



REPORT

IND

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LOW CARBON GROWTH POLICY TRACKER FOR INDIAN STATES

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"India will reduce the emissions
intensity of its GDP by
20-25
percent over the 2005 levels by
the year 2020"

Source: Government of India

ACRONYMS AND ABBREVIATIONS

APPC	Average Power Purchase Cost
ASHRAE	American Society of Heating, Refrigerating and Air-conditioning Engineers
ASSOCHAM	Associated Chambers of Commerce and Industry of India
AT&C losses	Aggregate Technical And Commercial Losses
BEE	Bureau of Energy Efficiency
BIS	Bureau of Indian Standards
BRTS	Bus Rapid Transit System
CAFE	Corporate Average Fuel Economy
CAMPA	Compensatory Afforestation Fund Management and Planning Authority
CCS	Carbon Capture And Sequestration
CEA	Central Electricity Authority
CERC	Central Electricity Regulatory Commission
CETP	Common Effluent Treatment Plant
CNG	Compressed Natural Gas
CPCB	Central Pollution Control Board
CSS	Centrally Sponsored Scheme
DC	Designated Consumers
DSM	Demand-Side Management
EC	Energy Conservation
ECBC	Energy Conservation Building Code
EE	Energy Efficiency
EEFP	Energy Efficiency Financing Platform
EIA	Environment Impact Assessment
ESCCerts	Energy Savings Certificates
EU	European Union
EY	Ernst & Young LLP
FDI	foreign direct investment
FEEED	Framework for Energy Efficient Economic Development

FICCI	Federation of Indian Chambers of Commerce and Industry
FO	Furnace Oil
FSI	Forest Survey of India
GBI	Generation-Based Incentives
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GIM	Green India Mission
GMAC	Green Manufacturing Committee
GoI	Government of India
GRIHA	Green Rating for Integrated Habitat Assessment
GW	Gigawatt
IBEF	India Brand Equity Foundation
ICFRE	Indian Council of Forestry Research and Education
ICRISAT	International Crops Research Institute for the Semi-Arid Tropic
IDC	India Design Council
IEX	Indian Energy Exchange
IGBC	Indian Green Building Council
IGCC	Integrated Gasification Combined Cycle
IIFM	Indian Institute of Forest Management
INCCA	Indian Network on Climate Change Assessment
INR	Indian Rupees
IPCC	International Panel on Climate Change
ISO	International Organization for Standardization
IWT	Inland Water Transport
JNNURM	Jawaharlal Nehru National Urban Renewal Mission
Lakh	100,000
LDO	Light Diesel Oil
LEED	Leadership in Energy and Environmental Design
LPG	Liquefied Petroleum Gas
LSHS	Low Sulphur Heavy Stock
LULUCF	Land Use, Land-Use Change And Forestry
MLD	Million Litres Per Day
MNRE	Ministry of New and Renewable Energy
MoEF	Ministry of Environment and Forests
MoPNG	Ministry of Petroleum and Natural Gas
MoRTH	Ministry of Road Transport and Highways

MoSPI	Ministry of Statistics and Programme Implementation
MoUD	Ministry of Urban Development
MPP	Mega Power Plant
MRTS	Mass Rapid Transport System
MSME	Micro, Small And Medium Enterprises
MSW	Municipal Solid Waste
MT	Million Tonnes
MTEE	Market Transformation for Energy Efficiency
MU	Million Units
MW	Megawatt
MYT	Multi-Year Tariff
NAP	National Afforestation Programme
NAPCC	National Action Plan on Climate Change
NATCOM	National Communication
NBC	National Building Code
NIC	National Informatics Centre
NICRA	National Initiative on Climate Resilient Agriculture
NMCP	National Manufacturing Competitiveness Programme
NMEEE	National Mission for Enhanced Energy Efficiency
NMT	Non-Motorized Transport
NREGA	National Rural Employment Guarantee Act
NRSC	National Remote Sensing Centre
NSDP	Net State Domestic Product
NSTEDB	National Science and Technology Entrepreneurship Development Board
NTFP	Non-Timber Forest Products
NZEB	Net-Zero Emission Buildings
OA	Overarching
OE	Obligated Entities
PAT	Perform, Achieve and Trade
PLF	Plant Load Factor
PPP	Public–Private Partnership
PUC	Pollution Under Control
PWD	Public Welfare Department
PXIL	Power Exchange India Ltd
RE	Renewable Energy

REC	Renewable Energy Certificate
REDD	Reducing emissions from deforestation and forest degradation
REI	Renewable Energy Investments
RPO	Renewable Purchase Obligation
SAPCC	State Action Plan on Climate Change
SDA	State Designated Agency
SEC	Specific Energy Consumption
SERC	State Electricity Regulatory Commission
SRI	System of Rice Intensification
TERI	The Energy and Resources Institute
TIME IS	Technology Innovation Management and Entrepreneurship Information Service
TRAI	Telecom Regulatory Authority of India
T&D	Transmission And Distribution
TPP	Thermal Power Plant
UMPP	Ultra Mega Power Plant
UMTA	Unified Metropolitan Transport Authority
W2E	Waste to Energy
WWF	World Wide Fund for Nature

1. BACKGROUND

The Low-Carbon Growth Policy Tracker for India has been designed on the lines of the Climate Policy Tracker for the European Union (EU), which was developed by WWF International in 2010.

The Climate Policy Tracker for the EU was developed to provide an overview and assessment of different policies, across the 27 EU member states, that affect greenhouse gas (GHG) emissions and contribute to the national, EU-wide and international policy debate in the related domain. EU countries were rated on the adequacy of their current GHG-related policies to eventually create a low-carbon economy, in line with the committed overall GHG reduction objective of 80-95 per cent by 2050. The tracker was updated in 2011 to record developments in climate and energy policies across the EU member states.¹

Highlights of the EU Climate Policy Tracker

- The methodology was unique because of the following qualities.
 - **Comprehensiveness:** The analysis included all policy areas that positively and negatively influence GHG emissions.
 - **Comparability:** All EU countries were rated by the same methodology, so that their performances in renewable, energy efficiency and overall climate policy were comparable.
 - **Ambition:** Policies were rated against the clear goal of a low-carbon economy in 2050
- **Policies** on renewable energy and energy efficiency were considered separately.
- All other elements were grouped under the 'Overarching' category, which includes:
 - CCS in electricity production and industry
 - Modal shift in transport
 - CO₂ taxes or energy taxes
- An individual analysis was conducted for each of the following sectors—electricity supply, industry, buildings, transport, agriculture and forestry.
- The category, 'General' includes the general long-term climate strategy.
- Two methods were used to evaluate countries.
 - **Method 1: Detailed method**
For 12 countries with the highest emissions, plus three particularly interesting countries, 85 indicators were evaluated. The indicators not only measure whether policies directed at emission reduction are in place, but also whether counterproductive policies and barriers to emissions

¹ www.climatepolicytracker.eu

reduction are adequately removed. The average values for 16 barriers were also analyzed in this detailed method.

- **Method 2: Simplified method**

For the other 12 countries, 43 indicators were evaluated.

- Indicators were evaluated for each country on a scale from 0 (poor) to 4 (excellent), against defined benchmarks. The results were aggregated to obtain scores by country, by sector and by policy area.
- Weighting of sectors was, in principle, based on their share of emissions in the country.
- Weighting of policy areas was based on the necessary contribution of the policy area to a low-carbon economy.
- The summary results per sector, area and country are displayed in seven categories, 'A' (excellent) to 'G' (poor), resembling the EU energy-efficiency labelling for appliances.

Specific modifications made to the Low-Carbon Growth Policy Tracker for Indian states, as per the Indian context, are highlighted below.

- As India is a developing country, the indicators assessed in the EU tracker have been modified to suit Indian conditions.
- The indicators have been derived from the sectoral policy package for India, which has been developed based on central and state policies. This is a modification of the approach in the EU study, which defines a best-practice policy package for the same.
- In an ideal scenario, the sectoral GHG emission contribution of each state should be used to provide weightage to scores achieved by each state in the respective sector. These weighted sectoral scores would then be consolidated to present the overall picture of the progress of low-carbon policy in each state. Due to absence of sectoral GHG inventories in most of the 10 states covered under study, the current model uses uniform, or equal, weightage for each sector's scores.

1.1. Introduction

On 8 June 2007, The prime minister of India had declared to the international community that India was determined to ensure that its per capita emission levels would never exceed the average per capita carbon emission levels of developed countries.

India released the National Action Plan on Climate Change (NAPCC)² on 30 June 2008 to outline its strategy to meet the challenge of climate change. Eight national missions form the core of the NAPCC, representing multi-pronged, long term and integrated strategies for achieving key goals in the context of climate change.

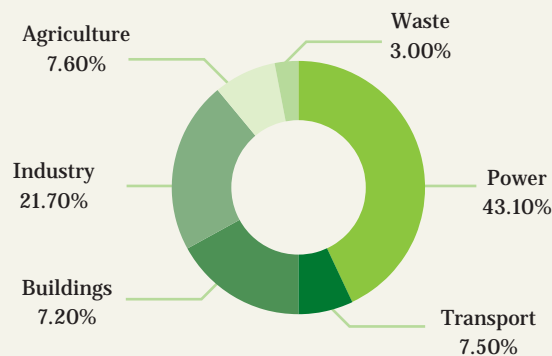
In December 2009, the Indian government announced that it would aim at reducing

² Ministry of Environment & Forest, National Action Plan on Climate Change, 2008, GoI, -<http://www.indiaclimatportal.org/the-napcc>

the emissions intensity of its GDP by 20-25 per cent from the levels in 2005 by 2020. This further articulated the Indian government's voluntary domestic commitment, even though India is not part of any international legally binding agreement on emissions intensity targets and emissions reduction outcomes. The announcement demonstrated India's resolve to ensure that its growth process is sustainable and based on low-carbon principles. Meeting this goal will require necessary sector-specific actions to reduce emissions intensities over India's twelfth and thirteenth Five Year Plan periods. India's draft Twelfth Five Year Plan, launched in 2012³ has, as one of its key pillars, a thrust toward low-carbon inclusive growth.

As per the *India: Greenhouse Gas Emissions 2007* (Indian Network for Climate Change Assessment, MoEF, 2010), sector-wise emissions contributions in India are presented in the figure below.

Percentage emissions, by sector, in India in 2007⁴



In May 2011, the Planning Commission came out with an interim report on low-carbon strategies for inclusive growth that provides a menu of options to reduce India's emissions intensity. The report⁵ provides a strategy for low-carbon growth across key economic sectors of India.

In May 2012, India submitted the *Second National Communication to the United Nations Framework Convention on Climate*⁶, which provides the national GHG inventory in 2000.

The strategies for low-carbon growth emphasize policy intervention at the national level. In this context, each of the states in India is in the process of developing its individual State Action Plan on Climate Change (SAPCC). These state action plans and sectoral policies on low-carbon transformation, developed on the lines of the NAPCC, will customize features to take care of state-specific issues. In order to harmonize the efforts undertaken by different states, it would be useful to track their progress in terms of the policies for low-carbon growth under different sectors.

3 Planning Commission Report, Draft Twelfth Five Year Plan (2012-17), GoI-http://planningcommission.gov.in/plans/planrel/12thplan/pdf/vol_1.pdf

4 The forestry sector is regarded as a net GHG sink for India. The land use, land -use change and forestry (LULUCF) sector was a net sink in 2007. It sequestered 177.03 million tonnes of CO₂.

5 Planning Commission, GoI, Interim Report of the expert group on Low Carbon Strategies for inclusive growth, May 2011- http://planningcommission.nic.in/reports/genrep/Inter_Exp.pdf

6 Government of India, Second National Communication to UNFCCC, 2007-<http://unfccc.int/resource/docs/natc/indnc2.pdf>

In the above context, this study has been commissioned with the objective of developing a Low-Carbon Growth Policy Tracker for Indian states. For the purpose of the study, a sample of 10 states has been selected, and a tracker has been designed to map their performance and progress in the development of policies that, directly or indirectly, impact the low-carbon growth of the states.

1.2. Study Objectives

The specific objectives of the project are as follows:

- Develop a methodology and mechanism to track the state's progress in designing and implementing policies that enhance low-carbon transformation.
- Stimulate positive action by comparing and encouraging best practices.
- Encourage policies that promote overall low-carbon transformation and development at the state level.

The Low-Carbon Growth Policy Tracker is aimed at providing an overview and assessment of different policies across each of the key economic sectors—power, industry, transport, buildings, waste, forestry and agriculture. Apart from these sectors, the tracker has provisioned for a 'General' sector under which the overarching support from the states toward low-carbon policy initiatives has been captured.

The study assesses existing policies and complementary actions of state governments (such as state laws, rules, regulations, etc., as well as published guidelines or specific initiatives) that promote low-carbon development.

The tracker, in its current phase, maps out sectoral policies applicable across 10 Indian states. The selected states are highlighted in the map below.



1.3. Study parameters

- The initiatives that have been assessed under this project include central and state policies and acts implemented through instruments, such as state bylaws, special regulations, etc., as well as published guidelines or specific initiatives that showcase the state's pro-activeness toward implementation.
- Mapping the effectiveness of implemented state policies is limited to secondary literature review. A cut-off date of 31 March 2012 has been applied for the consideration of central and state policies under this tracker. However, considering the relative infancy of reported data and/or policies in low-carbon growth across state sectors, certain comparable state policies or reports, if available, have been utilized even if they are of a subsequent date.
- Since the central and state policies have been referenced from published sources, the time range of sourced data differs for different indicators. Best efforts have been made to maintain relevance of the data assessed against the indicators. Also, the same references have been used for all 10 states to maintain comparability.

1.4. Methodology for state selection

The project is envisaged as a pilot study to assess the development of state-level low-carbon policies across sectors. Thus, a representative set of 10 states was selected for the policy tracker study.

1.5. Methodology for the selection of states under the current phase of study:

The methodology for state selection has been developed using two criteria.







- i. Sector relevance for low-carbon growth
- ii. Overarching criteria for low-carbon development, such as administrative and policy support, geographical representation, proactive climate change policies, etc.

Thus, by putting the results obtained from the application of the above criteria through a process of iterative ranking, a final list of 10 states has been developed.

Selection criteria

The first selection criterion includes an assessment of sector-specific factors that are relevant within the state(s). The sector-specific indicators, which have been considered for assessment, are presented in the following table.

Table: Sector-specific criteria

Study sector	Identified state-level indicators	Rationale for indicator
 POWER	<ul style="list-style-type: none"> ■ Total electrical energy consumption ■ Installed renewable energy generation capacity 	<p>The pattern in power consumption and generation directly provides metrics to assess the carbon intensity of states, thus providing the highest potential for mitigation opportunities. On the one hand, total electricity consumption, which calls for greater mitigation action, has been considered to rank states; on the other hand, renewable energy generation capacity, which indicates an important mitigation measure on the supply side, has been used for assessing the states.</p>
 INDUSTRY	<ul style="list-style-type: none"> ■ Industry net state domestic product (NSDP) 	<p>Industry is a carbon-intense sector and has great potential for mitigation. The contribution to industrial NSDP by each state has been considered for ranking the states.</p>
 TRANSPORT	<ul style="list-style-type: none"> ■ Number of registered vehicles 	<p>The number of registered vehicles per state may represent, in part, the extent of the contribution of the transport sector toward the consumption of fossil fuels.</p>
 BUILDINGS	<ul style="list-style-type: none"> ■ Percentage of urban population 	<p>Urban population serves as a good proxy for the mitigation potential of buildings. The percentage of urban population has been considered for ranking states.</p>
 AGRICULTURE	<ul style="list-style-type: none"> ■ Cultivators 	<p>The agriculture sector provides for food security, access to food resources, enhances livelihood opportunities and contributes to the economic stability at the national level. In an agrarian economy like India, the agriculture sector's relative importance to a state was determined by considering the number of cultivators in each state.</p>
 FORESTRY	<ul style="list-style-type: none"> ■ Total forest area 	<p>The forestry sector has a great influence on environmental amelioration through net carbon sequestration, biodiversity conservation and livelihood security of forest-dependent communities. The total forest area in each state has been considered while assigning a rank to it.</p>
 WASTE	<ul style="list-style-type: none"> ■ Solid waste generated 	<p>There are various categories of waste—municipal waste, industrial, medical waste, sewage, etc. The total municipal solid waste may serve as a good representation of the total amount of waste generated within a state.</p>

Overarching criteria

The overarching criteria that have been assessed include the status of the SAPCCs, the level of proactive steps taken by states in the area of climate change and ensuring overall representativeness of India's geo-climatic zones through the selection of the 10 states for this study.

i. Status of SAPCC

Under the NAPCC released by the prime minister of India on 30 June 2008, measures to promote India's development objectives have been identified, along with the co-benefits of effectively addressing climate change. The plan outlines a number of steps to simultaneously advance India's development and climate change-related objectives of adaptation and mitigation.

The states which had released the draft SAPCC on the Ministry of Environment and Forest, GoI, website⁷ by February 2012 were considered for analysis at the time of state selection.

The SAPCC focuses on measures that state governments will take to reduce their carbon footprints and GHG emissions, besides adopting a low-carbon climate-resilient development path on the basis of agro-climatic zones and industrial sectors.

ii. Proactive climate change policies of the state under any of the NAPCC missions

This criterion assesses actions taken by some of the Indian states, which may or may not have released a draft SAPCC but have proactively prescribed the identified measures detailed within the respective NAPCC missions. These actions include the establishment of dedicated climate change departments/cells/task forces.

iii. Geographical representativeness and other considerations

This criterion assesses the balance of physical representativeness of the selected 10 states to enable holistic coverage of the diverse geo-climatic zones of India (i.e., the northern signifying the Himalayan region; the southern and eastern signifying the coastal, agricultural and forested areas; the western, which is dominated by desert and industrial zones; and the northeastern states that represent specific Himalayan and water reserves for India).

Thus, a list of states – ranked in order of maximum number of occurrences for each of the above indicators – was prepared.

The following considerations were further applied to obtain the final list of states, apart from quantitative ranking.

- The need to consider a northeastern state that has a high rank and is representative of the northeastern region. Arunachal Pradesh has been selected based on the extensive forests and the proactive interest of the state government in protecting them.

⁷ MoEF, GoI, website, *Draft Reports State Action Plan on Climate Change (SAPCC)*, <http://moef.nic.in/mod-ules/others/?f=sapcc-2012>, last accessed in February 2012.

- Himachal Pradesh was included because it is a key Himalayan state and is proactive on climate change issues.
- Delhi was included due to its special status as the capital city of India.

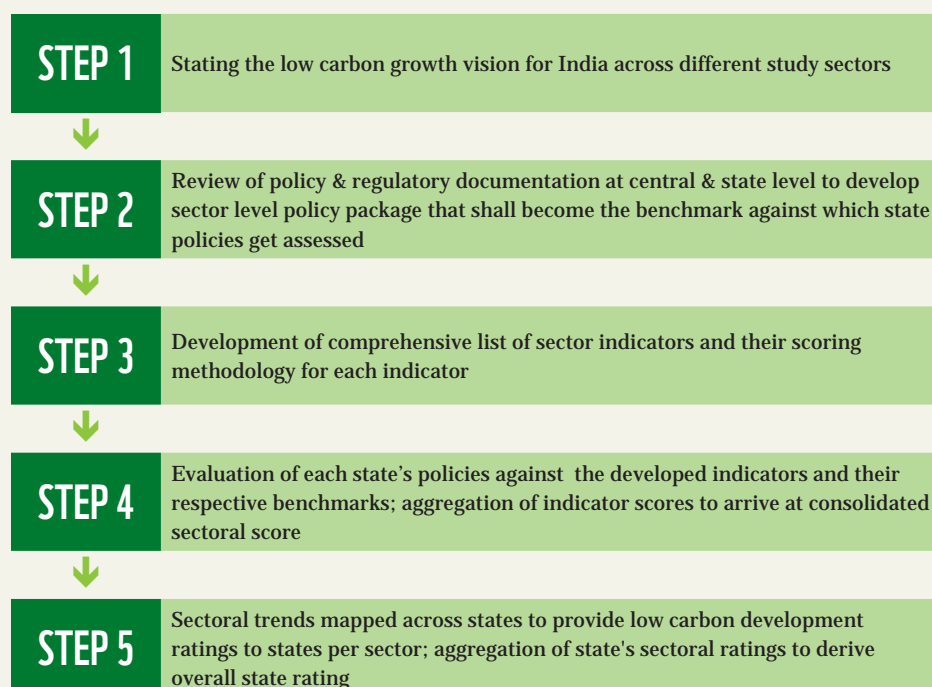
Thus, the states considered for the study are Andhra Pradesh, Arunachal Pradesh, Delhi, Gujarat, Himachal Pradesh, Karnataka, Madhya Pradesh, Maharashtra, Rajasthan and Tamil Nadu.

It is envisaged that the tracker shall be updated as and when India's low-carbon growth policies are finalized across sectors. The learning from this pilot study is expected to prove extremely resourceful when applied to the future versions of the tracker.

2. APPROACH AND METHODOLOGY

2.1. Study framework

The overall approach adopted for assessing the progress in low-carbon policies across states is depicted in the figure below.



The framework for the study covers the following sectors and three policy enabler areas.

GENERAL				
POWER		RENEWABLES	ENERGY EFFICIENCY	OVERARCHING
INDUSTRY				
BUILDINGS				
TRANSPORT				
WASTE				
AGRICULTURE				
FORESTRY				

The policies that influence low-carbon growth across the above sectors and are available in the public domain have been analyzed for the selected states.

The tracker has provisioned for a 'General' sector under which the overarching and proactive support from the states toward low-carbon policy initiatives has been captured.






The three main policy enabler areas have been covered under the heads of 'Renewable', 'Energy efficiency' and 'Overarching'. The Overarching policy enabler head includes all measures aimed at other emission reduction options apart from renewable and energy efficiency initiatives, such as a modal shift in transport, green tax, budget allocation for clean energy, subsidies, etc.

2.2. Weightages for policy enabler areas across sectors

Overall sector weightage: The overall sectoral weightage in the study has been uniformly maintained as equal to all sectors for all states.⁸

Each policy enabler area is accorded a weightage based on the overall potential of the area toward low-carbon growth for the sector. Thus, the weightage accorded to different policy enabler areas for different sectors is different, as presented in the table below.

⁸ This approach can be further refined if state-specific GHG emission contributions are available, by each sector. In such a case, the state-specific sectoral GHG contribution can be directly used to provide weightage to sectoral scores of the particular state.

Sector	RE	EE	Overarching	Rationale
GENERAL	0	0	100%	<ul style="list-style-type: none"> The General sector focuses on institutional mechanisms set up across states for low-carbon action, in accordance with state policies and state budgets. Thus, the indicators are covered under the Overarching policy enabler area.
 POWER	60%	30%	10%	<ul style="list-style-type: none"> India's policy focuses on increasing RE installed capacity and increasing power generation. In the transition period, emissions can be decreased by increasing the efficiency of fossil fuel power plants. Other measures, such as carbon/coal taxes, energy prices, etc., are covered under Overarching
 INDUSTRY	25%	25%	50%	<ul style="list-style-type: none"> Emissions in industry can be reduced to a certain extent by increasing renewable energy use and energy efficiency Technology upgradation through technology transfer, subsidies/waivers and the restructuring of products and industry is very important, thus, covered under Overarching
 TRANSPORT	10%	0%	90%	<ul style="list-style-type: none"> Huge reductions, which can only be achieved with a modal shift, phasing out of old vehicles, reducing the number of private vehicles, fuel switch from diesel to CNG/LPG/hybrid, etc., are covered under Overarching. Biofuels can meet some of the fuel demand for the transport sector and are covered under the Renewable policy enabler area. Setting up of fuel efficiency standards is an extremely important aspect, controlled by the central government. Policy on the same is, thus, addressed in the sector background.
 BUILDINGS	40%	60%	0%	<ul style="list-style-type: none"> High energy efficiency is essential for buildings. The remaining energy demand is to be supplied by renewable.
 AGRICULTURE	0%	0%	100%	<ul style="list-style-type: none"> Overarching enabler policies cover the aspects that focus on mitigating emissions from the agriculture sector, as defined in the GHG inventories provided in second NATCOM report. Energy-related emissions from the agriculture sector due to the use of agricultural appliances and equipment are already covered under the power sector. The split of Renewable and Energy efficiency does not apply in the set of indicators.



FORESTRY

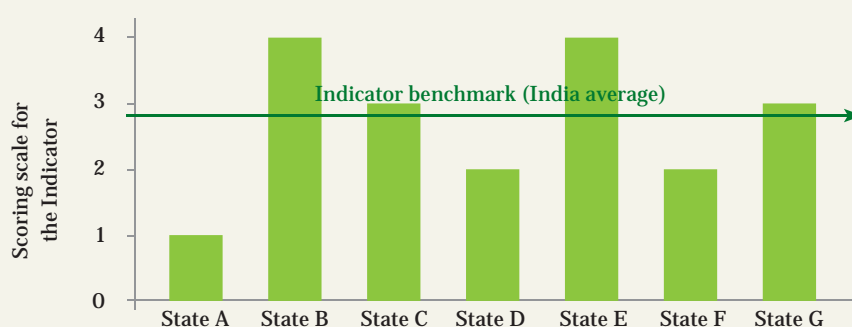
0%	0%	100%	<ul style="list-style-type: none"> Forestry is a net sink, and aspects related to protection, increasing the stock and quality of existing forests and restoring forests and tree cover are assessed under the Overarching policy enabler area. The split of Renewable and Energy efficiency does not apply in the set of indicators.
20%	0%	80%	<ul style="list-style-type: none"> There is a need to promote generation of energy from waste. Energy efficiency does not apply in the set of indicators. The aspects and policies on waste management are covered under the set of Overarching enabler policies.



WASTE

A list of specific indicators (both quantitative and qualitative) has been developed for each sector. These are used to assess the state's policies and provide a score to the state, with respect to the developed benchmarks. This provides an index of the state's progress toward low-carbon policy development across each of the study sectors. The benchmarks have been designed by assessing the status of the indicators at the national level and comparing the progress of the states against these national average values. Each of the developed sectoral indicators has been distributed among the policy enabler areas. The sectoral scores for each state is then aggregated and an overall state-level rating assigned.

An illustrative depiction of assigning benchmarks and raw scores for states given below.



Indicator ID	Indicators	Benchmark	Rational for Benchmark	Documentation source
W1	Conversion of waste-to-energy achieved (excluding biomass)	4 - >4.0% 3 - 2.66-4.0% 2 - 1.66 - 2.66% 1 - 0.5 - 1.66% 0 - <0.5%	Less than 0.5% is insignificant; 2.66% is the average India has installed, as on March 2011	MoSPI report <i>Energy Statistics 2012</i>

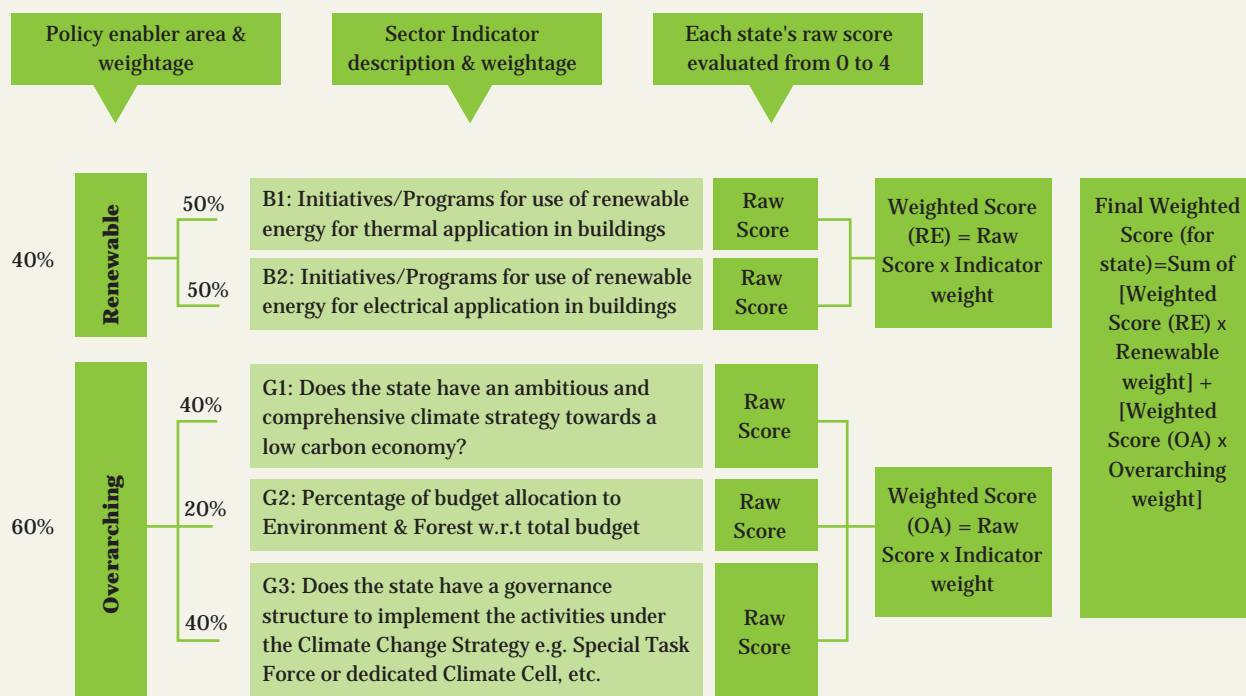
States	Percentage of waste-to-energy potential achieved	Raw score
Andhra Pradesh	35.09%	4
Karnataka	0.66%	1
Maharashtra	1.99%	2
Madhya Pradesh	3.46%	3
Rajasthan	0%	0
Tamil Nadu	3.74%	3

The indicators developed across each sector have also been provided weightage based on the direct relevance of the indicator toward promoting low-carbon growth (i.e., reducing GHG emissions while sustaining sectoral growth).

The raw score has been assigned based on the benchmark and, finally, a weighted score is arrived at as a combination of the raw score, indicator weightage and enabler weightage. A schematic snapshot of the scoring is presented in the following section.

2.3. Snapshot of scoring scheme

The policy enabler areas weightage, sample indicator weightage and the sample scoring accorded to a state are represented in the example below.










Provision of neutral score: A neutral score of 2 – the mean from the minimum score of 0 to the maximum achievable score of 4 – is provisioned for indicators that do not apply to a state due to certain reasons (the policies for the sector may still be being developed at the central level or the sector may have no relevance for the state). For example, Agricultural indicator A2 capturing the “percentage of districts where

SRI method of rice cultivation has been introduced out of the total districts cultivating paddy” may assess states where rice cultivation does not occur or occurs in low-lying areas. For such states, a neutral score of 2 is provisioned for this indicator.

The indicators developed for each of the sectors, along with benchmarking methods, are provided in Appendix B.

2.4. Rating criteria, by sector

The summation of weighted scores accorded to the indicators in each sector provides the final sectoral score for each state. These scores are then converted to a percentage value, which is used to provide sectoral ratings across the states. The rating criteria are depicted in the following figure.

Rating band and colour code							
Normalized score on a scale from 0 to 100	90 <= 100	75 <= 90	60 <= 75	45 <= 60	30 <= 45	15 <= 30	0 <= 15

Thus, the states shall be rated, or banded, across seven bands – A, B, C, D, E, F and G – across different sectors, with ‘A’ representing the most advanced low-carbon growth policies/initiatives being practiced in the state, with respect to centrally promoted policies.

2.5. State rating chart across sectors

On the basis of the scores obtained by the states, the sectoral trends are to be represented in the format shown in the following table.

Rating	Power	Industry	Forestry	Transport	Building	Agriculture	Waste
A							
B							
C							
D							
E							
F							
G							

The policies and practices adopted by states are categorized under ‘areas of achievement’ and ‘areas that need improvement’ in the respective sections of chapter 6. Leading practices observed across the states are presented in chapter 4.

2.6. Stakeholder consultation and feedback

As the Low-Carbon Growth Policy Tracker covers a variety of sectors, the project requires a multitude of expert views, inputs and judgment. To provide a mechanism that substantiates the analysis of policies, development of indicators and subsequent benchmarks, a process of continuous stakeholder consultation has been followed during the course of the project. The process involves identifying sectoral experts and seeking their inputs during the various phases of the project cycle.

- Phase 1: Development of low-carbon-growth oriented indicator sets per sector, including the methodology for benchmarking and scoring
- Phase 2: Finalization and analysis of sectoral results

2.6.1. Phase 1

A preliminary set of indicators was developed for each sector and subjected to an initial stakeholder consultation for feedback and expert inputs. Along with the indicators, the methodology for benchmarking and scoring was also shared with the stakeholders.

The specific outcomes from the stakeholder consultations were as follows:

Critical feedback on the sectoral policy framework, comprehensiveness and relevance of indicators to evaluate state policies and the availability of comparable state-level data
Suggestions on state-level leading practices across study sectors
Feedback on preliminary results shared during the consultations
During the initial group-level stakeholder consultation sessions, the list of indicators across each sector, along with the benchmarks and sample ratings for a few states, were discussed and debated. One-on-one discussions were undertaken with sectoral experts to determine and finalize the list of sectoral indicators.

The final list of sectoral indicators, along with the method for benchmarking and scoring, is based on the feedback obtained from the stakeholder consultations.

2.6.2. Phase 2

Following the development of the sectoral set of indicators and the compilation of statewide information, the analysis of the final ratings achieved by each of the 10 states was also shared with sectoral experts. High scores in the sectoral analysis highlight leading policies and/or practices among the 10 states.

2.6.3. Summary of consultations

A list of stakeholders with whom consultations were held with across sectors is presented in **Appendix A** of this report.

While experts from various organizations were consulted for the project, the final outcome is based on taking a balanced view of the inputs and is guided by practical considerations such as the feasibility of incorporating the inputs, given the data and time constraints in the project. Thus, there is scope for further improvement of the analysis in subsequent versions. Some of the stakeholders have been consulted for seeking clarifications on specific points, whereas others have provided extensive

inputs, which have been useful in developing the sectoral indicator sets. This exercise would be strengthened and its coverage could be increased with further interactions with stakeholders and more support from the state governments when the assessment is undertaken again in future.

The inputs and feedback received from each and every one of the sector experts consulted is gratefully acknowledged.

2.7. Sectoral indicator matrices

Indicators to examine the development, presence and, where possible, efficacy of policies have been developed for each sector under study. The Low-Carbon Growth Policy Tracker (LCPT)-India draws inspiration from the EU tracker study. The indicators for LCPT-India have been formulated based on the objectives of central and state policies, GHG-intensive practices in the sectors and the vision statements for each sector. There are 60 indicators across all sectors, out of which 35 are qualitative and 25 are quantitative. The developed indicators measure the effectiveness of policies to reduce GHG emissions across all major sectors of the economy. Most indicators measure the expected impact of recent policies. For example, the indicator on the implementation of Energy Conservation Building Codes (ECBC) would assess the energy efficiency standards in the building sector. In addition, there are indicators that measure past progress, for example, the indicator on past tariff structure for power generated from renewable energy sources would assess the investment scenario for renewable energy technologies in the power sector. Some indicators represent the quality of the long-term strategies, for example, the indicator on the increase of forest cover area would measure the long-term impact of forest sector policies. The indicators not only measure the impact of the policies directed at emissions reduction, but also measure the impact of policies that are counterproductive so that barriers to emission reduction are adequately removed. It should be noted that data availability is an issue, which has led to the formulation of a few qualitative indicators. The indicators are designed to either track past performance or measure long-term impact or to address barriers or a combination of any of the three.

Detailed sector-wise indicator matrices are presented in **Appendix B**.

3. INDIA-LEVEL POLICY PACKAGE ACROSS SECTORS

3.1. General sector

The general sector has been provisioned for covering the overarching policies and support extended by the states toward their low-carbon development. The impact of NAPCC and the setting up of climate task forces, etc., which directly or indirectly propagate low-carbon growth, have been taken into consideration while developing the indicators and scoring under this sector.

The following aspects have been considered while deriving the scores under the general sector.

1. Status of the State Action Plan on Climate Change (SAPCC)—Whether the SAPCC has been submitted/endorsed by the **National Steering Committee or considered by the Expert Committee on Climate Change**
2. Proactive climate change policies of the state—Setting up climate change cells, etc.
3. Other aspects—Aspects such as the presence of a state-specific climate change strategy, budget allocation, governance structure for climate change mechanisms, etc.

The NAPCC outlines a number of steps to advance India's development and simultaneously further its climate change-related objectives of adaptation and mitigation.

The following eight missions under the NAPCC, cover both mitigation and adaptation policies.

- National Solar Mission
- National Mission for Enhanced Energy Efficiency
- National Mission on Sustainable Habitat
- National Mission for a Green India
- National Mission for Sustainable Agriculture
- National Water Mission
- National Mission for Sustaining the Himalayan Ecosystem
- National Mission on Strategic Knowledge for Climate Change

The centre has also constituted a National Steering Committee on Climate Change under the chairmanship of the secretary, MoEF, GoI. The Planning Commission, GoI,

formulated a Working Group on Environment & Climate Change for the Twelfth Five Year Plan (2012–2017) in June 2011.

The following states that have released draft SAPCCs on the MoEF, GoI, website⁹.
(Endorsed by the National Steering Committee on Climate Change)

- Rajasthan
- Madhya Pradesh
- Sikkim
- Tripura
- Arunachal Pradesh

(Considered by the Expert Committee on Climate Change)

- Andhra Pradesh
- Assam
- Meghalaya
- Mizoram
- Odisha
- West Bengal

Some of the Indian states, which may or may not have released a draft SAPCC but have taken proactive action by establishing dedicated climate change departments/ cells/ task forces, which work on the measures identified in the NAPCC, have also been considered while evaluating them under the general sector.

Some aspects, such as the presence of a state-specific climate change strategy, budget allocation, governance structures for climate change mechanisms, etc., are assessed for the 10 states under the project, in the general sector.

Of the 10 states assessed in this study, Andhra Pradesh, Gujarat, Himachal Pradesh, Karnataka, Madhya Pradesh and Tamil Nadu have initiated the process for creating a special climate change centre or task force.

3.2. Power sector

3.2.1. Sectoral background

Energy is of strategic importance for India, particularly because of its fast-growing economy, rising population, and its commitment toward inclusive socio-economic development. In order to meet India's human development goals for poverty eradication, an economic growth rate of 9 per cent has to be sustained over the next 20 years.¹⁰ Therefore, India is faced with the challenge of meeting energy requirements for sustaining a high economic growth, while adopting a sustainable low-carbon development path.

9 MoEF, GoI, website, *Draft Reports State Action Plan on Climate Change (SAPCC)*, last accessed 18 November 2012- <http://moef.nic.in/modules/others/?f=sapcc-2012>,

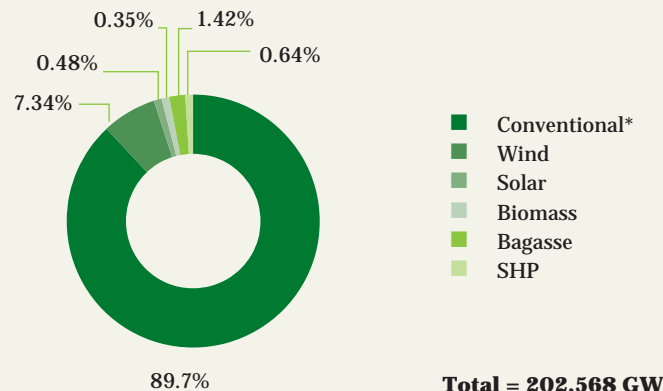
10 Planning Commission of India, GoI, *Low Carbon Strategies for Inclusive Growth*, 2011-http://planning-commission.nic.in/reports/genrep/Inter_Exp.pdf

India's total energy usage has grown by more than 25 per cent over the last two decades, and fossil fuel usage contributed predominantly to this growth.¹¹ Over the last 10 years, energy and peak demand shortage averaged around 8 per cent and 12 per cent,¹² respectively. Approximately 100,000 villages in India (17 per cent) remain un-electrified, and close to 400 million Indians do not have access to electricity¹³. These figures illustrate the urgent need to increase the supply of energy to meet the power demand shortage and to achieve inclusive growth.

India's total power generation installed capacity is around 202.5 GW, as of August 2012. In India, around 90% of the installed capacity consists of the conventional sources - a major proportion (more than 50%) is in the coal based thermal power sector while the remaining share of installed capacity consists of natural gas, diesel and large hydro. India's power sector emits about 719.31 million tonnes of CO₂, contributing about 37.8 per cent of India's GHG emissions, as of 2007.¹⁴ As per the Centre for Science and Environment (CSE), in a business-as-usual scenario, the power sector is projected to contribute around 1,935 million tonnes of CO₂ by 2031¹⁵

Installed Power Generation Capacity by type (as on August 2012)

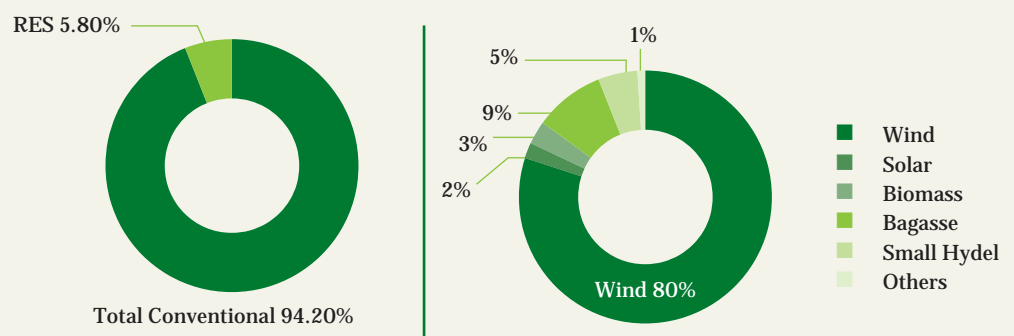
*Conventional power includes coal, diesel, gas, nuclear and large hydro power



Source: CEA Monthly Generation Report, August 2012

Left: Source wise electricity generation (MU) April-Aug 2012

Right: Sourcewise, renewable energy generation(MU) April to August, 2012



Source: CEA Monthly Generation Report, August 2012

- 11 Planning Commission of India, GoI, *Low Carbon Strategies for Inclusive Growth*, 2011-
http://planningcommission.nic.in/reports/genrep/Inter_Exp.pdf
- 12 Central Electricity Authority, Yearly CEA electricity generation report, 2012-<http://www.cea.nic.in/report.html>
- 13 World Bank , *Unleashing the potential of Renewable Energy in India*, 2010 - ,http://siteresources.worldbank.org/EXTENERGY2/Resources/Unleashing_potential_of_renewables_in_India.pdf
- 14 Indian Network for Climate Change Assessment , *India Greenhouse Gas Emissions 2007* - <http://www.moef.nic.in/downloads/public-information/fin-rpt-incca.pdf>
- 15 *Challenge of the New Balance*, Centre for Science and Environment, last accessed on Dec 2012- <http://www.cseindia.org/node/1442>

Renewable energy in India

Renewable capacity comprises approximately 12 per cent of the total installed capacity, and generation from renewable energy accounts for approximately 4 per cent of total electricity generation in India. Of the total electricity generation from renewable sources, almost half is from wind power. This is significant considering the intermittency of wind power generation. Significant increases in the share of renewable energy in the Indian grid-mix, as envisaged in the NAPCC, must address challenges associated with grid stability and peaking power.

The NAPCC places particular emphasis on the role of renewable energy in ensuring the low-carbon development of the country. The ambition of NAPCC is that 15 per cent of the total energy generated in the country will be through renewable energy sources by 2020¹⁶; however, at present only 4 per cent of energy is generated through renewable energy sources. Every additional 1GW of renewable energy capacity reduces CO₂ emissions by 3.3 million tonnes a year¹⁷. Considering the magnitude of India's energy requirements, the contribution of the power sector to India's GHG emissions and the potential for renewable energy to displace GHG-intensive energy sources, it is clear that renewable energy has to be promoted in an accelerated manner to meet India's objectives for sustainable low-carbon development and inclusive growth. To enable this accelerated growth of the renewable energy sector, associated barriers have to be¹⁸addressed and alleviated.

REC mechanism

The Electricity Act, 2003, has outlined several enabling provisions to accelerate the development of renewable energy in India. As per Section 86(1)(e) of this Act, state commission shall "promote cogeneration and generation of electricity from renewable sources of energy by providing suitable measures for connectivity with the grid and sale of electricity to any person, and also specify, for purchase of electricity from such sources, a percentage of the total consumption of electricity in the area of a distribution licensee". The same has been reiterated in the National Electricity Policy, Tariff Policy and further strengthened in the NAPCC. Under this, the target for renewable energy purchase for FY 2009-10 has been set as 5 per cent of total grid power purchase, with the provision for increasing it by 1 per cent every year for the next 10 years. With these regulations in place, obligated entities (OEs), like distribution licensees, captive power plant owners and open access consumers, will be mandated to fulfill their Renewable Purchase Obligations (RPOs). The State Electricity Regulatory Commissions (SERCs) will set target RPOs for all the OEs within the state. This is going to be considered one of the key efforts at the national level to combat climate change.

While assessing critical challenges, it can be construed that a mechanism enabling and recognizing interstate renewable energy transactions is urgently required for the promotion of renewable energy in India. Such a mechanism will also enable all the SERCs to have ambitious RPO targets for OEs, irrespective of the renewable energy potential within the state. Against this backdrop, the concept of Renewable Energy

16 National Action Plan on Climate Change, 2008- http://pmindia.gov.in/climate_change_english.pdf

17 World Bank, *Unleashing the potential of Renewable Energy in India*, 2010- http://siteresources.worldbank.org/EXTENERGY2/Resources/Unleashing_potential_of_renewables_in_India.pdf

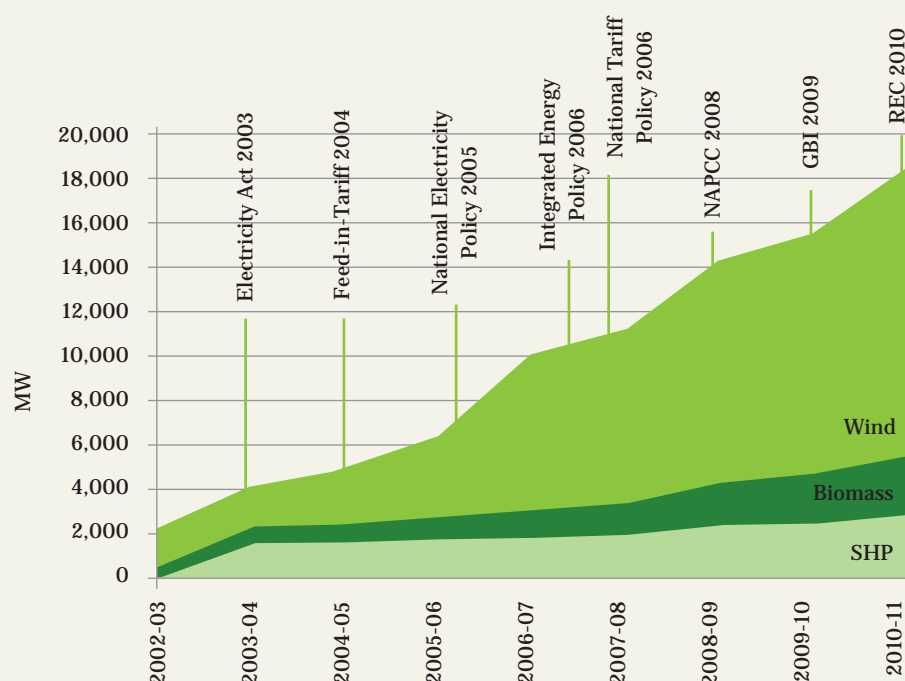
18 National Action Plan on Climate Change, 2008- http://pmindia.gov.in/climate_change_english.pdf

Certificates (RECs) trading has emerged in India. RECs represent an aggregation of certain non-energy and societally beneficial attributes (for example, environmental and socio-economic benefits) of electricity generated from renewable energy sources. These attributes, embodied in the form of certificates, may be traded separately from electricity. The overall objectives of the mechanism have been summarized below.

- Effectively implementing RPO regulations across all the states in India
- Providing participants with increased flexibility for carrying out renewable energy transactions
- Overcoming geographical constraints for harnessing available renewable energy sources
- Reducing transaction cost for renewable energy
- Creating competition among different renewable energy technologies
- Developing an all-encompassing incentive mechanism
- Reducing risks for local distribution licensees

In this study, performances of states until 31 March 2012 have been considered; at that time, the states were at different stages of their RPO notifications. Only a few states, such as Rajasthan and Maharashtra, had submitted the status of their RPO achievements in the form of compliance reports. Hence, this aspect could not be covered as an indicator for comparison among states. However, since this is the first version of Low-Carbon Growth Policy Tracker in India, the exemplary performances of some states – based on their potential beyond the REC notification date of 2010 – has

Key government initiatives
and increase in renewable
energy capacity



been considered in Indicator P1, "Percentage of renewable energy potential achieved". In addition to this, it has been acknowledged that the enforcement of RPOs is a 'leading practice' in the power sector.

Energy efficiency in India

Energy efficiency (EE) can play a key role as India struggles to meet its development goals under severe environment and resource constraints. Several EE options are less expensive than coal or gas-based generation, and therefore, should be the 'first resource' considered for fulfilling demand. However, despite the apparent attractiveness of several EE options, their diffusion and adoption is sluggish. Clearly, there are barriers to adoption that need to be overcome through appropriate policies and institutional arrangements.

Energy-saving potential in the power consumption sector¹⁹

Sector	Determined effort for energy efficiency improvement (billion kWh)	Aggressive energy efficiency improvement (billion kWh)
Appliances	80	147
Agriculture	5	10
Industry	20	60
Total Savings	105	217
Savings in net electricity generation (billion kWh)	96	201
Emission reduction	111 Million MT CO ₂ e	229.6 Million MT CO ₂ e

Energy-saving potential in thermal generation

On the supply side, coal is presently the least-cost option and will continue to be the main power generation source in 2020 as well. To ensure energy security, the present coal-based capacity needs to be expanded to 230GW by 2020. This will require an annual coal supply of at least 1,000 million tonnes, two-and-a-half times the supply at present. Domestic mining will have to increase considerably otherwise imports will have to meet a large fraction of the coal demand.

There are several technology options to improve combustion efficiency and to lower CO₂ emissions. Supercritical plants operate at higher temperatures leading to a net heat rate of 2,235kcal/kWh and specific emission of 0.83kg/net kWh. The technology is available globally and the cost is almost the same as sub-critical plants. As per recent guidelines and projections, supercritical power plants would account for 60 per cent of the thermal capacity to be built during the Twelfth Five Year Plan and 100 per cent in thirteenth Plan. Supercritical units could thus contribute up to 50GW by 2020. Ultra supercritical power plants operate at still higher temperatures leading to net heat rate of 1,986 kcal/kWh and specific CO₂ emissions of 0.74kg/kWh. However, the technology is still not ready for large-scale adoption. High temperatures impose stringent challenges to materials. It is unlikely that such plants would be installed before 2020.

¹⁹ Planning Commission of India, *Interim Report of the Expert Group on Low Carbon Strategies for Inclusive Growth-2012*, Planning Commission, GoI, http://planningcommission.nic.in/reports/genrep/Inter_Exp.pdf

Integrated Gasification Combined Cycle (IGCC) is another promising technology, which can attain higher efficiencies and lower CO₂ emissions and also produce synthetic chemical fuels, such as diesel and hydrogen. However, initial estimates under Indian conditions of high-ash coal show very high auxiliary power consumption and, hence, the overall efficiency is comparable with sub-critical units at almost double the cost. While we should pursue research in IGCC, its commercial deployment is unlikely before 2020.

Carbon capture and sequestration (CCS) is being considered in several countries with large capacity for coal-based power generation. However, there are several technical, economic and regulatory challenges in its role as a commercially viable low-carbon option. We need to watch the development of this technology in the US and EU, where a number of commercial plants are under construction/consideration, and also undertake a few studies to examine the issues of potential and feasibility, both technical and economic.

Gas-based power is an attractive power-generation option as the capital cost is low and the CO₂ emissions are only 0.4kg/kWh. However, the cost of generating one unit of electricity from gas is usually much higher than generating a unit of electricity from coal. Also, there is considerable uncertainty about availability of gas for power, given the limited reserves and its alternate use in fertilizer production and other sectors. It is, therefore, unlikely that gas-based technology would be able to contribute a large share in electricity generation.

Financing renewable energy and energy efficiency in India

The government of India has taken several tangible measures to incentivize investments in renewable energy and clean energy technologies in power generation. The Integrated Energy Policy, 2006, laid down frameworks for providing fiscal benefits, such as reducing transaction costs, neutral tax measures and promoting import of technologies. This created a competitive market and provided a level playing field for investors to overcome barriers associated with investment in India.

The National Tariff policy, 2006, and, later, the REC mechanism in 2010 created a market-based mechanism to set tariffs for electricity generated through renewable energy-based sources. Subsidies on decentralized renewable energy-generation technologies and generation-based incentives (GBI) further reduced the cost of technology. Efforts to achieve grid parity for renewable energy have been highlighted in the Planning Commission report on low-carbon growth in India.

Vision statement for the power sector (from the *Interim Report of the Expert Group on Low Carbon Strategies for Inclusive Growth*, Planning Commission):

- Appliance energy efficiency:
 - Determined effort - 70 per cent of all appliances in 2020 to be highly energy efficient
 - Aggressive effort - 65 per cent of all appliances in 2020 to be super efficient and 25 per cent highly efficient);
- Energy enhancement and efficiency on the supply side:

<ul style="list-style-type: none"> • Supercritical thermal power plants • IGCC plants • Carbon capture and sequestration 	<ul style="list-style-type: none"> • Natural gas • Limited growth in hydropower • High growth in wind power • Rapid and significant growth in solar power and nuclear power
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3.2.2. Sectoral policies

The following central policies were scanned for the power sector.

Name of policy or enacted law or guideline	Year	Objective
Energy Conservation Act ²⁰	2001	<ul style="list-style-type: none"> ■ To assume leadership and provide policy framework and direction to national energy efficiency and conservation efforts and programmes ■ To coordinate policies and programmes on efficient use of energy and its conservation, with the involvement of stakeholders ■ To establish systems and procedures to measure, monitor and verify energy efficiency results in individual sectors as well as at the national level ■ To leverage multilateral, bilateral and private sector support in implementation of the Energy Conservation Act and programmes for the efficient use of energy and its conservation ■ To demonstrate energy-efficiency delivery mechanisms, through private–public partnership and to plan, manage and implement energy conservation programmes as envisaged in the Energy Conservation Act
Electricity Act ²¹	2003	<ul style="list-style-type: none"> ■ To ensure sustainable and affordable clean energy access across all sectors ■ To develop and support energy efficient and clean technologies
National Electricity Policy ²²	2005	<ul style="list-style-type: none"> ■ To increase inter-regional transmission capacity to 37,000MW and achieve energy efficiency/conservation savings of about 15%
Rajiv Gandhi Grameen Vidyutikaran Yojana (RGGVY) ²³	2005	<ul style="list-style-type: none"> ■ To provide sustainable electricity access

²⁰ Energy Conservation Act 2001, GoI - www.powermin.nic.in/acts_notification/pdf/ecact2001.pdf

²¹ Electricity Act 2003, Ministry of Power, GoI – www.powermin.nic.in/acts.../electricity_act2003/preliminary.htm

²² Ministry of Power, GoI, New Electricity Policy 2005, powermin.nic.in/whats_new/national_electricity_policy.htm

²³ Rural Electricity Corporation Limited, Rajeev Gandhi Grameen Vidhyutikaran Yojana, 2005, powermin.nic.in/whats_new/pdf/Rajiv_gandhi.pdf

National Tariff Policy ²⁴	2006	<ul style="list-style-type: none"> ■ To encourage efficiency in operations by sharing gains between licensees and consumers ■ To promote a multi-year tariff (MYT) framework ■ To encourage loss-reduction strategies ■ To promote tariff design (link tariffs to cost of service) ■ To bring a gradual reduction in cross subsidy [(+/-) 20% of the average cost of supply] ■ To progressively reduce cross-subsidy surcharge for open access
Restructured - Accelerated Power Development Reform Programme (R-APDRP) ²⁵	2006	<ul style="list-style-type: none"> ■ To implement renovation and modernization programmes in the power sector ■ To improve the financial viability of state power utilities ■ To reduce AT&C losses ■ To increase the reliability and quality of power supply
Integrated Energy Policy ²⁶	2006	<ul style="list-style-type: none"> ■ To ensure that taxes are neutral except in cases specifically intended to counter externalities such as environmental costs ■ To promote energy efficiency by enforcing standards effectively ■ To promote competitive energy markets in order to promote energy efficiency and to encourage investment in the energy sector ■ To remove entry barriers to new players and imports ■ To link incentives for renewable energy production to output and not just capacity addition (outlay)
National Mission for Enhanced Energy Efficiency (NMEEE) ²⁷	2010	<ul style="list-style-type: none"> ■ To promote renewable energy through 2020 ■ To promote energy efficiency: mandating a specific reduction in energy consumption by large energy-consuming industries and creating a framework to certify excess energy savings along with market-based mechanisms to trade these savings ■ To adopt innovative measures for making energy-efficient appliances/products in certain sectors more affordable ■ To create mechanisms to help finance demand-side management programmes by capturing future energy savings and enabling public-private partnerships for this

²⁴ Ministry of Power, GoI, National Tariff Policy 2006 powermin.nic.in/whats_new/pdf/Tariff_Policy.pdf

²⁵ Ministry of Power, GoI, Accelerated Power Development and restructuring Programme, 2000-01-www.apdrp.gov.in/

²⁶ Ministry of Power, GoI, Integrated Energy Policy, 2005-, planningcommission.nic.in/reports/genrep/intengpol.pdf

²⁷ Government of India, National Mission of Enhanced Energy Efficiency (NMEEE), 2008, - moef.nic.in/downloads/others/Mission-SAPCC-NMEEE.pdf

		<ul style="list-style-type: none"> ■ To develop fiscal measures for promoting energy efficiency, for example, tax incentives for including differential taxation on energy-efficient certified appliances
Renewable Energy Mechanism ²⁸	2010	<ul style="list-style-type: none"> ■ To effectively implement RPO regulation in all Indian states ■ To provide increased flexibility to participants for carrying out RE transactions ■ To overcome geographical constraints to harness available RE sources ■ To reduce costs for RE transactions ■ To create competition among different RE technologies
Jawaharlal Nehru National Solar Mission ²⁹	2010	<ul style="list-style-type: none"> ■ To establish India as a global leader in solar energy, by creating the policy conditions for its diffusion across the country as quickly as possible ■ To focus on setting up an enabling environment for solar-technology penetration in the country, both at a centralized and decentralized level ■ To achieve the ambitious target of deploying 20,000MW of grid-connected solar power by 2022 (As on September 2012, under the migration scheme, 87MW of solar PV rooftop installations and 48MW of grid-connected PV were commissioned under Phase I of the mission.)
Interim Report of the Expert Group – Planning Commission ³⁰	2011	<ul style="list-style-type: none"> ■ To promote energy conservation and energy efficiency improvements toward low-carbon transformation

3.3. Industry sector

3.3.1. Background

Industry is one of the most important sectors in India, as it contributes a substantial share to the GDP (27 per cent in 2007³¹). On the other hand, the sector consumes the second-largest share in the final energy usage, after the residential sector. In 2007, industry as a sector contributed 412.55 MT CO₂ in the form of direct emissions,³² which is about 22 per cent³³ of the total GHG emissions of India. The iron and steel, cement

28 MNRE, GoI, Report on Development of conceptual framework for Renewable energy Certificated Mechanism for India, 2009, mnre.gov.in/file-manager/UserFiles/MNRE_REC_Report.pdf

29 MNRE, GoI, Jawaharlal Nehru National Solar Mission, Ministry of New and Renewable energy, 2010, <http://www.mnre.gov.in/solar-mission/jnnsn/introduction-2/>

30 Ministry of Power, GoI, Integrated Energy Policy 2005-www.planningcommission.nic.in/reports/genrep/rep_intengy.pdf

31 Ministry of Environment & Forest, GoI, Indian Network for Climate Change Assessment INCAA, Report 2010- <http://www.moef.nic.in/modules/others/?f=event>

32 Ministry of Environment & Forest, GoI, Indian Network for Climate Change Assessment INCAA, Report 2010- <http://www.moef.nic.in/modules/others/?f=event>

33 Ministry of Power, GoI, Integrated Energy Policy 2005-www.planningcommission.nic.in/reports/genrep/rep_intengy.pdf

and oil and gas sectors are the largest GHG-emission intensive industries in India, as per the interim report of the Planning Commission.

The industry sector has made significant advances in the conservation of energy and reduction of GHG emissions in the last decade. Government policies, campaigns by associations of industry and strategic decisions by firms have all contributed to sizeable improvements in the intensity of energy use in industries. The major energy-consuming sectors are steel, cement, caustic soda, brick, aluminum and electric power generation. Measures to improve energy efficiency include promotion of fuel-efficient practices and equipment, replacement of old and inefficient boilers and other oil-operated equipment, fuel switching and technology upgrade.

The National Mission for Enhanced Energy Efficiency (NMEEE) targets ushering in four initiatives to significantly scale up energy-efficiency implementation efforts being undertaken in India. This is in addition to the policies and programmes for energy efficiency being implemented by the Bureau of Energy Efficiency (BEE). These new initiatives include:

- **Perform, Achieve and Trade (PAT)**, a market-based mechanism to make improvements in energy efficiency in energy-intensive large industries and to make facilities more cost-effective by certification of energy savings that can be traded
- **Market Transformation for Energy Efficiency (MTEE)** by accelerating the shift to energy-efficient appliances in designated sectors through innovative measures that make the products more affordable
- **Energy Efficiency Financing Platform (EEFP)**, a mechanism to finance DSM programmes in all sectors by capturing future energy savings
- **Framework for Energy Efficient Economic Development (FEEED)** for developing fiscal instruments to promote energy efficiency

PAT, the flagship programme of the mission, seeks to utilize a market-based mechanism to facilitate energy efficiency improvements in large energy-intensive industries in a cost-effective manner. Not only does the mechanism establish a framework of legal obligations under the Energy Conservation Act, 2001, but also provides innovative market-based incentives to trade savings beyond the prescribed targets.

The PAT framework has been developed considering the legal requirements under the Energy Conservation Act, the analysis of the situation of designated consumers, the national energy-saving goals to be achieved by 2013-14 and the sustainability of the entire scheme. A key premise of the scheme is to incentivize the industry to achieve better energy-efficiency improvements than their defined specific energy consumption (SEC) improvement targets, in a cost-effective manner. To facilitate this, the scheme provides the option to trade any additional certified energy savings with other designated consumers to comply with the SEC reduction targets. The Energy Savings Certificates (ESCs) so issued are tradable on special trading platforms created in the two power exchanges—Indian Energy Exchange (IEX) and Power Exchange India Ltd (PXIL). Eight industry sectors are currently covered under the PAT scheme (i.e., thermal power plants, cement, iron and steel, fertilizer, aluminum, textile, pulp and paper and chlor-alkali industries).

The Ministry of Power, through its Gazette Notification dated 30 March 2012, has released a list of 478 industrial designated consumers (DCs), along with the specific energy reduction targets assigned to each of them. This historic announcement marks the start of India's very own domestic Cap and Trade Scheme around energy efficiency, with an estimated valuation of around USD 15 billion. The scheme fosters market-driven incentives to promote energy efficiency in the Indian industry.³⁴

The Energy Conservation Act, 2001,³⁵ lists 15 Energy Intensive Industries and other establishments that are specified as designated consumers.

The industrial sector has also seen significant increase in the share of renewable energy consumption, which has been mainly due to policy interventions, in addition to other energy security issues. The NAPCC lays emphasis on increasing renewable energy consumption in industries and non-conventional sources of energy for sustainable growth. The REC mechanism has considered industries with captive generation facilities and other third-party consumers obligated entities. The obligated entities have been given incremental targets to increase their share of renewable energy consumption till 2020. The industry sector consumed 150 MToe of energy in 2007, out of which biomass and waste-to-energy contributed 19 per cent of the total energy consumed.³⁶

In addition to the energy efficiency and renewable energy implementation schemes, the government has taken overarching initiatives to finance these schemes and improve product design.

The National Manufacturing Competitiveness Programme (NMCP) is the nodal programme of the government of India to develop global competitiveness among Indian micro, small and medium enterprises (MSMEs).³⁷ One of the components of the NMCP focuses on providing technology and quality upgrade support for sensitizing MSMEs to the benefits that could accrue from the use of renewable energy, energy-efficient technologies and reduction in GHG emissions. The major activities planned under this component include programmes such as Capacity Building of MSME Clusters for Energy Efficiency/Clean Development Interventions, Implementation

Vision statement for the industry sector (from the *Interim Report of the Expert Group on Low Carbon Strategies for Inclusive Growth*, Planning Commission):

- Improved efficiency in the iron and steel sector (through blast furnace-basic oxygen furnaces, electric arc furnaces and induction furnaces, coke dry quenching, cold rolling, slab casting, corex and finex smelting and pulverized coal injections)
- Improved efficiency in the cement sector (through an increase in blending percentage, fuel substitution through the use of waste materials and co-generation);
- Improved efficiency in the oil and gas sector (by reducing gas flaring and through reduction of waste in processing and transportation)

34 Ministry of Power, GoI, Details on the energy conservation initiatives of the Ministry of Power, Government of India, last visited in Dec 2012, - http://www.powermin.nic.in/acts_notification/energy_conservation_act/introduction.htm

35 Ministry of Power, GoI, Energy Conservation Act 2001- http://www.powermin.nic.in/acts_notification/pdf/ecact2001.pdf

36 IEA Paris, energy outlook 2011.

37 Ministry of Micro, Small & Medium Enterprises, GoI, Annual Report 2011-12, - <http://www.msme.gov.in/MSME-Annual-Report-2011-12-English.pdf>

of Energy Efficient Technologies in MSME sector and setting up of carbon credit aggregation centres.

The National Manufacturing Policy of India stresses on three strategic paths—mainstreaming and promoting green business, protecting natural resources and addressing technology-funding issues. Immediate focus on these is required to achieve environmental sustainability in the manufacturing industry.

3.3.2. Sector policies

The following central policies were scanned for the industry sector.

Policy name or enacted law or guideline	Year	Objectives
Industrial Policy Statement ^{38 39}	1991	<ul style="list-style-type: none"> ■ To encourage all sectors of the industry – whether small, medium or large, belonging to the public, private or cooperative sector – to grow and improve on their past performance
National Design Policy ⁴⁰	2007	<ul style="list-style-type: none"> ■ To set up an India Design Council (IDC) with eminent personalities drawn from different walks of life, in particular industry. The function of the council, inter alia, would be to promote a “cradle-to-grave environment-friendly approach” for designs produced in India so that they have global acceptance as ‘sustainable’ designs
National Mission for Enhanced Energy Efficiency (NMEEE) ⁴¹	2010	<ul style="list-style-type: none"> ■ To promote renewable energy through 2020 ■ To promote energy efficiency: mandating specific reductions in energy consumption in large energy-consuming industries and creating a framework to certify excess energy savings, along with market-based mechanisms to trade these savings (Perform, Achieve and Trade). ■ To take innovative measures for making energy-efficient appliances/products in certain sectors more affordable ■ To create mechanisms to help finance demand-side management programmes by capturing future energy savings and enabling public–private partnerships for this ■ To develop fiscal measures to promote energy efficiency, such as tax incentives for including differential taxation on energy-efficient certified appliances

38 Department of Industrial Policy & Promotion, GoI, Industry Policy Statement 1991 - http://dipp.nic.in/English/Policies/Industrial_policy_statement.pdf

39 Web article, Industrial Policy statement, last visited Dec 2012, -<http://www.preservearticles.com/2012013022068/short-notes-on-industrial-policy-1991.html>

40 Union Cabinet of India, GoI, National Design Policy, 2007, -www.pib.nic.in/release/release.asp?relid=24647

41 Ministry of Environment & Forest, State Action Plan on Climate Change, last visited December 2012, -moef.nic.in/downloads/others/Mission-SAPCC-NMEEE.pdf

Renewable Energy Mechanism ⁴²	2010	<ul style="list-style-type: none"> ■ To effectively implement RPO regulation in all Indian states ■ To increase flexibility for participants for carrying out RE transactions ■ To overcome geographical constraints for harnessing available RE sources ■ To reduce costs for RE transactions ■ To create competition among different RE technologies ■ To develop an all-encompassing incentive mechanism ■ To reduce risks for local distribution licensees
Interim Report of the Expert Group – Planning Commission	2011	<ul style="list-style-type: none"> ■ To bring about improvements in energy conservation and energy efficiency for low-carbon transformation
National Manufacturing Policy ⁴³	2011	<ul style="list-style-type: none"> ■ To encourage sustainable manufacturing through green technologies, energy efficiency and optimal utilization of natural resources and restoration of damaged/degraded ecosystems ■ To put in place financial and institutional mechanisms for technology development, including green technologies ■ To provide continuous incentives, monetary and otherwise, to encourage polluting entities to reduce the release of harmful pollutants and to ensure that they comply with defined standards ■ To leverage the existing incentives/schemes of the government of India and to introduce new mechanisms to promote green technologies ■ To prescribe objective criteria, which will be consistent with the aims of the NAPCC and the strategy for inclusive sustainable development. The criteria will be set by the Green Manufacturing Committee (GMAC). ■ To give SMEs access to the patent pool and/or part reimbursement of technology-acquisition costs up to a maximum of Rs 20 lakhs for the purpose of acquiring appropriate technologies patented up to a maximum of five years, generally, prior to the date of the submission of the project ■ To provide incentives for the production of equipment/machines/devices, which control pollution, reduce energy consumption and conserve water

42 Directorate of Energy, State Government of Himachal Pradesh, last visited august 2012- admis.hp.nic.in/doe/pdf/REC_india.pdf

43 Department of Industrial Policy & Promotion , National Manufacturing Policy, 2011, - http://dipp.nic.in/English/policies/National_Manufacturing_Policy_25October2011.pdf

Foreign Trade Policy ⁴⁴	2012-13 (27 August 2009 - 31 March 2014)	■ To make India a hub for the production of green products and technologies: special initiative will be taken to promote the development and manufacture of such products and technologies for export. To begin with, focus would be on items related to transportation, solar and wind power generation, and other products as may be notified.
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Some of the other industry-oriented policies that were scanned for low-carbon growth objectives were the FDI Policy; Industries (Development and Regulation) Act, 1951; The Central Advisory Council (Procedural) Rules, 1952; The Development Council (Procedural) Rules, 1952; The Scheduled Industries (Submission of Production Returns) Rules, 1979; The Registration and Licensing of Industrial Undertakings Rules, 1952. However, these were not found relevant.

3.4. Transport sector

3.4.1. Sectoral background

In India, the transport sector accounted for an estimated 142MT CO₂eq of emissions in 2007, which is approximately 7.5 per cent of the total GHG emission from the country, in 2007.⁴⁵ Since this report studies low-carbon policies across the states, only road transport is assessed in the transport sector. Marine and aviation transport policies are not covered in this sector, as they are largely central subjects. Of the total emissions, 87 per cent (123.55MT CO₂eq) was from the road transport, 7 per cent from civil aviation and 5 per cent from the railways.⁴⁶

3.4.2. Sectoral policies

In last decade, the government has taken various measures, such as promoting fuel norms, public transport systems, energy-efficient transportation vehicles and alternate modes of transportation, etc., which have had a significant impact on reducing the carbon footprint of the transport sector.

Some of the major initiatives taken by the government include the framing of the National Urban Transport Policy (NUTP) and stipulating fuel efficiency norms for automobiles.

National Urban Transport Policy:

The NUTP, which came out in 2006, defines policies in the transport sector at the central level. The policy aims at catering to the transportation needs of the rapidly growing urban population. The objectives under this policy are to promote clean technologies in transportation, alternative fuels, mass rapid transportation systems, traffic management systems and non-motorized vehicles. The policy provides a regulatory and enforcement mechanism to enhance coordination

⁴⁴ Ministry of Commerce & Industry, Department of Commerce, GoI, National Foreign Trade Policy 2009, - <http://pib.nic.in/archieve/ForeignTradePolicy/ForeignTradePolicy.pdf> or <http://dgft.gov.in/>

⁴⁵ Ministry of Environment & Forest, GoI, INCAA Report 2007- http://moef.nic.in/downloads/public-information/Report_INCCA.pdf

⁴⁶ Planning Commission, GoI, Interim Report of the expert group on Low Carbon Strategies for inclusive growth, Planning Commission, GoI, 2011-http://planningcommission.nic.in/reports/genrep/Inter_Exp.pdf

among key agencies and to enforce the implementation under the policy directives. The government has also undertaken pilot projects under the initiative to promote best practices under a sustainable transportation system.

Automobile fuel efficiency norms for India:

The Prime Minister's Office (PMO) has approved a new set of standards for the automobile industry and car manufacturers to ensure that vehicles have higher fuel-efficiency standards.

The country is set to introduce new fuel efficiency standards, to force auto-manufacturing companies to produce cars that give more mileage. The standard called 'corporate average fuel economy' (CAFE) will give auto manufacturers time till 2015 to improve and raise fuel efficiency of cars by about 18 per cent, up from the average of 14.1 km/litre of petrol to 17.3 km/litre. Cars will have one- to five-star labels, depending on their fuel efficiency. The CAFE standard is the average annual fuel efficiency for a manufacturer's fleet and is measured in terms of CO₂ emissions.

The draft fuel-efficiency standard, based on CAFE, will be 135g/kmCO₂ emissions for the entire fleet in 2015. In 2010, the average CO₂ emission was 165g/km.

Other initiatives

The **National Policy on Biofuels** emphasizes the increased use of clean energy fuel, especially biofuels. The policy proposes mandatory blending of petrol and diesel with 20 per cent biofuel by 2017. The government promotes cultivation of crops, such as jatropha, oil seeds and sugarcane, for biofuel extraction. The policy will accelerate the development and promotion of the cultivation, production and use of biofuels to increasingly substitute petrol and diesel for transport, thereby, reducing GHG emissions due to carbon-intensive vehicle fuels.

Star labelling of cars defines their fuel-efficiency standards, based on the fuel consumption in litres/100km. It was formally proposed by the Bureau of Energy Efficiency (BEE), Ministry of Power, in a consultation paper in October 2011. A 'star rating' (based on a five-star scale, with five being the most efficient and one, the least) would help compare the fuel efficiency of different car models within the same weight class.

National Auto Fuel Policy, 2010, introduced the Bharat Stage IV norms in 13 cities – the National Capital Region, Mumbai, Kolkata, Chennai, Bangalore, Hyderabad, Ahmedabad, Pune, Surat, Kanpur, Agra, Solapur and Lucknow – while Bharat Stage III norms were made effective across the country.

Centrally Sponsored Scheme (CSS) was developed to encourage inland water transportation (IWT). Under the scheme, a 100 per cent grant was provided to the Northeastern states for their IWT projects, and a 90 per cent grant was provided to the rest of the states till 2007-08. The scheme continues for the North-east.⁴⁷

47 Inland Waterways Authority of India, GoI Revised guidelines for Centrally Sponsored Scheme (CSS) for inland water transport sector, last visited Dec 2012, <http://iwai.gov.in/misc/CSS%20guidelines.htm>

Vision statement for the transport sector (from the *Interim Report of the Expert Group on Low Carbon Strategies for Inclusive Growth*, Planning Commission):

- Applying the 'avoid–shift–improve paradigm', including increasing the share of rail in freight transport (the completion of freight corridor is already underway)
- Increasing or retaining current modal shares of public and non-motorized transport in urban passenger transport
- Improving the fuel efficiency of the current vehicle fleet and its operation (labelling, defining minimum fuel-efficiency standards, etc.)
- Periodically tightening corporate fleet fuel-efficiency standards
- Levying up-front tax on personal vehicles,
- Introducing equal pricing for petrol and diesel to get rid of price distortions and allowing consumers to choose more efficient options

The following central policies were scanned for the transport sector.

Name of policy or enacted law or guideline	Year	Objective
Auto Fuel Policy ⁴⁹	2003	<ul style="list-style-type: none"> ■ To provide a road map for vehicular emission norms for new vehicles and their compliance ■ To promote auto fuels, keeping in mind the twin objectives of providing assured supply of auto fuels and meeting environmental concerns like promoting CNG/LPG, biofuels and alternative fuel vehicles (such as battery-powered vehicles, hydrogen- and fuel-cell vehicles). ■ To reduce pollution from the vehicles in use through measures like improved Pollution Under Control (PUC) checking system for vehicles, inspection and maintenance systems for vehicles, performance checking system of catalytic converter and conversion kits for CNG/LPG, augmentation of city public transport systems and enforcing the compliance of city public service vehicles and inter-state vehicles with emission norms
National Urban Transport Policy ⁴⁸	2006	<ul style="list-style-type: none"> ■ To integrate the use of land and the transport plying to reduce travel distances ■ To establish multi-modal public transport systems that are well integrated ■ To increase the share of rail in freight transport ■ To introduce intelligent transport systems for traffic management

48 Ministry of Petroleum & Natural Gas, GoI, National Auto Fuel, 2003- <http://pib.nic.in/archieve/lreng/lyr2003/roct2003/06102003/r0610200313.html>

49 Ministry of Urban Development, GoI, National Urban Transport Policy, 2006,- <http://urbanindia.nic.in/policies/TransportPolicy.pdf>

		<ul style="list-style-type: none"> ■ To reduce pollution levels through changes in travelling practices, better enforcement, stricter norms and technological improvements
National Environment Policy ⁵⁰	2006	<ul style="list-style-type: none"> ■ To enhance sustainable transportation to reduce emissions
National Mission on Sustainable Habitat ⁵¹	2010	<ul style="list-style-type: none"> ■ To introduce a modal shift toward public transport in urban areas for sustainable habitats
National Policy on Biofuels ⁵²	2009	<ul style="list-style-type: none"> ■ To propose a target of 20% blending of biofuels, both for biodiesel and bioethanol by 2017 ■ To take up the production of biodiesel from non-edible oil seeds in waste/degraded/marginal lands
Interim Report of the Expert Group – Planning Commission ⁵³	2011	<ul style="list-style-type: none"> ■ To introduce fuel-efficiency norms for vehicles ■ To improve the share of non-motorized and public transport in urban passenger transport ■ To establish an institutional mechanism for coordination in planning and the management of transport systems

3.5. Buildings sector

3.5.1. Sectoral background

With the growth of the Indian economy and the development of infrastructure in the country, there will be an increasing demand for new commercial and industrial building spaces. In addition to this, the increasing population in urban and emerging cities will create a demand for new residential buildings. Under this scenario, the buildings sector will play an important role in low-carbon transformation initiatives.

The government of India launched the National Mission on Sustainable Habitat under the NAPCC, which recognizes this. The mission promotes energy efficiency and renewable energy technologies in the residential and commercial sectors.

It is estimated that, on an average, the implementation of energy-efficiency measures will help achieve energy savings of about 30 per cent in new residential buildings and of 40 per cent in new commercial buildings. In the case of existing buildings, these estimates are about 20 per cent and 30 per cent, respectively.⁵⁴ The Indian Green Building Council estimates that there is a potential to abate 142 MT of CO₂ per year by

50 Ministry of Environment, GoI, National Environment Policy 2006, <http://envfor.nic.in/nep/nep2006.html>

51 Ministry of Environment & Forest, National Mission on Sustainable Habitat, National Action Plan on climate change 2008, <http://urbanindia.nic.in/programme/uwss/nmsh.htm>

52 Ministry of New and Renewable Energy, GoI, National Mission on Biofuels 2009, http://mnre.gov.in/file-manager/UserFiles/biofuel_policy.pdf

53 Planning Commission, GoI, Interim Report of the expert group on Low Carbon Strategies for inclusive growth, http://planningcommission.nic.in/reports/genrep/Inter_Exp.pdf

54 Ministry of Environment & Forest, GoI, India's Second National Communication to the United Nations Framework Convention on Climate Change, <http://www.moef.nic.in/downloads/public-information/fin-rpt-incca.pdf>

2020 and 296MT of CO₂ per year by 2030, including both residential and commercial buildings.

Measures to reduce GHG emissions from buildings can be classified under the following three categories.

- Reducing energy consumption and embodied energy in buildings
- Carrying out low-carbon fuel switch, including a higher share of renewable energy
- Controlling emissions of non-CO₂ GHG gases

3.5.2. Sectoral policies

Overview of the Indian policy scenario for sustainable buildings

The Ministry of Power has come up with the Energy Conservation Building Code (ECBC), which will issue mandates in the future for all the upcoming buildings in India. The ECBC sets minimum efficiency standards for energy-efficient design and the construction of buildings and major renovations, if the connected load exceeds 110kVA or if the peak demand is greater than 100kW.

In 2006, BEE introduced the Standards and Labeling Programme for improving the efficiency standards of various appliances in the building sector. The scheme includes four equipments/appliances under the mandatory minimum energy performance scheme – frost-free refrigerators, tubular fluorescent lamps, room air conditioners, distribution transformers – and 11 other appliances under the voluntary scheme.⁵⁵

Vision statement for the buildings sector (from the *Interim Report of the Expert Group on Low Carbon Strategies for Inclusive Growth*, Planning Commission):

- Improved efficiency in residential buildings (primarily through appliances, such as efficient ceiling fans, and redesigning buildings to reduce heating and air conditioning loads);
- Improved efficiency in commercial buildings (through design-efficiency and day-lighting, insulation, plugging of leaks, use of natural ventilation, better implementation of the currently voluntary ECBC and other green ratings systems like GRIHA and LEED India)
- In the buildings sector, the report distinguishes what can be accomplished through:
 - Determined effort - 10 per cent of the new buildings built by 2020 to surpass ECBC requirements and save 50 per cent energy from the current baseline; 10 per cent of the new buildings to meet ECBC requirements and save 70 per cent energy from current the baseline; and 10 per cent of existing buildings and 30 per cent of new buildings to have energy performance comparable with a retrofitted building and save 18 per cent energy from the current baseline.
 - Aggressive effort - 15 per cent of new buildings to surpass ECBC requirements and save 50 per cent energy from current baseline; 35 per cent of the new buildings to meet ECBC requirements and save 70 per cent energy from the current baseline; and 20 per cent of existing buildings and 50 per cent of new buildings to have an energy performance comparable with a retrofitted building and save 18 per cent energy the from current baseline.

⁵⁵ Ministry of Power, GoI, Super Efficient Equipment and Appliance Deployment, last visited on Dec 2012-
<http://beeindia.in/content.php?page=schemes/schemes.php?id=2>

The Ministry of New and Renewable Energy (MNRE) has taken many initiatives, such as providing a rebate on solar water heaters, promoting SPV technology, etc. The government of India and USAID initiated the net-zero emission buildings (NZEB) programme. Under this, one-third of all new buildings should be NZEB by 2020, two-third by 2025 and all new buildings by 2030.⁵⁶

The following policies were scanned for the buildings sector.

Name of policy or enacted law or guideline	Year	Objective
National Urban Housing & Habitat Policy ⁵⁷	1998	<ul style="list-style-type: none"> ■ To achieve the overarching goal of “affordable housing for all” ■ To encourage green cover for cities for a balanced ecological development
Energy Conservation Act ⁵⁸	2001	<ul style="list-style-type: none"> ■ To mandate the creation of the Bureau of Energy Efficiency (BEE), which was established under the Ministry of Power in 2002 ■ To authorize BEE to establish an Energy Conservation Building Code (ECBC)
Indian Green Building Council (IGBC) ⁵⁹	2001	<ul style="list-style-type: none"> ■ To usher in a green building movement and facilitate India's emergence as one of the world leaders in green buildings by 2015.
Green Rating for Integrated Habitat Assessment (GRIHA) ⁶⁰		<ul style="list-style-type: none"> ■ To minimize a building's resource consumption, waste generation and overall ecological impact to within certain nationally acceptable limits/benchmarks
Environment Impact Assessment and Clearance (EIA) ²⁹	1994, amended subsequently, with the latest amendment made in 2012	<ul style="list-style-type: none"> ■ To mandate that building and construction work get prior clearance
National Sustainable Habitat Mission ⁶²	2010	<ul style="list-style-type: none"> ■ To promote energy efficiency in the residential and commercial sectors ■ To develop National Sustainable Habitat Standards (legal/regulatory)

⁵⁶ Bilateral Project Agreement was signed between the Government of India (GOI) and the United States in January 2000 , Energy Conservation and Commercial Programme, Net Zero Emission Building, Roundtable on Technologies for NZEB 25 May 2011- <http://eco3.org/roundtable-on-technologies-for-net-zero-energy-buildings-25-may-2011-new-delhi/>

⁵⁷ Ministry of Housing & Urban Poverty Alleviation, GoI , National Urban Housing and Habitat Policy 2007, <http://mhupa.gov.in/policies/duempa/HousingPolicy2007.pdf>

⁵⁸ Ministry of Power, Government of India, Energy Conservation Act 2001-http://powermin.nic.in/acts_notification/pdf/ecact2001.pdf

⁵⁹ Confederation of Indian Industry (CII) , Indian Green Building Code, 2001,- <http://www.igbc.in/site/igbc/index.jsp>

⁶⁰ Green Rating for Integrated Habitat Assessment, last visited on Dec 2012- <http://www.grihaindia.org/>

⁶¹ Ministry of Environment & Forest (MoEF), GoI , Environmental Impact Assessment notification, http://www.moef.nic.in/legis/env_clr.htm

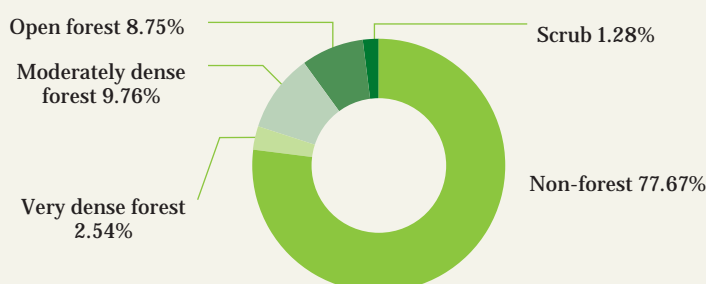
- To incorporate the principles of sustainable habitat across cities
- To take complementary action, such as supporting green building demonstration projects and conducting national outreach programmes for creating awareness among consumers

3.6. Forestry sector

3.6.1. Sectoral background

The land use, land-use change and forestry (LULUCF) sector in India was a net sink in 2000. The forest and tree cover of India in 2011 was estimated to be 78.29 million ha, accounting for 23.81 per cent of the country's geographical area. Out of this, the forest cover was about 69.2 million ha, constituting 21.05 per cent of the geographical area of the country.⁶³ There was a decrease of 367km² in the forest cover in comparison to the 2009 assessment. However, after accounting for interpretational changes in the assessment of 2009, there is a net increase of 1,128km² in the forest cover as compared to the 2009 assessment. Though India has only 2 per cent of the global forest area, it faces the demands of 16 per cent of the world's human population and 18 per cent of the world's cattle population.

The forest cover for India, as per the *India State of Forest Report 2011*, is depicted in the figure below.



Source: Forest cover of India in 2011

Forest emissions mitigation options include reducing emissions from deforestation and forest degradation, enhancing the sequestration rate in existing and new forests, providing wood fuels as a substitute for fossil fuels and providing wood products for more energy-intensive materials. Properly designed and implemented forestry mitigation options will have substantial co-benefits in terms of employment and income-generation opportunities, biodiversity and watershed conservation, provision of timber and fibre, as well as aesthetic and recreational services.

62 Ministry of Urban Development, GoI, National Mission on Sustainable Habitat, National Action Plan on Climate Change 2008- <http://urbanindia.nic.in/programme/uwss/nmsh.htm>

63 Forest Survey of India 2011 Report

3.6.2. Sectoral policies

The **National Mission for a Green India** is among the eight missions under the NAPCC. The mission aims at addressing climate change by enhancing carbon sinks in sustainably managed forests and other ecosystems, supporting the adaptation of vulnerable species/ecosystems to the changing climate, and helping forest-dependant local communities develop adaptation strategies in the face of climatic variability.

The **Green India Mission (GIM)** puts 'greening' in the context of climate adaptation and mitigation, aiming at enhancing ecosystem services like carbon sequestration and storage (in forests and other ecosystems), hydrological services and biodiversity, along with provisioning services like fuel, fodder, small timber and non-timber forest products (NTFP). The mission's strategy is to aim beyond tree plantations and to encompass the protection and restoration of forests. Emphasis is placed on the restoration of degraded ecosystems and habitat diversity, for example, grassland and pastures, mangroves, wetlands and other critical ecosystems. It will also contribute to the enhancement and protection of relatively dense forests. The mission promotes an integrated approach that regards forests and non-forest public lands as well as private lands simultaneously. Livelihood dependencies, for example, firewood needs and livestock grazing, will be addressed using inter-sectoral convergence. The mission also acknowledges the importance of local communities in project governance and the implementation of the mission. An overarching criterion for the selection of project areas will consider vulnerability to climate change projections and the potential of the areas for enhancing carbon sinks.

The forest sector receives budget allocations⁶⁴ both from the state and central governments. In addition, there are state-specific externally aided projects, which are mostly in the form of soft loans from donor countries/agencies. However, the major portion of the budget comes from the state government's allocation, consisting of committed expenditure (non-plan) and plan works. Even the plan allocations of state governments are quite high compared to the central government allocation. Yet compared with other sectors, the forest and wildlife sector received only 1.29 per cent of the total plan allocation from the state governments' budgets during Tenth Plan.

One of the main objectives of the budget allocation is to increase the forest cover of the country through afforestation and to improve the quality of the forests. Protection and conservation of forests and wildlife, as well as its habitat, is another major objective.

The Sub-Group on Climate Change, Planning Commission, GoI, October 2011,⁶⁵ recommends that the GIM should promote the convergence of the National Afforestation Programme (NAP) with the activities and objectives of the NREGA (under the **Mahatma Gandhi National Rural Employment Guarantee Act, 2005**) in order to maximize efficiency and resource use. The central government provides around Rs 350 crores per year as assistance for the afforestation. With the convergence between NREGA and NAP, the financial resources for the GIM can be augmented.

64 Indian Council of Forestry Research and Education, Dehradun, MOEF, GOI, Forestry Sector Report India 2010- <http://www.fsi.org.in/>

65 Planning Commission, Government of India, Climate Change & 12th Five Year Plan, Report on Sub-Group on Climate Change, http://planningcommission.nic.in/aboutus/committee/wrkgrp12/enf/wg-sub_climate.pdf

The GIM defines four levels of monitoring that need to be undertaken by the states for effective monitoring of forest areas. These levels include:

- Level 1: On-ground self-monitoring of the region by the local community, implementing organization and forest department. Building community capacity for monitoring carbon and other services, using lessons from pilot projects is envisaged.
- Level 2: Field review of randomly selected sites by an external agency. This will be, primarily, for mission-financed activities.
- Level 3: Use of remote sensing and GIS techniques
- Level 4: A few pilot areas will be intensively monitored to assess the impact and efficacy of different old and new practices in tandem by the implementing agency, forest department and support organization. In addition to growing stock and forest cover, other parameters for evaluation will include monitoring environmental services and associated factors – ground cover, soil condition, erosion and infiltration, run-off, groundwater levels to develop water budgets, as well as the provision of locally relevant fuelwood, fodder, and other NTFPs – and basic biodiversity analysis. This will facilitate the review of different regulatory conditions in the future. Such an analysis will require extensive support for communities and can form the basis for REDD-based monitoring methodologies.

However, the SAPCC and the state policies do not cover the extensive monitoring methodology to be followed by the state. State policies do mention the use of information technology for monitoring, based on Level 3. Under this, the GIM defines the use of remote-sensing-based forest cover monitoring by the Forest Survey of India, supplemented by boundaries of areas covered under the mission. The mission will work in close collaboration with the Forest Survey of India, National Remote Sensing Agency and Indian Institute of Remote Sensing for developing a countrywide mosaic of high-resolution satellite images (LISS IV, Cartosat) and overlaying polygons of areas taken up for interventions under the mission to help develop a centralized spatial database in the GIS domain. Density slicing could be used to gauge migration within the density class. This service will be available for both mission-financed activities as well as those undertaken and financed by other stakeholders. The real-time, web-based monitoring system, being developed for the Compensatory Afforestation Fund Management and Planning Authority (CAMPA) by National Informatics Centre (NIC), will be taken as the starting point for the system.

REDD+ (Reducing Emissions from Deforestation and Forest Degradation) is a global attempt to create incentives for developing countries to protect, manage and save their forest resources. REDD+ goes beyond merely checking deforestation and forest degradation and includes incentives for positive elements of conservation, sustainable management of forests and enhancement of forest carbon stock, thus, contributing to the fight against climate change.

REDD+ conceptualizes the flow of positive incentives for demonstrated reduction in deforestation or for enhancing the quality and expanse of forest cover. It works on the basis of creating a financial value for the carbon stored and enhanced in biomass and the soil of standing forests ecosystem. Countries that reduce emissions and undertake sustainable management of forests will be entitled to receive funds and resources as incentives. The REDD+ approach incorporates important benefits for livelihoods improvement, biodiversity conservation and food security services. There are a number of laws and policies in place in India that have impacted forest management

positively. In addition, there are well-established institutions, such as the Indian Council of Forestry Research and Education (ICFRE) institutes, FSI, National Remote Sensing Centre (NRSC) and Indian Institute of Forest Management (IIFM), which monitor and assess REDD+ related activities. Sustained efforts for conserving and expanding forest cover and tree resources result in an increase in forest carbon stocks. Thus, India has the possibility of being rewarded for providing carbon service to the international community, in addition to providing traditional goods and services to local communities.

It is estimated that a REDD+ programme for India could lead to the capture of more than 1 billion tonnes of additional CO₂ over the next three decades and provide an earning of more than US\$3 billion as carbon service incentives. REDD+ will benefit local communities as it explicitly safeguards their rights and those of indigenous peoples. India is committed that the monetary benefits from REDD+ will flow to local, forest dependent, forest dwelling and tribal communities.

India is playing a proactive role in international negotiations and has taken a firm stance in favour of a comprehensive REDD+ approach; the argument is that a unit of carbon saved by checking deforestation should be treated the same as a unit of carbon added due to conservation and afforestation measures.

Vision statement for the forestry sector (from the *Interim Report of the Expert Group on Low Carbon Strategies for Inclusive Growth*, Planning Commission):

- Effective implementation of the National Mission for a Green India
 - Double the area for afforestation by 2020 and raise the total forested area to 20 million ha
 - Enhance the resilience of current forest areas
 - Increase GHG removal by India's forests to 6.35 per cent of India's annual GHG emissions
 - Restore four million ha of degraded forests
 - Restore two million ha of scrub forests
 - Restore 0.20 million ha of mangroves
 - Restore 0.10 million ha of wetlands
 - Create critical wildlife corridors

The following central policies were scanned for the forestry sector.

Name of policy or enacted law or guideline	Year	Objectives
Indian Forest Act ⁶⁶	1927	<ul style="list-style-type: none"> ■ To preserve areas that have forest cover or significant wildlife ■ To implement policies regarding the definition of various types of forest (like reserved forest, protected forest or village forest) ■ To enforce regulations regarding forest offences and penalties
Forest Conservation Act ⁶⁷	1980	<ul style="list-style-type: none"> ■ To slow down deforestation ■ To mandate the need to seek permission from the central government before converting forestland above 1ha into non-forestland. The legislation requires that the user agency pay a compensatory amount for afforestation and the net present value of the forest diverted.
National Forest Policy, 1988 ⁶⁸	1988	<ul style="list-style-type: none"> ■ To shift focus from revenue-oriented management to the conservation-oriented management ■ To shift focus from regulatory to participatory action ■ To focus on the maintenance of environmental stability and restoration of ecological balance ■ To focus on methods that will increase the productivity of forests ■ To focus on a people's movement for forest protection
National Mission for Green India (GIM) ⁶⁹	2011	<ul style="list-style-type: none"> ■ To increase forest/tree cover on 5m ha of forest/non-forestlands and improve the quality of forest cover on another 5m ha (a total of 10m ha) ■ To improve ecosystem services, including biodiversity, hydrological services and carbon sequestration, through treatment of the 10m ha land. ■ To enhance annual CO₂ sequestration by 50-60MT in 2020 ■ To cultivate a holistic view of 'greening': emphasis to be laid on restoration of degraded ecosystems and habitat diversity ■ To add 'vulnerability' and 'potential' as criteria for the selection of areas that need intervention ■ To integrate across-sectoral approach

66 Ministry of Environment & Forest, GoI, Indian Forest Act 1927, <http://envfor.nic.in/legis/forest/forest4.html>

67 Ministry of Environment & Forest, GoI, Forest Conservation Act 1980, <http://www.moef.nic.in/legis/forest/forest2.html>

68 Ministry of Environment & Forest (MoEF), GoI, National Forest Policy 1988, <http://www.moef.nic.in/downloads/about-the-ministry/introduction-nfp.pdf>

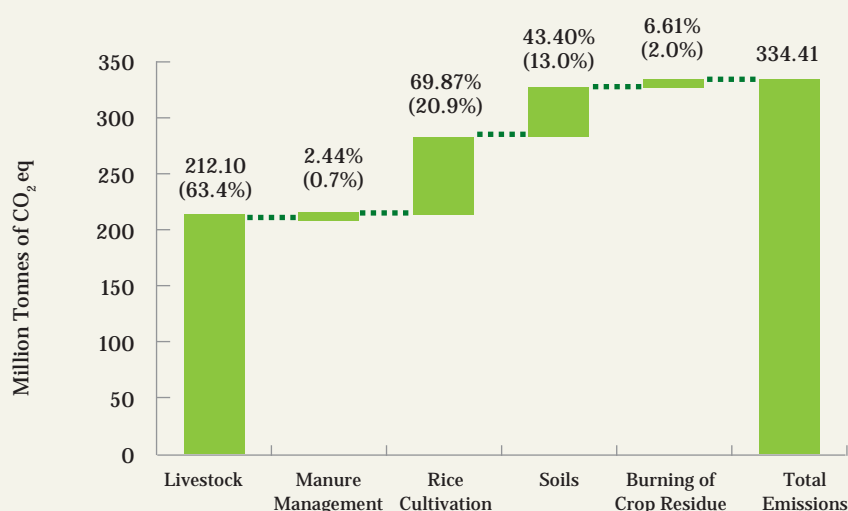
69 Prime Minister Council on Climate Change, Government of India, National Mission on a Green India, 2010- <http://moef.nic.in/downloads/public-information/GIM-Report-PMCCC.pdf>

		<ul style="list-style-type: none"> ■ To develop a cadre of community-based change agents from among educated community youth ■ To ensure robust and effective monitoring ■ To enable local communities and decentralized governance to play key roles ■ To identify research priorities
National Environment Policy ⁷⁰	2006	<ul style="list-style-type: none"> ■ To formulate an appropriate methodology for reckoning and restoring the environmental value of forests, which is unavoidably diverted to other uses ■ To formulate and implement a 'code of best management practices' for dense natural forests to realize the objectives and principles of the National Environment Policy. Forests of high indigenous genetic diversity should be treated as entities with 'incomparable value'. ■ To formulate an innovative strategy to increase the forest and tree cover from the 2003 level of 23.69% of the country's land area to 33% in 2012, through afforestation of degraded forestland, wastelands and increasing tree cover on private or revenue lands

3.7. Agriculture sector

3.7.1. Sectoral background

Agriculture is a crucial sector in India's economy as it provides employment to the rural population of the country. The total emissions from agriculture in India in 2007 were 57.73MT of CO₂eq, comprising 17.6 per cent of India's total GHG emissions, as per the *India: Greenhouse Gas Emissions 2007 Report*.



70 Ministry of Power, GoI, National Electricity Policy 2006, <http://moef.nic.in/nep/nep2006e.pdf>

Distribution of emissions in the agriculture sector in 2007 (in million tonnes of CO₂eq), as per the *India: Greenhouse Gas Emissions 2007 Report* (MoEF, GoI)

The sources of GHG emissions in the agriculture sector are categorized as follows:

- Enteric fermentation
- Livestock manure management
- Rice cultivation
- Agriculture soils
- Field burning of agricultural residue

The **National Agriculture Policy 2010** aims at strengthening rural infrastructure to support faster agricultural development, promoting value addition, accelerating the growth of agro business, creating employment in rural areas, securing a fair standard of living for farmers and agricultural workers and their families, discouraging migration to urban areas and facing the challenges arising out of economic liberalization and globalization. The policy seeks to promote the technically sound, economically viable, environmentally non-degrading and socially acceptable use of the country's natural resources – land, water and genetic endowment – to promote sustainable development of agriculture. The policy encourages the use of biomass, organic and inorganic fertilizers and the controlled use of agro chemicals through integrated nutrients and pest management (INM & IPM).

Several approaches have been tested at an experimental scale to reduce emissions in the agriculture sector. The following are relevant to Indian conditions.⁷¹

- Improved water and fertilizer management in rice paddies could reduce emissions of GHGs. There are possibilities for crop diversification, as the value added from different crops is gaining importance under globalization and supply chain management
- Improved management of livestock population and its diet could also assist in mitigation of GHGs.
- Approaches to increase soil carbon, such as organic manures, minimal tillage and residue management, should be encouraged. These have synergies with sustainable development as well.
- The use of nitrification inhibitors, such as neem-coated urea, and fertilizer placement practices needs further consideration for GHG mitigation.
- Improve the efficiency of energy use in agriculture by using better-designed machinery and by adopting conservation practices.

Scientific irrigation practices such as micro-irrigation, drip irrigation, water management, rainwater harvesting, etc., can be applied to restrict the use of diesel pumps and electrical pumps. Energy-efficient electrical pumps can replace diesel-operated pumps and other inefficient, old electrical pumps to reduce GHG emissions in the agriculture sector. However, due to inadequate data on the state-wise distribution of diesel and electric pump sets, a suitable indicator to measure the states' performance on that basis could not be developed.

71 Planning Commission, GoI, Climate Change & Twelfth Five Year Plan, Report of the Sub-Group on Climate Change, October 2011, planningcommission.nic.in/aboutus/committee/.../wgsub_climate.pdf

Methane emission from livestock in India has to be seen from the perspective of agriculture—animal husbandry system, in the larger context. Keeping in view the utility of the Indian livestock population to the national economy and food security as well as social needs, this emission is not a threat to the environment. Nevertheless, methods for the mitigation of methane emission from livestock should be explored. Increasing the dietary energy level will not only improve its productivity but also mitigate methane emission. Alternatively, some feed additives may be developed to control the methanogenic bacteria in the rumen.

The **National Initiative on Climate Resilient Agriculture (NICRA) 2011** was launched by ICAR with a view to enhance the resilience of Indian agriculture to climate change and climate vulnerability through strategic research and technology demonstration. The research on adaptation and mitigation covers crops, livestock, fisheries and natural resource management.

The Report of the Sub-Group on Climate Change, Planning Commission, has recommended actions related to adaptation and mitigation in agriculture. The mitigation efforts for making agricultural production more energy efficient should focus on the following points.

- GHG inventorization using state-of-the-art emission equipment coupled with simulation models and GIS.
- Assessment of the carbon-sequestration potential of different land-use systems, including opportunities offered by conservation agriculture and agro-forestry
- Assessment of the mitigation potential of biofuels and their enhancement by genetic improvement and the use of engineered microbes
- Identification of cost-effective opportunities for reducing methane generation and emission in ruminants (by modification of diet) and in rice paddies (by water and nutrient management)
- Renewing the focus on the efficient use of nitrogen fertilizers, with the added dimension of mitigating emissions of nitrous oxides
- Assessment of the biophysical and socio-economic implications of the proposed GHG-mitigation interventions before developing policies for their implementation.

3.7.2. Sectoral policies

Vision statement for the agriculture sector (from the *National Action Plan on Climate Change*, GOI):

- Development of crops resilient to dry weather conditions
- Risk management through early warning systems and adaptation to climate change
- Access to information
- Application of biotechnology

The following central policies were scanned for the agriculture sector.

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Name of policy or enacted law or guideline	Year	Objective
Fertilizers (Control) Order ⁷²	1985	<ul style="list-style-type: none"> ■ To restrict any person from selling fertilizers. Intimation has to be given to the notified authority. A certificate of authorization to sell the fertilizers would be treated as final letter.
Insecticides Act ⁷³	1968	<ul style="list-style-type: none"> ■ To prevent import, manufacturing, sale or stock of insecticides which do not follow the specifications laid down by the Ministry of Agriculture
The Seeds Act ⁷⁴	1966	<ul style="list-style-type: none"> ■ To ensure that the central government specifies the minimum limit of germination and purity, with respect to any seed of any variety and to put indicative labels on them. An authorized agency's certification is required for selling and distributing the seeds.
National Seeds Policy ⁷⁵	2002	<ul style="list-style-type: none"> ■ To ensure that government-certified agencies will be responsible for testing the seeds for various requirements and for their marking/labelling, certification, etc.
National Agriculture Policy ⁷⁶	2000	<ul style="list-style-type: none"> ■ To promote the technically sound, economically viable, environmentally non-degrading and socially acceptable use of country's natural resources – land, water and genetic endowment – to promote the sustainable development of agriculture To promote the balanced and conjunctive use of biomass, organic and inorganic fertilizers and to promote the controlled use of agro chemicals through integrated nutrients and pest management To make it the government's endeavour to supply adequate and timely quality inputs such as seeds, fertilizers, plant protection chemicals, bio-pesticides, agricultural machinery and credit at reasonable rates to farmers ■ To set up agro-processing units in production areas to reduce wastage, especially of horticultural produce, to increase value addition and to create off-farm employment opportunities in rural areas

72 Ministry of Agriculture and Cooperation, GoI, The Fertilizers (Control) Order 1985, http://www.krishi.bih.nic.in/Acts_&_Rules/Fert_Order_1985.pdf

73 Central Insecticide Board & Registration Committee, GoI, Insecticides Act, 1968, - http://cibrc.nic.in/insecticides_act.htm

74 Department of Agriculture & Cooperation, Ministry of Agriculture & Cooperation, GoI, The Seeds Act, 1966, - <http://agricoop.nic.in/seedsact.htm>

75 Department of Agriculture & Cooperation, Ministry of Agriculture & Cooperation, GoI, The Seeds Act, 1966, - <http://agricoop.nic.in/seedsact.htm>

76 The seed rules, 1968, Department of Agriculture and Cooperation, GoI - <http://agricoop.nic.in/seedsrules.htm>

National Action Plan on Climate Change, Sustainable Agriculture ⁷⁷	2010	<ul style="list-style-type: none"> ■ To develop crops resilient to dry weather conditions ■ To enhance risk management by developing early warning systems and adaptation to climate change ■ To provide access to information, traditional methods ■ To promote the application of biotechnology, geospatial systems, etc.
Draft National Water Policy ⁷⁸	2012	<ul style="list-style-type: none"> ■ To encourage stakeholder participation in land–soil–water management, with scientific inputs from local research and academic institutions for evolving different agricultural strategies, managing droughts, reducing soil erosion and improving soil fertility ■ To adopt compatible agricultural strategies and cropping patterns, which may be achieved by involving water users, sensitizing them appropriately and building their capacities ■ To evolve an agricultural system which economizes on water use and maximizes value from water ■ To encourage the use of very small local-level irrigation through small bunds, field ponds, agricultural and engineering methods and practices for watershed development, etc. ■ To integrate farming systems and non-agricultural developments for livelihood support and poverty alleviation ■ To encourage and incentivize methods like micro-irrigation (drip, sprinkler, etc.), automated irrigation operation, evaporation/transpiration reduction, etc.
National Food Security Mission ⁷⁹	2012	<ul style="list-style-type: none"> ■ To identify hub-specific technology needs and opportunities and system components and combinations that meet farmers' livelihoods for increasing overall impact

3.8. Waste sector

3.8.1. Sectoral background

Waste generation is closely linked to population, urbanization and affluence. With increasing population, prosperity and urbanization in most developed and developing countries, it remains a major challenge for municipalities to collect, recycle, treat and dispose of increasing quantities of solid waste and wastewater. A cornerstone of sustainable development is the establishment of affordable, effective and truly sustainable waste management practices in developing countries. It must be further

77 Prime Minister's Council on Climate Change, GoI, National Action Plan on Climate Change 2008, - http://pmindia.gov.in/climate_change_english.pdf

78 Ministry of Water Resources, GoI, Draft National Water Policy 2012 - http://mowr.gov.in/writereaddata/linkimages/DraftNWP2012_English9353289094.pdf

79 Ministry of Agriculture, GoI National Food Security Mission, 2009- <http://nfsm.gov.in/Guidelines.aspx>

emphasized that multiple public health, safety and environmental co-benefits accrue from effective waste management practices, which concurrently reduce GHG emissions and improve the quality of life, promote public health, prevent water and soil contamination, conserve natural resources and provide renewable energy benefits.

Indian scenario

The emissions through waste have increased at a compounded annual growth rate of 7.3 per cent between 1994 and 2007. Projecting the same emission–GDP elasticity forward up to 2020, emissions from the waste sector are expected to rise to 146-163MT CO₂eq in 2020 under the 8 per cent GDP growth scenario and 165-183MT CO₂eq in 2020 under the 9 per cent GDP growth scenario.⁸⁰

Systematic collection of solid waste, its recycling and the conversion of waste to energy has a large potential for reducing emissions from this sector. In India, systematic collection and dumping of waste is only carried out in urban areas, leading to the potential for the recovery of methane emissions. Domestic wastewater is managed in most cities, and industrial wastewater treatment plants regularly treat the waste in industries. These two are also large sources of methane emissions.

Few of the best waste management practices followed in the country are incineration with heat recovery, landfilling with recovery of methane emissions and setting up common effluent treatment plant (CETP). Some states like Andhra Pradesh, Karnataka and Gujarat have installed recycling units for e-waste. Thus, while initiatives have proven to be effective, they are restricted mainly to urban areas. Considering the increasing levels of urbanization, population and standards of living, stringent laws and state-level policies to strengthen waste management practices are the need of hour.

The MoEF and Central Pollution Control Board (CPCB) have instituted a scheme for setting up a demonstration project⁸¹ for solid waste management, in accordance with the MSW Rule. The objective of the scheme is to demonstrate the implementation of the MSW Rule in an integrated manner.

80 Planning Commission, GoI, Interim Report of the expert group on Low Carbon Strategies for inclusive growth, 2012 - http://planningcommission.nic.in/reports/genrep/Inter_Exp.pdf

81 Central Pollution Control Board, MoEF, GoI, MSW demonstration projects-12th Financial Commission, CPCB- http://www.cpcb.nic.in/wast/municipalwast/Demonstration_projects.pdf

3.8.2. Sectoral policies

The following policies were scanned for the waste sector.

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Name of policy or enacted law or guideline ⁸³	Year	Objective
Bio-Medical Waste (Management and Handling) Rules ⁸³	1998	<ul style="list-style-type: none"> To prevent general exposure to the harmful effects of cytotoxic, genotoxic and chemical biomedical waste
Municipal Solid Waste (Management and Handling) Rules ⁸⁴	2000	<ul style="list-style-type: none"> To ensure proper collection, segregation, storage, transportation, processing and disposal of municipal solid waste To lay out specifications for landfilling and other waste processing options, such as composting, treated leachates and incinerations
Hazardous Wastes (Management, Handling and Transboundary Movement) Rules ⁸⁵	2008	<ul style="list-style-type: none"> To stop the import of hazardous waste in India; import of only those wastes will be permitted which are for recycling or reuse To utilize hazardous waste for reprocessing or energy recovery in only those units which have an authorization from the CPCB
E-waste (Management & Handling) rules ⁸⁶	2010	<ul style="list-style-type: none"> To provide guidance for the identification of various sources of waste electrical and electronic equipments (e-waste) and to prescribe procedures for handling e-waste in an environmentally sound manner
National Mission on Sustainable Habitat ⁸⁷	2010	<ul style="list-style-type: none"> To promote management of solid waste for sustainable habitats
Plastics Waste Management (PWM) Rules ⁸⁸	2011	<ul style="list-style-type: none"> To setup a systematic mechanism for plastic waste collection, segregation and disposal To ensure that plastic waste is recycled in an environment-friendly manner To utilize plastic waste in road construction (polymer-coating over stone aggregate) To encourage the co-processing of plastic waste in cement kilns

- 82 Central Pollution Control Board, MoEF, GoI: Plastic Waste Management Plan (http://www.cpcb.nic.in/Plastic_waste.php); Municipal Waste Management Plan (http://www.cpcb.nic.in/Municipal_Solid_Waste.php), Hazardous Waste Management Plan; (http://www.cpcb.nic.in/Hazardous_waste.php); Bio-Medical Waste Management; (http://www.cpcb.nic.in/Bio_medical.php); E-Waste Management Plan, http://www.cpcb.nic.in/e_Waste.php)
- 83 MoEF, GoI, Bio-Medical Waste (Management and Handling) Rules, 1998-<http://envfor.nic.in/legis/hsm/biomed.html>
- 84 MoEF, GoI, Municipal Solid Wastes (Management and Handling) Rules, 1999-<http://www.envfor.nic.in/legis/hsm/mswmhr.html>
- 85 MoEF, GoI, Hazardous Waste Management Plan, 2008- http://www.moef.nic.in/legis/hsm/HAZMAT_2265_eng.pdf
- 86 MoEF, GoI, E-Waste Management Plan, 2010- http://envfor.nic.in/downloads/rules-and-regulations/1035e_eng.pdf
- 87 National Action Plan on Climate Change, GoI, National Mission on Sustainable Habitat, 2008- <http://urbanindia.nic.in/programme/uwss/nmsh.htm>
- 88 MoEF, GoI Plastic Waste Management Plan, 2011- <http://moef.nic.in/downloads/public-information/drft-rls-plstc-wst-mgmt-amndmt-2011.pdf>

3.9. Overview of results

The Low-Carbon Growth Policy Tracker maps the development and, wherever possible, results of low-carbon policies across key economic sectors, across different Indian states.

It is also understood that different sectors are likely to demonstrate a varying degree of relevance for different states, depending upon the abundance of state-specific natural resources, state GHG emission profiles and state-specific GDP relevance. Thus, some states are expected to perform better in certain sectors that are key to those states, and the same states may not perform equally well in other sectors.

It must be noted that the tracker analyzes, where possible, the quantitative impact of sectoral policies that have taken several years to bear fruit. The results are, thus, not a statement on any political administration, person or state bureaucracy.

The tracker evaluates each state's trends toward meeting the low-carbon policy framework, irrespective of the starting point of each state. The same methodology is applied to all states, irrespective of differences between the states in terms of economic conditions, size, finalization of SAPCCs, public awareness and the institutional support for the implementation of low-carbon policies.

The results of this study are presented in the following format.

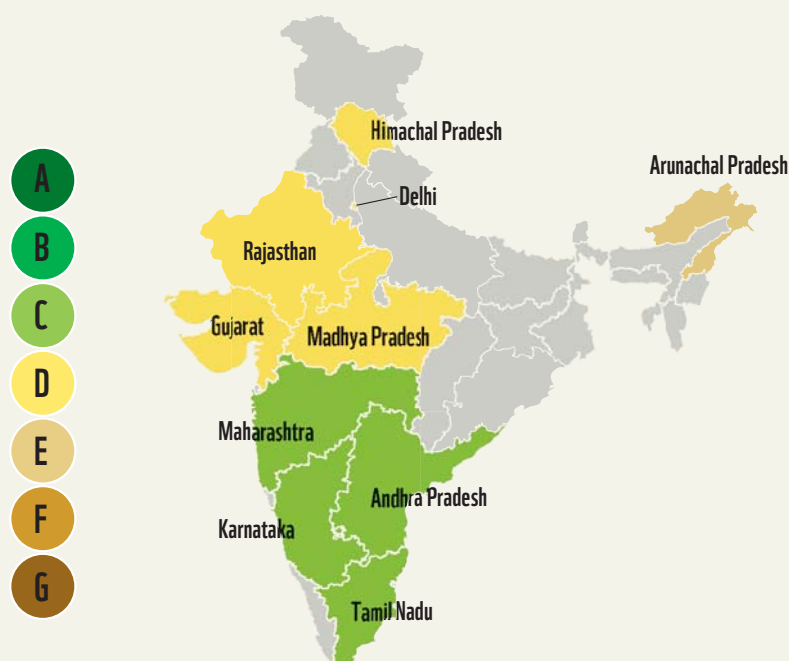
- i) Overall assessment of state's actions toward low carbon policies
- ii) Sector-wise assessment of the state's low-carbon policies
- iii) Overall set of leading practices adopted by various states across sectors, demarcated by policy enabler area

4. OVERALL ASSESSMENT OF THE STATES' ACTIONS TOWARD LOW-CARBON POLICIES ACROSS ALL SECTORS

As defined in the methodology, in an ideal scenario, the sectoral GHG emission contribution of each state should be used to provide weightage to the scores achieved by the state in the respective sector. These weighted sectoral scores would then be consolidated to present an overall picture of the low-carbon policy progress in each state.

Due to the absence of sectoral GHG inventories of most of the 10 states under this study, the current model uses a uniform, or equal, weightage for each sector's scores. However, a sensitivity analysis has been conducted for two states, namely, Himachal Pradesh and Karnataka, which have provided a state-level GHG inventory in the public domain.⁸⁹ Based on the sensitivity analysis, the overall variation in scores for each of the two states, when compared with uniform weightage, is within 10 per cent. GHG inventorization of states, when completed and released in the public domain, will provide the GHG sectoral emission contribution per state and should be used to provide sectoral weightages for the overall assessment of a state's policy actions.

The figure below presents the overall assessment of the states' actions toward low-carbon policies across all sectors, based on equal importance to each sector.



⁸⁹ Delhi and Arunachal Pradesh, have also provided their GHG inventory in the public domain. However, in the absence of the values of sectoral contribution of GHG emissions like agriculture, waste and, in the case of Arunachal Pradesh, a separate sector-wise emission breakup for the power, industry, transport and buildings sectors, both the states have been excluded from the sensitivity analysis.

4.1. Assessment of the states' actions, by sector

Rating	Power	Industry	Buildings	Transport	Forestry	Waste	Agriculture	General
A					Tamil Nadu		Andhra Pradesh	Madhya Pradesh
B			Rajasthan		Madhya Pradesh, Andhra Pradesh, Himachal Pradesh, Maharashtra		Himachal Pradesh, Tamil Nadu	Rajasthan, Arunachal Pradesh
C	Andhra Pradesh, Maharashtra, Karnataka	Maharashtra, Tamil Nadu	Gujarat, Andhra Pradesh, Tamil Nadu	Andhra Pradesh, Maharashtra, Tamil Nadu, Karnataka, Delhi,		Andhra Pradesh, Maharashtra, Karnataka, Tamil Nadu, Gujarat	Karnataka	Karnataka
D	Rajasthan, Gujarat, Tamil Nadu	Himachal Pradesh, Rajasthan, Karnataka	Maharashtra, Karnataka	Gujarat, Madhya Pradesh, Rajasthan	Delhi, Rajasthan	Madhya Pradesh	Madhya Pradesh, Maharashtra, Gujarat, Delhi, Arunachal Pradesh	Andhra Pradesh, Delhi
E	Himachal Pradesh	Madhya Pradesh, Gujarat, Andhra Pradesh, Arunachal Pradesh	Madhya Pradesh, Delhi, Himachal Pradesh		Gujarat, Karnataka, Arunachal Pradesh	Delhi, Himachal Pradesh, Rajasthan, Arunachal Pradesh	Rajasthan	Himachal Pradesh, Gujarat, Maharashtra
F	Arunachal Pradesh, Delhi, Madhya Pradesh	Delhi		Himachal Pradesh, Arunachal Pradesh				Tamil Nadu
G			Arunachal Pradesh					

4.2. Leading practices across sectors

The section below summarizes the leading practices across sectors, which have yielded positive results for the states in the analysis conducted in this study. This will help laggard states identify the key initiatives that have resulted in low-carbon transformation in the other states and offer a sector-specific approach to achieve enhanced results. This section also recognizes some leading national-level policies, which are indirectly significant in assessing the sectors on the basis of the developed indicators.

Sectors	
 <p>POWER</p>	<p>Renewables</p> <p>Setting judicious renewable energy tariffs: An effective way of reaching the grid parity for different renewable energy technologies is by basing renewable energy tariffs on the Average Power Purchase Cost (APPC) and technology viability cost. The Central Electricity Regulatory Commission (CERC) comparison of the APPC for renewable energy among the states has shown that Maharashtra, Andhra Pradesh, Tamil Nadu and Himachal Pradesh have the most feasible tariff structure for renewable energy.</p> <p>Enforcing RPOs: The enforcement of Renewable Energy Purchase Obligations (RPO) would ensure the tradability of Renewable Energy Certificates (RECs) generated under the scheme. The regulatory framework for the RPO mechanism was designed to support renewable energy in India. There have been very few states, such as Rajasthan and Maharashtra, which have submitted a compliance report to the state regulator.</p>
	<p>Energy efficiency</p> <p>Adopting renovation and modernization techniques for plant operations: State-owned power plants that were performing poorly have been able to scale up power generation after the Renovation and Modernization (R&M) programme. The deviation from Station Heat Rate (SHR) has reduced considerably and specific emissions from these units have also come down. Andhra Pradesh, Gujarat, Karnataka, Maharashtra and Tamil Nadu have benefitted from the R&M programme.</p> <p>Improving transmission and distribution systems in the power sector: The poor performance of power utilities, commercial losses and the use of old equipment resulted in losses up to 40%. This was a major concern. After the improvement of the transmission and distribution (T&D) systems, losses have come down to below 10% in states such as Andhra Pradesh. Other states like Rajasthan, Maharashtra and Karnataka have shown reduction in the T&D losses, higher than the national average.⁹⁰</p>
	<p>Overarching</p> <p>Notifying Green SEZs: The notification of special economic zones (SEZ) as 'green' areas for attracting investment in clean energy has driven project developers to invest in eco-friendly projects in India. Under Green SEZs, the government provides various support mechanisms, such as single-window clearance and financial incentives, to private developers investing in these regions. Some of the leading states to have notified Green SEZs are Gujarat and Maharashtra.</p>

90 Planning Commission of India, GoI, State-wise T&D Loss (%), 2010, -http://planningcommission.nic.in/data/datatable/1705/final_84.pdf



Renewables	Incentivizing and promoting solar photovoltaic rooftops: States like Andhra Pradesh, Gujarat, Karnataka and Maharashtra provide incentives, such as generation-based incentives, rebates and subsidies for promoting SPV rooftops. Other states like Madhya Pradesh, Rajasthan and Tamil Nadu have planned or proposed to do the same.
Energy efficiency	<p>Promoting eco-buildings: The Pune Municipal Corporation's (PMC) Eco-housing programme promotes the adoption of environment-friendly houses. The Pune Municipality offers a concession of 10-50% on the total premium on building certification fees to developers, depending on the project rating achieved under the certification of this programme.</p> <p>Mandating the notification of the ECBC: Rajasthan is the only state among the selected states under study to notify and mandate the Energy Conservation Building Code (ECBC).</p> <p>Mandating energy efficiency norms for public procurement: Minimum energy-efficiency standards – based on mandatory or voluntary star rating norms for electrical appliances listed under BEE's Standards and Labelling Programme – have been mandated for all public procurements in Rajasthan.</p>
Overarching	Setting high FAR⁹¹ for green buildings: The Delhi Urban Art Commission has made a recommendation to the Ministry of Urban Development that the floor area ratio (FAR) for green buildings be increased by 1%. This suggestion may be added to Delhi Master Plan 2021.



Renewables	<p>Increasing the share of renewable energy mix in industrial energy demand: This can be achieved through policy interventions or making existing policies more inclusive such as:</p> <ul style="list-style-type: none"> i) Including separate solar RPOs on captive and open access consumers ii) Including captive consumers as obligated entities in all states (currently few states don't have captive consumers as obligated entities) and specifying the minimum capacity for captive consumers for RPOs to be applicable.
Energy efficiency	Decreasing the SEC: A decrease in the Specific Energy Consumption (SEC) by the industry sectors in Madhya Pradesh, Andhra Pradesh, Rajasthan and Maharashtra has reduced GHG emission levels attributable to industrial processes emissions. Cap and trade policies at the national level provide incentives to industries to reduce the SEC levels in India. Perform, Achieve and Trade (PAT) is one such leading national-level practice.
Overarching	Levying Carbon tax/Green cess: Carbon tax on coal consumption (Rs 50/metric tonne) ⁹² in all states provides a corpus for the National Clean Energy Fund (NCEF). A green cess has been levied on power consumption in energy-intensive industries in states such as Karnataka (5 paise/kWh), Gujarat (2 paise/kWh), Maharashtra (5 paise/kWh), Tamil Nadu (5 paise/kWh). ⁹³

⁹¹ **Floor area ratio (FAR)** is the ratio of a building's total floor area to the size of the land upon which it is built.

⁹² Ministry of Environment & Forest (MoEF), GoI, Post-Copenhagen Domestic Actions, 2010- <http://moef.nic.in/downloads/public-information/India%20Taking%20on%20Climate%20Change.pdf>

⁹³ The Indian Express, article on the website- dated 11th October 2012- <http://newindianexpress.com/cities/chennai/article1293883.ece>



TRANSPORT

Renewables	Promoting biofuels for transportation: The Cabinet Committee on Economic Affairs (CCEA) has approved the pricing for bio-ethanol procurement by oil marketing companies (OMCs) under the Ethanol Blended Petrol (EBP) Programme. As decided by the CCEA, it is now mandated that petrol blended with 5% ethanol will be sold across the country.
Energy efficiency	Enforcing fuel efficiency standards: The upcoming Corporate Average Fuel Economy (CAFE) standards need to be enforced effectively and the already active Auto Fuel Policy, which introduced strict emission norms for vehicles, needs to be implemented.
Overarching	<p>Promoting effective public transportation: An increase in the fleet of state-run buses and the expansion of Bus Rapid Transit (BRT) and Mass Rapid Transit System (MRTS) systems provides a more effective public transport system. Bus fleets have been ramped up above the average figure for India in Himachal Pradesh, Karnataka, Tamil Nadu and Andhra Pradesh between 2007 and 2009. Delhi has, by far, the maximum number of buses per lakh of population. The expansion of the Delhi Metro is also noteworthy.</p> <p>Levying green cess on vehicles: Green cess should be levied on the use of vehicles to discourage inefficient plying. For example, a green tax is imposed on old vehicles in states like Tamil Nadu, Maharashtra, Karnataka, Rajasthan and Andhra Pradesh; a green cess is levied on vehicles from outside the state in Himachal Pradesh; and an environment cess of 40 paise per litre of diesel sold is levied in Delhi to create an Air Ambience Fund for financing pollution control measures.</p> <p>Incentivizing cleaner fuel: The use of cleaner fuels should be promoted, such as CNG usage in eight states under the CNG programme, which is in effect in India since 2011.</p> <p>States like Madhya Pradesh, Andhra Pradesh, Delhi, Rajasthan and Maharashtra offer capital subsidy or tax exemptions on Electric Hybrid Vehicles (EHV).</p>



FORESTRY

Renewables	Not applicable
Energy efficiency	Not applicable
Overarching	<p>Augmenting carbon stock: Increasing carbon stock through effective preservation, restoration and enhancement in the quality of forest and tree cover, leading to more carbon sequestration, was observed in states like Himachal Pradesh, Andhra Pradesh, Tamil Nadu and Maharashtra. Arunachal Pradesh has the highest forest cover (with respect to geographical area) in the country but has seen a minor decline in growth rate over the period from 2002 to 2009.</p> <p>Enhancing funding for forestry: The allocation for forests in the state budget need to be increased for activities related to afforestation, and forest conservation. Depending on the forest cover and the need of the state, several state-level forestry projects have been taken up through external fundings⁹⁴ in Gujarat, Himachal Pradesh, Karnataka, Rajasthan and Tamil Nadu.</p>

94 Indian Council of Forestry Research and Education, Dehradun, MoEF, GoI, Forestry Sector Report India 2010- http://www.envfor.nic.in/mef/Technical_Paper.pdf



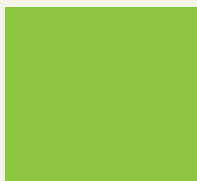
AGRICULTURE

Renewables	Not applicable
Energy efficiency	Not applicable
Overarching	Reducing livestock emissions: Andhra Pradesh, Delhi, Tamil Nadu and Arunachal have lower methane emissions with respect to livestock productivity as compared to the Indian average. When compared with the national average, Madhya Pradesh, Rajasthan and Karnataka need to take action to reduce methane emissions caused by enteric fermentation from livestock and dung management.



WASTE

Renewables	Harnessing waste-to-energy potential: Andhra Pradesh is very active in harnessing energy from waste and is able to achieve 35% of its potential, as compared to India's average of 3%.
Energy efficiency	Not applicable
Overarching	Increasing sewage treatment capacity: Himachal Pradesh is the only state that has a higher sewage treatment capacity than the sewage generated in the state. Increasing e-waste recycling capacity: Karnataka and Tamil Nadu have the maximum e-waste recycling capacity of 63% and 64%, respectively.



GENERAL

Renewables	Not applicable
Energy efficiency	Not applicable
Overarching	Implementing SAPCCs: Madhya Pradesh, Rajasthan and Arunachal Pradesh have published their respective State Action Plans on Climate Change (SAPCC) and the National Steering Committee on Climate Change (NAPCC) has endorsed the same. States like Madhya Pradesh, Andhra Pradesh, Delhi, Himachal Pradesh, Rajasthan, Gujarat, Maharashtra and Karnataka have set up dedicated climate change task forces or special cells to implement the activities to be taken up.

5. THE WAY FORWARD

The current study involved developing a pilot framework for assessing the progress of each selected state in developing and implementing low-carbon policies across key economic sectors. It is expected that this exercise can be further strengthened and the coverage increased, both in terms of the number of states as well as the technical parameters/indicators considered. While the current study has relied, to a large extent, on published or publically available sources of information, it is also recognized that further interactions with stakeholders, including state governments, would add value to the assessment.

It is expected that with release of the final report of the Planning Commission, which is likely to chalk out the pathway for India's low-carbon growth across the sectors analyzed in this report, and the finalization of the SAPCCs across all the 28 states in India, the indicators can be further fine-tuned. Additions or modifications can be made to the indicators to address the changes, as they occur. In addition, the availability of state-level GHG emission profiles can be utilized to add relevance to the study results in the future, especially with respect to assigning weightages across sectors for each of the states considered.

Given that the implementation of the NAPCC and the formulation and adoption of SAPCCs is still an ongoing process; the results of this project in the first year should be considered only indicative of the development of state-wide policies directed towards low-carbon growth. The current work adds to the knowledge base on good policies and practices that promote low-carbon development. It is intended to stimulate positive action among states and encourage best practices as well as to raise the level of ambition among them. Thus, the rating across the states should be analyzed taking the above into consideration.

In the future, the project can act as a barometer for measuring the progress of state and central policies designed to achieve low-carbon growth. As more quantitative data becomes publicly available, the indicators can be further refined and the progress across sectors can be mapped better in terms of the impact of the policies. Not only the existence of a particular policy but also its effectiveness, in terms of implementation on the ground, will make a difference to the overall long-term progress toward low carbon development.

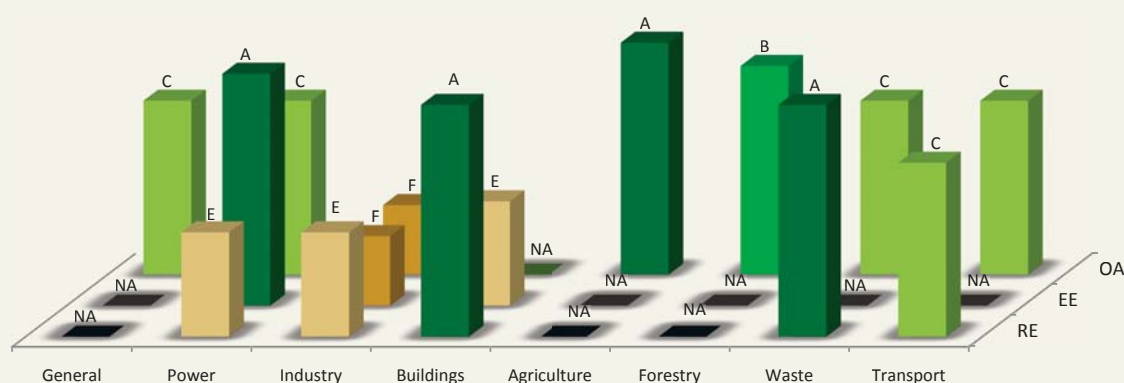
6. STATE WISE RESULT⁹⁵

6.1. Andhra Pradesh



Sector	Sectoral GDP contribution ⁹⁶ as percentage of state GDP
Power	2%
Transport	5%
Industry	15%
Buildings	8%
Agriculture	17%
Forestry	1%
Waste	Not available

Summary of the state's results




Rating band and colour code	A	B	C	D	E	F	G
Normalized score on a scale from 0 to 100	90 ≤ 100	75 ≤ 90	60 ≤ 75	45 ≤ 60	30 ≤ 45	15 ≤ 30	0 ≤ 15

⁹⁵ Due to absence of the sectoral GHG inventories of most of the 10 states under study, the current model uses a uniform, or equal, weightage for each sector's scores. GHG inventorization of states, when completed and released in the public domain, would provide GHG sectoral emission contribution per state and should be used to provide sectoral weightages for the overall assessment of state's policy actions.

⁹⁶ CSO (as on 1 March 2012). (ON251)

Sectors in detail

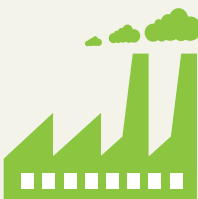
Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 POWER	Renewables	The state offers differentiated policy support for bio, solar and wind energy development. The policy environment in the state supports the development of different renewable energy technologies. However, the state is yet to tap into its huge renewable energy potential.
	Energy efficiency	Andhra Pradesh has been the best performer in energy efficiency in the power sector. The state has an effective and comprehensive policy scenario for energy efficiency improvement in power generation, transmission and distribution and has achieved considerable success in attaining the objectives of the policies.
	Overarching	Subsidy on fossil fuel for power generation and subsidy at the consumer end encourages the adoption of low-carbon technology in the state.

Areas of achievement- Power

- Andhra Pradesh has shown considerable improvement between 2000 and 2010 in the energy efficiency area. It has laid special focus on the renovation and modernization of the existing power plants and the upgrade of fossil fuel-fired technologies. The state offers balanced policy support for hydro, wind and solar energy and provides one of the best tariff structures for renewable energy.⁹⁷ The state has sufficient budget allocation to support the development of renewable energy in the state.

Areas that need improvement- Power


- The state has a high renewable energy potential, of over 10,000 MW, and needs to harness it to meet its increasing power demand.
- The state needs to reduce the subsidy on fossil fuel to meet its low-carbon growth targets and improve energy efficiency in the sector.

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 INDUSTRY	Renewables	The state's industrial policy does not have a provision to support the adoption of renewable energy in the state. The state does not have sufficient incentive support or regulation to increase the share of renewable energy in industrial consumption.
	Energy efficiency	Industrial energy efficiency norms in the state are not stringent enough to reduce the energy intensity of the state. The state policy scenario does not have provisions for promoting local technologies or for importing energy-efficient technologies.
	Overarching	The industrial policy talks about the promotion of green products but there is no incentive to accelerate such adoption. The state does not impose penalties or carbon tax to regulate industrial GHG emissions in the state.

⁹⁷ Central Electricity Regulatory Commission of India, GoI, analysis of APCC and technology viability cost: Determination of Forbearance and Floor Price for the REC framework 2011- http://www.cercind.gov.in/2011/August/Order_on_Forbearance_&_Floor_Price_23-8-2011.pdf

Areas that need improvement- Industry

- The state needs to tighten regulation on the use of renewable energy in the sector through RPO mandates.⁹⁸ Effective enforcement of RPOs and the penalty mechanism can improve captive consumption of renewable energy in the sector.
- The state industrial sector has increased its GDP energy intensity by 2.3% in the period from 2004-05 to 2007-08.⁹⁹
- The state should develop effective policy support to increase industrial energy efficiency norms in the state.
- The state needs to reduce the subsidy on fossil fuels to limit their use and increase the commercial viability of renewable sources of energy.

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 BUILDINGS	Renewables	The state provides tax reductions for investments in renewable energy, such as solar-thermal and PV. A proper monitoring mechanism should be in place to attract more customers and to ensure implementation.
	Energy efficiency	The state has started to draft the ECBC, as per its climatic condition. The state has not mandated the procurement of BEE Star-rated appliances that are listed in the voluntary scheme. Moreover, there is no procurement policy for the four appliances that fall under the mandatory scheme of the Standards and Labeling Programme. Almost 40 buildings have been identified for energy conservation measures. An energy audit has been completed, and its recommendations need to be implemented. The state has mandated an energy audit of buildings with a connected load of 100kVA or above.
	Overarching	NA

Areas of achievement- Buildings

- The state provides a 10% rebate on the installation and use of solar heating¹⁰⁰ and lighting systems.¹⁰¹
- The state has mandated an energy audit of all buildings with a load of 100kVA or above.¹⁰²

Areas that need improvement- Buildings

- There is no mandate for energy efficiency norms,¹⁰³ and this needs to be remedied.

98 Andhra Pradesh Electricity Regulation Commission – Government of AP, Andhra Pradesh draft regulation order on Renewable Energy Purchase Obligation, 2011-<https://www.recregistryindia.in/pdf/RPO/AndraRECREgulation.pdf>


99 State-wise GDP of India 2010- <http://www.rediff.com/business/slide-show/slide-show-1-indias-top-20-states-by-gdp/20120911.htm>

100 Ministry of New and Renewable Energy , GoI, Status on G.O.s issued by State Governments on mandatory use of solar water heaters/solar buildings & other supportive measures taken on use of solar energy devices/systems, 2011, solar water-heater - <http://solarwaterheater.gov.in/#>

101 Municipal Administration and Urban Development Department, Andhra Pradesh Building Rules 2012 order, Government of Andhra Pradesh - <http://www.ghmc.gov.in/tender%20pdfs/GOMsNo168.pdf>

102 Consultation with SDA - NEDCAP

103 Municipal Administration and Urban Development Department, Andhra Pradesh Building Rules 2012 order, Government of Andhra Pradesh - <http://www.ghmc.gov.in/tender%20pdfs/GOMsNo168.pdf>


Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 TRANSPORT	Renewables	The state has a draft policy for the promotion of biofuels.
	Energy efficiency	NA
	Overarching	The state has a five-year tax exemption policy for electric and hybrid vehicles (EHV) and also imposes additional cess on old transportation vehicles and fines on the vehicles with expired vehicle test certifications. The state is promoting the use of CNG vehicles in prominent cities like Hyderabad. BRT systems are proposed in certain cities, like Visakhapatnam and Vijayawada, and a draft pedestrian policy has been planned for the state.

Areas of achievement - Transport

- Andhra Pradesh has significantly improved the public transport system by increasing the fleet of buses under the state road transport authority by 18% from 2007 to 2009.¹⁰⁴
- The state levies additional cess on non-transport vehicles that have completed 15 years from the date of their registration and transport vehicles that have completed seven years from the date of their registration.¹⁰⁵
- The state promotes the use of CNG in vehicles in its major cities, including the capital city Hyderabad.¹⁰⁶
- A Bus Rapid Transit System (BRTS) is under development in Vijayawada and Visakhapatnam.¹⁰⁷
- Hyderabad has established an Urban Metropolitan Transport Authority (UMTA) for the better monitoring and planning of the transport system in the state. This is a significant step since Hyderabad is a JNNURM city and is also a rapidly growing city, with a population of more than a million.¹⁰⁸

Areas that need improvement - Transport

- Non-motorized transport modes, such as cycle lanes, dedicated walk lanes, etc., need to be developed.¹⁰⁹
- Effective public transport, including vehicles under PPP should be encouraged, thereby reducing the usage of private vehicles

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 AGRICULTURE	Renewables	NA
	Energy efficiency	NA
	Overarching	A good percentage of districts in the state practice the SRI method of rice cultivation. Micro-irrigation techniques are also widely practiced in the state. The tonnage of methane emitted per INR lakh of livestock output in the state is less than the Indian average. The state needs to improve its cropping intensity.

¹⁰⁴ Ministry of Road Transport & Highways, GoI, Ministry of Road Transport year book and performance of SRTUs -2011 - <http://morth.nic.in>

¹⁰⁵ Andhra Pradesh State Transportation Department, Government of Andhra Pradesh, "FIFTH SCHEDULE" (See sub-section (1) of Section 3-B), 2006- http://aptransport.org/pdf_uploads/go-gazet1227943233.pdf

¹⁰⁶ Data referred from Ministry of Petroleum and Natural Gas, GoI.

¹⁰⁷ Ministry of Urban Development, Government of India, JNNURM status report "Implementation status of projects as on Dec 2012-<http://jnnurm.nic.in/state.html>

¹⁰⁸ Unified Metropolitan Transport Authority (UMTA), Hyderabad Metropolitan Development Authority, Government of Andhra Pradesh, Comprehensive Transportation study -2011 - <http://www.hmda.gov.in/umta.html>


¹⁰⁹ THE HINDU, News article, website of leading national newspaper dated 16th April 2012, <http://www.thehindu.com/todays-paper/tp-national/tp-andhrapradesh/article3319104.ece>

Areas of achievement - Agriculture

- Andhra Pradesh has substantially low methane emissions per INR lakh of livestock output (0.50 tonnes) as compared to India's average output (0.72 tonnes).
- The state has implemented the SRI method of rice cultivation in most paddy-growing districts (more than 90%)¹¹⁰, thus, conserving inputs like water and fertilizers and reducing methane emissions, which are significant when paddy is grown using traditional methods.
- The state has significantly reduced the application of nitrogen fertilizer per unit of gross cropped area by 0.72% from 2008 to 2010, thus, reducing nitrogen emissions from soil.
- The state has considerable area under micro-irrigation practices,¹¹¹ such as drip irrigation, which result in tangible benefits of water conservation.

Areas that need improvement - Agriculture

- The state needs to improve its cropping intensity, which is 126.1% as compared to the Indian average of 139%, as on 2007-08.¹¹²

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 FORESTRY	Renewables	NA
	Energy efficiency	NA
	Overarching	The forest policy of Andhra Pradesh mentions forest fires, however, a management plan needs to be developed for the protection of forests from fires. Policy or programmes should be developed for improving fuel-use efficiency and for promoting alternative energy sources.

Areas of achievement - Forestry

- The total forest area cover has increased by 0.72% with respect to the geographical area from 2002 to 2009.¹¹³
- There is an improvement in the forest density by 0.34% from 2002 to 2009.
- The tree cover on private lands has increased by 73.27% from 2002 to 2005 in the state.¹¹⁴
- The growing stock of tree cover, as a percentage of the state's geographical area, has increased to 2.6%.¹¹⁵

Areas that need improvement - Forestry

- Policy or programmes can be developed to improve fuel-use efficiency and to promote alternative energy sources, which will help reduce the burden on forests due to unsustainable harvesting and also reduce the use of fuelwood.¹¹⁶

¹¹⁰ System of Rick Integration, 1980, refer web-site, www.sri-india.net

¹¹¹ Indian Agriculture Statistics Research Institute, data table 3.36, state-wise area coverage under drip-irrigation in India, http://www.iasri.res.in/agridata/08data/chapter3/db2008tb3_36.pdf


¹¹² Central Water Commission of India, Water Resource Information and System Directorate, Water and related statistics, Dec 2010- http://www.cwc.nic.in/ISO_DATA_Bank/W&RelatedStatistics_2010.pdf

¹¹³ Forest Survey of India, Government of India, Indian State of Forest Report 2003 and 2011-http://www.fsi.org.in/sfr_2011.htm

¹¹⁴ Data around tree plantation target for private land and achieved figure is available for years 2002-2005

¹¹⁵ State of Forest Report 2011 of the FSI, GoI, State/UT-wise Tree Cover Estimates-<http://www.fsi.nic.in/sfr2003/forestcover.pdf>

¹¹⁶ Ministry of Forest, Government of Andhra Pradesh, information booklet prepared for fulfillment of the provisions of the right to information act 2005-<http://forest.ap.nic.in/r2ia-infoact.htm>

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 WASTE	Renewables	Andhra Pradesh has achieved the highest waste-to-energy potential in India. The percentage achieved is approximately 35% of its capacity.
	Energy efficiency	NA
	Overarching	Andhra Pradesh's sewage treatment capacity of 37.15% is poor as compared to its waste generation. This can give rise to inefficiency in treated water, health issues, etc. Andhra Pradesh has been proactive in setting up e-waste recycling facilities and, thus, carries the capacity to manage 11,800MT of e-waste. The state has a PPP model for handling MSW and treating sewage.

Areas of achievement - Waste

- The state has achieved 35.09% of its waste-to-energy potential,¹¹⁷ which is the best in India.
- Andhra Pradesh has the capability to recycle 20.6% of the e-waste that it generates.¹¹⁸

Areas that need improvement- Waste

- The state only has one compost plant, in Vijayawada. Considering the amount of waste generated in the state, it needs to commission more plants in other cities.¹¹⁹

¹¹⁷ Ministry of Statistics and Programme Implementation (MoSPI), GoI, Energy Statistics 2012- http://mospi.nic.in/mospi_new/upload/Energy_Statistics_2012_28mar.pdf

¹¹⁸ Central Pollution Control Board, GoI, last visited Dec 2012, E-Waste Registration List- www.cpcb.nic.in

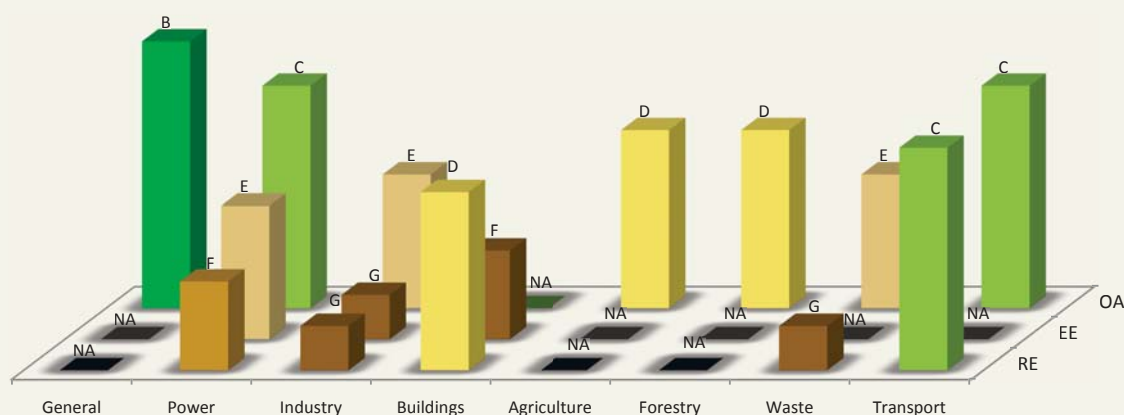
¹¹⁹ Central Pollution Control Board, Reports/schemes of MoUD and MNE, - http://www.cpcb.nic.in/wast/municipalwast/Reports_schemes_of_MoUD_and_MNE.pdf

6.2. Delhi



Sector	Sectoral GDP contribution ¹²⁰ as percentage of state GDP
Power	2%
Transport	4%
Industry	5%
Buildings	7%
Agriculture	1%
Forestry	0%
Waste	Not available


Summary of the state's results



Rating band and colour code	A	B	C	D	E	F	G
Normalized score on a scale from 0 to 100	90 <= 100	75 <= 90	60 <= 75	45 <= 60	30 <= 45	15 <= 30	0 <= 15

¹²⁰ Source: Central Statistical Organisation (as on 1 March 2012). (ON251)

Sectors in detail

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 POWER	Renewables	Renewable energy policies in Delhi are in the initial stages of their implementation. The policy environment has been developed to promote the installation of renewable energy in the power generation sector, but this is still to be implemented on a large scale. As a result, the state is yet to achieve any substantial percentage of its renewable energy potential. Restricted by its renewable energy potential and land limitation issues, the state focuses on the development of solar energy in power generation.
	Energy efficiency	The intervention of the private sector has improved the efficiency in transmission and distribution. On the generation side, an underperforming power plant is considered for close down. The newly constructed 1,000MW-capacity state-owned gas power plant in Bawana region of Delhi is being run below its full capacity as it is still waiting for gas allocation from the MoPNG. DSM measures, such as energy-efficient street lighting, building energy management systems and water pumping measures, need to be proactively adopted.
	Overarching	The state offers partial subsidy to domestic and agriculture consumers, which encourages consumers to adopt energy-efficient measures.

Areas of achievement - Power

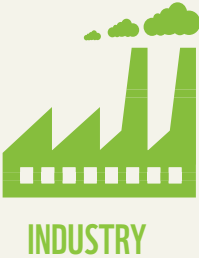
- The state has reduced T&D losses in the power sector since the privatization of the power distribution system. Transmission losses alone have come down from 3.84% in 2002 to 0.83% in 2006-07, which has led to a significant reduction in T&D losses in Delhi.¹²¹
- The state also has modest budget allocation – Rs 20 crores – to promote renewable energy in the state to achieve its untapped renewable energy potential of 129MW.¹²²

Areas that need improvement - Power

- At the generation end, the state needs to develop sustainable plan for its increasing power demand to cater to the developmental needs, primarily service industry, and to meet increasing domestic needs due to a rise in population and improved standards of living.,
- On demand side, the state needs to undertake regulatory reforms for promoting energy efficiency in domestic, municipality and commercial buildings.

¹²¹ Planning commission, GoI, Report on state-wise T&D loss(%), March 2010 - http://planningcommission.nic.in/data/datatable/1705/final_84.pdf

¹²² Government of Delhi, Monthly Progress Report of Plan Expenditure-Annual Plan 2011-12-<http://delhi.gov.in/wps/wcm/connect/4c15ce004a0fd0a4aae8eae4899821f2/DW+March+2012.pdf?MOD=AJPERES&lmod=-1580752628&CACHEID=4c15ce004a0fd0a4aae8eae4899821f2>


Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
	Renewables	Delhi has an appropriate policy scenario for increasing the consumption of renewable energy in industries. However, the state needs to have a robust policy mechanism to promote differentiated policy support for various available RE technologies, including waste-to-energy and solar technology.
	Energy efficiency	The industrial sector in Delhi has improved its energy intensity, with a focus on improving the energy efficiency of industrial processes.
	Overarching	The state does not have a policy environment to support the redesign of industrial products. The state offers partial subsidies in various industrial sectors. Delhi also levies carbon taxes and cess ¹²³ from energy-intensive industries.

Areas of achievement - Industry

- Industrial units in Delhi have reduced their energy intensity; however, there is scope for further improvement.
- The industrial policies in Delhi want to encourage the growth of the service sector in the state as compared to energy-intensive industries. To check the continuance of inefficient industries, Delhi has imposed differentiated tariffs for industries and also proposes to impose carbon taxes and green cess on the consumption of fossil fuels or electricity generated through fossil fuels.¹²⁴

Areas that need improvement - Industry

- Delhi has over 3,000 factories¹²⁵ for chemical manufacturing, electrical equipments, basic metals, apparel, etc.¹²⁶ The state should focus on increasing the use of renewable energy in the industrial sector, and this needs to be incorporated in the state policy for industries.
- The state needs to develop an industrial policy to promote energy-efficiency standards in the sector and to improve eco-friendly product design.

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
	Renewables	The state has mandated the usage of solar water heaters (SWH), but does not have an initiative to promote solar photovoltaic rooftop systems.
	Energy efficiency	The state has not started work on the ECBC. Delhi has not mandated the public procurement of BEE Star-rated appliances listed under both the voluntary and mandatory schemes of the Standards and Labeling Programme. The Delhi government has identified a few buildings for retrofitting; but the scope of retrofitting is limited to the replacement of CFLs with LEDs. Delhi must come up with a comprehensive policy stating the percentage of buildings that will be retrofitted per year.
	Overarching	NA

¹²³ The Times of India, News article dated 13 Jan 2007, http://articles.timesofindia.indiatimes.com/2007-01-13/delhi/27887786_1_new-industrial-policy-power-and-water-pollution

¹²⁴ The Times of India, News article dated 13 Jan 2007, http://articles.timesofindia.indiatimes.com/2007-01-13/delhi/27887786_1_new-industrial-policy-power-and-water-pollution

¹²⁵ Ministry of Statistics and Project Implementation (MoSPI), GoI, statement on relative importance of states – All industries, GoI- http://mospi.nic.in/mospi_new/upload/asi/Section_9_Statements_15-16_18jan11.pdf


¹²⁶ Ministry of Statistics and Project Implementation (MoSPI), GoI statement on Regional Distribution of Industries, MoSPI, GoI -http://mospi.nic.in/mospi_new/upload/asi/Section_10_Statements_17-18_18jan11.pdf

Areas of achievement - Buildings

- Delhi has mandated the use of solar water heating systems.¹²⁷
- The state has taken initiatives for energy conservation in old government buildings.

Areas that need improvement - Buildings

- Delhi needs to mandate/incentive the usage of SPV rooftops.
- The extent of the energy conservation measures in Delhi is limited to replacing CFLs with LEDs.¹²⁸ The state needs to come up with a more comprehensive plan.
- Delhi has not taken any initiative for ECBC implementation,¹²⁹ and needs to start work on adapting and notifying the code, as per its climatic conditions.
- There is no mandate for the public procurement of Star-rated BEE appliances (e.g. minimum 3-Star or above).¹²⁰ The state needs to take initiative in this area.

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 TRANSPORT	Renewables	Delhi follows the central mandate of blending ethanol with petrol
	Energy efficiency	NA
	Overarching	The state government provides incentives for the use of electric and hybrid vehicles. CNG vehicles have already been introduced in the state. The state also has a policy and imposes strict fines on vehicles with expired vehicle test certificates. The BRTS has been implemented in many areas of Delhi and the MRTS (Delhi Metro) is being expanded across the National Capital Region (NCR).

Areas of achievement - Transport

- Delhi has the highest number of public buses per lakh of population under the state road transport authority.¹³¹
- Delhi was the pioneer state to introduce CNG as a vehicle fuel in the country and still is a leader in terms of the number of CNG vehicles on the road.¹³²
- Delhi imposes a strict fine for non-compliance with pollution testing norms.¹³³
- Delhi has been a pioneer state in the country in introducing both MRT and BRT systems for easy public transport. The MRTS is growing to the nearby states, ensuring very good connectivity for intra- and interstate transportation.¹³⁴
- The government of Delhi provides a 15% subsidy on the purchase of the Reva car in New Delhi, an exemption from VAT up to 12.5% and a refund of road taxes and registration charges up to 2%.¹³⁵
- Delhi imposes an environment cess of 40 paisa per litre of diesel sold in the city to create an Air Ambience Fund, which finances its pollution control measures.¹³⁶

127 Government of Delhi, Solar Water heating system scheme-<http://www.delhi.gov.in/wps/wcm/connect/environment/Environment/Home/Climate+Change/Energy+Conservation/Solar+Water+Heating>

128 Consultation with SDA – Delhi Transco Limited

129 <http://ibec.in/state/DelhiNCT>

130 Consultation with SDA – Delhi Transco Limited

131 Ministry of road transport & Highways, GOI. Year book and performance of SRTUs 2011 - <http://morth.nic.in/showfile.asp?id=947>

132 Ministry of Petroleum and Natural Gas, Govt. of India.

133 Transport Department, Government of Delhi, Frequently Asked Questions (FAQs) on Pollution Under Control Certificate, last visited Dec 2012- http://www.delhi.gov.in/wps/wcm/connect/doi_transport/Transport/Home/Pollution+Control/P.U.C.+Certificate


134 National Institute of Urban Affairs, Government of India, Urban Transport Initiatives in India: Best Practices in PPP) <http://www.niua.org/>), Planning Commission report on Urban Development chapter 18, 2011 , http://planningcommission.nic.in/plans/mta/11th_mta/chapterwise/chap18_urban.pdf , Economic Survey of India, 2008-09chapter 9(<http://indiabudget.nic.in/es2008-09/chapt2009/chap913.pdf>)

135 Business Standard, News article, 5th August 2012- <http://www.business-standard.com/india/news/delhi-to-consider-incentivessalehybrid-car/40780/on>

136 Center for Science & Environment, City Action Air Quality & Mobility Kolkatta, 2011- <http://www.shaktifoundation.in/cms/uploadedImages/kolkata%20report.pdf>

Areas that need improvement - Transport

- Delhi needs to enhance its framework for promoting non-motorized transport in the state. This has been identified in the transport policy.¹³⁷
- Delhi is in a process of framing a UMTA and needs to create a city-based agency for better monitoring of transport-related issues.


Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 AGRICULTURE	Renewables	NA
	Energy efficiency	NA
	Overarching	The cropping intensity improved in 2007-08. There is a marked increase in the use of nitrogen fertilizers per unit of gross cropped area.

Areas of achievement - Agriculture

- Delhi has very low methane emissions per INR lakh of livestock output (0.28 tonnes) as compared to India's average output (0.72 tonnes).¹³⁸
- Delhi registered a very high cropping intensity figure for 2007-08, i.e., 189% as compared to India's average of 139% in the same year.¹³⁹

Areas that need improvement - Agriculture

- Delhi showed an increase of 191% in the use of nitrogenous fertilizers during 2008-2010,¹⁴⁰ thereby contributing significantly to nitrogen emissions. This trend needs to be checked.

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 FORESTRY	Renewables	NA
	Energy efficiency	NA
	Overarching	The total forest area cover has increased from 170km ² to 176km ² , i.e., 0.42% with respect to its geographical area, from 2002 to 2009. The state's forest density needs to be improved. Cross-sectoral forestry programmes could be developed for increasing tree plantations on private lands.

¹³⁷ Tackling Urban Transport – Operating Plan for Delhi, Government of Delhi-<http://delhigovt.nic.in/trans-pol.asp>

¹³⁸ Methane enteric fermentation from the paper "Spatial pattern of methane emissions from Indian livestock" by Abha Chhabra*, K. R. Manjunath, Sushma Panigrahy and J. S. Parihar; Remote Sensing Applications Area, Space Applications Centre, Indian Space Research Organization, Ahmedabad 380 015, India

2. Ministry of Statistics and Programme Implementation, Govt. of India, Total livestock output

¹³⁹ Central Institute of Agricultural Engineering, Selected state-wise area coverage under drip-irrigation in India, Agricultural Engineering Data Book, Jan. 2008 http://www.iasri.res.in/agridata/08data/chapter3/db2008tb3_36.pdf


¹⁴⁰ The Fertiliser Association of India, Fertiliser Statistics 2009-10-www.faidelhi.org/general/Publication%20Price%20List.pdf

Areas of achievement - Forestry

- The total forest area cover has increased by 0.42%, with respect to its geographical area, from 2002 to 2009.¹⁴¹
- The growing stock of tree cover, as a percentage of state's geographical area, has increased by 8.07%.¹⁴²
- Forest density in the state has improved by 0.13% during 2002-2009.¹⁴³

Areas that need improvement - Forestry

- The forest density needs to be improved.¹⁴⁴ Effective cross-sectoral forestry programmes could be developed for increasing the tree plantations on private lands.

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 WASTE	Renewables	The state has not harnessed any waste-to-energy. There are a couple of plants that have been setup for the same, but poor waste collection makes it infeasible to operate these plants.
	Energy efficiency	NA
	Overarching	Delhi's sewage treatment capacity is also not good, compared to its generation. It treats only 61.32% of the waste. This will give rise to water inefficiency and health issues. Delhi has no e-waste recycling facilities. Being the capital of India and boasting affluent lifestyles, e-waste is definitely going to increase exponentially.

Areas of achievement - Waste

- Delhi has the capacity to treat 61% of the sewage it generates.¹⁴⁵

Areas that need improvement - Waste

- Delhi has still not utilized its waste-to-energy potential.¹⁴⁶ Although some plants exist, they are not in operation due to poor waste collection. These issues need to be resolved to make sure that Delhi achieves its W2E potential.
- Delhi does not have any e-waste recycling facilities.¹⁴⁷ With the changing lifestyle of people in the state and the increasing demand for electronic gadgets, it is immensely important that the capital of the country set up e-waste recycling facilities.

¹⁴¹ Forest Survey of India, Government of India, Indian State of Forest Report 2003 and 2011- http://www.fsi.org.in/sfr_2011.htm

¹⁴² State of Forest Report 2011 of the FSI, GoI, State/UT-wise Tree Cover Estimates, www.fsi.nic.in/sfr2003/forestcover.pdf

¹⁴³ State of Forest Report 2011 of the FSI, GoI, State/UT-wise Tree Cover Estimates, www.fsi.nic.in/sfr2003/forestcover.pdf

¹⁴⁴ State of Forest Report 2011 of the FSI, GoI, State/UT-wise Tree Cover Estimates, www.fsi.nic.in/sfr2003/forestcover.pdf

¹⁴⁵ Central Pollution Control Board, GoI, Report on schemes of MoUD and MNE, last accessed on Dec 2012, http://www.cpcb.nic.in/wast/municipal-wast/Reports_schemes_of_MoUD_and_MNE.pdf

¹⁴⁶ MoSPI, GoI, Energy Statistics Report 2012- http://mospi.nic.in/mospi_new/upload/Energy_Statistics_2012_28mar.pdf

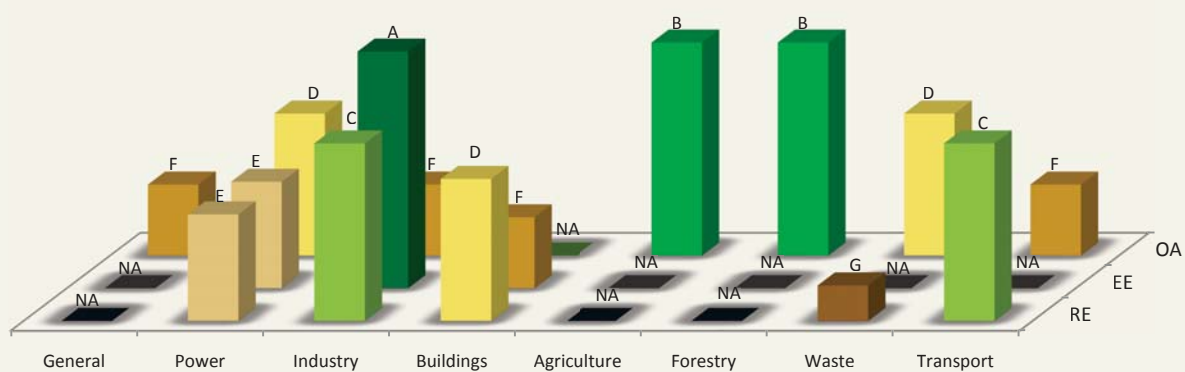
¹⁴⁷ Central Pollution Control Board, GoI, E-Waste Registered Projects, last accessed on Dec 2012, <http://www.cpcb.nic.in/E-waste%20Registration%20List.PDF>

6.3. Himachal Pradesh



Sector	Sectoral GDP contribution ¹⁴⁸ as percentage of state GDP
Power	8%
Transport	2%
Industry	16%
Buildings	16%
Agriculture	16%
Forestry	6%
Waste	Not available


Summary of the state's results



Rating band and colour code	A	B	C	D	E	F	G
Normalized score on a scale from 0 to 100	90 <= 100	75 <= 90	60 <= 75	45 <= 60	30 <= 45	15 <= 30	0 <= 15

¹⁴⁸ Source: Central Statistical Organisation (as on 1 March 2012). (ON251)

Sectors in detail


Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 POWER	Renewables	Although the state has achieved high hydro potential, it is yet to harness its overall renewable energy potential. The state has policy focus on biofuels and hydro energy. Himachal Pradesh offers attractive renewable energy tariff and infrastructure support to promote renewable energy.
	Energy efficiency	The power sector in Himachal Pradesh is largely dependent on renewable energy power generation. The state is exploring advanced technologies like hot spring power generation and geothermal energy generation. The state has improved the existing generation facilities, along with the T&D infrastructure and operations.
	Overarching	Himachal Pradesh offers partial subsidy to power distribution categories, such as agriculture and domestic consumers, which affects the adoption of low-carbon technologies. The budget allocation for non-conventional sources of energy generation is reasonable, however, considering its high potential, it may be enhanced in subsequent years.

Areas of achievement - Power

- Himachal Pradesh offers one of the most attractive renewable energy tariffs and offers infrastructure support by extending preferential grid access for RE, as is the case with almost every state.¹⁴⁹
- The state has one of the better performing power generators, with low-specific emissions intensity.¹⁵⁰

Areas that need improvement - Power

- The state needs to utilize its renewable energy potential and scale up power generation from renewable energy sources. Currently, the state has been able to harness 16% of its renewable energy potential.¹⁵¹
- The policy framework needs to support other renewable energy sources, such as biofuels, in addition to developing its hydro energy policies.

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 INDUSTRY	Renewables	The energy consumption from renewable energy sources has not decreased in the industry sector in the state. The state has comprehensive policy provisions to increase the use of renewable energy through various incentives, like regulatory clearances, attractive tariffs, expansion of existing capacities, etc. ¹⁵²
	Energy efficiency	The state has reduced its energy intensity between 2004-05 and 2007-08, but it still lags behind other states in the overall national context.
	Overarching	The state does not have a robust overarching policy scenario. The industrial policy does not talk about eco-friendly product design or the reduction in subsidy and imposition of carbon taxes on energy-intensive industries.

149 Himachal Pradesh Electricity Regulatory Commission, Government of Himachal Pradesh, HP State Tariff Order, 2011-<http://www.hperc.org/tariff.html>

150 Central Electricity Agency, GoI, Baseline Carbon Dioxide Emissions From Power Sector, User version guide 7- http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm

151 Central Electricity Agency, GoI, Baseline Carbon Dioxide Emissions From Power Sector, User version guide 7- http://www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm


152 Himachal Pradesh State electricity Regulatory Commission, promotion scheme for electricity generation through hydro energy, July 2012- www.hperc.org/rules/dpromo_gen_hydro12.doc

Areas of achievement - Industry

- Himachal Pradesh has industrial policies that are comprehensive, ambitious and cover all the renewable sources with potential in the state.
- The state has a balanced approach toward improving efficiency of manufacturing processes and promoting new energy efficiency technologies.¹⁵³

Areas that need improvement - Industry

- The state needs to formulate a comprehensive overarching policy, especially for eco-friendly product design.
- The state also needs to create incentives to reduce emissions or must impose penalty or carbon tax for emissions from industries.

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 BUILDINGS	Renewables	Himachal Pradesh is the first state in the country to introduce solar passive building technology for the design and construction of government and semi-government buildings in the state. Solar passive building technology has been made mandatory in Himachal Pradesh. All departments, including corporations, boards, universities and the Himachal Pradesh Housing Board and the public works department must incorporate features of solar passive technology in their building designs at places above 2,000msl [vide H.P. Govt. Notification No.STV (S&T) A(5)1/93 Dated 18 August 2000].
	Energy efficiency	The state has no policy for the public procurement of BEE Star- labelled voluntary and mandatory scheme electrical appliances. The State has not yet taken any initiative or framed a policy for implementing energy conservation measures and the retrofitting of old buildings. The state also needs to mandate energy audits of buildings.
	Overarching	NA

Areas of achievement - Buildings


- Himachal Pradesh was the first state in the country to introduce and mandate the use of solar passive building technology for the design and construction of government and semi-government buildings.¹⁵⁴

Areas that need improvement - Buildings

- The state needs to formulate a policy for the public procurement for BEE Star-labelled voluntary and mandatory scheme electrical appliances.
- The state needs to mandate energy audits of buildings.

¹⁵³ Department of industries, Government of Himachal Pradesh, New Industrial Policy 2004- <http://himachal.nic.in/industry/indpol99.htm>

¹⁵⁴ MNRE, GoI Status on G.O.s issued by State Governments on mandatory use of solar water heaters/solar buildings & other supportive measures taken on use of solar energy devices/systems, 2011, - [http://www.solarwaterheater.gov.in/phpdsurl5/speakers/userfiles/file/Status%20on%20GOs%20issued%20by%20state%20govts\(20\).pdf](http://www.solarwaterheater.gov.in/phpdsurl5/speakers/userfiles/file/Status%20on%20GOs%20issued%20by%20state%20govts(20).pdf)


Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 TRANSPORT	Renewables	Himachal Pradesh does not have any policy for biofuels. However, jatropha is being cultivated.
	Energy efficiency	NA
	Overarching	Himachal Pradesh does not have any programme for the implementation of CNG/LPG vehicles. There is no policy for the implementation of NMT in the state. However, the state has a transport policy, and a penalty exists for driving a vehicle with an expired vehicle test certificate.

Areas of achievement - Transport

- Himachal Pradesh has significantly increased the number of buses under the state road transport authority to cater to the rising public transportation demands.¹⁵⁵
- Himachal Pradesh imposes a very strict fine for non-compliance with pollution testing norms.¹⁵⁶
- Shimla, the capital of Himachal Pradesh, is also a thriving tourist destination and attracts a lot of traffic. Vehicles that bear registration numbers of states other than Himachal Pradesh need to pay a 'green tax'.¹⁵⁷

Areas that need improvement - Transport

- Himachal Pradesh does not have a policy/programme for the introduction of CNG vehicles in the state. The use of cleaner fuels may be explored in terms of feasibility.
- A significant amount of work is required to provide a comprehensive system of non-motorized transport, which gains more importance since the state is a tourist hub.

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 AGRICULTURE	Renewables	NA
	Energy efficiency	NA
	Overarching	The state has achieved significant decrease in nitrogenous fertilizer usage and has low methane emissions per INR lakh of livestock output. Also, 50% of the paddy-growing districts practice the SRI method. The state has also registered impressive cropping intensity figures of 179% as compared to India's average of 139%. The state needs to strengthen the application of water conservation practices, such as micro-irrigation.

¹⁵⁵ Review of the Performance of State Road Transport Undertakings (SRTUs) (Passenger Services for April, 2011 – March, 2012), Ministry of Road Transport - <http://morth.nic.in/index.asp?lang=1>

¹⁵⁶ Department of Transport, Government of Himachal Pradesh, Offences, Penalties & Punishment, last accessed Dec 2012, <http://admis.hp.nic.in/transport/Penalties.aspx>


¹⁵⁷ Money Control, News article in moneycontrol.org dated Feb 13 2012- http://www.moneycontrol.com/news/wire-news/green-taxoutside-vehiclesshimla_667065.html

Areas of achievement - Agriculture

- Himachal Pradesh has low methane emissions per INR lakh of livestock output (0.61 tonnes) as compared to the national average output (0.72 tonnes).¹⁵⁸
- Almost 50% of the paddy-growing districts have implemented the SRI method¹⁵⁹, thus, conserving resources like water and fertilizers and reducing methane emissions, which are significantly higher in traditional methods involving standing water.
- The state demonstrated substantial decrease in nitrogenous fertilizer usage from 2008 to 2010.¹⁶⁰
- The state registered an impressive cropping intensity figure of 179% in 2007-08, surpassing the national average figure of 139% in the same year.¹⁶¹

Areas that need improvement - Agriculture

- Himachal Pradesh needs to strengthen policies for water conservation practices, such as rainwater harvesting in agricultural ponds and micro-irrigation.¹⁶²

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
	Renewables	NA
	Energy efficiency	NA
	Overarching	The state has a good forest policy and covers all the major and minor aspects of forestry. The total forest area cover has increased from 14,353km ² to 14,670km ² , i.e., 0.59%, with respect to the geographical area, from 2002 to 2009. There is also a healthy improvement in the forest density, i.e., 0.34% between 2002 and 2009.

Areas of achievement – Forestry

- The total forest area cover has increased by 0.59%, with respect to the geographical area of the state, from 2002 to 2009.¹⁶³
- There is a healthy improvement in the forest density, i.e., 0.34% between 2002 and 2009.¹⁶⁴
- Himachal Pradesh Forest Sector Policy and Strategy, 2005, addresses concerns such as fuel-use efficiency and alternative fuel sources and the protection of forests from forest fires.¹⁶⁵

Areas that need improvement - Forestry

- The state should improve the percentage of the growing stock of tree cover, with respect to the total geographic area, which is currently 1.12%.¹⁶⁶

158 1. Methane enteric fermentation from the paper "Spatial pattern of methane emissions from Indian livestock" by Abha Chhabra*, K. R. Manjunath, Sushma Panigrahy and J. S. Parihar; Remote Sensing Applications Area, Space Applications Centre, Indian Space Research Organization, Ahmedabad 380 015, India

2. Ministry of Statistics and Programme Implementation, Govt. of India), Total livestock output, last accessed on 02 Nov 2012-http://mospi.nic.in/mospi_new/upload/Manual%20on%20Animal%20Husbandry%20Statistics.pdf

159 www.sri-india.net

160 The Fertiliser Association of India, Fertiliser Statistics 2009-10- <http://www.faidelhi.org/>

161 Central Water Commission, GoI, Water and related statistics, 2010 -http://www.cwc.nic.in/ISO_DATA_Bank/W&RelatedStatistics_2010.pdf


162 Indian Agriculture Statistics Research Institute, data table 3.36, state-wise area coverage under drip-irrigation in India- http://www.iasri.res.in/agridata/08data/chapter3/db2008tb3_36.pdf

163 Forest Survey of India, Government of India, Indian State of Forest Report 2003 and 2011 - http://www.fsi.org.in/sfr_2011.htm

164 Forest Survey of India, Government of India, Indian State of Forest Report 2003 and 2011 - http://www.fsi.org.in/sfr_2011.htm

165 Department Of Forest, Government Of Himachal Pradesh, HP Forest Sector Policy & Strategy, 2005-http://hpforest.nic.in/HP_Forest_Sector_Policy_title.pdf

166 Department of Forest, Government of India, Chapter 2, Forest Survey Report of India 2011-<http://www.fsi.nic.in/sfr2003/forestcover.pdf>

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 WASTE	Renewables	Himachal Pradesh does not have any significant potential for W2E, according to the MoSPI report <i>Energy Statistics 2012</i> .
	Energy efficiency	NA
	Overarching	Himachal Pradesh is the only state in India that has a higher sewage treatment capacity than the state's waste generation. Although, not a very large producer of e-waste, Himachal Pradesh still needs e-waste recycling facilities and, currently, it has none.

Areas of achievement - Waste

- Himachal Pradesh is the only state in India that has a higher sewage treatment capacity than waste generation, i.e., 123% as compared to its generation.¹⁶⁷

Areas that need improvement - Waste

- Himachal Pradesh has no e-waste recycling facilities. The state needs to plan in this line for the future.¹⁶⁸

¹⁶⁷ CPCB, GoI, Status of water supply, wastewater generation and treatment in class-i cities & class-ii towns of India -2009-http://www.cpcb.nic.in/upload/NewItems/NewItem_153_Foreword.pdf

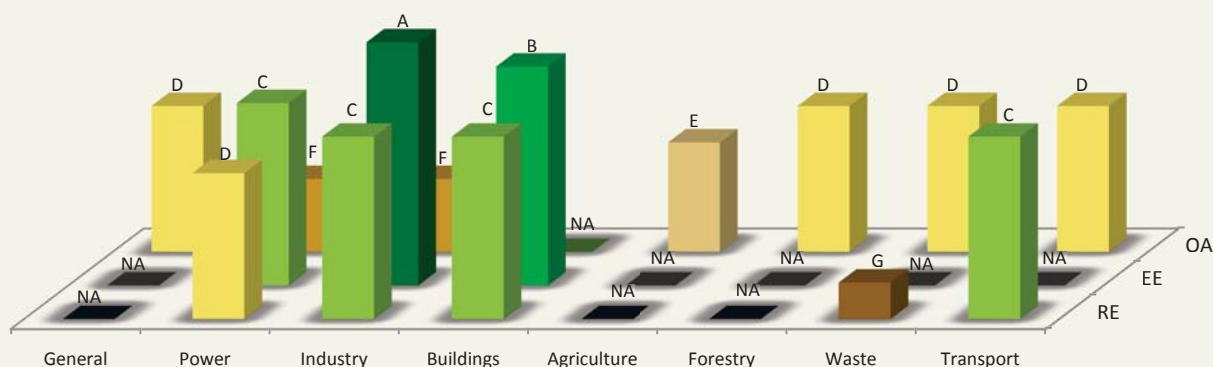
¹⁶⁸ CPCB, GoI, E-Waste project registration, last accessed on Dec 2012, <http://www.cpcb.nic.in/E-waste%20Registration%20List.PDF>

6.4. Rajasthan



Sector	Sectoral GDP contribution ¹⁶⁹ as percentage of state GDP
Power	4%
Transport	3%
Industry	14%
Buildings	10%
Agriculture	24%
Forestry	3%
Waste	Not available


Summary of the state's results



Rating band and colour code	A	B	C	D	E	F	G
Normalized score on a scale from 0 to 100	90 <= 100	75 <= 90	60 <= 75	45 <= 60	30 <= 45	15 <= 30	0 <= 15

¹⁶⁹ Source: Central Statistical Organisation (as on 1 March 2012). (ON251)

Sectors in detail

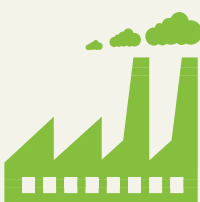
Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 POWER	Renewables	The state has wind and solar energy potential and needs to strengthen the policy environment to accelerate differentiated policy support to various technologies. The state needs to offer better tariff for non-solar renewable energy.
	Energy efficiency	The state is working toward improving the energy efficiency of its power sector operations. However, it needs to improve its specific emissions from power generation by adopting advanced thermal technologies and increasing the share of renewable energy in the power generation mix.
	Overarching	The overarching scenario in power sector needs to be improved by increasing the budget allocation for the development of non-conventional sources of energy generation.

Areas of achievement - Power

- Rajasthan has huge wind energy potential, of over 5,000MW, as well as high solar irradiation. The state has been working aggressively on its solar energy policy, with support from the centre. The government of Rajasthan offers incentives like exemption from electricity duty, grants, supply of water for generating electricity in solar thermal power plants and promotion of solar parks and SEZs.¹⁷⁰
- In the energy efficiency sector, the state has adopted a balanced approach toward improving energy-efficiency standards in the existing power generation facility and transmission and distribution systems.¹⁷¹
- The state has immediate plans to adopt advanced thermal combustion technology. A new 1,200MW-power plant, Kalisindh Thermal Power Plant, is coming up in the district of Jhalawar.¹⁷²

Areas that need improvement- Power

- The state needs to offer attractive tariff for renewable energy sources other than solar energy. At present, technology viability costs for various renewable energy sources in the state are high.
- The GHG emissions intensity for power generation in the state is high. Measures need to be taken to check this.

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 INDUSTRY	Renewables	State policies need to promote renewable energy consumption in industries.
	Energy efficiency	The state has shown exceptional performance in industrial energy efficiency, with comprehensive policy measures to improve the development of the overall sector.
	Overarching	The overarching scenario needs to be improved in the state, with appropriate incentives and penalty mechanisms.

¹⁷⁰ Ministry of New and Renewable Energy (MNRE), GoI, Rajasthan Solar Policy-2011- mnre.gov.in/file.../Rajasthan%20Solar%20Policy%202011.pdf

¹⁷¹ Central Electricity Authority, GoI Database on state-wise Transmission & Distribution (T&D) losses, 2010, Planning Commission-http://planning-commission.nic.in/data/datatable/1705/final_84.pdf


¹⁷² Rajasthan Rajya Vidyut Utpadan Nigam Ltd. Government of Rajasthan, Installed project list, last accessed Dec 2012- <http://www.rvunl.com/Kalisindh%20Thermal%20Power%20Project.php>

Areas of achievement - Industry

- The state has been highly successful in improving the low-carbon scenario in the industrial sector. This is highlighted by the reduction in SGDP emissions intensity and the overall low-emission benchmark set by the state.
- The state has comprehensive and ambitious policies that cover all identified renewable sources with potential in the state.
- The state has decreased its overall energy intensity by 21% since 2004-05 and promotes industrial energy efficiency standards in the state.¹⁷³

Areas that need improvement - Industry

- The overarching scenario in the state needs to be strengthened with sufficient institutional support and penalty mechanisms to check increasing emissions in industrial sector.

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 BUILDINGS	Renewables	Rajasthan has mandated the usage of solar water heaters. The state has also proposed incentives for grid-connected solar photovoltaic rooftop systems. The state is yet to come up with a policy for off-grid and decentralized solar power systems.
	Energy efficiency	Rajasthan is the only state in India, which has mandated the public procurement of minimum BEE 3-Star rated electrical appliances under both the voluntary and mandatory schemes. The state has taken initiatives for energy conservation measures and retrofitting of old buildings but not framed any policy for the same.
	Overarching	NA

Areas of achievement - Building

- Rajasthan is the first state in India to mandate the ECBC.¹⁷⁴
- The state has mandated the usage of solar water heaters.¹⁷⁵
- The state has proposed grid-connected solar photovoltaic rooftop systems.¹⁷⁶
- The state has mandated the public procurement of BEE Star-labelled appliances, for both voluntary and mandatory scheme electrical appliances.¹⁷⁷
- The state has mandated an energy audit of all buildings with a load of 100kVA and above.¹⁷⁸

Areas that need improvement- Building

- Rajasthan needs to promote green buildings.

¹⁷³ Central Statistics Office (CSO)


¹⁷⁴ Energy Department, Government of Rajasthan, Energy Conservation Building (ECB) directives, Order number: F20 (6) Energy/98/Pt /ECBC/, website-IBEC- a joint initiative by Shakti Sustainable Energy Foundation- <http://ibecc.in/sites/default/files/sites/default/files/codes/ECB%20Directives%202011.pdf>

¹⁷⁵ Status on G.O.s issued by State Governments on mandatory use of solar water heaters/solar buildings & other supportive measures taken on use of solar energy devices/system, [http://www.solarwaterheater.gov.in/phpdsurl5/speakers/userfiles/file/Status%20on%20GOs%20issued%20by%20state%20govts\(20\).pdf](http://www.solarwaterheater.gov.in/phpdsurl5/speakers/userfiles/file/Status%20on%20GOs%20issued%20by%20state%20govts(20).pdf)

¹⁷⁶ Rajasthan Renewable Energy Corporation Limited, State Government of Rajasthan, Rajasthan Solar Policy 2011, - http://mnre.gov.in/file-manager/UserFiles/guidelines_sbd_tariff_gridconnected_res/Rajasthan%20Solar%20Policy%202011.pdf

¹⁷⁷ Consultation with SDA – RRECL

¹⁷⁸ Consultation with SDA – RRECL


Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 TRANSPORT	Renewables	NA
	Energy efficiency	NA
	Overarching	The state has exempted tax on the use of electric vehicles. It imposes tax on the usage of old vehicles. There exists a penalty mechanism under the policy for driving a vehicle with an expired vehicle test certificate. BRT systems are under construction, and a UMTA has been established in Jaipur. Programmes for NMT are also proposed for Jaipur. There are no programmes for the implementation of CNG/LPG vehicles in the state.

Areas of achievement - Transport

- Rajasthan imposes strict fines for non-compliance with pollution testing norms.¹⁷⁹
- Work on a MRTS is nearing completion in its capital city Jaipur. A BRTS Project (Package IB) is already completed.¹⁸⁰ and there are few other BRTS projects which are under different phases of implementation.¹⁸¹ This is a bonus for the city, since it is India's major tourist spot.¹⁸²
- A UMTA has been established in Jaipur.¹⁸³

Areas that need improvement - Transport

- The state needs to improve the non-motorized transport system, which gains more importance since the state is a tourist hub.
- The state needs to formulate official programmes to introduce the use of alternative fuels, such as CNG and LPG.

Sector	Policy enabler area	Overall assessment (description of policy scenario based on the evaluation of indicators)
 AGRICULTURE	Renewables	NA
	Energy efficiency	NA
	Overarching	The state has slightly higher methane emissions per INR lakh of its livestock output as compared to India's average. This means that the state should look into increasing the productivity of its livestock. The use of nitrogen fertilizers has also increased in the state. Micro-irrigation techniques need to be widely introduced in the state.

179 Ministry of Transport, Government of Rajasthan, Status of traffic violations, penalties list 2010- <http://www.transport.rajasthan.gov.in/PDF%20Files/Offence.pdf>

180 List of completed projects in Rajasthan under the JNNURM, 2012, GoI- <http://jnnurm.nic.in/wp-content/uploads/2012/06/RAJASTHAN1.pdf>

181 Project details document in Bus Rapid Transit Service (BRTS) in Jaipur, Jaipur Development Authority- <http://jaipurjda.org/page.aspx?pid=69>

182 Ministry of Urban Development, Government of India- JNNURM status report "Implementation status of projects as on Dec 2012., approved under JNNURM"- <http://jnnurm.nic.in/state.html>


183 Report by Standing Committee on urban development (2009-2010), MINISTRY OF URBAN DEVELOPMENT, GoI <http://re.indiaenvironmentportal.org.in/files/4thReportfinal.pdf>

Areas of achievement - Agriculture

- Rajasthan, despite having a high coverage of arid land, has achieved a cropping intensity of 130% in 2007-08, however it still lags behind the India average figure of 139% in the same year.¹⁸⁴

Areas that need improvement - Agriculture

- Rajasthan contributes 0.74 tonnes of methane emissions per INR lakh of its livestock output.¹⁸⁵ This means that the state should look at increasing the productivity of livestock, especially milch animals, which have higher emission factors of enteric fermentation as compared to other animals. The state may also consider changing the feed given to the livestock, since this factor can drastically impact the methane emissions from the animals.¹⁸⁶
- Some percentage of the net irrigated area in Rajasthan is under micro-irrigation.¹⁸⁷ However, it should concentrate more on such water conservation techniques.
- There has been an increase in the use of nitrogen fertilizers per unit of gross cropped area from 2008 to 2010.¹⁸⁸

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 FORESTRY	Renewables	NA
	Energy efficiency	NA
	Overarching	The state should develop programmes/policies for improving forest area, forest cover and forest density. Tree cover in the state is about the same as the national average.

Areas of achievement - Forestry

- Effective cross-sectoral forestry programmes developed to increase tree plantations on private lands resulted tree plant count to increase to 303.49 lacs which is 101.16% of its target for the duration 2002 to 2005.¹⁸⁹

Areas that need improvement - Forestry

- The total forest cover has decreased by 0.08%, with respect to the geographical area, from 2002 to 2009.¹⁹⁰
- The forest density has improved in the state by only 0.02%. This area needs focus.

184 1. Methane enteric fermentation from the paper "Spatial pattern of methane emissions from Indian livestock" by Abha Chhabra*, K. R. Manjunath, Sushma Panigrahy and J. S. Parihar; Remote Sensing Applications Area, Space Applications Centre, Indian Space Research Organization, Ahmedabad 380 015, India
2. 2012 Ministry of Statistics and Programme Implementation, Govt. of India), Total livestock output.

185 Central Water Commission, Water and related Statistics, Dec 2010, Water Resource Information and System Directorate- http://www.cwc.nic.in/ISO_DATA_Bank/W&RelatedStatistics_2010.pdf


186 KARUNANITHI E., SIROHI SMITA and SIROHI, S.K. (2010). Indian Dairy Sector and Climate Change: baseline Scenario of methane emissions. LAP Lambert Academic Publishing, 76p

187 Indian Agriculture Statistics Research Institute, data table 3.36, state-wise area coverage under drip-irrigation in India-http://www.iasri.res.in/agridata/08data/chapter3/db2008tb3_36.pdf

188 Forest Survey of India, Government of India, Indian State of Forest Report 2003 and 2011- http://www.fsi.org.in/sfr_2011.htm

189 Data around tree plantation target for private land and achieved figure is available for years 2002-2005.

190 Forest Survey of India, Government of India, Indian State of Forest Report 2003 and 2011- http://www.fsi.org.in/sfr_2011.htm

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 WASTE	Renewables	Rajasthan has not been able to tap energy from waste despite having the potential for it. In a state like Rajasthan, which has ample sunlight and extreme temperature variations, energy demand is a constant. Therefore, it is of utmost importance for the state to utilize its W2E potential.
	Energy efficiency	NA
	Overarching	The state has an e-waste recycling capacity of only 10.58% as compared to its generation.
Areas of achievement - Waste <ul style="list-style-type: none"> ■ Rajasthan is one of the few states that has e-waste recycling facilities, although the e-waste recycling capacity is only 10.58% of the e-waste generated.¹⁹¹ Areas that need improvement - Waste <ul style="list-style-type: none"> ■ The state still needs to harness its W2E potential.¹⁹² ■ The state has been able to treat only 3.91% of its sewage generation. This is an area that needs drastic improvement.¹⁹³ 		

¹⁹¹ Central Pollution Control Board, GoI, E-Waste Registration List, www.cpcb.nic.in

¹⁹² MOSPI, GoI, ENERGY STATISTICS 2012, http://mospi.nic.in/mospi_new/upload/Energy_Statistics_2012_28mar.pdf

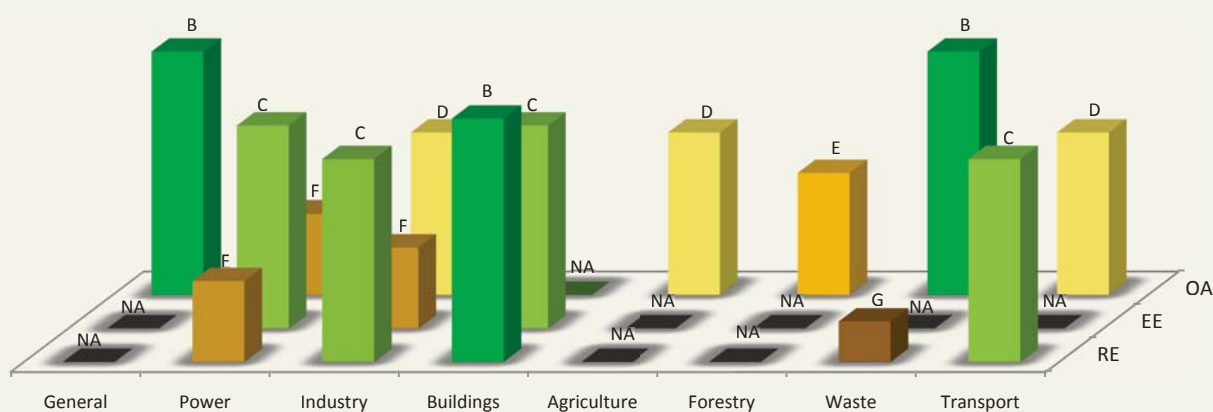
¹⁹³ CPCB, India, Status of water supply, wastewater Generation and treatment in class-i cities & class-ii towns of india, 2009-10, http://www.cpcb.nic.in/upload/NewItems/NewItem_153_Foreword.pdf

6.5. Gujarat



Sector	Sectoral GDP Contribution ¹⁹⁴ as percentage of State GDP
Power	3%
Transport	4%
Industry	29%
Buildings	9%
Agriculture	11%
Forestry	1%
Waste	Not available


Summary of the state's results



Rating band and colour code	A	B	C	D	E	F	G
Normalized score on a scale from 0 to 100	90 <= 100	75 <= 90	60 <= 75	45 <= 60	30 <= 45	15 <= 30	0 <= 15

194 Source: CSO (as on 1 March 2012). (ON251)

Sectors in detail

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
	Renewables	Gujarat needs to harness its high renewable energy potential. The state offers differentiated policy support for biomass, wind, solar and hydro, including the creation of Green SEZs and solar and wind energy parks. However, except wind and solar energy, other renewable energy technologies have not developed appreciably in the state.
	Energy efficiency	Gujarat has shown considerable improvement in energy efficiency in the power sector. The state has shown overall development in power generation, transmission and distribution.
	Overarching	The state offers partial subsidies to its power consumers in more than one sector. However, the state needs increase its budget allocation for non-conventional sources of energy generation.

Areas of achievement - Power


- The state offers good infrastructure support to the renewable energy sector, with promotion of wind energy farms and preferential grid access for all sources of renewable energy. Gujarat has taken policy measures to scale up decentralized solar application through incentives like capital subsidy, RE vouchers, interest subsidy, viability gap funding, etc.¹⁹⁵
- The state has performed well in the thermal power sector, with low specific emissions from power generation and high operational performance in the existing power infrastructure. The state has one of the most advanced thermal power generation technology infrastructures in the country, including India's first synchronized supercritical power plant at Mundra.¹⁹⁶

Areas that need improvement - Power

- The state has the highest renewable energy potential in the country, but the current installation is only 18% of the total installed capacity in the state. The state needs to scale up power generation from renewable energy sources. It needs to develop a balanced technology mix from the renewable energy pool.
- The state needs to offer a more attractive renewable energy tariff, with differential policy support to meet the viability gap of different RE technologies.
- Gujarat also needs to develop its overarching policy by allocating a higher percentage of the state budget for promoting renewable energy.

¹⁹⁵ Ministry of New and Renewable Energy, GOI, Guidelines for off-grid and decentralised solar application, 2010- http://geda.gujarat.gov.in/policy_files/jnns-m-g170610.pdf

¹⁹⁶ List of Coal based Thermal Power plants in India, last visited Dec 2012 , <http://dcpl.dclgroup.net/powergeneration.html>


Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 INDUSTRY	Renewables	The industrial sector in Gujarat has improved its share of renewable energy mix in the state. The state industrial policy is comprehensive, ambitious and implementable.
	Energy efficiency	The level of energy intensity has not improved in the last five years in Gujarat. The state attracts investors in advanced technology but does not have a comprehensive policy documented for adopting energy efficiency technologies in the state.
	Overarching	The state levies a green cess of Rs 0.02/kWh ¹⁹⁷ of electricity consumed by emission-intensive industrial sectors. Overall, the state needs to strengthen the policy scenario to check the utilization of energy for its industrial growth plans.

Areas of achievement - Industry

- Gujarat has been able to increase the use of renewable energy in the industrial sector by implementing good industrial policy practices.
- In the industrial energy efficiency area, the state has a balanced approach toward improving the efficiency of manufacturing processes and eco-friendly product design and promoting new energy efficiency technologies. To promote the efficient use of fuels for energy generation, the state has also reduced subsidies to different category of power consumers and imposes a green cess of 2 paise/kWh on the use of electricity generated through fossil fuels.

Areas that need improvement - Industry

- The state needs to reduce the energy intensity of its industrial sector through policy interventions.
- The state also needs to establish an incentive and penalty mechanism for checking emissions from the industry sector.

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 BUILDINGS	Renewables	The state has mandated the use of solar water heaters. It provides a green incentive of Rs 3/kWh of energy generated through rooftop solar systems. ¹⁹⁸
	Energy efficiency	Gujarat is one of the few states that have already started working toward the implementation of the ECBC. It has amended the ECBC as per the state's climatic condition. The state is expected to come out with a notification soon. Gujarat has proposed to its various departments that the public procurement of electrical appliances may be made only under the voluntary and mandatory schemes of the BEE Standards and Labeling Programme. For energy conservation measures and retrofitting of old buildings, the state has identified a few buildings and conducted detailed energy audits of the same. Following the audits, Gujarat has installed energy-efficient appliances.
	Overarching	NA

¹⁹⁷ State Government of Gujarat Gujarat , Green Cess Bill, 2011- <http://www.kseboa.org/news/gujarat-introduces-green-cess-of-re-002-per-unit-of-electricity-generated-30031547.html>


¹⁹⁸ State Government of Gujarat, Gandhinagar Solar Rooftop Programme-http://www.rooftopsolargujarat.com/gpcl_rsg/gandhinagar_solar_rooftop.html

Areas of achievement - Building

- Gujarat has mandated the use of solar water heaters.¹⁹⁹
- The state has incentives for the usage of SPV.²⁰⁰
- Gujarat is one of the few states in the country to have amended the ECBC as per its climatic conditions.²⁰¹
- The state has proposed the mandatory procurement of BEE Star-labelled appliances under both the voluntary and mandatory schemes.²⁰²
- The state has mandated an energy audit of all buildings with loads of 75kVA or more.²⁰³

Areas that need improvement - Building

- Gujarat still needs to mandate the public procurement of BEE Star-labelled appliances.²⁰⁴

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 TRANSPORT	Renewables	NA
	Energy efficiency	NA
	Overarching	The state does not have any policy or incentive for the promotion of electric vehicles. CNG vehicles are being promoted in the major cities of the state. BRTs have been developed for major cities like Ahmedabad, Surat and Rajkot. A draft policy has been framed for the establishment of the UMTA and programmes are being planned for NMTs.

Areas of achievement- Transport

- BRT systems are already under construction in Ahmedabad, Rajkot and Surat.²⁰⁵
- The state has a large fleet of CNG vehicles²⁰⁶, and it promotes such vehicles in the public transportation sector.
- Significant improvement has been undertaken between 2007 and 2009 to introduce more buses under the state transport authority to increase the use of public transport.²⁰⁷

Areas that need improvement - Transport

- Gujarat does not have any policy to promote electric and hybrid vehicles. It should consider the same.
- The state needs to implement its draft policy on non-motorized transport system.²⁰⁸
- The state has a draft policy for establishing the UMTA, but needs to implement it.

199 MNRE, GoI, Status on G.O.s issued by State Governments on mandatory use of solar water heaters/solar buildings & other supportive measures taken on use of solar energy devices/systems, 2011, - [http://www.solarwaterheater.gov.in/phpdurl5/speakers/userfiles/file/Status%20on%20GOs%20issued%20by%20state%20govts\(20\).pdf](http://www.solarwaterheater.gov.in/phpdurl5/speakers/userfiles/file/Status%20on%20GOs%20issued%20by%20state%20govts(20).pdf)

200 State Government of Gujarat, Gandhinagar Solar Rooftop Programme http://www.rooftopsolargujarat.com/gpcl_rsg/gandhinagar_solar_rooftop.html

201 Bureau of Energy Efficiency, Ministry of Power, GOI, Energy Conservation Building Code, Energy Conservation Act 2001- <http://www.beeindia.in/schemes/documents/ecbc/ECBC%20India.jpg> and <http://www.ibec.in/code-map>

202 Consultation with SDA – GEDA

203 Consultation with SDA – GEDA


204 Consultation with SDA – GEDA

205 Urban Transport Initiatives in India: Best Practices in PPP, lasted accessed on Dec 2012 (<http://www.niua.org/>); Planning Commission report on Urban Development chapter 18, 2011, (http://planningcommission.nic.in/plans/mta/11th_mta/chapterwise/chap18_urban.pdf)

206 Ministry of Petroleum and Natural Gas, Govt. of India.

207 Ministry of Road Transport year book and performance of SRTUs 2011, - <http://morth.nic.in>

208 Gujarat Infrastructure Development Board, State Government of Gujarat , Urban Transport Policy , 2005 -http://www.gidb.org/cms.aspx?content_id=288


Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 AGRICULTURE	Renewables	NA
	Energy efficiency	NA
	Overarching	Gujarat has marginally lower methane emissions per INR lakh of livestock output than the rest of the country. It implements water conservation techniques like micro-irrigation over 0.18% of its net irrigated area. The state has fewer districts with SRI method of rice cultivation. The amount of nitrogenous fertilizer used has increased in the state, thus, leading to more nitrogen-related emissions from the state.

Areas of Achievement - Agriculture

- Gujarat has marginally lower methane emissions, i.e., 0.68 tonnes per INR lakh of livestock output than the all-India average value of 0.72 tonnes.²⁰⁹
- Water conservation techniques, such as micro-irrigation, are practiced across a significant percentage of Gujarat's net irrigated area.²¹⁰

Areas that need improvement – Agriculture

- The state has registered a low cropping-intensity figure of 125% in 2007-08, thus lagging behind the all-India average figure of 139% in the same year.²¹¹ Steps need to be taken to address this.
- The amount of nitrogenous fertilizers used from 2008 to 2010 has registered an increase of 3.08%, although it is below the India average of 3.24%.²¹² This trend needs to be checked.
- SRI has been implemented in only 24% of the paddy-growing districts²¹³ in the state as compared to national average of 44%. The state needs to promote this method of rice cultivation.

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 FORESTRY	Renewables	NA
	Energy efficiency	NA
	Overarching	The state should develop programmes/policies for improving forest area, forest cover and forest density.

Areas of achievement - Forestry

- The growing stock of tree cover, as a percentage of state's geographical area, has increased by 4% from 2002 to 2005.²¹⁴

Areas that need improvement- Forestry

- The total forest area cover has decreased by 0.17%, with respect to the state's geographical area, from 2002 to 2009.²¹⁵ This trend needs to be addressed.
- Gujarat needs to take measures to increase forest density, which decreased by 0.11% during 2002-2009.

209 1. Methane enteric fermentation from the paper "Spatial pattern of methane emissions from Indian livestock" by Abha Chhabra*, K. R. Manjunath, Sushma Panigrahy and J. S. Parihar; Remote Sensing Applications Area, Space Applications Centre, Indian Space Research Organization, Ahmedabad 380 015, India

2. Ministry of Statistics and Programme Implementation, Govt. of India, Total livestock output,

210 Central Institute of Agricultural Engineering, Table 3.36, state-wise area coverage under drip irrigation in India, Agricultural Engineering Data Book, Jan. 2008 - http://www.iasri.res.in/agridata/08data/chapter3/db2008tb3_36.pdf


211 Central Water Commission, India, Water and related statistics, Dec 2010, Water Resource Information and System Directorate- http://www.cwc.nic.in/ISO_DATA_Bank/W&RelatedStatistics_2010.pdf

212 The Fertiliser Association of India, Fertiliser Statistics 2009-10- <http://www.faidelhi.org/>

213 www.sri-india.net

214 Forest Survey of India, Government of India, State/UT-wise Tree Cover Estimates, State of Forest Report 2011 - http://www.fsi.org.in/sfr_2011.htm

215 Forest Survey of India, Government of India, Indian State of Forest Report 2003 and 2011-http://www.fsi.org.in/sfr_2011.htm

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 WASTE	Renewables	Gujarat is considered one of the most active states across India in terms of the development of renewable technologies. But, when it comes to utilizing its waste-to-energy (W2E) potential, a lag is observed. The state has a potential of generating 112MW of energy from waste. But as per the MoSPI report, <i>Energy Statistics 2012</i> , the state still does not have a W2E plant. This area needs to be explored by the state. A detailed study needs to be carried out to understand why investors are unwilling to invest in such a green initiative and what are the other issues faced by the state.
	Energy efficiency	NA
	Overarching	As regards e-waste recycling facilities, the state ranks third in India, after to Karnataka and Tamil Nadu. But its e-waste recycling capacity of 12,000MTA is only 29.77% of the e-waste generated in the state.
Areas of achievement - Waste <ul style="list-style-type: none"> Gujarat is proactive in handling e-waste, although its recycling capacity is limited to 29.77% of the e-waste generated.²¹⁶ Areas that need improvement - Waste <ul style="list-style-type: none"> The state needs to harness its W2E potential.²¹⁷ The state needs to increase its sewage treatment capacity, which, at present, is only 46.55% of the sewage generated.²¹⁸ 		

²¹⁶ <http://www.cpcb.nic.in/E-waste%20Registration%20List.PDF>

²¹⁷ Ministry of Statistics and Programme Implementation (MoSPI), GoI, Energy Statistics 2012,

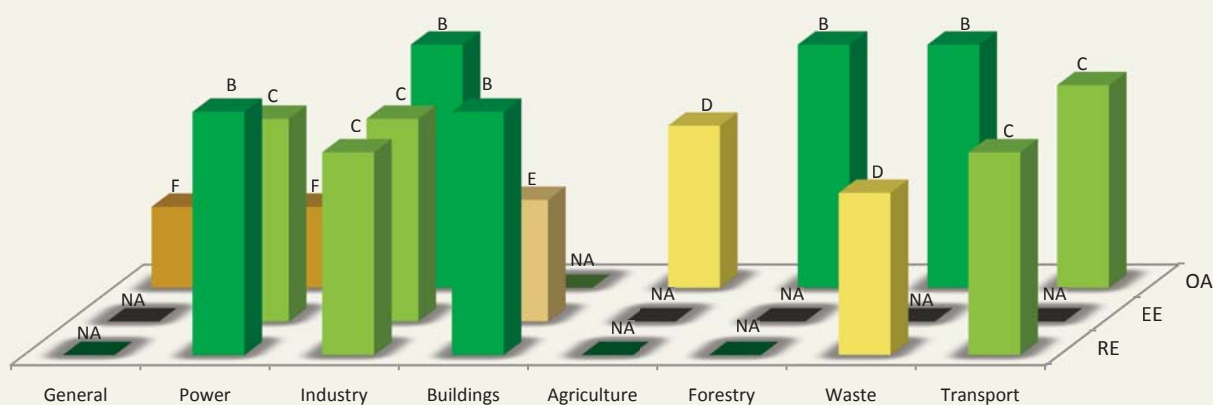
²¹⁸ Central Pollution Control Board, GoI, E-Waste Registration List, www.cpcb.nic.in

6.6. Maharashtra



Sector	Sectoral GDP contribution ²¹⁹ as percentage of state GDP
Power	2%
Transport	4%
Industry	22%
Buildings	6%
Agriculture	7%
Forestry	2%
Waste	Not available


Summary of the state's results



Rating band and colour code	A	B	C	D	E	F	G
Normalized score on a scale from 0 to 100	90 <= 100	75 <= 90	60 <= 75	45 <= 60	30 <= 45	15 <= 30	0 <= 15

²¹⁹ CSO (as on 1 March 2012). (ON251)

Sectors in detail


Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 POWER	Renewables	Maharashtra has been successful in achieving considerable progress in the use of renewable energy in the state. The state offers a differentiated policy for renewable energy technologies, with focus on biomass, hydro, wind and solar energy.
	Energy efficiency	The state has made the power sector more efficient than before by improving the operational efficiency of existing plants and the T&D infrastructure. However, the state needs to decrease its emission intensity by installing advanced thermal technologies and renewable energy installations.
	Overarching	The state needs to improve its budget allocation for tapping its renewable energy potential.

Areas of achievement - Power

- Maharashtra has a balanced approach toward developing renewable energy in the state, with a focus on utilizing its high wind-energy potential and biomass for power generation.
- The performance of the thermal power sector, with low deviation from station heat rate and low T&D losses²²⁰, is better in Maharashtra than in other states. The state also plans to adopt advanced technology in the thermal energy sector.²²¹

Areas that need improvement - Power

- Maharashtra needs to adopt advanced thermal power generation technologies and improve the renewable energy mix in the grid.
- The state needs to play a more proactive role in the development of renewable energy by allocating a higher budget to support the financing of renewable energy projects/programmes.
- To accelerate adoption of energy efficiency and energy conservation measures, the state needs to reduce subsidy on power supply from fossil fuels.

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 INDUSTRY	Renewables	Maharashtra needs to increase the share of renewable energy consumption in the industrial sector. It has a comprehensive, ambitious and inclusive policy scenario for all renewable sources in the state; it offers financial incentives to promote clean technologies, waste management and capacity building toward eco-friendly practices in SMEs and has award schemes for energy efficiency practices in the industries. ²²²
	Energy efficiency	Industries in the state have improved the intensity of both conventional and non-conventional sources of energy.
	Overarching	The state has an overarching policy scenario for the development of eco-friendly products. The state also levies taxes on emissions from energy-intensive industries.

²²⁰ Central Electricity Authority, India, Database, state-wise Transmission & Distribution (T&D) losses, 2010, Planning Commission, GoI -http://planningcommission.nic.in/data/datatable/1705/final_84.pdf

²²¹ state government of Maharashtra, Maharashtra Generation Company, ongoing capacity addition programme- <http://www.mahagenco.in/Ongoing-projects-english.pdf>


²²² State Government of Maharashtra, Industrial Policy of Maharashtra, 2013- <http://www.midcindia.org/Lists/Policies%20Circulars%20and%20Notification/Attachments/88/Industrial%20Policy%20of%20Maharashtra%202013.pdf>

Areas of achievement - Industry

- Maharashtra has comprehensive, ambitious industrial policies, which cover all the possible renewable energy sources with potential in the state.
- With regard to industrial energy efficiency, the state has balanced approach toward improving the efficiency of manufacturing processes and promoting eco-friendly product design and new energy efficiency technologies.²²³

Areas that need improvement - Industry

- Industries in the state need to increase the share of renewables in the energy mix.
- Energy efficiency policies for industries need to be strengthened, with appropriate regulatory and financial support mechanisms to ensure effective implementation across the state.

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 BUILDINGS	Renewables	Maharashtra has mandated the usage of solar water heaters. The state also provides subsidy for the same, apart from the one extended by the central government. But the state has no policy for solar photovoltaic rooftop systems.
	Energy efficiency	The state has mandated the public procurement of BEE Star-labelled mandatory electrical appliances (with minimum 4-star rating). This is a huge step in energy conservation, especially in existing buildings. Retrofitting of existing/old government buildings has been done. Forty buildings had been identified for the same. A new scheme of providing financial assistance up to Rs 25 lakhs per buildings has been initiated. Twelve buildings have successfully implemented EC measures, and savings up to 40% have been realized. Maharashtra has not started working on the ECBC. Being one of the fastest growing states in the country, Maharashtra needs to draft an adapted version of the code and notify it at the earliest.
	Overarching	NA

Areas of achievement - Building

- Maharashtra has mandated the usage of solar water heaters.²²⁴
- The state has mandated public procurement of BEE Star-labelled electrical appliances (4-Star or above) for government buildings.²²⁵
- The state has mandated an energy audit of all buildings with loads of 100kVA and above.²²⁶

Areas that need improvement - Building

- The state needs to formulate a policy for SPV rooftop systems.
- The state has not started working on the ECBC.²²⁷ It needs to draft an adapted version and notify it soon.
- The state has no mandatory energy audit for commercial buildings.²²⁸ This needs to be implemented.

²²³ Maharashtra Industrial Development Corporation, State Government of Maharashtra, Hazardous Waste Management Plan, last accessed Dec 2012 - <http://www.midcindia.org/Pages/EnvironmentManagement.aspx>


²²⁴ MNRE, GoI, Status on G.O.s issued by State Governments on mandatory use of solar water heaters/solar buildings & other supportive measures taken on use of solar energy devices/systems, 2011- [http://www.solarwaterheater.gov.in/phpdsurl5/speakers/userfiles/file/Status%20on%20GOs%20issued%20by%20state%20govts\(20\).pdf](http://www.solarwaterheater.gov.in/phpdsurl5/speakers/userfiles/file/Status%20on%20GOs%20issued%20by%20state%20govts(20).pdf)

²²⁵ Consultation with SDA – MEDA

²²⁶ Consultation with SDA – MEDA

²²⁷ Bureau of Energy Efficiency, Ministry of Power, GOI, Energy Conservation Building Code, Energy Conservation Act 2001- <http://www.beeindia.in/schemes/documents/ecbc/ECBC%20India.jpg> and <http://www.ibecc.in/code-map>

²²⁸ Consultation with SDA – MEDA

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 TRANSPORT	Renewables	NA
	Energy efficiency	NA
	Overarching	The use of electric vehicles is exempted from tax in Maharashtra. The state imposes a green tax on commercial vehicles that are more than seven years old and on non-commercial or private vehicles that are more than 15 years old. A very strict fine exists for driving a vehicle with an expired vehicle test certificate. The state is promoting the use of CNG vehicles in major cities. BRT and NMT systems have been introduced in cities such as Pune. A UMTA is already established for Mumbai, and a comprehensive mobility plan has been submitted for Pune to the MoUD.

Areas of achievement - Transport

- Maharashtra levies additional cess on non-transport vehicles that have completed 15 years from the date of their registration and on transport vehicles that have completed seven years from the date of their registration.²²⁹
- The state provides complete tax exemption on motor vehicle tax to electric vehicles.²³⁰
- The state has a large fleet of CNG vehicles in Mumbai, its capital city, and Pune.²³¹
- BRT and MRT systems are being planned and constructed in its major cities, such as Pune and Mumbai, for easy public transport.²³²
- A UMTA has been established in Mumbai. Also, a city-level agency for supervising the planned development of the transport sector within the city has been formulated for Pune.²³³

Areas that need improvement - Transport

- Maharashtra needs to improve its non-motorized transport systems.²³⁴
- The state needs to strengthen its public transport system by adding more buses to its fleet.²³⁵

²²⁹ Ministry of Vehicles Department, Government of Maharashtra, Status of offences, penalties schedules, last accessed Dec 2012- http://www.mahatranscom.in/offen_penalties_schedule.aspx

²³⁰ State government of Maharashtra, Tax exemption notification on Electric Vehicles, 18 May 2012 published on oncars.in - <http://www.oncars.in/Car-News-Detail/Full-tax-exemption-offered-to-electric-cars-in-Maharashtra/2386>


²³¹ Ministry of Petroleum and Natural Gas, Govt. of India.

²³² Ministry of Urban Department, GoI, JNNURM status report "Implementation status of projects approved under JNNURM, last accessed Dec 2012- <http://indiabudget.nic.in/es2008-09/chapt2009/chap913.pdf>

²³³ Pune Municipality Corporation, state government of Maharashtra, Comprehensive Mobility Plan for Pune city, last accessed Aug 2012- <http://www.punecorporation.org/pmcwebn/Mobility%20Plan.aspx>

²³⁴ Pune Municipality Corporation, state government of Maharashtra, Comprehensive Mobility Plan for Pune city, last accessed Aug 2012- http://punecorporation.org/pmcwebn/informpdf/CMP/CMP_July_2010/1-iuisl_Pune-CMP-November-2008-chapters-1-6.pdf

²³⁵ Ministry of Road Transport, Year book and performance of SRTUs -2011-<http://morth.nic.in>


Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 AGRICULTURE	Renewables	NA
	Energy efficiency	NA
	Overarching	Maharashtra has a lower methane emissions level (0.63 tonnes per INR lakh of livestock output) than the Indian average value (0.72 tonnes per INR lakh of livestock output). Of the net irrigated area in the state, only a low percentage is under micro-irrigation. In addition, very few districts (9%) are covered under the SRI method of rice cultivation. Maharashtra registered high nitrogen fertilizer usage from 2008 to 2010, thus, leading to high nitrogenous emissions.

Areas of achievement - Agriculture

- Maharashtra has lower methane emissions (0.63 tonnes per INR lakh of livestock output) than the all-India average (0.72 tonnes per INR lakh of livestock output).²³⁶
- The state had a cropping intensity figure of 130% vis-à-vis the all-India level of 139% during 2007-08.²³⁷
- Only 0.64% of Maharashtra's net irrigated area is under micro-irrigation. It should consider promoting the use of this practice since it conserves water.²³⁸

Areas that need improvement - Agriculture

- Maharashtra registered a 10.3% increase in the use of nitrogen fertilizers from 2008 to 2010, thus leading to high nitrogenous emissions.²³⁹ The state needs to check this trend.
- Only 9% of the paddy-growing districts practice the SRI method.²⁴⁰ More areas need to be brought under this method of cultivation.

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 FORESTRY	Renewables	NA
	Energy efficiency	NA
	Overarching	The state needs to improve the geographical extent of its forest area. It needs to implement effective cross-sectoral forestry programmes, which will encourage tree plantations on private lands. The state's actions have helped in increasing the forest cover by 1.2% between 2002 and 2009.

²³⁶ Please refer references section

²³⁷ Central Water Commission, India, Water and related statistics, Central Water Commission 2010-http://www.cwc.nic.in/ISO_DATA_Bank/W&RelatedStatistics_2010.pdf

²³⁸ Indian Agriculture Statistics Research Institute, data table 3.36, state-wise area coverage under drip-irrigation in India-http://www.iasri.res.in/agridata/08data/chapter3/db2008tb3_36.pdf

²³⁹ The Fertilizer Association of India, Fertiliser Statistics 2009-10, <http://indianfertilizer.com/contentFileView.do?page=statistics2010>


²⁴⁰ www.sri-india.net

Areas of achievement - Forestry

- The total forest area cover has increased by 1.23%, with respect to the geographical area, from 2002 to 2009.²⁴¹
- Forest density improved by 0.32% during 2002-2009.
- The growing stock of tree cover, as a percentage of the state's geographical area, has increased by 2.95%.²⁴²

Areas that need improvement - Forestry

- Effective cross-sectoral forestry programmes could be developed for increasing tree plantations on private lands, which have increased by only 33.62% from 2002 to 2005.²⁴³

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
Waste  WASTE	Renewables	Maharashtra is considered one of the proactive states where harnessing renewables is concerned. But when it comes to utilizing its waste-to-energy potential, Maharashtra has not been up to the mark. The state has a potential of 287MW. But as per the MoSPI report <i>Energy Statistics 2012</i> , the state has utilized only 5.72MW (1.99%) of its potential.
	Energy efficiency	NA
	Overarching	Maharashtra is one of the states in the country that has e-waste recycling facilities. But the state's e-waste recycling capacity is only 11.06% of the waste generated in the state.

Areas of achievement - Waste

- Maharashtra is proactive in handling e-waste, though its e-waste recycling capacity is only 11.06% of the waste generated.²⁴⁴

Areas that need improvement-Waste

- Maharashtra is able to harness only 1.99% of its waste-to-energy potential.²⁴⁵ It needs to develop this potential.
- The state has been able to treat only 42.31% of its sewage generated. Maharashtra, being the biggest state in the country, needs to urgently tackle this issue of sewage treatment.²⁴⁶

²⁴¹ Forest Survey of India, Government of India, Indian State of Forest Report 2003 and 2011-http://www.fsi.org.in/sfr_2011.htm

²⁴² State of Forest Report 2011 of the FSI, GoI, State/UT-wise Tree Cover Estimates-<http://www.fsi.nic.in/sfr2003/forestcover.pdf>

²⁴³ Data around tree plantation target for private land and achieved figure is available for years 2002-2005

²⁴⁴ Central Pollution Control Board, GoI, E-Waste Registration List, last accessed Dec 2012. www.cpcb.nic.in

²⁴⁵ Ministry of Statistics and Programme Implementation (MoSPI), GoI, Energy Statistics 2012- http://mospi.nic.in/mospi_new/upload/Energy_Statistics_2012_28mar.pdf

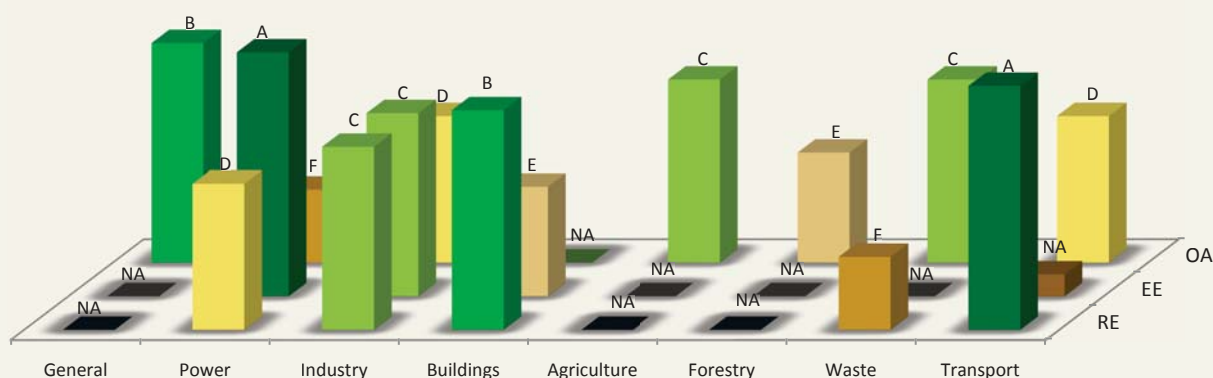
²⁴⁶ Central Pollution Control Board, India, Status of water supply, wastewater generation and treatment in class-i cities & class-ii towns of India -2009- http://www.cpcb.nic.in/upload/NewItems/NewItem_153_Foreword.pdf

6.7. Karnataka



Sector	Sectoral GDP contribution ²⁴⁷ as percentage of state GDP
Power	2%
Transport	5%
Industry	17%
Buildings	9%
Agriculture	14%
Forestry	2%
Waste	Not available


Summary of the state's results



Rating band and colour code	A	B	C	D	E	F	G
Normalized score on a scale from 0 to 100	90 ≤ 100	75 ≤ 90	60 ≤ 75	45 ≤ 60	30 ≤ 45	15 ≤ 30	0 ≤ 15

²⁴⁷ CSO (as on 1 March 2012). (ON251)

Sectors in detail

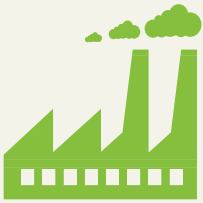
Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 POWER	Renewables	Karnataka has achieved 26% of its renewable energy potential. The state has a comprehensive solar policy. It needs to strengthen its tariff structure for the development of its non-solar renewable energy technologies.
	Energy efficiency	The power sector in the state scores high in energy efficiency. It has comprehensive strategies for improving the energy efficiency of its existing set-up and for developing upcoming thermal generation technologies. The state also offers comprehensive plans for the improvement of transmission and distribution operations in the state.
	Overarching	Karnataka needs to improve its overarching scenario. It needs to allocate a higher share from the state budget to non-conventional sources of energy.

Areas of achievement - Power

- Karnataka has made substantial progress in developing the infrastructure for renewable energy power generation, with a balanced mix of renewable energy technologies.
- The state is one of the best performers in the energy efficiency parameter. The existing power plants in the state are energy efficient in overall operational aspects, with low T&D losses and a good DSM plan in place.²⁴⁸

Areas that need improvement - Power

- The state needs to offer a more lucrative tariff structure for renewable energy and provide differential policy support to different technologies to meet viability cost.
- The state needs to improve its infrastructure for thermal power generation by introducing advanced technologies.
- The state needs to show increased support for renewable energy technologies by allocating more funds to bridge the gap between potential and achieved renewable energy installed capacity.

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 INDUSTRY	Renewables	The renewable energy consumption in industries needs to be strengthened by policy support.
	Energy efficiency	The state needs to improve energy efficiency in the industrial sector in order to reduce its energy intensity. The policy scenario also needs to promote adoption of advanced energy-efficient technologies.
	Overarching	There is no policy in place that provides a financing mechanism to support the low-carbon growth of industries. However, the state levies carbon taxes on coal consumption and a green cess of 5 paise/kWh on industries to check energy consumption and GHG emissions. ²⁴⁹

²⁴⁸ Planning commission report on state-wise T&D loss(%), March 2010, - http://planningcommission.nic.in/data/datatable/1705/final_84.pdf


²⁴⁹ Federation of Karnataka Chambers of Commerce & Industry, Government of Karnataka, Karnataka Industrial Policy 2009-14, - http://www.fkcci.in/fkcci_pdf/industrial_policy.pdf

Areas of achievement - Industry

- Karnataka's industrial policies are comprehensive, ambitious and cover all the identified renewable sources with potential in the state.
- To increase the energy efficiency of the industrial sector, the state maintains a balanced approach between improving efficiency of manufacturing processes and promoting new energy efficiency technologies.²⁵⁰

Areas that need improvement - Industry

- The share of renewable energy in the industry sector needs to be increased in Karnataka.
- The overall energy intensity of the state is high and needs to be restricted through policy intervention.
- The industrial policy needs to capture eco-friendly product design.

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 BUILDINGS	Renewables	The state has mandated the usage of solar water heaters. It also provides subsidy for solar PV rooftops, thus encouraging decentralized systems.
	Energy efficiency	Karnataka has already started working on the ECBC. It has amended the code as per the climatic conditions in the state. It is expected to issue a notification soon. The state has not mandated the public procurement of BEE Star-labelled electrical appliances. Retrofitting of buildings has been initiated; 20 buildings have been identified, but the retrofitting is only partially complete due to financial constraints. The state has not mandated energy audits of commercial buildings.
	Overarching	NA

Areas of achievement - Building

- Karnataka has amended the ECBC as per its climatic conditions.²⁵¹
- The state has mandated the use of solar water heaters.²⁵²
- The state provides subsidy for the use of solar PV rooftop systems.²⁵³

Areas that need improvement- Building

- The state has not mandated energy audits of commercial buildings,²⁵⁴ and needs to do so.
- The state has no public procurement policy for BEE Star-labelled electrical appliances.²⁵⁵ The state needs to mandate the same.

250 Ministry of Renewable Energy, Karnataka, Renewable Energy Policy 2009-14- <http://www.advantagekarnataka.com/images/pdf/Karnataka-Renewable-Energy-Policy-2009-2014Booklet.pdf>


251 Bureau of Energy Efficiency, Ministry of Power, GOI, Energy Conservation Building Code, Energy Conservation Act 2001,- <http://www.beeindia.in/schemes/documents/ecbc/ECBC%20India.jpg> and <http://www.ibec.in/code-map>

252 MNRE, GoI, Status on G.O.s issued by State Governments on mandatory use of solar water heaters/solar buildings & other supportive measures taken on use of solar energy devices/systems, 2011-[http://www.solarwaterheater.gov.in/phpdsurl5/speakers/userfiles/file/Status%20on%20GOs%20issued%20by%20state%20govts\(20\).pdf](http://www.solarwaterheater.gov.in/phpdsurl5/speakers/userfiles/file/Status%20on%20GOs%20issued%20by%20state%20govts(20).pdf)

253 Department of Energy, Government of Karnataka, Karnataka Renewable Energy Policy, 2009-14- <http://www.advantagekarnataka.com/images/pdf/Karnataka-Renewable-Energy-Policy-2009-14.pdf>

254 Consultation with SDA – KREDL

255 Consultation with SDA – KREDL

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 TRANSPORT	Renewables	NA
	Energy efficiency	NA
	Overarching	Programmes for NMT are in the proposal stage for the cities like Bangalore, and a draft policy has been framed for the establishment of the UMTA. A green tax is levied on old vehicles. The state has significantly increased the total number of buses in the fleet under the state road transport authority. There is no policy or incentive to promote of electric and hybrid vehicles. There is no programme for the introduction of the CNG vehicles.

Areas of achievement - Transport

- Karnataka has improved the total fleet of buses under the state road transport authority during 2006-2009.²⁵⁶
- The state levies additional cess on private vehicles that have completed 15 years from the date of their registration and transport vehicles that have completed seven years from the date of their registration.²⁵⁷
- Karnataka has a fleet of 75,000 LPG autorickshaws, which is one of the largest in the country.²⁵⁸
- The Bangalore Metro Rail Corporation Limited (BMRCL), a joint venture of the government of India and government of Karnataka, is a Special Purpose Vehicle entrusted with the responsibility of the implementation of Bangalore Metro Rail Project. The first phase of the metro project— construction of 42.3km of rail network – is in the final stages of its implementation.

Areas that need improvement - Transport

- The development of non-motorized transport is being considered and needs to be implemented.²⁵⁹
- The UMTA draft policy needs to be implemented and city-level agencies for planning the development of transport sector need to be set up.²⁶⁰
- The use of CNG in vehicles needs to be promoted. The feasibility may be explored.
- Electric and hybrid vehicles should be promoted in the state.

²⁵⁶ Ministry of Road Transport, GoI, Year book and performance of SRTUs, Ministry of Road Transport, 2011-<http://morth.nic.in>

²⁵⁷ Department of Transport, Government of Karnataka, Karnataka ACT NO. 4 OF 2002, The Karnataka Motor Vehicles Taxation (AMENDMENT) ACT, 2002-[http://dpal.kar.nic.in/ao2002%5CMotor%20Vehicles%20Taxation%20\(A\)%20Act.pdf](http://dpal.kar.nic.in/ao2002%5CMotor%20Vehicles%20Taxation%20(A)%20Act.pdf)

²⁵⁸ Article publication, Indian Auto LPG Coalition, last visited December 2012, www.iac.org.in

²⁵⁹ <http://www.bmlta.org/bmlta/projects>


²⁶⁰ 1. Ministry of Urban Development, Government of India, National Urban Transport Policy 2006, - http://urbanindia.nic.in/programme/ut/K_14011152007_UT.pdf

2. Zee News- http://zeenews.india.com/news/nation/reddy-for-unified-metropolitan-transport-body-in-big-cities_632660.html

3. The Hindu, - <http://www.thehindu.com/news/cities/chennai/article405604.ece>

4. India Governance Knowledge Portal- <http://indiagovernance.gov.in/news.php?id=241>

5. The Hindu- <http://www.hindu.com/pp/2009/06/20/stories/2009062050320500.htm>


Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 AGRICULTURE	Renewables	NA
	Energy efficiency	NA
	Overarching	A large number of districts in Karnataka practice the SRI method of rice cultivation. Karnataka has implemented water conservation practices like micro-irrigation. The state has higher methane emissions (in tonnes per INR lakh of its livestock output) as compared to India's average. The state has also increased the use of nitrogen fertilizer per unit gross cropped area during 2008-2010, thus increasing nitrogenous emissions. The cropping intensity of the state is comparatively low.

Areas of achievement - Agriculture

- The SRI method of growing paddy has been implemented in 82%²⁶¹ of Karnataka's paddy-cultivating districts.
- A considerable area in the state is covered under micro-irrigation practices²⁶², which results in the tangible benefit of water conservation.

Areas that need improvement - Agriculture

- Karnataka has slightly higher methane emissions at 0.76 tonnes per INR lakh of its livestock output as compared to the national average of 0.72 tonnes per INR lakh of livestock output. The state should consider introducing programmes for reducing emissions caused by enteric fermentation.²⁶³
- The state has increased the use of nitrogen fertilizers per unit gross cropped area by 11.5% from 2008 to 2010, thus increasing nitrogenous emissions.²⁶⁴ This trend needs to be checked.
- The cropping intensity of the state during 2007-08 was 123%, which is lower than the all-India figure of 139% in the same year.²⁶⁵ The state needs to take measures to increase yield.

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 FORESTRY	Renewables	NA
	Energy efficiency	NA
	Overarching	The state needs to implement policies and programmes for improving forest cover, forest density and tree cover.

²⁶¹ www.sri-india.net

²⁶² Indian Agriculture Statistics Research Institute, data table 3.36, state-wise area coverage under drip-irrigation in India-http://www.iasri.res.in/agridata/08data/chapter3/db2008tb3_36.pdf

²⁶³ 1. Methane enteric fermentation from the paper "Spatial pattern of methane emissions from Indian livestock" by Abha Chhabra*, K. R. Manjunath, Sushma Panigrahy and J. S. Parihar; Remote Sensing Applications Area, Space Applications Centre, Indian Space Research Organization, Ahmedabad 380 015, India

2. Ministry of Statistics and Programme Implementation, Govt. of India), Total livestock output

²⁶⁴ The Fertiliser Association of India, Fertiliser Statistics 2009-10,


²⁶⁵ Indian Agriculture Statistics Research Institute, data table 3.36, state-wise area coverage under drip-irrigation in India-http://www.iasri.res.in/agridata/08data/chapter3/db2008tb3_36.pdf

Areas of achievement - Forestry

- At 2.99%, the percentage of tree cover in Karnataka, with respect to its geographical area, is slightly higher than the India average of 2.76%.

Areas that need improvement - Forestry

- The forest cover in Karnataka decreased by 0.13%, with respect to the total geographical area, from 2002 to 2009,²⁶⁶ and needs focus.
- The state needs to take measures to increase its total forest density, which decreased by 0.08%, with respect to the geographical area, from 2002 to 2009.

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 WASTE	Renewables	Karnataka is considered proactive in the development of renewable technologies. But its utilization of W2E potential can be improved. The state has a potential of 151MW. As per the MoSPI report, <i>Energy Statistics 2012</i> , the state has achieved only 1MW (0.66%) of its potential.
	Energy efficiency	NA
	Overarching	Karnataka ranks second in e-waste recycling capacity in India. It has the capability to recycle 26,040 MTA of e-waste, thus, being able to recycle 63% of the waste generated. The state's performance in terms of sewage treatment is extremely poor; it can treat only 2.43% of the sewage generated.

Areas of achievement - Waste

- Karnataka ranks second in India in e-waste recycling capacity. It has the capability to recycle 26,040MTA of e-waste, thus being able to recycle 63% of the waste generated. Bangalore, Karnataka's capital city, is the IT hub of the country. Hence, this capacity needs to be expanded and the recycling programme needs to be carefully implemented.²⁶⁷

Areas that need improvement-Waste

- Karnataka needs to harness its W2E potential.²⁶⁸
- The state sewage treatment capacity is only 2.43 % of its sewage generation. Karnataka needs to take some immediate steps to tackle this serious issue.²⁶⁹

²⁶⁶ Forest Survey of India, Government of India, Indian State of Forest Report 2003 and 2011

²⁶⁷ Central Pollution Control Board, GoI, E-Waste Registration List, last accessed Dec 2012, www.cpcb.nic.in

²⁶⁸ MoSPI, GoI. Energy Statistics 2012- http://mospi.nic.in/mospi_new/upload/Energy_Statistics_2012_28mar.pdf

²⁶⁹ Central Pollution Control Board, India, Status of water supply, & class-ii towns of India - wastewater generation and treatment in class-i cities 2009-http://www.cpcb.nic.in/upload/NewItems/NewItem_153_Foreword.pdf

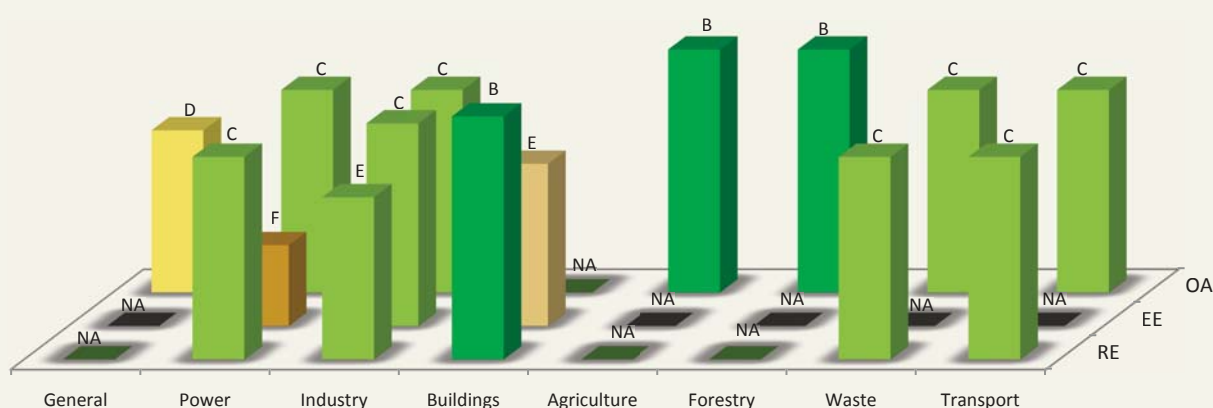
6.8. Tamil Nadu



Sector	Sectoral GDP contribution ²⁷⁰ as percentage of state GDP
Power	0%
Transport	6%
Industry	17%
Buildings	9%
Agriculture	10%
Forestry	1%
Waste	Not available

270


Summary of the state's results



Rating band and colour code	A	B	C	D	E	F	G
Normalized score on a scale from 0 to 100	90 <= 100	75 <= 90	60 <= 75	45 <= 60	30 <= 45	15 <= 30	0 <= 15

270 CSO (as on 1 March 2012). (ON251)

Sectors in detail


Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 POWER	Renewables	Tamil Nadu has a high renewable energy potential of 7,705MW and has achieved substantial RE installed capacity—6,499MW, i.e. almost 85% of its potential. The state has exceeded its wind energy technical potential and has favorable, comprehensive renewable energy policies. The state offers attractive renewable energy tariff for power generation from wind and small hydropower plants. ²⁷¹
	Energy efficiency	The state needs to improve the energy efficiency in the power sector, especially in power transmission and distribution. The state needs to promote DSM activities and end-use energy efficiency.
	Overarching	Tamil Nadu has a favorable overarching policy scenario for the adoption of energy efficiency and renewable energy in the state, for example, preferential grid access, grid evacuation facility, favourable tariff policy, etc.

Areas of achievement - Power

- Tamil Nadu has one of the highest renewable energy potentials in the country. It has a balanced approach toward adopting a renewable energy technology mix. The state has achieved 100% of its wind energy potential.²⁷²
- The state has allocated a substantial share of the state budget for promoting renewable energy generation in the state.²⁷³

Areas that need improvement - Power

- The state needs to reduce the emissions intensity from power generation by improving the performance of existing power generators and also by reducing the emissions intensity of the power generation mix, which can be achieved by increasing the share of renewable energy and introducing high-efficiency thermal power plants in the state.
- The state has poor power generation facilities and a weak power infrastructure, with high T&D losses. The state needs to reduce these losses.
- The state needs to improve its DSM plans.

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 INDUSTRY	Renewables	The state needs to increase the share of renewable energy consumption in the industry sector and adopt a balanced approach for the renewable energy mix.
	Energy efficiency	To ensure that the industry sector meets its development needs and achieve low energy intensity, the state needs to promote energy efficient technologies in the sector.
	Overarching	The overarching policy scenario needs to be strengthened, with comprehensive industrial policies focused on product design, carbon taxes, etc.

²⁷¹ Tamil Nadu Electricity Regulatory Commission, orders - <http://tnerc.tn.nic.in/Order.htm>

²⁷² MoSPI, GoI, Energy Statistics 2012- http://mospi.nic.in/mospi_new/upload/Energy_Statistics_2012_28mar.pdf


²⁷³ State Government of Tamil Nadu, Tamil Nadu State Budget 2012-13- http://www.tn.gov.in/budget/budgetspeech_e_2012_2013.pdf

Areas of achievement - Industry

- Industrial policies in Tamil Nadu are comprehensive, ambitious and cover all the possible renewable sources with potential in the state.
- In the industrial energy efficiency area, the state has a balanced approach toward improving efficiency of manufacturing process and promoting new energy-efficient technologies.²⁷⁴

Areas that need improvement - Industry

- Tamil Nadu needs to increase the share of renewable energy consumption in the total energy mix of the industrial sector.

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 BUILDINGS	Renewables	Tamil Nadu has mandated the usage of solar water heaters. The state has also proposed GBI for Solar PV rooftop systems.
	Energy efficiency	Tamil Nadu has already started working on the ECBC. But it lags behind many states, which have already amended, or even mandated, the ECBC. The state has mandated rainwater harvesting. It has mandated the public procurement of BEE Star-labelled mandatory electrical appliances (3-Star or above). Retrofitting of existing/old government buildings has been done in coordination with the Public Works Department. The state has not yet mandated energy audits of commercial buildings.
	Overarching	NA

Areas of achievement - Building

- The state has started working on the ECBC, amending it as per its climatic conditions.²⁷⁵
- The state has mandated the use of solar water heaters.²⁷⁶
- The state has proposed GBIs for the use of solar PV rooftop systems.²⁷⁷
- The state has mandated the public procurement of BEE Star-labelled electrical appliances (3-Star rated or above) in government buildings.²⁷⁸

Areas that need improvement- Building

- The state has not mandated energy audits of commercial buildings.²⁷⁹ It needs to take a step in this direction.

²⁷⁴ Government of Tamil Nadu, Policy Notes – State department of Industries, last visited Dec 2012- <http://www.tn.gov.in/policynotes/pdf/industries.pdf>


²⁷⁵ MNRE, GoI, Status on G.O.s issued by State Governments on mandatory use of solar water heaters/solar buildings & other supportive measures taken on use of solar energy devices/systems, 2011 [http://www.solarwaterheater.gov.in/phpdsurl5/speakers/userfiles/file/Status%20on%20GOs%20issued%20by%20state%20govts\(20\).pdf](http://www.solarwaterheater.gov.in/phpdsurl5/speakers/userfiles/file/Status%20on%20GOs%20issued%20by%20state%20govts(20).pdf)

²⁷⁶ State Government of Tamil Nadu, Notifications on ECBC, state by-laws- <http://www.ibecc.in/state/TamilNadu>

²⁷⁷ Energy Department, State Government of Tamil Nadu, New Announcement on energy management schemes, <http://www.tn.gov.in/policynotes/announcements/energy.pdf>

²⁷⁸ Consultation with SDA – Govt. of Tamil Nadu Electrical Inspectorate

²⁷⁹ Consultation with SDA – Govt. of Tamil Nadu Electrical Inspectorate


Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 TRANSPORT	Renewables	NA
	Energy efficiency	NA
	Overarching	The state has significantly improved the total fleet of buses for public transport under the state road transport authority. Taxes are levied on vehicles that are more than 15 years old. Modes of public transport, like rail-based metro, are being constructed in Chennai. Programmes for NMT systems in Chennai are in the proposal stage, and the UMTA has been established for the city. There is no policy or incentive for electric and hybrid vehicles (EHV).

Areas of achievement – Transport

- The state has significantly improved the total fleet of buses for public transport under state road transport authority from 2006 to 2009.²⁸⁰
- The state levies additional cess on non-transport vehicles that have completed 15 years from the date of their registration and transport vehicles that have completed seven years from the date of their registration.²⁸¹
- The MRTS (Chennai Metro Rail) is been constructed in the capital city and plans for major expansion are in the pipeline.²⁸²

Areas that need improvement - Transport

- The NMTA is in the proposal stage for Chennai and needs to be replicated in other major cities of Tamil Nadu.
- CNG has not been promoted in the state although the Tamil Nadu Pollution Control Board has agreed to offer a subsidy of Rs 3,000 for the conversion of a normal autorickshaw to a CNG-fuelled one.²⁸³
- Means of public transport, including vehicles under public–private partnership, should be encouraged for dissuading the use of private vehicles.
- EHV's need to be promoted.

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 AGRICULTURE	Renewables	NA
	Energy efficiency	NA
	Overarching	The state has registered a lower tonnage of methane emitted per INR lakh of livestock output than the national average. A large number of districts in the state practice the SRI method of paddy cultivation. The state registered a negative growth in nitrogenous fertilizer use from 2008 to 2010, thereby, decreasing nitrogenous emissions. The state should augment its efforts to promote micro-irrigation in agriculture.

²⁸⁰ Ministry of Road Transport year book and performance of SRTUs , Ministry of Road Transport

²⁸¹ State Transport Authority, Government of Tamil Nadu, GREEN TAX (with effect from 01/08/2003) FOURTH SCHEDULE (See Section 3-A),- <http://www.tn.gov.in/sta/t11.html>

²⁸² State government of Tamil Nadu. Status of programme implementation of Chennai metro rail limited, last accessed Dec 2012- <http://chennaime-tro-rail.gov.in/status.php>


²⁸³ State Transport Authority, Government of Tamil Nadu, Controlling Vehicular Pollution, last accessed Aug 2012., <http://www.tn.gov.in/sta/feedback.html>

Areas of achievement - Agriculture

- The state has achieved a lower tonnage of methane emitted per INR lakh of livestock output (0.57) as compared to India's average (0.72). This indicates that the total livestock productivity is higher in the state as compared to the rest of India.²⁸⁴
- The SRI method has been demonstrated in 97%²⁸⁵ of the paddy-growing districts of Tamil Nadu, thereby, conserving water and mitigating methane generation from conventional paddy-growing techniques.
- The state registered a growth of -5.84% in the use of nitrogenous fertilizers from 2008 to 2010, thereby decreasing nitrogenous emissions.²⁸⁶
- Micro-irrigation is practiced across 0.69% of the net irrigated area in Tamil Nadu. This is a high figure when compared to the India average of 0.21%. These efforts should be further augmented as the practice helps conserve water.²⁸⁷

Areas that need improvement - Agriculture

- The state has low cropping intensity, 115% as compared to India's figure of 139% in 2007-08.²⁸⁸ This needs to be increased.

Sector	Policy Enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
	Renewables	NA
	Energy efficiency	NA
	Overarching	The total forest area cover has increased from 22,643km ² to 23,625km ² , i.e., 0.76% with respect to the geographical area, from 2002 to 2009. The forest density has improved by 0.35% from 2002 to 2009.

Areas of achievement - Forestry

- The total forest area cover in Tamil Nadu has increased by 0.76%, with respect to the geographical area, from 2002 to 2009.²⁸⁹
- Forest density improved by 0.35% from 2002 to 2009.
- The growing stock of tree cover, as a percentage of state's geographical area, has increased by 3.63%.²⁹⁰

Areas that need improvement - Forestry

- Although Tamil Nadu is one of the best performers in the forestry sector among the 10 states, efforts can be increased to strengthen the forest database system.

284 1. Methane enteric fermentation from the paper "Spatial pattern of methane emissions from Indian livestock" by Abha Chhabra*, K. R. Manjunath, Sushma Panigrahy and J. S. Parihar; Remote Sensing Applications Area, Space Applications Centre, Indian Space Research Organization, Ahmedabad 380 015, India
2.: Ministry of Statistics and Programme Implementation, Govt. of India. Total livestock output

285 www.sri-india.net


286 The Fertiliser Association of India, Fertiliser Statistics 2009-10,

287 Indian Agriculture Statistics Research Institute, data table 3.36, state-wise area coverage under drip-irrigation in India- http://www.iasri.res.in/agridata/08data/chapter3/db2008tb3_36.pdf

288 Central Water Commission Statistics 2010, GoI-http://www.cwc.nic.in/ISO_DATA_Bank/W&RelatedStaatics_2010.pdf

289 Forest Survey of India, Government of India . Indian State of Forest Report 2003 and 2011.

290 Forest Survey of India, Government of India , State of Forest Report 2011 of the FSI, GoI, State/UT-wise Tree Cover Estimates,

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
	Renewables	Tamil Nadu is known for generating more than 60% of the total wind power in India. But when it comes to utilizing its waste-to-energy potential, the state lags behind. The state has a potential of 151MW. As per the MoSPI report <i>Energy Statistics 2012</i> , the state still has only utilized 5.65MW (3.74%) of its potential.
	Energy Efficiency	NA
	Over arching	Tamil Nadu ranks first in e-waste recycling facilities in India, having a capacity of 38,927MTA. The state, thus, has the capacity to recycle 64% of the e-waste generated. However, the state shows poor performance in sewage treatment. Its treatment capacity is only 30.95% of the waste generated.

Areas of achievement - Waste

- Tamil Nadu has the highest e-waste recycling capacity in India, thus showing its pro-activeness to take care of e-waste. But this recycling capacity of 38,92MTA is only 64% of the total e-waste generated in the state.²⁹¹

Areas that need improvement - Waste

- Tamil Nadu needs to harness its W2E potential. As on 31 March 2011, it had achieved only 3.74% of its total potential.²⁹²
- The state's sewage treatment capacity needs to be enhanced. At present, the treatment capacity is only 30.95% of its sewage generated.²⁹³

²⁹¹ Central Pollution Control Board, GoI, E-Waste Registration List -www.cpcb.nic.in

²⁹² Ministry of Statistics and Programme Implementation (MoSPI), GoI, Energy Statistics 2012- http://mospi.nic.in/mospi_new/upload/Energy_Statistics_2012_28mar.pdf

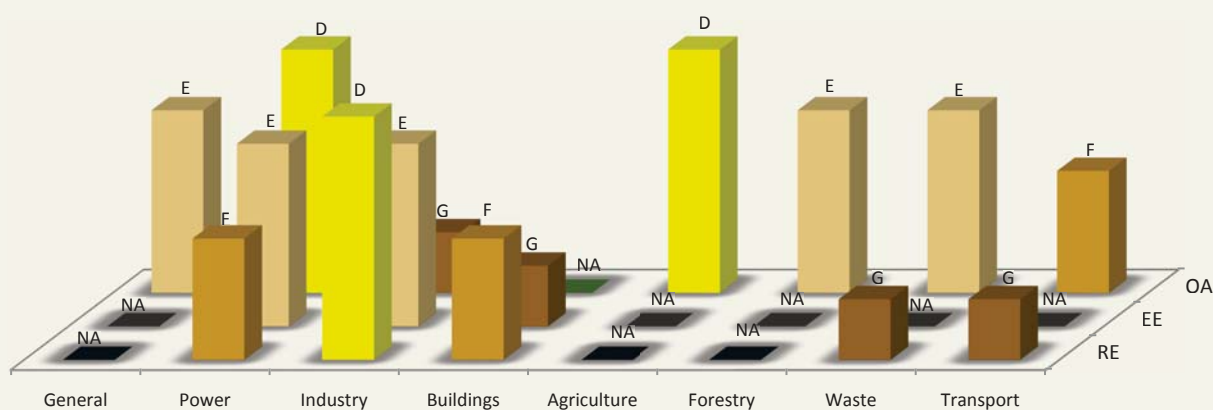
²⁹³ Central Pollution Control Board, India, Status of water supply, wastewater generation and treatment in class-i cities & class-ii towns of India -2009-http://www.cpcb.nic.in/upload/NewItems/NewItem_153_Foreword.pdf

6.9. Arunachal Pradesh




Sector	Sectoral GDP contribution ²⁹⁴ as percentage of state GDP
Power	8%
Transport	2%
Industry	4%
Buildings	24%
Agriculture	16%
Forestry	11%
Waste	Not available

Summary of the state's results



294 CSO (as on 1 March 2012). (ON251)

Sectors in detail

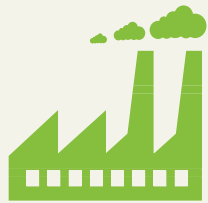
Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 POWER	Renewables	Arunachal Pradesh has high renewable energy potential, however, the state is yet to attract investors for harnessing it. The state policy is concentrated toward hydro energy and needs to focus on other RE technologies.
	Energy efficiency	The share of thermal-based power plants in the state's energy mix is limited, and it does not have a robust T&D infrastructure. The performance of the existing infrastructure has improved, which has increased the overall energy efficiency of the sector.
	Overarching	NA

Areas of achievement - Power

- The state offers a feasible renewable energy tariff with support to a mix of renewable energy technologies.²⁹⁵
- A reasonable share of the state budget is allocated for the renewable energy sector.²⁹⁶

Areas that need improvement - Power

- The state, given its huge RE potential, needs to develop the renewable energy sector, with differential support to the technology mix.
- The state needs to develop a policy framework with adequate financial support to project developers by offering preferential tariff for power generated from the renewable energy sources.

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 INDUSTRY	Renewables	The share of renewables in the energy generation mix in industries needs to increase. Arunachal Pradesh has policies for all types of renewable energy potential in the state, but there is no action plan to implement these provisions.
	Energy efficiency	Energy efficiency policies need to reduce the energy intensity of the sector and promote energy-efficient technologies.
	Overarching	The state does not have an overarching policy scenario that specifies product design change, reduction of subsidies and carbon taxes for emissions in the industry sector.

Areas of achievement - Industry

- Arunachal Pradesh has comprehensive and ambitious industrial policies, which cover the utilization of all the possible renewable sources, with reasonable potential, in the state.²⁹⁷


Areas that need improvement - Industry

- The state needs to increase the share of renewables in the energy mix of the industrial sector.
- The policy scenario for renewable energy needs to be made more implementable with government support and financing mechanisms.
- The state needs a robust policy for improving the energy efficiency of the industrial sector.

²⁹⁵ Central Electricity Regulatory Commission, India, Determination of Forbearance and Floor Price for the REC framework, Aug 2011 - http://www.cercind.gov.in/2011/August/Order_on_Forbearance_&_Floor_Price_23-8-2011.pdf

²⁹⁶ State Government of Arunachal Pradesh, Arunachal Pradesh State Industrial Policy 2008- <http://arunachalpradesh.nic.in/deptt/industry/IndPolicy.pdf>

²⁹⁷ Department of industries, Government of Arunachal Pradesh, State Industrial Policy 2008, <http://arunachalpradesh.nic.in/deptt/industry/Ind-Policy.pdf>


Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 BUILDINGS	Renewables	The state has still not mandated the usage of solar water heaters. However, the state is proposing a subsidy for the same. The state has no policy for solar PV rooftop systems.
	Energy efficiency	Arunachal Pradesh has done nothing to implement the ECBC. Thus, it lags far behind many states, which have already amended, or even mandated, the ECBC. The state has no public procurement policy for BEE Star-labelled electrical appliances. The state has not yet mandated energy audits of commercial buildings.
	Overarching	NA

Areas of achievement - Building

- The state has proposed a subsidy for solar water heaters.²⁹⁸

Areas that need improvement - Building

- The state has not started working on the ECBC.²⁹⁹ It needs to draft and notify an adapted version of the code soon.
- The state has no policy for solar PV rooftop systems,³⁰⁰ and needs to formulate one.
- The state has no policy for the public procurement of BEE Star-labelled electrical appliances,³⁰¹ and needs to mandate the same.
- The state has not mandated energy audits.³⁰² It needs to take steps in this direction.

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 TRANSPORT	Renewables	NA
	Energy efficiency	NA
	Overarching	The state has to improve its state-run bus fleet. There is no policy for promotion of EHV's. There are no policies or programmes for NMT or the UMTA.

Areas that need improvement³⁰³ - Transport

- Means of public transport, including vehicles under public-private partnership, should be encouraged for dissuading the use of private vehicles.
- State-level and city-level agencies are required to promote the development and planning of transport-related initiatives.
- Vehicles that use cleaner fuels like CNG/LPG need to be promoted. The promotion of EHV's may be assessed for the state.

²⁹⁸ Consultation with SDA


²⁹⁹ state government of Arunachal Pradesh- ECBC notification-Website: <http://ibecc.in/state/ArunachalPradesh>- a joint initiative of Shakti Sustainable Energy Foundation

³⁰⁰ Consultation with SDA

³⁰¹ Consultation with SDA

³⁰² Consultation with SDA

³⁰³ Department of Transportation, State Government of Arunachal Pradesh - <https://arunachaltransport.nic.in/>


Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 AGRICULTURE	Renewable	NA
	Energy efficiency	NA
	Overarching	Arunachal Pradesh has a low tonnage of methane emitted per INR lakh of the total livestock output. The state has a lower cropping intensity figure compared to the all-India level. The state needs to improve micro-irrigation techniques, and the SRI method of rice cultivation needs to be introduced in the state.

Areas of achievement - Agriculture

- The state produces 0.52 tonnes of methane per INR lakh of the total livestock output as compared to India's average of 0.72 tonnes per INR lakh of the total livestock output.³⁰⁴

Areas that need improvement - Agriculture

- Arunachal Pradesh has registered a cropping intensity figure of 130% vis-à-vis the all-India figure of 139% in 2007-08.³⁰⁵ Hence, it needs to take steps to increase the cropping intensity.
- The state does not have any districts covered under the SRI³⁰⁶ programme. It needs to introduce this method of rice cultivation.

Sector	Policy enabler area	Overall assessment (description of policy scenario based on the evaluation of indicators)
 FORESTRY	Renewables	NA
	Energy efficiency	NA
	Overarching	The state needs to develop policies/programmes for improving forest cover and forest density. The total forest area cover has decreased by 0.73%, with respect to the geographical area, from 2002 to 2009. Forest density decreased by 0.41% in the state in the same period.

Areas of achievement - Forestry

- The growing stock of tree cover, as a percentage of state's geographical area, has increased by 0.66% during 2002-09.³⁰⁷

Areas that need improvement - Forestry

- The total forest area cover has decreased by 0.73%, with respect to the geographical area, from 2002 to 2009.³⁰⁸ The state needs to take measure to check this trend.
- The state needs to increase its forest density, which decreased by 0.41% from 2002 to 2009.

304 1. Methane enteric fermentation from the paper "Spatial pattern of methane emissions from Indian livestock" by Abha Chhabra*, K. R. Manjunath, Sushma Panigrahy and J. S. Parihar; Remote Sensing Applications Area, Space Applications Centre, Indian Space Research Organization, Ahmedabad 380 015, India


2. Ministry of Statistics and Programme Implementation, Govt. of India, Total livestock output data

305 Central Water Commission of India, Water and related statistics, Central Water Commission 2010, - http://www.cwc.nic.in/ISO_DATA_Bank/W&RelatedStatistics_2010.pdf

306 Systematic Rice Intensification, 2008- www.sri-india.net

307 Forest Survey of India 2003,2011, GoI, Table 4.6.1: State/UT-wise Tree Cover Estimates

308 Indian State of Forest Reports 2003 and 2011 (released by Forest Survey of India, Government of India-http://www.fsi.org.in/sfr_2011.htm)

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 WASTE	Renewables	As per the MoSPI report <i>Energy Statistics 2012</i> , the state has no potential for waste-to-energy. This may be accounted to the fact that its waste is mostly wet in nature. So, it is economically not viable to convert it into energy because of pre-processing energy needs.
	Energy efficiency	NA
	Overarching	The state does not have any e-waste recycling facilities.
Areas of achievement - Waste <ul style="list-style-type: none"> ■ The state has taken initiatives for better waste management practices, such as setting up compost plants and landfill facilities. Areas that need improvement- Waste <ul style="list-style-type: none"> ■ Arunachal Pradesh has no e-waste recycling facilities.³⁰⁹ ■ Not much data/information is available on Arunachal Pradesh's sewage treatment. 		

³⁰⁹ Central Pollution Control Board, GoI, Report on schemes of MoUD and MNE-http://www.cpcb.nic.in/wast/municipalwast/Reports_schemes_of_MoUD_and_MNE.pdf

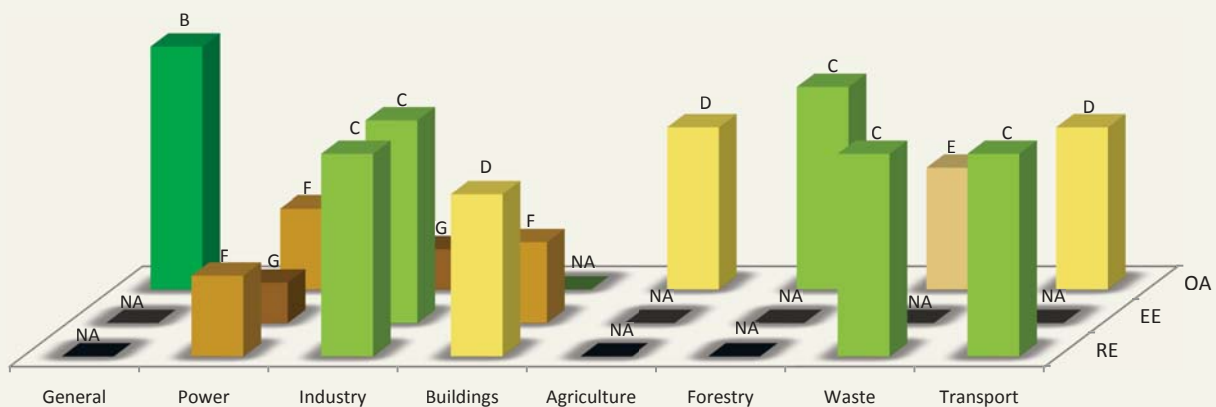
6.10. Madhya Pradesh



Sector	Sectoral GDP contribution ³¹⁰ as percentage of state GDP
Power	3%
Transport	3%
Industry	17%
Buildings	10%
Agriculture	20%
Forestry	3%
Waste	Not available

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Summary of the state's results



Rating band and colour code	A	B	C	D	E	F	G
Normalized score on a scale from 0 to 100	90 <= 100	75 <= 90	60 <= 75	45 <= 60	30 <= 45	15 <= 30	0 <= 15

310 CSO (as on 1 March 2012). (ON251)

Sectors in detail

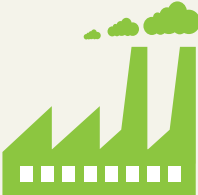
Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 POWER	Renewables	Madhya Pradesh has been proactive in coming up with a wind energy policy, but it is yet to achieve its substantial renewable energy potential. The state needs to provide attractive renewable energy tariffs and support the infrastructure for renewable energy in the state.
	Energy efficiency	The energy efficiency of the power sector needs improvement. State-owned power generators have a low efficiency level, and the sector has a poor T&D supporting structure. The state does not have any major demand-side management initiative.
	Overarching	The state offers partial subsidies to its consumers and needs to allocate a larger amount from the state budget to develop non-conventional sources of energy.

Areas of achievement - Power

- Madhya Pradesh focuses on wind energy generation and has achieved 27%³¹¹ of its potential; however, it lacks a balanced mix of renewable energy technologies available in the state.
- Madhya Pradesh focuses on the development of the infrastructure to promote renewable energy, especially solar power, by providing grid-evacuation facilities, land clearances and developing solar parks.
- The state has announced a series of incentives, like electricity duty and cess exemption, wheeling charges, entry tax and VAT exemption, etc., in its solar energy policy, released in 2012.

Areas that need improvement - Power

- Madhya Pradesh needs to improve all the three aspects of the power sector, namely, renewable energy, energy efficiency and the overarching policy scenario.
- The power sector in the state has low energy efficiency and needs to improve its existing thermal facilities, upgrade its thermal power generation technologies and also improve the T&D system.
- The state offers high subsidy to various classes of consumers, which deters the adoption of energy conservation measures. The state offers policy measures but lacks substantial budget allocation for non-conventional and renewable energy sources of power generation.

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 INDUSTRY	Renewables	The share of renewables in the energy mix consumed by the industrial sector in Madhya Pradesh has reduced between 2004-05 and 2007-08. The state is yet to implement various drafted policies.
	Energy efficiency	The energy intensity of the industries in Madhya Pradesh has improved over a period of time. To improve the efficiency standards in the industrial sector, the state has introduced policies and support mechanisms, like exemption from duty on captive power consumption and renewable energy consumption in industries.
	Overarching	The state industrial policies do not have any major provisions for carbon taxes or incentives for promoting low-carbon growth in the industrial sector.


311 Madhya Pradesh Urja Vikas Nigam Limited, State Government of MP, WIND ENERGY PROGRAMME IN M.P. visited Dec 2012- <http://www.mprenewable.nic.in/winde.html>

Areas of achievement - Industry

- The industrial policies of Madhya Pradesh are comprehensive, ambitious and cover all the possible renewable sources with potential in the state.
- The state has a balanced approach toward improving efficiency of manufacturing processes and promoting new energy efficiency technologies.³¹²

Areas that need improvement - Industry

- The state needs to develop its overarching policy scenario by framing policies for improving product design and incentivizing advanced manufacturing technologies.
- The industrial policy needs to increase the share of renewable energy in the energy mix of the state and also reduce the overall energy intensity of the industry sector.
- The state should also consider introducing carbon taxes and other penalty mechanisms for emissions-intensive industries.

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 BUILDINGS	Renewables	The state has not mandated the usage of solar water heaters, thus, lagging behind many states, which have already done so. However, the state offers incentives to investors for projects involving solar heating technologies and solar PV rooftops in its Solar Policy, 2012.
	Energy efficiency	Madhya Pradesh has not started working on the ECBC, and thus lags behind many states, which have already amended, or even mandated, the code. The state has no policy for the public procurement of BEE Star-labelled appliances. Energy audits have been mandated for all government buildings that have loads of 100kVA or above. Retrofitting of old buildings has already been done, with focus on major buildings, such as Raj Bhawan, the RBI office and the Mantralaya. Also, every district's collectorate office has been selected to sensitize people to EC measures.
	Overarching	NA

Areas of achievement - Buildings

- Madhya Pradesh has proposed incentives for solar water heaters and solar PV rooftop³¹³ systems.
- The state has taken up initiatives for retrofitting.³¹⁴
- The state has mandated energy audit of all government buildings.³¹⁵

Areas that need improvement - Buildings

- The state has yet to take up amending the ECBC,³¹⁶ and needs to draft the same as per its climatic requirements.
- The state has no public procurement policy of BEE Star-labelled electrical appliances.³¹⁷ This needs to be mandated.
- The state needs to mandate the use of solar water heaters.

312 State Government of Madhya Pradesh, Industrial Policy Promotion Policy 2010 and Action Plan- <http://www.dif.mp.gov.in/InvestOpportunity%5CIndusPromtnPolicy2010.pdf>


313 State Government of Madhya Pradesh, Madhya Pradesh Solar Policy 2012- <http://www.ireda.gov.in/Solar/DATA/Policy/9%20Madhya%20Pradesh-solar.pdf>

314 Consultation with SDA – MP Urja Vikas Nigam Limited

315 Consultation with SDA – MP Urja Vikas Nigam Limited

316 Energy Conservation Building Code, State Notification, -<http://ibecc.in/state/ArunachalPradesh>

317 Consultation with SDA – MP Urja Vikas Nigam Limited


Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 TRANSPORT	Renewables	NA
	Energy efficiency	NA
	Overarching	The state provides subsidy on VAT for the promotion of electric vehicles. The state is promoting CNG vehicles in major cities. BRT systems are under construction in Bhopal and Indore. Programmes have been started for promoting NMTs and a draft policy has been framed for the establishment of the Urban Mass Transit Company. ³¹⁸

Areas of achievement - Transport

- CNG vehicles are present in major cities, including Bhopal.³¹⁹
- Between years 2007 and 2009, the number of state run bus per lakh population in Bhopal has increased by 8%. Over the same duration Madhya Pradesh has increased the fleet size of its state-run bus vehicles.
- The BRTS has been constructed in the cities like Bhopal and Indore and plans for major expansion are in the pipeline.³²⁰

Areas that need improvement - Transport

- NMT systems have been implemented in Indore, and the same should be replicated in other cities.³²¹
- Means of public transport, including vehicles under public-private partnership, should be encouraged for dissuading the use of private vehicles.
- EHVs should be promoted in the state.

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
 AGRICULTURE	Renewables	NA
	Energy efficiency	NA
	Overarching	The state has a good cropping intensity. The SRI method of rice cultivation is widely followed in many districts of the state. The state has registered a very high tonnage of methane emitted per INR lakh of livestock output and also registered a high usage of nitrogen fertilizer, thus, also contributing to higher nitrogenous emissions. The state should increase the percentage of its net irrigated area under micro-irrigation, since this technique conserves water significantly.

³¹⁸ Andhra Pradesh State Road Transport Company Ltd agency UMTC - <http://www.umtc.co.in/>

³¹⁹ Ministry of Petroleum and Natural Gas, Govt. of India.

³²⁰ JNNURM status report "Implementation status of projects approved under JNNURM", <http://www.niua.org/projects/tpt/introduction.pdf>, http://planningcommission.nic.in/plans/mta/11th_mta/chapterwise/chap18_urban.pdf, <http://ibnlive.in.com/news/travel-travails-set-to-end-in-city/264150-60-120.html>, <http://indiabudget.nic.in/es2008-09/chapt2009/chap913.pdf>


³²¹ Government of Madhya Pradesh, State Urban Transport Mission weblink last visited Dec 2012- <http://www.citybusindore.com/sutpproject.aspx>

Areas of achievement - Agriculture

- In 2007-08, Madhya Pradesh registered a cropping intensity of 139%,³²² which was comparable to India's average in the same period.
- The state has implemented the SRI method in 63% of its paddy-cultivating districts. This is a good sign, since SRI decreases the amount of inputs required for paddy cultivation as well as the quantity of methane emissions.³²³

Areas that need improvement - Agriculture

- Madhya Pradesh had high methane emission levels, in tonnes per INR lakh of livestock output, in 2003.³²⁴ The state should work significantly toward introducing programmes that concentrate on managing the enteric fermentation emissions from its huge livestock inventory.
- Madhya Pradesh has registered a high usage of nitrogen fertilizers from 2008 to 2010, thus, contributing to higher nitrogenous emissions.³²⁵ It needs to take steps to check this trend.
- The state should increase the percentage of its net irrigated area under micro-irrigation, since this technique significantly conserves water.³²⁶

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
	Renewables	NA
	Energy efficiency	NA
	Overarching	The total forest area cover has increased by 0.41%, with respect to the geographical area, from 2002 to 2009. Forest density increased by only 0.07% during 2002-2009. The growing stock of tree cover, as a percentage of the state's geographical area, has increased by 2.3%. Programmes should be implemented for improving the tree cover, with respect to the geographical area of the state. The tree cover on private lands has increased by 100.03% from 2002 to 2005 in the state of Madhya Pradesh.

Areas of achievement - Forestry

- The total forest area cover has increased by 0.41%, with respect to the state's geographical area, from 2002 to 2009.³²⁷

Areas that need improvement - Forestry

- Steps need to be taken to increase forest density, which grew by only 0.07%³²⁸ during 2002-2009.

³²² Central Water Commission of India, Water and related statistics, Central Water Commission 2010, http://www.cwc.nic.in/ISO_DATA_Bank/W&RelatedStatistics_2010.pdf

³²³ Systematic Rice Intensification, www.sri-india.net

³²⁴ 1. Methane enteric fermentation from the paper "Spatial pattern of methane emissions from Indian livestock" by Abha Chhabra*, K. R. Manjunath, Sushma Panigrahy and J. S. Parihar; Remote Sensing Applications Area, Space Applications Centre, Indian Space Research Organization, Ahmedabad 380 015, India


2. Ministry of Statistics and Programme Implementation, Govt. of India, Total livestock output, last accessed Nov 2012.

³²⁵ The Fertiliser Association of India, Fertiliser Statistics 2009-10, - www.faidelhi.org/general/Publication%20Price%20List.pdf

³²⁶ Indian Agriculture Statistics Research Institute, data table 3.36, state-wise area coverage under drip-irrigation in India -http://www.iasri.res.in/agridata/08data/chapter3/db2008tb3_36.pdf

³²⁷ Forest Survey of India, Government of India, Indian State of Forest Report 2003 and 2011-http://www.fsi.org.in/sfr_2011.htm

³²⁸ Forest Survey of India, Government of India, Indian State of Forest Report 2003 and 2011-http://www.fsi.org.in/sfr_2011.htm

Sector	Policy enabler area	Overall assessment (description of the policy scenario based on the evaluation of indicators)
	Renewables	Madhya Pradesh has a W2E potential of 78MW. As per the MoSPI report <i>Energy Statistics 2012</i> , the state still has utilized only 2.7MW (3.46%) of its potential.
	Energy efficiency	NA
	Overarching	Madhya Pradesh has no e-waste recycling facility. Also, the state shows poor performance in sewage treatment. Its treatment capacity is only 14.97% of the sewage generated.

Areas of achievement - Waste

- The state has commissioned few compost plants³²⁹ and proposed a few landfill facilities.

Areas that need improvement - Waste

- Madhya Pradesh needs to harness its W2E potential, of which it has achieved only 3.46%.³³⁰
- The state's sewage treatment capacity is only 14.97% of its sewage generation. Madhya Pradesh needs to take care of this void in waste management.³³¹
- The state has no e-waste recycling facility. With the rising standard of living in its major cities, such as Bhopal, Indore, Gwalior and Jabalpur, setting up e-waste recycling facilities is going to be of immense importance.³³²

329 Central Pollution Control Board, GoI, Report on schemes of MoUD and MNE, -http://www.cpcb.nic.in/wast/municipalwast/Reports_schemes_of_MoUD_and_MNE.pdf

330 MOSPI, GOI., Energy Statistics 2012 -http://mospi.nic.in/mospi_new/upload/Energy_Statistics_2012_28mar.pdf

331 Central Pollution Control Board, India, Status of water supply, wastewater generation and treatment in class-i cities & class-ii towns of India -2009, http://www.cpcb.nic.in/upload/NewItems/NewItem_153_Foreword.pdf

Appendix A

External stakeholder organizations consulted during the development of the Low-Carbon Growth Policy Tracker for Indian states:³³²

Bureau of Energy Efficiency	Indian Institute of Soil Science, Bhopal
Central Pollution Control Board	International Food Policy Research Institute
Centre for Policy Research	Integrated Research and Action for Development (IRADe)
Department of Environment, Science and Technology, Himachal Pradesh	Ministry of New and Renewable Energy
Department of Science and Technology, Government of India	National Dairy Research Institute
Dr Lakshmi Raghupathy, technical specialist on e-waste management, currently consultant to GIZ (retired director from Ministry of Environment and Forests)	Royal Norwegian Embassy
Delegation of the European Union to India	SENES Consultants
Federation of Indian Chambers of Commerce and Industry	SGS India
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH	Shakti Sustainable Energy Foundation
Himachal Pradesh Energy Development Agency	Society of Indian Automobile Manufacturers
Indian Agricultural Research Institute	State Council for Science, Technology and Environment, Himachal Pradesh
Indian Council of Agricultural Research	The Energy and Resources Institute
Indian Council of Forestry Research and Education	National Centre for Agricultural Economics and Policy Research
Indian Institute of Forest Management	WWF-India (Delhi and Shimla offices)

State Designated Agencies consulted for energy conservation measures in the building sector, over telephonic conversations:

Arunachal Pradesh Energy Development Agency	Karnataka Renewable Energy Development Ltd
Delhi Transco Ltd	Madhya Pradesh Urja Vikas Nigam Ltd
Government of Tamil Nadu Electrical Inspectorate	Maharashtra Energy Development Agency
Gujarat Energy Development Agency	New and Renewable Energy Development Corporation of Andhra Pradesh Ltd (NREDCAP)
Himachal Pradesh State Electricity Board Ltd	Rajasthan Renewable Energy Corporation Ltd (RRECL)

³³² The list of stakeholder organizations is presented in alphabetical order. The inputs provided by various stakeholders are gratefully acknowledged. However, any opinions presented in the study report are not attributed to any of the listed stakeholders.

Appendix B: Sector-wise indicator matrices

Sectoral matrices, which detail the qualitative (Qu) and quantitative (Qt) indicators developed to assess the progress or effectiveness of policies at the state level, are listed in this section.

Power sector

Sub-sector	Indicator ID	Indicators	Indicator weight	Rationale for indicator weightage	Benchmark	Justification for benchmark	Documentation source	Remarks
Renewable energy	P1 (Qt)	Percent of RE potential achieved (as on March 2012)	30%	Direct high impact on zero-emission energy generation technology(ies)	4 - >28% 3 - 25-28% 2 - 22-25% 1 - 20-22% 0 - <20%	RE installed capacity w.r.t RE potential	Comparison with national performance, sourced from Energy Statistics 2012	The indicator captures the achieved RE potential of each state, which is directly related to the conducive climate created by the state for the promotion of RE technologies.
	P2 (Qu)	Differentiated policy support for RE technologies	15%	Indirect impact: Attracting investment in RE technology generation mix	4 - Support for more than four technologies 3 - Support for four technologies 2 - Support for three technologies 1 - Support for two technologies 0 - Support for less than two technologies	Differentiated policy support for different RE technologies	CII (all about renewables.com)	The indicator captures the effectiveness of the coverage of RE policies in the state (for RE technologies with potential in the state).

Sub-sector	Indicator ID	Indicators	Indicator weight	Rationale for indicator weightage	Benchmark	Justification for benchmark	Documentation source	Remarks
	P3 (Qt)	Number of RE technologies achieving RE potential higher than the average national achievement of each RE technology	15%	Indirect impact: Scaling up the effectiveness of the RE technologies	4 - >3 3 - 3 2 - 2 1 - 1 0 - 0	Effectiveness of RE technologies in the state	Monthly Generation Report, CEA	While P1 captures the overall achievement in the RE sector for a state, this indicator tries to rate a state on its balance of efforts toward achieving the potential across different RE technologies.
	P4 (Qt)	Difference between technology viability cost and average power purchase cost (APCC) in the state (compares grid parity approach of state)	25%	Direct impact: Effective tool for supporting RE generation over the long term	4 - If indicator value for two or more than two technologies is negative 3 - If indicator value for one technology is negative 2 - If indicator value is less than 1 for two technologies 1 - If indicator value is less than 1 for at least one technology 0 - If indicator value is less than 1 for all technologies	State-wise efforts to achieve grid parity for RE technologies	Order on forbearance and floor price, dated 21 August 2011	The indicator captures the grid parity gap for renewable energy.

Sub-sector	Indicator ID	Indicators	Indicator weight	Rationale for indicator weightage	Benchmark	Justification for benchmark	Documentation source	Remarks
	P5 (Qu)	Preferential grid access and congestion management for renewable electricity	15%	Indirect impact: Neutral score assigned, as the role of grid access and congestion management schemes lies with the central government	4 - If preferential access and congestion management is present 0 - If preferential access and congestion management is not present	Compliance with national objectives to provide grid support and grid access for renewable energy	India Grid Electricity Code, 2010	This indicator captures policy direction to overcome infrastructural barrier to RE technologies.
Weightage			60%					
Energy efficiency	P6 (Qt)	Decrease in specific CO ₂ emissions of thermal power plants (TPPs)	25%	Direct impact: Reduction in the emissions intensity of the power stations in India.	4 - >4% 2 - (2-4%) 0 - <1%	Thermal energy technology mix in the states	Baseline Carbon Dioxide Emission Database Version 7.0, CEA (www.cea.nic.in/reports/planning/cdm_co2/cdm_co2.htm)	The indicator captures the technology mix performance of thermal power plants
	P7 (Qt)	Deviation from design station heat rate (SHR)	20%	Direct impact on emissions due to improved energy conversion efficiency	4 - <15% 3 - 15-20% 2 - <20-25% 1 - 25-30% 0 - >30%	Performance of state-owned TPPs	CEA's performance report on TPPs	The indicator captures operational performance of the thermal power plants.

Sub-sector	Indicator ID	Indicators	Indicator weight	Rationale for indicator weightage	Benchmark	Justification for benchmark	Documentation source	Remarks
	P8 (Qt)	Transmission and Distribution (T&D) losses reduction	20%	Direct impact: The government has ambitious plans for reducing T&D losses in India. The indicator has an impact on the efficiency of the power system.	4 - >30 % 3 - 26-30% 2 - 22-26% 1 - 20-22% 0 - <20%	Performance of T&D companies' infrastructure	Planning Commission's Eleventh Plan databook	As per the available data from 2002
	P9 (Qt)	Demand-side management energy savings as a percentage of the total energy consumption in the electricity sector in the state	30%	Direct impact factor in improving end-use efficiency	4 - Greater than or equivalent to the national average 0 - Less than the national average	Based on data availability	1. Report on Verified Energy Savings with the Activities of "Bureau of Energy Efficiency" for the year 2009-10 2. National Productivity Council	The energy savings achieved directly relate to capacity addition avoided.
	P10 (Qu)	Advanced fossil fuel combustion technologies like MPPs, UMPP, clean coal technology, supercritical IGCC, gas-based power generation (as per the Interim Report of the Planning Commission)	5%	Direct impact on the emissions; however, central policy has a greater role in supporting advanced technologies.	4 - Commissioning of project in place for any one of the advanced technologies 2 - Ongoing construction of project for any one of the advanced technologies 0 - No project based on advanced technology	Adoption of advanced combustion technology in the state	1. Ministry of Power 2. Projects listed on state generation companies websites	Status of the projects with state generation companies, as available in the public domain

Sub-sector	Indicator ID	Indicators	Indicator weight	Rationale for indicator weightage	Benchmark	Justification for benchmark	Documentation source	Remarks
Weightage			30%					
Overarching	P11 (Qu)	Extent of subsidies on electricity supply (domestic, industrial, commercial and agriculture)	50%	Indirect impact on electricity consumption pattern of sectors	4 - No subsidy 2 - Partial subsidy to more than one sector 0 - Full subsidy in any one sector	Compares subsidies offered to different classes of electricity consumers	State average revenue realization (ARR) reports	The indicator highlights barriers to energy efficiency projects.
	P12 (Qt)	Budget allocation per unit untapped RE potential	50%	Indirect impact: Financial support available with the state for harnessing the RE and EE potential in the state	4 - Higher than the national ratio 0 - Lesser than the national ratio	Compares the share of RE development budget w.r.t. installed capacity and RE potential	State budget publications for renewable energy and non-conventional sources of energy	The indicator highlights the financial commitment of the state to RE/EE development in the state.
Weightage			10%		0			

The emission intensity, indicator P6, has considered only state-run power plants, which constitute 41% of the energy generated in the state. Centre-owned (41%) and private-owned power plants (18%) have been excluded since the states' policies do not have a significant effect over the operations of these plants.

Ref: Baseline Carbon Dioxide Emission Database Version 7.0, CEA

Industry sector

Sub-sector	Indicator ID	Indicator	Indicator weight	Rationale for indicator weightage	Benchmark	Justification for benchmark	Documentation source	Remarks
Renewable energy	II (Qt)	Increase in the share of renewable energy consumption by industries	30%	This indicator assesses the increase of renewable energy share in the total energy mix in industry.	4 - > 32% 3 - 32% 2 - 32-10% 1 - 10-0% 0 - <0%	The benchmark is calculated on the basis of the performance at the national level, i.e., the percentage increase in the share of renewable energy in industry at the national level. The share of renewable energy increased by 32% in the 2008-09 compared to the 2004-05 levels.	1. Annual Survey of Industries (http://mospi.nic.in/Mospi_New/upload/asi/ASI_main.htm?status=1&menu_id=88) 2. Ministry of Petroleum and Natural Gas (http://petroleum.nic.in/pngstat.pdf)	While calculating the total energy consumption, various assumptions are used: 1. Naphta, LDO, FO are assumed to be consumed totally in industry. 2. LPG, kerosene, petrol are assumed to be negligible for industrial use. 3. Aviation turbine fuel (ATF) has not been included in industrial energy consumption, as it is used in aviation and not in manufacturing. 4. Lubes/greases, LSHS/HHS and bitumen are not included in energy consumption as they are used as raw materials and are sparingly used as fuels. 5. Energy generation in captive plants is totally attributed to industry irrespective of the electricity exported or not, since the fuel burnt in the captive plants is attributed to the energy consumed by the captive plants. 6. The coal consumed is assumed to be sub-bituminous (majority of coal used in India is sub-bituminous) 7. For biomass calculations, installed capacity in the state is taken, and energy generation is calculated assuming 300 days of operation and an average PLF of 70%.

Sub-sector	Indicator ID	Indicator	Indicator weight	Rationale for indicator weightage	Benchmark	Justification for benchmark	Documentation source	Remarks
	I2 (Qu)	Are policies in place that effectively lead to increasing the use of renewable energy in industry (support schemes, voluntary agreements, trading mechanisms, etc.)?	70%	Presence of policies would drive the use of renewable energy in industry	4 - Comprehensive, ambitious and covering all the possible renewable sources that have potential in the state 3 - Policies exist for all types of renewable energy with potential in the state 2 - There are policies in place for some renewable sources but not all, despite the potential available in the state 1 - Some policy in place that supports the use of a non-conventional source 0 - No policies exist	Policy support for increasing renewable energy use in industry	1. IREDA (http://www.ireda.gov.in/Compendium/index%20copy.htm) 2. State renewable energy policies	This indicator would include the support/policies available for setting up demo/pilot projects as well for renewable energy in industry.
Weightage			25%					

Sub-sector	Indicator ID	Indicator	Indicator weight	Rationale for indicator weightage	Benchmark	Justification for benchmark	Documentation source	Remarks
Energy efficiency	I3 (Qt)	Decrease in energy intensity of industry (across all fuels, both conventional and non-conventional)	30%	This indicator assesses the energy intensity performance in the state's industry.	4 - >-3.38% 3 - >-3.38% to -4% 2 - >-4% to -10% 1 - >-10% to -15% 0 - <-15%	There are no targets at the state level to the decrease energy intensity. The benchmark is calculated on the basis of the performance at the national level, i.e., the decrease in the energy intensity at national level. The energy intensity for India has increased by 3.38% (hence a negative value) from 2004-05 to 2008-09. This percentage is included as the higher value of the range, taken at the benchmark score of 3. States performing better than this value are given better ranking.	1. Annual Survey of Industries (mospi. nic.in/Mospi_New/upload/asi/ASI_main.htm?status=1&menu_id=88 2. Ministry of Petroleum and Natural Gas: (http://petroleum.nic.in/pngstat.pdf).	Energy intensity is defined as energy consumed per unit of GDP. Currently, the calculations are done by considering energy consumption per unit of NDP (net domestic product), which is provided at the state level by the RBI. NDP (GDP minus depreciation) is as good a parameter to use in calculating energy intensity as is GDP. Also, the NDP is taken at factor cost of 2004-05 base values, to ensure normalization. While calculating the total energy consumption, various assumptions are used: 1. Naphta, LDO, FO are assumed to be consumed totally in industry. 2. LPG, kerosene, petrol are assumed to be negligible for industrial use. 3. ATF has not been included in industrial energy consumption, as it is used in airplanes and not in manufacturing. 4. Lubes/greases, LSHS/HHS and bitumen are not included in energy consumption as they are used as raw materials and are sparingly used as fuels.

Sub-sector	Indicator ID	Indicator	Indicator weight	Rationale for indicator weightage	Benchmark	Justification for benchmark	Documentation source	Remarks
								<p>5. Energy generation in captive plants is totally attributed to industry irrespective of the electricity exported or not, since the fuel burnt in the captive plants is attributed to the energy consumed by the captive plants.</p> <p>6. The coal consumed is assumed to be sub-bituminous (majority of coal used in India is sub-bituminous).</p> <p>6. For biomass calculations, installed capacity in the state is taken, and energy generation is calculated assuming 300 days of operation and an average PLF of 70%.</p>
	14 (Qu)	Are schemes in place that lead to sufficient additional improvements in energy efficiency and support purchase/import of energy-efficient technologies?	70%	Assessing the support of state-level policies in driving energy efficiency initiatives, including technology transfer within the industry	<p>4 - Comprehensive, ambitious and implemented policies</p> <p>3 - Policies in place with defined incentives and action plan</p> <p>2 - Policies in place with defined mechanism for support</p> <p>1 - The policy identifies the need for energy efficiency</p> <p>0 - No policies exist</p>		<p>1. State energy conservation funds</p> <p>2. Industrial promotion policies</p> <p>3. State electricity board's policies</p> <p>4. State energy development agencies</p> <p>5. SAPCCs</p>	

Sub-sector	Indicator ID	Indicator	Indicator weight	Rationale for indicator weightage	Benchmark	Justification for benchmark	Documentation source	Remarks
Weightage			25%					
Overarching	I5 (Qu)	Policies that support the redesign of products to be less material intensive, more long lasting and 100% recyclable	30%	Policies that support product eco-design have an impact across the product's life cycle and, therefore, resource efficiency.	4 - Policies that are comprehensive, ambitious and have an implementation plan applicable to domestically produced and imported/exported products 3 - Policies with defined mechanism of support for the redesign of products to achieve all objectives, i.e., material reduction, long lasting and recyclability 2 - Policies in place with defined mechanism of support (i.e., through some committees or		State industrial promotion policies	

Sub-sector	Indicator ID	Indicator	Indicator weight	Rationale for indicator weightage	Benchmark	Justification for benchmark	Documentation source	Remarks
					funds or incentives) for any of the objectives of redesign, i.e., material reduction or long lasting or recyclability 1 - Policies at the state level, which acknowledge the need for redesign of products 0 - No policies exist			
	16 (QU)	Decrease in subsidies to energy-intensive industry for conventional fuel supply and consumption	30%	Decrease in subsidies on consumption of fossil fuel would limit its use, thus, promoting a low-carbon pathway.	4 - Substantial decrease in the subsidies 3 - No subsidies exist 2 - High subsidies exist but there has been a small decrease in the same (less than 10 %) 1 - Low subsidies exist with no decrease 0 - High subsidies exist with no decrease	Evaluation will be based on data availability in the future	State industrial policies	This indicator is important from the perspective of future policies for decreasing the use of fossil fuels in industries. The indicator currently fetches a neutral score for all states. However, in the future, this may be addressed through greater inputs from state policies.

Sub-sector	Indicator ID	Indicator	Indicator weight	Rationale for indicator weightage	Benchmark	Justification for benchmark	Documentation source	Remarks
	17 (Qu)	Policies that encourage industry to avail and trade carbon credits	10%	Industry can avail carbon credits through effective renewable energy-based projects as well as energy efficiency projects, and both would help growth toward a low-carbon pathway.	4 - A comprehensive, ambitious and implemented policy 3 - Policies that quantify the kind of support, along with the mechanisms that can be established to provide the support 2 - Policy that talks about the support in detail 1 - Policy exists, which acknowledges the need for support 0 - No policy exists		State industrial promotion policies	Although CDM, the current carbon credit generating mechanism available for Indian industry, is a market-based mechanism and, thus, open for all industries for participation, some states offer a CDM facilitation unit to support industries to take up more GHG mitigation projects. This is reflected in the state's industrial policies. But not much clarity exists on how the support would be provided. However, in the light of the changing scenario for CDM, the process of generating carbon credits from industrial projects may change.

Sub-sector	Indicator ID	Indicator	Indicator weight	Rationale for indicator weightage	Benchmark	Justification for benchmark	Documentation source	Remarks
	18 (Qu)	Levy of energy and/or CO ₂ taxes (or any cess applicable in the sector)	30%	Energy or CO ₂ taxes/cess levied on energy intensive industries would promote resource conservation and energy conservation by the industry sector	4 - There are additional taxes/cess 0 - No tax		State industrial promotion policies	Levying a green cess on the consumption of carbon-intensive conventional energy works as a detrimental cost to industry.
Weightage			50%					

Transport sector

Sub-sector	Indicator ID	Indicators	Indicator weight	Rationale for indicator weightage	Benchmark	Justification for benchmark	Documentation source	Remarks
Renewable energy	T1 (Qu)	Policy promoting biofuels (biodiesel and bioethanol)	100%	Direct impact on the reduction of emissions from the transport sector	4 - Policy exists and implementation of ethanol-blended petrol seen in state and cultivation of crops for biodiesel in progress 3 - Policy exists and implementation of ethanol-blended petrol seen in state or cultivation of crops for biodiesel in progress 2 - Biofuel policy exists 0 - No policy exists	The cultivation of crops for biodiesel and the blending of ethanol in petrol, as per the central government-promoted National Biofuel Policy blending norms (prescribed in subsequent notifications and under the Ethanol Blended Petrol (EBP) Programme), in the state would lead to the reduction of emissions due to the substitution of fossil fuels.	<p>1. jatrophabiodiesel.org(http://www.jatrophabiodiesel.org/location-india.php)</p> <p>2. Policy paper on Biofuels in India: Potential, Policy and Emerging Paradigms (http://www.ncap.res.in/upload_files/policy_paper/pp27.pdf)</p> <p>3. Petroleum Conservation Research Association, National Biofuel Centre (http://www.pcr-a-biofuels.org/ap.htm)</p> <p>4. State biofuel board websites</p> <p>5. Ethanol Blending Policy in India: demand and Supply Issues, ICRIER (http://www.icrier.org/pdf/policy_series_no_9.pdf)</p> <p>6. Gazette of India (http://petroleum.nic.in/Gazette.tif)</p>	<p>1. This indicator assesses the role of policy in the promotion of renewable energy in the transport sector. At an all-India level, the biofuel policy aims at raising the blend of biofuels with petrol and diesel to 20% by 2017. 2. The EBP Programme is presently being implemented in 13 states, with a blending level of about 2% against a mandatory target of 5% due to various reasons, such as availability of adequate ethanol, which has alternate uses, eg. use in potable liquor. 3. On 22 November 2012, the Cabinet Committee on Economic Affairs (CCEA) approved the issue of pricing for bioethanol procurement by oil marketing companies (OMCs) for the EBP Programme. The 5% mandatory ethanol blending with petrol, already decided by the CCEA, should be implemented across the country. For this, the Ministry of Petroleum and Natural Gas will immediately issue a gazette notification, mandating the OMCs to sell blended petrol from the 2012-13 sugar season, effective from 1 December 2012. (http://pib.nic.in/newsite/erelease.aspx?relid=29728) and (http://articles.economictimes.indiatimes.com/2012-11-23/news/35300815_1_cent-ethanol-core-litres-ebp-programme).</p>

Sub-sector	Indicator ID	Indicators	Indicator weight	Rationale for indicator weightage	Benchmark	Justification for benchmark	Documentation source	Remarks
Weightage			10%					
Overarching	T2 (Qu)	Incentives for the promotion of electric and hybrid vehicles (EHV)	10%	EHVs play an important role in improving end-use efficiency	4 - Policy and incentive exists for the promotion of EHV's 2 - Policy or incentive exists 0 - No incentive or policy exists	Incentives, when enforced with policy, give greater boost to efforts at the state level than when a policy is enforced without incentives. At present, a direct cash subsidy of 20% is provided on the purchase of all electric cars and two-wheelers. Additionally, state governments give their own incentives such as exemption from sales tax and VAT.	Wikipedia (http://en.wikipedia.org/wiki/Government_incentives_for_plug-in_electric_vehicles)	No standard documentation is available to evaluate the state-wise incentives for the promotion of EHV's.
	T3 (Qt)	Number of buses under SRTU per lakh population	10%	The use of a public transport system is less emission intensive.	4 - > 1000 3 - 500-1000 2 - 100-500 1 - < 100 4 - > 10% change 3 - 5% to 10% change 2 - < 5% change 0 - Negative change	At an all-India level, the indicator has a value of 131.2 buses per lakh population	The number of buses is referred from the Road Transport Year Book, Ministry of Road Transport, GoI	This indicator gives the absolute number of buses per lakh population of the capital city of a state.

Sub-sector	Indicator ID	Indicators	Indicator weight	Rationale for indicator weightage	Benchmark	Justification for benchmark	Documentation source	Remarks
		Rate of change in number of buses (under state road transport authority) per lakh population of the capital city	5%			The rate of change in the number of buses (under state road transport authorities) per lakh population of India is 10.02%		This indicator gives the rate of change of buses (under the state road transport authority) as per the population change.
	T4 (Qu)	Levying additional tax (green tax) for registered vehicles	5%	This indicator covers the general type of green taxes, which can be employed by different states	4 - Additional tax is levied 2 - Green tax is in the proposal stage 0 - No additional tax levied	A green tax would act as financial disincentive for the inefficient use of vehicles	Various reports available in the public domain	This indicator assesses the implementation status of financial disincentives for using vehicles.
	T5 (Qu)	Use of clean fuels like LPG and CNG	15%	Even if policies are in place, effective administrative support is essential to attract investment.	4 - Introduction of CNG/LPG vehicles in the state 2 - Programmes proposed to introduce CNG/LPG vehicles in the state 0 - Neither programmes proposed nor implementation of CNG/LPG vehicles in the state	A CNG programme in the transport sector has been implemented in eight states in India since 2011.	Data referred from Ministry of Petroleum and Natural Gas, GoI.	1. The number of CNG vehicles in India is available for select cities and a select group of data. This data is not available for the entire state. 2. However, some states have a CNG programme across model cities; these are accorded scores under this indicator.

Sub-sector	Indicator ID	Indicators	Indicator weight	Rationale for indicator weightage	Benchmark	Justification for benchmark	Documentation source	Remarks
	T6 (Qu)	Policy to phase out passenger and goods' vehicles that do not meet existing PUC emission norms	10%	Policies are required to promote vehicles that meet current PUC emission norms. Policies also include the introduction of vehicle inspection programmes.	4 - Policy and strict fines exist for non-compliance with pollution testing norms 3 - Strict fines exist for non-compliance with pollution testing norms, as per section 190(2) of the Motor Vehicles Act 2 - Basic fines exist for non-compliance with pollution testing norms, as per section 177 of the Motor Vehicles Act 0 - No fines exist for non-compliance with pollution testing norms	At the all-India level, there is a budgetary allocation for vehicle testing stations and their implementation; the Motor Vehicles Act, 1988, specifies the level of fines.	1. Outcome budget 2012-2013 of the Ministry of Road Transport and Highways 2. State transport departments	States have the authority to penalize vehicles that do not conform to existing emission norms. This indicator assesses the application of the law by state-level authorities.

Sub-sector	Indicator ID	Indicators	Indicator weight	Rationale for indicator weightage	Benchmark	Justification for benchmark	Documentation source	Remarks
	T7 (Qu)	Promoting low-carbon transportation, including Bus Rapid Transit Systems (BRTS) and Mass Rapid Transit systems (MRTS)	15%	Effective and efficient public transportation leads to reduced GHG emissions.	4 - BRT or MRT has been implemented 3 - BRT or MRT is under construction for identified-cities under JNNURM 2 - BRT or MRT is in planning phase for identified cities under JNNURM 0 - No progress	Enhancing public transportation would reduce emission from transport sector.	1. Implementation status of Projects approved under JNNURM (www.nitua.org/projects/tpt/introduction.pdf) Planning Commission (planning commission. nic.in/plans/mta/11th_mta/chapterwise/chap18_urban.pdf) 3. ibnlive.in.com/ (ibnlive.in.com/news/travel-travails-set-to-end-in-city/264150-60-120.html) 4. indiabudget.nic.in (indiabudget.nic.in/es2008-09/chapt2009/chap913.pdf)	The BRTS and MRTS are tangible low-carbon growth options, which can meet the growing need for public transport across states, under the JNNURM scheme (covering around 63 cities). The progress in implementation is assessed across states through this indicator.
	T8 (Qu)	Promoting modes of non-motorized transport in urban areas (through building NMT infrastructure like cycle lanes, walk lanes, etc.)	15%	Encouraging NMT leads to more sustainable modes of transportation in urban areas.	4 - Policy and implementation of NMT facilities in the state 2 - Programmes/policy proposed in the state for addressing NMT 0 - No programmes/policies/implementation of NMT	At the national level, the National Urban Transport Policy (NUTP) requires that exclusive lanes and corridors need to be created for public transport and non-motorized modes of transport.	State programmes and/or policies on transport	

Sub-sector	Indicator ID	Indicators	Indicator weight	Rationale for indicator weightage	Benchmark	Justification for benchmark	Documentation source	Remarks
	T9 (Qu)	Establishment of administrative agency in accordance with NUTP and CMP (Comprehensive Mobility Plan) for JNNURM cities	15%	Norms in accordance with NUTP and CMP for better monitoring of the transport system in the state As per the Review of Comprehensive Mobility Plans – a study conducted by TERI and Shakti Sustainable Energy Foundation – 22 JNNURM cities had submitted their CMPs to the MoUD, as on 2010.	4 - SUTP/ SUTA/city-level agency and UMTA/UMTC established and functioning 3 - UMTA/UMTC established and functioning 2 - Policy drafted for establishment of UMTA/UMTC 0 - No policy exists, as on date	Functioning nodal agency to monitor transportation sector in a state would lead to effective policy implementation	1. MoUD (urbanindia.nic.in/programme/ut/K_14011152007_UT.pdf) 2. ZEE News (zeenews.india.com/news/nation/reddy-for-unified-metropolitan-transport-body-in-big-cities_632660.html) 3. thehindu.com (www.thehindu.com/news/cities/chennai/article405604.ece) 4. Governance Knowledge Centre (indiagovernance.gov.in/news.php?id=241) 5. thehindu.com (www.hindu.com/pp/2009/06/20/stories/2009_06_2050320500.htm)	The NUTP has recommended the establishment of the UMTA/UMTC or a nodal agency for managing urban transport-related issues. (From NUTP: "The Central Government will, therefore, recommend the setting up of Unified Metropolitan Transport Authorities (UMTAs) in all million-plus cities, to facilitate more co-ordinated planning and implementation of urban transport programmes and projects and an integrated management of urban transport systems. Such Metropolitan Transport Authorities would need statutory backing in order to be meaningful.") The implementation progress of this aspect across states is assessed through the indicator.
Weightage			90%					

Buildings sector

Sub-sector	Indicator ID	Indicators	Indicator weight	Rationale for indicator weightage	Benchmark	Justification for benchmark	Documentation source	Remarks
Renewable energy	B1 (Qu)	Initiatives/programmes for the use of renewable energy for thermal applications in buildings	50%	Use of renewables will contribute to low carbon emissions, hence, also contribute to climate change mitigation.	4 - Mandatory 3 - Rebate/subsidy apart from MNRE/central government 2 - Proposed 0 - No rebate/mandate on the use of renewables in buildings	A few cities in particular states have mandatory requirements. Also, there are some states, which do not have mandatory requirements but give rebates for the same.	Ministry of New and Renewable Energy (http://www.solarwaterheater.gov.in/)	More than 70% of the energy consumption is in urban India. So, only urban buildings have been taken into consideration.
	B2 (Qu)	Initiatives/programmes for renewable energy use for electrical applications in buildings	50%	Use of renewables will contribute to low carbon emissions, hence, also contribute to climate change mitigation.	4 - Mandatory 3 - Rebate/subsidy but non-mandatory 2 - Proposed 0 - No rebate/mandate on use of renewables in buildings	A few cities in particular states have mandatory requirements. Also, there are some states, which do not have mandatory requirements but give rebate for the same.	1. SAPCC 2. Renewable energy policies 3. State energy development agencies	
Weightage			40%					
Energy efficiency	B3 (Qu)	Initiatives by the state government for promoting sustainable buildings (incentives, tax reduction, etc.)	15%	Promoting green buildings will help reduce GHG emissions from buildings.	4 - Incentives exists 2 - Incentives Proposed 0 - No mandate/incentive exists	Some states have incentives, while others have proposed or are planning the same.	1. SAPCCs 2. Renewable energy policies	Incentives are an attractive way to promote green buildings.

Sub-sector	Indicator ID	Indicators	Indicator weight	Rationale for indicator weightage	Benchmark	Justification for benchmark	Documentation source	Remarks
	B4 (Qu)	Rainwater harvesting	10%	By using rainwater, electricity that would have been used for pumping can be saved. Also, to meet the same water requirement, wastewater treatment might be required..	4 - Mandatory 2 - Voluntary 0 - Non-existent	A few cities in particular states have mandatory requirements. Also, there are some states that do not have mandatory requirements but give rebate for the same.	rainwater harvesting, org (http://www.rainwaterharvesting.org/policy/legislation.htm)	Rainwater harvesting is one of the measures for achieving sustainability. This water can be used for all domestic and industrial uses, thus avoiding the need for fresh water and pumping for the same.
	B5 (Qu)	ECBC implementation stage of a state. ECBC implementation falls into three stages: 1. In process 2. Amendment 3. Notification (mandate)	35%	By implementing the ECBC, there will be significant reduction in the consumption of electricity and other energy-related parameters, thus, leading to low carbon emissions.	4 - Mandate 3 - Amendment 2 - In Process 0 - No Activity	ECBC is mandatory in India from 2014. But some states have proactively implemented it after making amendments, as per their local climate.	1. BEE 2. Indian Building Energy Code Community (IBECC)	ECBC compliance ensures energy-efficient buildings. Buildings in India contribute to 33% of the GHG emissions.
	B6 (Qu)	Public procurement policy for BEE Star-rated appliances in government buildings	25%	BEE Star-rated appliances can significantly decrease electricity usage in buildings. Shifting to these energy-efficient appliances will lead to low carbon emissions.	4 - Mandatory procurement of Star-rated appliances (3-Star or above) 2 - Proposed for mandatory procurement of Star-rated appliances (3-Star or above) 0 - No mandatory procurement of Star-rated appliances (3-Star or above)	Since BEE Star-rated appliances can be procured by any organization/personnel, it provides equal opportunity to all.	State energy development agencies	Appliances, especially air conditioners and refrigerators, consume a significant amount of electricity in a year. Replacement of normal appliances with BEE Star-rated ones is path to a low carbon economy.

Sub-sector	Indicator ID	Indicators	Indicator weight	Rationale for indicator weightage	Benchmark	Justification for benchmark	Documentation source	Remarks
	B7 (Qu)	Mandatory energy audit	15%	Existing buildings always carry a scope for energy efficiency, which can be better known if an energy audit is mandated. Since technology is constantly evolving, an energy audit should be conducted every three years for new buildings.	4 - Mandatory energy audit 0 - No mandatory energy audit	Some states have realized the potential benefits of an energy audit and mandated it, while others are in the voluntary phase.	State energy development agencies	An energy audit is only a preliminary step. The main step is to implement the findings of the audit. Due to resource constraints, mainly financial, many states are unable to do so.
Weightage			60%					

Retrofitting is important in the context of energy efficiency in existing and old buildings. But an indicator on state-wise retrofitting of buildings is not included due to the unavailability of data. However, the same can be included, depending on the availability of data, in updated versions.

Forestry Sector

Sub-sector	Indicator ID	Indicator	Indicator weight	Rational for indicator weightage	Benchmark	Justification for benchmark	Documentation source	Remarks
Overarching	F1 (Qt)	Historical forest cover	20%	This indicator shows the historic forest cover and, thus, the influence of policies on already existing forests, quality and total forest cover change	4 - >21% 3 - >15-21% 2 - >10-15%, 1 - >0-10% 0 - <0% of the geographical area	The forest cover in India was 20.64% in 2002. Thus, the same figure has been benchmarked at the score of 3.	India State of Forest Report 2003	Provides state-wise historic forest cover in 2002
	F2 (Qt)	Increase in the total forest cover	15%	This has a direct impact on reducing emissions.	4 - >0.4%, 3 - 0.3%-0.4% 2 - 0.2%-0.3%, 1 - >0%-0.2% 0 - <0% of the geographical area	The forest cover in India grew by 0.42%, w.r.t to the country's geographical area, over the last seven years (from 2002 to 2009); this figure is benchmarked at the score of 3.	India State of Forest Report 2003 and India State of Forest Report 2011	The sequestration of carbon is directly related to the increase in forest cover. The year 2003 has been chosen as the starting point as the categories for dense forest cover were redefined in the India State of the Forest Report 2003, across very dense and moderately dense forest cover. However, a different resolution was used in 2011 to map the forests than the one used in 2003.

Sub-sector	Indicator ID	Indicator	Indicator weight	Rational for indicator weightage	Benchmark	Justification for benchmark	Documentation source	Remarks
	F3 (Qt)	Increase in forest density	15%	This indicator shows the effectiveness of the policies over the long-term period for increasing forest cover (across all three types, i.e., open forest, moderately dense forest and very dense forest)	4 - >0.17% 3 - 0.15 >= 0.17% 2 - 0.10 >= 0.15% 1 - 0 >= 0.10% 0 - No increase in the density index	Forest density in India increased by 0.17% in the last seven years from 2002 to 2009.	India State of Forest Report 2003 and India State of Forest Report 2011	Comparison with the increase in the type of forest cover (open forest, moderately dense and very dense)
	F4 (Qu)	Information database for professionals and forest owners	10%	This information is required for planning the various aspects of strategy over a long-term period	4 - Up-to-date, strong database system for forest data, such as forest cover, forest fire, soil conservation, wildlife, etc.; penetration of IT in the forest department of the state; trainings and workshops for the forest department professionals and local people and link to R&D professionals 2 - Information available for some parameters but not up-to-date, easily accessible to the target audience 1 - Some information available but not easily accessible and/or content not well described 0 - Very limited information or no information available	Information portal support provided to the forestry sector by the state governments	1. State Forest Management Information System 2. State forestry policies	The adoption of best practices, as compared to other states, was assessed in this indicator.

Sub-sector	Indicator ID	Indicator	Indicator weight	Rational for indicator weightage	Benchmark	Justification for benchmark	Documentation source	Remarks
	F5 (Qu)	Availability of financial resources, research funds, etc.	10%	This indicator demonstrates the implementation intent of the policy through appropriation of funds	4 - Provision and allocation of funding from state policies and externally aided projects 3 - Provision and allocation of funding from externally aided projects or state policies 2 - Provision and allocation of funding from central schemes 1 - Provision but no allocation of funding 0 - No provision of funding for forestry activities	Comparison of the funds allotted to support the forestry sector; [All states receive funding from the various central schemes, e.g. National Bamboo Mission, National Afforestation Programme, Intensification of Forest Management, Wildlife Conservation, Finance Commission, CAMPA, NREGA, etc., as appropriate. Apart from central schemes, state budgets also outlay funds for forestry-related activities. Externally aided grants (e.g. JICA or World Bank funding) can provide suitable monetary support to special projects - sourced from India Forestry Sector Report 2010]	1. SAPCCs 2. India Forestry Sector Report 2010, released by ICFRE in October 2012	
	F6 (Qu)	Policy on protection of forest from fire, pests/diseases and invasive species	5%	Forests would be vulnerable on account of increased occurrences of fire; this benchmark shows the effectiveness of the management's plans for avoiding or detecting these issues.	4 - Effective and comprehensive policy on forest fire, pests/diseases and invasive species 2 - Weak policy 0 - No policy	Comparison of the policies/management tools for different states	1. State forest policies 2. State websites 3. SAPCCs	Increase in forest fire, pests and invasive species impact the quality of forest cover.

Sub-sector	Indicator ID	Indicator	Indicator weight	Rational for indicator weightage	Benchmark	Justification for benchmark	Documentation source	Remarks
	F7 (Qt)	Growing stock of tree cover, as a percentage of the state's geographical area	10%	Trees grown outside forests for agro-forestry practices and or under other policies have a direct impact on carbon sequestration.	4 - Tree cover percentage, w.r.t. the state's geographical area, is greater than 3% 3 - Tree cover percentage, w.r.t. the state's geographical area, is between 2.76% and 2.99% 2 - Tree cover percentage, w.r.t. the state's geographical area, is less than 1% 1 - Tree cover percentage, w.r.t. the state's geographical area, is less than 1% 0 - No tree cover	Percentage of tree cover, w.r.t. geographical area; Tree cover refers to the Trees outside Forest (TOF) patches that are less than 1ha in extent, and scattered trees in rural and urban areas are also taken into consideration. Thus, tree cover is a subset of TOF (TOF refers to all trees growing outside recorded forest area irrespective of patch size). The tree cover for India is 2.76%, as per the India State of Forest Report 2011.	Table 4.6.1: State/ UT-wise Tree Cover Estimates, India State of Forest Report 2011	Tree cover depicts the green cover of the non-forest area of the state and is a function of the state's agro-forestry and green cover enhancement policies.
	F8 (Qu)	Effective cross-sectoral forestry programmes, leading to increase in tree plantations due to greater participation across stakeholders	10%	There are several cross-sectoral programmes like existence of forest management policies/ plans/ schemes such as the National Afforestation Programme, Intensification of forest management systems, joint forest management (JFM), Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) under the MoRD, Compensatory Afforestation Fund Management and Planning Authority (CAMPA) which have resulted in convergence to effective policy design for the sector. These programmes involve the local community, thereby, improving the implementation of afforestation activity across all land types, especially private land.	4 - >78% tree plantation in private land achieved 3 - 70 to <=78% tree plantation in private land achieved 2 - 55% to <70% tree plantation in private land achieved 1 - <55% tree plantation in private land achieved 0 - No tree plantation witnessed in private land	Plantation activity is supported by community involvement through JFM measures, MGNREGA and funding supported through CAMPA and other schemes. Data around tree plantation target for private land and the achieved figure is available for 2002-2005 (MOSPI). The same has been evaluated. The India-level benchmark is 76.88%.	MOSPI	This is one of the key strategic elements stated in the National Mission for a Green India, 2010. It has a bearing on climate change initiatives. State-level initiatives may vary on these counts and may play a significant role in the state's performance.

Sub-sector	Indicator ID	Indicator	Indicator weight	Rational for indicator weightage	Benchmark	Justification for benchmark	Documentation source	Remarks
	F9 (Qu)	Policy/ programmes to improve fuel use efficiency and promote alternative energy sources	5%	These programmes and policies will reduce the burden on forest due to unsustainable harvesting and use of fuelwood	4 - Effective and comprehensive policy exists 2 - Weak policy 0 - No policy exists	Comparison of the policies/ management tools for different states	Various state forestry acts and bylaws	
	Weightage	100%						

Agriculture Sector

Sub-sector	Indicator ID	Indicator	Indicator weight	Rational for indicator weightage	Benchmark	Justification for benchmark	Documentation source	Remarks
Overarching	A1 (Qt)	Tonnes of methane produced per INR lakh of livestock output	30%	Lesser the tonnage of methane per INR lakh of livestock output, the better it is for the state.	4 - <0.75 tonnes of methane per INR lakh of livestock output 3 - 0.6-0.75 tonnes of methane per INR lakh of livestock output 2 - 0.75-0.80 tonnes methane per INR lakh of livestock output 1 - >0.8 tonnes of methane per INR lakh of livestock output	The all-India average figure is 0.72 tonnes of methane per INR lakh of livestock output.	1. sites.google.com/site/viveklpm/livestock-statistics-of-india/milk-production-in-india/state-wise-share-of-milk-production-by-cows-buffaloes-goats-2007-08 2. Annual Report 2011-12, Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture (dahd.nic.in/dahd/WriteReadData/Annual%20Report%20English%202011-12.pdf)	Enteric fermentation accounts for almost 60% of India's agricultural emissions, as per the INCCA Report, with data for 2007 as base. The data on livestock output comprises livestock value from milk, meat, wool, eggs, hides, silk, dung (used as fuel and manure), etc. As per the breakup of livestock output, milk comprises about 67% of the total livestock output value in India. It is also understood that milching livestock results in maximum enteric fermentation. Also, manure management constitutes around 0.7% of India's total GHG emissions (INCCA report). The livestock output value comprises the economic value of dung as well. Thus, the indicator helps in interpreting the link between methane emissions from the livestock due to enteric fermentation and dung and the economic value of the same. The states that have a high ratio would need to improve feed management practices for their milching livestock so as to reduce methane emissions from these two areas, at the same time maintaining or enhancing the livestock output.

Sub-sector	Indicator ID	Indicator	Indicator weight	Rational for indicator weightage	Benchmark	Justification for benchmark	Documentation source	Remarks
	A2 (Qt)	Percentage of districts where SRI method of rice cultivation has been introduced out of the total districts cultivating paddy	30%	The SRI method has proven to increase the yield of paddy manifold, while decreasing methane emissions simultaneously	4 - >70% of the districts have programmes for SRI introduction 3 - 40-70% of the districts have programmes for SRI introduction 2 - 30-40% of the districts have programmes for SRI introduction 1 - 10-30% of the districts have programmes for SRI introduction 0 - <10% of the districts have programmes for SRI introduction For states where rice cultivation does not happen or rice cultivation occurs in low lying areas, the neutral score of 2 is given	The India-level benchmark is 44% of districts with SRI implementation, as per a WWF-ICRISAT study. According to the study, SRI introduction has brought a lot of benefit to all the states in which it has been introduced.	1. Programmes available on sri-india.net 2. Climate Change - Vulnerability and Adaptation Experiences from Rajasthan and Andhra Pradesh, the case study for India by SDC (Swiss Agency for Development & Cooperation)	SRI is a growing practice for rice cultivation in India. But it has not been fully tested and implemented in the country yet. SRI practices stimulate biological processes that are beneficial to the plants and the production of grains. This indirectly helps meet the policy objectives of the National Agriculture Policy, 2000, NAPCC (sustainable agriculture) and the Interim Report of the Expert Group on Low Carbon Strategies for Inclusive Growth, since it is a sustainable way of rice cultivation. SRI is climate-friendly since: 1. It reduces the demand for water. It requires that the root zone to be kept moist and not submerged, hence, conserving natural resources and reducing the need to pump water. 2. It reduces methane emissions from bacteria (which thrive in flooded paddy fields) and decomposing manure in an oxygen-free environment since the crop does not require standing water. 3. It reduces the need for chemical fertilizers and pesticides since the method requires application of organic manure, which increases good fungi and bacteria in the soil, leading to less emissions (from production, transportation and storage of chemical alternatives). 4. It reduces the demand for excessive seed (hence conserving natural resources)

Sub-sector	Indicator ID	Indicator	Indicator weight	Rational for indicator weightage	Benchmark	Justification for benchmark	Documentation source	Remarks
	A3 (Qt)	Percentage change in nitrogen fertilizer used per unit gross cropped area	20%	Indirect impact: Indicates nitrogenous emissions indirectly, as per the nitrogen fertilizer used	4 - <0% change 3 - 0-15% change (both inclusive) 2 - 15-50% change (both inclusive) 1 - 50-100% change (both inclusive) 0 - >100% change	At the all-India level, the percentage change in nitrogen fertilizer usage per unit gross cropped area is 3.24%.	Statistics for 2009-10 from the Handbook on Fertiliser Usage, Fertiliser Association of India	
	A4 (Qt)	Percentage of area covered under micro-irrigation per unit net irrigated area	10%	Micro-irrigation has proven to conserve water in crop irrigation	4 - >1% of the net irrigated area 3 - 0.50-1% of the net irrigated area 2 - 0.20-0.50% of the net irrigated area, 1 - <0.20% of the net irrigated area	0.21% is an all-India level value	Selected state-wise area coverage under drip irrigation in India, Indian Agricultural Statistics Research Institute (www.iasri.res.in/agridata/08data/chapter3/db2008tb3_36.pdf)	
	A5 (Qt)	Total cropping intensity (gross cropped area/net sown area x 100)	10%	Indirect impact: An increase in cropping intensity indicates an improvement in agricultural land productivity.	4 - >140% 2 - 120-140% 0 - <120%	Cropping intensity value for India, which was 139% in 2007-08	1. State of Indian Agriculture 2011-12 report (agricoop.nic.in/SIA111213312.pdf) 2. Water and Related Statistics 2007, Central Water Commission	This indicator tracks the improvement in cropping intensity.
Weightage			100%					

Although the yield of all crops (cereals, coarse cereals, pulses, fibre, sugarcane, etc.) across India has increased by almost 8% between 2008-09 and 2009-10, the rise is not sole attributable to the increase in the use of nitrogen fertilizers. Yield is also a function of several other factors, such as weather, irrigation, seed quality, principal crop type, other fertilizer inputs, proper tilling practices, etc. Considering these factors, the indicator has limitations when comparison is made among states on the basis of nitrogen fertilizer use.

Waste sector

Sub-sector	Indicator ID	Indicators	Indicator weight	Rationale for indicator weightage	Benchmark	Justification for benchmark	Documentation source	Remarks
Renewable energy	W1 (Qt)	Conversion of waste-to-energy (W2E) achieved (MSW only, excluding biomass)	100%	Conventional sources of energy will be replaced. Hence, leading to low carbon emissions.	4 - >4.0% 3 - 2.66-4.0% 2 - 1.66-2.66% 1 - 0.5-1.66% 0 - <0.5%	Installed W2E capacity of less than 0.5% is insignificant; the average installed capacity for W2E in India was 2.66%, as on March 2011	Energy Statistics 2012, MoSPI	Andhra Pradesh has proactively utilized the huge potential of W2E. Also, since there is no potential in Arunachal Pradesh, an average score has been allocated to it. W2E is one of the most effective ways to treat waste.
Weightage			20%					
Overarching	W2 (Qu)	Initiatives for treating of municipal solid waste (MSW)	10%	Direct impact: Effective management of methane emissions (Global Warming Potential: 21) from MSW is essential	4 - Public-private partnership exists 0 - Public-private partnership does not exist	Some credit has to be given states if they have PPP as it increases the chances of solid waste handling in an effective way, leading to low carbon emissions.	IBEF (India Brand Equity Foundation) report on public-private partnership for all states.	Initiatives, such as PPP, depict and boost the state's intention to have effective waste management practices. Other than PPP, state governments can provide fiscal and non-fiscal support. However, such initiatives are not there. Moreover, municipal corporations are responsible for the same, not the state government. These PPP model projects come under the Jawaharlal Nehru National Urban Renewal Mission (JNNURM).

Sub-sector	Indicator ID	Indicators	Indicator weight	Rationale for indicator weightage	Benchmark	Justification for benchmark	Documentation source	Remarks
	W3 (Qu)	Initiatives for the treatment of sewage	10%	Direct impact: Sewage waste contains a high amount of methane. Untreated sewage will lead to GHG emissions.	4 - Public-private partnership exists 0 - Public-private partnership does not exist	The presence of PPP increases the likelihood of efficient waste management in the state, leading to low methane emissions.	IBEF report on public-private partnership for all states.	Initiatives, such as PPP, depict and boost the intention of states to have effective waste management practices. Other than PPP, the state government can provide fiscal and non-fiscal support, however such initiatives are not there. Moreover, municipal corporations are responsible for the same, not the state government. These PPP model projects come under the JNNURM.
	W4 (Qt)	Percentage of sewage waste treatment capacity available	20%	Sewage waste contains biogenic material, which, if untreated, can lead to methane emissions.	4 - >60% 3 - 45-60% 2 - 30-45% 1 - 15-30% 0 - <15%	Water utilization is a must to ensure sustainability. So 32%, which is benchmarked as a score of 4, is on par with the Indian average.	CPCB report Status of Water Supply, Wastewater Generation and Treatment in Class-I Cities & Class-II Towns of India (www.cpcb.nic.in/upload/NewItems/NewItem_153_Foreword.pdf)	Percentage treatment of sewage clearly depicts the waste management effectiveness in a state.

Sub-sector	Indicator ID	Indicators	Indicator weight	Rationale for indicator weightage	Benchmark	Justification for benchmark	Documentation source	Remarks
	W5 (Qu)	Status of compost plant	20%	Compost waste is mainly organic in nature. If untreated, it will lead to methane emissions.	4 - Both compost and vermicompost plants commissioned 3 - Either compost or vermicompost plants commissioned 2 - Both compost and vermicompost plants proposed 1 - Either compost or vermicompost plants proposed 0 - Neither compost nor vermicompost plants proposed or commissioned	Compost and vermicompost plants have been commissioned in some states. Few have proposed the same.	Municipal Solid Waste. Reports/ Schemes of MoUD and MNE (www.cpcb.nic.in/wast/municipalwast/Reports_schemes_of_MoUD_and_MNE.pdf)	The benchmarking assesses the implementation status of composting plants across states, i.e., commissioned, proposed, etc. Thus, the numbers of commissioned or proposed plants is not a consideration. Also, the latest data available for evaluation was for 2005-06.
	W7 (Qu)	Setting up landfill facilities for waste disposal	15%	The lack of proper landfilling facilities for methane recovery leads to methane emissions from landfill waste	4 - Landfill facility constructed 2 - Initiatives taken for construction of landfill facility 0 - None of the above	Landfill facilities play an important part in solid waste management.	Municipal Solid Waste. Reports/ Schemes of MoUD and MNE (www.cpcb.nic.in/wast/municipalwast/Reports_schemes_of_MoUD_and_MNE.pdf)	

Sub-sector	Indicator ID	Indicators	Indicator weight	Rationale for indicator weightage	Benchmark	Justification for benchmark	Documentation source	Remarks
	W8 (Qt)	Percentage of e-waste recycling capacity available against generation	25%	E-waste is the fastest growing waste across the globe. Recycling e-waste is essential to save virgin materials and, thus, to develop a low-carbon economy.	4 - >38% 3 - 28-38% 2 - 18-28% 1 - 8-18% 0 - 0-8%	E-waste recycling is still a new concept in India, and recycling facilities are not sufficient. The e-waste recycling capacity versus generation across each state is used for benchmarking. India's generation versus treatment capacity is taken as the benchmark. Anything above that is given a score of 3 or 4. Also, it should be noted that it is too early to judge the implementation of e-waste recycling in each state and the data for the same is unavailable.	1. CPCB's E-waste Registration List (www.cpcb.nic.in/E-waste%20Registration%20List.PDF) 2. E-waste In India (www.rajyasabha.nic.in/rsnew/publication_electronic/E-Waste_in_india.pdf) has been used for estimating the generation of e-waste across states in 2010, by taking values provided in the report for 2004-05 as base and assuming a 10% exponential growth, which ultimately matched with the 2012 projection for India's e-waste generation of 8 lakhs MT, as per the CPCB.	The actual quantity of e-waste generated by each state is not available. Thus, the assessment is based on projected values of e-waste generated by states, as available in the government sources and explained in the adjacent documentation source column.
Weightage			80%					

General sector

Sub-sector	Indicator ID	Indicators	Indicator weight	Rationale for indicator weightage	Benchmark	Justification for benchmark	Documentation source	Remarks
Overarching	G1 (Qu)	Does the state have an ambitious and comprehensive climate strategy toward a low-carbon economy?	20%	A climate change mitigation strategy will act as a pathway for the state to prioritize and implement solutions in a phase-wise manner.	4 - State Action Plan on Climate Change (SAPCC) endorsed by the National Steering Committee on Climate Change 2 - Draft SAPCC submitted to MoEF and Considered by Expert Committee on Climate Change Climate Change 1 - SAPCC exists in public domain 0 - SAPCC does not exist in public domain	It was mandatory for states to have their SAPCC finalized by 30 September 2011	1. List of SAPCCs on the MoEF website (envfor.nic.in/modules/others/?f=sapcc-2012) 2. Ministry of Environment & Forest, GoI, last accessed on Dec 2012, moef.nic.in/downloads/public-information 3. Climate Change Agenda for Delhi 2009-2012 (publicity.delhigovt.nic.in/public/eng/publication/climateChange0001.aspx)	Although mandatory, some states are still in the drafting stage of the SAPCC development.

Sub-sector	Indicator ID	Indicators	Indicator weight	Rationale for indicator weightage	Benchmark	Justification for benchmark	Documentation source	Remarks
	G2 (Qt)	Percentage of budget allocation to science, technology and environment, w.r.t the total budget	40%	Resources are always needed to combat climate change. The more the budget allocation for the science, technology and environment, the better the reinforcement to combat climate change.	4 - >0.07% 3 - 0.05-0.07% 2 - 0.03-0.05% 1 - <0.01-0.03% 0 - <0.01%	Budget allocation over three years for science, technology and environment in India is taken as benchmark, i.e., 0.03%. A score of 2, 3 or 4 has been provided to a state if it has allocated a budget above the national average.	1. Expenditure Budget Vol. I, 2012-2013 2. State finance department websites such as: www.mp.gov.in/finance/higheng.pdf and www.apfinance.gov.in/html/budget-2012-13-books/budget-speech-2012-13-eng.pdf 3. economictimes.com/articles.com/2012-03-18/news/31207431_1_budgetary-allocation-green-india-mission-afforestation	A percentage of the budget allocation is considered rather than absolute terms to give justification to the weightage. It can also be assumed that the states have other priorities or lack of resources for environment and forest.
	G3 (Qu)	Does the state have a governance structure to implement the activities under the Climate Change Strategy, e.g., special task force or dedicated climate cell, etc.?	40%	A dedicated governance structure for managing and implementing climate change-related activities/plans is imperative to enforcing the policy framework of the state.	4 - Dedicated governance structure already in place 2 - Planning to set up a dedicated governance structure 0 - No dedicated governance mechanism exists	Presence of dedicated resources to address climate change impacts	Various state department websites, such that of the Environmental Planning and Coordination Organization (Madhya Pradesh) (www.epco.in/epco_division_ccc.php), Mahatma Gandhi Institute for Combating Climate Change (Delhi) (gicc.delhigovt.nic.in), www.eptri.com/esd%20links.htm , etc.	
Weightage		100%						

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ABOUT WWF-INDIA

WWF-India is one of the largest conservation organizations in the country dealing with nature conservation, environment protection and development-related issues. Established as a Charitable Trust in 1969, it has an experience of over four decades in the field. Its mission is to stop the degradation of the planet's natural environment, which it addresses through its work in biodiversity conservation and reduction of humanity's ecological footprint.

WWF-India works across different geographical regions in the country to implement focused conservation strategies on issues like conservation of key wildlife species, protection of habitats, management of rivers, wetlands and their ecosystems, climate change mitigation, enhancing energy access, sustainable livelihood alternatives for local communities, water and carbon footprint reduction in industries, and combating illegal wildlife trade. WWF-India is actively engaged in promoting renewable energy uptake, enabling energy access, demonstrating renewable energy projects in critical landscapes, and overall promoting clean energy solutions.

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To stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature.

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