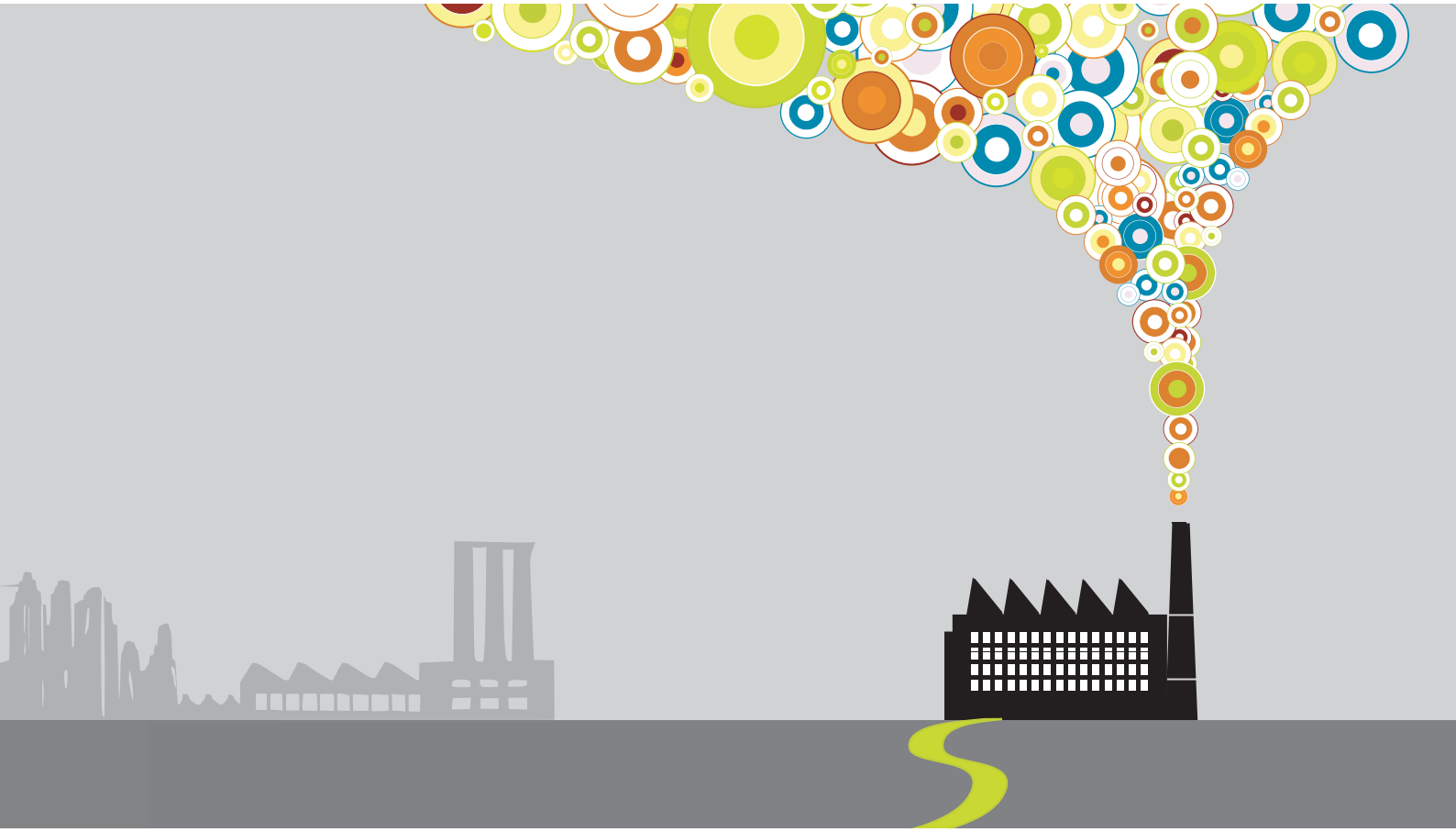

Carbon Market Roadmap for India

Looking back on CDM and looking ahead

german cooperation
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Ministry of Environment and Forests
GOVERNMENT OF INDIA

Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety

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Foreword

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Shri Susheel Kumar

The Clean Development Mechanism (CDM) has been a flagship programme addressing climate change mitigation and simultaneously giving an opportunity to developing countries in meeting their sustainable development objective. CDM thrived and grew to proportions unparalleled in the last decade registering more than 7,000 projects at UNFCCC from all over the world. India clearly played an important role in the international carbon market. The CDM has played a significant role in supporting Greenhouse Gas (GHG) emission reduction projects in India. The National CDM Authority (NCDMA) was established in December 2003 and accorded Host Country Approval to 2,786 projects, until 31 December 2012, out of which more than 1,200 registered projects under UNFCCC. India has contributed about 13 % of the total issued CERs from over 450 projects that have seen issuances. The registered projects represent an investment of over INR 1.6 trillion and have generated over 170 million Certified Emission Reductions (CERs) that can be used by developed countries to meet their compliance requirements under the Kyoto commitments. The proactive approach of the Ministry of Environment and Forests combined with high level activity exhibited by the Indian industry and private sector, has positioned the country as a world second largest suppliers of CERs and the number of registered project under UNFCCC.

The future of a carbon market post-2012 has become the center stage of discussions, debates and negotiations across the world with the end of the first commitment period of Kyoto Protocol (KP) in December 2012. CDM is going through difficult times as the CER prices have dwindled. CERs lost 98 percent of their value from over 20 Euros in the past five years after most nations refused to take on fresh legal targets to cut greenhouse gas emissions under Kyoto II. This move hit demand and left the market massively oversupplied with credits. With the decade long experience and also the increasing criticism that CDM is garnered, it is important to closely analyze how CDM in India contributed to sustainable development and how we can learn from the CDM for possible future initiatives.

I have great pleasure in introducing the report on "**Carbon Market Roadmap for India – Looking back on CDM and Looking Ahead**" prepared by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH on the request by this Ministry. The aim of the study is to assess the contribution of CDM projects implemented during the period from 2000 till 2012 to the development of the Indian economy and society. The study provides in-depth analysis of Carbon Markets and CDM, sustainable development benefits achieved so far by Indian CDM projects and barriers encountered during project implementation. The recommendations focus on harnessing demand for Indian projects post-2012, achieving better sustainable development for CDM projects, developing synergies between CDM, NAMAs and other market mechanisms and encouraging larger participation of industry in carbon markets.

Shri Susheel Kumar,
Additional Secretary (Env & Forests)
Government of India

LIST OF

Abbreviations

BEE	Bureau of Energy Efficiency
BUR	Biennial Annual Report
CDM	Clean Development Mechanism
CDM EB	CDM Executive Board
CDP	Carbon Disclosure Project
CER	Certified Emission Reduction
CERC	Central Electricity Regulatory Commission
CFL	Compact Fluorescent Lamp
COP	Conference of the Parties
CO_2e	CO_2 equivalent
CSR	Corporate Social Responsibility
DC	Designated Consumers
DFC	Dedicated Freight Corridors
DGCA	Directorate General of Civil Aviation
DNA	Designated National Authority
DOE	Designated Operational Entity
DPE	Department of Public Enterprises
DSM	Demand Side Management
EB	Executive Board
ECBC	Energy Conservation Building Code
EE	Energy Efficiency
ERPA	Emission Reductions Purchase Agreement
ERU	Emission Reduction Units
EUA	EU Emission Allowance
FIT	Feed-in tariff

FVA	Framework for Various Approaches
GCF	Green Climate Fund
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GOI	Government of India
GRI	Global Reporting Initiative
HCA	Host Country Approval
HFC	Hydro Fluoro Carbon
IGES	Institute for Global Environmental Strategies
JCM/ BOCM	Japan's Joint Crediting Mechanism / Bilateral Offset Credit Mechanism
KP	Kyoto Protocol
LDC	Least Developed Country
LULUCF	Land Use, Land-Use Change and Forestry
METI	Ministry of Economy and Trade (Japan)
MOE	Ministry of Environment (Japan)
MOEF	Ministry of Environment and Forests (India)
MOP	Meeting of Parties
MRV	Measurement Reporting and Verification
MW	Mega Watt
MWh	Mega Watt hour
N_2O	Nitrous oxide
NABARD	National Bank for Agriculture and Rural Development
NAMA	Nationally Appropriate Mitigation Action
NGO	Non Governmental Organization
NMEEE	National Mission for Enhanced Energy Efficiency
NMM	New Market Mechanism
NMSH	National Mission on Sustainable Habitat
NUTP	National Urban Transport Policy
NZ ETS	New Zealand's Emission Trading Scheme
PAT	Perform Achieve and Trade
PCN	Project Concept Note
PDD	Project Design Document
PIN	Project Information Note
PMR	Partnership for Market Readiness
PP	Project Proponent
PV	Photo Voltaic
RE	Renewable Energy
REC	Renewable Energy Certificate
REDD+	Reducing Emissions from Deforestation and forest Degradation
RPO	Renewable Purchase Obligation
SAPCC	State Action Plan on Climate Change
SBSTA	Subsidiary Body for Scientific and Technological Advice
SD	Sustainable Development

SEBI	Securities and Exchange Board of India
SEC	Specific Energy Consumption
SERC	State Electricity Regulatory Commission
SME	Small and Medium Enterprises
SUZ	Special Underdeveloped Zone
UNFCCC	United Nations Framework Convention on Climate Change
USD	US Dollar
WRI	World Resources Institute

DEFINITIONS OF

Project-types

Project-type	Definition
Afforestation and reforestation	According to land use, land-use change and forestry rules
Methane avoidance	Biogas from manure, waste water, industrial solid waste and palm oil solid waste, or methane avoidance by composting or aerobic treatment
Biomass energy	New plant using biomass or existing ones changing from fossil fuels to biomass; also bio-fuels
Cement	Projects where lime in the cement is replaced by other materials, or neutralization with lime is avoided
Energy distribution	Reduction in losses in transmission/distribution of electricity/district heat; country interconnection
Energy efficiency (EE) households	Energy efficiency improvements in domestic houses and appliances
EE industry	End-use energy efficiency improvements in industry
EE own generation	Waste heat or waste gas used for electricity production in industry
EE service	Energy efficiency improvements in buildings and appliances in public & private service
EE supply side	More efficient power plants producing electricity and district heat, coal field fire extinguishing
Fossil fuel switch	Switch from one fossil fuel to another fossil fuel (including new natural gas power plants)
Fugitive	Recovery instead of flaring of CH_4 from oil wells, gas pipeline leaks, charcoal production and fires in coal piles
HFCs	HFC-23 destruction

Hydro	New hydro power plants
Landfill gas	Collection of landfill gas, composting of municipal solid waste, or incinerating of the waste instead of land filling
N_2O	Reduction of N_2O from production of nitric acid, adipic acid and caprolactam
PFCs and SF_6	Reduction of emissions of PFCs and SF_6
Solar	Solar photovoltaic, solar water heating and solar cooking
Transport	More efficient transport
Wind	New wind power plants

Executive Summary

The Clean Development Mechanism (CDM) under the Kyoto Protocol has played a significant role in supporting Greenhouse Gas (GHG) emission reduction projects in India. The CDM and other market mechanisms have supported development and implementation of about 3,000 projects from India till December 2012, out of which about 40% have been registered with UNFCCC. These registered projects represent an investment of over INR 1.6 trillion and have generated over 170 million Certified Emission Reductions (CERs) that can be used by developed countries to meet their compliance requirements under the Kyoto Protocol. With this, India has taken second spot in the world, behind China but significantly ahead of Brazil, Mexico and South Korea. Renewable energy projects have dominated in terms of number of registered CDM projects whereas industrial gas projects have consistently supplied the lion's share of CERs.

During the period 2003 and 2007, forward contracts for sale of CERs dominated, with comparatively low volumes and an absence of transparent price discovery mechanism. Nevertheless, prices increased from € 4 (in 2005) to € 23 (in 2008). A steep correction followed in early 2009 due to the economic crisis in the EU. With the development of an increasingly robust secondary market, the CER prices stabilized in a range of € 10 – 15 from 2009 to late 2011. Since late 2011, the unwillingness of governments to take up stringent emission commitments for the time after 2012, the increasing limitation of CER imports by the EU and other countries and a substantial increase in CER issuance led to a price crash to less than € 0.50. Ironically, the increase in CER supply is partially due to a successful response of UNFCCC institutions to the criticism that they process CDM project proposals in a slow and inefficient manner - since 2010 processing times have reduced significantly while rule application has become more consistent. The present supply overhang is likely to continue in the future unless consensus on a new binding agreement under the UNFCCC triggers significant new demand.

At present, an international "CDM fatigue" is evident, caused by low market price and a general feeling among many stakeholders that CDM has not significantly contributed to sustainable development, often rewards "business as usual" and is unable to lead to transformation of entire sectors towards de-carbonization due to its project-by-project nature. In line with these

thoughts, the international negotiations on carbon market mechanisms have begun to focus on New Market Mechanisms (NMMs) that should cover entire sectors and generate global net emission reductions instead of being a pure offset mechanism.

If India and other key CDM players like China and Brazil want to prevent the demise of the CDM, they need to address the criticisms regarding contribution to sustainable development, additionality and low-carbon transformation in a proactive manner. This will also prepare Indian entities to actively participate in the development and implementation of NMMs. Here, the 12th five year plan (2012-17) which builds on the principle that every investment should not only add to economic growth but also to sustainable development could be an important starting point. The experience gained through strong participation in the CDM should be harnessed to design the new mechanisms in a way that maximizes opportunities for India.

In this context, it becomes important to understand the sustainable development benefits achieved by the registered CDM projects in India, differentiated into social, environmental, economic and technological dimensions. A methodology for assessing the contribution to sustainable development has been developed to define indicators covering economic, environmental, social and technological dimensions. A statistically significant sample of registered CDM projects has been selected to assess the contribution across the various dimensions. A mix of primary and secondary research has been carried out to obtain information on projects' contribution to sustainable development. The barriers to implementation of CDM projects have been analysed through discussions with key stakeholders and review of secondary information on shortcomings in the registration, issuance and transaction process of registered CDM projects. Project-types have been prioritized based on their contribution to sustainable development and emission reduction potential in 2020 so that targeted effort is made to harness these project-types – whether under a revived CDM market or under future carbon market mechanisms. The key recommendations have been synthesized into a carbon market roadmap for India.

Sustainable Development (SD) Benefits

The review revealed that the sample CDM projectshavecontributed to sustainable development andsupportedcommunities and states in India. There is a clear pattern when project-types in the sample are categorized on the breadth of sustainable development benefits across the dimensions (economic, environment, social and technological). Some project-types demonstrate benefits across all dimensions while others are more narrowly focused. Project-types that are observed to have a broad-based contribution to sustainable development are reforestation, EE household, landfill gas and transport, all categories with a small share in the Indian CDM project portfolio. The widespread renewable energy projects, which play a key role in Indian CDM have medium sustainable development benefits. The industrial and commercial energy efficiency as well as methane avoidance projects are observed to have more narrow sustainable development benefits.

In a significant number of sample CDM projects, it was observed that the PDD contained limited information on contribution to sustainable development including the initiatives undertaken by the project proponents. The sustainable development benefits and the number of local community initiatives undertaken by project proponents have been consistently higher than those reported in the PDD in the sample CDM projects.

While only a limited number of projects in the sample (19) provided data on the revenues from CER sales and the amount spent on local community initiatives, all the large-scale projects that provided the information had exceeded the minimum threshold of 2% of CER revenues that is

stipulated by the NCDMA. 18 of these 19 projects reported that their interventions were spread over at least 2-3 areas like health, education, livelihood, women's empowerment, community empowerment etc. 16 projects reported interventions in the area of livelihood generation and 15 projects reported health and education related interventions. 13 projects reported interventions in women's empowerment and community empowerment. It is evident from the above that most projects spread their sustainable development interventions over at least 2-3 themes. This could be directly related to the multi-dimensional needs and requirements of the communities.

Gujarat leads the Indian states in terms of investment into CDM projects. The majority of registered CDM projects from India are located in states that rank low on the Human Development Index (HDI).

Barriers: Project Development and Registration

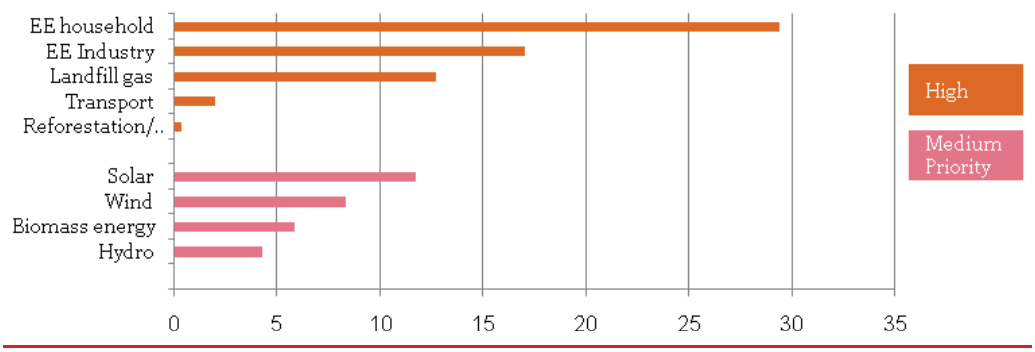
The most significant barrier to new CDM project implementation comes from the EU which has restricteduse of CERs from CDM projects registered post 31 December 2012 for compliance requirements except from projects located in Least Developed Countries (LDCs). The EU restriction on the use of CERs from all project-types that are registered after 31 December 2012 is unfair to India as there are several backward districts in India with a level of socioeconomic development similar to LDC.

A number of projects have faced significant delays and rejections on account of lack of acceptable guidelines for setting benchmark for additionality, performance benchmarks, lack of institutional capacity, etc. Several project-types including reforestation, EE household, EE in SME, off-grid renewable energy and agriculture face monitoring, reporting and verification (MRV), organizational and financial barriers and have low share in registered projects and CER issuances. Landfill gas projects have a substantial share in CDM project registrations and issuances globally but have not been successful in India as they face barriers related to high capital cost and lack of availability of segregated waste in India. HFC-23, N2O and landfill gas (where there is no energy generation) project-types risk closure post the withdrawal of market support and fall in CER prices as there is no alternative source of revenue.

Mitigation Priorities: Identification

In order to prioritize mitigation projects, consideration should be given to project-types that have high sustainable development benefits, have large emission reduction potentialand have faced significant barriers to their development even under CDM so that these can be supported through future carbon market mechanisms.On this basis, EE household, landfill gas, transport, reforestation/afforestation and EE industryshould have the highest priority and are estimated

Figure ES1
Maximum Emission reduction (million tCO_2 in 2020) potential of project-types



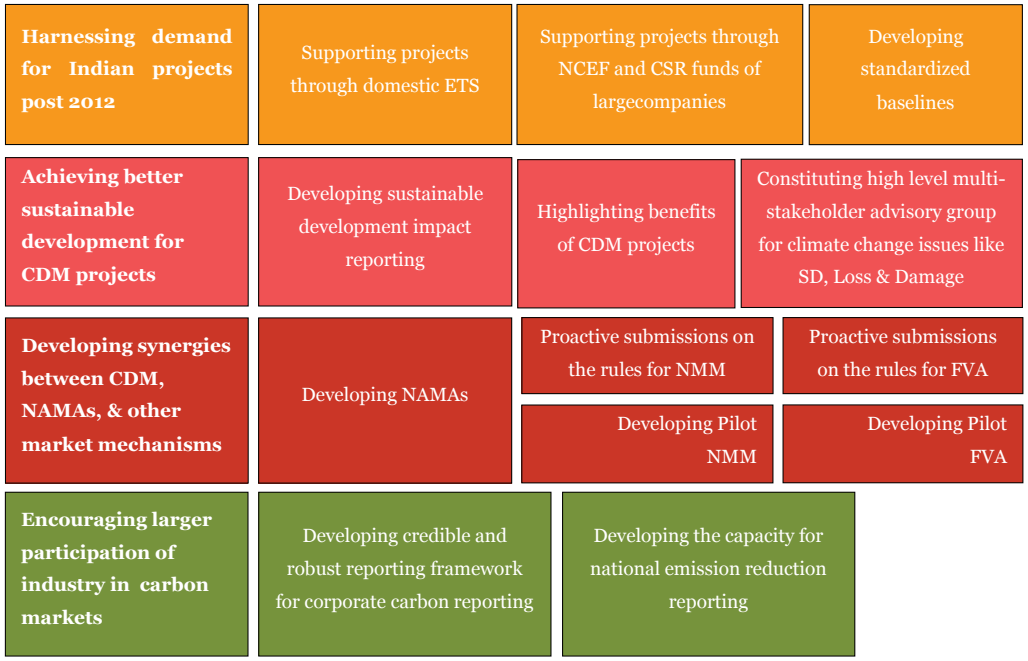
to have a maximum emission reduction potential of 61million tCO_2 in 2020. Medium priority mitigation project-types include renewable energy projects-types and are expected to have a maximum emission reduction potential of 30 million tCO_2 in 2020. The graph below shows the emission reduction potential of medium and highest priority project.

Carbon market roadmap for India

Based on the analysis conducted above in three broad areas of interventions – existing carbon markets, sustainable development outcomes from CDM projects and efficiency in development and registration of CDM projects, this report makes recommendations targeted towards:

- harnessing demand for Indian projects post 2012;
- achieving better sustainable development for CDM projects;
- developing synergies between CDM, NAMAs and other market mechanisms; and
- encouraging larger participation of industry in carbon markets

Figure ES2
Carbon Market Roadmap for India



SECTION 1

Introduction

1.1 The Kyoto Protocol and the CDM

In 1997, the governments participating in the United Nations Framework Convention on Climate Change (UNFCCC) agreed on the Kyoto Protocol. The Protocol works on the principle of common but differentiated responsibilities between developed and developing countries. 38 industrialized countries agreed to legally binding targets for their emissions of a basket of six greenhouse gases in the commitment period 2008-2012. Targets are differentiated according to countries. However, ratification and entry into force of the Protocol proved more difficult than expected. The US never ratified it while Russia waited until 2004. The Protocol thus only entered into force in 2005. The principle of differentiated responsibilities in the Kyoto Protocol permitted developing countries to continue with their economic development without being subject to greenhouse gas emission targets. The Protocol allows developing countries to voluntarily contribute to emissions mitigation through the Clean Development Mechanism (CDM). CDM allows emission reduction projects in developing countries to generate emission credits (Certified Emission Reductions, CERs) that can be sold to industrialized countries[1]. These can use the credits to comply with their Kyoto targets. Host countries of CDM projects set up Designated National Authority (DNA) to assure that proposed CDM projects contribute to sustainable development. Due to sovereignty concerns, each country is free to define the criteria for assessing contribution according to its national context.

In order to avoid an inflation of industrialized countries' greenhouse gas budgets by business-as-usual credits, an elaborate system of rules and procedures has been set up to ensure the environmental integrity of the CDM. It is headed by the CDM Executive Board and includes independent audit of project proposals as well as requests for issuance of CERs. More than 150 staff at the Secretariat of the UNFCCC administer this system.

1 Industrialized countries are designated as Annex 1 countries in the KP. In addition to CDM, the other market based mechanisms are Joint Implementation (JI) and / or International Emissions Trading (IET)

CDM was not expected to play a major role but it has grown to proportions that are unparalleled. Until the end of 2012, close to 7000 projects were registered in 87 countries. By late June 2013, 1.35 billion CERs had been issued. Since late 2011, there has been a backlash against the CDM, following high profile NGO campaigns against specific project types such as industrial gas reduction and efficient coal power plants. The initial restrictions on CERs from developing countries like India emerged with the EU Directive 2009/29/EC. CERs from CDM projects registered after 31 December 2012 are not eligible in EU ETS unless they are hosted in least developed countries (LDCs). Another restriction on the use of CERs from HFC_{23} and N_2O (from adipic acid) projects was imposed in 2011. Other markets for CERs including the New Zealand ETS have imposed similar restrictions on CERs from industrial gas projects.

The price for CERs has crashed from over € 13 in early 2011 to less than € 0.5 in 2013. The September 2012 report of the High-Level Panel on the CDM policy dialogue aptly titled "A call to action" did not result into any action at the UNFCCC conference in Doha in December 2012. Regional CDM support centres as well as loans for project developers in underrepresented regions also do not change the broader picture. A telling sign of the situation is that the CDM Executive Board's 2-year business plan not only aims to provide for simplicity and predictability in the operation of the CDM but also to ensure the integrity of CERs to "safeguard the reputation of the CDM as a mechanism for low carbon development". Due to complicated negotiations after the failure of the Copenhagen conference in 2009, only the Doha conference in 2012 managed to agree on a second commitment period of the Kyoto Protocol covering 2013 – 2020. However, only the EU and some smaller European countries have taken up emissions targets for that period.

In the present international regime, it appears that the CDM will lose its relevance for India and several other developing economies unless regulatory uncertainty, weak market conditions and sustainable development related issues are addressed hands on. Action is required to strengthen such a widely accepted market based mechanism and make it future ready for adoption as part of the global mitigation strategy.

1.2 India and the CDM: A Success Story

India has the second largest number of registered CDM projects under the Kyoto Protocol. India's CDM journey is nothing less than remarkable. It was one of the participants in some of the early market activities including strong private sector participation in the Netherlands' Certified Emission Reduction Unit Procurement Tender (CERUPT- 2001) even before the ratification of the Kyoto Protocol by India. Ever since then, international and national consultingfirms drove CDM development in India. India hosted the eighth Conference of Parties (COP8) under UNFCCC in New Delhi in 2002. The first CDM project (an HFC-23 abatement project in Gujarat) from India was registered in 2005 and by the end of 2006, India had consolidated its position in the carbon market as a leader with 30% share of the registered CDM projects. India retained its eminent position as the leading developer for CDM projects until 2008 when it was overtaken by China. With more than 1,200 registered projects with UNFCCC until 31 December 2012[2] India has contributed about 13 % of the total issued CERs from over 450 projects that have seen issuances.

India played a key role in facilitating the development of CDM projects through a proactive National CDM Authority (NCDMA).Various donor agencies were instrumental in promoting

2 This numbers will change somewhat as the last projects submitted before the end of 2012 are processed by the UNFCCC Secretariat.

CDM in India through carbon fund purchase programs, capacity building and training. For example, the German Technical Cooperation provided technical and secretarial support in efficient functioning of the NCDMA which is continuing till date. The presence of major CDM auditors, so-called Designated Operational Entity (DOEs) in India also facilitated early development of CDM projects.

By May 2013, the NCDMA had approved about 2,800 projects of which 40% are registered with UNFCCC, 25% are at the stage of validation with UNFCCC accredited Designated Operational Entities, 10% have completed validation and are now with UNFCCC for final approval / registration and 25% have either been withdrawn by the project proponents, the validation has been terminated by DOE or have been rejected by the CDM regulators at UNFCCC. The registered CDM projects and NCDMA approved projects from India represent an investment of over INR 1.6 trillion[3] and INR 5.5 trillion respectively. Figures 1 and 2[4] categorize them according to the sectoral scopes of UNFCCC and the more detailed project-types defined by UNEP-Risoe Centre[5].

The majority of registered CDM projects in India belong to the energy industries (solar, biomass, wind, hydro, fuel switch, supply side energy efficiency) which contribute about 70% of

Figure 1
Registered CDM projects in India – number of registered projects and ER potential (plotted on log scale) as per UNFCCC project-types

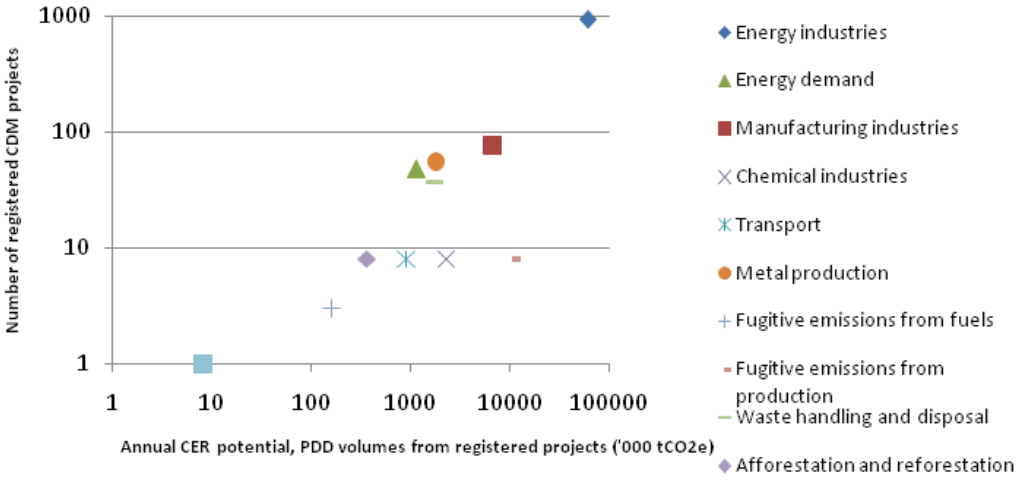
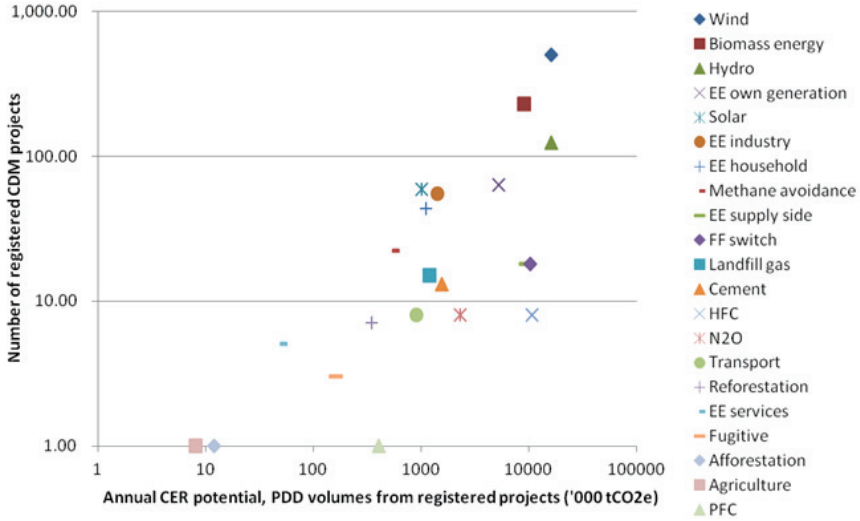


Figure 2
Registered CDM projects in India – number of registered projects and ER potential (plotted on log scale) as per UNEP Risoe project-types



3 UNEP Risoe CDM pipeline
4 Source- UNEP Risoe CDM pipeline
5 This report analyses the CDM projects by synthesizing them into project-types defined by UNEP Risoe as they offer better categorization of sustainable development impacts.

the estimated CER potential (based on annual CER estimates in the PDDs). Renewable energy projects alone contribute about 50% of the estimated CER potential. Industrial gas (HFC23 or fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride, N2O or chemical Industries, and PFC or metal production) projects have a share of 1% of registered projects, but contribute to about 15% of India's CER potential. They are thus much larger than average project size. Transport, landfill gas (waste handling and disposal), reforestation/afforestation, energy efficiency (EE) in households (energy demand) and agriculture projects only contribute to 4% of CER estimates.

A. National CDM Authority (NCDMA)

The NCDMA was established in December 2003. The host country approval (HCA) process was first introduced in January 2004 and was gradually strengthened over the years. Initially, the HCA process required submitting information in a specified format (Project Idea Note) that contained description of the project, cost, financial strength of the project proponent, project returns, sustainable development impacts, anticipated CER revenues, details of clearances, CDM methodology used, etc.The project proponents were specifically required to demonstrate that the proposed project meets the sustainable development criteria (elaborated in the next section below). The project proponents were required to make a presentation to NCDMA in a meeting that was scheduled monthly.

giz (erstwhile GTZ) has been a knowledge partner to the NCDMA since its inception. Over the years the collaboration between giz and Ministry of Environment and Forests (MoEF) has created awareness about CDM through several capacity building programs and seminars in India. The partnership has successfully created awareness amongst more than 10,000 project developers, trained more than 100 consultants andled to development of several CDM projects.

After conducting successful capacity building programs throughout the country,giz in collaboration with the Ministry of Environment and Forests (MoEF) organized international event, "Carbon Bazaar", for four years to disseminate knowledge, facilitate interaction and linkages among growing numbers of project developers for investment, technology and CER transactions. The Carbon Bazaar events created a platform for business transactions between carbon market developers, investor, buyer and sellers.

The NCDMA witnessed unprecedented growth in submission of CDM projects starting 2006-07. The HCA process was further strengthened by establishing a dedicated NCDMA website to facilitate online submission of documentation and an expanded secretariat through assistance from German Development Cooperation. The NCDMA website now hosts the list of DNA approved projects and copies of Host Country Approval (HCA) letters on their website, which is very useful for the independent auditors (UNFCCC accredited Designated Operational Entities – DOEs) while validation of projects. In a recent move, small scale project proponents are exempted from making presentation.

In 2009, the NCDMA proactively took steps to get project proponent of large scale CDM projects[6] to commit 2% of the CER revenue towards sustainable development initiatives[7]. Adequate provisions were stipulated to verify such investments by making it integral part of the

6 As defined by the UNFCCC, i.e. renewable energy projects above 15 MW capacity, energy efficiency projects with more than 60 GWh annual energy savings and other projects with annual reductions of more than 60,000 t CO_2.

7 For CDM projects implemented within the premises of an existing large installation, NCDMA does not segregates additional sustainable development on account of the CDM project but accounts for all the initiative the large installation undertakes,

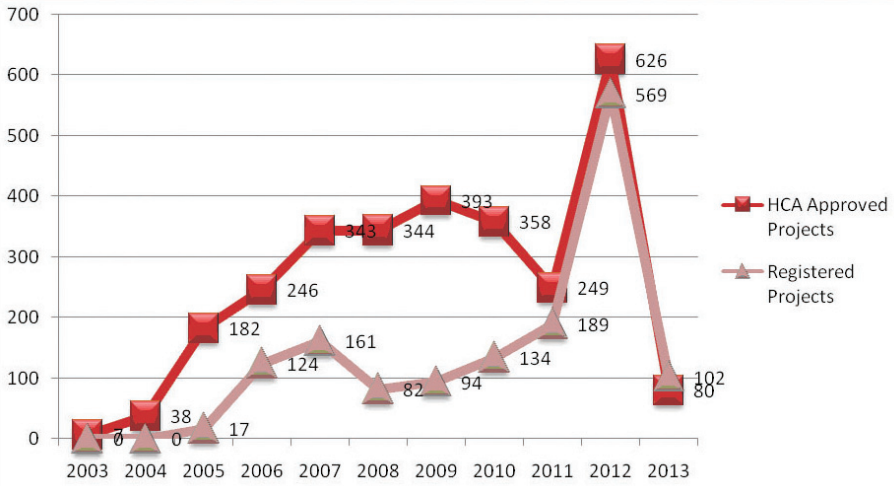
monitoring and verification of the project. It was expected that the DOE would verify the claim during verification of the project.

NCDMA formed a CDM sub-group with representation from the industry (through industry chambers), Project Proponents (PPs), consulting firms etc. for discussions on issues around the CDM registration and issuance process. NCDMA engaged with the project participants, state authorities, government owned enterprises, industry bodies for disseminating information on CDM and explaining the HCA process and documentation requirements. A number of workshops and presentations were conducted throughout the country to promote CDM.

In addition to the regular DNA approval process, the NCDMA implemented a CDM capacity buildingprogramme through the Indo-German Environment Partnership (IGEP). The primary aim is to support the public and private sector institutions to prepare and implement internationally acceptable projects under the CDM. Its objective is to foster high quality CDM projects that will successfully complete the project cycle and provide experience through 'learning by doing'. Also, as a facility it helped to reduce transaction cost in early market development process.

It is important to highlight the proactive approach of the Indian DNA in providing HCA to Indian CDM projects in the last decade spanning from 2003 to 2012-13. The Indian DNA approved 2,839 CDM projects of which 1,472 ot registered through UNFCCC (as on 31st December 2013). Ffigure 3 shows that HCA through the Indian DNA peakedin 2012. Considering the deadline of the first commitment period i.e. 31st December 2012, that year 626 project received HCA and the same year witnessed maximum registration, amounting to 38.65% (569 projects) of allUNFCCC listed projects from India. The grim post-2012 projections have proven right. In 2013, only 102 projects received HCA, and 80 got registered owing to the restriction by EU ETS to only buy credits from LDCs. This has led to a loss of private sector confidence in the mechanism. However it is important to note thatpeaking in registrstion is not as a result of HCA peaking for a given particular year for e.g. projects registered in 2012 are also those projects that have been approved by the host country in previous years.

Figure 3
Number of Indian CDM projects that received HCA and those that got registered annually from 2003 to 2013



B. Sustainable development criteria

Sustainable development criteria of the NDCMA have been defined broadly. For a project to be approved by the NCMDA, the following aspects[8] are considered:

8 http://cdmindia.gov.in/approval_process.php

- From 2005-06 the Environment Impact Assessment (EIA) reports were required to be submitted.
- Land document (lease, purchase, diversion of land approval for project use by competent authority), compensatory afforestation, rehabilitation and resettlement plans were made mandatory
- Specific approvals from Public Works Department, Department of Fisheries etc were introduced for hydro-electric projects while state nodal agency approval were sought for wind energy projects to ensure compliances
- Biomass assessment reports through empanelled consulting firms with state renewable energy agencies endorsement were required for biomass projects

C. Geographic distribution

The distribution of CDM projects across Indian states has the top 6 states accounting for more than 60% of the projects (see Table 1 below). As the majority of the CDM projects are renewable energy projects, the distribution of CDM projects largely follows the attractiveness of states in terms of policies and renewable energy potential. Some of the differentiating factors are:

- Strong policy initiatives for promotion of renewable energy in selected states, through Feed In Tariffs, favourable regulatory regime on wheeling and banking, sales tax benefits, viability of group captive schemes or third party sales, etc.
- Availability of Technology Up-gradation Fund for textile industry (present in select states) to invest in wind
- Level of industrialization / commercial activities in the state

Table 1 | Distribution of NCDMA approved projects[9]

Name of State	Number of Projects	Name of State	Number of Projects
Maharashtra	368	Haryana	36
Tamil Nadu	358	Jharkhand	32
Gujarat	353	Kerala	18
Karnataka	251	Delhi	16
Rajasthan	223	Assam	13
Andhra Pradesh	208	Sikkim	10
Uttar Pradesh	163	Bihar	8
Chhattisgarh	104	Jammu & Kashmir	6
Himachal Pradesh	91	Goa	4
Orissa	79	Meghalaya	4
West Bengal	78	Pondicherry	3
Punjab	74	Arunachal Pradesh	1
Madhya Pradesh	70	Tripura	1
Uttaranchal	49	Multi State (Project boundary spanning more than 1 state)	183

9 Source- www.cdmindia.gov.in

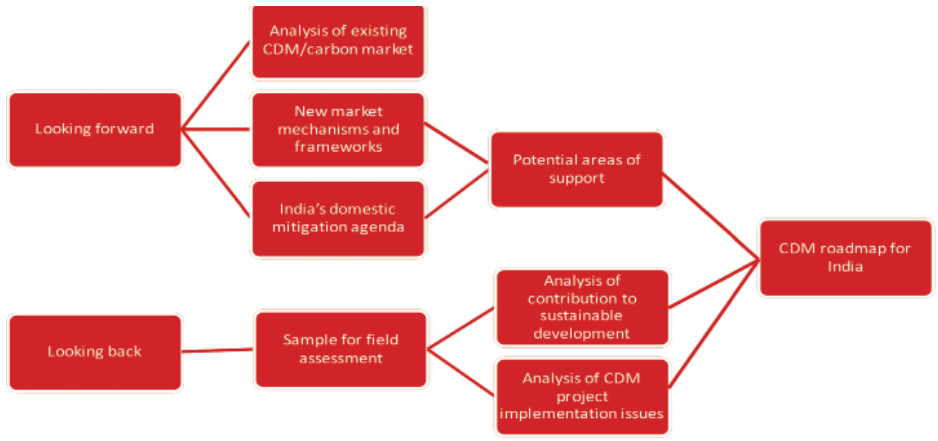
It is evident from the above analysis that India has seen tremendous growth in CDM but this growth will be difficult to sustain in the future as the mechanism is imperilled. It is therefore important to look back at the key learning from CDM and look ahead at the future mechanisms being proposed. This study has thus two objectives – looking back at CDM and looking forward to the future carbon market mechanisms/frameworks.

The subsequent sections detail the approach for this study. The approach for assessing the sustainable development impacts have been further detailed, given the complexity of the assessment, its importance to the CDM agenda and providing a basis for further research.

1.3 Approach and methodology

This study analyzes the existing market covering demand-supply of CER, price expectations and opportunities and threats to CDM. It examines the proposed carbon market mechanisms and frameworks and the stage of development with a view to identify initiatives for India. In order to examine the relevance of the proposed carbon market mechanisms and frameworks, an assessment has been done on the requirements arising from the domestic mitigation agenda of India. A sector wise assessment has been adapted from the studies carried out by an expert group under the Planning Commission and the National Action Plan on Climate Change and the respective National Mission documents. Further analysis has been done to understand the types of proposed mechanisms and frameworks that can support the domestic mitigation agenda. Figure provides the overall framework for analysis.

Figure 4
Overall approach



The need to look back at CDM has the objective of identifying measures to strengthen the contribution to sustainable development and address CDM implementation issues. A literature review of earlier attempts at determining the sustainable development benefits of CDM projects showed that several studies were based on the claims made by project proponents in their project design documents (PDDs) with limited field level assessment. This study which is based on extensive primary survey and secondary research thus includes field assessments of the contribution to sustainable development.

Primary information has been collected through discussions with local stakeholders to understand the sustainable developments benefits of CDM projects in a statistically significant sample (10% of registered projects across different project-types). A detailed questionnaire (see Appendix 5- Questionnaire) was developed and sent to the project proponents seeking informa-

tion on various aspects of project implementation, operation, barriers in implementation and registration with UNFCCC. The filled questionnaires / responses of the project proponents were analyzed along with the information contained in the PDDs. This was supplemented with Focus Group Discussions in selected cases (where large community involvement was expected such as CFL distribution projects, biomass projects etc) to capture the sustainable development initiatives undertaken.

The technological, financial, organizational and CDM process (host country approval, registration, issuance) related barriers to CDM project implementation have been analyzed through discussions with the project proponents. Issues specific to particular project type, project proponent type and geography have been examined. The analysis also relied on publicly available literature, analysis and discussions of third parties with a range of stakeholders including project proponents, DOEs, buyers and traders of CERs, financial institutions and CDM consultants.

Based on the conclusion of the analysis of carbon markets, contribution to sustainable development and CDM implementation, a roadmap for carbon market for India has been developed considering the stage of development of carbon market mechanisms and frameworks and the characteristics of the project-type. Priorities for action have been recommended and the institutional changes required to implement the recommendations have been identified.

The results of the study are intended to establish a base for policy dialogue that can help in formulation of India's strategy to promote emission reduction projects in the second commitment period of the Kyoto Protocol that support sustainable development in accordance with national priorities.

A. Research methodology for sustainable development benefits

The methodology for analyzing the sustainable development benefitsof CDM projects has been summarized in the flowchart in Figure 4below.

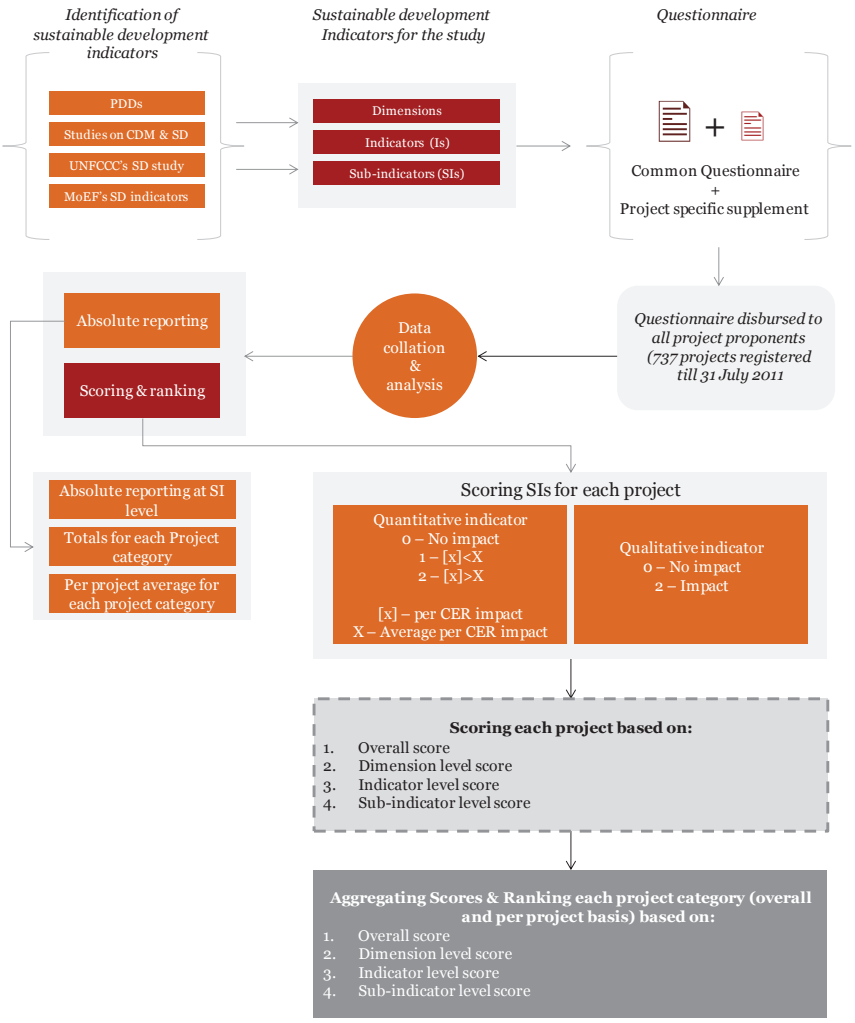
Establishing sustainable development indicators

UNFCCC's annual publication titled "Benefits of Clean Development Mechanism" evaluates CDM projects on social, economic and environmental dimensions using a set of sustainable development indicators. This study has used the same set of indicators to evaluate projects based information provided by the project proponents, information collected through site visits and information collected in the PDDs. Table 2 lists the dimensions and the associated indicators; for the detailed list see Appendix 3- List of dimensions, indicators and sub-indicators.

Table 2 | List of sustainable development indicators

Dimension	Indicator
Economic	Direct/indirect financial benefit for the local and/or regional economy
	Local/regional jobs generated directly/indirectly
	Investment in the local/regional infrastructure
Environment	Efficient utilization of natural (for purposes other than energy) resources
	Reduction in noise, odour, dust or pollutants
	Improvement and/ or protection of natural resources
	Available utilities (supplying more or making use of less energy)
	Promotion of renewable energy
Social	Labour conditions and/or human rights
	Promotion of education
	Health and Safety
	Poverty alleviation
	Engagement of local population
	Empowerment of women, care of children & frail
Technological	Adoption of new local/imported technology

Figure 5 Methodology for analyzing the sustainable development benefits



Establishing methodology to quantify the impacts

The analysis of PDDs revealed that projects reported sustainable development benefits that could be attributed to the inherent characteristics or nature of the project or to additionalactivities (voluntary and mandatory) undertaken by the project proponent for development of local communities. For the purpose of this study, these two types of benefits have been differentiated as:

- **Intrinsic Benefits:** The sustainable development benefits from projects that could be attributed to the inherent characteristics or nature of the project activity.
- **Secondary Benefits:** The sustainable development benefitsthat could be attributed to additional community development activities undertaken by the project proponent in the vicinity of the project.

These benefits have been analyzed separately as the scale and intensity of impacts is likely to differ significantly. A few illustrations of intrinsic and secondary benefits are discussed in Table 3 below.

Table 3 | Classification of benefits[10]

Type of project	Intrinsic benefits	Secondary benefits
Wind energy project	Promotion of renewable energy (Environment) Making more energy available for the country (Economic) Creation of jobs for the project activity (Economic) Building roads for access to the project activity (Economic)	Building of hospitals or schools for communities (Economic and Social) Conducting health camp in local areas (Social) Supporting community skill building activities (Economic) Planting trees in nearby areas (Environment)
Efficient cook stoves project	Health benefits due to reduction of smoke (Social) Reduced drudgery on women as they need not walk to far away areas for fuel wood (Social)	Supporting education for women (Social) Building schools or hospitals for the local community (Economic and Social) Conducting community health check-ups over and above the project (Social)

This study has considered only local level benefits in social, economic, environmental and technological dimensions and any upstream / downstream benefits have not been considered. A mix of qualitative and quantitative sub-indicators has been used for analysis. A project is scored on the qualitative sub-indicators based on the presence (or absence) of a stated sustainable development benefit corresponding to the sub-indicator. Measurement of the magnitude or extent of the benefitfor the qualitative indicators is outside the scope of this study. The detailed methodology for assigning scores to projects is provided in Appendix 4- Detailed methodology.

Research process

A significant number of registered CDM projects in India achieve commercial operation by the time they are registered. A cut-off period of one year prior to the start of study was therefore determined to be sufficient for most projects participating in the study to achieve commercial operations. A cut-off date of 31 July 2011 was decided and all the registered CDM projects up to

10 Dimensions are mentioned within brackets

the cut-off date, totalling 737 projects[11], were shortlisted and questionnaires were sent through emails in September 2012.

The project proponents had the option to fill and submit their responses in an online form or fill their responses in a word file and return by email. For some projects, questionnaires were also sent by post and they had the option to revert with their responses via post or send the scanned copies via email. Follow-ups through telephone were carried out and email reminders were also sent to increase the response rate. Nevertheless, the response rate only reached 20%, i.e. 155 responses.

A stratified random sample of 76 projects was selected for site visits to review the internal processes used to capture the data provided in the questionnaire and capture additional information. The stratification took into account the project-type and geography. However, there was significant reluctance on the part of project proponents for site visits and only 62 site visits could be undertaken..A combination of one-on-one interviews and focus group discussions (FGD) was used for collecting inputs from the local communities. Inputs from PDDs and filled questionnaires were used to develop a set of questions and topics to be discussed during the FGD. For each project selected for conducting an FGD, inputs from PDD and filled questionnaires were used to identify relevant stakeholder groups like local NGOs, village panchayats[12], local village residents, local industry bodies etc. prior to the site visit and participation from these identified stakeholder groups was solicited for each FGD. The FGD primarily involved discussing sustainable development activities. The minutes for all the FGDs were recorded and the questionnaire responses were updated (if required) based on the inputs from site visit.

There are a number of reasons for the low participation in the survey. Many project proponents believed that this survey is not formally mandated through NCDMA. If there had been a formal mandate from NCDMA for project proponents to provide information, the participation may have been more robust. While NCDMA played a facilitative role, this was insufficient to convince project proponents to provide information for the survey, particularly given the timing when CDM is at an all time low. A significant number of project proponents were not interested in the survey because of the crash in the CER prices, delay/postponement of CER issuances and a general disillusionment with CDM process.Some of the projects were commissioned as early as 2001-02 and the project proponents conveyed that it will require substantial effort on their part to search for old records whilefew projects have been abandoned.

Summary statistics of the sample and the response rate to questionnaire, site visit and focus group discussions is set out in below:

Table 4 | Summary statistics of the sample and response rate

Project-type	Questionnaire based survey			Site visits		
	No. of projects contacted	No. of projects responded	No. of site visits planned	No. of site visits carried out	No. of projects covered from the original selection	Site visits where FGD held
Afforestation	1	1	1	1	1	1
Biomass Energy	192	27	15	10	5	7
Cement	13	0	2	0	0	0

11 The number of registered projects accessed in July 2012.
12 These are locally elected governing councils of the village

Project-type	Questionnaire based survey			Site visits		
	No. of projects contacted	No. of projects responded	No. of site visits planned	No. of site visits carried out	No. of projects covered from the original selection	Site visits where FGD held
EE household	18	5	5	4	3	2
EE Industry	51	13	5	6	2	3
EE own generation	59	8	5	5	4	0
EE service	2	1	1	1	1	0
EE supply side	15	5	2	3	2	2
Fossil fuel switch	11	3	1	2	0	2
Fugitive	3	2	1	0	0	0
HFCs	8	1	3	0	0	0
Hydro	83	15	9	6	4	6
Landfill gas	13	2	4	1	1	1
Methane avoidance	15	4	2	3	0	0
N2O	5	3	2	2	1	0
PFCs and SF_6	1	1	1	1	1	0
Reforestation	5	2	2	1	1	1
Solar	6	2	2	1	1	1
Transport	3	1	1	1	1	0
Wind	233	59	12	14	4	7
Total	737	155	76	62	31	33

None of the large scale HFC-23 and cement projects submitted responses to the questionnaire. The HFC project-type referred in the analysis refers to only the small scale projects. Agriculture projects have not been covered in the analysis as there were no registered CDM projects from this project-type in the 737 projects registered till 31 July 2011.

1.4 Study Limitations

The new carbon market mechanisms and frameworks are at a nascent stage of development. The analysis and recommendations related to the new market mechanisms and frameworks should be interpreted keeping in view the significant uncertainty of the international willingness to engage in climate change mitigation and to use efficient approaches like carbon markets.

The emission reduction activities have certain inherent characteristics based on the project-type and technologies (and sometimes where they are located) and this should be kept in mind when interpreting the results of the contribution to sustainable development under intrinsic economic, environmental, social and technological benefits by a project-type. This is different for secondary economic, environmental or social benefits of local community investment activities which are independent of project-type and technologies. Also, it is often not possible to segregate the incremental contribution of CDM to community activities when these are supported by corporate social responsibility programs, government rehabilitation and resettlement programs, joint initiatives, etc. The issue of allocating contribution to sustainable development benefit to a project, program or at times an organization is difficult.

Sustainable development can have various interpretations which can be subjective in many cases. Similarly investments in different conditions may give different outcomes, including the benefits received by communities. The analysis and interpretation of sustainable development indicators (assumed in this study) is influenced by local context and practices, by public perception and the manner in which the issues are presented. The indicators are not easy to aggregate as there is a mix of quantitative and qualitative information.

The methodology for the assessment of sustainable development has given equal weight-age to all the sub-indicators, i.e. only considering if the local community benefited or not. For example, the benefit of a project proponent's effort to protect the biodiversity in the local area is considered to be equal to a project proponent's efforts to improve accessibility of educational resources or donating resources for local education. Further, this study does not quantify the magnitude or extent of sustainable development benefits. For example, a project proponent's effort to impart skill enhancement training is given the same score as a project proponent's initiative to distribute free textbooks to students. Also, a project gets similar score whether the project proponent distributed 100 text books or 1000 text books. The reasonsfor adopting this approach arelack of sufficient data, lack of common reportingframework (adopted by project proponents) to compare diverse initiatives and lack of an accounting framework to value the sustainable development benefits across the various project types and initiatives.

The sample characteristics relating to sustainable development benefits should be seen in the light of limited participation from the project proponents in the study, particularly for project-types that only had few responses (Afforestation, EE service, HFC, Solar, PFC and SF_6, Reforestation and Transport). While this study does not draw any conclusions about the overall impact of CDM in India based on the sample of projects covered, it is possible that the projects that had carried out specific activities (mandatory or voluntary) are more likely to respond as compared to those that have not undertaken any secondary activity. Whenever the sample characteristics have been present, a conservative approach has been adoptedto aggregate the data in the sample. .

One major hurdle was gathering responses from project proponents/CDM project participants on sustainable development activities and impactsas a result of CDM project implementation. Project participants were reluctant in forthcoming with their replies and the response rate was about 21%, even after following up via telephone and email. Upon followup be telephone, many project proponents mentioned the grim carbon market situation as a reason for not responding. Hence it is possible that the responses received are from those project proponents who are content to report about the sustainable development impacts resulting from CDM project implementation.

Finally, this study has not carried out any audit or verification of information, in particular, financial information, information on amount spent on community initiatives, or information on sale of emission reductions. Only information provided voluntarily by the project proponent was utilized, which may affect the conclusions of the study.

SECTION 2

Global carbon markets

At present, CDM is facing one of most severe crisis since it was set up a decade ago. A flagging demand with ad hoc restrictions from the buyer side coupled with a continuously increasing supply has lead to a significant decline in CER prices. With the present price of CERs around € 0.5 with no signs of revival, India will have to consider alternative ways to ensure that mitigation initiatives sustain and further investment is made in these kinds of opportunities. One of the approaches could be bilateral arrangements with industrialized countries like the Japanese "Joint Crediting Mechanism".Such an arrangement can play an important rolein supporting GHG mitigation projects from India.

There is a general unwillingness of governments to engage in mitigation activities sufficient to reach the ultimate objective of the UNFCCC, i.e. the prevention of dangerous anthropogenic climate change. While industrialized countries refrain from taking on legally binding emission commitments or making the existing commitments more stringent, developing countries do not want to commit to emission commitments due to the principle of "common but differentiated responsibilities". The resulting stalemate has deeply and negatively impacted the carbon markets; its resurrection depends on the potential 2015 agreement with generally increased mitigation ambition.

The Doha climate summit was no landmark event, but governments adopted an extension of the Kyoto Protocol, set milestones in the lead up to a 2015 agreement. The most significant outcome from Doha was the adoption of the second commitment period of the Kyoto Protocol. Europe and a handful of others, amounting to less than 15% of global emissions, effectively put their existing national targets under the Kyoto framework. In doing so, they maintain the institutions and mechanisms established by the Protocol through to the end of 2020. However, only those developed countries which have taken on KP_2 targets are eligible to use credits from Clean Development Mechanism (CDM) projects after 2012.

Against this dim background, this chapter assesses the growth and development of the present carbon market (from the time of Kyoto Protocol came into force until the end of the first commitment period in December 2012) and discusses future prospects until 2020. This chapter also assesses the possible market potential of GHG emission reduction projects from India.

2.1 Present state of affairs

The success of CDM as flexible market mechanism has been unprecedented as compared to JI which only became relevant in late 2012. This was the case despite the CDM rules being comparatively more stringent than those for JI. The CDM rules, seen as complicated by many stakeholders, have survived in their key elements. Multiple checks have been introducedto ensure the environmental integrity of emissions credits. The CDM requires assessment of additionality i.e. that the project would not have happened in the absence of the revenue stream through sale of CERs. Validation of project documentation and verification of emission reductions is done by UNFCCC accredited DOEs. The CDM has been very dynamic, with rules, especially baseline and monitoring methodologies being frequently revised. Achieving registration took around a year during the early days of CDM (2004-05) and increased to 2 years by 2008-09. However, a concerted effort by the UNFCCC Secretariat including a substantial streamlining of procedures brought the time to less than one year in 2012. Some of the reasons for the time taken for registration reported by various stakeholders (project proponents, members of CDM subgroup and DOEs) are:

- Lack of subject matter experts with DOEs
- Quality of documentation and lack of clarity / coordination among project proponent, DOE and consultants
- New versions of methodologies
- Absence of baseline data (specifically for power sector during initial years)
- Spot checks of DOEs by UNFCCC
- Coordination between the accredited overseas office of DOE and the Indian offices
- Changes in the PDD templates
- Process change at NCDMA for approval of projects
- Introduction of new guiding documents (Validation and Verification Manual)
- Suspension of methodologies or major revisions
- International and domestic criticism of some of the sectors with large reduction potential

While the impact of some of reasons cited above was short term, others completely changed the way in which projects were being developed. A key difference between expectations and actual implementation mode of the CDM is found in the “unilateral” approach. While everyone had expected that CDM would lead to direct investment of companies from industrialized countries into projects in developing countries, these companies were just willing to buy CERs from projects fully organized by companies from the host countries. Thus, many Indian CDM projects did not have any direct financial / technological involvement from the industrialized countries. This was already visible in the early days of the CDM where bilateral and multilateral financial institutions and industrialized country procurement programmes preferred large scale structured procurements against direct investment.

Except for the few projects that have entered into long-term purchase agreements, the issuance from registered projects is on the verge of standstill due to the present price being lower than the transaction cost (including the issuance fee – which alone would work to almost 50% of the current CER prices). Project proponents have not paid the issuance fee for the CERs in pending account after successful completion of verification and certification even after receiving reminders from the UNFCCC Secretariat.

A. European Union Emissions Trading Scheme (EU ETS)

The EU ETS was the first large emissions trading system being introduced worldwide, covering over 10,000 installations from January 2005 onwards. From the beginning, CERs were allowed to be used within the system, based on the "Linking Directive[13]". While imports were limited from 2008 onwards, and limitations have been tightened over time, the possibility for CER use in the EU ETS was the key driver for the emergence of the CDM.

The design of the EU ETS has changed considerably over time, with allocation decisions being now centralized by the EU Commission to make the allocations system more robust for the participating EU nations. Moreover, free allocation has now been substituted by auctioning for a significant share of the allowances. Nevertheless, the financial crisis of 2008, and the subsequent fiscal crisis has led to such a strong decrease of emissions of covered entities that there has been a surplus in the market since 2008, which has weighed on the price. This surplus has also contributed to the tightening of CER import restrictions, which now in addition to this, have limited aggregate demand to 1,635 $MtCO_2e$[14] CERs and JI credits at the present commitment level of 20% GHG reductions below 1990 levels by 2020. This demand could increase to 2,435 $MtCO_2$ if EU revises its emission target to 30%; this is however rather unlikely in the current situation. By the end of 2012, 675 million CERs and 383 million JI credits had been used in the EU ETS[15]. The World Bank[16] predicts that by 2015, the EU ETS will reach its import cap CDM and JI credits.

The elimination of the oversupply in the EU ETS has proven more difficult than expected. While the European Commission had proposed to postpone (back-load) the auctioning of 900 million EU ETS allowances from the years 2013-2015 until 2019-2020, the European Parliament voted against this proposal in April 2013 and accepted a revised version in mid-June 2013. It is unlikely that a decision will be taken before the German elections in September 2013.

Despite all its woes, the EU ETS will continue to be a cornerstone of the global emissions markets. Through the option to negotiate bilateral agreements, even India might regain the option to export emission credits to the EU.

B. Japan: Out of Kyoto – On lookout for alternatives

The Japanese government as well as its large industries have been active players in the CER market during the first commitment period. Japan did not take up a new commitment under the Kyoto Protocol post-2012 but confirmed its commitment[17] to reducing GHG emissions. Like

13 Directive 2004/101/EC of the European Parliament and the of the Council dated 27 October 2004 (amending Directive 2003/87/EC)
14 World Banks state and trends of the carbon market 2012
15 Ferdinand, M., Vik, B., 2013, Taking stock: Usage of CERs and ERUs during phase 2 of the EU ETS, Point Carbon, Oslo
16 World Banks state and trends of the carbon market 2012
17 http://www.mmechanisms.org/document/BOCMworkshop_20120414.pdf (Page 4)

other industrialized countries without Kyoto commitments, Japan can buy CERs from existing and new projects, but not sell them further[18]. Japan has developed a bilateral mechanism similar to CDM called Joint Crediting Mechanism (JCM). The price of emission reductions or the associated methodologies under JCM are not known at this point in time but JCM represents a potential future market for Indian emission reduction projects. Japan could require up to 330 $MtCO_2e$[19] during the 2013-2020 period, from JCM or CDM.

C. New Players: New Zealand and Switzerland ETSs

New Zealand has not taken up a commitment, whereas the Swiss commitment mirrors that of the EU. New Zealand ETS allow CDM projects registered post 2012 but ban CERs from industrial gas projects, while Switzerland applies more stringent qualitative restrictions. The aggregate demand of international offsets from these trading schemes is expected to be 190 $MtCO_2e$.[20]

D. United States of America

The US and its regional emission trading schemes in the Northeast and California have not created demand for CERs during the first commitment period of the Kyoto Protocol. This is unlikely to change soon given the scepticism of US institutions towards UNFCCC instruments.

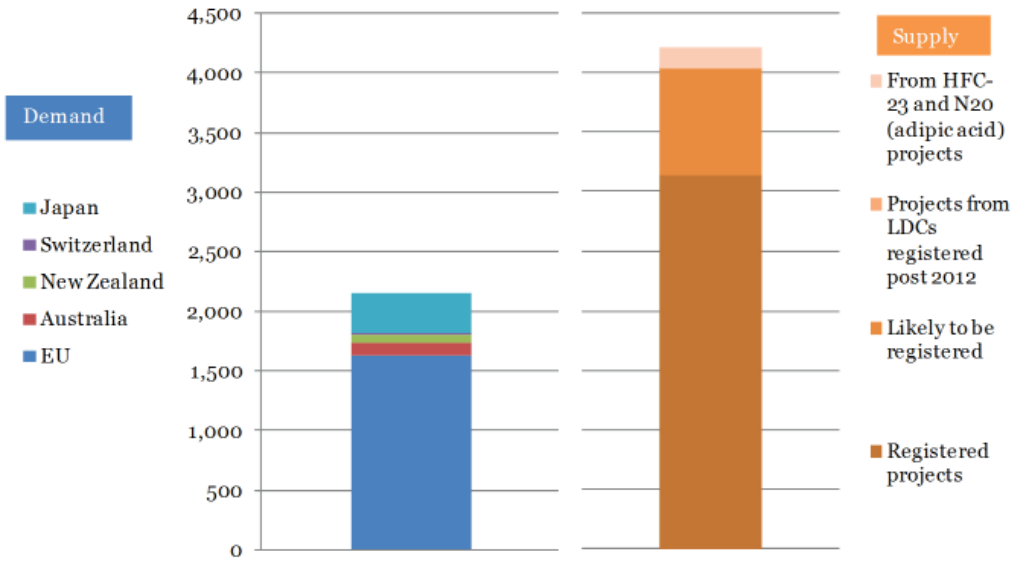
E. The overall market balance

The CER supply is estimated at 4,214 million over the period 2013 – 2020. Supply is taken as sum of the following categories: (a) CDM projects registered on or before 31 December 2012 ("Registered projects"), (b) CDM projects that are currently undergoing completeness check which have been submitted before 31 December 2012 and if registered, will carry a registration date prior to 31 December 2012 ("Likely to be registered"), and (c) CDM projects registered in LDCs post 31 December 2012[21]. CERs from HFC-23 and N2O (Adipic acid) projects have been considered separately because of import restrictions imposed by the EU, and New Zealand ETS. Figure 6 summarizes the demand and supply scenario.

This indicates a CER surplus of 2 billion tCO_2e during the period of 2013 – 2020. Other studies have also predicted this supply overhang. World Bank[22] (2012) and Point Carbon (June 2012)[23] projected a surplus in the range of 1 billion tCO_2e while CDC Climate (May 2012)[24] saw it at around 2 billion tCO_2e. CDC's estimate excludes HFC, N20 (adipic acid) and ERU from the supply scenario while projecting the demand from EU ETS at 1,600 million tCO_2e. Michaelowa (2012) has estimated supply overhang under three scenarios of demand-supply. The supply overhang ranges from 1.1 billion tCO_2e under a high demand-high supply scenario to 10.1 billion tCO_2e under a standard demand-standard supply scenario.

18 http://cdm.unfccc.int/faq/index.html (refer summary of the rules agreed in Doha)
19 http://enviroscope.iges.or.jp/modules/envirolib/upload/4295/attach/CDM_reform_No.3_e.pdf
20 World Banks state and trends of the carbon market 2012
21 Data has been taken from UNFCCC and IGES (http://enviroscope.iges.or.jp/modules/envirolib/upload/4295/attach/CDM_reform_No.3_e.pdf)
22 World Banks state and trends of the carbon market 2012
23 http://www.pointcarbon.com/research/promo/research/1.1927685?&ref=searchlist
24 http://www.cdcclimat.com/IMG/pdf/12-05_climate_brief_no13_-_supply_demand_for_cer_eru_in_the_ets.pdf

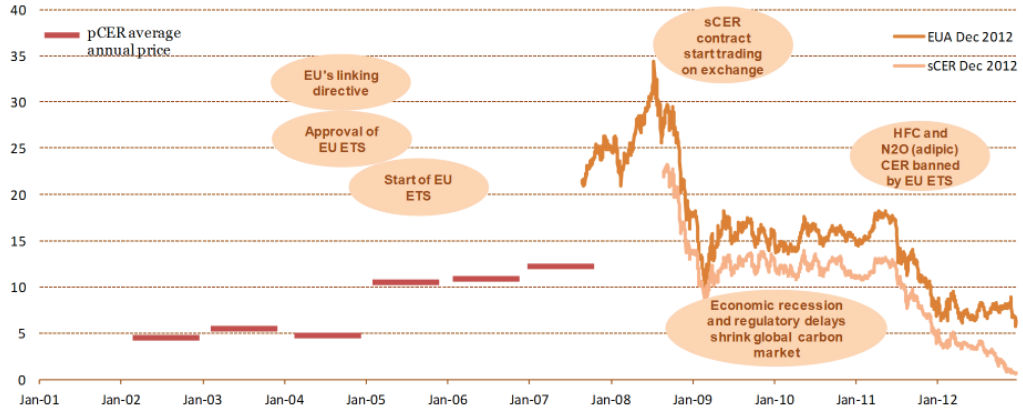
Figure 6
Summary of demand and supply scenarios



F. Price history

The primary CER[25] prices from 2002 to early part of 2008 were mostly determined through bilateral negotiations between buyers and sellers. However, this price discovery mechanism changed once secondary CER[26] started trading on the exchange. Secondary CER prices have mostly mirrored the trend observed in the price of EUA. The global economic downturn in 2008 led to a steep fall but prices did recover in 2009 led mostly by anticipation that output of power plants and manufacturing units will increase. Prices again started falling in 2011 because of oversupply (partly caused by the rush to sell CERs generated by industrial gas projects), decrease in demand because of weak economic growth and exhaustion of export limit of CERs for compliance. The CER prices are expected to remain subdued unless there is a revival of demand. Figure below shows the historic CER and EUA prices in Euros. Important events pertaining to CDM and the carbon markets have also been marked in the figure below.

Figure 7
Historical prices of CERs and EUAs in Euros[27]



25 Primary CERs are those that are directly contracted by the final buyer
26 Secondary CERs are those that are traded on exchange by intermediaries
27 Source- World Bank state and trends of carbon market and Point Carbon

G. UNFCCC's efforts to revive CDM

Global efforts are needed for CDM mechanism to play a meaningful role – both as a project-based mechanism and as body of knowledge that can inform the architecture of new mechanisms. Some of these efforts are already underway.

The ongoing public criticism of the CDM also led the EB to launch a platform for engaging with civil society, policymakers and market participants. CDM policy dialogue was launched in late 2011 and was headed by an independent, external, and high-level panel composed of international experts. The report of the High-Level Panel on the CDM policy dialogue - "Climate Change, Carbon markets and the CDM: A call to action" was released in September 2012. The report built the case for restoring faith in CDM, made 51 recommendations for addressing the shortcoming of CDM, improving performance and responding to future challenges and opportunities to keep it relevant to mitigation efforts. It urged nations to intervene to address the crisis in the carbon market and substantially increase level of mitigation ambition. However, the report did not result into any action at the UNFCCC conference in Doha in December 2012.

The UNFCCC secretariat, in collaboration with the BanqueOuestAfricaine de Développement (BOAD) established a CDM support office in Lomé, Togo to bring the benefits of the CDM to currently underrepresented countries. The CDM support office aims to help the region's governments, non-governmental organizations and private sector engage in the development of potential CDM opportunities. The UNFCCC secretariat is willing and actively seeking to collaborate with organizations that are interested in establishing such CDM support offices in their region. This is done to address the lack of equity in the regional distribution of CDM projects caused by the disparity in institutional and human capacity in underrepresented countries. In the coming months, similar offices are expected to open up in underrepresented regions in Asia, Latin America, the Caribbean and Francophone Africa.

The UNFCCC secretariat also launched The CDM Loan Scheme in 2012 to boost CDM project development in LDCs. The Scheme provides interest-free loans for CDM projects in LDCs as well as countries that have fewer than 10 registered CDM projects. The scheme is run jointly by the UNFCCC, the United Nations Environment Programme (UNEP) Risoe Centre and the United Nations Office for Project Services (UNOPS). The loans are utilized to finance the development of Project Design Documents (PDD), validation by a Designated Operational Entity (DOE), registration of the project with the UNFCCC and the monitoring and verification of Certified Emissions Reductions (CERs). In the first round of solicitation, the scheme received applications from 42 projects in 23 countries in Latin America and the Caribbean, Asia and Africa with the majority of the applications coming from Africa (29). Regional CDM support centres as well as loans for project developers in underrepresented regions also do not change the broader picture.

The Executive Board (EB) of the CDM has chalked out a 2-year business plan to adapt to the ever-changing environment of the CDM and create sufficient room to review and adjust the plans and activities over time. The EB has set 4 objectives to be achieved over the next 2 years: (a) provide for simplicity and predictability in the operation of the CDM and ensure the integrity of CERs, (b) ensure the CDM makes a growing contribution to the mitigation of climate change and sustainable development of host countries, (c) further expand the geographic reach of the CDM, (d) promote the use of, and safeguard the reputation of, the CDM as a mechanism for low carbon development. The result of this initiative will be only known in the coming years.

2.2 Carbon Market Potential for India in 2020

Considering India's high economic growth and rising GHG emissions and the threat climate change poses to sustaining growth in the future, the Government of India embarked upon its National Action Plan on Climate Change (NAPCC) with 8 missions to ensure energy security, sustainable development, protection of bio-diversity and climate resilience in June 2008 (see Appendix 1 – National missions). These missions are:

(i) National Solar Mission

(ii) National Mission for Enhanced Energy Efficiency

(iii) National Mission on Sustainable Habitat

(iv) National Water Mission

(v) National Mission for Sustaining the Himalayan Ecosystem

(vi) National Mission for a "Green India"

(vii) National Mission for Sustainable Agriculture and

(viii) National Mission on Strategic Knowledge for Climate Change.

The 9th mission, Clean Coal Mission is in the pipeline. This mission will target to increase the efficiency of power generated through coal by initiating work on advanced technologies.

An expert group was constituted by the Planning Commission to develop a low carbon inclusive growth strategy for India's Twelfth Five Year Plan. This Expert Group on Low Carbon Strategies for Inclusive Growth in its interim report estimated[28] the national emissions reduction potential by 2020 for various sectors under two scenarios namely 8% and 9% annual GDP growth. The sectors covered are power sector, transport, iron & steel, cement, oil & gas, buildings, waste management, other industries and households. The Expert Group has either not considered or considered very limited potential in the following sectors: energy distribution, chemical industries, fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride, construction, solvent use, mining/mineral production and fugitive emissions from fuels (solid, oil and gas). These sectors have been excluded from the analysis.

The regulatory framework, use of market mechanism and incentive mechanism (including price of emission reduction), will significantly influence carbon mitigation potential. This study examines the carbon market potential assuming CDM (or CDM like) framework in terms of baseline and crediting, additionality, etc.

As the expert group has assumed a base year of 2007, the analysis has first linearly apportioned the estimate to make 2012 as the base year. Two adjustments to account for the characteristics of the CDMwere also made to the Expert Group's analysis to quantify the Indian CDM potential in 2020 (see Table 5):

- **Adjustment 1:** The mitigation activities under CDM are a fraction of the mitigation activities that otherwise occur. Additionality acts as the first screen. If a mitigation activity is financially attractive, it would occur and contribute to the overall mitigation but will be excluded from CDM as only those eligible projects that are not financially attractive in the absence of CDM can be supported under CDM.Certain institutional factors also act

28 http://planningcommission.nic.in/reports/genrep/Inter_Exp.pdf

as screen – CDM projects have been largely developed by the private sector while public sector had a correspondingly limited participation. Certain sectors likeEE service and EE household have had limited participation, often due to complex MRV requirements. An adjustment to the overall mitigation potential estimated by the Expert Group has been applied on this account to arrive at the likely potential that may apply for CDM (or CDM like) registration.

- **Adjustment 2:** Another adjustment is applied to reflect the proportion of the projects that are able to achieve CDM registration from the total number of projects that apply for CDM registration. There are a variety of reasons because of which not all CDM projects that apply for registration will achieve CDM registration and the trends in registration success have been analysed to arrive at the adjustment.

Refer Appendix 7- Estimation of emission reduction potential for the adjustments and detailed IRRs for each sector.

CER price will have a significant influence on the CDM potential as CER revenues are incremental to project revenues and increase the financial returns to the project and/or alleviate barriers to project implementation. Increasing returns (or reducing barriers to investments) will mean that project activities that were unviable under the current policy, regulatory and institutional framework are likely to become viable (depending on the CER price and the gap in viability) and may be taken up for implementation. This will lead to an increase in the CDM potential. It also follows that if the CER price is at the present level (around € 0.5) and there are no regulatory constraints (of the nature described earlier in the chapter), it is unlikely to support development of any mitigation activity under the CDM. It is important to clarify that mitigation activity that can be supported under the current policy, regulatory and institutional framework will continue to be developed. Further, if future policy, regulatory and institutional frameworks provide sufficient support or if new carbon market mechanisms provide additional support, the overall mitigation potential may still be achieved.

Three different scenarios have been developed for CER price levels of € 5, 10 and 15 to access the potential at different prices. The maximum potential without the consideration of CER price is also estimated. This should not be interpreted as CER price forecast, which is expected to remain at the current levels of around € 0.5 unless the significant supply overhang is removed or demand is boosted and barriers to CDM projects registered post 2012 from India is removed.The annual mitigation potential in 2020 varies from 24 million tCO_2e at a carbon price of € 5 to 83 million tCO_2e at the price of € 15. If the carbon prices are significantly higher than € 15, the annual potential in 2020 is estimated to increase to 107 million tCO_2e.

The 'Emission reduction potential ($MtCO_2$) estimated by the Expert Group' in table 5 is the emission reduction potential from new projects that are expected to come between 2013 and 2020. As the expert group had estimated the potential between 2008 and 2020, the emission reduction potential between 2013 and 2020 is based on the linear apportioning. E.g. The expert group had estimated the potential for solar to be 22 $MtCO_2$ for capacities that are added between 2008 and 2020 (13 years). For analysis a linear addition of this capacity was assumed and that expected capacity for 8 years between 2013 and 2020 was calculated. Thus, the amount of 14 $MtCO_2e$ was arrived at by dividing the potential projected by the expert group from 2008-2020 (22 $MtCO_2e$) by 13 (number of years) and multiplying by the number of years (20012-2020) for which the value is required.
This results as (22/13) x 8 = 14

The realizable emission reduction potential in a sector depends upon various factors including additionality of the projects, type of project proponent, MRV requirements of the CDM methodology, acceptance by DOE/EB, and price of CERs. The 'Maximum emission reduction potential' mentioned in table 5 assumes no restriction on the CER price but takes into account the aforementioned factors (refer description of adjustment 1 and 2 in section 2.2 of the report).

In order to explain the values arrived at different price scenarios in table 5 the PDDs of registered projects from India were analysed to assess the IRR and the expected financial returns by the project proponents. Returns varied across projects for various reason (largely because of time of investment decision). For CDM project implementation IRR range was computed against various price scenarios of 5, 10 and 15 Euros. So the value of emission reduction potential was arrived at based on different price scenarios and IRR range. Taking solar projects as an example these projects were not able to cross the benchmark even with the price of 15 Euros. Therfore none of the capacity in solar category could come up even if the price is Euro 15 per CER. However if the price is considered indefinite, the IRR range is bound to cross the benchmark, therefore the entire capacity may come up at the specific price of the CER which, in case of solar category, will be more than Euro 15.

The IRR range for all project categories were calculatedassuming a CER price of 5 Euros. For some of the cases, it was observed that the part capacity is covered under a specific price of CER. This is due to the fact that at a specific price, the upper limit of IRR range will be above the benchmark value and the lower limit of the IRR range will be below the benchmark value. Under such circumstances, it was assumed that the expected (maximum) capacity will linearly fall under the maximum and minimum IRR observed for the specified CER price. The IRR rangewas then compared with the benchmark to assess the percentage of projects crossing the benchmark at that specific price. This was repeated for 10 and 15 Euro price scenarios. For sectors like Biomass or Wind, a certain percentage of projects do cross the benchmark at 10 Euro and the entire capacity at 15 Euro.

Table 5 | Estimated CDM potential in 2020 in million tCO_2

Sectoral Scope	Activity	Emission reduction potential ($MtCO_2$) estimated by the Expert Group	Maximum emission reduction potential ($MtCO_2$)	Emission reduction potential ($MtCO_2$) at Euro 15 / tCO_2e	Emission reduction potential ($MtCO_2$) at Euro 10 / tCO_2e	Emission reduction potential ($MtCO_2$) at Euro 5 / tCO_2e
Energy industries (renewable - / non-renewable sources)	Solar	14	11.72	0.00	0.00	0.00
	Biomass	12	5.82	5.82	4.90	0.00
	Wind	11	8.31	8.31	7.91	0.00
	Fossil fuel switch (Gas Based Combined cycle)	8	5.09	5.09	4.67	3.28
	Supercritical coal power plants	5	0.28	0.28	0.28	0.00
	Hydro	28	4.24	0.16	0.00	0.00
Energy demand	EE commercial building [Heating, Ventilation and Air conditioning, Lighting, Internal Loads and others]	37	0.23	0.23	0.23	0.23
	Lighting	27	26.20	26.20	26.20	0.00
	Fan, TV and AC	12	2.46	2.46	2.46	2.46
Manufacturing industries	Energy Efficiency - Clinker Substitution in Cement[29]	31	0.00	0.00	0.00	0.00
	Energy Efficiency - Fuel Substitution in Cement	5	2.43	2.43	2.43	0.04
	Refrigerators	4	0.74	0.74	0.74	0.74
Metal production	BF-BOF including waste heat projects	17	11.08	11.08	11.08	11.08
	COREX/FINEX-BOF	3	1.54	1.54	1.54	1.54
	DRI-EAF and F-Technology	2	1.23	1.23	1.23	1.23
Transport	Modal shift - Increased freight share of Railways and Non-motorised and public transport	19	1.39	1.39	1.39	1.17
	Fuel efficiency of vehicles	7	0.60	0.60	0.60	0.60
Waste handling and disposal	Landfill gas - (Composting, Solid waste, manure)	37	12.70	12.70	12.70	1.74
	Wastewater					
Afforestation and reforestation	Reforestation/Afforestation	26	0.37	0.12	0.00	0.00
Agriculture	Agriculture	3	3.08	0.00	0.00	0.00
Total		**307**	**99.5**	**80.38**	**78.35**	**24.11**

Source- Interim report of Expert Group on Low Carbon Strategies for Inclusive Growth and PwC analysis

29 The future carbon potential for clinker substitution is not considered due to two reasons – (1) financial additionality for this activity is difficult to establish and (2) barrier analysis is no longer acceptable by the CDM EB for this type of project activity.

2.3 Conclusions

It has been well accepted by the international community that without significant support from large developing economies like China and India, it will be difficult to materialize the goals set for global mitigation efforts. It has equally been accepted that these growing economies have a lower per-capita emission (especially in the case of India) and thus a pure cap and trade regime will not work in the near future. Also, the world has to work on new approaches to curb emissions (some of them are being discussed in the later sections of this report- Chapter 5) to buy time for the impact of climate change while making sure that the world (or at least the most vulnerable regions) is geared up for such changes through adapting and ensuring safety of impacted populations.

India can thus look for a more significant contribution in the future, till the projected emission peak is reached (based on the projection of economic growth of India). As part of voluntary commitments, India has pledged reducing its emissions intensity of its GDP by 20-25% by 2020 in comparison to the 2005 level.

Though restrictions around technologies (HFC23 and N2O abatement in adipic acid production) post true up period has no detrimental impact[30] on the Indian supplies, yet the absence of demand for Indian projects registered after 31 December 2012 has resulted in reduced investment in several other sectors.

Chapter highlights

- There is currently a supply overhang in the CER market and this situation is expected to remain till 2020. EU has restricted use of CERs from CDM projects from India registered post 31 December 2012 for compliance requirements. New Zealand ETS presently allow CDM projects registered post 2012.
- India's emission reduction potential is substantial in 2020. The top sectors are energy demand, metal production and waste handling and disposal

30 Except that some of the project proponents may or may not continue with HFC23 and N2O abatement in their industrial facilities as there is no commercial gain for them

SECTION 3

CDM and Sustainable Development in India

> "…. the purpose of CDM shall be to assist parties non included in Annex-1 in achieving sustainable development and in contributing to the ultimate objective of the convention……[31]"

One of the primary objectives of CDM is to assist non-Annex 1 parties in achieving sustainable development. The CDM projects were required to report the sustainable development initiatives during the host country approval process. Some voluntary standards like The Gold Standard[32] required more extensive reporting of the sustainable development benefits including verification of sustainable development benefits throughout the crediting period.

Given the sheer size of India's share in the CDM pie, it is imperative to assess the impact CDM has had on sustainable development in India. Also, since the goal of sustainable development will find its place in the mandates of any new mechanism that comes to the fore along with CDM in the future, lessons from experiences during the first commitment period can be helpful in designing the framework for enhancing the sustainable development benefits for potential future mechanisms.

A literature review of earlier attempts at determining the sustainable development benefits of CDM projects by Sutter and Parreno[33] (2007), Alexeew et al[34], (2010), Tanguy du Monceau and

31 Kyoto Protocol Article 12.2
32 http://www.cdmgoldstandard.org/about-us/why-gs
33 Does the current Clean Development Mechanism (CDM) deliver its sustainable development claim? An analysis of officially registered CDM projects, 2007
34 An analysis of the relationship between the additionality of CDM projects and their contribution to sustainable development, 2010

Arnaud Brohé, CO2logic[35] (2011) and studies by UNFCCC[36] and TERI[37] unearthed that all these were based on the claims made by Project Proponents in their project design documents (PDDs) submitted during registration of the project.

Projects from India have been criticized for having low sustainable development benefits and technology transfer. It is a common perception that large CER project activities (supercritical, large hydro) have low sustainable development benefits and weak additionality arguments. Lack of technology transfer has also been criticised by various studies. Studies by UNFCCC[38] and researchers [Dechezlepretre et al (2009)] claim that technology transfer in projects from India in wind is lowest globally at less than 20%. The basis of such studies has largely been information in the PDDs. It is therefore worthwhile to carry out a detailed assessment of the actual benefits achieved by the project to assess the benefitsof CDM on sustainable development in India and technology transfer in India.

This chapter starts with a summary assessment of investment and employment generation, followed by an evaluation of the four sustainable development dimensions differentiated by project-type.

3.1 Assessment of total investment in CDM projects and employment generation

Registered CDM projects have facilitated an estimated investment of INR 1.6 trillion in India since its inception. As a comparison, funding received other climate change (mitigation) focused funds operating in India have been more moderate, e.g., Global Environment Facility (GEF) has funded projects worth INR 11 billion[39].

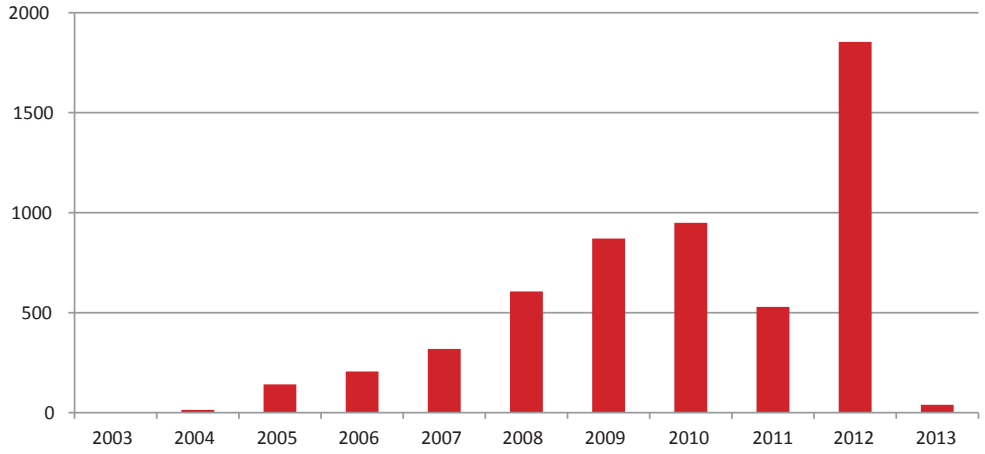
As the registered CDM projects are a fraction of projects proposed as CDM, a comparison has been made with the total investment by NCDMA approved projects. The total investment in NCDMA approved projects is INR 5.5 trillion. Figure 8 shows the year-wise investment in NCDMA approved CDM projects.

The distribution of investment among project types depends upon national and state policies promoting the underlying project activity, additional incentives (apart from revenue CERs) and existing institutional framework.

As shown in Figure 9, wind, EE supply side, and hydro projects have seen the highest investments amongst CDM projects. Biomass, fossil fuel switch, solar and transport projects have also seen substantial investments. These project-types were supported to a certain extent by national/ state policies like preferential tariff, fixed return on equity, etc. and revenue from CERs provided the additional support required for making the investment financially viable. Renewable energy CDM projects have relatively small investments on a per project basis but large overall investment due to the sheer number of projects while EE supply side and fossil fuel switch projects

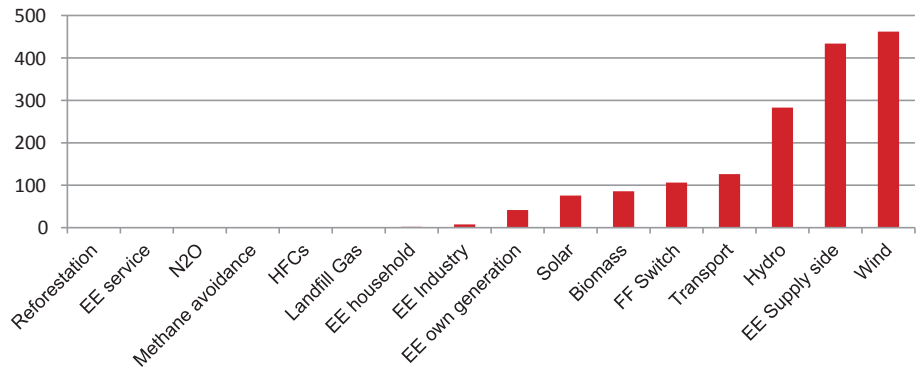
35 Briefing paper "Sustainable Development and Social Equity", 2011
36 Benefits of the Clean Development Mechanism 2011, UNFCCC
37 Assessing the Impact of the Clean Development Mechanism on Sustainable Development and Technology Transfer, prepared by TERI for UNFCCC, 2012
38 The contribution of CDM to Technology Transfer
39 Source- http://www.thegef.org/ (accessed on 3rd July 2013) and exchange rate of USD 45/ INR (same as used by UNEP Risoe)

Figure 8
Year-wise investment in NCDMA approved CDM projects (in INR Billion)



are dominated by large utility scale projects. A typical ultra mega power plant (EE supply side) would involve an investment larger than that of annual wind capacity additions in the country.

Figure 9
Project-type investment in CDM projects (INR billion)[40]



States that have a high renewable energy potential (wind and hydro) or are more industrialized than the rest have attracted greater investments in the CDM projects. Figure 10 shows the total investment into CDM projects for each state in the country. Industrialized states also have high renewable energy potential and this has lead to concentration of investments in the states of Gujarat, Andhra Pradesh, Maharashtra, Tamil Nadu and Karnataka. Himachal Pradesh has benefited from large number of hydro CDM projects, which is to be expected given its hydro potential, and Delhi because of transport CDM projects. High investment in Madhya Pradesh in on account of coal based supercritical power projects. Arunachal Pradesh, Assam, Bihar, Kerala and West Bengal have seen very limited investments into CDM.

Biomass CDM projects in the sampleare the most efficient job creator and create more than four times the average jobs (per rupee invested) across all project-types. Wind and hydro projects in the sample create relatively less employment per rupee invested as compared to EE own generation and EE industry projects during the construction phase. Figure 11 and Figure 12plots the total number of people employed during construction and operations and number of people employed per rupee invested for various project-types in the sample. It can be seen that EE supply side projects generate less employment per rupee invested.

40 UNEP Risoe CDM pipeline

Figure 10
State wise investments in CDM projects (INR billion)[41]

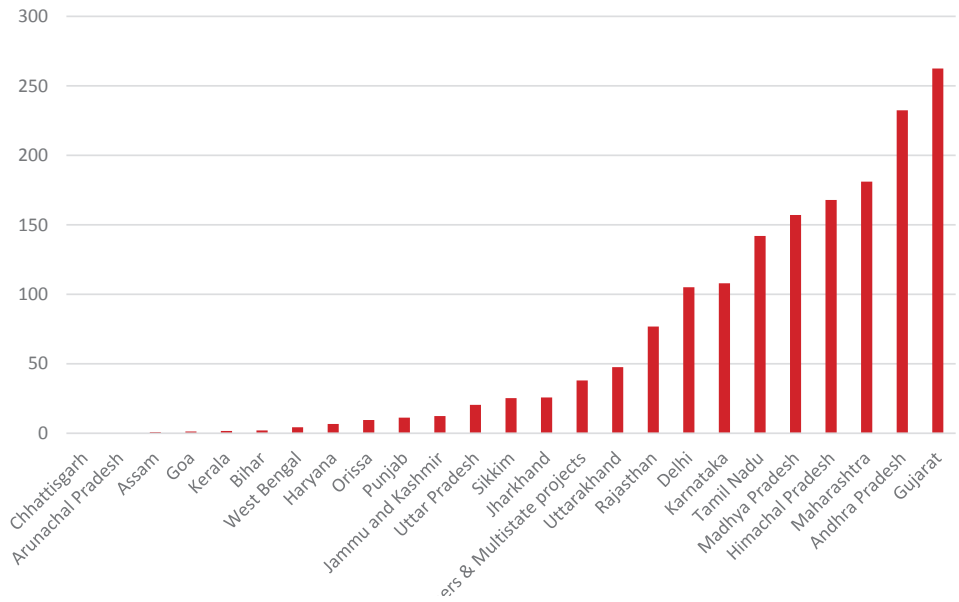


Figure 11
Project-type wise employment generation during construction from CDM projects in the sample

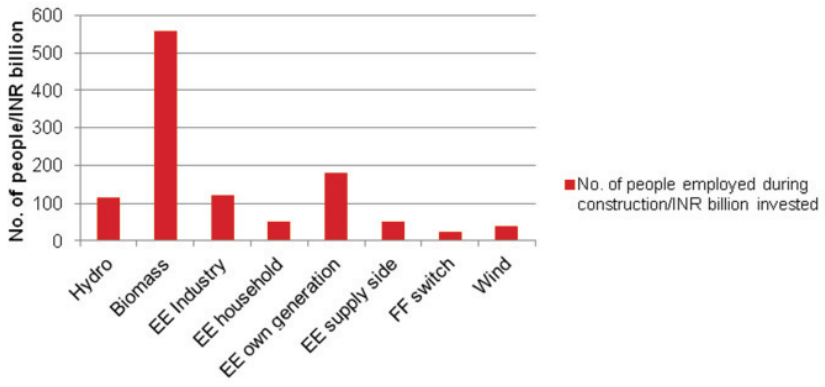
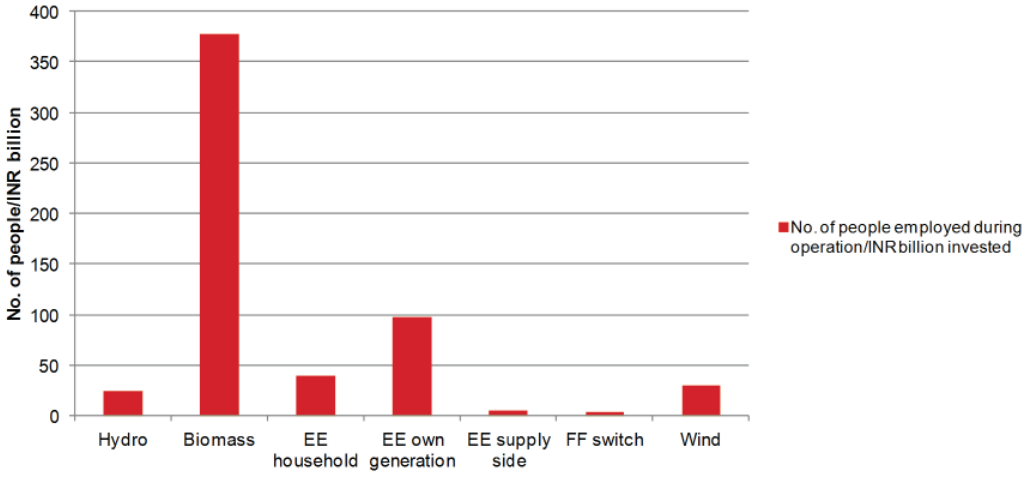


Figure 12
Project-type wise employment generation during operations from CDM projects in the sample



41 UNEP Risoe CDM pipeline

3.2 Assessment of investment into sustainable development activities

NCDMA requires large-scale CDM projects to invest a minimum of 2% of the CER revenues in sustainable development activities. An analysis was carried out to assess the investment of CER revenue proceeds into such activities. 46 projects reported data on amount spent on sustainable development activities and provided information on these respective activities. It was possible to calculate the percentage of CER revenue spent on sustainable development activities for only 19 projects in the sample due to lack of information on CER revenues. More than 90% of these projects in the sample have invested more than 2% of the CER revenues on CSR activities. The remaining 10% are small scale projects and are thus not covered by the NCDMA stipulation.

18 of these 19 projects in the sample reported that their interventions were spread over at least 2-3 areas like health, education, livelihood, women's empowerment, community empowerment etc. 16 projects reported interventions in the area of livelihood generation and 15 projects reported health and education related interventions. 13 projects reported interventions in women's empowerment and community empowerment. It is evident from the above that most projects spread their sustainable development interventions over at least 2-3 themes. This could be directly related to the multi-dimensional needs and requirements of the communities in areas like health, education, livelihood generation etc.

3.3 Comparison of sustainable development claims in the PDD and survey of sample projects

A comparison has been made between the sustainable development claims made in the PDD and those in the questionnaire response gathered through the email survey and site visits. It is evident from the analysis presented in Table 6 that the sustainable development initiatives undertaken are consistently higher than that reported in the PDDs for the project-types in the sample.

Table 6 | Comparison of the claims made in the PDD and additional activities reported during the survey of the sample projects

Sector	Claims in the PDD	Additional activities reported during the survey of sample projects
Biomass energy	• Local employment generation • Income generation from sale of biomass • Creation of opportunities local businesses	• Skill development trainings – especially for women • Water related infrastructure – storage tanks/reservoirs, pond deepening, water supply connections • Tree plantation activity • Promotion of village level institutions – SHGs • Promoting community harmony – building community halls, organizing festivals, sports related activities, awareness campaigns, library • Distribution of solar lanterns • Promoting good agricultural practices • Sanitation related activities • Disaster relief work • Other infrastructure related activities like rural housing , bus shelters

EE households	• Poverty alleviation by reducing household expenditure on electricity bills • Local health benefits	• Promoting good agricultural practices • Upliftment of socially backward communities • Building education and health related infrastructure • Conducting education and health related activities • Skill development – youth and women • Women's empowerment • Rehabilitation of differently-abled citizens • Access to finance (micro credit)/Financial inclusion • Promotion of village level institutions – SHGs, gram sansthas • Water related infrastructure – Farm Ponds, Trench-cum Bunds and desilting of tanks, clean water supply
EE industry	• Local employment generation • Creation of opportunities local businesses	• Building education and health related infrastructure • Conducting education and health related activities • Sanitation related activities • Maintaining local infrastructures – parks, street lights • Providing clean drinking water
EE own generation	• Local employment generation	• Building education and health related infrastructure • Conducting education and health related activities • Skill development trainings – especially for women, youth • Promotion of village level institutions – SHGs • Building local infrastructure – roads • Water related infrastructure - drainage system, bore wells • Providing clean drinking water • Promoting community harmony – celebrating festivals ,awareness campaigns • Promoting good agricultural practices • Creation of opportunities local businesses
EE supply side	• Local employment generation	• Building education and health related infrastructure • Conducting education and health related activities • Skill development trainings – especially for women, youth • Promotion of village level institutions – SHGs • Promoting good agricultural and animal husbandry practices • Tree plantation activities • Promoting community harmony – awareness campaigns, community meetings and events • Sanitation related activities • Water recharging activities
Fossil fuel switch	• Local employment generation • Building local infrastructure – roads • Conducting education and health related activities • Creation of opportunities local businesses	• Building education and health related infrastructure • Conducting education and health related activities • Skill development trainings – especially for women, youth • Promotion of village level institutions – SHGs • Promoting community harmony –organizing festivals, sports related activities, awareness campaigns, library • Sanitation related activities • Tree plantation activities • Rehabilitation of differently-abled citizens

Hydro	• Local employment generation • Building local infrastructure – roads, street lights, community shed • Plantation forestry based activities	• Building education and health related infrastructure • Conducting education and health related activities • Promotion of village level institutions – SHGs, Mahilamandal • Building local infrastructure – street lights, footpath, temple shed, park maintenance, roads • Promoting community harmony –organizing festivals, events, village level meetings • Clean drinking water • Tree plantation activity • Skill development trainings • Creation of opportunities local businesses • Water related infrastructure – water pipeline • Sanitation related activities • Disaster relief work
Methane avoidance	• Local employment	• Building education and health related infrastructure • Conducting education and health related activities • Skill development trainings • Building local infrastructure – roads • Water related infrastructure – infiltration tanks, drainage. de-silting drains and irrigation channel • Clean drinking water • Promotion of village level institutions – SHGs • Promoting community harmony –organizing festivals, sports related activities, awareness campaigns
N2O	• Local employment generation • Building education and health related infrastructure • Conducting education and health related activities • Developing local agriculture sector – free soil and water analysis, veterinary facilities	• Building education and health related infrastructure • Conducting education and health related activities • Skill development trainings • Water related infrastructure – storage tanks, check dams • Clean drinking water • Tree plantation activities
Reforestation	• Strengthening local/village level institutions • Additional income generation • Capacity building - agricultural / forestry practices	• Building education and health related infrastructure • Conducting education and health related activities • Skill development trainings • Water related infrastructure – bore well • Tree plantation activities • Promoting community harmony – awareness campaigns • Promotion of village level institutions – SHGs • Women's empowerment
Solar	• Local employment generation • Creation of opportunities local businesses	• Rainwater harvesting activities • Awareness campaigns around energy conservation
Wind	• Local employment generation • Building local infrastructure – roads • Creation of opportunities local businesses	• Building education and health related infrastructure • Conducting education and health related activities • Skill development trainings • Promoting good agricultural and animal husbandry practices • Tree plantation activities • Water related infrastructure – rainwater harvesting tanks, village ponds • Promotion of village level institutions – SHGs, Village Development Committees

3.4 Assessment of CDM projects by project-types

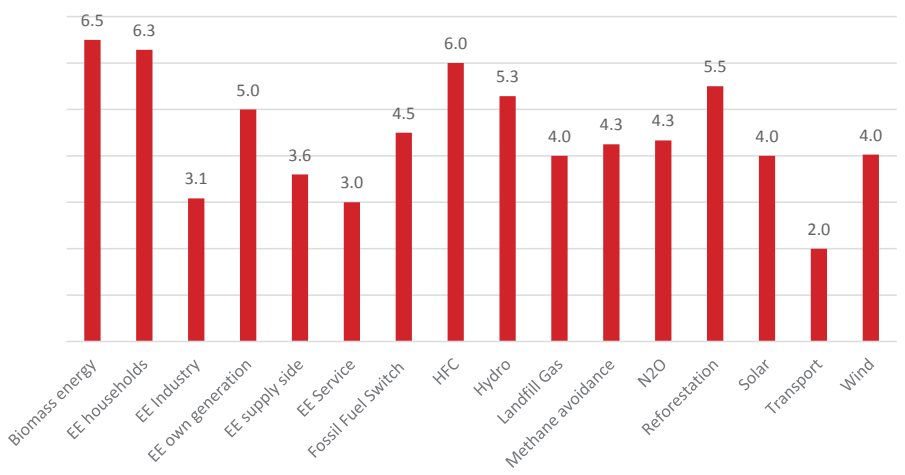
According to the methodology described in chapter 1, the sample projects have been given scores based on the sustainable development benefits reported on economic, environmental, social and technological dimensions. The analysis and results of intrinsic and secondary benefits of the projects in the sample are presented below. The results should not be interpreted as being applicable for all the registered CDM projects from India.

A. Intrinsic Economic Dimension

In terms of intrinsic economic indicators, the highest performing projects in the sample are biomass, EE household, HFC, reforestationand hydro projects. All these project-types (except reforestation) contributed through both transferring direct/indirect financial benefit[42] to the local and/or regional economy and by generating local/regional jobs (during construction and operation and maintenance phases). Reforestation project-type contributed to the economic dimension essentially by transferring direct/indirect financial benefit to the local and/or regional economy. Contribution of investments in local/ regional infrastructure to the score in economic dimension was higher for hydro and reforestation project-types in the sample compared to other top performing project-types.

Also, renewable energy projects (biomass, hydro, wind and solar) in the sample performed better than energy efficiency projects (EE industry, EE supply side, EE services, EE own generation) in the economic dimension. Figure 13below represents the performances on economic indicators of different project-types.

Figure 13
Scores on Intrinsic economic dimension (Max score- 18)



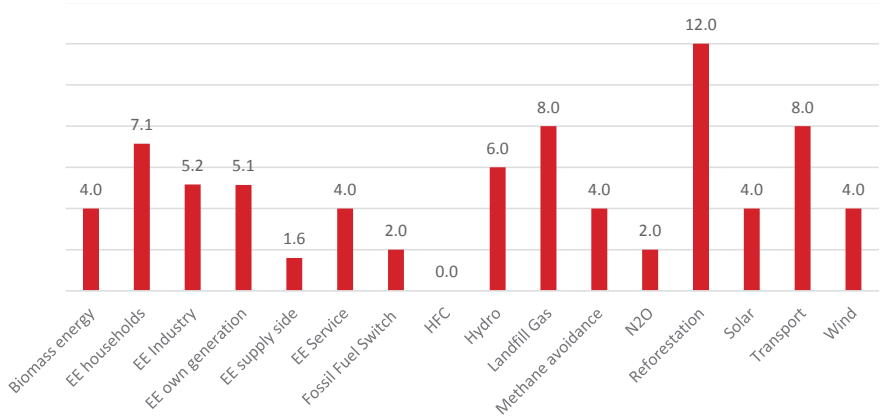
Fossil fuel switch, landfill gas, solar and windproject-types in the sample have contributed to direct/indirect financial benefit to the local and/or regional economy. EE industry, EE own generation, EE supply side and N2O project-types in the sample contributed towards job creation. EE service and transport project-types in the sample contributed to the economic dimensionsolely through transfer of direct/indirect financial benefit to the local and/or regional economy.

42 Financial benefit is defined as community cost savings, income generation, poverty reduction, supporting entrepreneurial activity, investing in the economy and by undertaking community investments

B. Intrinsic Environmental Dimension

In terms of intrinsic environmental indicators, the highest performing project-types in the sample are reforestation, transport, EE household, landfill gas and hydro. Reforestation project-type contributed by promoting efficient utilization and improvement/protection of natural resources. Landfill gas, EE household and transportation project-types in the sample gained from their contribution towardsnoise/odour/dust/pollutant reduction and energy utilities apart from their impact on efficient utilization of natural resources. Hydro project-types in the sample gained equally from promotion of efficient utilization and improvement/protection of natural resources, impact on energy utilities and promotion of renewable energy. Project-types in the sample that positively contributed to the local environment have higher scores on intrinsic environment dimension compared to projects whose effect is away from the project site. Thus reforestation, EE household (efficient cook stoves),Municipal Solid Waste (MSW) and metro rail project-types in the sample contributed significantly to local air quality improvement. On the other hand, renewable energy projects in the sample did not contribute to local air quality improvement but displaced emissions in the national grid. The scores on environmental dimensions are shown in Figure 14 below.

Figure 14
Scores on Intrinsic environment dimension (Max score- 32)



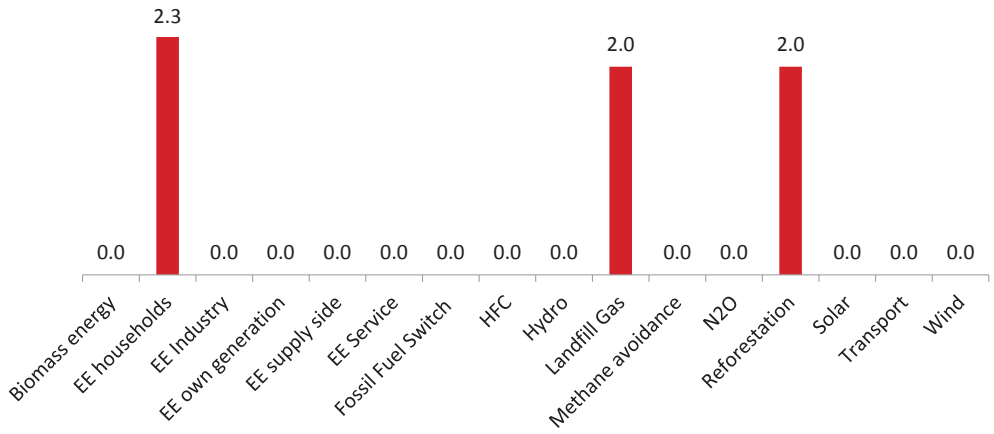
EE own generation project-typein the sample benefited from contribution to promotion of efficient utilisation of natural resources, impact on energy utilities, reduction in noise/ odour/dust/pollutants and promotion of renewable energy.Biomass, wind and solar project-types gained from their contribution to impact on energy utilities and promotion of renewable energy. Methane avoidance project-type in the samplegained from contribution to promotion of efficient utilisation of natural resources and impact on reduction in noise/ odour/dust/pollutants.EE supply side project-type in the sample scored entirely on accountof impact on energy utilitieswhile N20 project-typescored solely on their contribution to promoting efficient utilization of natural resources. Fossil fuel switch project-type in the sample contributed to promoting efficient utilization of natural resources (as they are situated within industry premises) and reduction in noise/ odour/dust/pollutants.

C. Intrinsic Social Dimension

Only projects in reforestation, EE household and landfill gas project-types in the sample had intrinsic social benefits. Reforestation project-type contributed towards poverty alleviation as these projects were designed to increase forest cover and in the process created additional income from sale of Non Timber Forest Products (NTFPs) for the low income households. EE household

project-type (projects that replace inefficient cook stoves) and landfill gas project-type improved the health of local population through reduction in exposure to carbon dioxide and methane. The scores for social dimension are presented in Figure 15 below:

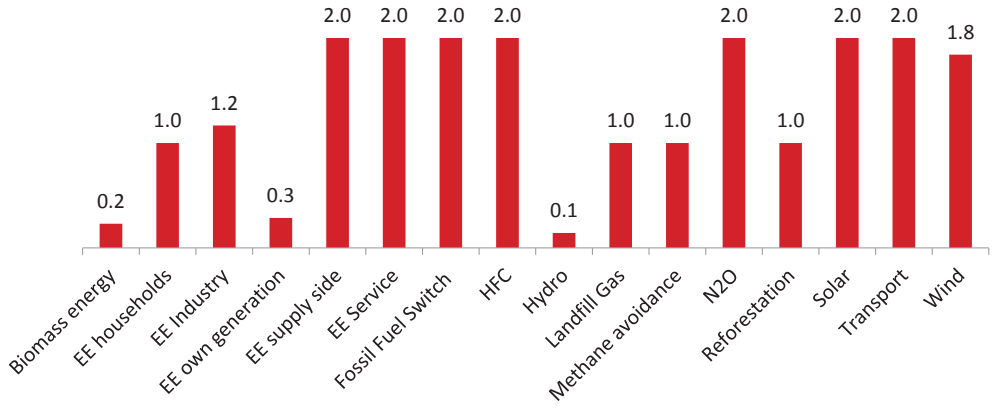
Figure 15
Scores on Intrinsic social dimension (Max score- 12)



D. Intrinsic Technological Dimension

The top performing project-types in the technological dimension are transport, HFC, N2O, wind, EE service, EE supply side and EE households as CDM has enabled technology transfer in these project-types. Wind project-types have reported technology transfer from European firms. EE household projects that distribute CFLs have largely imported CFLs from European firms. Other renewable energy and energy efficiency projects in the sample have seen limited technology transfer as most technology suppliers are available domestically. The scores for technological dimension are presented in Figure16 below.

Figure 16
Scores on Intrinsic technological dimension (Max score- 4)



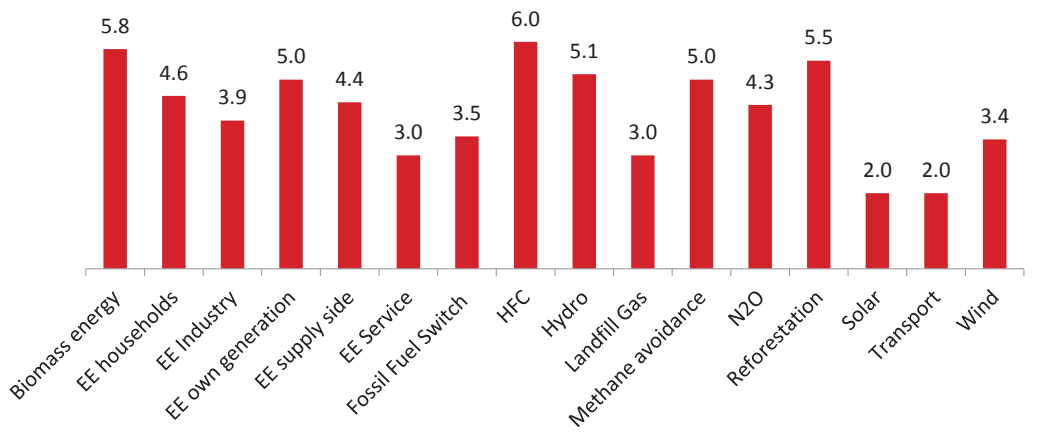
E. Secondary Economic Dimension

The scores along the secondary economic dimension for the project-types in the sample are presented in Figure 17. Project-types in the sample with high scores on intrinsic dimension such as reforestation, hydro and biomass are also found to have high scores on secondary economic dimension on account of greater engagement with community development activities. The con-

tributors to the high score in secondary economic dimension are the same as those for primary economic dimension. These project-types (except reforestation) in the sample have undertaken local community initiatives that contributed through transferring direct/indirect financial benefit to the local and/or regional economy and by generating local/regional jobs (during construction and operation and maintenance phases) while reforestation project-type contributed only to the former.

Methane avoidance and EE own generation project-types that have moderate scores on intrinsic economic dimension are found to have better scores on the secondary economic dimension. Both these project-types have undertaken local community initiatives that contributed towards transferring financial benefits, creating jobs and creating local infrastructure. The contribution of investing in local infrastructure was one of the highest for EE own generation projects in the sample. EE own generation projects contributed to transferring financial benefits only through investment in the local/regional economy and through community investments as opposed to methane avoidance projects which also provided community cost savings and supported entrepreneurial activity.

Figure 17
Scores on secondary economic Dimension(Max score- 18)



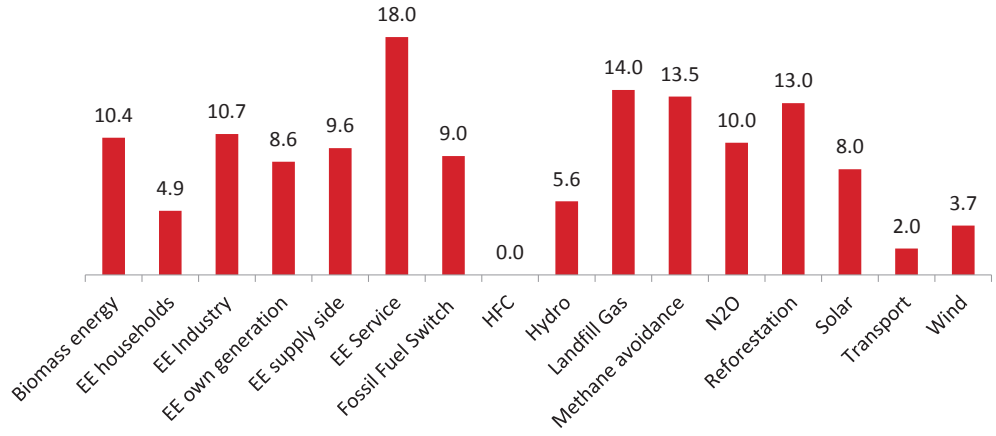
EE households, EE supply side, N2O and fossil fuel switchproject-type in the sample have gained on account of their contribution to both transferring direct/indirect financial benefit to the local and/or regional economy and by generating local/regional jobs.

Solar, transport and EE service project-types in the sample contributed solely through transfer of direct/indirect financial benefit to the local and/or regional economy. For wind, EE industry and landfill gas project-types, most of the contribution was on account of their contribution to direct/indirect financial benefit to the local and/or regional economy and local job creation.

F. Secondary Environmental Dimension

The highest performing project-types in the sample on the secondary environmental dimension are EE service, reforestation, methane avoidance and landfill gas. The scores for secondary environmental dimension are illustrated in Figure 18. These project-types haveundertaken local community initiatives in areas of providing clean drinking water, recycling solid waste and protection of biodiversity through tree plantation. For all the four project-types in the sample, contribution to community infrastructures in efficient utilization and improvement/protection of natural resourceswas more prominent.

Figure 18
Scores on secondary Environment Dimension (Max score- 32)



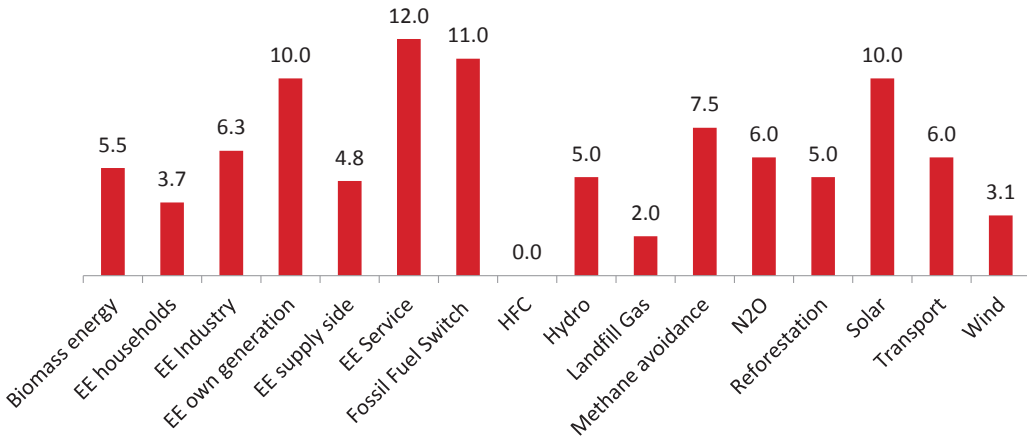
EE industry, EE supply side, N2O, fossil fuel switch, biomass energy and EE own generation-project-types in the sample scored on account of promotion of efficient utilisation of natural resources and reduction in noise/ odour/dust/pollutants. Solar project-type in the sample gained by virtue of their impact on energy utilities and promotion of renewable energy.

Hydro, EE households, wind and transport project-types in the sample gained because of their contribution to promotion of efficient utilisation of natural resources and their impact on reduction in noise/ odour/dust/pollutants. EE household project-types benefitted from their impact on improvement and/ or protection of natural resources and impact on energy utilities. Transport project-types gained entirely on account of their contribution to promotion of efficient utilisation of natural resources.

G. Secondary Social Dimension

EE own generation, EE service, fossil fuel switch and solar CDM projects in the sample had significantly high scores in the secondary social dimension. These scores for secondary social dimension are represented in Figure 19. The scores on the secondary social dimension were found to be higher for large projects or projects undertaken by large companies as they have structured Corporate Social Responsibility programs for local communities.

Figure 19
Scores on secondary Social Dimension(Max score- 12)



The contribution to social dimension is measured through impact on labour conditions/human rights, promotion of education, health and safety, poverty alleviation, engagement of local population and empowerment of women, children or the frail. Methane avoidance, hydro, EE industry and reforestation project-types scored on almost all of these indicators. N2O project-type in the samplecontributed towards promotion of education and engagement of local population. Transport project-type gained equally from impact on health and safety, engagement of local population and empowerment of women, children or the frail.

EE supply side, EE households and wind project-typesscored on at least 5 of the 6 indicators of the social dimension. The score for landfill gas project-type was equally driven by their impact on health and safety and engagement of local population.

H. Secondary Technological Dimension

Secondary technology benefits have been negligible across project-types in the sample. A number of local community initiatives were targeted towards providing access to basic services where there was little scope for technology transfer. Instances of initiatives involving distribution of products (e.g., solar lanterns) allowed the local community to get access to the product but not to the technology. The initiatives that supported livelihoods and capacity building focussed on upliftment of the communities and not on introducing new technology.

I. Combined intrinsic and secondary dimension

The intrinsic and secondary benefits are independent as the former is inherent in project design while the latter depends on the additional voluntary (and mandatory) local community initiatives undertaken by the project proponent. An analysis on the relative performance of individual projects in the sample considering both these benefits together yields useful insight.Figure 20 plots all the renewable energy projects in the sample on their respective scores on the intrinsic and secondary dimensions, totalled across economic, environmental, social and technological dimensions (out of a maximum possible score of 66).Each point represents individual project.

Renewable energy projects (wind, hydro and biomass) have similarities in terms of scores on intrinsic dimension as the scores of all the projects are clustered between 7 and 14. The secondary score of biomass projects exceeds that of wind and hydro projects. Most wind and hydro projects in the sample have scored less than 15 on secondary dimension while biomass projects on the other hand, have scores in excess of 15 on secondary dimension. This observed pattern is on account of multiple factors:

- More environmental initiatives: Wind and hydro projects in the sample did not involve continuing waste generation andtherefore, these projects didnot undertake initiatives in their plants to minimize the harmful impacts of waste discharge. Most initiatives of these projects in the sample were around creation of green belt around the plant boundary and forestation of barren land whereas biomass projects in the sample generated both liquid as well as solid wastes and thus tooksteps to minimize the local impacts of these emissions.
- Greater social benefit: Biomass projects in the sample are developed within the premises of an existing installation e.g. cogeneration in sugar and rice mills, fuel switches to utilize the surplus biomass, etc. These installations have undertaken various social activities for the upliftment of local communities under their Corporate Social Responsibility (CSR) programmes. The advantage of scale and time helped biomass projects in the sample garner

higher score on the social indicators. On the other hand, hydro and wind projects in the sample were set up on greenfield sitesand as CSR programmes have some correlation to a company's profits, these projects in the samplestruggled to initiate community social programmes during the first few years of their operations.

No discernible pattern is observed in the scores of energy efficiency and other project-types. However, projects distributing energy efficient cook-stoves have higher scores on intrinsic and secondary dimensions as compared to those distributing efficient lighting equipment. All the energy efficient cook-stoves projects have been developed by NGOs who inherently have greater community development goals as compared to a company distributing efficient lighting equipment. Figure 21 and Figure 22 plot all the projects in the sample under energy efficiency and other project-types on a XY scatter diagram respectively.

Figure 20
Scores on intrinsic and secondary dimension of renewable energy projects

Note: Each point represents individual project

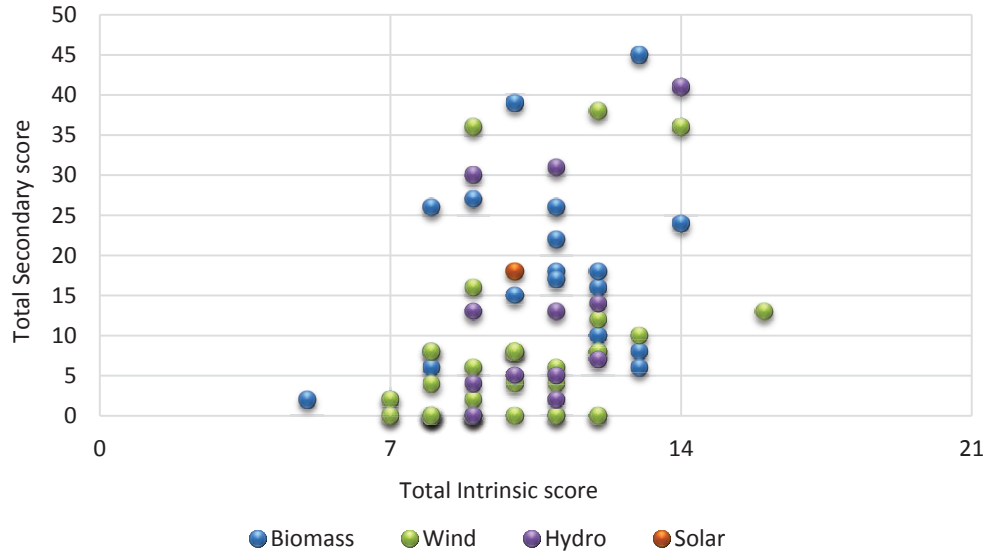


Figure 21
Scores on intrinsic and secondary dimension of energy efficiency projects

Note: Each point represents individual project

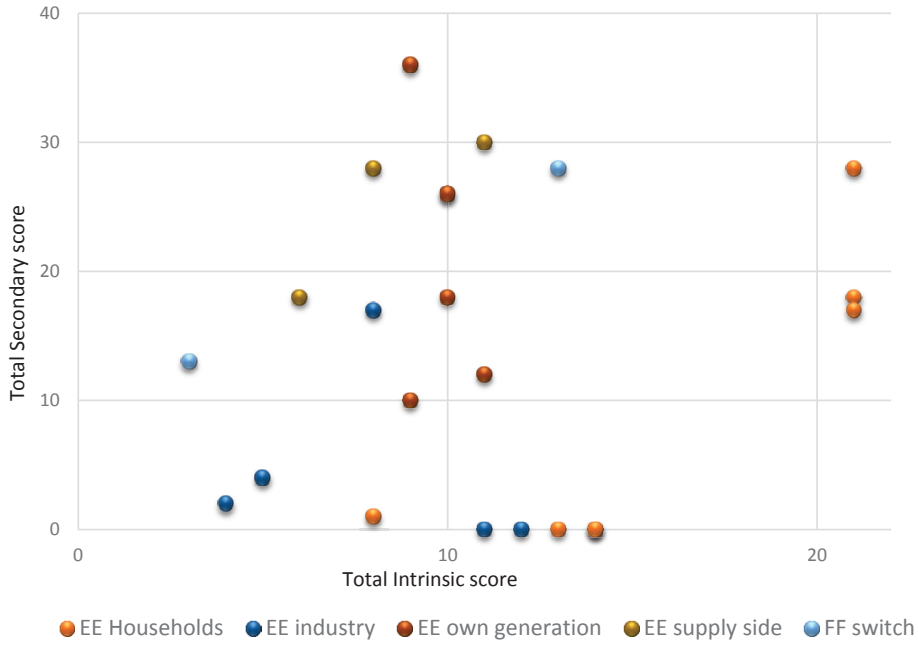
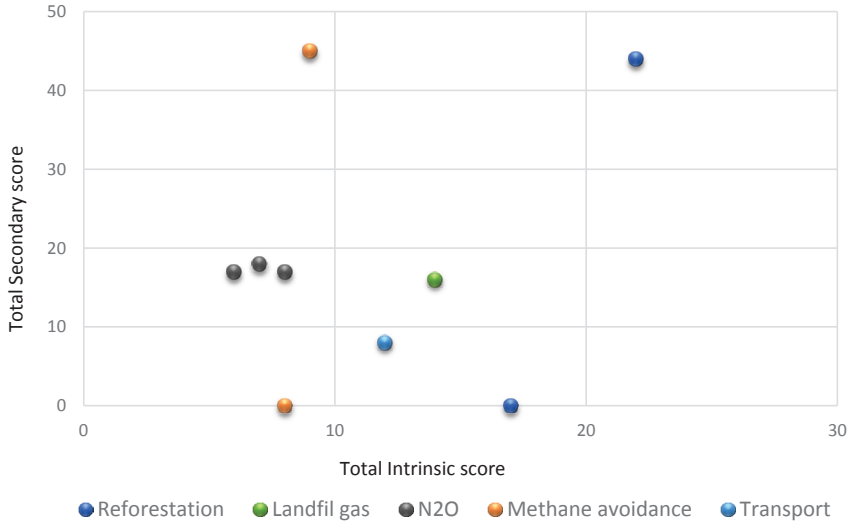


Figure 22
Scores on intrinsic and secondary dimension of other project-types

Note: Each point represents individual project



3.5 Communities and states benefiting from CDM

Local communities have benefitted through direct employment in the CDM project activities. Figure 23 and Figure 24 depicts the percentage of projects in the sample that employed local people (in terms of % of total number of people employed) during the construction and operations phase.

Availability of skilled labour is an important factor in the employment of local communities. EE household, reforestation, hydro and biomass project-types require limited technical expertise during construction or require skills that can be acquired easily and can thus employ more people from the local communities. Refer Text Box 1 for an illustrative list of activities carried out under the economic, social and environmental dimensions by the projects in the sample.

Figure 23
Contribution to local employment during construction

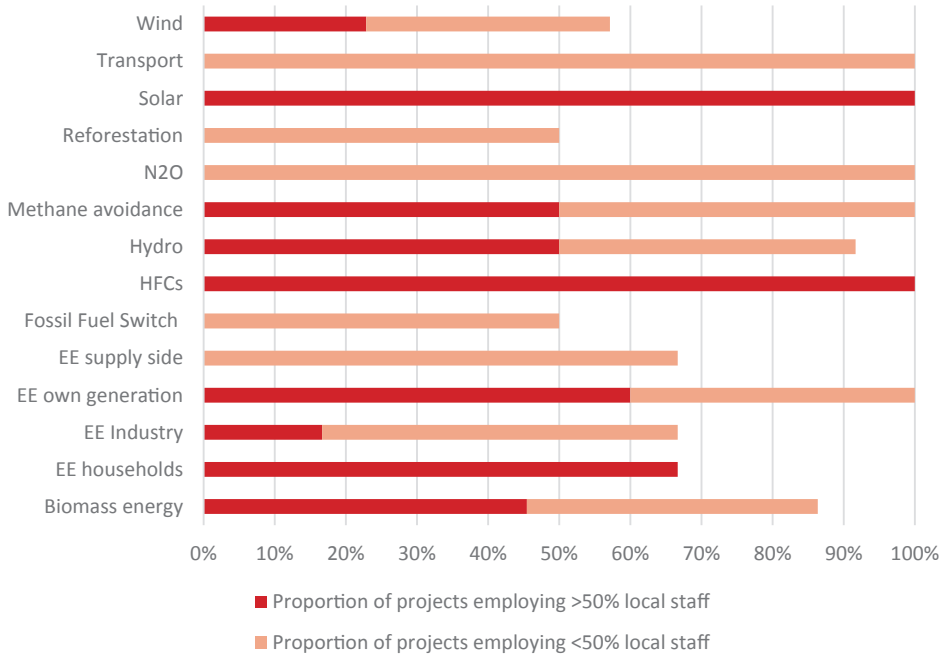
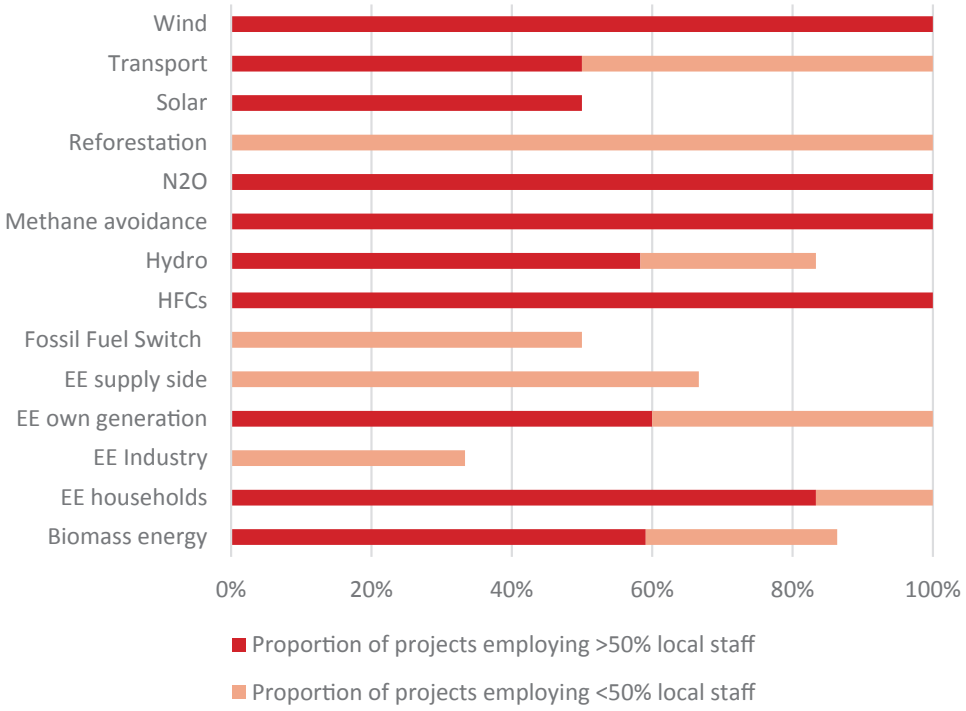


Figure 24
Contribution to local employment during operations



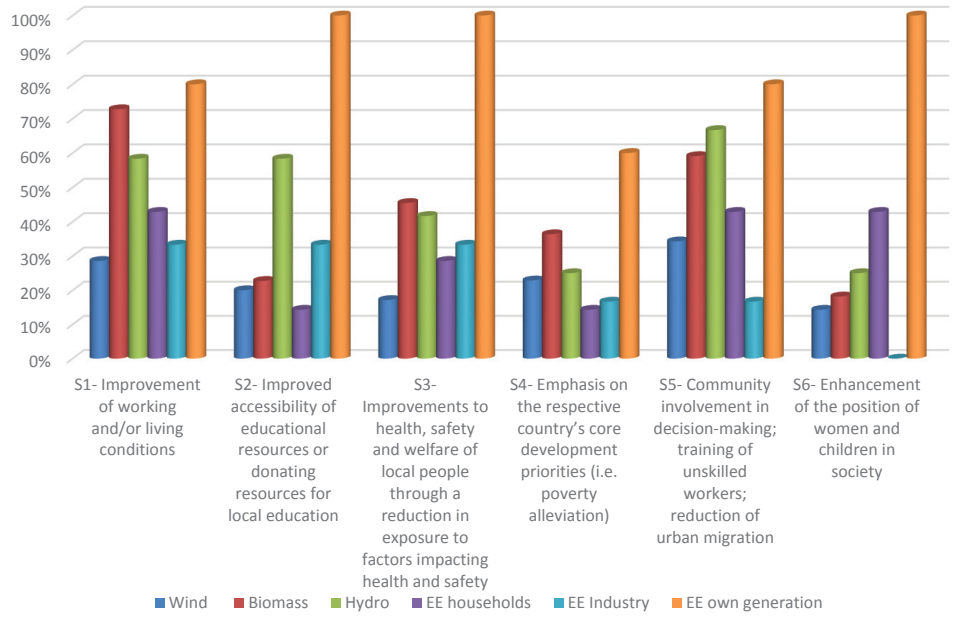
Further analysis on the nature of local community initiatives is presented in Figure 25. It shows the percentage of projects (covering only project-types which had at least 5 responses) that have undertaken social community initiatives on:

- Improvement of working and/or living conditions (S1)
- Improved accessibility of educational resources or donating resources for local education (S2)
- Improvements to health, safety and welfare of local people through a reduction in exposure to factors impacting health and safety (S3)
- Emphasis on the respective country's core development priorities (i.e. poverty alleviation) (S4)
- Community involvement in decision-making; training of unskilled workers; reduction of urban migration (S5)
- Enhancement of the position of women and children in society (S6)

Text Box 1 | Illustrative list of sustainable development activities

Social:	1. Health- Organizing medical camps to promote awareness, free consultations and distribution of free medicine, Mobile Dispensary for the surrounding villages, renovation of existing hospital/dispensaries, etc. 2. Education- Supporting schools/anganwadis[43], providing notebooks, school uniforms and scholarships, Computer literacy program, improving school infrastructure (buildings, flooring, toilets, boundary walls) and provision of equipments like computers. 3. Women empowerment- Training through SHGs on tailoring, soap and detergent making and other income generation activities like making plates from leaves, etc. 4. Community/women empowerment – Formation of SHGs, engaging panchayats (village governing council), awareness programmes on women's rights and her entitlements (e.g. property, land, etc) , promotion of sports etc
Environment:	1. Land reclamation and plantation of trees. 2. Fly ash generated as waste product being used to produce fly ash bricks. 3. Rain water harvesting and recycling and reuse of wastewater. 4. Development of check dams and water recharging structures for effective utilization of groundwater resources. 5. Conservation of top soil
Economic:	1. Training to local communities on agriculture practices, animal husbandry, etc. 2. Training to women through self help groups on soap and detergent preparation, tailoring classes and other income generation activities 3. Relief activities during flood and landslides. 4. Micro credit and asset building through small interventions relating to facilitation of NREGA for employment and as investment into Natural Resources Management. 5. Community infrastructure- Building infrastructure like bore well, check dams, roads, sanitation, public toilets, etc. 6. Livelihoods- Engaging the local communities for plantation in the plant's vicinity, imparting vocational training (driving, computers, etc)

Figure 25 Percentage of projects in the sample undertaking social community initiatives

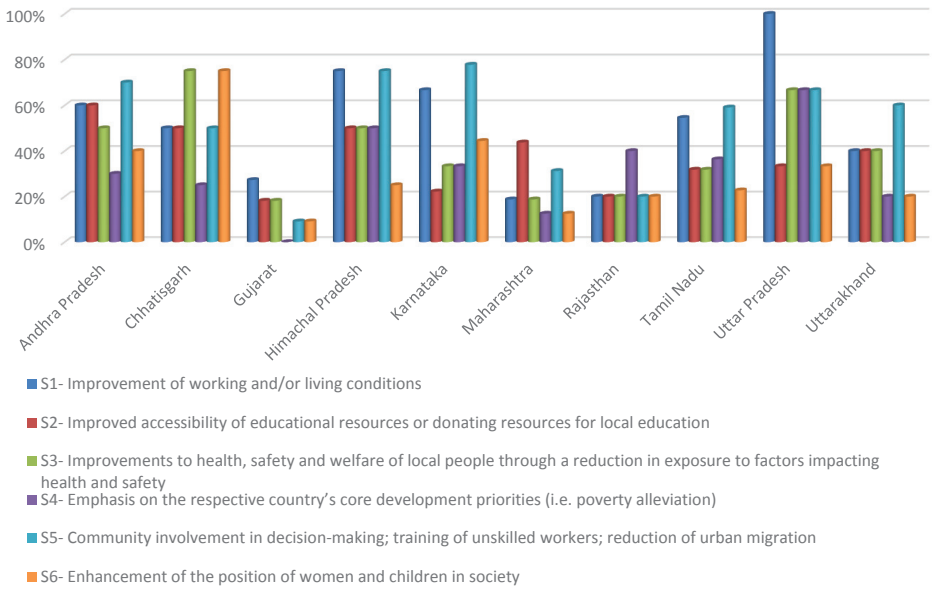


43 Courtyard shelter - They were started by the Indian government in 1975 as part of the Integrated Child Development Services program to combat child hunger and malnutrition.

A greater proportion of projects in the sample belonging to EE own generation, biomass and hydro project-types have undertaken diverse social community initiatives compared to other project-types.

The benefits of these social community initiatives percolate to states which have higher concentrations of these project-types in the sample; Chhattisgarh (EE own generation), Himachal Pradesh (hydro) and Uttar Pradesh (biomass). Andhra Pradesh has benefited from the combined effect of EE own generation and biomass projects in the sample. Gujarat has seen limited benefits from social community initiatives as it hosts relatively few top performing project-types in the sample. Figure 26 shows the percentage of projects undertaking social community initiatives which had at least 5 responses for projects located in that state.

Figure 26
Percentage of projects in various states undertaking social community initiatives

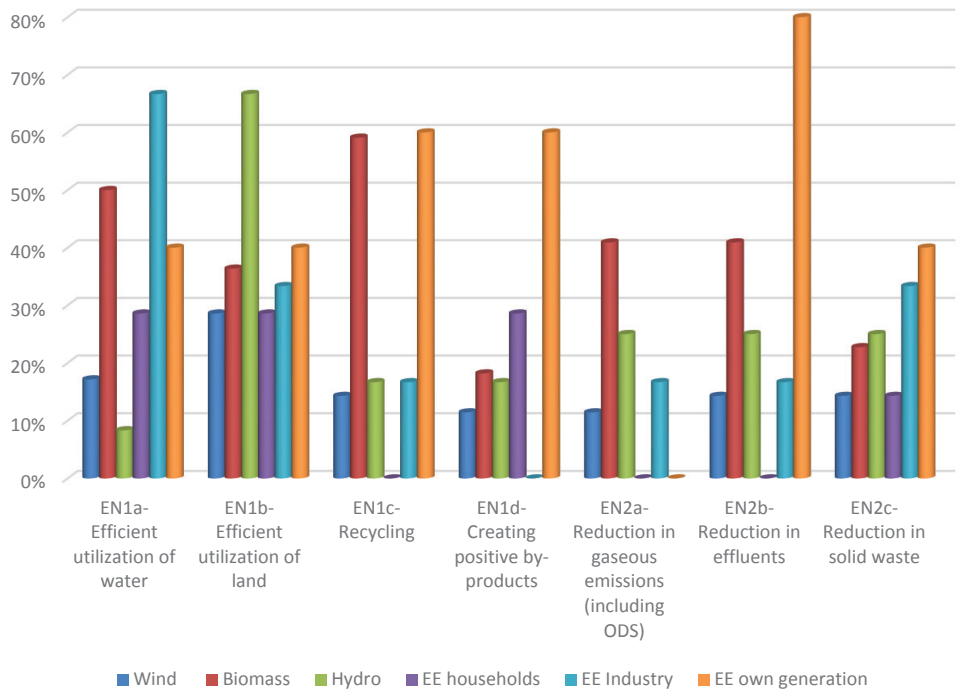


The local community initiatives of projects-types under the environmental dimension (with at least 5 responses to the questionnaire) are clustered on the following indicators:

- Efficient utilization of water (EN 1A)
- Efficient utilization of land (EN 1B)
- Recycling (EN1C)
- Creating positive by-products (EN1D)
- Reduction in gaseous emissions (including ODS) (EN2A)
- Reduction in effluents (EN2B)
- Reduction in solid waste (EN2C)

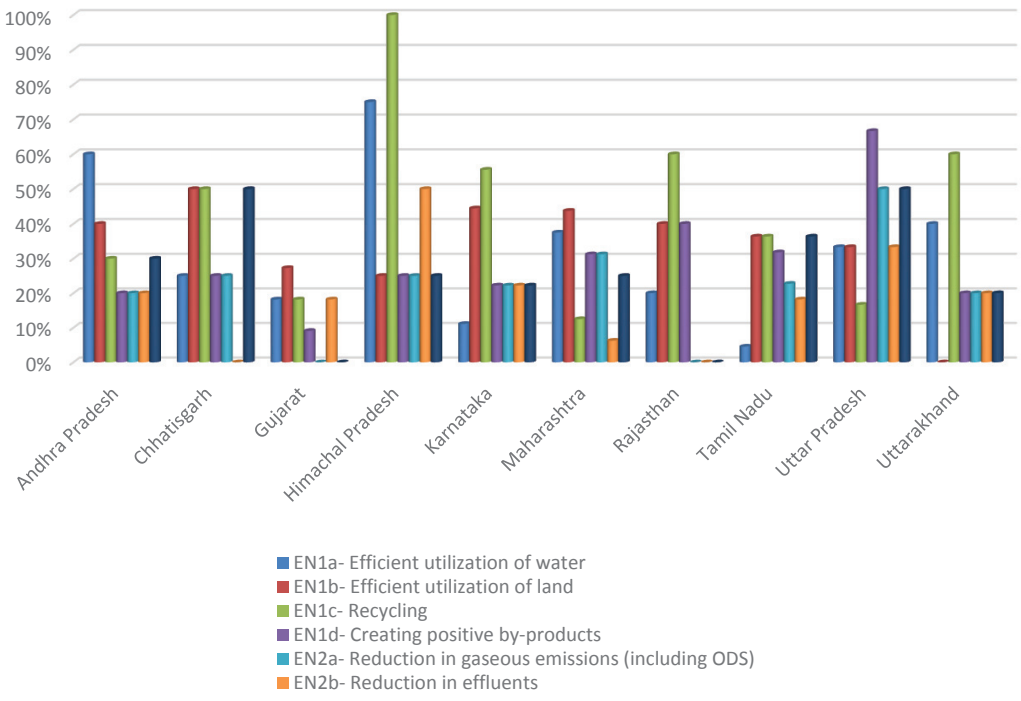
Figure 27 shows the percentage of projects in a project-type that have undertaken environment related community initiatives. Again, more projects belonging to project-types of EE own generation, biomass and hydro have taken local community initiatives on environmental dimensions compared to other project-types. More than 60% of the EE industry projects undertake initiatives to efficiently utilize water and half of these projects also take initiatives to efficiently utilize land and reduce solid waste.

Figure 27
Percentage of projects in the sample impacting environmental dimension



The benefitsof local community initiatives on states in environmental dimension mirrors the observed interrelationship between project-type in the sample and their distribution within a state in social dimension; communities around the CDM projects in Chhattisgarh, Himachal Pradesh and Uttar Pradesh have also benefited from the environment related initiatives undertaken by these projects in the sample. Figure 28shows the percentage of projects impacting the various environmental dimensions in states which had at least 5 responses for projects located in the state.

Figure 28
Percentage of projects in various states impacting environmental indicators



3.5.1 Cumulative Scores and normalized scoresof intrinsic benefits across each dimension for every sector

The analysis reveals that it is the intrinsic sustainable development benefits, which need tobe looked into in order to draw a comparison across sectors. Secondary benefits could not be as accounted to being results of CDM projects or outcomes of CSR initiatives by the projects proponents or the companies. Hence it is necessary to look at the overall cumulative performace of these sectors taking into account all the indicators and sub-indicators. Figure 29depicts the cumulative scores of intrinsic sustainable development benfits for each sectoral scope across all four dimensions namely environmental, economic, social and technological. Explain the first 4 ranks

It is also interesting to see how the scenario regarding the sustainable development benefits respective to the sectors change oncescores across the four dimensions are normalised. Upon normalising,previously strong sectors, viz. Hydro, Biomass and Energy Efficiency Own Generation, lose their cumulative ranking (figure 30) and result as bottom three. On comparing cumulative and the normalised scoring, sectors namely Reforestation, EE households, Landfill gas, and Transport scores the highest. It wasobserved that cumulatively environmental dimension looks like the major contribution in almost all the sectors but this is because the environmental dimension has the maximum number of sub-indicators. With only two sub-indicators, the technology dimension in figure 30 seems to be a majorcontributor.Afternormalization however,the impact of this becomes evident.

Figure 29 Cumulative scores for intrinsic sustainable development benefits for each sectoral scope across all four dimensions

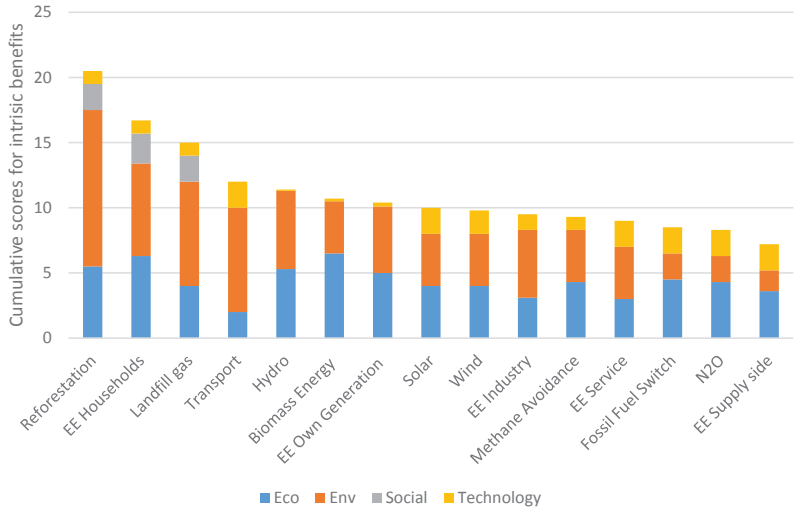
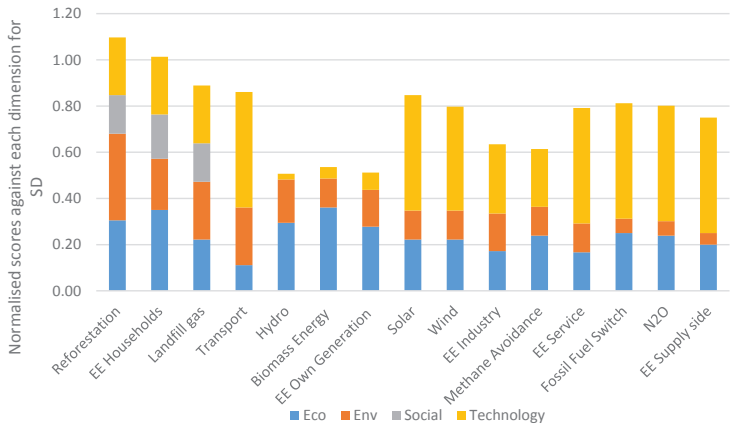


Figure 30 Normalised scores for intrinsic sustainable development benefits for each sectoral scope across all four dimensions



3.6 Diversity of sustainable development benefits

Based on the aggregate score on intrinsic dimension of the project in the sample, three categories have been identified – (a) broad-based, (b) medium, and (c) narrow. The categories reflect the diversity of sustainable development benefits assessed through the number of sustainable development indicators to which a project-type contributes to.It is therefore an indicator of the breadthof sustainability development benefits rather than the depth or value of sustainable development benefits. . In other words, the broad-based category reflects contribution to sustainable development on more indicators within the dimensions of economic, social, environmental and technological as compared to the narrow category. The result of the comparative analysis is shown in Figure 31 below:

Figure 31 Sustainable development benefits by project-type

Broad-based sustainable development impact	Medium sustainable development impact	Narrow sustainable development impact
•Reforestation •EE household •Landfill gas •Transport	•Hydro •Biomass •Wind •Solar •EE own generation	•EE service •Fossil fuel switch •EE Industry •EE supply side •Industrial gases •Methane avoidance

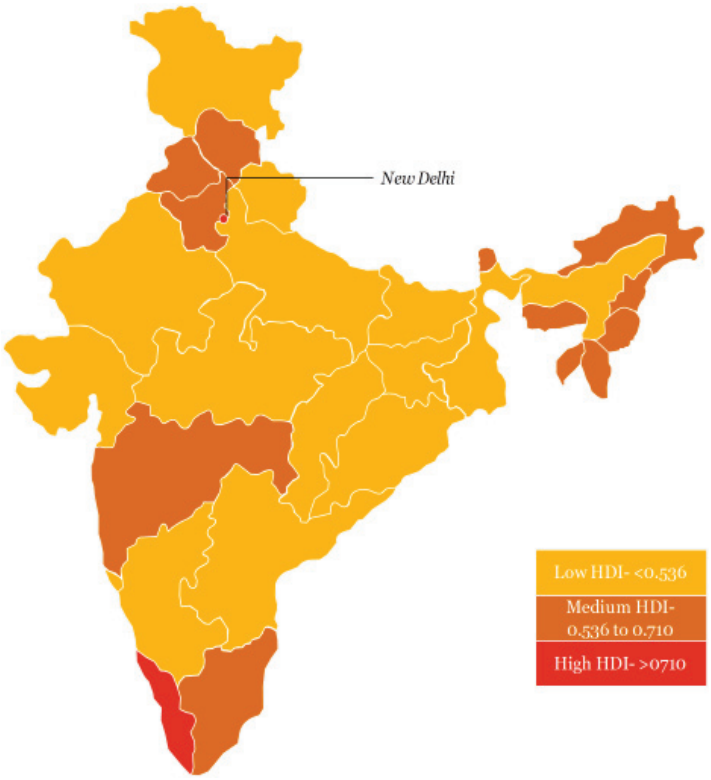
The above categorization also signifies that broad-based category project-types in the sample have a more distributed sustainable development benefit, i.e. landfill gas and transport project-type's benefits are scattered across economic and environment dimensions whereas benefitsof biomass or hydro project-type are clustered on economic dimension. Thus the broad-based category project-types have greater breadth in their sustainable development benefits and address the economic needs of local communities as well as have a positive impact on the local environment and social issues. Narrow category project-types have limited sustainable development benefitsacross all the dimensions.

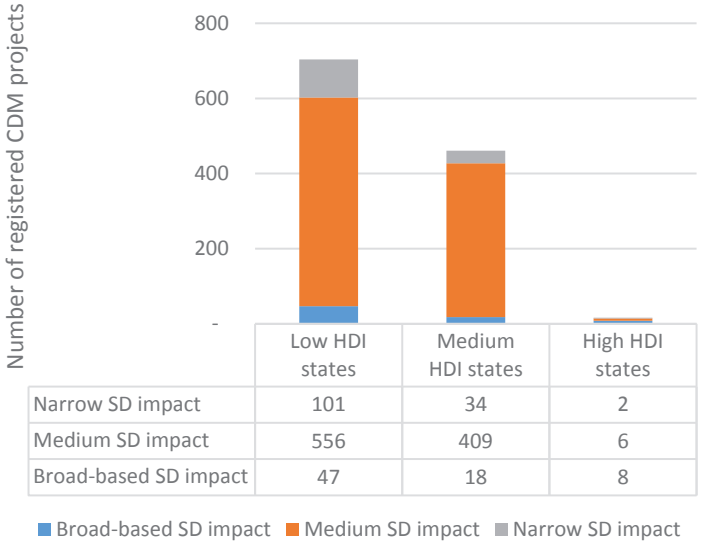
3.7 Geographical context of development of CDM projects

In order to assess the geographic context of CDM projects, a measure of the level of development of the states is required. The Human Development Index (HDI) has been selected as the measure and states have been grouped as high, medium and low range used by UNDP for countries (medium HDI as 0.536 to 0.710[44]). The geographic spread of registered CDM projects within these groups was then analyzed. The spread of registered CDM projects in the country has largely been concentrated in the low HDI states in the country. Low HDI states also host the maximum number of broad-based CDM projects in India and thus benefit from the high intrinsic sustainable development benefits. The high HDI states have seen limited penetration of CDM projects as these are small in number.Figure 32presents the states that have benefitted from CDM.

44 http://hdr.undp.org/en/statistics/faq/

Figure 32
States benefitting from CDM projects





	Low HDI states	Medium HDI states	High HDI states
Narrow SD impact	101	34	2
Medium SD impact	556	409	6
Broad-based SD impact	47	18	8

3.8 Conclusions

CDM projects have contributed to sustainable development

One of the criticisms by various NGOs and other CDM stakeholder groups is that since sustainable development initiatives are not monitored once a project activity is registered, the actual impact of the project activity on sustainable development is not known. This study has attempted to report the benefitsand has found that the projects in the sample made contribution

to sustainable development andsupportedcommunities and states in the country. A majority of CDM projects from India are located in low HDI states. These low HDI states also host majority ofbroad-based sustainable development benefitproject-types.

Projects in the sample perform better than what they mention in the PDD

Various NGOs and other CDM stakeholder groups are of the opinion that since sustainable development initiatives are not monitored once a project activity is registered, the actual impact of the project activity on sustainable development will fall short of claims made in the PDD. In the sample of projects covered in this study, it was found that contribution to sustainable development and benefits to local communities have been higher than reported in the PDDs.

A balance between intrinsic and secondary benefits

The analysis shows that a majority of CDM projects in the sample do not contribute to intrinsic indicators in the social dimension as their design restricts contribution only to the economic, environmental and technological dimensions. However, most project proponents of the projects in the sample structure programmes through their CSR activities to increase the impact on social dimension and this is reflected in the high scores on their secondary dimension.

Lack of monitoring of sustainable development impacts of CDM projects

There is currently no mechanism established by NCDMA to receive, compile and monitor the information on sustainable development impact of CDM projects.

3.9 Select case studies of projects

This section presentsselect case studies of the projects for which site visits were carried out. The case studies highlight the community development initiatives being undertaken by these projects of various project-types. Text Box 2 highlights the projects that have taken initiatives that differentiates them from other projects in their project-types.

Hydro Power Project

The project proponent has carried out tree plantation and maintenance activities, involving women Self Help Groups (SHGs). The project proponent has helped develop a Mahila Mandal Bhawan in the surrounding villages. Various vocational trainings are provided to women to promote financial independence and also to promote economic activities in the villages. Health awareness camps are also organised periodically.

The electricity bill of the street lights in the village is also borne by the project proponent.Salaries of the village cleaning staff are alsobeing paid by the project proponent.

Methane Avoidance through a closed anaerobic system– bagasse based pulp and papermill

The project proponent sources water for usage from a nearby river, which is polluted upstream by local dye factories. This water is pre-treated, used in production and the resulting waste water undergoes extensive treatment, after which it is discharged to nearby communities / villages for irrigation free of charge.

The project proponent is involved in vocational trainings (tailoring and bee-keeping) to the women. The project proponent provides Rs.5,000 per acre every year for raising pulp wood plantation. The wood from the plantation is then purchased by the project proponent for its papermill.

Reforestation of severely degraded land in southern India

The lands of tribal farmers were fallow lands which were brought under plantation through this CDM forestry project. The CDM forestry project created avenues for the tribal poor to earn money from wood generated from the fallow land as well as the anticipated CER revenue.

The project proponent has undertaken initiatives in promoting health and awareness in the region. Various medical camps have been conducted with the support of local government doctors and consultants from hospitals to offer free expert consultation for needy people on regular basis. Till date, over 1, 200 members have benefitted from the free consultation and medicines. About 300 patients with vision impairment have been checked and advised for cataract operation free of cost in the past and 160 spectacles have been distributed free of cost.

Solar PV based lighting systems for rural households with no prior access to electricity

This project was meant mainly for the dalit households who did not have electricity connection. The project was later extended to the other households also, who were poor, did not have electricity connection and solely depended on the kerosene lamp for lighting.

With the use of solar lamps, children are able to read and write in better light away from pollution. Moreover, with the soot free household environment, general health has improved. Better lighting has also increased alternate economic activities as many of the villagers can undertake additional income generating activities like flower tying and selling activities.


Destruction of N2O in a nitric acid plant

The project proponent has been contributing to sustainable development activities in and around the project area. The activities include development of the local environment, health and education facilities. The project proponent has created check dams in the water stressed regions in the vicinity of the project area and has plans for more such activities in order to improve water availability in the area. The project proponent has also set up one of the biggest sewage treatment plants in India. The company operates 2 hospitals in its residential colonies, which are also open to the other local communities. A regular publication 'Sheti Patrika' is also distributed among farmers which contains the relevant information on the topics like latest techniques in farming and balanced use of fertilizers.

Closing of an existing Municipal SolidWaste disposal landfill site andmethane capture and its destruction

The project activity has led to a number of benefits for the people living in the vicinity of the area. The overall air quality of the area has improved as there are no further emissions of toxic fumes and foul smell from the landfill. Earlier, waste used to overflow into the nearby water body, causing damage to the marine life. Since the implementation of the project activity, there has been a visible improvement in the quality of marine life. Improvement in the marine environment has resulted in development of the fishing industry, directly benefitting the fishermen-living in the vicinity.

Energy efficiency in power generation

The project proponent, as part of its sustainable development initiatives, has been involved in developing education, community health, livelihoods and infrastructure in the region. The project proponent has provided uniforms, school bags, bicycles, sports material and school furniture to the local schools/anganwadis. The company regularly organises health camps and provides aid for surgical treatment.

The project proponent has been organising vaccination camps for cattle, horticulture and plantation activities and capacity building programs for SHGs and farmers. Training on dairy based livelihood, honey bee keeping and paper plate making have been conducted with the local women. The project proponent has promoted water conservation practices in the area. Over the past few years, trainings on improved agriculture practices have alsobeen provided.

Biomass based power plant supplying electricity to the state grid

The project proponent has been very active in promoting education in the region. The company organises training and internship programmes for students belonging to technical institutes like ITI, Polytechnic and engineering colleges. Recently, around 4 students from these institutes were hired by the company. During the construction phase, the project employed about 500 people from the nearby village on a temporary basis. The project has also employed about 64 people from the nearby villages on a permanent basis. The project activity has indirectly led to an increase in business for local tea stalls, eateries, local transport, etc.

The project activity involves generation of electricity using wind power

The project proponent has been involved in various sustainable development initiatives in the region through the WEG technology supplier. The nature of a wind power project is such that the technology provider has direct interaction with the local communities while the owners may be located elsewhere. The technology provider, as part of its CSR initiatives at the project sites, has tied up with a NGO for community development initiatives. As a part of its initiatives, the technology provider helped develop a Village Development Committee (VDC) for the villages around the project sites. The task of the VDC is to coordinate with the technology provider for the developmental activities in the region. Every year, the VDC develops a proposal with a set of areas which require developmental support and presents it to the CSR team of the technology provider. The technology provider, after discussions with the VDC then selects 2-3 such activities for the year.

Biomass based power plant supplying electricity to the state grid

The project proponent has been very active in promoting education in the region. The company organises training and internship programmes for students belonging to technical institutes like ITI, Polytechnic and engineering colleges. Recently, around 4 students from these institutes were hired by the company. During the construction phase, the project employed about 500 people from the nearby village on a temporary basis. The project has also employed about 64 people from the nearby villages on a permanent basis. The project activity has indirectly led to an increase in business for local tea stalls, eateries, local transport, etc.

Natural gas based combinedcycle powerplant

A training centre for tailoring is being established by the project proponent. Around 4 staff members are specifically engaged with this task. The centre also supports the stakeholders in terms of locating the buyers for finished products. Around of 150 women have participated in the training programs till now.

The project activity involves distribution of improved cookstoves in over 100 villages

The project proponent is engaged in community-based rehabilitation of people with disabilities and care of people with HIV/AIDS. The project proponent is in the process of promoting 110 village climate change committees in Yelburga taluk of Koppal district. The project proponent is also involved in promoting financial independence of women through setting up Self Help Groups (SHG) in villages across Karnataka.

The cookstoves program has led to an overall improvement in the health and economics of the region as households now require 50% less fuel wood and the new cookstoves produce negligible smoke. The project proponent has helped in developing a red alert cell in the regional office of the Deputy Commissioner from where it tracks maternal deaths, infant deaths and anaemia in women.

Text Box 2 | Examples of community initiatives

Health	1. A company in the outskirt of Delhi works in the area of health for the local communities. However, its activities are not restricted to just organizing health camps but extends to creating a linkage with the community in an integrated manner. It keeps a health record of all the community members and updates its record after every health check-up. This ensures that the members are given the right care based on their health condition. 2. A hydro power project has created a system that allows local village Panchayat/ Local Body to have its say in implementation of Local Area Development works by involving Local Panchayat in decision making process
Engaging the local communities:	3. A project's construction in Sikkim has provided many opportunities to the local inhabitants, particularly the young people. The project directly as well as through their contractors has ensured that local population are given preference and are absorbed in the project. The project has also provided opportunities to many unskilled youth to develop skills. The technical skill opens different avenues of employment for the youth. Enhancement of skills through training and employment in the project has resulted in upliftment of the standard of living of the local inhabitants and enhances the economic status of the population. Besides generating local employment for skilled and unskilled labourer, the project has also provided an opportunity for the local people to compete for various project works related contracts. There have also been sufficient opportunities for indirect income generating activities, such as providing services to contractors, opening small and medium sized market place/ shops, etc. 4. A company in Jharkhand has facilitated training of marginal farmers on newer and more scientific methods of agriculture so that the productivity of their land increases. It works with the paddy growing farmers and helps them improve their paddy yields through the System of Rice Intensification (SRI). They have also been imparting vocational skills linking youth to the entry level jobs in organized sector. The objective is to convert the potential talent pool into a trained and readily employable force. Utilizing a pool of resource persons, the company has been conducting in-house trainings on site safety supervision, plumbing and sanitation and traffic safety management. It also collaborated with external agencies to impart training on computer, motor driving, nursing, sewing and fashion designing.
Engaging women SHGs:	5. Projects target women empowerment by creating additional income generation opportunities for women through self help groups. A project in Himachal Pradesh has helped local women to acquire the skill of making plates from leaves called 'pattaldona'. They have also installed a machine, renovated the SHG centre and engage with them for tree plantation around the project activity. Women are also trained in various other income generation activities like tailoring, soap making, etc.
Cost saving for the local communities:	6. Many large projects have financed the installation of solar street lights in the near-by villages. This ensures that there is no additional financial burden of electricity bills on the villages and they have access to clean energy. 7. A methane avoidance project in Maharashtra has distributed high efficiency biogas cook stoves in the nearby villages. This leads to cost saving for the communities and also ensures a cleaner source of energy.
Clean drinking water	8. A company in Maharashtra is providing drinking water to several nearby villages and also maintains the pipelines.

Chapter highlights

- In the responses received, the sustainable development impacts are higher than what is reportedin the PDDs. Large scale projects in the sample spend more than 2% of the CER revenues towards on local community initiatives.
- CDM has lead to an estimated investment of INR 1.6 trillion in India since its inception in 2004.
- Biomass CDM projects in the sample are the most efficient job creator and creates more than four times the average jobs (per rupee invested) across all project-types.
- Renewable energy projects in the sample perform better than energy efficiency projects in the sample on intrinsic economic dimension. Only reforestation, EE household and landfill gas project-types have intrinsic social impacts. Reforestation, EE household, landfill gas and transport have broad-based sustainable development impacts
- Reforestation, EE household, Landfill gas and Transport projects in the sample have broad based sustainable development impacts; Hydro, Biomass, Wind, Solar, EE own generation have medium sustainable development impacts; and other project-types have narrow sustainable development impacts.

SECTION 4

CDM Project Implementation

CDM implementation and registration follows a structured process guided largely by the CDM Executive Board procedures and prevailing practice on transaction of CERs. Some of the key steps in the CDM process are as follows:

- Development of a baseline and monitoring methodology, if no approved methodology is available for the planned project
- Development of Project Design Document (PDD)
- Host Country Approval (HCA)
- Validation of project through a UNFCCC accredited Designated Operational Entity (DOE)
- Development of Monitoring Report (MR)
- Verification of MR through a UNFCCC accredited DOE
- Issuance and transaction of CERs. Transactions can also be done under forward contracts in earlier stages of the project cycle

This chapter analyzes the project registration and issuance trends from the point of view of project-types, project developer types, geographies, etc. UNEP Risoe CDM pipeline has been used as data source.

The success of CDM in India has largely been due to aggressive private sector participation, availability of resources (consulting firms, DOEs) along with operational and proactive NCD-MA. Having said that, there have been instances where the project proponents have faced various barriers during the development of CDM projects. This chapter reports on the barriers in implementation of CDM projects based on discussions with project proponents as part of site visit for selected projects, information collected through questionnaires, interview of some of the DOEs operating in Indian market and information available in public domain. The review and analysis of barriers has been categorized under regulatory barriers (international / national),

organizational / institutional barriers, technological barriers, financial barriers and others barriers (post 2012).

4.1 Analysis of barriers in CDM project implementation

A. Regulatory barriers

The EU restriction on the use of CERs from all project-types that are registered after 31 December 2012 is unfair to India as there are backward districts in India where the level of socioeconomic development similar to LDC. Most backward districts in India have more than 50% of the population having income below the poverty line and World Bank has estimated that 32.7% of the Indian population falls below the international poverty line of US$ 1.25[45]. UNFCCC also categorizes regions that have more than 50% of its population on income less than US$ 2 per day as special underdeveloped zones (SUZs) and recommends automatic additionality of CDM projects. However, the restriction imposed by EU of new CDM projects also extends to these underdeveloped zones.

CERs from HFC projects are not permitted under EU ETS. It is possible that EU may restrict supply from other project-types registered before 31 December 2012. The project-types that are can be targeted are potentially large sources of emission reductions, project-types where the cost of mitigation is very low, project-types that are exposed to environmental and social risks, project-types that suffer from negative perceptions are likely to be at risk and projects-types that are added under a PoA registered before 31 December 2012, etc. A preliminary assessment shows that the following project-types may be susceptible to further restrictions:

Table 7 | Project types already facing or likely to face regulatory restrictions

Project-type	Annual ER potential[46]	Assessment
Supercritical coal based power plant	8.5 million	Supercritical coal based power plants from India are at the highest risk of being targeted as almost all the registered projects are from India and their ER potential is also high.
Large hydro power plants	10 million	EU has restricted the use CERs from non-World Council of Dam (WCD) large hydro projects compliant projects in its ETS. There is a possibility that this restriction might be extended to WCD compliant hydro projects as well.
CPAs from POAs registered before 31 December 2012 (9 POAs from India have been registered)	NA	The present EU restriction applies to new CDM projects registered post 2012 but allows CERs from CPAs added after 2012. There is a possibility that further restrictions could also be applied to CPAs that will be added to registered POAs from India if found by the EU to be a vehicle circumventing the restrictions for single projects.

A key concern highlighted by project proponents is the frequent revisions to CDM EB guidelines and methodologies for project validation and registration. The project proponents are of the opinion that UNFCCC does not impose any time restriction for the completion of validation by DOEs and the process is delayed. The DOEs cite the technical review stage as the major reason for the delay as the technical reviewers are significantly limited in numbers. The registration process is also delayed as a result of revision in methodology.

45 http://povertydata.worldbank.org/poverty/country/IND
46 CERs from projects from India registered before 31 December 2012

Requirement of revision/deviation in the monitoring plan after registration is the major reason cited by project proponents as the reason for delay. N2O abatement projects and wind projects have also cited this as a major cause for delay in issuance of CERs. This issue has finally been addressed by CDM EB's in the latest Validation and Verification Standard tool as registered projects now no longer require separate revision/deviations in monitoring. The request can now be submitted along with the request for issuance of CERs.

Complex monitoring requirements has been cited by project proponents of reforestation, N2O abatement and methane avoidance projects. The monitoring under these projects is complex because of the inherent limitation / complexity of use of monitoring technologies. Projects in the transport project-type also face barriers because of complex MRV requirement of the methodology.

Text Box 3 | Case studies of few regulatory barriers faced by Indian CDM projects

Supercritical power projects:

Supercritical power plants are developed under CDM using the approved methodology ACM 13. The methodology was approved in 2007. India had also embarked its journey of developing supercritical power plants around the same time and leveraged the additional revenues from CERs to make their investments viable. Indian projects took the lead in CDM registration and presently have 5 out of the 6 projects registered under the methodology.

However, the recent changes to the methodology have proved detrimental to Indian projects. The version 5.0.0 of the methodology was approved in September 2012 but introduced additional requirements that are difficult for Indian projects to comply. The methodology requires data on electricity generation, fuel consumed and average net calorific value (NCV) of individual power plant units for the establishment of baseline under the methodology. While data on electricity generation for the power plants in available in the national CO2 database (maintained and updated by Central Electricity Authority), data on unit-wise fuel consumption and average NCV is not maintained by power plants in India.

Renewable energy certificates as E+ or E-:

There is a lot of ambiguity on consideration of E+/E- policies (E+ policies are those which give comparative advantage to more emissions intensive technologies or fuels and E- policiesare those which give comparative advantage to less emissions intensive technologies or fuels) in baseline and additionality of CDM projects. EB 22 Annex 3 states that only those policies which have been implemented before the adoption of Kyoto Protocol shall be taken into account while developing the baseline scenario. Further, it was stated in EB 53 Annex 32 that this guidance on national and sectoral policies be applied in the determination and assessment of input values used in the investment analysis.

However, when the REC mechanism was launched to promote investment in renewable energy in India, its inclusion in baseline and additionality was unclear. A clarification was sought from the Executive Board by the DoE Bureau Veritas Certification (BVC) regarding applicability of guidance on E+/E- policy (EB 53 Annex 32) in the context of REC regime in India. The response received from Executive Board clearly stated that project participants should be using the additionality analysis based on the policy in place as of 11 November 2001.

In spite of the clarification, many projects have come under review by the UNFCCC on the applicability of REC in investment analysis. These reviews have again raised suspicion on the use of REC benefits while applying the investment analysis. A clear guideline/clarification from UNFCCC for such issues would be helpful in paving the way for smoother validation process.

Regulatory barriers on the national level include requirements regarding licenses and specific background documentation for projects for DNA approval are inconsistent and do not take into account several states have no such documentary processes in place. State agencies took a considerable amount of time in providing additional endorsements required by NCDMA. The key reported issues are:

- Biomass assessment report endorsement by state nodal agency
- Land transfer in the name of project proponent (in case of revenue land / forest land) where in-principle approval was given by state government or Ministry of Environment & Forests / Conservator of Forests
- Land transfer from EPC Contractor to the investors (in case of wind energy projects).

B. Organizational / Institutional Barriers

Several project proponents reported that there has been little support from NCDMA for activities beyond DNA approval. They have to depend upon the consultants for status updates and issues with their projects, but the consultants have no locus standi once the project is submitted to UNFCCC or the cases where the DOE advises the project proponents to withdraw the project or issues a negative report. The project proponents expect support from the national authorities like NCDMA on aspects like:

- Guidance on management of international contracts (ERPAs) and acceptable CER price level: This was particularly relevant in the early days of CDM due to the absence of secondary markets. In order to conclude forward transactions with advance payments, country guarantees were asked by buyers, which was difficult for small project owners and they have to sell CERs in spot market and could not lock value of their commodity when the price was attractive.
- Seeking clarification from UNFCCC when two similar projects were submitted to UNFCCC with request for registration and one failed to register / called for request for review: several project proponents expect that NCDMA should reach out to UNFCCC where it is necessary to seek clarification or further information from the UNFCCC.
- Development of baseline for various sectors (in-line with the electricity grid emission factor published by CEA) which is easy to adopt and acceptable to DOEs and CDM Executive Board: Investors in the electricity sector also complained about government agency not helping to meet the additional requirements set out in the revised coal power plant baseline methodology ACM0013. The unavailability of the data required after the revision led to several Indian projects missing in December 31, 2012 deadline for registration. According to some of the project proponents, India should have followed the developments of this methodology and proactively provided the required information.
- A large number of wind energy projects spent considerable time in validation due to rejection of benchmark rate of returns based on the state electricity regulatory commissions tariff orders. It took more than one year for the CDM EB to accept the revised Weighted Average Cost of Capital (WACC) as appropriate benchmark for investment analysis.

In addition to this, barriers were reported in projects involving multiple owners / bundled projects. A notable exception is the Bachat Lamp Yojna[47] (BLY), which was supported by government of India through an innovative institutional arrangement. An attempt by private sector (wind turbine manufacturers) in this direction through aggregation of multiple investors re-

47 The large scale CFL distribution program manage by Bureau of Energy Efficiency (BEE- Government of India)

sulted in reduction of CDM development costs resulting in up-scaling of such initiatives across geographies in the country. Similar attempts in other sectors to replicate the success of BLY / wind project-type were made in one project-type but limitations such as administrative hurdles of entering into agreement with multiple beneficiaries/investors, lack of commitment, difficulty in inducing beneficiaries to comply with CDM additionality and MRV requirements have led to limited success.

Similarly limited participation in reforestation, EE household, EE in small and medium enterprises (SME) and agriculture was reported to be on account of complex program management issues due to involvement of multiple communities in a single activity and extensive baseline data and monitoring requirements.

C. Technological barriers

There are several sectors in India, which could not attain success due to limited availability of technology. One such example is waste management / landfill gas projects in India. There are issues pertaining to segregating waste, identifying appropriate waste-to-energy technologies, operational challenges, etc. International support through state-of-the-art technology may address the hurdles faced by such opportunities. Similarly transportation and building energy efficiencies are some of the other sectors where availability of best available technology will help in capturing the available potential.

D. Financial barrier

There are three major financial barriers reported by the project proponents:

- Additional investment requirements for MRV: this has been reported mainly by small scale project proponents where additional equipments are required to monitor the performance of the project / CDM intervention (energy efficiency projects)
- Non-recognition of CDM revenues as one of the possible additional revenue streams in the loan appraisal by financial institutions. CDM registration did not lead to better financing terms (e.g. higher debt equity ratio, lower interest rate) in most instances.
- High transaction cost has been the common reason cited by many first generation entrepreneurs and small investors. Even if they are aware of the UNFCCC waiver of advance payment of registration fee yet consulting and validation fee continue to be significant for them. In addition to this, uncertain value of the CERs (lack of minimum guaranteed price) reduced participation.

E. Other barriers post 2012

The analysis in the chapter 2 highlighted the extremely low CER prices and dim prospects of price recovery. Projects that primarily relied on CDM to fund their operating cost and do not have any other source of income face the risk of closure. These projects belong to HFC-23, N2O and landfill gas (where these is no energy generation) project-types. While some of these projects may have completed their crediting period, others are likely to go a further few years. Some of these projects like HFC-23 have been faced criticism in the past and can potentially face more criticism if they stop operations because of lack of CER revenues.

F. Reasons why projects with broad-based sustainable development benefits did not gain ground under CDM

The previous chapter on 'CDM and Sustainable Development in India' categorised sectoral scopes based on the aggregate score of intrinsic benefits of the project into a) broad-based b) medium and c) narrow considering the breadth of sustainable development benefits in the sectors (explained in detail in the previous chapter). Sectoral scopes like Reforestation, Landfill gas, Transport, EE household fall in the broad-based category.However it is interesting to note that these sectors have not garnered enough support from private, public or civil societies as far as implementation under the CDM is concerned. It is worthwhile to analyse and report reasons why these sectors did not gain ground under CDM as these sectors are the sectors that would have met the dual objective of sustainable development and emission reduction in the country. The table 8 below briefly gives major reasons why these sectors account for less than 10% in total.

Table 8 | Major Reasons for poor penetration of sectors with broad-based sustainable development impacts

S. no.	Sector	SD Impact	Major reasons for poor penetration amongst others
1	Reforestation	Broad-based	a) Non-permanence - Carbon removals by forests are considered to be only temporary. The temporary nature of carbon sequestration by forests was taken into account by special types of expiring carbon credits b) The negotiation of modalities and procedures for forestry CDM took two years longer than for other CDM sectors (e.g. energy), which also caused delay in investment in this sector c) The market for temporary credits from forestry is limited as EU decided to exclude forestry credits from the EU ETS, which is the biggest carbon market thus keeping forestry credits out of reach of one of the major demand groups d) Cost benefit constraints – Investors face high initial costs and delayed returns, which demands the availability of initial investment capital and the ability to wait for revenues e) Tedious, time consuming bureaucratic process, complicated methodological requirements - Difficulty in establishing land eligibility, additionality and complex monitoring requirements, and leakage amongst others f) Availability of forest growth data, forest inventory data and aerial images for project documentation is also a major hurdle
2	EE House Hold	Broad-based	a) Dispersed nature of emission reductions b) Transaction cost is high as single projects are very small, hence not economically attractive c) Difficulty in calculating emission reductions d) Lack of default factors
3	Landfill Gas	Broad-based	a) High investment cost, low payback period – Investors and lenders view LFG as high risk a) Community opposition concerning environmental impacts of landfill projects. b) Lack of awareness of the characteristics of landfill CDM projects
4	Transport	Broad-based	a) Methodologies are very few only 14 out of 181 – Several methodologies rejected due to unclear baseline and emission reduction calculations (due to diffused nature of emissions). b) Complex and time-consuming procedures required for quantification of emission reductions and for fulfilling UNFCCC requirements c) Huge investment and monitoring issues d) Difficult to be applied for by private sector e) Additionality issues due to large public funding and complex montioring requirements

4.2 Project registration analysis

A. Project registration according to geography

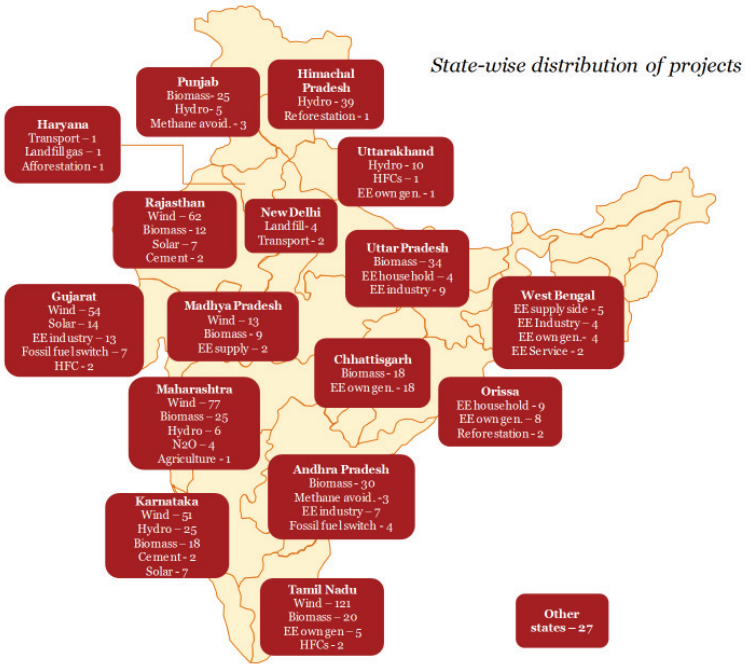
On account of their high wind potential and high level of industrialization Tamil Nadu, Maharashtra, Karnataka, Gujarat and Rajasthan host 60% of CDM projects in India. Localization for the other project-types is as follows:

- Hydro projects are primarily located in Himachal Pradesh and Uttarakhand
- Biomass projects are primarily located in Punjab, Maharashtra and Uttar Pradesh

Several states of India – Bihar, Jammu & Kashmir, Goa, North-Eastern region (Meghalaya, Arunachal Pradesh & Tripura) and Pondicherry have witnessed less than 10 projects (approval by NCDMA). These states have significant potentials which can qualify under CDM :

- Bihar – Fossil fuel and Metal reserves
- Jammu&Kashmir – Hydro
- Goa – Wind & Solar
- North-eastern states - Solar, forestry

Figure 33
Distribution of CDM projects in India

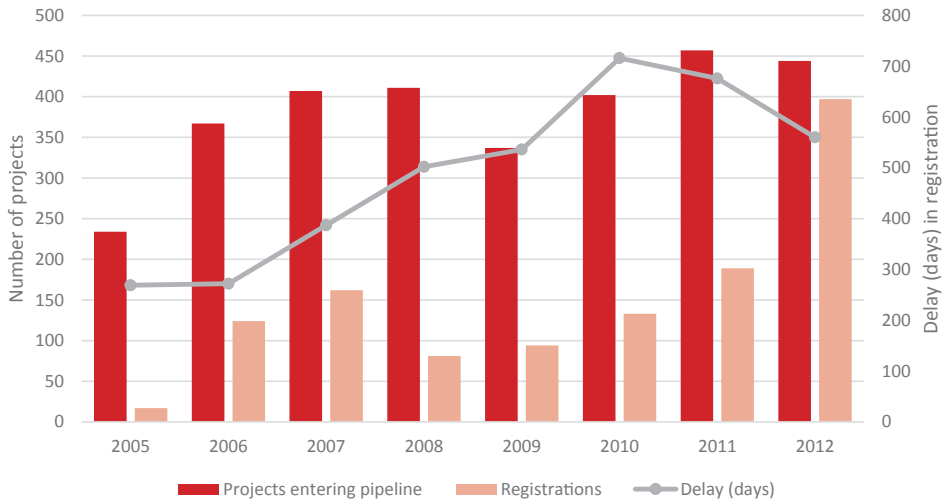


B. Project Registration according to project-types

The first CDM project from India was registered on 8th March 2005 and since then the number of CDM projects getting registered with UNFCCC has gone up each year. The number of registrations fell in 2008 due to the decision of CDM Executive Board's (EB) to discard the benchmarks used by Indian project for demonstration of financial additionality. The issue was resolved in 2009 when EB accepted a proposed methodology for benchmark calculation.

The delay in registration of CDM projects was also due to increase in projects in CDM pipeline and limited increase in the number of new DOEs available for validation of CDM projects. Indian companies attempted to bring this gap by applying for accreditation but their efforts were successful only in 2011. Figure 34 shows the trends of registration of CDM projects since 2005.

Figure 34
Trend of project registration from India



C. Project Registration according to project developer type

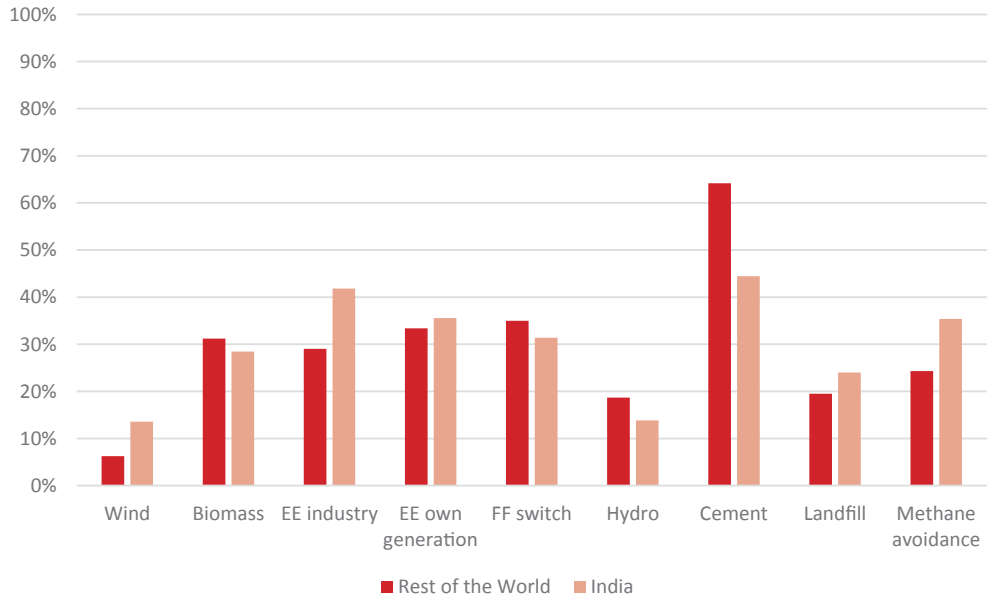
Private sector (91%) has the highest share of CDM projects followed by public sector (8%) and non-government organizations/ foundations (1%). Amongst the private sector, 63% of the companies are listed, while the rest are of them are privately held. 2% of the projects have been developed by multi-nationals in India.

D. Project Rejections by DOE or UNFCCC

25% of the projects that applied for CDM registration from India were rejected during validation stage. This rate of rejection is relatively higher in comparison to the world average of 16%. Wind, energy efficiency, landfill gas and methane avoidance projects from India have witnessed a higher rejection rate as compared to the rest of the world's average. Figure 35 shows the rejection rates of Indian and rest of world's CDM projects.

The cement project-type and energy efficiency have the highest rejection rates whereas wind and hydro have the lowest rates of rejections. Energy efficiency projects have mostly been rejected on account of lack of financial additionality and benchmark. Cement projects had the highest rejection rate as the technology (blending fly ash, gypsum, slag, etc with clinker) adopted by these projects had become a common practice and they could not demonstrate significant barriers to its adoption. The renewable energy projects (wind and hydro) were able to transparently demonstrate additionality through investment analysis, leaving little scope for subjective assessment. Further the baseline data for renewable energy projects could be sourced from CEA CO2 database and as a result renewable energy projects have low rates of rejection.

Figure 35
Rejection rates of project-types

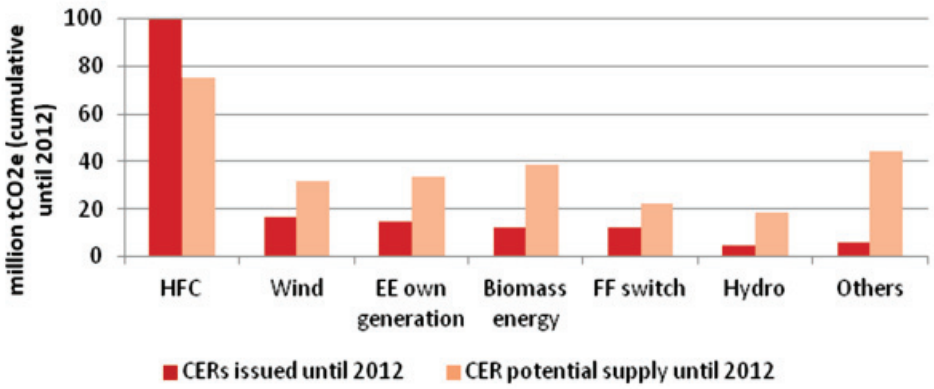


4.3 Project issuance analysis

A. Project issuance according to project-type

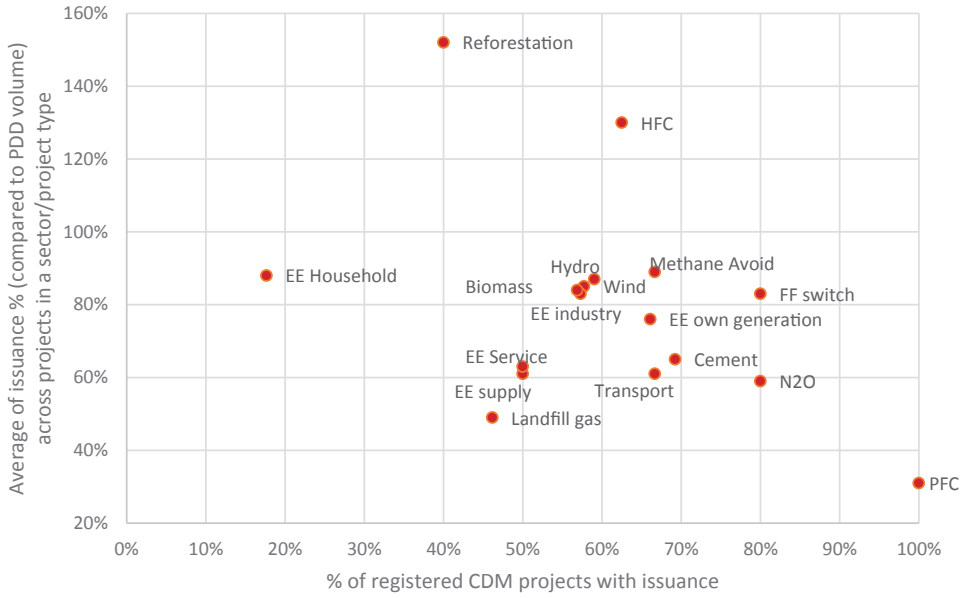
Figure 36 below compares the share of various projects in the CER issuances (up to 2012) and ER potentials (PDD potential volumes up to 2012). The CER issuances are in sharp contrast to the potential of ER expected from these project-types. All the project-types, except HFC have resulted in lower issuance of CERs than expected.

Figure 36
Comparison of share of various project-types in ER potential and issuances



Shortfall in issuance can either be due to underperformance of project as compared to its potential or lack of issuance altogether. These factors are furtheranalyzed in Figure 37 which depicts the fraction of registered projects with successful issuance of CERs and project-type performances as compared to the volume forecasted in PDD of the projects.

Figure 37
Fraction of CDM projects with successful issuances and issuance successes

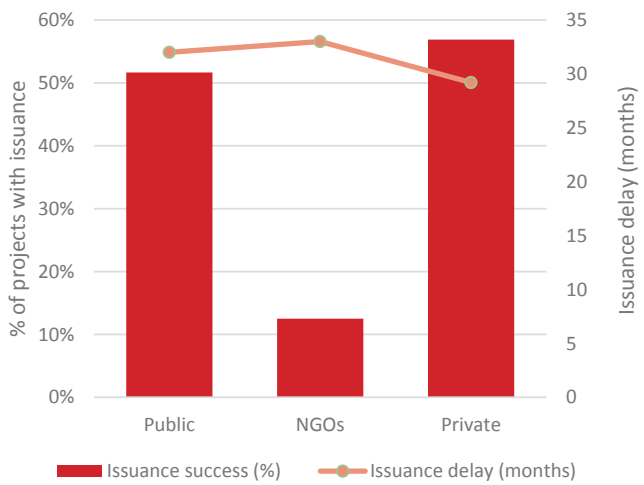


Most projects from India achieve 60%-90% of their emission reduction potential with the exception of reforestation and HFC projects. 40% of the reforestation projects and more than 60% HFC (including all large scale) projects have issuances. High issuance percentage as compared to the PDD volume and high share in projects with successful issuances has helped HFC projects achieve a major share in CERs issued to the Indian projects. EE own generation projects, FF switch projects and renewable energy projects (wind, biomass and hydro) have on an average achieved more than 80% of their ER potential. Due to complex MRV only 17% of EE household projects have successfully seen CER issuance.

B. Project issuance according to project developer type

Figure 38 shows the percentage of projects with issuances and issuance delays. There is no significant difference in project with issuances and issuance delays within the public and private sectors. Due to complex MRV requirements only 12.5% of the projects by NGOs have seen issuance.

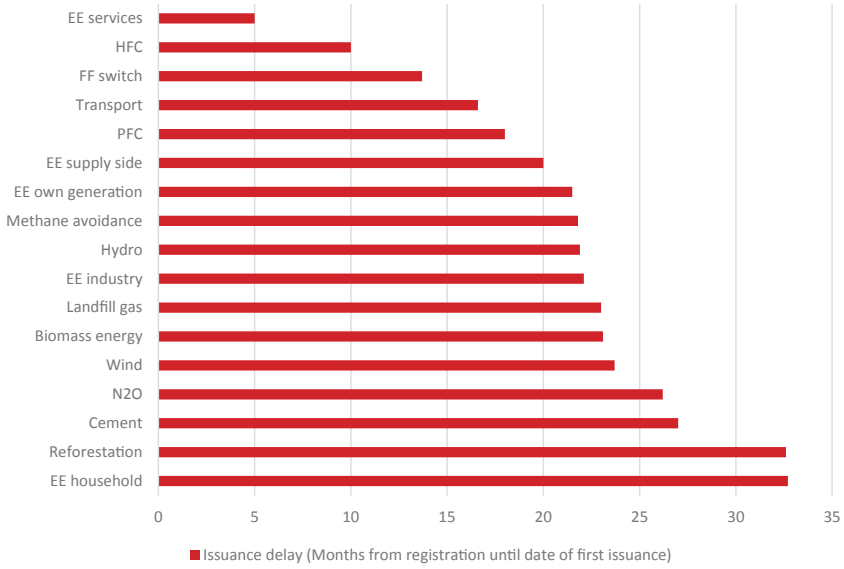
Figure 38
Issuance % and delays by project developer type



C. Issuance delays

The average time taken by a registered project for first issuance of CERs is 20 months from the date of registration. Issuance delays for EE household and reforestation are the highest. Reforestation projects have harvesting cycles and issuance is initiated only at the completion of at least one cycle. This causes the delay in issuance. Issuance delays are also common due to delay in project commissioning. As EE household projects involve distribution of energy efficient equipment, the project completion takes time and thus the verification may be delayed.

Figure 39
Issuance delays



4.4 Conclusions

Barriers for CDM project development in India are of widely varying nature. The different forms are summarized below:

Pre 2012 registered project facing risk

Supercritical coal based power plants, gas based combined cycle power plants, large hydro and CPAs from PoAs might also face restrictions under EU ETS as these project-types have high CER potential and have similarities to projects that have been banned by EU earlier.

Registration delays and rejections

A number of projects have faced delays and rejections because of lack of nationally accepted guidelines on setting benchmark for additionality and performance benchmarks (for example, unit level performance required under ACM0013) as per the recently revised version of the methodology. Similarly in past a large number of wind energy projects spent considerable time in validation due to rejection of benchmark rate of returns based on the state electricity regulatory commissions tariff orders, it took more than one year for the CDM EB to accept the revised Weighted Average Cost of Capital (WACC) based financial modelling as basis for project additionality.

Projects in Reforestation, EE household, EE in SME, off-grid renewable energy and agriculture face MRV, organizational and financial barriers

As most of the projects in these project-types involve multiple owners/beneficiaries, project management is complex and this also complicates MRV as there are multiple data sources that have to be monitored during the crediting period of the project. The high cost of baseline establishment is also a hindrance in developing projects in these project-types.

Lack of coordination between state government agencies and NCDMA

The NCDMA has evolved in last one decade with stipulation of new requirements for approval of projects submitted by various project proponents. Some of these requirements mandate additional approvals / endorsements from the state government department / statutory bodies, which are unavailable in some states or whose procurement takes a lot of time.

HFC-23 incineration, N2O abatement and landfill gas (which do not generate energy) risk closure post 2012

Apart from revenues from sale of CERs, the projects in these project-types have no alternative financing support. While CERs from HFC incineration are not allowed in EU ETS, the current price of CERs will not support N2O abatement and landfill gas projects. There is a risk that the abatement activity might not continue post withdrawal of support from CDM.

Chapter highlights

- The biggest threat to CDM project implementation comes from EU's restriction on CDM projects registered post 31 December 2012
- One of the major reason for delays in registration of CDM projects is on account of lack of acceptable guidelines for setting benchmark, lack of institutional capacity, frequent revisions to CDM EB guidelines and lengthy validation cycle
- The delay in registration of CDM projects was due to the increase in CDM projects from India and limited increase in the number of DOEs
- The cement and energy efficiency project-types have higher rejection rate than hydro and wind project-types
- Projects in reforestation, EE household, EE in SME, off-grid solar and agriculture project-types face MRV, organizational and financial barriers.
- HFC 23, N2O and landfill gas(where these is no energy generation) projects risk closure post the withdrawal of market support and fall in CER prices
- Goa, Bihar, Jharkhand, Kerala, Jammu & Kashmir, Haryana and North Eastern states have very limited development of CDM projects

SECTION 5

Developing a carbon market roadmap for India

This chapter sets out the carbon market roadmap for India. It begins by developing a priority list of emission reduction project-types that can be supported under CDM and the potential for emission reduction by 2020. The role of new market mechanisms in promoting the priority emission reduction projects has also been examined. The promotion and development of the emission reduction projects will require a combination of the following measures:

- Demand-side measures: Given the weak demand for CERs and the uncertain time frame for new market mechanisms, all attempts should be made to revive demand in the existing regulatory framework, particularly for projects registered post 2012.
- Improving sustainable development impacts: Improving the sustainable development impacts as well as improving communication on the outcomes / impacts of CDM project activities is required for stimulating demand of quality CDM projects and addressing international concerns.
- Efficiency of registration: Once there is a revival of demand, measures should be undertaken to remove the barriers in CDM project registration while also improving sustainable development impacts.
- Future regulatory mechanisms: Recognizing that CDM is likely to be transitory in nature and new market mechanisms are likely to be more prominent particularly in the post 2020 carbon markets, measures should be undertaken to develop synergies between CDM, NAMAs and other market mechanisms.
- Supply side measures: Once there is regulatory certainty and robust demand, supply side measures should be undertaken that encourage larger participation of industry in emerging global carbon / CDM market.

The carbon market roadmap integrates the above measures. The next chapter makes detailed recommendations under each of the above measures.

5.1 Priority GHG mitigation projects for support

For the period 2013 – 2020, GHG mitigation projects should be prioritized based on their contribution to sustainable development and emission reduction potential. Barriers to investment should also be an important consideration as it is possible that financially attractive projects with low barriers to investment operating in favourable policy and regulatory regime may not require any additional support. However, developing indicators for barriers to investment is difficult, particularly over a 2013 – 2020 period, as policy and regulatory regime and market conditions (including financial markets) will keep evolving. Moreover, barriers to investment is a project-specific analysis and does not easily lend itself to aggregating at a sector level. The final consideration should be equitable distribution, i.e., sectors that have been left out of carbon support mechanism in the last decade should be encouraged more.

In the context of this study, the contribution to sustainable development parameter has been correlated with the breadth of the sustainable development benefits (broad-based, medium and narrow as presented in Figure 31 above) contributed by a project. The emission reduction potential has been taken from the 'Estimate of maximum emission reduction potential in 2020 by the Expert Group'presented in Table 5above. The CDM penetration levels (number of CDM projects)presented in Figure 2above have been used to show the extent by which project-types have been supported under CDM.

In order to prioritize using these three parameters, a simple rule has been established – if a project ranks highest on two of the parameters, it is classified as highest priority project. If it ranks lowest on two of the parameters, it is classified as low priority project. The analysis for arriving at project priorities (by project-type) is provided below in Table 10 below– the green category implies highest priority followed by blue and then yellow.

The 'emission reduction potential in 2020' in table 8 is maximum emission reduction potential derived in table 5. The UNFCCC sectors (mentioned in table 5) were divided into activities which have been recategorised as UNEP Risoe sectors in Table 10so as to coincide with the sustainable development analysis carried out. The categorisation of sectors is as follows:

Table 9 | Emission reduction potential in 2020 ($MtCO_2$) for UNEP Risoe sector categorization

UNEPRisoe Sectors[48]	Activities[49]	Emission Reduction Potential in 2020[50] in $MtCO_2$	Total Emission Reduction Potential[51] in $MtCO_2$
EE household	Lighting	26.20	29.4
	Fan, TV and AC	2.46	
	Refrigeration	0.74	
Transport	Modal shift	1.39	2.0
	fuel efficiency of vehicles	0.60	

48 Sectors as used in table 8 under 'project type'
49 Activities from table 5 as per UNFCCC categorisation
50 Refer to table 5 'Maximum emission reduction potential in 2020 $MtCO_2$
51 This is the value given in table 8 under Emission reduction potential in 2020.

EE Industry	EE- clinker substitution in Cement	0.0	16.28
	EE- Fuel substitution in Cement	2.43	
	BF-BOF including waste heat projects	11.08	
	COREX/FINEX-BOF	1.54	
	DRI-EAF	1.23	
Refforestation	Reforestation	0.37	0.37
Landfill Gas	Composting, solid waste, manure	12.7	12.7
Solar	Solar	11.72	11.7
Hydro	Hydro	4.24	4.2
Wind	Wind	5.82	5.8
Biomass Energy	Biomass	8.31	8.3
EE service	EE commercial Building	0.23	0.2
EE supply side	Supercritical coal power plants	0.28	0.3
FF switch	FF switch (gas based combined cycle	5.09	5.1

Table 10 | Prioritization of project-types[52]

Project-type	Activities	Sustainable Development Impacts	Emission Reduction Potential in 2020 ($MtCO_2e$)[52]	CDM penetration levels	Priority list
EE household	Energy efficient Lighting, Fan, TV and AC	Broad-based	Large (29.4)	Minimal	Highest Priority
Landfill gas	Landfill gas (Composting, Solid Waste, manure) and wastewater	Broad-based	Large (12.7)	Minimal	Highest Priority
Transport	Modal shift and fuel efficiency of vehicle	Broad-based	Small (2)	Minimal	Highest Priority
Reforestation/ Afforestation	Reforestation, afforestation	Broad-based	Small(0.37)	Minimal	Highest Priority
EE Industry	Energy efficiency in cement, steel and other industry sectors	Narrow	Large (16.28)	Minimal	Highest Priority
Hydro	Grid connected hydro power projects	Medium	Medium (4.2)	Reasonable	Medium Priority
Biomass energy	Cogeneration and grid connected projects	Medium	Medium (5.8)	Reasonable	Medium Priority
Solar	Solar PV and Solar thermal	Medium	Large (11.7)	Reasonable	Medium Priority
Wind	Grid connected projects	Medium	Medium (8.3)	Significant	Medium Priority
EE service	EE commercial buildings (heating, ventilation and air conditioning, lighting, internal loads, etc)	Narrow	Small (0.2)	Minimal	Low Priority
EE supply side	Supercritical coal power plants	Narrow	Small (0.3)	Significant	Low Priority
FF switch	Gas based combined cycle power plants	Narrow	Medium (5.1)	Significant	Low Priority
FF switch	Gas based combined cycle power plants	Narrow	Medium (5.1)	Significant	Low Priority

52 These values are derived from maximum emission reduction potential mentioned in table 5 after applying adjustment factors to the values of emission reduction potential in 2020 assessed by the expert group

In 2020, highest priority project-types have a maximum mitigation potential of 61.4million tCO_2e while medium priority project-types can contribute up to 30 million tCO_2e. Low priority project-types are estimated to contribute to 5.6 million tCO_2e. Given the significant quantum of emission reductions that have to be supported by CDM and the fact that price support offered by the current carbon market is not sustainable, it is worthwhile to analyse the future mechanism. Even though these mechanisms are still years away from being materialized, it is important for India to influence their evolution process so that projects from India can gain once these mechanisms are finalized.

5.2 Role of NAMA, NMM, FVA and JCM in supporting projects from India

The new market mechanisms and frameworks – NAMA, NMM, FVA and JCM are at early stage of development and this is an opportunity to play a constructive role in the development of such mechanisms. These mechanism are described in detail in Appendix 8 –The role of New Market Mechanisms for India. This is also an opportunity to dovetail the types of national schemes and frameworks that have been developed or are under development in India with the new carbon market mechanisms and frameworks. A preliminary analysis has been done to correlate the characteristics of national schemes/initiatives with the possible contours of the new market mechanisms and frameworks so that this can push the national and international discussion to the next stage. For carrying out this analysis, certain assumptions have been made based on the current understanding of the market mechanisms which are as follows:

- NAMA (supported) is likely to be the most flexible mechanism as it takes the inputs of low carbon development, i.e., financing, technology transfer and capacity building. It is likely to be most conducive to aligning with the national policy and programs and the likely place that this can start and scale up is donor agency co-operation with the national government. This is not to say that NAMA cannot be designed on output based measures like an emission trading scheme or be designed as an aggregation of project based initiatives.
- New Market Mechanism is more likely to take the shape of an emission trading scheme or an energy efficiency trading scheme similar to Perform, Achieve and Trade with absolute / intensity targets so that certain sectors (above certain thresholds) have common standards of baseline, monitoring, reporting and verification and reduction targets.
- Framework for Various Approaches is likely to take two paths both market-based and a non-market based FVA. The market based FVA can be used to develop mitigation frameworks around standards and labelling. The standards and labelling mechanism is likely to be more widely used (and accepted) than emissions trading. FVA could cover fuel standards, building standards, renewable purchase obligation, appliance labelling, agriculture pump-set labelling, etc. Some CDM methodologies have tried to fit labelling program under CDM. However a separate framework will be required to introduce a market based approach is linked to the performance thresholds of standard and labelling program where the emission reductions are estimated using penetration levels of star labelled devices. The non-market based FVA can be used to address the issue of mitigation actions associated with say industrial gases, on the lines of the fund financing replacement of ozone-depleting substances under the Montreal Protocol.

With this context, an analysis has been carried out to explore avenues of support offered by future carbon markets and the estimated emission reduction potential for highest and medium

priority project-types. The result of this analysis is presented in Table11 below.

Table 11 | Priority mitigation project-types, market mechanism

Project-type	Priority	Possible approach under NAMAs	Possible approach under NMM/FVA	Possible JCM
EE household	Highest Priority	NAMA (capacity building and financing for energy efficiency and deployment of renewable energy solutions in households)	FVA (supporting development and deployment of appliances)	
Landfill gas	Highest Priority	NAMA (capacity building, technology transfer and financing of landfill gas projects)		Yes
Transport	Highest Priority	NAMA (technology transfer and financing urban transport infrastructure and capacity building for fuel efficiency standards)	FVA (supporting development and deployment of fuel efficiency standards)	Yes
EE industry	Highest Priority		NMM (supporting Perform, Achieve and Trade)	
Reforestation/ Afforestation	Highest Priority	NAMA (capacity building and financing of reforestation/afforestation activities)		
Hydro	Medium Priority		FVA (supporting Renewable Purchase Obligation)	Yes
Biomass energy	Medium Priority			
Solar	Medium Priority	NAMA (financing of solar projects)		
Wind	Medium Priority			

5.3 Carbon market: Roadmap of the recommendations

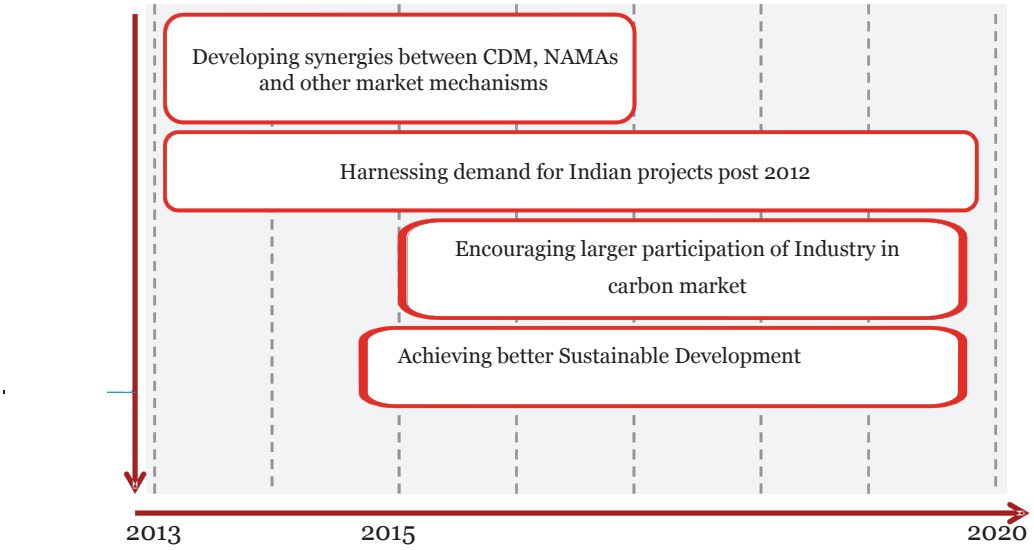
It is clear that the carbon markets stand at a crossroad and therefore, the carbon market roadmap for India must take into account the inherent uncertainty of whether CDM will be discarded in favour of new, but untested market mechanism and frameworks. The roadmap must also take into account that progress on either path is going to be slow and uncertain but it requires action to build capacities to be ready to address the market as soon as regulatory certainty increases and markets stabilize. The roadmap should also consider the varying timelines – implementing measures to develop future regulatory mechanism will be part of a global negotiation process which is likely to take much longer than implementing measures to implement SD impacts. The roadmap should also recognize that there are certain measures that will be significantly under control of India, e.g., improving efficiency of registration at one end while other measures will be dependent on multiple stakeholders, e.g., future regulatory mechanism.

The roadmap is set out in Figure 40 showing a timeline from 2013 to 2020. The measures proposed are arranged in decreasing order of control. The year 2015 assumes significance on account of being the current target for global negotiated agreement for post 2020 carbon market. The outcome of the demand side measures are not within the control of India but is the need of the hour in light of the dwindling demand from major CER buyers. This should be prioritized

to harness demand for Indian project post 2012. As new mechanisms evolve up to 2015, India should initiate domestic efforts to achieve better sustainable development through these mechanisms. Enhancing efficiency of registration and future regulatory mechanisms are not entirely within the control of India but India can influence their outcomes through UNFCCC and COPs. India's domestic action should be leveraged to create synergies between CDM, NAMA-sand other the new mechanisms being proposed. Supply side measures is completely in control of India and appropriate measures should be taken to promote highest priority projects and ensure larger participation ofindustries in the emerging carbon markets.

A summary of the recommendations follow in next chapter.

Figure 40
Carbon market road-map



SECTION 6

Recommendations

The recommendations in this chapter is based on the analysis conducted above in three broad areas of interventions –existing carbon markets, sustainable development outcomes from CDM projects and efficiency in development and registration of CDM projects. The recommendations below are targeted towards:

A. Harnessing demand for Indian projects post 2012;

B. Achieving better sustainable development for CDM projects;

C. Developing synergies between CDM, NAMAs and other market mechanisms; and

D. Encouraging larger participation of industry in carbon market.

This chapter also identifies actions that needs to be taken now and activities that needs to be undertaken depending upon when CDM revives or is replaced by a new mechanism. This chapter also recommends certain institutional arrangement for effective implementation of these activities and actions.

A. Harnessing demand for Indian projects post-2012

1. **Supporting projects through domestic emission trading scheme –** India should promote priority projects through a domestic emission trading scheme. The scheme could be supported by corporate who wish to voluntary offset their emissions or financed through CSR funds. The recently approved Companies Bill does require companies to earmark, but provisions to assist emission trading schemes are still lacking.

2. Supporting projects through NCEF and CSR funds of large companies – India should promote broad-based sustainable development projects in EE household, EE in SME, off-grid renewable energy and agriculture. Reforestation projects have been excluded because of the non-permanent nature of emission reductions. Transport projects have been excluded as

they require very large investments, often multiple times the size of funds presently available in NCEF. Landfill projects have support from the private sector and are thus excluded from the support mechanism. A mechanism should be established to support these projects through voluntary offsets and funds like National Clean Energy Fund (NCEF). NCEF has provisions to support projects in a wide array of low carbon energy technologies and priority areas identified under NAPCC. Some of these areas include innovative projects related to integrated community energy solutions, renewable energy and mission projects identified in the NAPCC. India should provide transitional support to projects (through CSR funds of large companies) that cannot cover their operational cost at the current CER prices and which would have to be paid back once CER profits resume. An assessment of the types of registered CDM projects and technologies that risk closure should be made on the basis that (i) these contribute to direct emission reductions, and (ii) that the operating costs are higher than the revenues earned and engage with the project proponents for charting a course of action. Potential options could include (ii) supporting the operating cost of the project until the end of the crediting period, (iii) legislating mandatory emission reductions for those projects until (or beyond) the crediting period, (iv) identifying and supporting alternate sources of revenues.

3. Developing standardized baselines – India should ease the CDM validation process in EE household, EE in SME, off-grid renewable energy and agriculture projects by developing standardizes baselines. This will promote projects in these sectors by reducing the transaction cost.

B. Achieving better sustainable development for CDM projects

4. Developing sustainable development impact reporting – For CDM projects submitted for host country approval, NCDMA should require sustainable development monitoring, reporting and verification during the regular emission reduction verification, similar to the practice followed by The Gold Standard. In order to ensure transparency and robustness of the measured sustainable development impacts of CDM project activities, a protocol could be developed to monitor, report and verify (MRV) sustainable development impacts periodically (e.g. every year). The project proponent may submit an annual status report on the quantitative sustainable development initiatives being undertaken. Developing such a MRV framework could be utilized for other mechanisms, like NAMA, NMM that may come in the future. The status reports should be subject to audit and on-site verification during the regular emission reduction verification process by DOEs. Further, there should also be a redressalmechanism for local stakeholder groups to submit grievances against a particular project activity in case the stakeholders find a deviation in the ex-post sustainable development activities than what was planned during the initial stakeholder meeting. Finally, NCDMA should make public on its website the sustainable development impacts of CDM projects as well as ask the project proponents to display the activities planned, budgets allocated and completed in prominent places locally in the local language so that the local communities are aware of the same.

5. Evaluating and highlighting the benefits of CDM projects focusing on sustainable development impacts –NCDMA should highlight benefits of 'lighthouse' CDM projects from India. A platform could be developed to report the sustainable development impacts of CDM projects to the stakeholders. Aggregate reporting of sustainable development impacts of CDM project activities could be done on a regular basis. Social audit methodologies developed for the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) could be adapted for this purpose. The platform could also highlight case studies of proj-

ects which have developed innovative ways of engaging with the communities. NCDMA should mandate the projects to spend the 2% of their CER revenues in supporting secondary initiatives in the social dimension. CDM projects by design contribute to the economic and environment dimensions and have very limited intrinsic social impacts. Secondary initiatives in the community should be encouraged to create direct community benefits in the social dimension.

6. Constituting a high level Multi Stakeholder Advisory Group for Climate Change issues like Loss and Damage, Equity, Sustainable Development, Gender etc. –Issues like Loss and Damage, Equity and Sustainable Development, Gender are being discussed at the highest levels in negotiations. India should constitiute a high level multistakeholderadvisory group to discuss such isses and develop policy briefs on these aspects to create and disseminate knowledge for more effective climate change policy development.

C. Developing synergies between CDM, NAMAs and other market mechanisms

7. Developing NAMAs –NAMAs will need more government intervention than earlier mitigation actions, as for example the strongly market driven CDM under the Kyoto Protocol. Hence there is a need to come up with a resolute Government of India Approach for NAMAs. For most successful implementation, the India NAMA Approach should incorporate all necessary stakeholder views at an early stage of design and build upon excising experiences in India deriving e.g. out of the CDM. India will have to formulate its opinion on the constituents of NAMA proposals and their relevance in the context of sustainable development.Indian Government first needs to understand and define what NAMA meansfor the Country and come up with a NAMA framework defining formats and selection criteria such as, Marginal Abatement Cost Curves, GHG mitigation potential, financing requirements,MRV protocol, sustainable development impact etc.A way forward would be to identify potential NAMAs building upon various missions and policies formulated by the Government of India under the aegis of NAPCC, SAPCC, Five Year Plan, etc., in such a way that would cover all the potential sectors by definitive actions with goals that are simple to define, not too complex to MRV and cater the sustainable development objectives of the Government of India. Based on the criteria defined in the NAMA framework, Government of India can then prioritise potential NAMAs from the exisiting landscape of mitigation policies of the Government as NAMAs for recognition (Unilateral NAMAs) or NAMAs for support. India as the first step can invite suggestions from line Ministries,proposals for NAMA development. In order to facilitate the entire process of NAMA development Ministry of Environment and Forests, Government of India, the National Focal Point, should develop a NAMAcell supporting and coordinating NAMA activities. HenceIndia will have to develop institutions, processes, systems and capacities for the efficient management of NAMAs in the future.

8. Proactive submission on the rules for NMM and FVA and develop pilot NMM and FVA – India should make proactive submissions on the rules for NMM and FVA in order to maximize benefits. India has gained significant experience in rolling out the Perform, Achieve and Trade scheme and it can contribute to the development of discussions on Sectoral Crediting / Trading Mechanism. As the rules for NMM are getting finalized, India should enhance co-operation with EU for developing pilot NMM with regard to the Perform, Achieve, Trade scheme. Based on the learning of the pilot phase, India could roll out a full NMM. As more than 90% of the CDM projects were developed by the private sector, India should

also actively engage with the private sector in seeking their inputs on NMM submissions. This will help mobilize quick investment once these frameworks are finalized.As the rules for FVAs are getting finalized, India should enhance co-operation with international community for developing pilot FVA with regard to deployment of standards (building, fuel, renewable purchase), labelling program (appliances, building, agriculture pump-sets, etc.) and piloting a fund for supporting industrial waste gases (one of the frameworks could on the lines of Montreal Protocol through a centralized fund that finances the destruction of certain industrial waste gases like HFC23 and eventual phase out of processes that generate such emissions). Based on the learning of the pilot phase, India could roll out full FVAs. This should be linked to the activities under the JCM which can serve as blueprint for FVA.

D. Encouraging larger participation of domestic industry in carbon market

9. Developing the capacity for national emission reduction reporting and develop credible and robust reporting frameworks for corporate carbon reporting– India should develop the capacity for national emission reduction reporting. This will cover performance of CDM projects and their sustainable development impacts, performance of initiatives under the NAPCC and SAPCCs, future New Market Mechanisms / NAMAs / FVAs, reported voluntary initiatives, etc. This reporting will also provide an insight to the international community on the possible new cooperation opportunities around domestic mitigation efforts of the country. India should develop a credible framework for corporate carbon reporting, which should be progressively made mandatory by the time a global climate treaty is expected to come into force (2020). India should encourage voluntary carbon offsetting, starting with public sector.

APPENDIX 1

National missions

National Solar Mission

Under the vision of NAPCC, the Jawaharlal Nehru National Solar Mission (JNNSM) was launched on 19 November 2009. The Solar Mission will be implemented in 3 stages leading to an installed capacity of 20,000 MW by the end of 13th Five Year Plan in 2022.

Table 13 | National Solar Mission targets

Phase	Period	Targets
Phase 1	2010-13	7 million sq meters Solar collectors 200 MW off-grid applications 1,000-2000 MW utility grid power, including rooftop
Phase 2	2013-17	15 million sq meters Solar collectors 1000 MW off-grid applications 4000 - 10,000 MW utility grid power, including rooftop
Phase 3	2017-22	20 million sq meters Solar collectors 2000 MW off-grid applications 20,000 MW utility grid power, including rooftop

Although the National Solar Mission refers to GHG emission reductions, there is no specific mention of linking the same with the Clean Development Mechanism. The Mission does not have a specific GHG emission reduction target as this co-benefit is implicit in the implementation of the mission objectives.

National Mission for Enhanced Energy Efficiency

The National Mission for Enhanced Energy Efficiency (NMEEE) is one of the eight Missions set up under the Prime Minister's National Action Plan on Climate Change (NAPCC) in June 2008. The Mission has created a conducive regulatory and policy regime to foster innovative and sustainable business models to unlock energy efficiency market. As a result of the implementation of this Mission over the next five years, it is estimated that by 2015, about 23 million tons oil-equivalent of fuel savings- in coal, gas, and petroleum products, will be achieved every year along with an expected avoided capacity addition of over 19,000 MW. The consequential carbon dioxide emission reduction is estimated to be 98.96 million tons annually. The Union Cabinet approved implementation of NMEEE framework in June 2010 with dedicated funds in tune with Rs. 235 crores. The NMEEE operates under the Bureau of Energy Efficiency (BEE), a statutory body constituted under Ministry of Power, Government of India. To enhance energy efficiency, four initiatives have been introduced:

- A market based mechanism to enhance cost effec¬tiveness of improvements in energy efficiency in energy-intensive large industries and facilities, through certification of energy savings that could be traded. (**Perform Achieve and Trade**)
- Accelerating the shift to energy efficient appliances in designated sectors through innovative measures to make the products more affordable. (**Market Transformation for Energy Efficiency**)
- Creation of mechanisms that would help finance demand side management programmes in all sectors by capturing future energy savings. (**Energy Efficiency Financing Platform**)
- Developing fiscal instruments to promote energy efficiency (**Framework for Energy Efficient Economic development**) market- based approaches to unlock energy efficiency opportunities, estimated to be about INR 74,000 crores.

The NMEEE aims to achieve a GHG emission reduction target of 98 million tCO_2e by 2015 under this mission. NMEEE plans to include monetary benefits from the CDM to attract private sector participation in the various activities of the mission. NMEEE clearly states that the targets and actions under this mission will not have a direct bearing on the clean development mechanism since instruments like PAT do not create any international obligations. NMEEE mentions that several EE activities could be bundled as one CDM project in order to reduce the transaction costs associated with CDM registrations as usually single EE measures have very low CERs. Alternately, such measures may also be registered as a CDM POA project. The focus areas for CDM registrations are retrofits, replacements, Greenfield projects, fuel switch and captive generation. The Bachat Lamp Yojna, implemented by the BEE, can be considered as a model for such cases. In order to reduce barriers associated with CDM registrations in EE measures, NMEE suggests the following:

- Development of a National CDM Strategy
- Promotion of POA
- Capacity building and training on CDM and related aspects
- Inclusion of CDM assessment in all public investments
- Regulatory incentives to promote clear technologies, which could then be taken up as CDM projects
- Promotion of public transport and energy efficiency in the transport sector

NMEEE targeted to increase the global CER market share of India by at-least 10%, thereby bringing in an investment of about USD 100 million. NMEEE envisaged CDM as a means to reducing financing and transaction costs for EE interventions in the industrial sector, particularly the MSME. NMEEE intended to promote Energy efficiency in the MSME sector by promoting CDM registrations in the SME sector.

National Mission on Sustainable Habitat

The National Mission on Sustainable Habitat (NMSH) seeks to promote sustainability of habitats through improvements in energy efficiency in buildings, urban planning, improved management of solid and liquid waste including recycling and power generation, modal shift towards public transport and conservation. It also seeks to improve ability of habitats to adapt to climate change by improving resilience of infrastructure, community based disaster management and measures for improvingadvance warning systems for extreme weather events. The Mission document was approved by the Prime Minister's Council for Climate Change in June 2010.

As a first step towards implementation of the Mission, development of sustainable habitat standards would be undertaken. This would encompass standards aimed at increasing energy efficiency in the residential and commercial sectors, urban transport, water supply and sewerage, urban planning and municipal waste. The mission ties in with several other regulatory frameworks, such as Municipal Solid (Management & Handling) Waste Rules, National Urban Transport Policy (NUTP), JawaharLal Nehru National Urban Renewal Mission (JNNURM), Energy Conservation Building Code (ECBC), National Urban Sanitation Policy.

NMSH targets promoting sustainability in urban habitats by enhancing the energy efficiency of buildings, solid waste management and shift towards public transport through:

- Extension of Energy Conservation Building Code
- Urban waste management and recycling, including production of energy from waste
- Regulatory and financial measures for enforcement of automotive fuel standards and to encourage purchase of efficient vehicles
- Incentivising the use of public transportation.

The Mission is to be implemented through appropriate changes in the legal and regulatory framework, viz. Building Byelaws, Development Control and Regulation etc.; mainstreaming of climate change and sustainable development concerns in city planning through City Development Plans including those related to adaptation, promotion of modal shift in public transport through Comprehensive Mobility Plans, capacity building and outreach; and implementation of pilot projects. Since funds for this sector are insufficient, this mission envisages this mission to be implemented together with JNNURM and other project of the MOUD. For green buildings, NMEE envisages that the high upfront costs can be met through revenues from CDM. This would also increased uptake of energy efficiency measures in buildings as people who are unsure of year on year benefits can be attractedtowards the same through CDM revenues. NMEEE also suggests that the BEE labelling program be used for launching a PoAfor a specific products with the manufacturers. However, capacity building w.r.t. CDM of the various stakeholder involved in building energy efficiency would be required. CDM could also be an important revenue source in waste management projects.

Policy level interventions may include directives to banks to fund only those building which are code compliant. The banks may offer soft loans for construction of green buildings. Tax rebates coupled with tax penalties may be an effective tool in promoting green buildings. The buildings or owners undertaking such measuresmay be provided with the tax rebate while the ones not following efficient practices may be imposed a higher tax/cess. Green building may be provided power at a lower cost to promote investment in such measures. Additionally, CDM may also be used as a mechanism to attract more investment in the building sector. The mission suggests that a separate fund may also be created for transport related activities in the country. For automotive manufacturers, certain fiscal incentives may be developed which are linked to the fuel economy of the vehicles produced. This would increase adoption of better and more efficient technology in the automotive sector. There may be an award program from green buildings and waste management projects to promote participation in the same.

Green India Mission

Green India Mission (GIM) recognizes that climate change phenomena will seriously affect and alter the distribution, type and quality of natural resources of the country and the associated livelihoods of the people. The Mission also acknowledges the influences that the forestry sector has on environmental amelioration though climate mitigation, food security, water security, biodiversity conservation and livelihood security of forest dependent communities.

The objectives of the mission are three-fold:

- To double the area to be taken up for afforestation / eco-restoration in next 10 years, taking the total area to 20 million ha (henceforth million hectare will be referred as m ha).
- Increase GHG removals by forests to 6.35% of annual total GHG emissions by 2020 (an increase of 1.5% over what it would be in the absence of the Mission).
- Enhance the resilience of forests/ecosystems being treated under the Mission to help local communities adapt to climatic variability.

The Green India Mission aims to achieve an annual CO2 sequestration of 50-60 million tonnes in 2020. The total cost for implementing the mission objectives is estimated as INR 46,000 crores. The missions aims to source these funds from the planning commission.

National Mission for Sustainable Agriculture

The National Mission for Sustainable Agriculture (NMSA) attempts to address issues regarding 'Sustainable Agriculture' in the context of risks associated with climate change by putting together appropriate adaptation and mitigation strategies for ensuring food security, equitable access to food resources, enhancing livelihood opportunities and contributing to economic stability at the national level. The mission identifies ten key dimensions for promoting the sustainable agricultural practices by implementing a POA covering both adaptation and mitigation measures through four functional areas, namely, Research and Development, technologies, products and practices, infrastructure and capacity building.

National Water Mission

The main objective of the National Water Mission is "conservation of water, minimizing wastage and ensuring its more equitable distribution both across and within States through integrated water resources development and management". The five identified goals of the Mission are: (a) comprehensive water data base in public domain and assessment of impact of climate change on water resource; (b) promotion of citizen and state action for water conservation, augmentation and preservation; (c) focused attention to over-exploited areas; (d) increasing water use efficiency by 20%, and (e) promotion of basin level integrated water resources management.

National Mission for Sustaining the Himalayan Ecosystem

The Himalayan ecosystem is vital to the ecological security of the Indian landmass, through providing forest cover, feeding perennial rivers that are the source of drinking water, irrigation, and hydropower, conserving biodiversity, providing a rich base for high value agriculture, and spectacular landscapes for sustainable tourism.
Glacial melt may impact long-term lean season flows of rivers, with adverse impacts on the economy in terms of water availability and hydropower generation. Recession of Himalayan glaciers will pose severe threats in terms of water availability and climate impacts. The NAPCC has included the National Mission for Sustaining the Himalayan Ecosystem as one of its eight key sub-missions. The Mission is intended to deliver better understanding of the coupling between the Himalayan ecosystem and the climate factors and provide inputs for Himalayan Sustainable development while addressing the protection of the ecosystem.

Primary objective of the mission is to develop a sustainable National capacity to continuously assess the health status of the Himalayan Ecosystem and enable policy bodies in their policy-formulation functions and assist States in the Indian Himalayan Region with their implementation of actions selected for sustainable development.

National Mission on Strategic Knowledge for Climate Change

As one of the eight National Missions which form the core of the National Action Plan, the National Mission on Strategic Knowledge for Climate Change (NMSKCC) seeks to build a vibrant and dynamic knowledge system that would inform and support national action for responding effectively to the objective of ecologically sustainable development. The main action points that have been identified under the mission are:

- Establishing Networks of Knowledge Institutions including establishment of an updatable and interactive knowledge portal on climate change research in the country is an identified action.
- Setting up an effective mechanism for data sharing and access where Ministries and agencies are expected to initiate action to digitize data, maintain meta-databases and streamline procedures governing access.

- The mission will leverage the high bandwidth networks being created through National Knowledge Network to enable scientists to collaborate, access and share computational and data resources.
- Strengthening Institutional and Human Capacity - The mission proposes creating centers of excellence collectively to be called as "national climate change knowledge centers" and operated through a common apex management structure.
- Strengthening Outreach and Internal Stakeholder Linkages:
  - NMSKCC will develop two kinds of knowledge products - One for wider audiences and Other for internal stakeholders
  - Development and dissemination of information and knowledge products ideally required for policy building would be limited to internal stake holders within the decision bodies.
  - Proposed interventions for wider audience include Open platforms for information and knowledge sharing and collaboration, building linkages for outreach and dissemination hosted and managed by NGOs.

APPENDIX 2

Domestic carbon market activity

Corporate reporting

There has been lot of activity in voluntary carbon market and these could be leveraged to create a domestic market for CERs. Some of the initiatives in this area include:

- The Expert group on Low Carbon Strategy for Inclusive Growth had recommended designing mechanisms for voluntary disclosure of GHGs by corporate and setting up a National GHG Inventory Management System. This was suggested to follow a bottom-up approach towards national GHG accounting and to validate the results of top-down approach presently followed to calculate India's national emissions.
- The Directorate General of Civil Aviation (DGCA) issued a circular in January 2012 to airports and airline operators asking them to submit their carbon footprint data for 2012 to DGCA by January 2013 in order to implement reduction measures, monitor progress over time and set targets. DGCA has released the first report on carbon emissions in the aviation sector covering airlines and airports.
- The Securities and Exchange Board of India (SEBI) mandated from November 2011 that the 100 largest listed companies to submit annual business responsibility reports along with their annual reports. This happened in line with the development of the National Voluntary Guidelines on Social, Environmental & Economic Responsibilities of Business in July 2011 by the Ministry of Corporate Affairs. Even though the current format of the business responsibility report does not require disclosure on GHG, the future iterations of the report could as Principle 6 (Environment) of the guidelines asks for a "statement on quantum of emissions of greenhouse gases and efforts made to reduce the same".
- Bombay Stock Exchange has developed based on carbon emission of companies called 'GREENEX'.

- The number of Indian companies reporting GHG to Carbon Disclosure Project (CDP) has also doubled since 2008. 41 companies reported their scope 1, 2 and 3 emissions to CDP in 2011. 19 amongst these have also made commitments to reduce GHG either on an absolute level or on intensity scale. Corporate sustainability reporting has also seen an upward trend over the years with 80 companies voluntarily publishing their annual sustainability reports in 2011 with 60 reports claiming to follow the Global Reporting Initiative (GRI) framework (51 of these reports are registered on the GRI database)[53].

The developments and trends in GHG emission reporting already have and will continue to create an environment conducive to establishing a domestic market for reporting emissions and emission reductions and subsequently, carbon offsets. To take this forward, a framework for carbon reporting and offsetting needs to be developed. Reporting of emissions and the subsequently verified data could feed into the bottom-up calculations of national emissions data.

National reporting

One of the policy recommendations made by the Expert Group on Low Carbon Strategies for Inclusive Growth is to develop national emission reduction reporting. This is likely to cover performance on CDM mechanisms, performance of initiatives under the NAPCC and SAPCCs, future New Market Mechanisms / NAMAs, reported voluntary initiatives, interface with REC and PAT mechanisms, etc. This will serve the purpose of tracking emission reductions / emission intensity and complement that national GHG inventory.

The World Bank's Partnership for Market Readiness provides support to member countries to implement market based instruments, such as domestic emissions trading schemes. India is one of the member countries working with PMR to support the development of emission reduction reporting.

Renewable Energy Certificates scheme

GOI launched Renewable Energy Certificates (REC) trading scheme in January 2010. This mechanism is an alternate to the preferential feed-in tariff[54] for renewable energy projects. If a project sells the electricity generated from renewable energy projects to the state electricity utility at a notified tariff (Average Power Procurement Cost of the previous year for all generating units in the grid including thermal and low cost hydro), it is credited with RECs proportional to the amount of electricity generated. These RECs can be traded in the open market on power exchanges and the project can earn additional revenue through them. Distribution companies, captive power plant owners and open access consumers can purchase these RECs to meet their renewable energy procurement commitments. REC currently supports 3350 MW of grid connected renewable energy projects in India[55]. The REC mechanism works with a moving target with a 1% increase every year from the baseline year of 2009-10. The target in 2009-10 was 5% electricity procurement from renewable energy sources. This target translates to an emission reduction potential of 32 $MtCO_2$ in 2009-10 and 190 $MtCO_2$ by 2020.

53 Sustainability Reporting: Practices and Trends in India 2012, GIZ

54 Preferential tariff is derived based on the cost of generation from the renewable energy technology and expected return on equity. This is expected to be at least 25% more than the Average Power Procurement Cost, which is based on low generating sources like fossil fuel and hydro.

55 https://www.recregistryindia.nic.in/index.php/general/publics/registered_regens

Perform Achieve and Trade

Indian government has notified PAT scheme on 30 March 2012. A total of 478 Designated Consumers (DCs) have been included under the PAT scheme from the following eight industrial sectors: Iron & Steel, Cement, Power, Pulp & Paper, Textile, Chlor-Alkali, Fertilizer and Aluminium. These sectors have been given targets to reduce their specific energy consumption by 2015 and are required to purchase energy certificates (E-Certs) in case they fail to achieve their targets. The E-Certs will be generated from installations that over-achieve their target of specific energy consumption. The performance of DCs in the scheme will be accessed in 2015. Energy saving target for the first cycle of PAT is 6.686 mtoe or 22 mtCO_2 of emission reductions.

Baseline of each DC has been established after a detailed energy audit by designated energy auditors. The baseline represent a three year average specific energy consumption and have been normalized to take into account factors like capacity utilization, mix of grid and captive electricity and other factors which affect energy consumption. Similar to baseline establishment, designated energy auditors after a detailed energy audit will assess the specific energy consumption of each DC at the end of cycle and certify any underachievement (or overachievement). The DCs are also required to submit a detailed plan for the planned energy efficiency measures and report the progress of the implementation to Bureau of Energy Efficiency (BEE) every year.

REDD+ in India

A REDD+ cell has been established in the Ministry of Environment and Forests (MoEF) and the Forest Survey of India (FSI) has been entrusted to conduct the task for forest carbon stock accounting. The REDD+ cell would be assisted by Indian Council of Forestry Research and Education (ICFRE), Indian Institute of Remote Sensing (IIRS), Indian Institute of Science (IISc), Wildlife Institute of India (WII) and the state forest departments.

As per India's submission on REDD+ to UNFCCC, India's national strategy aims to enhance and improve the forest and tree cover across the country, while enhancing the value of forest products to the communities dependent on the forests for livelihoods and other services. The Green India mission under the NAPCC and the National Afforestation Program would aid in achieving this goal. India has submitted that this would require an investment of USD 2 billion every year for 10 years. India would also aim to have maximum participation from the communities in the REDD+ programmes and follow the successful model for Joint Forest Management. The pilot projects under REDD+ would be launched upon availability of funding.

APPENDIX 3

List of dimensions, indicators and sub-indicators

Dimension	Indicator (I)	ID for I	Sub-indicators (SI)	ID for SI
Economic	Direct/indirect financial benefit for the local and/or regional economy	E1	Economic improvements for the population through domestic or community cost savings	E1a
			Economic improvement through income generation for local communities	E1b
			Poverty reduction	E1c
			Support for entrepreneurial activity in local economy	E1d
			Financial benefits of the project for national economy	E1e
			Reinvestment of clean development mechanism proceeds into the community	E1f
	Local/regional jobs generated directly/indirectly	E2	Economic improvements through direct job creation in construction phases	E2a
			Economic improvements through direct job creation in operation phases	E2b
			Economic improvements through indirect job creation	E2c
	Investment in the local/ regional infrastructure	E3	Creation of infrastructure (e.g. roads and bridges) and improved service availability (e.g. health centres and water availability)	E3

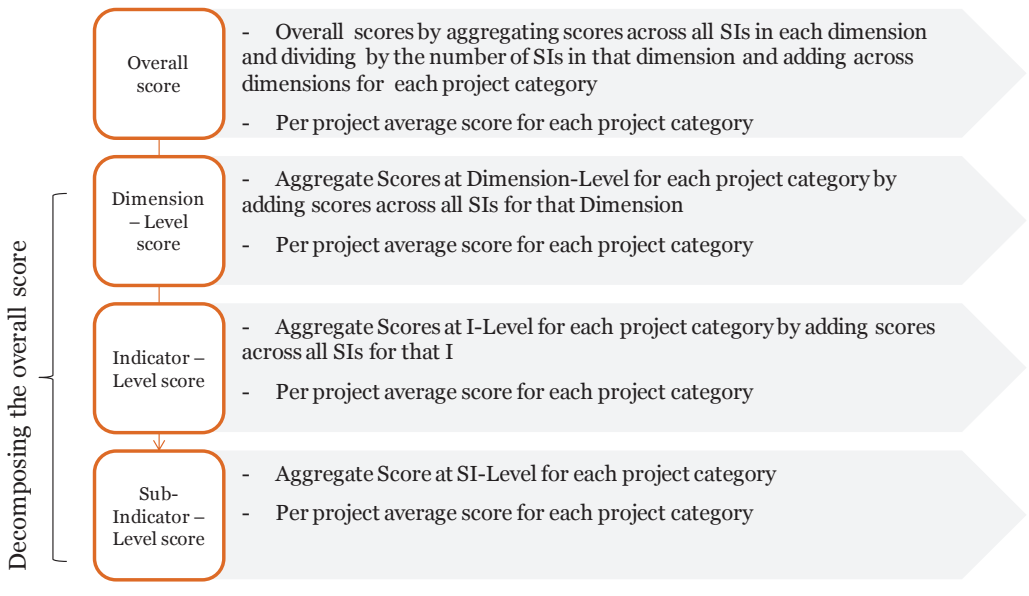
Environment	Efficient utilization of natural (for purposes other than energy) resources	EN1	Efficient utilisation of water	EN1a
			Efficient utilisation of land	EN1b
			Recycling	EN1c
			Creating positive by-products	EN1d
	Reduction in noise, odours, dust or pollutants	EN2	Reduction in gaseous emissions (including ODS)	EN2a
			Reduction in effluents	EN2b
			Reduction in solid waste	EN2c
			Reduction in noise	EN2d
			Reduction in door	EN2e
			Enhancement of indoor air quality	EN2f
	Improvement and/ or protection of natural resources	EN3	Improvement / protection of soil fertility	EN3a
			Improvement / protection of biodiversity	EN3b
			Improvement of water quality	EN3c
	Available utilities	EN4	Supply more energy	EN4a
			Making use of less energy	EN4b
	Promotion of renewable energy	EN5	Converting or adding to the country's energy capacity that is generated from renewable sources	EN5
Social	Labour conditions and/or human rights	S1	Improvement of working and/or living conditions	S1
	Promotion of education	S2	Improved accessibility of educational resources or donating resources for local education	S2
	Health and Safety	S3	Improvements to health, safety and welfare of local people through a reduction in exposure to factors impacting health and safety	S3
	Poverty Alleviation	S4	Emphasis on the respective country's core development priorities (i.e. poverty alleviation)	S4
	Engagement of local population	S5	Community involvement in decision-making; training of unskilled workers; reduction of urban migration	S5
	Empowerment of women, care of children & frail	S6	Enhancement of the position of women and children in society	S6
Technological	Development/diffusion of local/imported technology	T1	Development/ diffusion of New technology	T1 a
			Diffusion of imported new technology	T1 b

APPENDIX 4

Detailed methodology

Based on the scores assigned to projects belonging to different project-types, the following aggregated outputs were reported for each project-type:

Figure 41
Scoring methodology



After assigning the above scores to project-types, a ranking order of the various project-types was calculated that reflected their relative performance at each level – Overall, Dimension, Indicator (I) & Sub-indicator (SI). For each project belonging to a particular project-type, a score of 0, 1 or 2 is assigned to each sub-indicator based on that project's impact on that sub-indicator. Following stepwise method has been used to assign scores:

If the sub-indicator is quantitative:

1. Source the absolute value associated with that sub-indicator from the questionnaire/PDD (the absolute value is the summation of both intrinsic and secondary benefits)
2. Calculate per CER value by dividing the absolute value of the sub-indicator with the annual ER potential.[56] This is referred to as [x]
3. Calculate the average value of [x] across all projects (belonging to all project-types). This is referred to as X
4. Assign a score using the following rule:
   0 – No impact
   1 – [x]<X
   2 – [x]>X.

If the sub-indicator is qualitative:

1. Source the information on whether the project has any impact or no impact on the sub-indicator from questionnaire/PDD (this is a summation of both intrinsic and secondary benefits)
2. Assign a score using the following rule:
   0 – No impact (when there is no impact under both intrinsic and secondary benefits)
   2 – Impact (when there is impact under at least one of intrinsic and secondary benefits)

Details of the above process for each sub-indicator are provided in the table given in Annexure 6. The above scoring process involves normalisation of quantitative sub-indicators (except for E1a, E1c & E1f as these are recorded in percentage terms and are already measured on a relative scale) by dividing the absolute value of the sub-indicator with the CERs generated during the respective period. This has been done to remove the effects of scale of a project on its sustainable development impacts. Following scores are assigned to projects:

Indicator and sub-indicator level score

An indicator level score has been calculated by summing up the score of all sub-indicators belonging to that indicator. In this way, the indicator level score will have a maximum possible value equal to twice the number of sub-indicators in that indicator (e.g. 12 (6*2) for E1 and 6(3*2) for E2). The sub-indicator level score has been assigned based on the scoring methodology for sub-indicators described above. The maximum score for any sub-indicator is 2.

Dimension level score

A dimension level score has been calculated by summing up the score of all sub-indicators belonging to that dimension. In this way, the dimension level score will have a maximum possible value equal to twice the number of sub-indicators in that dimension (e.g. 12 (6*2) for social dimension and 4 (2*2) for technological dimension).

56 It was initially decided to use CERs issued during the same period for normalizing the quantitative indicators but eventually annual CER potential (sourced from CDM pipeline) was used for normalizing quantitative indicatorsas many projects reported no issuance. Therefore, in order to maintain uniformity, annual CER potential was used for normalization for all projects.

Overall score

An overall score has been calculated by:

1. For each dimension, summing up the score of all sub-indicators belonging to that dimension
2. Dividing the score of each dimension by the number of sub-indicators in that dimension
3. Adding up the per-sub-indicator scores of each dimension. In this way, the overall score will have a maximum possible value of 8 as there are 4 dimensions and each sub-indicator has a maximum possible score of 2. Thus, each dimension is assigned an equal weight while arriving at the overall score.

The following illustration depicts the above methodology:

Table 14 | Illustration of scoring methodology

Dimension	Indicator (I)	Sub-indicators (SI)	SI - Score	I - Score	Dimension - Score
Economic	E1	E1 a	1	6	9
		E1 b	2		
		E1 c	0		
		E1 d	0		
		E1 e	2		
		E1 f	1		
	E2	E2 a	1	3	
		E2b	1		
		E2 c	1		
	E3	E3 a	0	0	
Environment	EN1	EN1 a	0	4	16
		EN1 b	2		
		EN1 c	2		
		EN1 d	0		
	EN2	EN2 a	0	6	
		EN2 b	0		
		EN2 c	0		
		EN2 d	2		
		EN2 e	2		
		EN2 f	2		
	EN3	EN3 a	0	2	
		EN3 b	0		
		EN3 c	2		
	EN4	EN4 a	2	4	
		EN4 b	2		
		EN4 c	0		

Social	S1	S1 a	0	0	6
	S2	S2 a	0	0	
	S3	S3 a	2	2	
	S4	S4 a	2	2	
	S5	S5 a	2	2	
	S6	S6 a	0	0	
Technological	T1	T1 a	0	0	2
		T1 b	2	2	

APPENDIX 5

Questionnaire

Q1.1 Please input the UNFCCC registration number of the project:

Q1.2 Did you engage with any NGO / Community based organization/ any other agency for the sustainable development initiatives undertaken as part of your CDM project activity? If yes, please give the contact details of the concerned agency.

Yes/No	
If yes, provide details	

Q1.3 Do you have a trust or a foundation within your organization that manages sustainable development initiatives of the organization (including those catering to the CDM project)? If yes, please give the contact details of the concerned person in the trust / foundation.

Yes/No	
If yes, provide details	

Economic well-being

Q2.1 What is the total capital investment in the CDM project activity? Please report the value in INR lakhs.

Q2.2 What is the total expenditure incurred by you (till date) on sustainable development activities in and around the CDM project area? Please report the value in INR lakhs. If the total expenditure till date is not available, please provide value of expenditure incurred till the last available date. Please also indicate the date till when the data is provided.

Q2.3 What is the number of CERs issued to the candidate CDM project till 31 July 2011?

Q2.4 What is the number of CERs sold (for the candidate CDM project) till date?

Q2.5 What is the total CER revenue earned by the project till date? Please report the value in INR lakhs.

Q2.6 Please provide a brief description of the sustainable development initiatives undertaken in the local areas around the CDM project activity site by sector. Local area for the purpose of this survey refers to the project site and districts/villages/talukas identified during the local stakeholder consultation process.

	Please provide a description where applicable
Health	
Education	

Livelihoods	
Women's empowerment	
Community empowerment	
Any others, Please specify	

Is your project activity a wind power generation project? If yes, please answer questions: 2.7 till 2.14. If no, please skip to question 2.15.

Q2.7 What is the capacity of the entire wind farm (of which your project activity is a part of)? Please report the value in MW.

Q2.8 What is the total number of people employed in the local areas by the EPC contractor during the construction phase of the wind farm? Please report the value in numbers for the entire wind farm (which your project is a part of).

Q2.9 What is the total amount spent by the EPC contractor on salaries for the people employed during the construction phase of the entire wind farm? Please report the value in INR lakhs for the entire wind farm (which your project is a part of).

Q2.10 What is the total number of people employed in the local areas by the EPC contractor during the Operation and Maintenance phase of the wind farm? Please report the value in numbers for the entire wind farm (which your project is a part of).

Q2.11 What is the annual salary bill for the people employed by the EPC contractor in the local areas during operation and maintenance of the wind farm. Please report value in INR lakhs per year for the entire wind farm (which your project is a part of).

Q2.12 What percentage of people (approximate) employed by the wind farm during the construction phase are from the local communities? Please select from the below options. (Local communities refer to the local population residing in and around the CDM project site)

Percentage range	Please indicate "Yes" in the relevant row
a) 0%	
b) 1%-25%	
c) 26%-50%	
d) 51%-75%	
e) >75%	

Q2.13 What percentage of people (approximate) employed by the wind farm during the Operation and Maintenance Phase are from the local communities? Please select from the below options.

Percentage range	Please indicate "Yes" in the relevant row
a) 0%	
b) 1%-25%	
c) 26%-50%	
d) 51%-75%	
e) >75%	

Q2.14 Did your wind farm lead to creation of new businesses for the local community (such as local tea stalls, hotels, etc.)? If yes, please provide brief description. In case no description is provided, the answer to the item will be taken as No.

Yes/No	
If yes, provide details	

If your project is a wind power generation project, please skip to question 2.22

Q2.15 What is the total number of people employed by the CDM project (directly or through a contractor) in the local areas during the construction phase? Please report value in numbers.

Q2.16 What is the total amount spent on salaries for the people employed in the local areas during the construction phase of the CDM project? Please report value in INR.

Q2.17 What is the total number of people employed by the CDM project in the local areas during the operation and maintenance phase? Please report value in numbers.

Q2.18 What is the annual salary bill for the people employed in the local areas during operation and maintenance of the CDM project? Please report value in INR per year.

Q2.19 What is the percentage of people (approximate) employed by CDM project during the construction phase that are from the local communities? Please select from the below options. (Local communities refer to the local population residing in and around the CDM project site)

Percentage range	Please indicate "Yes" in the relevant row
a) 0%	
b) 1%-25%	
c) 26%-50%	
d) 51%-75%	
e) >75%	

Q2.20 What is the percentage of people (approximate) employed by the CDM project during the Operation and Maintenance Phase that are from the local communities? Please select from the below options.

Percentage range	Please indicate "Yes" in the relevant row
a) 0%	
b) 1%-25%	
c) 26%-50%	
d) 51%-75%	
e) >75%	

Q2.21 Did your CDM project lead to creation of new businesses for the local community (such as local biomass procurement, etc.)? If yes, please provide brief description. In case no description is provided, the answer to the item will be taken as No.

Yes/No	
If yes, provide details	

Q2.22 Have you created any infrastructure other than the CDM project (such as hospitals, roads, schools, etc.) for the benefit of the local communities?

Yes/No	
If yes, provide details	

Q2.23 If yes, please provide the following details:

	Number (s)	INR spent (Lakhs)
Hospitals/dispensary		
Schools		
Water related infrastructure		
Roads for local communities		
Others, please describe		
Others, please describe		
Others, please describe		
Others, please describe		

Q2.24 Have you undertaken any sustainable development activities (over and above the CDM project activity) that lead to cost savings for the nearby communities (e.g. distribution of solar lanterns at lower than market price, etc.)? If yes, please provide brief description. In case no description is provided, the answer to the item will be taken as No.

Yes/No	
If yes, provide details	

Q2.25 If you have undertaken any initiative that lead to cost savings to the community, then what is the total amount of cost savings due to the sustainable development activity undertaken? Please report the value in INR lakhs.

One time cost savings (e.g. cost savings due to supply of equipment at a lower than market price)	
Annual recurring cost savings (e.g due to annual savings in energy bill, as a result of use of energy efficient equipment)	

Q2.26 If you have undertaken any initiative that lead to cost savings to the community, then what is the cost savings in terms of % difference between baseline market cost and current discounted cost? Please report the value in %.

% difference in capital cost (one-time cost)	
% difference in annual recurring cost	

Q2.27 If you have reported the value of cost savings in the above questions, what is the methodology you employed for arriving at the same. Please provide brief description.

Q2.28 Have you undertaken any sustainable development activities (over and above the CDM project activity) that lead to income generation OR job creation for the local communities? If yes, please provide brief description. In case no description is provided, the answer to the item will be taken as No.

Yes/No	
If yes, provide details	

Q2.29 If you have undertaken any additional activities that lead to income generation for the local communities, then what is the total value of income generated for all households / communities? Please report the value in INR lakhs.

Q2.30 If you have reported a value in the question above, what is the methodology you employed for arriving at the total value of income generated for all households? Please provide brief description.

Q2.31 If you have undertaken any additional activities for job creation for the local community, then how many people did you employ? Please report value in numbers.

Q2.32 If you have undertaken any additional activities for job creation for the local community, what is the total amount spent on salary for the employment generated. Please report value in INR lakhs.

Q2.33 Have you undertaken any sustainable development activities (over and above the CDM project) that lead to creation of new businesses for the local community? If yes, please provide brief description. In case no description is provided, the answer to the item will be taken as No.

Yes/No	
If yes, provide details	

Environmental well-being

Q3.1 Have you undertaken any sustainable development activities (other than the CDM project activity) in the nearby areas that lead to the following? For each option if the answer is yes, please provide a short description of the activity undertaken. In case no description is provided, the answer to the item will be taken as No.

	Yes/No	Description
Effective utilisation of water (such as rain water harvesting)		
Efficient utilisation of land (such as forestry in previously barren land)		
Recycling of materials or waste		
Creation of positive by-products (such as manure)		
Reduction of pollutants other than GHGs		
Reduction of liquid effluents (such as sewage)		
Reduction of solid waste		
Reduction of noise		
Reduction of odour		
Enhancement of indoor air quality		
Protection or improvement of soil fertility		
Protection or improvement of biodiversity (such as conservation efforts for protection of wild animals, mangrove conservation, improving forest ecosystem, etc.)		
Improvement of water quality		

Q3.2 Have you undertaken any activities (other than the CDM project) that lead to supply of more energy to the local communities (e.g. solar PV distribution, waste to energy projects, etc.)? If yes, please provide a short description. In case no description is provided, the answer to the item will be taken as No.

Yes/No	
If yes, provide details	

Q3.3 Have you undertaken any activities (other than the CDM project) that lead to reduction in energy consumption for the local communities (such as distribution of efficient lighting or cooking equipment, etc.)? If yes, please provide a short description. In case no description is provided, the answer to the item will be taken as No.

Yes/No	
If yes, provide details	

Q3.4 Have you undertaken any activities (other than the CDM project) that involve addition to the local energy capacity that is generated through renewable sources (such as installation of small biomass gasifiers, etc.)? If yes, please provide a short description. In case no description is provided, the answer to the item will be taken as No.

Yes/No	
If yes, provide details	

Q3.5 Have you undertaken any other activities that lead to the betterment of the environment in the areas nearby the CDM project (such as planting of trees, etc.)? If yes, please provide a short description. In case no description is provided, the answer to the item will be taken as No.

Yes/No	
If yes, provide details	

Social well-being

All the questions in this section relate to activities undertaken in and with local communities other than creation of community infrastructure. These may be in the form of health camps, trainings, provision of consumables (medicines, school uniforms and kits, tool kits etc.), donations for local festivals and any activities that was done (over and above the CDM project activity) with the intention of enhancing the well-being of the local communities around your projects.

Q4.1 Have you undertaken any sustainable development activities other than the CDM project activity in the nearby areas that lead to the following. If yes, please provide a short description. In case no description is provided, the answer to the item will be taken as No.

	Yes/No	Description
Improvement in working and/or living conditions of the community nearby (e.g. provided clean drinking water, etc.)		
Improvement of labour conditions and / or human rights in the area (e.g. discouraging child labour, etc)		
Improving accessibility to education in the nearby communities (e.g. constructed a school for the community, etc.)		
Improvement of health and safety for the local communities nearby the project area (e.g. local health camp, etc.)		
Poverty alleviation in the nearby communities (e.g. provided additional sources of income for communities below poverty line, etc.)		
Empowerment of local communities through involving local level communities in decision making (e.g. strengthening the village panchayat, etc)		
Professional training being provided to unskilled workers (e.g. constructed a technical school for the community, skill enhancement training for handicraft, etc.)		
Reduction of urban migration (e.g. providing local employment for the communities, etc.)		
Promotion of social harmony or enhance awareness of local population about environmental issues (e.g. conducting street plays on environmental issues, etc.)		
Empowerment of women or children or the frail in the nearby community (e.g. creating self help groups for women, etc.)		

Q4.2 Have you donated any resources for local education?

Yes/No	
If yes, provide details	

Q4.3 Have you undertaken any activities (other than those mentioned above) in the areas nearby the CDM project site, that lead to social well-being of the communities? If yes, please provide a short description.

Yes/No	
If yes, provide details	

Technological well-being

Q5.1 Has your project employed any NEW technology that was previously not used anywhere in the country?

Yes/No	
If yes, provide details	

Q5.2 If yes, was it imported OR procured from Indian suppliers OR was it developed in house? Please choose the relevant option below and provide a brief description.

	Please indicate "Yes" in the relevant row	Description
Imported		
Procured from Indian suppliers		
Developed in house		

Q5.3 Have you undertaken any other community development activities (apart from the CDM project) that lead to development / diffusion of NEW technology in the local areas.

Yes/No	
If yes, provide details	

Q5.4 If yes, was it imported OR procured from Indian suppliers OR was it developed in house? Please choose the relevant option below and provide a brief description.

	Please indicate "Yes" in the relevant row	Description
Imported		
Procured from Indian suppliers		
Developed in house		

Barriers faced during CDM project implementation

Q6.1 Did you face any of the following barriers while obtaining the Host Country Approval for the project:

	Yes/No
Required documentation not available	
Delay from MoEF	

Any other, please specify

Q6.2 Did you face any of the following barriers during validation or registration of the project:

	Yes/no
Methodology was complex	
Data or information sought by DOE / UNFCCC not available	
Complex monitoring requirements for the project	
PP/consultant lacked technical expertise to address DOE / UNFCCC queries	
PP lacked financial resources to fulfil requirements of DOE / UNFCCC (such as lack of finances to undertake EIA or baseline survey)	
Delay by DOE in closing of queries	
Delay by UNFCCC in accepting responses submitted after a 'request for review'	

Any other, please specify

Q6.3 Did you face any of the following barriers during verification or issuance of CERs for the project:

	Yes/no
Revision or deviation to registered monitoring plan required	
Project design has changed since registration	
PDD monitoring requirements are rigorous	

Any other, please specify

Please refer to the supplementary questionnaires for following categories:

Category 1 Projects that distribute energy efficient equipment to households (e.g. CFL or efficient cook stove) or biogas plants to households

Category 2 Projects that procure biomass from farmers/communities

Category 3 Projects in forestry sector - afforestation or reforestation

Supplementary questionnaire for projects that distribute energy efficient equipment (e.g. CFL or efficient cook stove) or biogas plants to households

This supplement is applicable only to projects that distributes energy efficient equipment to households (e.g. CFL or efficient cook stove) or biogas plants to households

Q7.1 What was the market price of equipment distributed as a part of the CDM project? Please input value in INR per equipment.

Q7.2 What is the discounted price of the equipment as compared to the market price? Please input value in INR per equipment.

Q7.3 What is the number of households where the energy efficient equipment has been distributed. Please input value in number of households.

Q7.4 Are there any other recurring annual cost savings accruing to the community due to the project activity?

Yes/No	
If yes, provide details	

Q7.5 If yes, then what is the annual recurring cost savings (such as energy, free O&M, etc.) for the households? Please input value in INR/year.

Q7.6 What is the methodology you employed for arriving at the above mentioned estimate the annual recurring cost savings? Please provide a brief description

Supplementary questionnaire for projects that procure biomass from farmers/communities

This supplement is applicable only to projects that procure biomass from farmers/ communities

Q7.7 Does your project lead to an increase in annual income for the farmers / communities from whom your project has procured local biomass? If yes, please input value of increase in income in INR per farmer per year.

Yes/No	
If yes, provide details	

Q7.8 What is the methodology you employed to estimate the annual income increase of households/farmers? Please provide a brief description.

Q7.9 What is the total number of households / farmers for whom income generation activities have been created? Please input value in number of households / farmers.

Q7.10 What is approximate percentage of targeted households that fall under low income category? Please input value in %.

Supplementary questionnaire for projects in forestry sector - afforestation or reforestation

This supplement is applicable only to afforestation or reforestation projects

Q7.11 What is the market price of the sapling distributed as part of the forestry project? Please input value in INR per sapling.

Q7.12 What is the discounted price of the sapling distributed as part of the forestry project? Please input value in INR per sapling.

Q7.13 Does your project lead to an increase in annual income for the farmers / communities that are part of the project? If yes, please input value of increase in income in INR per farmer per year.

Yes/No	
If yes, provide details	

Q7.14 What is the methodology you employed to estimate the annual income increase of households/farmers? Please provide a brief description.

Q7.15 What is the total number of households / farmers for whom income generation activities have been created? Please input value in number of households / farmers.

Q7.16 What is approximate percentage of targeted households that fall under low income category? Please input value in %.

APPENDIX 6

Detailed scores

Scores in economic dimension

	Intrinsic			Secondary		
	E1	E2	E3	E1	E2	E3
Biomass energy	3.7	2.5	0.3	3.0	2.5	0.3
EE households	4.1	1.9	0.3	2.4	1.9	0.3
EE Industry	1.5	0.7	0.7	2.3	0.7	0.9
EE own generation	1.9	2.1	0.3	1.9	2.1	1.0
EE supply side	1.8	1.2	0.6	2.6	1.2	0.6
EE Service	3.0	0.0	0.0	3.0	0.0	0.0
Fossil Fuel Switch	3.0	1.0	0.5	2.0	1.0	0.5
HFCs	2.0	4.0	0.0	2.0	4.0	0.0
Hydro	2.6	2.1	0.6	2.4	2.1	0.6
Landfill Gas	2.0	2.0	0.0	1.0	2.0	0.0
Methane avoidance	2.5	1.0	0.3	3.3	1.0	0.8
N2O	1.7	1.3	0.0	1.7	1.3	1.3
Reforestation	4.5	0.0	1.0	4.5	0.0	1.0
Solar	4.0	0.0	0.0	2.0	0.0	0.0
Transport	2.0	0.0	0.0	2.0	0.0	0.0
Wind	2.8	1.0	0.2	2.2	1.0	0.2

Scores in environment dimension

	Intrinsic					Secondary				
	EN1	EN2	EN3	EN4	EN5	EN1	EN2	EN3	EN4	EN5
Biomass energy	0.0	0.0	0.0	2.0	2.0	3.5	4.5	1.7	0.3	0.3
EE households	2.0	2.9	0.0	2.0	0.3	1.7	1.1	1.1	0.9	0.0
EE Industry	2.0	1.2	0.0	2.0	0.0	3.7	3.7	2.3	0.7	0.3
EE own generation	1.7	1.4	0.0	2.0	0.0	4.3	2.6	1.4	0.0	0.3
EE supply side	0.0	0.0	0.0	1.6	0.0	3.2	4.8	0.8	0.8	0.0
EE Service	2.0	2.0	0.0	2.0	0.0	8.0	4.0	4.0	0.0	2.0
Fossil Fuel Switch	1.0	1.0	0.0	0.0	0.0	5.0	2.0	2.0	0.0	0.0
HFCs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hydro	2.0	0.0	0.0	2.0	2.0	1.9	1.9	1.3	0.4	0.1
Landfill Gas	1.0	2.0	0.0	1.0	0.0	5.0	5.0	4.0	0.0	0.0
Methane avoidance	2.0	2.0	0.0	0.0	0.0	4.0	3.5	3.0	2.0	1.0
N2O	2.0	0.0	0.0	0.0	0.0	5.3	1.3	2.0	0.0	1.3
Reforestation	6.0	0.0	6.0	0.0	0.0	4.0	6.0	3.0	0.0	0.0
Solar	0.0	0.0	0.0	2.0	2.0	2.0	0.0	0.0	4.0	2.0
Transport	0.0	4.0	0.0	2.0	2.0	2.0	0.0	0.0	0.0	0.0
Wind	0.0	0.0	0.0	2.0	2.0	1.5	1.4	0.7	0.1	0.0

Scores in social dimension

	Intrinsic						Secondary					
	S1	S2	S3	S4	S5	S6	S1	S2	S3	S4	S5	S6
Biomass energy	0.0	0.0	0.0	0.0	0.0	0.0	1.5	0.6	1.0	0.8	1.2	0.5
EE households	0.0	0.0	1.7	0.6	0.0	0.0	0.9	0.3	0.6	0.3	0.9	0.9
EE Industry	0.0	0.0	0.0	0.0	0.0	0.0	1.2	1.2	1.2	1.0	1.0	0.8
EE own generation	0.0	0.0	0.0	0.0	0.0	0.0	1.7	2.0	2.0	1.1	1.7	1.4
EE supply side	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.8	0.8	0.8	0.8	0.8
EE Service	0.0	0.0	0.0	0.0	0.0	0.0	2.0	2.0	2.0	2.0	2.0	2.0
Fossil Fuel Switch	0.0	0.0	0.0	0.0	0.0	0.0	2.0	2.0	2.0	1.0	2.0	2.0
HFCs	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Hydro	0.0	0.0	0.0	0.0	0.0	0.0	1.0	1.0	0.7	0.4	1.4	0.4
Landfill Gas	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	1.0	0.0
Methane avoidance	0.0	0.0	0.0	0.0	0.0	0.0	1.5	1.5	1.5	1.0	1.0	1.0
N2O	0.0	0.0	0.0	0.0	0.0	0.0	0.7	2.0	0.7	0.0	2.0	0.7
Reforestation	0.0	0.0	0.0	2.0	0.0	0.0	1.0	1.0	1.0	0.0	1.0	1.0
Solar	0.0	0.0	0.0	0.0	0.0	0.0	2.0	2.0	2.0	2.0	2.0	0.0
Transport	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	2.0	2.0
Wind	0.0	0.0	0.0	0.0	0.0	0.0	0.6	0.5	0.4	0.5	0.7	0.4

Scores in technological dimension

	Intrinsic	Secondary
	T1	T1
Biomass energy	0.2	0.3
EE households	1.1	0.0
EE Industry	1.2	0.3
EE own generation	0.3	0.3
EE supply side	2.0	0.0
EE Service	2.0	0.0
Fossil Fuel Switch	2.0	0.0
HFCs	2.0	0.0
Hydro	0.1	0.1
Landfill Gas	1.0	0.0
Methane avoidance	1.0	0.5
N2O	2.0	0.0
Reforestation	1.0	1.0
Solar	2.0	0.0
Transport	2.0	0.0
Wind	1.8	0.0

APPENDIX 7

Estimation of emission reduction potential

The following table summarizes the linear adjustment made to the base year, the average benchmarks and IRRs for various sectors. The benchmarks and IRRs have been taken from the PDDs of registered CDM projects. While the adjustment factors are mostly based on the past record of CDM project development in a sector and chances of a success CDM registration (as described in section 2.2), there are sectors like supercritical and gas power projects for which recent developments in CDM methodology and price of gas respectively has been especially considered.

Type	Activity	Mitigation potential (Million tCO_2 in 2020) as estimated by the Expert Group with 2007 as the base year	Future Mitigation potential (Million tCO_2 in 2020) with 2012 as base year	Average benchmark %	Average IRR considering Euro 5 / tCO_2e	Average IRR considering Euro 10/ tCO_2e	Average IRR considering Euro 15 / tCO_2e	Combined adjustment factor
EE Household	Lighting	44	27	16%	2%	25%	51%	97%
	Refrigerators	6	4	No investment analysis done by CDM projects				20%
	Fan, TV and AC	20	12	No investment analysis done by CDM projects				20%
EE commercial building	Heating, Ventilation and Air conditioning, Lighting and Internal Loads and others	60	37	No investment analysis done by CDM projects				1%

Waste	Landfill gas – (Composting, Solid waste, manure)	60	37	13%	11%	18%	24%	34%
	Wastewater			13%	14%	22%	30%	0%
EE Cement	Clinker replacement	50	31					0%
	Fuel Substitution	8	5	12%	11%	17%	26%	50%
Hydro	Hydro	45	28	16%	11%	12%	14%	15%
Reforestation/ Afforestation	Reforestation/Afforestation	43	26	15%	11%	12%	14%	1%
Transport	Modal shift – Increased freight share of Railways and Non-motorised and public transport	31	19	10%	13%	13%	13%	7%
	Fuel efficiency of vehicles	11	7	No investment analysis done by CDM projects				9%
Iron and Steel	BF-BOF including wasteheat projects	28	17	17%	21%	24%	27%	64%
	COREX/FINEX-BOF including wasteheat projects	5	3	16%	25%	38%	50%	50%
	DRI-EAF and F-Technology	4	2	No investment analysis done by CDM projects				50%
Solar	Solar	22	14	15%	10%	11%	11%	87%
Biomass	Biomass	19	12	15%	13%	16%	31%	50%
Wind	Wind	18	11	13%	9%	15%	17%	75%
FF Switch (Gas Based Combined cycle)	FF Switch (Gas Based Combined cycle)	13	8	12%	13%	16%	18%	64%
EE Supply side	EE Supercritical	8	5	13%	7%	20%	33%	6%
Agriculture	Agriculture	5	3	12%	10%	18%	26%	100%

APPENDIX 8

The role of New Market Mechanisms for India

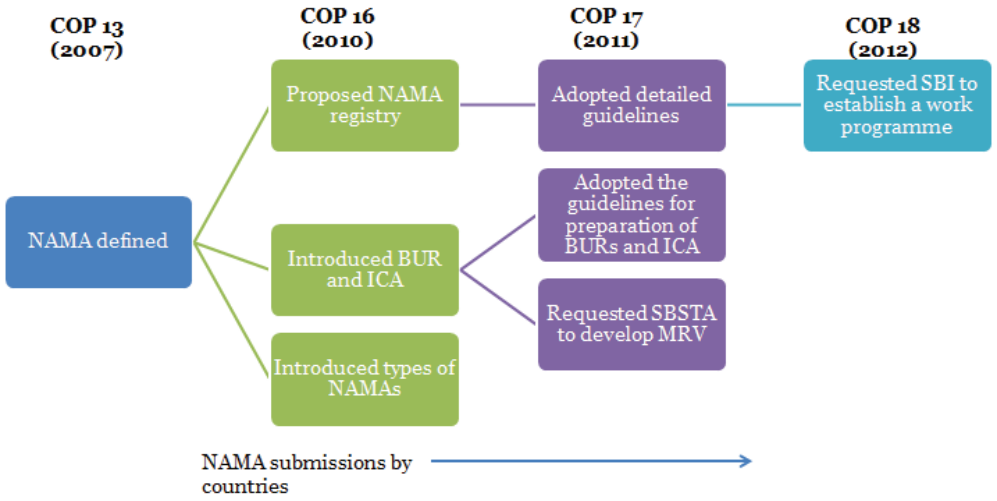
The new approaches discussed in the UNFCCC negotiations including Nationally Appropriate Mitigation Actions (NAMAs), the top-down New Market Mechanisms (NMM) and the bottom-up Framework for Various Approaches (FVA) can provide incentives for the introduction of mitigation policy instruments in India. It is crucial for India to ensure that the learning from the past decade long experience of the CDM should be used in a manner that the new mechanisms fulfil the criteria of environmental integrity, technology transfer, long term instrument availability for support and execution of planned interventions and inclusive growth and sustainable development of India.

Nationally Appropriate Mitigation Actions (NAMAs)

NAMAs originated in the 2007 Bali Action Plan in Para 1(b)(ii), Decision 1/CP13 which calls for "enhanced national / international action on mitigation of climate change" and includes "nationally appropriate mitigation actions by developing country Parties in the context of sustainable development, supported and enabled by technology, financing and capacity-building, in a measurable, reportable and verifiable manner."

Under the "Copenhagen Accord" at COP 15 in 2009, 114 countries committed to undertaking mitigation actions as part of a shared responsibility to reduce greenhouse gas emissions. COP 16 in Cancun 2010 (Para 48-67, Decision 1/CP.16) decided to segregate NAMAs into domestically and internationally supported actions. The UNFCCC was to set up a registry to record NAMAs seeking international support, which has been done in 2013. The Biennial Update Reports (BUR) due from 2014 onwards are to include details on individual NAMAs.

Figure 42
Decisions regarding NAMA



A mechanism to review internationally supported mitigation actions was set up in form of International Consultation and Analysis (ICA). COP 17 in Durban 2011 (Para 32-62, Decision 2/CP.17) adopted detailed guidelines for the operation of the registry, preparation of the BURs and ICA. The COP also requested SBSTA to develop general guidelines for domestic measurement, reporting, and verification of domestically supported NAMAs. COP 18 in Doha 2012 (Para 14-24, Decision 1/CP.18) decided to establish a work programme under Subsidiary Body for Implementation (SBI) to further the understanding of the diversity of the nationally appropriate mitigation actions. NAMA can range from a national emissions target underpinned by cross-sectoral mitigation policies to single mitigation projects. The most frequent differentiation made by analysts is strategic, policy and project-based NAMAs.

The UNFCCC NAMA registry has categorized submissions from the host countries under the following heads: (a) NAMA seeking support for preparation – currently has 6 submissions, (b) NAMA seeking support for implementation – 20 submissions, (c) Other NAMAs for recognition – 4 submissions. These submissions come from Chile, Ethiopia, Mali, Serbia and Uruguay. While beyond the NAMA registry submissions, many countries have asked for NAMA support. So far, no grant has been provided by industrialized countries for actual implementation of a NAMA. However, Germany and United Kingdom have set up a NAMA facility with Euro 70 million is likely to fund selected NAMAs with € 5-15 million each.

The Government of India convened a sub group under the working group on environment and climate change by the Planning Commission in July 2011 to make recommendations on climate change including the scale of funding necessary for NAMAs for the XIIth Five Year Plan. The Ministry of Environment & Forests (MOEF) constituted an expert committee on NAMAs in 2012 to undertake following activities[57] to:

- Deliberate on matters relating to NAMAs with a view to enhance understanding of diversity of mitigation actions
- Deliberate on assumptions and methodologies, sectors and gases covered and support needs for implementation of NAMAs and outcomes.
- Consider and advise on general guidelines for domestic measurements, reporting and verification of domestically supported NAMAs.

57 Towards preparation of India's third National communication and Biennial update report to UNFCCC- Ministry of Environment and Forest

- Consider issues and devise approaches to address issues related to international MRV of NAMAs.

Most, if not all of the Indian mitigation policies can be categorized and covered through NAMAs

- The REC / RPO programme[58]
- The PAT Scheme[59]
- Super-critical and ultra-super-critical thermal power projects
- Decentralized electricity generation
- Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY)
- Renovation and modernization of large thermal and hydro power projects
- Scrapping of less than 100 MW electricity generation units
- Agriculture Energy Efficiency Program (including Agri Pumping and HVDS)
- Smart Grids
- Standards and Labelling Programme
- Energy Conservation in Buildings (ECBC)
- Nuclear power expansion

New Market Mechanism and Framework for Various Approaches

New market mechanisms were first mentioned in the Copenhagen Accord which referred to "various approaches, including opportunities to use markets, to enhance the cost-effectiveness of, and to promote mitigation actions" (para 7). The Durban conference in 2011 decided that two options for new market mechanisms should be pursued – one top-down, operating under authority of the COP ("new market-based mechanism", NMM, para 83 of Decision 2/CP.17, referring to the Cancun decision on criteria for such mechanisms) and one bottom-up developed by countries "in accordance with their national circumstances" ("Framework for various approaches", FVA, para 80 of Decision 2 CP.17) but its details have not been specified yet. According to the Cancun and Durban decisions, the criteria for these mechanisms are as follows:

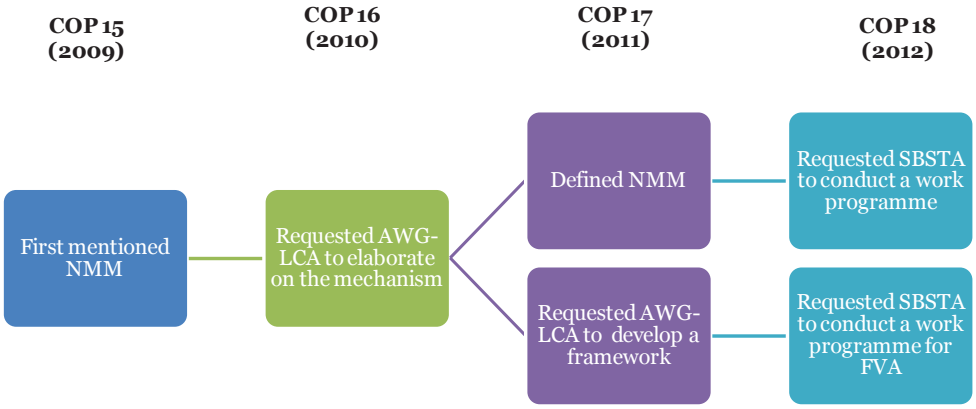
58 The REC scheme was launched in 2010 to promote use of RE and simultaneously ensuring availability of compliance instruments against RPO through trading of renewable energy certificates.

59 PAT allows large energy users in industry ("Designated Consumers", 478 as per March 2012 notification) to trade energy efficiency improvement certificates

Table 15 | NMM and FVA

NMM	FVA
• voluntary participation • promotion of fair and equitable access for all Parties • complementing other means of support for NAMAs • stimulating mitigation across broad segments of the economy • environmental integrity • net decrease and/or avoidance of global greenhouse gas emissions; • use supplemental to domestic mitigation efforts • good governance and robust market functioning and regulation	• real, permanent, additional and verified mitigation • no double counting of effort • net decrease and/or avoidance of greenhouse gas emissions

Figure 43 Decisions regarding new market mechanisms



Bilateral mechanisms are likely to play an important role (as compared to CDM) under the FVA. Japan wants to develop a more flexible approach through its Joint Crediting Mechanism (JCM). While its rules have not yet been specified, Japan is conducting feasibility studies in various Asian and Latin American countries to assess the potential of delivering its technologies under the JCM. Private sector companies have also conducted these feasibility studies with support from Ministry of Economy and Trade (METI) and the Ministry of Environment (MOE).

The reported feasibilities studies in India cover following sectors/technologies – (i) power sector (ultra supercritical coal power plants and integrated gasification combined cycle power plants), (ii) iron and steel (energy efficiency), (iii) renewable energy (solar PV and run-of-river micro hydro power plants), (iv) automatic coal control system, (iv) air conditioning (energy efficiency), (v) low temperature waste heat recovery, (vi) data centres (energy efficiency), (vii) LED lights, (viii) aluminium (high performance furnaces), (ix) bagasse-based power generation including waste heat utilization.

Reducing Emissions from Deforestation and forest Degradation (REDD+)

While avoided deforestation was excluded from the CDM, since 2007 the concept of Reducing Emissions from Deforestation and forest Degradation (REDD+) has gained a lot of ground. It is at present being treated separately from NMM and FVA, it might also generate tradable credits in the long run.

Demand from new trading schemes

The recent years have witnessed development of several new trading schemes (domestic and international) among developed and developing countries. Among developing countries Brazil, China, Kazakhstan, South Korea, Thailand and Vietnam have announced domestic emission trading schemes. Table below summarizes the various emission trading schemes in non-Annex 1 countries. Though nascent, some of these national schemes can provide opportunity for international offsets – be it CERs or units from the NMM and FVA - in due course of time subject to international acceptance.

Table 16 | Emission trading schemes in non-Annex 1 countries

Country	Emission Trading Scheme
Brazil	• To be launched in Rio de Janeiro by 2013 and will cover major emitters in Oil & gas, iron & steel, cement, ceramics, chemical and petrochemical industries. • Will help Brazil meet its voluntary obligation of reducing GHG emissions by 36-39% by 2020
China	• Pilot cap and trade ETSs are being established, with the aim to reduce CO2 emissions per unit of GDP to 40-45 percent below 2005 levels by 2020, in 7 provinces and districts; Beijing, Chongqing, Guangdong, Hunan, Shanghai, Shenzhen and Tianjin. These schemes cover major sectors like power, iron and steel, petrochemical, cement, chemical, plastics, paper, manufacturing, buildings, ceramics and rubber. • Some schemes will launch as early as 2013 • Will also be linked to EU ETS in the future
Kazakhstan	• Launched its domestic emission trading scheme (pilot basis) on 1st January 2013. • Targets to reduce GHG emissions by 5% from 1990 levels by 2020.
South Korea	• Will be launched in 2015 and help South Korea meet its voluntary obligation of reducing GHG emissions by 30% from projected levels by 2020 • International offsets are not allowed till 2020 (A 10% cap applies to international offsets post 2020) but obligated entities can use domestically generated CERs and thus support the registered projects from the country
Thailand	• Plans to establish a carbon market by October 2013
Vietnam	• Will be launched in 2020 to reduce GHG emissions per unit of GDP by 8-10 percent below 2010 levels by 2020. • Targets to reduce GHG emissions in the energy and transport sectors by eight percent from 2005 levels, and a 20 percent reduction in the agriculture sector

Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH

The Indo German Environment Partnership Programme
B-5/2, Safdarjung Enclave
New Delhi – 110029
T + 91 11 4949 5353
F + 91 11 4949 5391
E contact@igep.in
I www.igep.in, www.giz.de