development (UK-DFID)

Cooperation Project on "Climate Change Innovation Progarmme (CCIP)", Duration- (2014 -2019), Funding- £ 12 million. CCIP is a Technical Assistance 5 year Programme supported to strengthen the resilience of India's development to impacts of Climate Change. The project provide assistance for capacity building at Central and State Governments and Local Governments to address Climate issues and to integrate climate change and development imperatives in policy, plans and programmes in various sectors to the vulnerable rural populations in selected states viz. Odisha, Bihar, Assam, Chattisgarh, Maharashtra, Kerala, West Bengal and Tamil Nadu.

6.2.3 UNDP Cooperation Project

UNDP Cooperation project on strengthening climate change sensitive planning and implementation", Duration- 2013-2018, Funding- USD 7 Million. The project on Capacity Building on Climate Change has been supported by UNDP. After the successful completion of the 1st phase of the Capacity Building Project for addressing Climate Change, UNDP agreed to continue its support to the Ministry of Environment, Forest & Climate Change for further capacity building of the Climate Change Division through a 5-year project titled "Strengthening climate change sensitive planning and implementation". The second phase of the project has started from January 2013 - December 2018.