

PARTNERSHIP FOR MARKET READINESS (PMR)

Market Readiness Proposal (MRP)

India

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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
ESCCerts	Energy Savings Certificates
ETS	Emissions Trading Scheme
GDP	Gross Domestic Product
GHG	Green House Gas
IEX	Indian Energy Exchange
IMG	Inter-ministerial Group
NDC	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
MSME	Micro, Small and Medium Enterprises
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
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 Nationally Determined Contributions (NDCs). 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. Hence, India's ambitious NDCs can be achieved through a combination of SMART (Specific, Measurable, Assignable, Realistic and Time-related) policies requiring multiple policy instruments which can bring large scale transformative change. India is in process of preparing a road map for achieving the goals of NDCs and sees the activities under India's MRP as critical part of this exercise. The set of activities under the MRP will involve preparatory work including upstream policy work to implement market based mechanisms (MBMs) and implementation work including meta-registry development and piloting a market based instrument in one of the identified sectors.

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 approach¹ and provide strategic guidance to implement actions with both development and climate objectives. BB1 will provide a summary of trends and projections in the country's rising greenhouse gas (GHG) emissions; especially in the energy sector along with challenges the sector face. 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 NDC 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) provides a landscape of existing mitigation policies. India is already committed to domestic market based instruments focusing on increasing energy efficiency and renewable energy in the energy mix. This BB elaborates on three existing domestic market instruments being implemented in India, namely the Perform, Achieve and Trade (PAT) mechanism, the Renewable Energy Certificate (REC) mechanism

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>

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 specific⁴ but promote relative responsibility as more efficient units 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 barriers for effective implementation of PAT and REC, especially to increase their market liquidity and to provide recommendations to improve their design elements, and enhance preparedness for scaling-up. 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. Informed decision-making is important to identify, design and implement Market Based Mechanisms (MBMs). BB2 seeks to undertake analytical work to guide and support the process of selecting and prioritizing market based policy instruments. The studies under this BB will determine post-2020 mitigation scenarios and identify optimum policy packages of effective and cost-efficient policies. The upstream policy work will build on exiting policy framework in India and help policy-makers in making informed choices to achieve the NDC goals. This work also considers the interplay and alignment of different existing and future policy instruments and how they could impact development of sectors, mainly the energy sector and its emissions. This work is very crucial to

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

reiterate the domestic political buy-in in choice of policy instruments including MBMs for achieving the NDC goals.

In addition the existing market mechanisms, India's ambitious NDCs can be achieved through a combination of market based policy instruments (including new MBMs). Paris Agreement (PA) also opens up opportunities for new international market based mechanisms. Thus, in future a complex network of international and domestic mechanisms is envisaged. While this could pose challenges such as double counting and environmental integrity, it also opens up opportunities of inter-linking for cost effective mitigation outcomes, which might be necessary for making existing MBMs more effective. Such interlinking is not possible as of now and can be experimented in India's existing and new MBMs. This can be facilitated by developing a national Meta-registry. Such national Meta-registry will synthesize all the relevant information from the existing registries of individual MBMs and develop mechanisms to facilitate inter-linking of MBMs. India proposes to develop and pilot such a Meta-registry in Building Block 3 (BB3) as a win-win 'future proof' registry with a possibility of interlinking various MBMs. Activities under BB3 will help to develop technical infrastructure to integrate existing MBMs and create foundation for integrating new mechanisms

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 elements for the development of MBMs and would also support India's GHG reporting, including BURs. To achieve this, the meta-registry developed under Building Block 3 (BB3), in addition to supporting linking domestic MBMs (including individual MBM's registry), also supports linking the National Inventory Management System (NIMS). National meta-registry will also generate bottom-up data from these MBMs for the NIMS and hence strengthen MRV and transparency. This will also facilitate consistency in available data for accurate reporting for greater transparency. 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 Meta-registry is suggested to allow for flexibility and scalability. A draft TOR has been prepared for this work and included in the Annex II to facilitate fast start of the work.

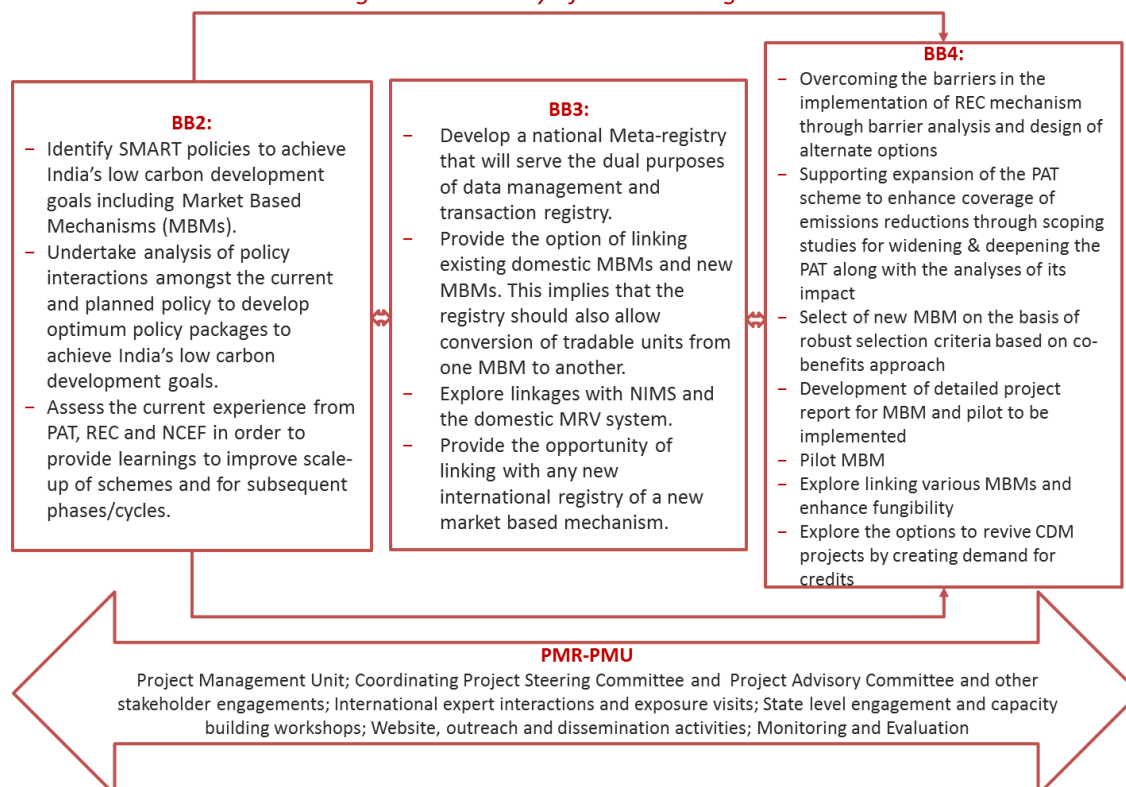
India has variety of policies and instruments as described in BB1 and BB2 with direct as well as indirect GHG mitigation impact. Indian experience suggests that supporting sector-specific policies with climate co-benefits that support and incentivize market players allows emission reductions in a cost effective manner while also addressing other priorities such as energy security, growth and development in the country. Ambitious NDC demands development of new policies targeting sectors that have not been prioritized in the past. Few such sectors with significant mitigation potential and ability to contribute India achieving its NDC targets are waste management, Micro, Small and Medium Scale enterprises (MSME), and transport amongst others. While the analytical work in BB2 will identify the actual potential in such untapped sectors, Building Block 4 (BB4) has set of activities that will help in harnessing such GHG emissions reduction potential. Those activities are (i) expanding (upgrading and/or designing) the scope of existing MBMs to include additional new sectors/sub-sectors: (a) inclusion of a new sector in PAT scheme, (b) Inclusion of Off-grid projects in REC given their unique and complementary nature of these activities; (ii) creating domestic demand for stranded CDM projects in India; (iii) designing and piloting new MBM to include sectors identified in BB2 with untapped GHG mitigation

potential. Possible candidates for new MBMs have been identified in the waste management and MSME sector. The details have been included in Annex III and Annex IV.

Building Block 5 (BB5) identifies the main institutions and stakeholders who will contribute to the development and implementation of market readiness components described in the MRP. This section describes the proposed governance structure for managing the activities discussed above. The proposed governance structure to manage MRP activities is a dedicated project management unit (PMU), which is also represented by all relevant ministries. The PMU will coordinate the activities to be undertaken by different institutions under the grant. There already exists a network of institutions, Indian Network on Climate Change Assessment (INCCA), which will be utilized to facilitate implementing activities. The PMU secretariat will allow number of activities being undertaken in parallel as long as those activities are not interdependent where one activity output is needed as input to another activity. Moreover, sequencing has been done in cases where information from one activity feeds into other activity so that it allows uptake of sufficient learning from one activity to other. PMU will facilitate transformation through consensus building by initiating conversation with various stakeholders. This section also details additional project management and outreach activities proposed for the PMR implementation phase. Emphasis is given on cross learning and experience sharing, India will be open to sharing experiences with others especially on new initiative like inter-linking of MBMs/markets and policy interaction work to inform decision making.

Building Block 6 (BB6) summarizes the schedule of activities and the proposed budget for each of the activities. Summary of the building block is provided in Figure 1.

Figure 1: Summary of MRP Building Blocks



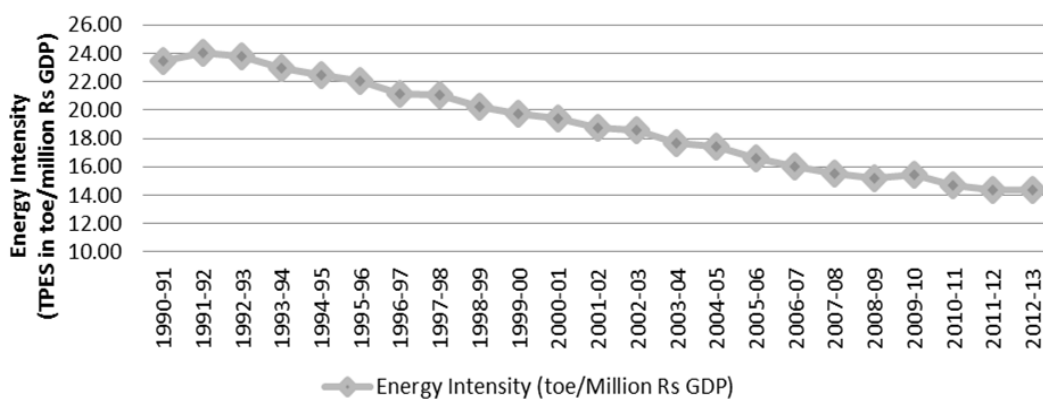
1 Building Block 1. Big Picture: Policy Context

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 ambitious Nationally Determined Contributions (NDCs).

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 toe⁵/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

⁵ Tons of oil equivalent

accompanied by increased GHG emissions, especially from the industrial sector where emissions are expected to increase to 448 mtCO₂ in 2020 and 806 mtCO₂ in 2030. Relative to 2005 levels, India's emission intensity dropped by 12% in 2012 to 0.36 kg CO₂/\$. India has also seen a steady decline in its energy intensity as shown in Figure 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 NDCs as illustrated below (see

Box 1: India's NDC 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 CO₂ 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 NDC 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 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

Mission	Aim	Date	Implementing agency
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.

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

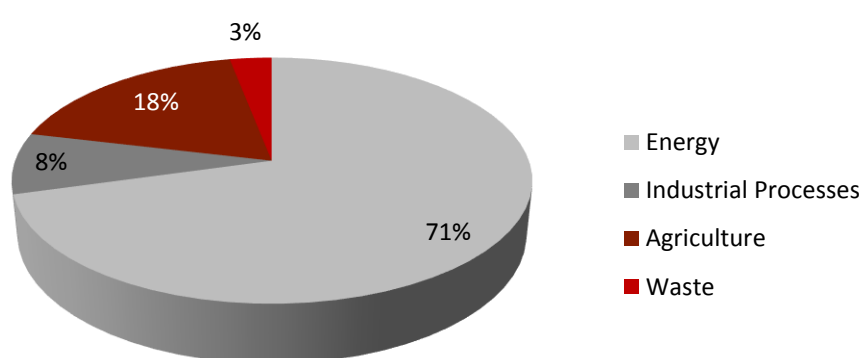
- i) Domestic market mechanisms such as the renewable energy certificates markets (REC) and energy efficiency certificate markets (PAT), and;
- ii) Carbon pricing policies such as carbon tax in the form of coal cess.

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 1.56tCO₂ 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). Figure 3 Gives the GHG emissions of India by sector in 2010.

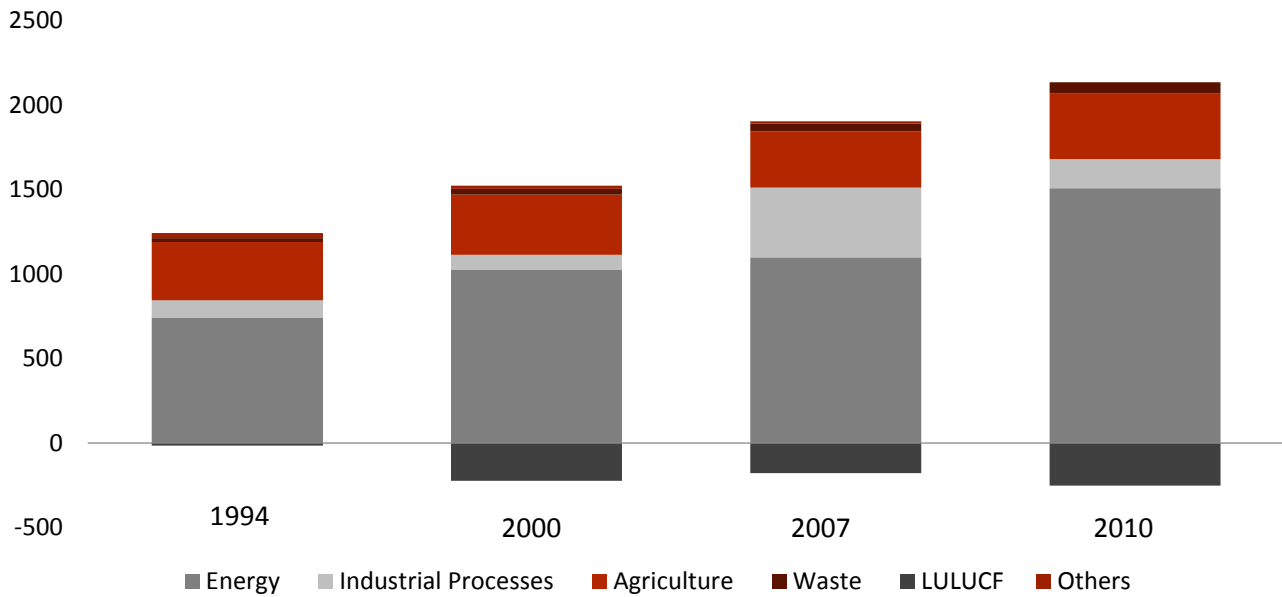
Figure 3 GHG Emissions of India by Sector for the year 2010 (LULUCF not included)



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 CO₂e in 1994 to 1,884.31 million tons of CO₂e 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 MtCO₂e in 2000 to 1501.1 MtCO₂e 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.

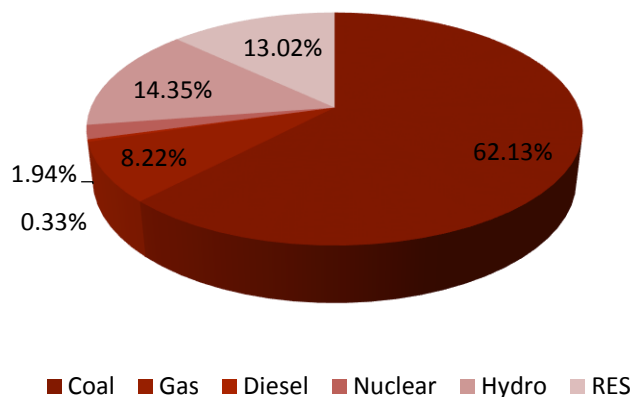
Figure 4 GHG Emissions Trend for India from the year 1994 to 2010



Source: Compiled from INC, SNC, INCCA and BUR

While energy sector contributes to majority of GHG emissions in India, it is to be noted that primary challenge facing the India is to provide 24-hour power supply to all its citizens while keeping its commitments on the international front of addressing climate change. In India, the power deficit has been steadily decreasing over the last 3–4 years and today the electricity supply available is much more than the procured demand. In pursuit of these dual goals, the government has initiated several policies in the last few years. In 2016, coal-based thermal capacity constituted more than 60% of the installed capacity of the country (Figure 5). This capacity is expected to increase to ~ 240 GW by 2022 (including expected capacity and those which will be decommissioned). Meanwhile there has been a policy push to expand renewable capacity to 175 GW. This has seen the installed capacity of renewables (solar and wind) in the energy mix increase over six times from 3.9 GW in 2002 to 36 GW in 2015-16. Complementing these measures, several other programmes have been initiated such as increasing domestic coal production to 1.5 billion tonnes by 2020, introducing reverse auction process of natural gas for the power sector and price pooling (domestic natural gas and R-LNG) for the fertilizer sector, easing environmental norms for coal block expansion, the hydrocarbon exploration and licensing policy to boost investment and production of domestic crude oil and natural gas, among others.

Figure 5 All-India installed capacity (as on 31 March 2016)



Source CEA (2016)

One of the major concerns facing the Indian power sector over the past one and a half years has been the demand for electricity. So far, power demand in India had been increasing monotonically over time, which was used to identify fuel supply trends and timetables. However, the current variations in the power consumption indicate that in the future there may be greater volatility in the power sector leading to business cycle like variations in the sector in the short and medium term. Such variations require effective demand-side management (DSM), not just at the national level but at a more disaggregated level. The recently initiated Ujjwal DISCOM Assurance Yojana (UDAY) scheme has implemented few DSM measures such as smart metering, energy efficient LED bulbs, agriculture pumps etc and aggregate technical & commercial (AT&C) losses. In addition, schemes like perform, achieve and trade (PAT) (more details in BB2) are designed to reduce the consumption at demand side and hence reduce the supply side requirements. Similar efforts to increase more renewable energy in to the grid mix through renewable energy certificates (REC) have been taken (details in BB2).

Recent policies focus on enhanced energy efficiency and increasing RE capacity in the energy mix, leading to possible un-utilized capacity of coal-based thermal power plants. In fact, the National Power Plan estimates that given 175 GW of RE by 2022, India may not need any new coal capacity till 2026-27. Similarly, India may not see gas-based capacity addition until issue of gas availability has been resolved as also a methodology is put in place that seeks to make gas-based power viable in comparison to coal-based power as also RE-based power. Moreover, to make RE more viable, intermittency and variability issues must be resolved. Establishing and regulating ancillary markets could be one such measure apart from strengthening the grid.

Given the importance of increasing supply and reducing the demand in the energy sector, India's PMR support is crucial to support initiatives that are targeted for the sector, mainly the PAT and REC scheme and to introduce new policy options in other sectors. Supporting establishment of new market mechanisms targeting sectors that are energy dependent and strengthening existing mechanisms to provide sufficient incentives for market players is crucial for addressing India's energy challenge.

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 studies⁶ that used different techniques and assumptions. According to the MOEFCC report, estimates of India's GHG emissions in 2031 vary between 4.0×10^9 - 7.3×10^9 tons of CO₂e, 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 CO₂ 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 CO₂ 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 CO₂ \$ 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.

According to the LCIG scenario, total CO₂ 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

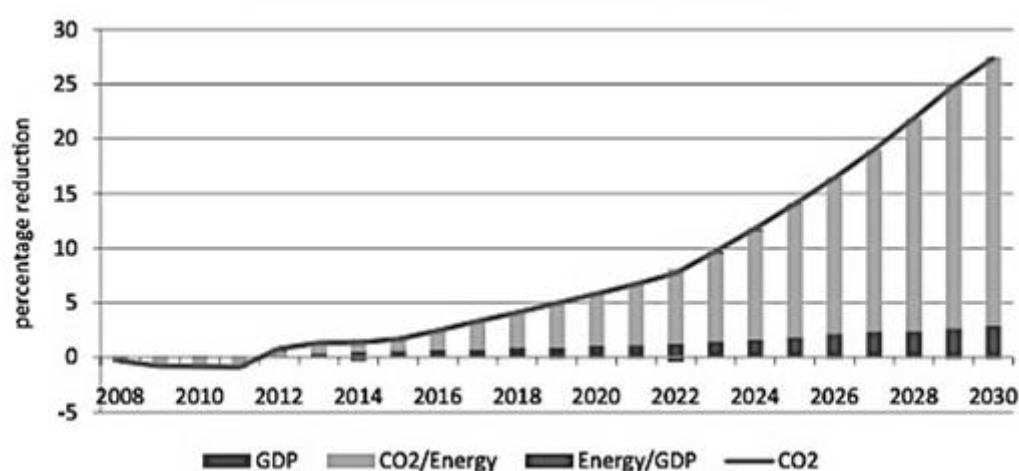
Figure 6). The total energy demand, in 2030, will be lower at 1,108 Mtoe, while the power demand would still rise to 3,466 billion kWh due to improved access and modal shifts. About one third of power supply should be fossil free and aggregate demand of fossil fuels would be much lower at 1,278 Mt of 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.

According to LICG scenario, total electricity generation is projected to about of about 3400 billion kWh. The results of the Macro Model highlight that even in the LCIG scenario; coal continues to be the dominant source of power generation. It accounts for about 315 GW of installed capacity and 63 percent of generation. However, super critical power plants account for over half of the coal based power generation, leading to a significant reduction in the CO₂ emissions. The share of renewable sources (solar, biomass and wind) increases

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.

from the present 6 percent to 18 percent in 2030. Hydropower and nuclear contribute 7 percent and 8 percent respectively. Consequently, in the LCIG scenario, fossil free sources account for 33 percent of the electricity generated in 2030 as against 23 percent at present. In terms of actual generation, fossil free generation increases nearly five-fold to 1100 billion kWh in 2030. Thus, the LCIG scenario has a significantly different power generation mix, including a much higher share of renewable sources.

Figure 6: Decomposition of Emission Reductions between the BIG and LCIG Scenarios



Source: LCCR (2016)

Keeping to its commitment to enhance the share of renewables in the India power sector mix and also to reduce its dependence on Coal Based power, the Government of India has put in facilitative regulatory frameworks and innovative business models to promote renewable energy capacity addition especially solar power. In a recent reverse auction of the world's largest solar power plant of 750 MW in Madhya Pradesh, Renewable energy producers quoted the prices below INR 3 per kilo-watt hour i.e. 4 US cents per unit of electricity. The Global Energy Sector is experiencing an unprecedented transition and the key trends emerging from the various INDCs show a massive expansion in renewable electrical energy, especially in developing countries and an average energy productivity improvement by 1.8% a year and it is fairly clear now that renewable electricity would be cost competitive with fossil fuel electricity, certainly before 2035, providing the driver for the large scale decarbonisation of the electricity sector. Global research also shows that the cost of firm renewable electricity (renewable electricity + battery) is on a steady decline and would stabilise at around 70\$ per MWh. In India, TERI's demand scenario suggests that the current installed capacity and the capacity under construction and after taking into account retirements, would be able to meet the demand till about 2026, or so. This suggests that there would be no new coal-based capacity investment that would be approved till about for years prior to that. With the ambition the Government of India has regarding its renewable energy last investment in any new coal based plants.

1.3 Pledged mitigation actions and its plan for their implementation

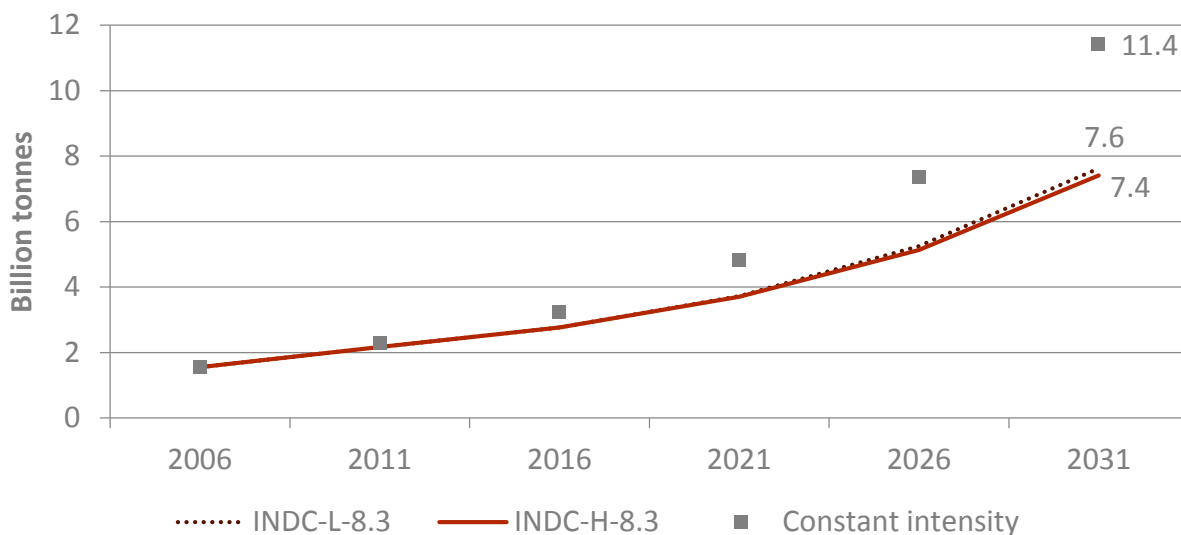
India is Party to key international agreements such as the Stockholm Declaration in 1972, United Nations Framework Convention on Climate Change (UNFCCC) in 1992, and the Kyoto Protocol ratified in 2002. Two landmark agreements were made in 2015: the climate change agreement under the UNFCCC in Paris 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, NDCs were a part of India's contributions to global efforts. The NDCs 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 CO₂e through additional forest and tree cover by 2030.
- The NDC is estimated to reduce 3.5 billion tons of emissions as compared to business as usual scenario (see Figure 7).

India's NDC 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 7: Projected GHG emissions for India



Source: TERI, 2015

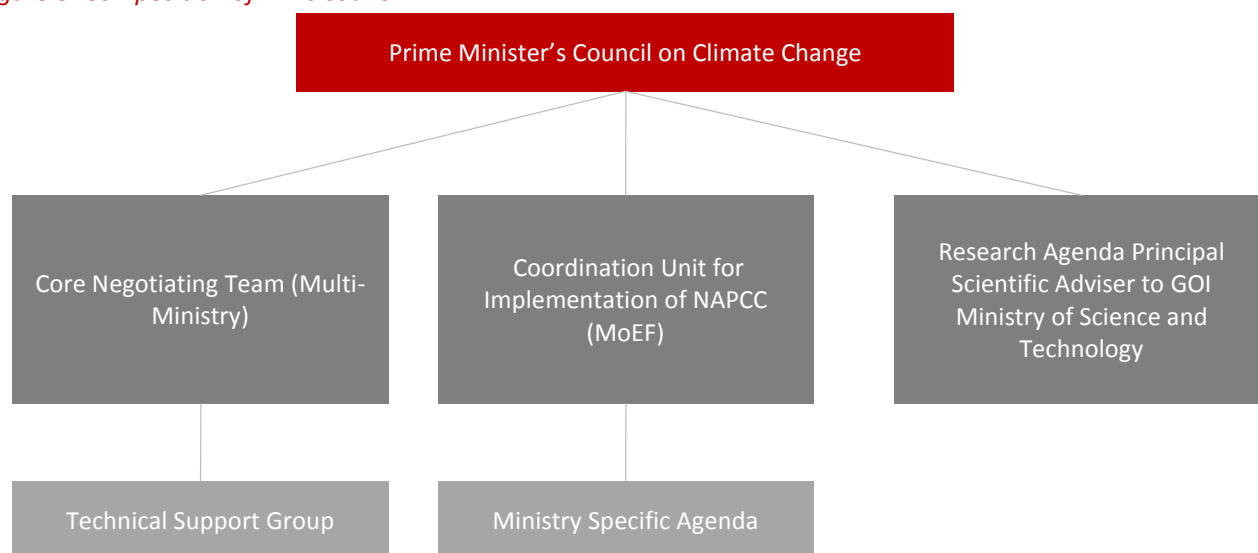
To support and facilitate the achievement of India's ambitious mitigation targets, aggressive domestic policies that balance climate and developmental goals are required. There is a well-designed policy formulation process for climate change in India. The cabinet is responsible for approving all climate 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 8 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 8: 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 NDCs can be achieved through a combination of policies which are Specific, Measurable, Assignable, Realistic and Time-related (SMART). Therefore, the NDC 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

Low Carbon Strategy	Present Status	Target by 2030	Stakeholders	Policy Instruments
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

Low Carbon Strategy	Present Status	Target by 2030	Stakeholders	Policy Instruments
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 Super-Efficient 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. The next inventory is being prepared for the upcoming BUR.	Inventories of GHG gases such as CO ₂ , CH ₄ , N ₂ O, 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 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 NDC 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 CO₂. 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, SO₂, NO_x, 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

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.

1.4.7 Experiences with REDD+

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 CO₂e by Indian industries⁷. 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.

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>

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 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 MtCO₂e. 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

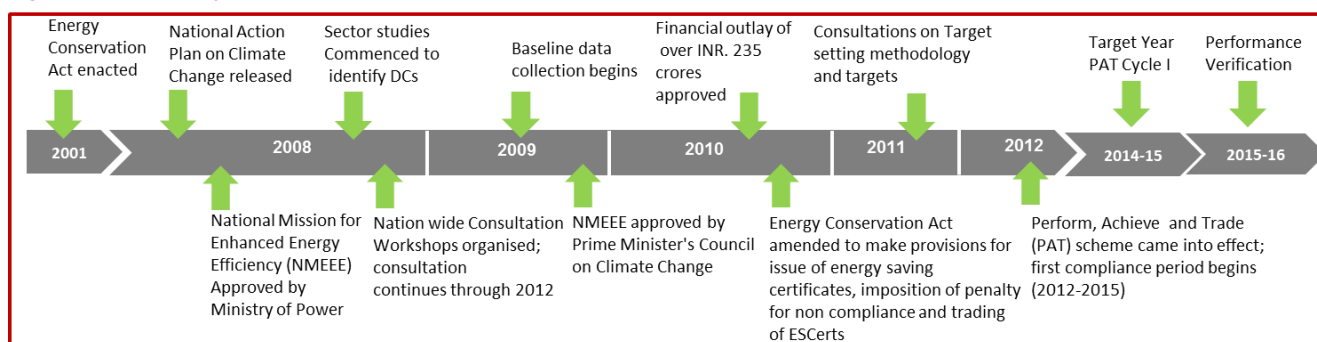
2 Building Block 2. Mitigation Policy Landscape

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 undertake upstream analytical work to support development of policy instruments to achieve India's GHG mitigation objectives along with assessment of interplay and alignment of different existing and future policy instruments and how they could impact development of sectors, mainly the energy sector and its emissions. This will help in identifying 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 9 outlines the timeline for the PAT scheme.

Figure 9: 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 (ESCs) 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 May 2017. 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.

2.1.1 Challenges to PAT Scheme

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 and capacity, 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 company⁸, 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.

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>>

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.

2.2.1 Challenges to REC scheme

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 illusory 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

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

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

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.
- 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

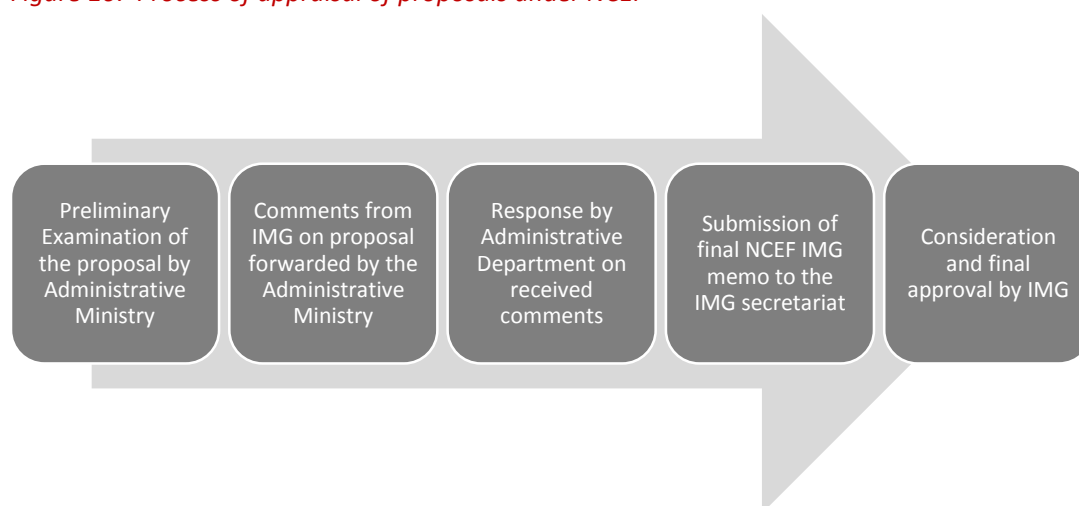
Source: Ministry of Finance, 2016

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 10: Process of appraisal of proposals under NCEF



The authority for disbursement 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 NDCs can be achieved through a combination of SMART policies. There is a need to disintegrate NDC 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 NDC. This activity is envisaged to be undertaken in depth in BB2. In order to achieve its NDC 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. This can be done by undertaking upstream analytical work so as to i) map and assess existing policy

instruments (including MBMs), understand their interplay and impact on mitigation objectives in major sectors including the power sector; ii) formulate GHG emission scenarios for 2020, 2030 and 2050, iii) develop optimum policy packages for a low carbon development pathway . Thus this BB will help in identify suitable candidate for new MBM. In order for an MBM to be designed, 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 NDC 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 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.
- ii) To identify SMART policies to achieve India's low carbon development goals including Market Based Mechanisms (MBMs).
- iii) 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.

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: Assessment of the current status of the PAT scheme along with identification of achievement and/or challenges in implementation in order to provide learnings to improve scale-up of schemes and for subsequent phases/cycles

Output 2.2: Assessment of the current status of the REC scheme along with identification of achievement and/or challenges in implementation in order to provide learnings to improve scale-up of schemes and for subsequent phases/cycles

Output 2.3: Assessment of the current status of the existing carbon pricing instrument, i.e. NCEF

Output 2.4: Prioritize a list of SMART policy instruments in key sectors after detailed evaluation of co-benefits and GHG reductions. This will include identification of possible candidates for an MBM which could be piloted in BB4.

Output 2.5: Develop and select optimal policy packages by analyzing policy interactions in all existing and new policies, their interactions and impacts on sectors. This will include identification of a MBM which can be piloted in BB4.

Output 2.6: 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.

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 current experience from PAT, REC and NCEF in order to provide learnings to improve scale-up of schemes and for subsequent phases/cycles.					
	2) To identify SMART policies to achieve India's low carbon development goals including Market Based Mechanisms (MBMs) Thus, identify most suitable sector for introducing new market based mechanism					
	3) 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.					
Output	Rationale	Activities	Description	Deliverables	Responsibility	Timeline
Output 2.1 Assessment of current status of PAT scheme along with identification of achievements and/or challenges in implementation	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
		2) Assessment of challenges and barriers and need assessment for improvisation		2) Needs assessment workshops		
						Interim report by end of Q1
Output 2.2	This will help the government take an informed decision on implementation	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	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	and expansion of the existing mechanisms	2) Assessment of challenges and barriers and need assessment for improvisation	achievements and challenges.	2) Needs assessment workshops		Interim report by end of Q1
Output 2.3 Assessing the status of current carbon pricing instruments and funds like NCEF	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-Q2 Interim Report in Q1
		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		
Output 2.4	The output will help the government to make an informed decision on sector,	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-Q4 Interim report by end of Q2

<p>Prioritized list of policies (regulatory and economic) and policy instruments in key sectors prepared after detailed evaluation of co-benefits and GHG reductions.</p>	<p>scale, scope of policy instruments like markets or pricing</p>		<p>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</p>	<p>2) Report highlighting the rationale for forming the basis for selecting key sectors</p>		
<p>Output 2.5 Develop and select optimum policy-packages by analysing policy interactions in all existing and new inter related policies and their impact on sectors</p>	<p>This will help government to make an informed decision on sector, scale, scope of new policies and policy instruments</p>	<p>Assessment of optimum policy packages for achieving India's goals to benefit from policy interactions and reduce costs and other trade-offs</p>	<p>Assessment of the interaction of such mitigation instruments with selected instruments in place or planned domestically/internationally (e.g., the CDM, PAT, REC), including double accounting risks and potential synergies</p>	<p>1) Modelling based analysis of policy interactions and identification of policy-packages 2) Report highlighting the policy packages and nature of interactions amongst policy instruments and their impact on sectors, mainly power sector</p>	<p>MOEFCC, Niti Ayog, PMR-PMU</p>	<p>Q3-Q5 Interim report by end of Q4</p>

Output 2.6 Needs assessment for implementation of MBMs and pricing Instruments in India	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	Q4-Q6 interim report by end of Q5
		2) This activity will undertake evaluation of processes and institutional arrangements in India for implementation of identified MBMs 3) Will suggest a framework, including capacity building requirements to facilitate the development and implementation of identified MBMs	2) Assessment report on the institutional arrangements and infrastructural requirements in India for implementing an MBM			

2.5.3 Gantt chart for activities

Activity	Description	Q*	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
Activity 2.1	Assessment of current status of the PAT scheme											
Activity 2.2	Assessment of current status of the REC scheme											
Activity 2.3	Assessment of current status of NCEF											
Activity 2.4	Modeling resulting in prioritized list of policy instruments in key sectors											
Activity 2.5	Develop and select optimum policy-packages by analyzing policy interactions											
Activity 2.6	Needs assessment for implementation of MBMs											

2.5.4 Budget

Budget for BB2						
Output	Estimated Support from PMR (in US\$)			Funding Source (in US\$)		
	Year 1	Year 2	Year 3	PMR	Govt.	Total
Output 2.1	150,000	0	0	150,000	99,000	249,500
Output 2.2	150,000	0	0	150,000	99,000	249,500
Output 2.3	100,000	0	0	100,000	33,000	133,000
Output 2.4	100,000	0	0	100,000	93,000	193,000
Output 2.5	100,000	0	0	100,000	93,000	193,000
Output 2.6	50,000	50,000	0	100,000	93,000	193,000
Total	650,000	50,000	0	700,000	510,000	1,210,000

3 Building Block 3. Core Market Readiness Component

This section outlines the required framework for the development of a National Meta-registry, which will form the backbone of inter-linking new and existing market-based mechanisms (MBMs). This section describes the broad design requirements for development of a centralized data management and Meta-registry platform for India. It is envisaged that a national Meta-registry will be designed as a win-win ‘future proof’ registry with the possibility of interlinking various MBMs which might also be necessary for making existing MBMs more effective. Activities under this building block will help to develop technical infrastructure to integrate existing MBMs. Thus, 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.

India’s ambitious NDCs can be achieved through a combination of multiple market based policy instruments (including existing and new MBMs). Paris Agreement (PA) also opens up opportunities for new international market based mechanisms. Thus, in future a complex network of international and domestic mechanisms is possible. While this could pose challenges such as double counting and environmental integrity, it also opens up opportunities of inter-linking for cost effective mitigation outcomes. Such interlinking is not possible as of now in the existing domestic MBMs in India. However, this can be experimented by developing a national Meta-registry. Such national Meta-registry will synthesize all the relevant information from the registries of individual MBMs (both existing and future) and develop platform to facilitate inter-linking of various MBMs.

Building Block 3 (BB3) focuses on the development of a Meta-registry to link domestic MBMs (including individual MBM’s registry) and the National Inventory Management System (NIMS) in order to provide a supporting framework for the design, piloting, and scaling-up of MBMs. The first biennial update report (BUR) from India¹¹, recognized the challenges of establishing a National Inventory Management System (NIMS) and implementing a domestic Measurement, Reporting and Verification (MRV) system. National meta-registry will also generate bottom-up data from these MBMs for the NIMS and hence strengthen MRV and transparency. This will also facilitate consistency in available data for accurate reporting for greater transparency. Thereby Meta-registry will provide bottom-up data from the MBMs to NIMS. One of the proposed market readiness components aims to build a Meta-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 Meta-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 Meta-registry is suggested to allow for flexibility and scalability. Since India already has existing MBMs and domestic MRV requirements, investing in infrastructure for creating a Meta-registry is a no-regret option.

¹¹ <http://www.moef.gov.in/sites/default/files/indbur1.pdf>

3.1 National Meta-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 Meta-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 Meta-registry with a national inventory management system (NIMS)¹² 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
- Provide **adequate flexibility provisions** to support future MBMs, link various MBMs together, and to link the Meta-registry with the NIMS.

Thus, a national Meta-registry serves the dual purposes of data management and transaction registry. As data management registry, it serves to (i) develop systems and processes to collect, organise, report data from MBMs; and (ii) generate bottom-up data from MBMs and explore linkages with NIMS and the domestic MRV system. As transaction registry, it serves to (i) facilitate linking existing domestic MBMs and new MBMs. This implies that the registry should also allow conversion of tradable units from one MBM to another; (ii) facilitate voluntary cancellation of offsets (e.g. CERs earned from the CDM projects in any domestic MBM); and (iii) facilitate of linking with any new international market based mechanism.

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 Meta-registry system will follow a phased approach, comprising i) design, ii) prototype, and iii) pilot.

¹² 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

Box 6: Rationale for a National Meta-registry

What type of National Meta-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 (domestic and international), retirement, cancellation, banking, and borrowing and ensures no double counting along with maintaining environmental integrity of tradable units. 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 Meta-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.

A draft ToR titled- “Development the National Meta-Registry For GHG Data Management And Inter-Linking of Various Market Based Mechanism”- have been included in Annex I. This ToR details out the specifics of the phased approach and is detailed in a ‘ready to go’ manner.

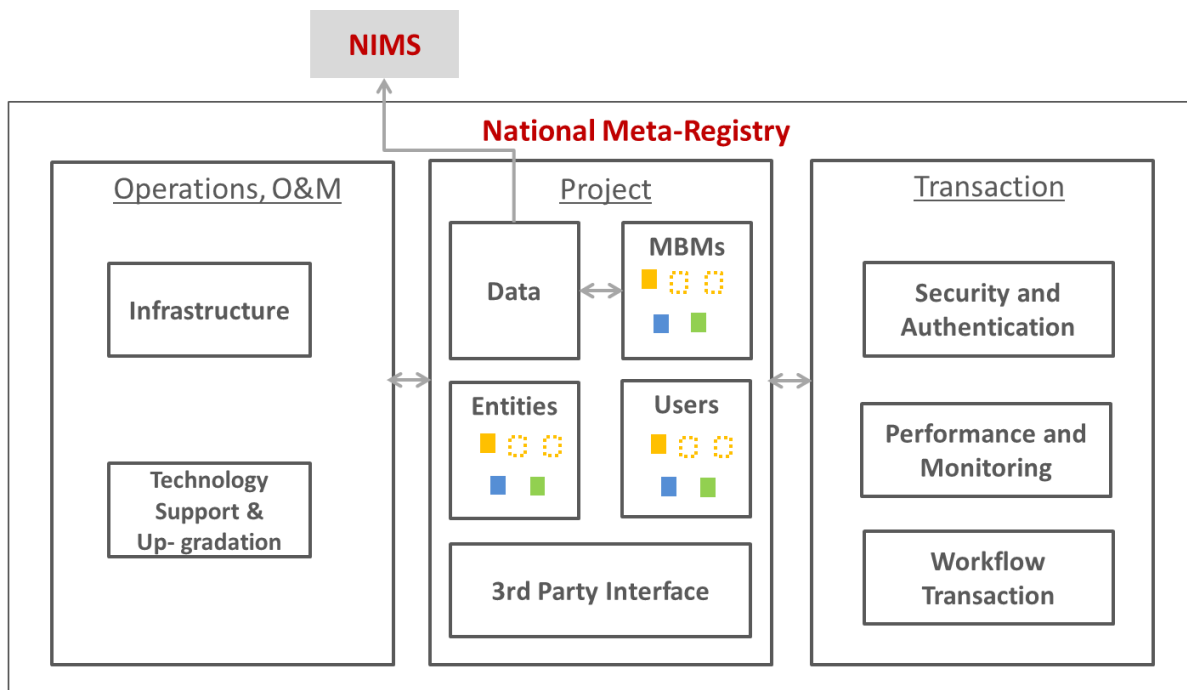
3.1.2 Components of the Meta-registry

The term ‘Meta-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 11: Framework for National Meta-registry



Note: The Meta-registry will have modules that will link and pick relevant information from registries of existing and new MBMs.

Legend

- New MBM under PMR
- PAT Scheme
- REC mechanism
- Future new mechanisms (international domestic)

3.1.3 Meta-registry Modules

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

Table 7: Meta-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.
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	<p>The transaction module will implement the following functions:</p> <ul style="list-style-type: none"> 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.

S.No	Module	Description
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 Meta-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 shows that the existing MBMs, namely PAT and REC mechanisms, have registries of their own. These offer rich experience and learnings which will be useful while designing registry for any new MBM. Interlinking of MBMs is not possible as of now. However, the existing registries could provide information to a national Meta-registry so that inter-linking of MBMs is possible. More details on existing registries are provided in Annex I.

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)¹³ and the GRI XBRL taxonomy developed by CDP and Climate Disclosure Standard Board (CDSB).¹⁴ 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

¹³ <http://www.cdsb.net/priorities/xbrl/cdsb%E2%80%99s-xbrl-project>

¹⁴ <https://www.globalreporting.org/REPORTING/REPORTING-SUPPORT/XBRL/Pages/default.aspx>

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.

A document¹⁵ called 'Procedure for Registration of a Designated Consumer with Registry as Eligible Entity' was put for public review. This document provide guidance to the Designated Consumer to become Eligible Entity as envisaged under Central Electricity Regulatory Commission Regulation, 2016 issued by CERC on 27th May, 2016 and notified on 30th May, 2016. This procedure is issued in compliance with clause 7(a) of the CERC ESCerts Transaction Regulations and is to enable implementation of the said Regulation so as to facilitate the transaction of Energy Savings Certificates between the Eligible Entities who have been issued ESCerts and the Eligible Entities who shall comply with the prescribed energy norms and standards for the current and subsequent cycles. A similar document is available for the REC mechanism¹⁶. This document title 'Model Procedure / Guidelines for Accreditation Of Renewable Energy Generation Project or Distribution Licensee, As The Case May Be, Under Rec Mechanism By State Agency' details out procedures of the mechanism and functions of the registry. A brief summary of the two registries is attached in Annex I.

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.

¹⁵

[https://beenet.gov.in/\(S\(0gmr0k3l1uygni1mioae54qu\)\)/GuideLine/Draft%20Detailed%20Procedure%20for%20Transaction%20of%20ESCert%20_7%20Dec%2016.pdf](https://beenet.gov.in/(S(0gmr0k3l1uygni1mioae54qu))/GuideLine/Draft%20Detailed%20Procedure%20for%20Transaction%20of%20ESCert%20_7%20Dec%2016.pdf)

¹⁶ https://www.recregistryindia.nic.in/pdf/REC_Procedures.pdf

The PMR grant is requested to provide the resources to help design and develop a national Meta-registry that would serve dual purpose: (i) as robust data management system and (ii) as transaction 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 Meta-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 Meta-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 five major outputs.

Output 3.1 Systems Needs Assessment: This will include lessons from existing examples of national and international registry, Institutional Framework Design of the proposed National Meta-registry such that linkage is possible with existing domestic markets (PAT and REC), the national registry and any new international markets with the national registry.

Output 3.2 Develop Functional Systems Specifications for a national Meta-registry to develop the systems' functional requirements, which describe the goals and objectives of the system, and define the types of data, users, key functional components, and design requirements on the basis of existing and potential mechanisms.

Output 3.3: Develop Technical Systems Specifications to develop the systems technical requirements document(s) which will provide system developers guidance on system performance, architecture, hardware, software, security, and hosting. Technical requirements will also clarify processes related to software development, integration, testing, and deployment. Tasks for the preparation of the Technical Systems Specifications will include defining performance requirements; assessing data storage considerations; defining the system architecture; assessing hardware and software options; and specifying security requirements.

Output 3.4: Software development: This output will include acquisition of the server as per the specifications in the DPR and development of the software as per the needs and demonstration of the same.

Output 3.5: Systems deployment and capacity building: This will deploy and launch the system providing support to and building the capacity of GHG data management users. This is key to ensuring smooth reporting cycles and accurate data input. Tasks for Systems Deployment and Capacity Building will also include the certification of the system to ensure it complies with India's relevant security standards.

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 Meta-registry.
- Evaluation of institutional capacity building requirements for operating the Meta-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 (technical and functional) for meta-Registry and GHG data management system and procurement of all relevant infrastructure (both hardware and software).
- Pilot the Meta-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 Meta-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.				
	2	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.				
	3	To explore linkages with NIMS and the domestic MRV system.				
	4	To provide the opportunity of linking with any new international registry of a new market based mechanism.				
Output	Rationale	Activities	Description	Deliverables	Responsibility	Timeline
Output 3.1 Systems Need Assessment	To understand and clearly articulate what is being built, and to ensure that the system supports and is aligned with relevant policies and regulations. Tasks for the preparation of the Systems Needs Analysis will include analyzing relevant regulation(s) and legislation; analyzing future linkages with other jurisdictions; assessing existing data systems in India for re-purposing; assessing data exchange and integration needs;	1) International best practice analysis through desk reviews, surveys and interviews with international experts and In-country site visits to learn from best practices 2) Learnings from the existing domestic registries for PAT and REC and experiences therein 3) Engagement with all relevant stakeholders including line ministries and end users to understand the need and	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. Interviews and discussions with the concerned officials of the existing schemes and other relevant stakeholders	1) Needs Analysis for India's Meta-Registry system 2) Report for Policy Makers 3) Project Stakeholder Engagement Plan 4) Project Kick-Off Workshop	MOEFCC, PMR-PMU	Q1-Q2 Interim Report end of Q1

	research and analysis of similar systems; gathering input from relevant stakeholders; and prototyping.	requirements for the meta-registry.				
Output 3.2 Functional System Specification	To develop the systems' functional requirements, which describe the goals and objectives of the system, and define the types of data, users, key functional components, and design requirements.	1) identifying the types of data and users;	This will be undertaken with a political economy analysis of existing institutions and their capacities. In depth interviews will be conducted with individual stakeholders.	1) Functional Requirements for India's Meta-Registry system: Full Report incl. 5-Year Business Plan and Summary Report for Policy Makers 2) Presentation for policy makers.	MOEFCC, PXIL, IEX, relevant ministries, PMR-PMU	Q1-Q4 Interim Report in Q2
		2) describing each major functional component to be included in the system – as determined during the requirements gathering and analysis phase;				
		3) drafting the system design requirements to ensure consistency with regulator/program administrator branding				

		4) defining a business plan assessing human and financial resources needs				
Output 3.3 Technical System Assessment	To develop the systems technical requirements document(s) this will provide system developers guidance on system performance, architecture, hardware, software, security, and hosting. Technical requirements will also clarify processes related to software development, integration, testing, and deployment. Tasks for the preparation of the Technical Systems Specifications will include defining performance requirements; assessing data storage considerations; defining the system architecture; assessing hardware and software options; and	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 system requirement will be undertaken. This will be followed by appointing a technical expert to develop a detailed project report for the national registry	1) Technical Requirements for India's Meta-Registry system: Full Report And Summary Report: "Summary of Technical Requirements" 2) Project Mid-Term Review Workshop 3) Presentations	MOEFCC, PXIL, IEX, relevant ministries, PMR-PMU	Q5-Q8 Interim Report in Q6
		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				

	specifying security requirements.					
Output 3.4 Software development	This process consists of several steps including configuring an appropriate development environment for the development team, developing clear database architecture for the system, adhering to best practices to coding/programming the system, and developing the front end of the system to be consistent with the programs brand/style requirements	Activities will include : 1) Acquisition of the server 2) Development of the software	These activities would ensure that all the facets of implementing meta-registry are assessed	<ol style="list-style-type: none"> 1) Software as per specification and system requirement along with User guidance 2) Expert demonstration Workshop 3) Relevant Presentations 	MoP, BEE, Niti Aayog, MOEFCC, MNRE, NLDC, PXIL, IEX, DISCOMS, PMR-PMU	Q6-Q8 6-8 months

Output 3.5 Systems deployment and capacity building	The objective of this output is to deploy and launch the system providing support to and building the capacity of users. This is key to ensuring smooth reporting cycles and accurate data input.	<ol style="list-style-type: none"> 1. Acquisition of the hardware 2. Deployment of the hardware 3. Development of guidelines for users 4. Launch of the interface/registry 5. Workshop for users 	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.	<ol style="list-style-type: none"> 1) System Deployment and Launch 2) Meetings with Government and demonstration 3) Project Completion Workshop with stakeholders 	MOEFCC, NATCOM Cell, PMR-PMU	Q7-Q10 6-8 months Interim report in Q5
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3.4.3 Gantt chart for activities

Activity	Description	Q*	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
Activity 3.1	Systems Need Assessment											
Activity 3.2	Functional System Specification											
Activity 3.3	Technical System Assessment											
Activity 3.4	Software development											
Activity 3.5	Systems deployment and capacity building											

3.4.4 Budget

Budget for BB3						
Output	Estimated Support from PMR (in US\$)			Funding Source (in US\$)		
	Year 1	Year 2	Year 3	PMR	Govt	Total
Output 3.1	150,000	0	0	150,000	49,000	199,000
Output 3.2	150,000	50,000	0	200,000	99,000	299,000
Output 3.3	0	250,000	0	250,000	82,000	332,000
Output 3.4	0	450,000	0	450,000	148,000	598,000
Output 3.5	0	750,000	600,000	1,350,000	495,000	1,845,000
Total	300,000	1,500,000	600,000	2,400,000	873,000	3,273,000

4 Building Block 4. Framework for Designing New MBMs

Supporting sector-specific policies with climate co-benefits and piloting new approaches to support and incentivize market players allows achievement of emission reductions cost effectively and supports mitigation of climate change along with other immediate priorities such as energy security, growth and development in the country. In order to achieve this, this section:

- Outlines the framework for designing new MBMs in two identified sectors with significant untapped mitigation potential as per the analysis undertaken in BB2;
- Outlines activities to facilitate overcoming barriers to effective implementation of existing schemes and to support scaling up of existing schemes;
- Explores the potential opportunities for market linkages and synergies between existing and future mechanisms in India;
- 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 decarbonization 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 (iii) 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.

India has variety of policies and instruments as described in BB1 and BB2 with direct as well as indirect GHG mitigation impacts. The current policy mix targets different sectors but with mixed enforcement results. Some sectors have shown more positive results and contributed more to the India's aspirations to achieve climate co-benefits. This coupled with targets specified in India's NDC demand development of new policies targeting sectors that are not prioritized in the past. Few such sectors with significant mitigation potential and ability to contribute India achieving its NDC targets are waste management, Micro, Small and Medium Enterprises (MSME), and transport amongst others. While the analytical work in BB2 will identify the actual potential in such untapped sectors, Building Block 4 (BB4) has set of activities that will help in harnessing such GHG emissions reduction potential. Such activities identified are:

- Expanding (upgrading and/or designing) the scope of existing MBMs to include additional new sectors/sub-sectors: (i) inclusion of a new sector in PAT scheme, (ii) Inclusion of Off-grid projects in REC scheme given their unique and complementary nature of these activities..
- Creating domestic demand for stranded CDM projects in India.
- Designing and piloting new MBM to include sectors identified in BB2 with significant GHG mitigation potential. Possible candidates for new MBMs have been identified in the waste management and MSME sector.

4.1 Expanding the scope of existing MBMs

India has been experimenting market based mechanisms through PAT and REC mechanisms for the past few years, and so far has witnessed mixed outcomes. With recent endorsement of India NDC, it became evident that India needs more than what it is currently doing. In this context and , given India's current implementation status of PAT and REC scheme, as a first step, it is important to assess the existing MBMs and explore options to make them more effective and their scope more ambitious. Outputs from BB2 will help identify options for scaling up and/ or implementing existing schemes effectively. Following this, this section discusses the options to make their scope ambitious and challenges associated. Given that there is an implicit alignment between MBMs and India's climate change mitigation targets, it is also 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 Expanding the scope of REC mechanism

The government of India has reiterated a goal of 'Electricity for All' through implementation of very ambitious renewable energy targets in its NDC. 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 2013-14.¹⁷ 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.

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

¹⁷Power Minister Piyush Goyal's written reply to Lok Sabha

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. Across the 2938 CDM projects developed and registered by Indian participants, most projects are developed within the Energy sector (renewable/ non-renewable energy source) with 79% of all projects, followed by Manufacturing Industries at 8%, Energy Demand at 7.6%, Waste Handling and Disposal at 2.4% and rest all other sectors including Afforestation/Reforestation, Agriculture, fugitive emissions etc (National CDM Authority, India). Within India, of the total CDM projects, only close to 24% projects were of large scale in nature while the bulk was of small scale CDM projects. While on one hand this demonstrates the increasing appetite of the industry to take advantage of markets for emissions reductions in untapped sectors, on the other hand this also draws lessons towards effective design of the market aimed at reducing policy uncertainty of the mechanism, low cost transactions, as well as the one which provides adequate incentives to the market players to participate. 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 CO₂ terms.
- iii) Options of using NCEF as a possible avenue for demand generation could also be studied.

There has been critique of the nature and kind of credits earned through some of the CDM projects. This will be noted while designing any new demand and any new mechanism so designed will be based on principles of environmental integrity and efficacy. 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 Designing and piloting Market-Based Mechanisms

As mentioned above, in order for India to achieve its ambitious mitigation targets in its NDC, it needs an additional policy options such as introducing new MBMs in addition to broadening and deepening the current PAT and REC schemes. 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 fulfill 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

Building on the experience of implementing market based instruments, India, with the PMR support, is determined to explore and create necessary incentive structure to support implementation of mitigation measures through market based instruments. 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. Building on the ground work that has already performed, the proposal provides information on two possible sectors for consideration - waste and MSME sectors, for developing market based options and design the elements relevant for their implementation through piloting. A detailed description of these two sectors with their potential and need for a MBM is provided in Annex III and IV. Based on the analysis conducted in BB2 and with a focus on above mentioned two sectors, a list of possible MBM types 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 type of MBM.

4.2.1 Selection of a new MBM

Selection of a suitable type of MBM in these sectors will be identified through criteria that 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 MBM types 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 type will depend on stakeholder response, analytical rigor of the proposed MBM, and support from relevant line ministries.

India recognizes the role of and participation in PMR very crucial for this step as it will help India to learn from other countries about what they are doing in similar sectors, what experience and knowledge it can tap into in order for India to develop, design and pilot most appropriate market based instrument. Based on preliminary understanding of relevant activities that other countries exploring for similar sector, MBM types range from implementation of NAMAs to scaled-up crediting instruments. Therefore, activities under BB2 will help in the selection of a new MBM type, which will 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.

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.

The design of a new MBM would also 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

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 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 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 improvements. 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.

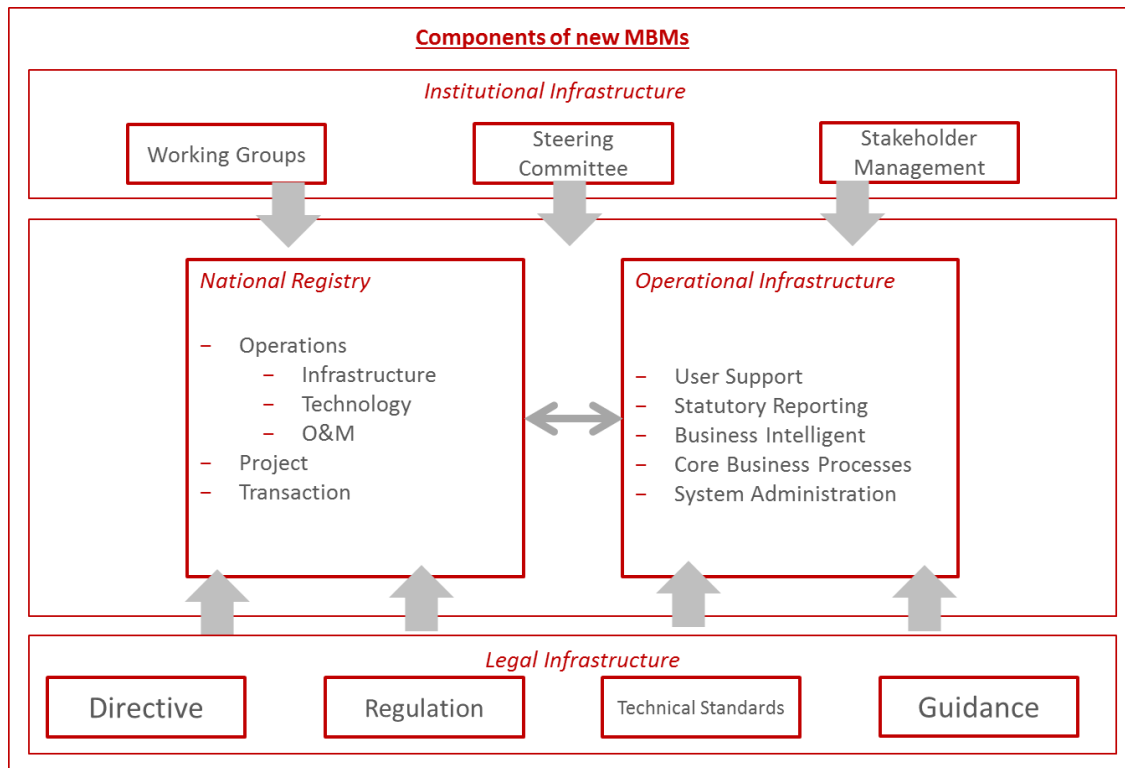
However, before a pilot can be implemented due policy approval process needs to be followed, as discussed in BB1 and earlier in this section, which involves relevant line ministries that also coordinate various committee approvals. The proposed pilot will then be put-up at the PM's council on climate 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. The Annex II and III describe two possible candidates for a new MBM which can be implemented as pilot. Some preliminary assessments of GHG mitigation impact have been included in the annex however the assessments and upstream policy work would be crucial to select these.

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 12. 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 12 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:

- 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.
- 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.
- 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.
- 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 11 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.

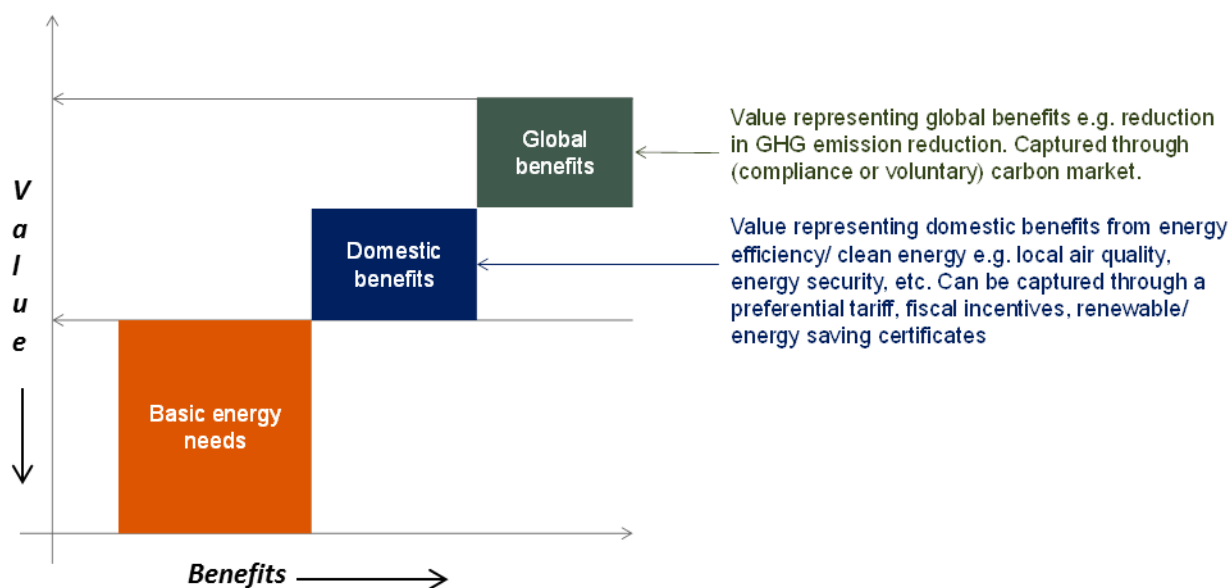
Although sectoral approaches may differ, there are synergies in terms of common benefits which can be explored in detail as a crucial step in linking carbon markets. This will be explored in detail under BB4.

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 level¹⁸. This can help further incentivize low carbon activity, as demonstrated in the following figure.

¹⁸ 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.

Figure 13 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 unbundling 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 tCO₂e). This carbon asset value is the quantified unbundled 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 market. 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.
- 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 tCO₂e). 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 CO₂ 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 CO₂ covered with savings of up to 70-80 million tCO₂e annually anticipated in its 2013-20 phase.

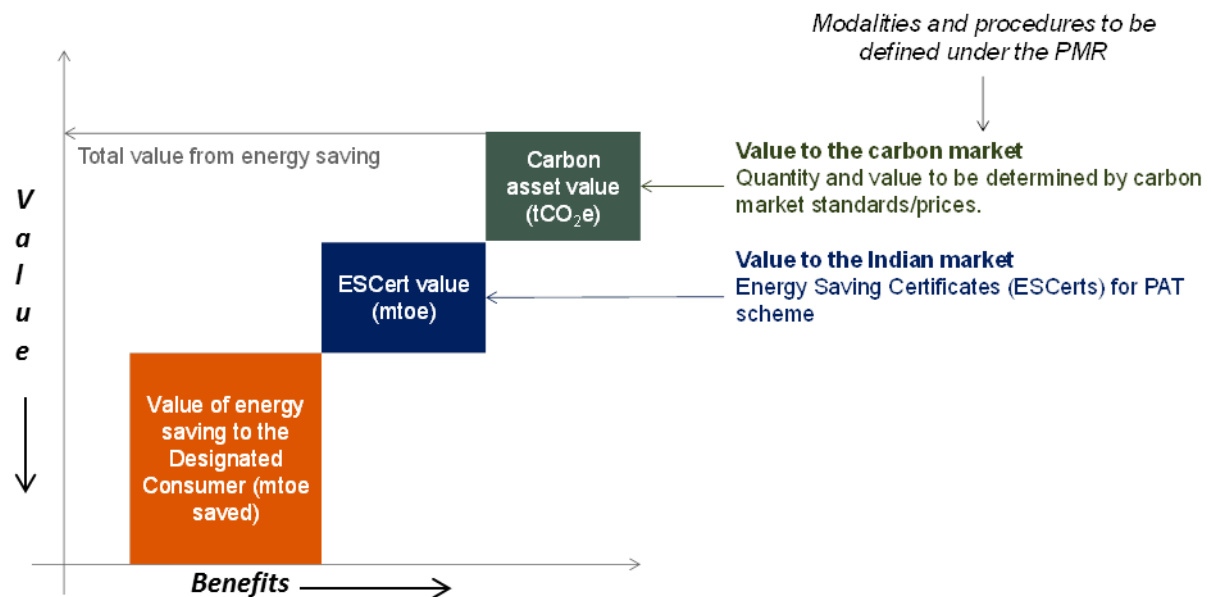
Figure 14 illustrates how domestic and potential global benefits may be unbundled with carbon linkages to the PAT scheme.

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.)

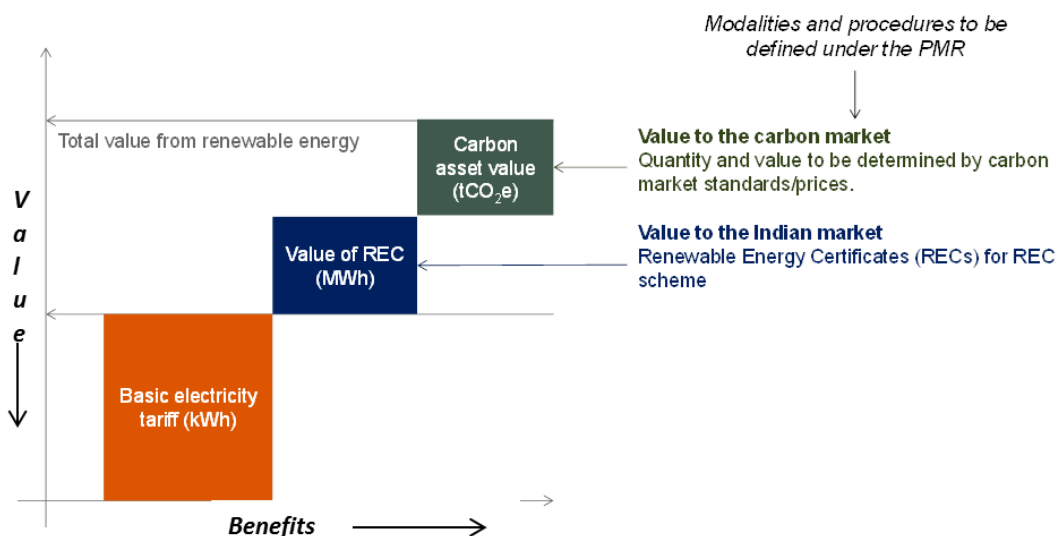
Figure 14 Linking the PAT scheme with carbon markets



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 15 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 CO₂e 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 CO₂e, 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 15 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 scale-up of existing domestic mechanisms such as PAT and REC
2. To explore options to create demand for offsets from stranded CDM projects
3. To select, design, and pilot a new MBM
4. To explore linking various MBMs (and potentially enhance fungibility)

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: Design options for deepening and broadening of PAT

Output 4.2: Design options for the expansion of REC mechanisms

Output 4.3: Reviving projects in the CDM pipeline and creation of demand for credits from existing projects

Output 4.4: Selection and designing of a new MBM in identified sectors

Output 4.5: Piloting the new MBM in one identified sector

Output 4.6: Linking of various domestic markets

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

1) Technical Assessments

- Assess the impact of the REC scheme and its contribution towards NDC targets and design options for its expansion.
- Assessment of various design 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 scale-up of existing domestic mechanism like PAT an REC 2. To explore the options to revive CDM projects by creating demand for credits 3. To select, design and pilot new MBM on the basis of robust selection criteria 4. To explore linking various MBMs and enhance fungibility					
Output	Rationale	Activities	Description	Deliverables	Responsibility	Timeline
Output 4.1 Design options for deepening and broadening of PAT	Study various design options to enhance the coverage in subsequent PAT cycles to harness untapped potential in Non PAT suitable Sectors	1) Analyze the impact of the PAT scheme and its contribution towards NDC targets	An analysis of the impacts of deepening & widening the existing schemes will be conducted along with identifying various design 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.	1) Study on assessment of design options for widening & deepening the PAT along with the analyses of its impact	MoP, BEE, PMR-PMU	Q3-Q6 Interim Report in Q4
		2) Design alternatives to the expand the scheme to Non PAT sectors		2) Development of generic & sector specific training modules with possibilities of tool development for creating inventories		
		3) Build capacity of the new entrants in the mechanism		3) Domain specific capacity building activities using the modules developed.		
Output 4.2 Design options for the expansion of REC mechanism	This will help government in its efforts to scale-up the existing domestic markets thereby facilitating the government achieve its mitigation goals by	1) Analyze the impact of the REC mechanism and its contribution towards NDC targets	Through this activity a detailed assessment of different design options for expanding the scope of REC scheme mainly for expanding this to off-grid sector would be	1) Study on assessment of design options for expanding the REC scheme mainly for off-grid sector along with the analyses of its impact	MoP, BEE, MNRE, NLDC, PXIL, IEX, DISCOMS, PMR-PMU	Q3-Q6 Interim Report in Q4
		2) Design alternatives to the expand the		2) Identify alternatives to the REC mechanism along with		

	including off-grid projects under the REC mechanism	mechanism to include off-grid projects 3) Build capacity of the new entrants	carried out and provides recommendations to enhance the design of the current scheme to enhance its effectiveness	the key indicators and rationale to enhance the impact of the REC scheme as it stands today. 3) Needs assessment workshops & dissemination workshops.		
Output 4.3 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. 2) Analyze various options to create a domestic mechanism where existing projects, institutions and infrastructure could be used as suppliers for the new MBM 3) Analyze options to create institutional structure like the UNFCCC's CBM EB to issue CERs	1) This will be done by creating web-based portal of suppliers and aggregators. The aggregators will also be linked to the international market. 2) Desk based studies combined with stakeholder engagement with CDM project owners, consultants, DOEs etc will be undertaken to determine various options. 3) Stakeholder engagement and interactions with the ministry responsible for HCA and maintaining registry.	1) Web-portal for supply aggregators 2) Report on various options to generate demand of the credits from the CDM projects. 3) A institutional strategy to revive CDM in India	MOEFCC, MoP, MNRE, NATCOM cel, PMR-PMU	Q3-Q6 Interim Report in Q4

Outputs 4.4 Designing of a new MBM	This will help the government understand feasibility of various design alternatives of MBMs in identified potential sectors (i.e. waste & MSME) and to select one of the MBMs to implement at a pilot scale.	1) National Strategy for Development of MBMs 2) Preparation of detailed technical and financial feasibility studies for the various MBM options	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 NDC targets for India 2) Technical & Financial feasibility reports for various MBMs identified	MOEFCC, PXIL, IEX, relevant ministries, PMR-PMU	Q4-Q7 Interim report in Q6
		3) Designing new MBM (one or more) on the basis of criteria developed in the national strategy and portability on the national registry 4) 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) Implementation plan of one MBM, based on the strategy developed 4) Multiple stakeholder consultations to understand the requirements and concerns of all the relevant stakeholders		
Output 4.5 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	1) Finalized and approved design of the MBM and piloting the MBM based on the identified jurisdiction	1) This will help the government highlight the positive impacts of market based mechanisms and also understand the nuances	1) Detailed piloting plan along with MRV modalities 2) Piloting the MBM 3) Impact assessment report of the pilot		Q7-Q10

	large scale	within India	before a large-scale roll out.		
Output 4.6 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 stabilizing 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" 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 Q7-Q10 Interim Report in Q8

4.4.3 Gantt chart for activities

Activity	Description	Q*	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
Activity 4.1	Design options for Deepening and broadening of PAT											
Activity 4.2	Design options for expansion of REC mechanism											
Activity 4.3	Reviving CDM projects and creating new demand											
Activity 4.4	Designing new MBM											
Activity 4.5	Piloting the new MBM											
Activity 4.6	Linking of various domestic markets											

4.4.4 Budget

Budget for BB4						
Output	Estimated Support from PMR (in US\$)			Funding Source (in US\$)		
	Year 1	Year 2	Year 3	PMR	Govt	Total
Output 4.1	150,000	150,000	0	300,000	159,000	459,000
Output 4.2	50,000	50,000	0	100,000	93,000	193,000
Output 4.3	300,000	200,000	0	500,000	158,000	758,000
Output 4.4	250,000	25,000	0	500,000	165,000	665,000
Output 4.5	0	850,000	850,000	1,700,000	528,000	2,128,000
Output 4.6	0	150,000	150,000	300,000	99,000	399,000
Total	750,000	1,650,000	1,000,000	3,400,000	1,202,000	4,602,000

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 16. 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 for Banking and Markets, Admin and Finance, Energy and Regulatory Frameworks, and Knowledge Management 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.

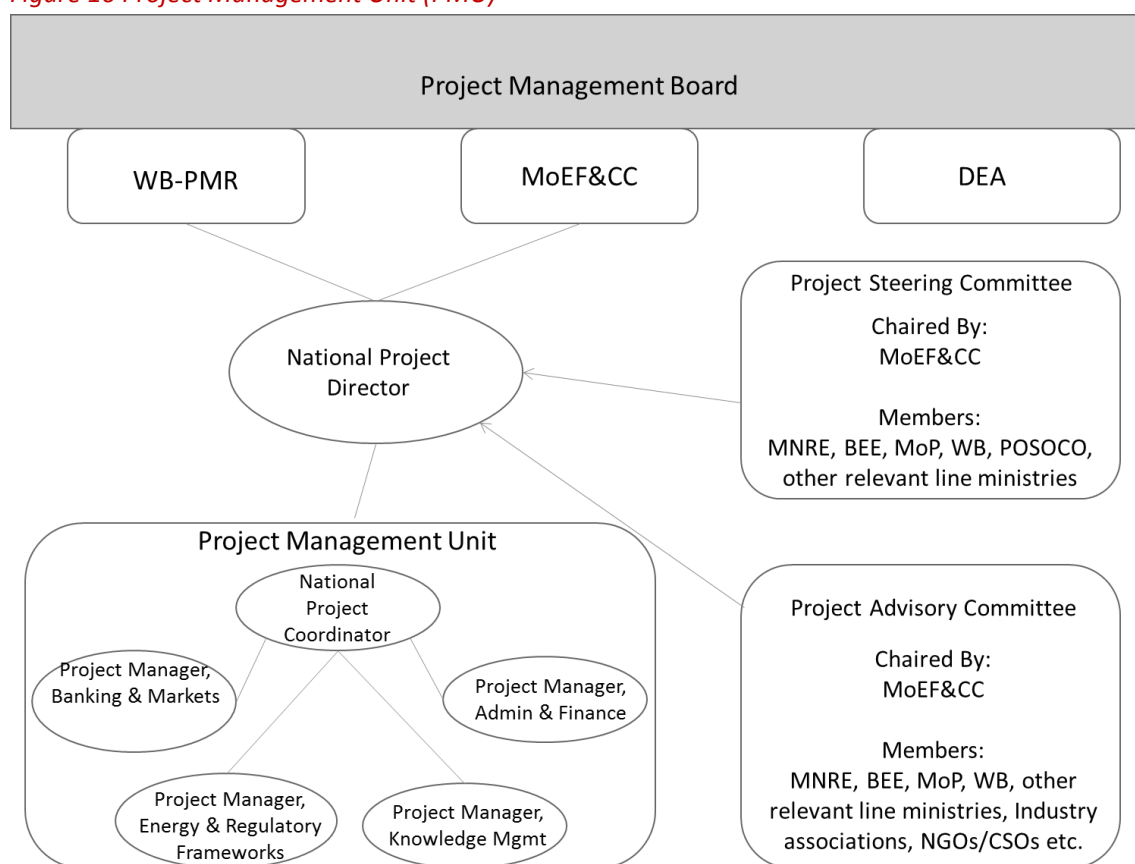
The Project Steering Committee (PSC) will be responsible for making management decisions for the project, particularly when guidance is required by the NPC. The PSC would play a critical role in project monitoring and evaluations by conducting quality assurance for the processes and products, and using 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.

The PSC may include representatives from civil society organizations, industrial associations and other relevant stakeholders to form a project advisory committee (PAC). PSC may call for a PAC meeting during the different stages of the PMR activities as deemed necessary. The PAC will ensure that views of all stakeholders are taken on board in the entire process.

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,¹⁹ 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 16 Project Management Unit (PMU)



¹⁹ 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.

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.;
- 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. Monitoring and Evaluation will culminate in synthesis report listed as a separate activity in the Gantt chart.

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

Activity	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 , 5) key capacity building, outreach and dissemination activities which would also include state level activities and 6) identify suitable risk mitigation strategies.	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 liaising along with identifying suitable risk mitigation strategies for smoother implementation.	PMR-PMU	Q1-onwards

Activity 5.2 Project Steering 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
Activity 5.3 National and International expert interactions	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 others. 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	1) Once every six months 2) Synthesis Report	PMR-PMU	Q1-onwards

5.4 Gantt chart for activities

Activity	Description	Q*	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
Activity 5.1	Project Management Unit											
Activity 5.2	Project Steering 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 5.9 (b)	Synthesis Report											

5.5 Budget

Budget for BB5						
Activity	Estimated support from PMR (in US\$)			Funding Source (in US\$)		
	Year 1	Year 2	Year 3	PMR	Govt	Total
Activity 5.1	250,000	250,000	250,000	750,000	502,500	1,252,500
Activity 5.2	2,000	2,000	1,000	5,000	21,980	26,980
Activity 5.3	100,000	150,000	50,000	300,000	115,500	415,500
Activity 5.4	50,000	50,000	50,000	150,000	49,500	199,500
Activity 5.5	20,000	40,000	40,000	100,000	79,800	179,800
Activity 5.6	5,000	10,000	10,000	25,000	64,950	89,950
Activity 5.7	15,000	15,000	15,000	45,000	74,850	119,850
Activity 5.8	25,000	20,000	20,000	65,000	24,750	89,750
Activity 5.9	20,000	20,000	20,000	60,000	26,400	86,400
Total	487,000	557,000	456,000	1,500,000	960,230	2,460,230

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* ²⁰	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
Activity 2.1	Assessment of current status of the PAT scheme											
Activity 2.2	Assessment of current status of the REC scheme											
Activity 2.3	Assessment of current status of NCEF											
Activity 2.4	Modelling resulting in prioritized list of policy instruments in key sectors											
Activity 2.5	Develop and select optimum policy-packages by analyzing policy interactions											
Activity 2.6	Needs assessment for implementation of MBMs											
Activity 3.1	Systems Need Assessment											
Activity 3.2	Functional System Specification											
Activity 3.3	Technical System Assessment											
Activity 3.4	Software development											
Activity 3.5	Systems deployment and capacity building											
Activity 4.1	Design options for deepening and broadening of PAT											
Activity 4.2	Design options for expansion of REC mechanism											
Activity 4.3	Reviving CDM projects and creating new demand											
Activity 4.4	Designing new MBM											
Activity 4.5	Piloting the new MBM											
Activity 4.6	Linking of various domestic markets											
Activity 5.1	Project Management Unit											
Activity 5.2	Project Steering Committee											

²⁰ Time taken in grant approval, various clearances and setting up of PMU

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 5.9 (b)	Synthesis Report												

6.1 Budget

Summary of Budget (in US\$)						
Building Block	Estimated Support from PMR			Funding Source		
	Year 1	Year 2	Year 3	PMR	Govt.	Total
BB2	650,000	50,000	0	700,000	510,000	1,210,000
BB3	300,000	1,500,000	600,000	2,400,000	873,000	3,273,000
BB4	750,000	1,650,000	1,000,000	3,400,000	1,202,000	4,602,000
BB5	487,000	557,000	456,000	1,500,000	960,230	2,460,230
Total	2,187,000	3,757,000	2,056,000	8,000,000	3,545,230	11,545,230

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 through 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 Programme (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.

Annex I Summary of Registries of PAT and REC

Introduction

PAT and REC mechanisms have quite mature registry having detailed rules and procedures for maintaining data and undertaking transactions. Both the registry for REC and PAT are maintained by same entity (POSOCO). The two registries differ in the functional specificities as per the design of respective mechanisms as follows:

1. **PAT Registry:** Registry maintains a database of all ESCerts and facilitates exchange of ESCerts. Thereby, playing a key role in the ESCerts exchange mechanism. After the ESCerts are credited in individual Designated Consumer, Registry maintains the records till the expiry of credited ESCerts. Registry shall be responsible to cross check the quantity of sell bid for each seller against the ESCerts available in the respective Designated Consumer's registry account. After each successful trading session, Registry transfers the ESCerts from seller's registry account to buyer's Registry account. Further details on the functioning of the registry can be found in document published by BEE providing draft procedures for the transaction registry.²¹ This document gives detailed procedures of transaction of energy saving certificates (ESCs) under the PAT scheme and its transaction registry.
2. **REC Registry:** REC Registry maintains records for registration, issuance and accreditation of obligated entities. REC Registry is a facilitating portal for all agencies that are involved in the RECs process, which are: CERC, NLDC, SLDC, SERCs, IEX and PXIL. Details can be accessed at online platform here <https://www.recregistryindia.nic.in>. A document has also been published to give details of procedures and modalities.²²

Data Management and transactions in the existing registry

Both the registry maintains the unique number for the issued certificates. Tracking of certificates issued within the two mechanisms can be easily tracked for trading through the unique number allocated to the certificates.

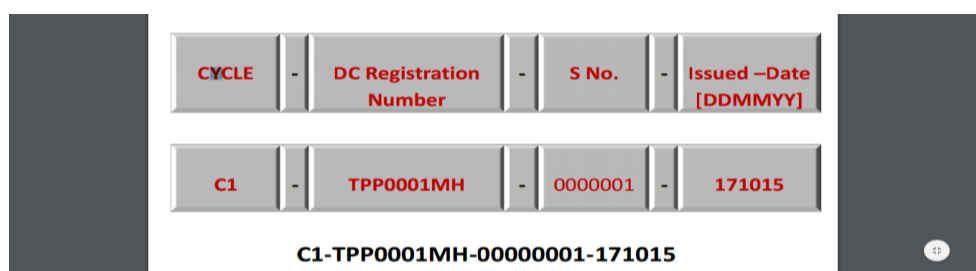


Figure 1: Unique number for issued certificates (Template)

Source: BEE²³

²¹ Document can be accessed here

<[https://beenet.gov.in/\(S\(0gmr0k3l1uygni1mioae54qu\)\)/GuideLine/Draft%20Detailed%20Procedure%20for%20Transaction%20of%20ESCs%20_7%20Dec%2016.pdf](https://beenet.gov.in/(S(0gmr0k3l1uygni1mioae54qu))/GuideLine/Draft%20Detailed%20Procedure%20for%20Transaction%20of%20ESCs%20_7%20Dec%2016.pdf)>

²² Document can be accessed here < https://www.recregistryindia.nic.in/pdf/REC_Procedures.pdf>

²³[https://beenet.gov.in/\(S\(yhl430bb1iky1halghmhnegl\)\)/GuideLine/Introduction%20to%20ESCs%20Trading%20under%20PAT%20Scheme.pdf](https://beenet.gov.in/(S(yhl430bb1iky1halghmhnegl))/GuideLine/Introduction%20to%20ESCs%20Trading%20under%20PAT%20Scheme.pdf)

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Figure 2: Template for REC Registry

Source: <https://www.recregistryindia.nic.in/>

REC currently trade on the trading platform/ exchanges namely IEX and PXIL. As per the scheme design, PAT certificates are also envisaged to trade on the same platforms. However, the trading platforms are linked with the registry and feed into the database management system.

Annex II Draft Terms of Reference for Development of Meta Registry

A. BACKGROUND

India submitted a very ambitious NDC, which three quantifiable goals, as follows: 1) Reduce the emissions intensity of its GDP by 33-35% by 2030 from 2005 levels, 2) Achieve 40% 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), and 3) Create an additional carbon sink of 2.5-3 billion tons of CO₂ equivalent through additional forest and tree cover by 2030. To achieve this, 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. This requires multiple policy instruments which can push large scale transformative change keeping its developmental prerogative fulfilled.

Many of such policy objectives can be achieved with the help of multiple market based policy instruments (including existing and new MBMs). Paris Agreement (PA) also opens up opportunities for new international market based mechanisms. There are already existing domestic MBMs in the form of PAT scheme and REC mechanism. The PMR activities are also channeled to design and pilot a new MBM domestically. Thus, a complex network of international and domestic market mechanisms is envisaged post 2020. While this could pose challenges such as double counting and environmental integrity, it also opens up opportunities of inter-linking for cost effective mitigation outcomes. Such interlinking has not been possible as of now in any international and domestic carbon market. However, it is envisaged that by developing a national Meta-registry which links data/information from various domestic MBMs, it may be made possible. This ToR is to design and implement such a National Meta-Registry in India. Besides linking existing MBMs, this national Meta-registry is to be designed as a 'future proof' registry with possibility of interlinking various MBMs thereby creating foundation for inter-linking international and domestic MBMs.

Such Meta-registry will record GHG emission data and inter-link various MBMs by supporting issuance, transfer and cancellation of credits. This ToR describes the broad design requirements for a centralized data management and Meta-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 Meta-registry is suggested to allow for flexibility and scalability.

B. OBJECTIVES

A national Meta-registry is to be designed to serve dual purposes of data management and transaction registry. Thus, the Meta-registry will have two components: 1) will serve as a data management system: which implies that it will collect, control, process, and analyze bottom-up data from various MBMs and regulatory sources. This would mean that the Meta-registry will control and consolidate the major chunk of GHG emissions data from all the sectors under various MBMs. Therefore, this can be linked with a National Inventory Management System (NIMS) and enhance

transparency of the emissions data being reported. 2) will serve as transaction registry: which implies that the Meta-registry will host and link infrastructure of the existing and upcoming MBM transaction registries for example will act as a platform for linking PAT and REC registries by providing relevant details on both registries and thus making inter-linking possible.

Thus the Meta-registry will have following specific objectives:

1) Data Management:

- Develop systems and processes to collect, organise, report data from MBMs
- Generate bottom-up data from MBMs and explore linkages with NIMS and the domestic MRV system.

2) Transaction:

- Facilitate linking existing domestic MBMs and new MBMs. This implies that the registry should also allow conversion of tradable units from one MBM to another.
- Facilitate voluntary cancellation of CERs earned from the CDM projects in any domestic MBM.
- Facilitate of linking with any new international market based mechanism.

C. SCOPE OF WORK

This ToR is seeking proposals to design and build a robust and 'future-proof' the Meta-registry for India as per objectives highlighted above. In order to fulfill the short, medium, and long-term objectives, the design and implementation of the data management and Meta-registry system will follow a phased approach, comprising i) design, ii) prototype, and iii) pilot. The development of IT systems and database for the India Meta-registry will take place in several phases, described as follows.

1) Phase 1, Systems Needs Analysis: The objective of this phase will be to understand and clearly articulate what is being built, and to ensure that the system supports and is aligned with relevant policies and regulations. Tasks for the preparation of the Systems Needs Analysis will include analyzing relevant regulation(s) and legislation; analyzing future linkages with other jurisdictions; assessing existing data systems in India for re-purposing; assessing data exchange and integration needs; research and analysis of similar systems; gathering input from relevant stakeholders; and prototyping. This work should take note of international systems and best practices in similar situations, provisions to link with NIMS, existing domestic MBM and new MBMs and future international carbon markets etc. Thus, this phase will have following set of activities and deliverable but not limited to these:

- i. Assessment of existing systems and data: experiences with domestic registries (PAT and REC)
- ii. Analysis of international best practices in design and implementation of a registry. A detailed report in this regard will be essential.
- iii. Engagement plan to seek and gather inputs from relevant stakeholders: A survey of future users of the system (e.g., regulators, reporters, verification bodies) covering their needs and challenges will provide key inputs into system design. Input can be gathered via interview (with individuals or groups) and/or by questionnaire or survey.
- iv. Workshops to help seek inputs from relevant stakeholders. In this regard at least two workshops will be required. First will serve as a Kick-off meeting to the Need Assessment

exercise seeking inputs and experiences of the existing systems and understanding the need for the Meta-registry. Last to serves as concluding technical workshops to inform about the findings and way forward.

2) Phase 2, Functional Systems Specifications: The objective of this phase is to develop the systems' functional requirements, which describe the goals and objectives of the system, and define the types of data, users, key functional components, and design requirements. Tasks for the preparation of Functional Systems Specifications will include a) identifying the types of data and users; b) describing each major functional component to be included in the system – as determined during the requirements gathering and analysis phase; c) drafting the system design requirements to ensure consistency with regulator/program administrator branding; and d) defining a business plan assessing human and financial resources needs for the envisaged system over 5 years and funding options. Thus, this phase will have following set of activities and deliverable but not limited to these:

- i. **Analysing relevant regulation(s)** and legislation that will inform the registry's functionality, and applicability of those to various types of users. This will involve engaging with relevant ministry and departments to understand the current data and information sharing legislations and regulations. It should also take note of anticipated regulatory changes for example new MBMs, new environment policies, changing reporting thresholds, additional sectors, and/or future linkages with international carbon markets.
- ii. **Analysing Future linkages with other jurisdictions:** Future linkages can be enabled by aligning reporting formats (metrics and conversion factors) according to calculation methodologies, including values for default emission factors and GWPs; and, common standards for verification so that inter-linking is possible. These considerations will then feed into the requirements for the GHG data management system thereby allow linkages with NIMS and domestic MRV system to simplify and streamline reporting requirements under the UNFCCC.
- iii. **System Architectural Design System architecture:** This activity will aim to specify the technical requirements as per following or more elements: a) Defining all the technology domains and components required to develop the proposed meta-registry, b) architecture that supports data collection, processing, analysis, reporting and dissemination functions required to operate the Meta-registry, c) overviews of data linkages with other registries, d) Data specifications as per User interface
- iv. **Business plan for sustaining the meta registry in future:** This will include managing budget and financial planning
- v. **Stakeholder engagements** in the form of technical workshops / policy dialogue etc.
- vi. **A small booklet** to give a crisp summary for policy makers describing the functional specifications of the registry.

3) Phase 3, Technical Systems Specifications: The main objective of this phase will be to develop the systems technical requirements document(s) which will provide system developers guidance on system performance, architecture, hardware, software, security, and hosting. Technical requirements will also clarify processes related to software development, integration, testing, and deployment. Tasks for the preparation of the Technical Systems Specifications will include defining performance requirements; assessing data storage considerations; defining the system architecture;

assessing hardware and software options; and specifying security requirements. Thus, this phase will have following set of activities and deliverable but not limited to these:

- i. Detailed project report (DPR) including detailed specification, feasibility and costing as per following parameters:
 - a. **Hardware Architecture:** A detailed specification on quantities of all required hardware, taking into consideration the number of users and amount of data required for each transaction, network specifications, internet bandwidth and any other infrastructure requirements.
 - b. **Hosting Solution:** Hosting of the system can be in-house i.e., at the government /regulator /agency. Consultant may propose solutions, costs, including initial hardware acquisition (if any) setup/licensing and maintenance costs. Procurement of hardware, software, hosting and maintenance services will be carried out in the next phase of the project.
 - c. **Software Architecture:** The consulting company must outline in the design document the most appropriate software for database, mapping and analysis or any other software component for the system. The consulting company needs to provide information about software such as user-base, maintenance cost, details about the company and support model for the software. Provide any additional requirements to implement the new system, including the following:
 - d. **Commercial Off-The-Shelf software:** Define commercial off-the-shelf software that is needed for the system's development and operations. The consulting company needs to provide detailed list of all software to be procured with details including maintenance plans.
 - e. **Relational Database Management System (RDBMS):** The proposed system should include a multi-user Relational Database Management System essential for storing the entire spatial and non-spatial data sets.
 - f. **Performance requirements:** The technical requirements typically specify clear performance targets in the areas of: Estimated system usage metrics, including total projected users, with projected cyclical impacts due to reporting or verification deadlines. Usage estimates should encompass total monthly users, as well as concurrent users and likely session length. Response time for page loading, search query response and report generation.
 - g. **Data storage considerations:** Options for Archival data that won't be used for current, real-time reporting will be considered such as secondary servers, back-up drives, or tapes and accessed via special
 - h. **Security:** The technical requirements will specify system security, and governance related to how different system components are accessed and how they connect with each other, including: Web server account details, including server name, IP address, authentication (login ID, password). Should be: database account permissions (SQL, MySQL or other), including database server authentication (login ID, password) and default database name. Reporting software permissions/path, including name, server and database authentication. Technical requirements also specify both physical and virtual security requirements.

- ii. Preparation of DPR will require number of **technical focused group discussions** with subject matter experts and stakeholders from domain expertise. The DPR should include detailed minutes of the discussions held during these technical focused group discussions.
- iii. The DPR to include **final specifications of the IT infrastructure** require costing and Infrastructure procurement plan

4) Phase 4, Software Development: This process consists of several steps including configuring an appropriate development environment for the development team, developing clear database architecture for the system, adhering to best practices to coding/programming the system, and developing the front end of the system to be consistent with the programs brand/style requirements. Thus, this phase will have following set of activities and deliverable but not limited to these:

- i. Acquisition of the server as per the specifications in the DPR
- ii. Development of the software as per the needs and demonstration of the same.

5) Phase 5, Systems Deployment and Capacity Building: The objective of this phase is to deploy and launch the system providing support to and building the capacity of GHG data management users. This is key to ensuring smooth reporting cycles and accurate data input. Tasks for Systems Deployment and Capacity Building will also include the certification of the system to ensure it complies with India's relevant security standards. Thus, this phase will have following set of activities and deliverable but not limited to these:

- i. Acquisition of the hardware
- ii. Deployment of the hardware
- iii. Development of guidelines for users
- iv. Launch of the Meta-registry
- v. Workshop for users

D. DELIVERABLES AND PAYMENT SCHEDULE

The assignment is expected to start in 2017. The consultant will be expected to work in close collaboration with India experts and government officials to develop the Meta-registry under the PMR project. Deliverables/specific outputs expected from the consultant are listed below.

Project phase	Outputs
Phase 1: Systems Needs Analysis	<ul style="list-style-type: none"> ○ Needs Analysis for India's Meta-Registry system <ul style="list-style-type: none"> - Full Report - Summary Report for Policy Makers ○ Project Stakeholder Engagement Plan <ul style="list-style-type: none"> - Technical Note ○ Project Kick-Off Workshop <ul style="list-style-type: none"> - Presentation <p>Timeline: 12 months from start of project</p>

Phase 2: Functional Systems Specifications	<ul style="list-style-type: none"> ○ Functional Requirements for India's Meta-Registry system <ul style="list-style-type: none"> - Full Report incl. 5-Year Business Plan - Summary Report for Policy Makers ○ Meeting with Government <ul style="list-style-type: none"> - Presentation <p>Timeline: One year from start of project</p>
Phase 3: Technical Systems Specifications	<ul style="list-style-type: none"> ○ Technical Requirements for India's Meta-Registry system <ul style="list-style-type: none"> - Full Report - Summary Report: "Summary of Technical Requirements" ○ Project Mid-Term Review Workshop <ul style="list-style-type: none"> - Presentation <p>Timeline: Month 12 to Month 18</p>
Phase 4: Software Development	<ul style="list-style-type: none"> ○ Software as per specification and system requirement <ul style="list-style-type: none"> - User guidance ○ Expert demonstration Workshop <ul style="list-style-type: none"> - Presentation <p>Timeline: Month 12 to Month 18</p>
Phase 5: Systems Deployment and Capacity Building	<ul style="list-style-type: none"> ○ System Deployment and Launch <ul style="list-style-type: none"> - System Deployed and Launched - System Certified - User Guidelines and FAQ - User Workshops (at least 2) ○ Meetings with Government <ul style="list-style-type: none"> - Presentation: "System Deployment Plan" - Presentation: "System Deployment Completion" - Presentation: "System Certification Completion" ○ Project Completion Workshop <ul style="list-style-type: none"> - Presentations <p>Timeline: Month 18 to Month 30</p>

Annex III Possible Candidate for New MBM: Waste Sector

A. BACKGROUND

With India moving on the path of rapid development, a major increase in the generation of waste is also being experienced. This growth in waste generation also includes rapid increase in the quantities of solid waste from urban areas. A major concern with this increased waste generation is that of the GHG emissions due to methane and nitrous oxide formation. This is largely a result of uncontrolled emissions from land disposed solid waste, and non-recovery of methane. These issues are attracting national concerns. As per report by CPCB, urban India generated about 51.488 Million Tonnes per year of MSW and collected 90% of this waste (CPCB, 2016). The treatment of waste was only 27% of collected and of the total only 1.64 million tonnes per year was dumped in engineered landfills. The per capita solid waste generation varies from city to city and ranges as shown in Table 1.

Table 1: MSW generation rate with respect to city size in India

S.No	Population range (in million)	No of cities surveyed	Average per capita value (kg/c*d)
1	0.1 to 0.5	12	0.21
2	0.5 to 1.0	15	0.25
3	1.0 to 2.0	9	0.27
4	2.0 to 5.0	3	0.35
5	>5.0	4	0.50

Source: NEERI study, 1996

B. SECTORIAL GOALS AND CURRENT LEGISLATION IN WASTE SECTOR

India in its India's Nationally Determined Contribution (NDCs) and Swachh Bharat Mission (SBM) has targeted solid waste management (SWM) services to transition towards a lower carbon emission trajectory.

As per Ministry of Urban Development (guidelines of SBM, 2014) Targets under SBM (Urban) for SWM has been set as to cover 80% of the urban population by SWM services (by end of mission in 2019) and further allowing for a 2% increase year on year²⁴. Thus Vision of SBM is towards sustainable urban development through enhanced waste collection from average of 90% at present to 100% along with treatment of waste from existing 24.3% to 100% in future. Thus with diversion of organic waste from being landfilled the GHG emissions from SWD will reduce by about 5350 Gg CO_{2e} by 2019 and 19000 Gg CO_{2e} by year 2031.

Swachh Bharat Mission

- ✓ Swachh Bharat mission envisage clean India by eliminating open defecation and manual scavenging.
- ✓ Improving the municipal solid waste management sector of the country
- ✓ Transforming the society by ensuring behavioural change towards improved

²⁴ (Ministry of Urban Development, 2014)

Under the India's NDC in section 1.4 (4) it has clearly been stated that 'Swachh Bharat Mission' (Clean India Mission) with the objective of making the country clean and litter free with scientific SWM in about 4041 towns covering a population of 306 million. Further in section 1.7 (6) it is stated that revised MSW (management and handling) rules will emphasize on proper segregation of waste at source; enhance waste processing and implementation of scientific landfills. Similarly, BioMedical Waste (Management & Handling) Rules, Plastic Waste Management Rules, ewaste (Management) Rules and Hazardous and Other Wastes (Management and Transboundary Movement) Rules are



Source: TERI University study 2015

being amended for a more scientific, technology driven, regulated and participative environment management. Section 1.4 (2) states that government has significantly invested in SWM projects over the years and has provided INR 25 billion (USD 397 million) as grant in aid to states and Urban Local Bodies specifically for SWM through public-private partnerships.

The solid waste generated by the urban areas are governed by effective rules like Plastic waste management Rules, 2016; E-waste (management) rules, 2016; Bio-Medical Waste Management Rules, 2016; Construction and Demolition Waste Management Rules, 2016; Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016; and Solid Waste Management Rules, 2016. The recycling/ processing industrial comes under the legislative measures for pollution control in the country commenced with the enactment of the Water (Prevention and Control of Pollution) Act, 1974, Air (Prevention and Control of Pollution) Act, 1981, the Environment (Protection) Act, 1986 and recently the National Green Tribunal Act, 2010²⁵. The Environment Protection Act (1986), also known as Umbrella act, is to protect and improve of the environment. It empowers the Central Government to establish authorities [under section 3(3)] charged with the mandate of preventing environmental pollution in all its forms and to tackle specific environmental problems that are peculiar to different parts of the country. The Act was last amended in 1991.

²⁵ National Green Tribunal (NGT) Act in 2010: The Act paved the way for the establishment of the NGT. It is a green court established for the effective and expeditious disposal of conflicts related to environmental conservation and protection of other natural resources of the country. Relevant Rules have been notified.

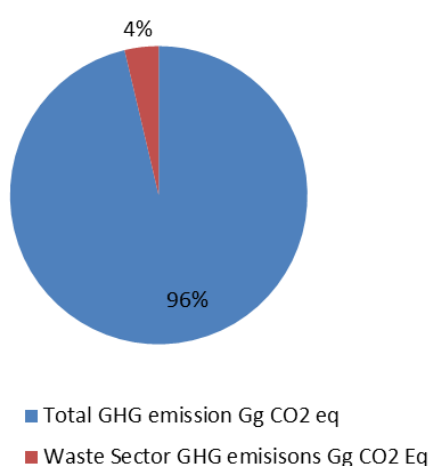
To implement these legislations, the Ministry formulated various regulatory instruments (e.g., environment standards, consent administration, authorization, environment clearances, environmental statement etc.) and created institutional infrastructures at the national, regional and state levels in the form of Central Pollution Control Board (CPCB), regional offices of MoEF and CPCB, State Pollution Control Boards/Pollution Control Committees (SPCBs/PCCs), State Department of Environment, and Environmental Research Institutes/Organizations, etc. Although despite these existing standards, there is a missing link on quantification of emissions in terms of greenhouse gas released from these plants and compounding ways to reduce these emissions to transition towards low emission pathways.

The water (prevention and control of pollution) act 1974 and air (prevention and control of pollution) act, 1981 require industries to get consent to establish and operate and comply with discharge standards along with submission of environmental statement every year showcasing the developments of an industry towards environmental protection. Monitoring and reporting also remains a challenge as the strength of SPCB's and PCC's do not permit extensive monitoring of running recycling industries for compliance.

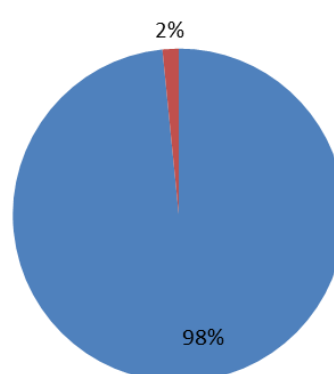
C. GHG EMISSIONS FROM THE WASTE SECTOR IN INDIA

A major concern with increased waste generation raised concerns about GHG emissions. The task force on waste to energy quoted that by year 2013 only 22 States/UTs had set up processing and disposal facilities. In total 279 conventional composting, 138 vermi-composting facilities, 172 bio-methanation, 29 Refuse Derived fuel (RDF) and 8 Waste to Energy (W to E) plants were reported to have been established. Of the established plants many are either closed or underperforming (Planning Commission, 2014).

GHG emission in 2006



GHG emission in 2031

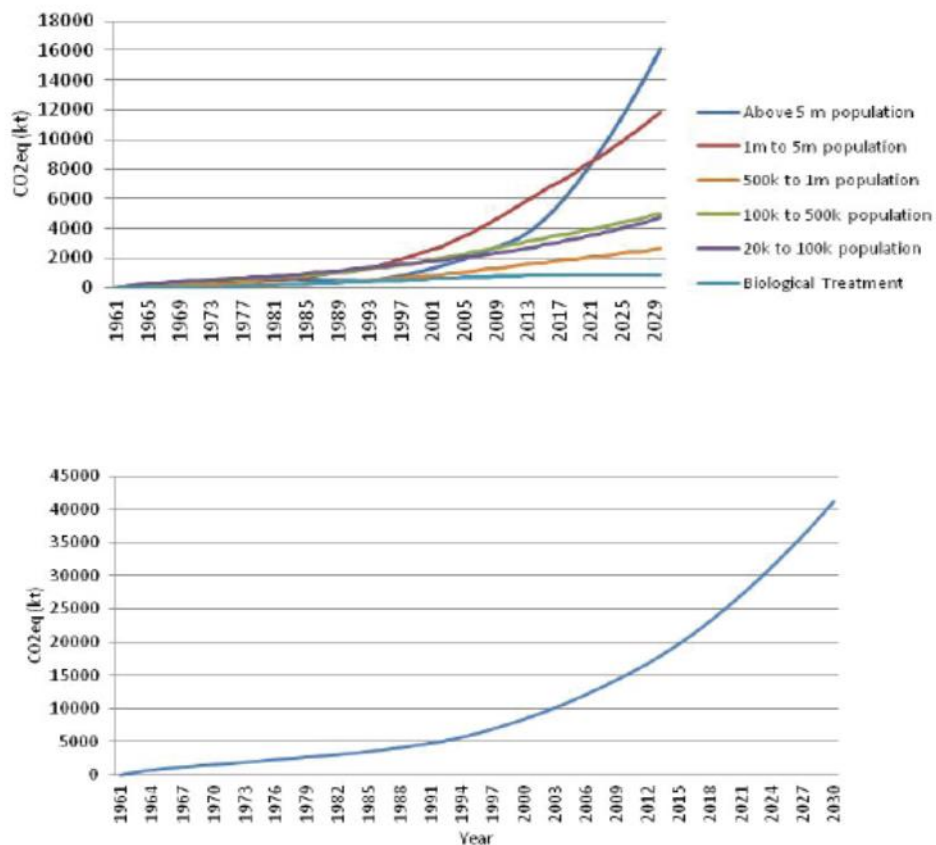


Source: TERI (2016) Modelling Study on Greenhouse Gas Emissions and Emission Intensity of Indian Economy

The organic fraction of MSW is an important component, not only because it constitutes about half of the total waste quantity, but also because it is potentially adverse impact upon public health and environmental quality. Half-life of Organic waste varies as per the temperature and precipitation and its adverse impact will continue till it has been fully decomposed or otherwise stabilized.

As per NATCOM II the waste sector emitted 52,552.29 Gg CO₂ eq. in 2000, which was 3.5% of the total India's GHG emissions (MoEFCC, 2012). It has increased by almost 23% and estimated at 65,052.47 Gg CO₂eq in 2010. The Waste sector includes GHG emission estimations from the following two categories: Solid waste disposal and Waste water treatment and discharge. Solid waste disposal in year 2000 contributed 19.5% of the waste sector's emissions with 10252.00 Gg of CO₂eq and are projected to contribute 18.55% with 22772 Gg CO₂eq GHG emissions in year 2031.

As per the NAMA feasibility study for the waste sector conducted with the support of GIZ, total sector emissions will more than double between 2015 and 2030 from roughly 19 million to 41 million tons CO₂ eq in a BAU scenario. The likely increase in emissions trend from municipal solid waste disposal and biological treatment of waste and from waste disposal to SWDS is shown in figures below.



The result shows that GHG emissions from solid waste disposal are going to double by 2030 from present level i.e. 2015, until 2030. It is also evident that the cumulative emissions from city groups with more than 1 million inhabitants will contribute more than 50% of total emission by 2030.

As per McKinsey Global Institute (2010), there will be 68 cities of this type by 2030.

D. CO-BENEFITS APART FROM GHG MITIGATION

GHG reduction is only one of the many co-benefits that accrue from the initiatives in the waste management sector. There are many economic, social and environmental co-benefits to be gained from developing waste sector initiatives. The idea is to look at the co-benefits as a package rather than only focussing on the GHG emissions.

Economic co-benefits are the backbone of any waste sector initiative especially in a developing country context. These initiatives should either provide a cost reduction or a revenue stream in order to be sustainable. Some of the economic co-benefits are [1] cost reductions in the waste sector like Reduction in transport costs, Cost savings of leachate treatment, Savings from using sub-products of alternative treatment technologies [2] Revenue streams from waste sector like sale of sub-products, Refuse Derived Fuel, Recycling, Composting and Electricity [3] Revenue from value added products.

There is a multitude of Social Co-Benefits that can be accrued due to initiatives in the waste management sector. Most of them revolve around decreased health impacts and providing better quality of life for rag pickers.

A focus on the co-benefits approach is what is needed to attract the attention of all relevant stakeholders including public sector, private sector, NGOs, etc. A sole focus on GHG mitigation may not be a sufficient way to address the waste problem.

E. CHALLENGE IN WASTE MANAGEMENT

As a mechanism to meet the sectorial goals of NDC's and Swachh Bharat Mission, processing technologies like Refuse derived fuels (RDF), Incineration, landfill gas recovery, Composting along with recycling and reuse of materials is a necessity. The Challenge we face in adopting these technologies lies with the market acceptability of the output products with a pricing mechanism to make these plants profitable. Example there is no such mechanism which makes the builders necessarily use products made of C&D waste in making new buildings, and an industry to buy RDF pellets necessarily to run its boiler. These are truly dependent on economics of using these products by the users.

Years of disposal	Gg Co2 Eq /yr
1	0.0000
11	0.0643
21	0.0761
31	0.0782
41	0.0786
51	0.0787

There is a need to bring emission reduction and altogether support the recycling and processing of waste. Since landfilling/dumping causes 0.0643 Gg Co2 eq emission for every year starting from 10th Year of disposal for a constant waste generation of 1 tonne waste every day and 70% disposal, vis a vis technologies like Composting can be practiced in tandem with recycling and material recovery for addressing the problem of biodegradable waste, the CO2 emissions in Gg CO2Eq / Gg MSW is zero and potential emission reductions are 1.16 Gg CO2Eq / Gg MSW (World Bank, 2006). The potential for anaerobic digestion is even higher with gainful use of biogas. Proper incineration of combustible waste can not only reduce the net GHG emission but also result in substantial waste volume reduction. The cost for installing and operating incineration plants in India is around one-third the cost in Western Europe and the United States of America. However, any standard concerning control of GHG emissions from plant yet does not exist.

F. MARKET-BASED MECHANISM FOR WASTE MANAGEMENT

As discussed above municipal waste management practices have benefits in terms of GHG mitigation and other co-benefits such as improved sanitation, environment and health. Given that the country is rapidly urbanising waste is a big challenge not only from emissions point of view but also from development point of view. While there are number of policies in the country to manage the sector there still are looming challenges. For example, urban local bodies (ULBs), who are responsible for municipal solid waste (MSW) management, are facing significant challenges and financial burden in providing efficient waste management services due to lack of sustainable financial mechanism, infrastructure, technologies, and collective efforts and participation from the private sector. This results in poor management of MSW during the entire cycle starting from collection, segregation, processing, transportation, and disposal and recycling. For example, only 70 percent of solid waste is collected and 12.45 percent is processed or treated²⁶. There is neither a comprehensive plan nor system in place at ULBs that periodically collects wastes in a systemic manner. Indian cities also suffer from serious health damage and economic loss due to such poor MSW management. More importantly, it leads harsh conditions and environment on where urban poor people and communities live.

Carbon finance through CDM was successful in providing the right incentives to the private sector to enter into MSW management. Of around 3000 plus projects in India, around 5 % were in the waste sector. However, this momentum is losing ground due to recent downturn of the carbon market and lack of other sources of finance to be leveraged for sustainable MSW management. A study suggests that about 40 waste processing projects through composting, generation of Refuse Derived Fuel (RDF) or waste to energy²⁷ have been undertaken under PPP mode, some of which has faced difficulty in implementing the projects due to the increased uncertainty on carbon revenue or lack of alternatives to supplement financial gaps.

A market based mechanism (MBM) is proposed for MSW to phase out methane emissions from solid waste disposal, and move from being a cost centre to being a profit centre through monetising GHG reduction benefits around compost, electricity, RDF, lower land requirement for disposals and recycled products. Although, a market mechanism that relies purely on GHG mitigation however it is difficult to sustain in the waste sector therefore a whole range of benefits like sale of compost, electricity from incinerator plants, ARF from RDF plants to industries, raw materials through recycling will be accounted for in the envisaged MBM. In doing so, there is need to establish a baseline of emissions from the sector. This will be done in consultation with various relevant state and central departments and involve stakeholder consultations at various levels.

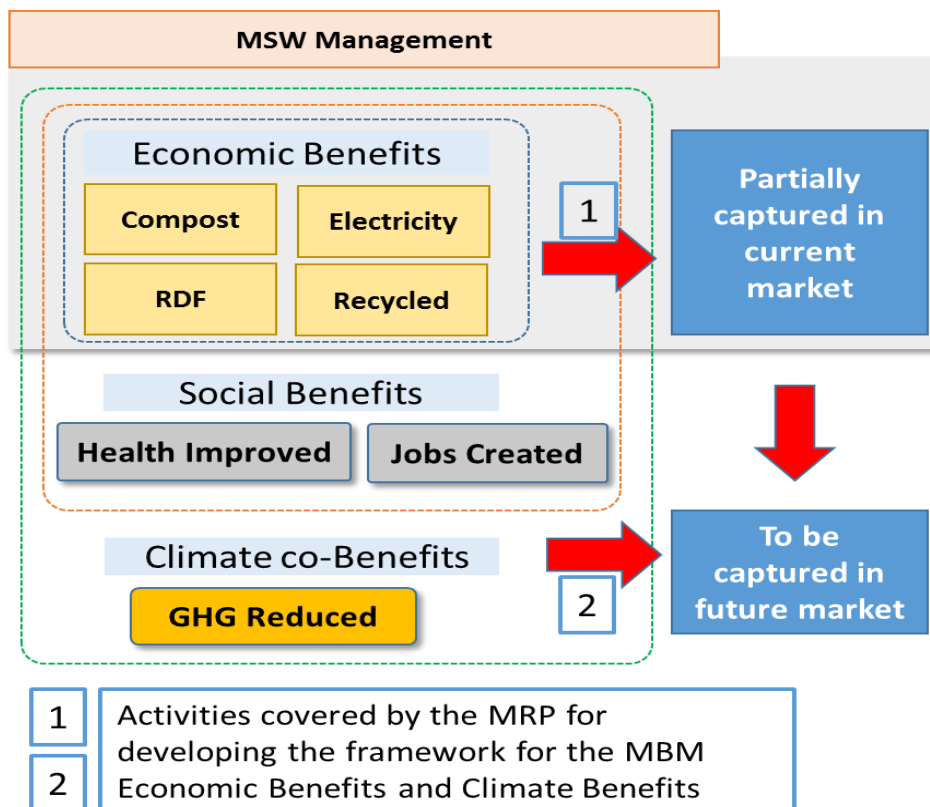
The starting point could be to tackle with the dump cities in major cities of India. In this regard there is already some momentum domestically as a meeting was held with a small group of select municipalities in late 2016 to discuss the issue²⁸. While there is need for further consultation on this,

²⁶ Central Pollution Control Board (2013). Status Report on Municipal Solid Waste Management. Retrieved from http://cpcb.nic.in/divisionsofheadoffice/pcp/MSW_Report.pdf

²⁷ Joshi and Ahmed (2016). Status and challenges of municipal solid waste management in India: A review. Cogent Environmental Science. 28

²⁸ http://www.swachhbharaturban.in:8080/sbm/content/CIRCULARS/Dump%20Closure%20meeting%20on%2010Wed_Oct_05_17:14:52_IST_2016.10

but cities and/or ULBs could be the entities involved in the envisaged MBMs and can be given targets on the basis of baseline set on scientific yet consultative basis. These targets can be set through small amendment in the Environmental protection act so as to implement gradual phase-out of methane emissions from SWM and/or through relevant provisions of swachh bharat mission, Smart Cities mission as well as the Atal Mission for Rejuvenation and Urban Transformation. Given that the sector has challenges of its own in terms of MRV, aggregation etc, it is envisaged that MBM in this sector would work if it is designed at the sectoral level and it will be financially viable only if smaller components (compost, electricity generation, etc) are aggregation in volumes.



Based on the current status and challenges in the waste sector, the implementation of the MBM in the sector is expected to:

- incentivize the private sector to involve in the sector;
- help the government with monitoring of their both fiscal and regulatory policies and supporting achieving waste sector targets in their NDC with the development of a MRV system;
- help with enforcement of existing policies and also for policy prioritization (very important given multiple policies in place);
- help India define indicators for monitoring sustainable development goals in the sector;
- bring more political support and leadership/engagement;
- Support capacity building of municipalities ;
- And finally help accessing climate financing.

To achieve these objectives, it is required that a detailed analysis is done as part of the PMR activities while designing the possible MBM in this sector. Such activities will include:

1. Developing a municipal solid waste inventory in the select cities/ULBs (who will be part of the MBM) and identifying options to achieve significant emission reductions in this sector. Each participant ULB could have a plan in this regard depending upon the composition of waste and level of aggregation in their boundary.
2. Building on existing policy framework, development of a comprehensive national waste management strategy with the purpose of assisting the Government of India to facilitate the development of targeted policies and measures. This will include elements of the MBM in the sector envisaged at a sectoral level rather than project based mechanism. This will give flexibility to cities/ULBs to develop their own plans.
3. Elaborating design options for introduction of new MBM at the sectoral level with detailed list of tasks, institutional procedures including public-private partnerships, allocation of responsibilities and efforts. Here, it is important to mention that while there are challenges to measure GHG emissions accurately, there are a variety of other co-benefits that could be measured and at the same time indicate direction GHG reduction as an impact. The design options should include broad checklists of such co-benefits and how these can be measured. This will ensure that there is sustainable result based funding to foster transformational change towards a low carbon development.
4. While simplifying the mechanism should reduce the transaction cost and time it should not at the cost of environmental integrity. Therefore the design options should elaborate on environmental and social safeguards along with avoidance of double counting
5. An MBM design detailing out the above and related to (1) baseline establishment; (2) regulatory and institutional arrangements; (3) capacity building; (4) MRV (5) timelines. This should include the detailed plan to Pilot the MBM.

Annex IV Possible Candidate for New MBM: MSME Sector

A. BACKGROUND

India has set forth a very ambitious Nationally Determined Contributions (NDCs), which aims at reducing the energy intensity of its GDP by 33 to 35 per cent by 2030 from 2005 levels. One of the sectors that play a vital role in Indian economy is the Industry sector. Over the last decade, there is a global trend of shifting manufacturing to developing countries like India. This shift is likely to continue and it is expected that it will account for over 55 percentage of global production by 2025 compared to 36 percentage during 2013 (Planning Commission, 2013). Therefore, manufacturing industry has been identified as the key sector for long term growth of the country. The National Manufacturing Policy envisages enhancing the share of manufacturing in GDP to 25 per cent and creating 100 million jobs by 2021. The new government has also initiated the 'Make in India' campaign, which is further expected to promote manufacturing in the country. Considering the energy intensive nature of the sector, the increase in the manufacturing activities will result in increase in energy consumption by the sector. As per TEDDY (TERI Energy and Environment Data Diary and Yearbook) 2015/16, the commercial energy consumption by industry sector in the country was 171.21 million tonnes of oil equivalent (mtoe), which is about 47% of total commercial energy consumption of the country. The distribution of commercial energy consumption across various sub-sectors is provided in **Table 1**.

Table 1: Commercial energy consumption across various sectors in India

Energy Consuming Sectors	Commercial energy consumption for 2012-13 (mtoe)
Industry	171.21
Building	48.94
Transport	80.29
Other	63.73
Final Energy Consumption	364.17

Source: TEDDY 2012-13

B. ENERGY CONSUMPTION AND CURRENT LEGISLATION

India has taken several initiatives focusing on low carbon transition in the sector over the last few years. Mostly, these concerns are tackled by focusing on co-benefits such as energy efficiency, resource use optimisation and technology up gradation, which will help in mitigation GHG emissions in the long run. Some of the major policies include Energy Conservation Act (2001) and its amendments, National Mission on Enhanced Energy Efficiency (NMEEE) of the NAPCC. The Energy Conservation Act (2001) has provided a list of energy intensive industries specified as Designated Consumers (DCs). To improve the energy efficiency of industries, an innovative program 'Perform, Achieve and Trade (PAT)' was launched by the Bureau of Energy Efficiency (BEE) in 2012.

During the first PAT cycle (2012-2015) 478 DCs were covered out of which 144 were thermal power plants. The remaining 334 DCs under seven industry sub-sectors were consuming 60.41 mtoe of energy annually (base year was average energy consumed during the years 2007/08, 2008/09 and 2009/10). Similarly, in the second PAT cycle (2016/17 to 2018/19), 49 DCs were added through deepening under seven industry sub-sectors taking the count of DCs upto 383. These 383 DCs consume 86.6 mtoe of energy (base year 2014/15). However, comparing these numbers with the

overall energy consumption figures of 2014/15 in the seven industry sub-sectors, it is found that that energy consumption of 84.6 mtoe is still outside the preview of PAT-2 cycle.

Micro, Small and Medium Enterprises (MSME) constitute a major chunk of this energy consumption. MSMEs are organized in clusters and there are 180 clusters within 18 energy intensive industries in India and their overall energy consumption is estimated to be 22.5 Mtoe per annum. There have been constant policy efforts and initiatives to organise the sector and transition towards low carbon development. This has been extensively emphasised in the low carbon committee report of planning commission²⁹ and the twelfth five year plan document³⁰. Still, there is little or no data available on distribution of energy consumption of these enterprises as the sector faces many challenges which are listed in following sections.

C. CHALLENGES IN THE MSME SECTOR

The industry sector in India is highly diversified and consists of large as well as micro, small and medium enterprises (MSME). According to the Micro, Small and Medium Enterprises Development Act 2006³¹, the MSME sector ranges from 7.8 million to 13 million enterprises in numbers with a share more than 80% in GDP. 90% of the total number of industrial enterprises are Small and Medium Enterprises (SME) and form the backbone of industrial development in India. Also every enterprise in its infant years is an SME. The enterprises in India are classified into Micro, Small and Medium according to the following criteria:

Table 2: Classification of Enterprises in India

Type of enterprise	Engaged in manufacture or production of goods	Engaged in providing or rendering of services
	Investment in plant and machinery	Investment in equipment
Micro enterprise	Does not exceed 25 Lakh rupees	Does not exceed 10 Lakh rupees
Small enterprise	More than 25 Lakh rupees, but does not exceed 5 Crore rupees	More than 10 Lakh rupees, but does not exceed 2 Crore rupees
Medium enterprise	More than 5 Crore rupees but does not exceed 10 Crore rupees	More than 2 Crore rupees but does not exceed 5 Crore rupees

Source: MSME Act (2006)

The Indian SME sector is facing high and rising energy costs, unlike certain other sectors of the economy such as agriculture that benefit from subsidized energy prices, whereas export-oriented Indian SMEs are facing increased global competition. Price and cost pressures are of high and increasing importance to enterprise owners. Many Indian SMEs are energy-intensive, employing inefficient and outmoded technologies and operational modalities that endanger their competitiveness and future growth. Investments in cost-effective EE measures would improve their productivity and bottom-line profits.

²⁹ http://planningcommission.nic.in/reports/genrep/rep_carbon2005.pdf

³⁰ http://planningcommission.gov.in/plans/planrel/12thplan/pdf/12fyp_vol1.pdf

³¹ <http://msme.gov.in/sites/default/files/MSMED2006.pdf>

SMEs, especially those for whom energy costs represent a large portion of total production costs, can reap especially high direct economic benefits from improving efficiency of energy conversion and reduction of energy losses. In the past, wide ranging governmental programs of fiscal incentives and other interventions have been offered to SME units to address technology improvements and performance efficiency. Despite the financial attractiveness of these types of investments and several efforts to support the development of EE investment projects and Indian technical capacity to deliver EE solutions, only a small number of projects have actually been implemented and there has been limited adoption of efficient technologies and replication of best practices, due to the existence of numerous barriers and market failures.

These barriers include not just market barriers typically seen in energy efficiency projects globally, but additional India-specific constraints in SME access to finance which have held back the establishment of small units, their overall growth and development, and their eventual graduation to medium sized enterprises. Indian SMEs typically face constraints in accessing adequate and timely financing on competitive terms, particularly longer tenure loans, but also, working capital loans.

As the EE components of SME loans are often small, they also carry higher transaction costs as a percentage of investment when compared to large loans, making them less attractive to the banks as a specific lending product. There is also a lack of information among banking sector stakeholders on the potential market for lending and the portfolio benefits in terms of improving asset quality which can be achieved by increasing their own lending for EE to existing clients. Despite several pilot efforts by the GOI and donors, imperfect information about EE among SMEs still persists, representing another barrier preventing increased adoption of efficient technologies.

Due to these challenges impeding the sector, it has been difficult to include these SMEs in any formal, regulated structure. There have been efforts like the BEE SME Program³² and SAMEEEKSHA³³ to undertake studies in the context of energy efficiency and conservation. However, sustained efforts over long period are required to propel the MSME sector towards a low carbon trajectory.

Given multitude of barriers and challenges in the sector, it requires mix of policies that address different technical, financial and capacity issues. In addition, it also needs tools that are complementary to any policy mix and should incentivize market players to take up ambitious energy efficiency projects. Information needs in the sector, mainly to understand the energy consumption patterns, baseline energy consumption, data monitoring and their quality assurance should be addressed on priority to facilitate any decision making to address the key challenges.

D. MARKET-BASED MECHANISM FOR MSME SCETOR

As discussed above, the industry sector in India is highly diversified and consists of large as well as micro, small and medium enterprises (MSME). The sector has a wide range of enterprises which consume variety of fuels depending upon the technology in use, ease of availability and price. Energy consumption from the high energy consuming large industries or Designated Consumers has already been covered under the two PAT cycles. The small and medium enterprises (SMEs) are not covered by the PAT scheme. There have been few very good efforts trying to streamline the sector. One such example is the BEE SME Program under the 11th Plan period (2007-12). Under this program BEE

³² Describe

³³ Describe

initiated diagnostic studies in 25 clusters to prepare cluster specific energy efficiency manuals covering Specific energy consumption norms, energy efficient process and technologies, best practices, case studies, etc. These studies provided information on technology status, best operating practices, gaps in skills and knowledge, energy conservation opportunities, energy saving potential, etc for each of the sub-sector in SMEs. The studies/projects aimed to provide a direction for designing sub-sector specific energy conservation programs in the SME sectors. Besides such analysis, the BEE SME program also focused on capacity building, implementation of EE measures and facilitation of innovative financing mechanisms. Box 1 enlists some of the studies available under the program. In 25 MSME cluster under the BEE SME program, studies have estimated potential of 15% reduction in energy consumption. This translates to about 0.66 Mtoe annual energy savings³⁴. There is further potential of up-scaling EE measures to cover all energy intensive MSME clusters.

Further, the knowledge sharing platform SAMEEEKSHA³⁵ provides data and information related to a number of energy intensive MSME sectors in India. SAMEEEKSHA is a collaborative platform aimed at pooling the knowledge and synergizing the efforts of various organizations and institutions—Indian and international, public and private—that are working towards the common goal of facilitating the development of the Small and Medium Enterprise (SME) sector in India, through the promotion and adoption of clean, energy efficient technologies and practices. The detailed project findings have been published enlisting energy use and technology analysis of each cluster. SAMEEEKSHA provides a unique forum where industry may interface with funding agencies, research and development (R&D) institutions, technology development specialists, government bodies, training institutes, and academia to facilitate this process. Figure 1 gives a pictorial representation of select industrial clusters that have been included in the platform and the BEE-SME program.

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http://sameeeksha.org/pdf/presentation/Energy_Efficiency_Programme_for_Small_and_Medium_Enterprises_SMEs.pdf

³⁵ SAMEEEKSHA (an acronym for "Small and Medium Enterprises: Energy Efficiency Knowledge Sharing") seeks to bring together the various initiatives, experiences and lessons associated with enhancing energy efficiency in SMEs.

Figure 1: MSME Energy Map of India



Source: <http://sameeksha.org/>

To take some of these activities forward, Small Industries Development Bank of India (SIDBI)³⁶ has implemented SME Financing and Development Project which aimed at making MSME lending an attractive and viable financing option. In order to achieve its aims, the Project, besides upgrading direct flow of credit to MSMEs, addresses demand side issues of credit and streamlining access to qualitative financial and non-financial enterprise oriented services. The project had undertaken initiatives like working with BEE for creation of a shelf of energy efficient technologies for 25 clusters, implementing energy efficient technologies and financing eligible proposals for energy efficient measures.

To enable SMEs overcome the challenges in Section C, above, and enhance their access to new technologies for increasing their competitiveness in the international market, it is imperative to give the sector a conducive environment, which includes (i) formulation of appropriate national policies and programmes, (ii) building up technological capacity, (iii) access to finance and (iii) develop inter-firm linkages.

As described in BB4, PMR grant is sought to design and pilot MBM in a selected sector with an objective to:

- 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

³⁶ <https://www.sidbi.in>

Given the objectives, based on the significant potential and similarities with designated consumers under the existing PAT scheme (though varied vastly in terms of energy consumption levels, capacity and energy saving potential), a potential MBM can be designed for the MSME sector. As detailed above the sectors faces number of unique challenges and hence require needs different approach and design of any market based instrument to make low carbon transition possible. The possible MBM candidate under the PMR grant will hence have to look into elements such as:

- (i) **Formulation of appropriate policies:** Considering the various challenges in implementation of the PAT scheme in the SME sector, appropriate policy formulation to drive low carbon transitions has been under consideration since long. The low carbon committee report³⁷ suggests a carbon tax could be one of the policy options to reduce emissions from the sector. The report further suggests that such tax could be introduced gradually by having fuel prices that reflect opportunity costs including the cost of CO₂ initially priced at a modest level. At the same time, there may not be stakeholder buy-in for a tax which may be perceived as additional burden. Therefore, it is important that the MBM catalyses policy environment where these challenges are overcome. Provision of up-front finance and technology up-gradation is therefore important.
- (ii) **Developing inter-firm linkages:** With SMEs varying widely in size, capabilities, environment (urban or rural-based) and organizational structures, coherent nation-wide approaches to address their problems have been difficult to craft. Networking offers an important route for individual SMEs to address their problems as well as to improve their competitive position. According to planning commission³⁸, evidence from developing and developed countries show that networking is more likely when enterprises operate in proximity and share business interests such as markets for products, infrastructure needs or challenging external competition. Within such groups or clusters, enterprises' joint initiatives are stronger, because of the critical mass of interested parties, more cost-effective due to shared fixed costs and easy coordination with proximity fostering mutual knowledge and trust. Thus, a cluster approach will be well suited.
- (iii) **Establishing baselines:** Due to nature of business and constraints explained above, Indian SME sector suffers from availability of a reliable data on their current energy consumption levels. In order to understand the actual energy saving and greenhouse emission reduction potential and then prepare a strategy for the sector including optimum policy design for supporting energy saving measures in the sector, it is essential that baseline will be developed. Development of a MBM for the sector will facilitate development of such baselines and supports assessing different options for design of an appropriate instrument.
- (iv) **Simplified MRV:** There is lack of data and information in the sector in general. It is therefore important that the new MBM start with a simplified MRV framework and provide incentives to enterprises to report their data. As a first step simple walk-through energy audits can be done to verify the data. These audits should not be looked as monitoring audits but should be intended to build capacities of the staff of the enterprises.

³⁷ http://planningcommission.nic.in/reports/genrep/rep_carbon2005.pdf

³⁸ http://planningcommission.nic.in/reports/genrep/rep_carbon2005.pdf

Based on the above and to support the sector addressing issues, a possible policy design option could be to design Energy Efficiency Package for the SME sector consisting of a levy to be collected from the industry³⁹ to set-up a Partial Risk Guarantee Fund (PRGF) for transforming the SME sectors and introducing PAT like scheme to incentivise enterprises for monitoring their energy consumption and to implement energy saving measures. This could be managed by SIDBI, which has some experience of similar nature. Such fund could be established by government's seed capital and supplemented by international funding. This fund could be utilised by Energy Service Companies (ESCOs) like EESL to adopt select clusters, prepare detailed plans for improving energy efficiency and technology up-gradation and implement these activities so as to achieve the results. To reduce the transaction cost and time, it is envisaged that one cluster could be looked as one unit. For such a simplified approach it is required that detailed analysis is done as part of the PMR activities while designing the possible MBM in this sector.

Such activities will include:

- 1) Building on existing work under the BEE SME program⁴⁰ identify clusters and sub-sectors to achieve significant emission reductions in this sector. This could be through measurable benefits like energy efficiency, technology up-gradation, fuel switch amongst other. Each participant cluster could have a plan in this regard depending upon the energy consumption and technology use pattern.
- 2) Building on existing policy framework, development of a comprehensive national strategy with the purpose of assisting the Government of India to facilitate the development of targeted policies and measures. This will include elements of the MBM in the sector envisaged at a cluster level rather than project based mechanism. This will give flexibility to clusters to develop their own energy efficiency plans.
- 3) Elaborating design options for introduction of new MBM at the sectoral level with detailed list of tasks, institutional procedures including public-private partnerships, allocation of responsibilities and efforts. Here, it is important to mention that while there are challenges to measure GHG emissions accurately, there are variety of other co-benefits that could be measured and at the same time indicate direction GHG reduction as an impact. The design options should include broad checklists of such co-benefits and how these can be measured. This will ensure that there is sustainable result based funding to foster transformational change towards a low carbon development.
- 4) While simplifying the mechanism should reduce the transaction cost and time it should not at the cost of environmental integrity. Therefore the design options should elaborate on environmental and social safeguards along with avoidance of double counting
- 5) An MBM design detailing out the above and related to (1) baseline establishment; (2) regulatory and institutional arrangements; (3) capacity building; (4) MRV (5) timelines. This should include the detailed plan to Pilot the MBM.

³⁹ May be as part of CSR, but decided in a participatory manner, involving the private sector

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[https://beeindia.gov.in/sites/default/files/Final%20Report%20on%20situation%20analysis%20submitted%20to%20BEE%20\(without%20annexures\).compressed.pdf](https://beeindia.gov.in/sites/default/files/Final%20Report%20on%20situation%20analysis%20submitted%20to%20BEE%20(without%20annexures).compressed.pdf)