

# POLICY FRAMEWORK AND PREPAREDNESS

for Implementing Measures to Effectively Deal with Climate Change



An Analysis For  
The State Of  
**GOA**

A study titled "Policy Framework and Preparedness for Implementing Measures to Effectively Deal with Climate Change: An Analysis of four states in India" was conducted through the support of the Heinrich Böll Foundation<sup>1</sup>.

The objective of the study was to assess climate change vulnerability of four states namely, Goa, Andhra Pradesh, Karnataka and Tamil Nadu. The aim of the study was also to understand the implications of the predicted Climate Vulnerability and Mitigation potential under various scenarios generated under the Intergovernmental Panel on Climate Change (IPCC) from the states' perspective.

Further, a detailed gap analysis was done to understand which actions, interventions and solution mentioned under the State Action Plan on Climate Change (SAPCC) (mandated under Ministry of Environment, Forest and Climate Change (MoEFCC)) were aligned with the IPCC AR5 report<sup>2</sup>.

This pull out comprises of findings for the state of Goa. It also lists out common recommendations that have emerged from the study. It has been prepared to initiate the discussions at the state level, on the status of the implementation of their climate change action plans.

# GOA State Profile

## Energy Profile

Goa is the smallest state in India, situated between 14°53' and 15°18' N latitude and 73° and 75°E longitude along Konkan coast of India. With a coastline that spans across 131 kilometers (km) by the Arabian sea. The state has a literacy rate of 87.4%<sup>3</sup>, ranking it fourth in the country.

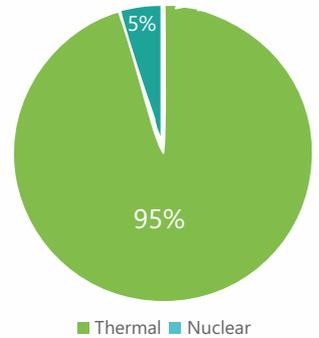
The states' Gross State Domestic Product (GSDP) growth rate was at 11.39% between 2004-05 and 2015-16<sup>4</sup>. Goa has impressive socioeconomic indicator as compared to other states.

This document comprises of the major findings for the state of Goa. Two broad parameters have been focused on - Energy profile and Vulnerability and Impacts profile of the state.

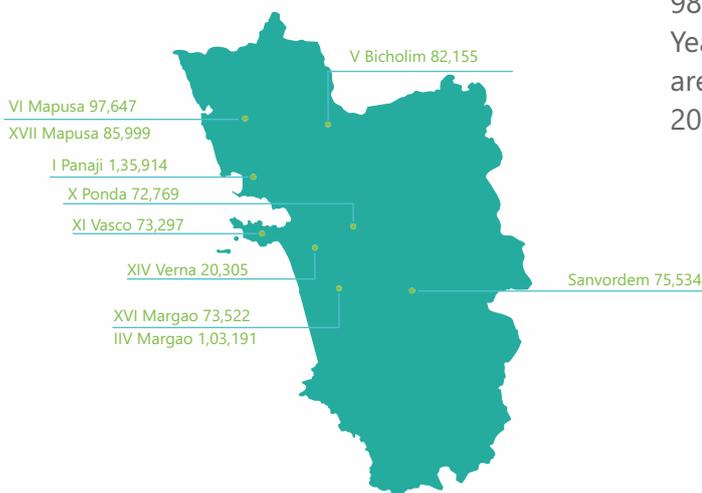
Majority of the power in Goa comes from thermal energy sources, especially coal based central power generating stations. This contributes to 95% power procured.

The state also procures power from privately owned cogeneration plants like Goa Energy Private Ltd. and Goa Sponge Private Ltd., of 30 Mega Watt (MW) and 12 MW power capacity respectively. Sesa Sterlite Ltd produces around 3 MW since FY 2015-16<sup>5</sup>.

As of June 2016, Goa had a total installed power generation capacity of 412.45 MW.<sup>7</sup> The state has the highest electrification coverage in India with urban electrification of 98%<sup>8</sup>. Goa's per capita electricity consumption for Financial Year (FY) 2013-14 was registered at 2414 kWh. Peak Demand are for electricity is predicted to increase up to 934 MW by 2018-19.<sup>9</sup>



**Energy Generation Profile  
Goa**



### Total LEDs distributed in Goa - 8,20,333

*National Ujala Dashboard, as accessed on July 14, 2017*

**Current programme for improving energy efficiency in residential areas is the national UJALA scheme. Following map reflects the implementation of the Ujala scheme.**

Electricity consumers in the state are 5.80 lakhs.<sup>10</sup> Goa has no renewable energy source of power generation. Government of Goa has signed a Power Purchase Agreement with NTPC Viduyut Vyapar Nigam Limited (NVVNL) for the supply of solar power to meet Renewable Energy Purchase Obligation.

Retrofitting of conventional streetlight with LEDs, has the potential to save about 50% energy, i.e. 4300 MU (million units) annually. This is another project in the pipeline.

The vulnerability and impacts profile for Goa is based on the climate change impacts on the state. Focusing on parameters such as rainfall patterns and variation from mean precipitation levels. Occurrence of natural disasters like drought and cyclone have been factored in to assess the vulnerability of the state. Groundwater availability is also taken as a parameter to assess potential vulnerability for states due to inadequate groundwater

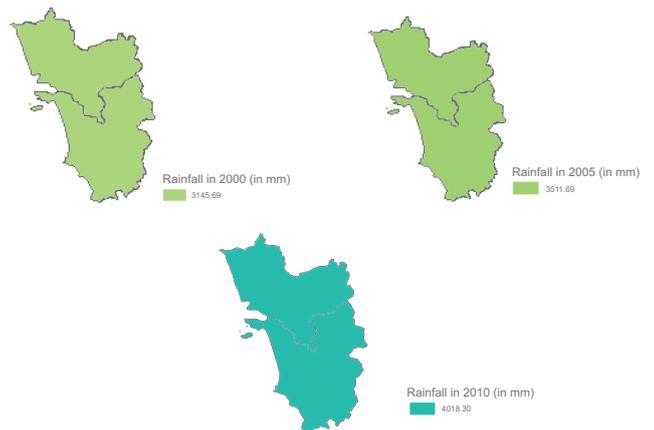
**Data sources for the Report -**

Vulnerability maps have been prepared for the following parameters – rainfall, drought, cyclone and ground water (see table below). These maps lend perspective on the most vulnerable districts for the state. Arc GIS and Quantum GIS software have been used to create the maps. The data has been mapped in different points of time to show the progressive changes in the vulnerabilities of the states.

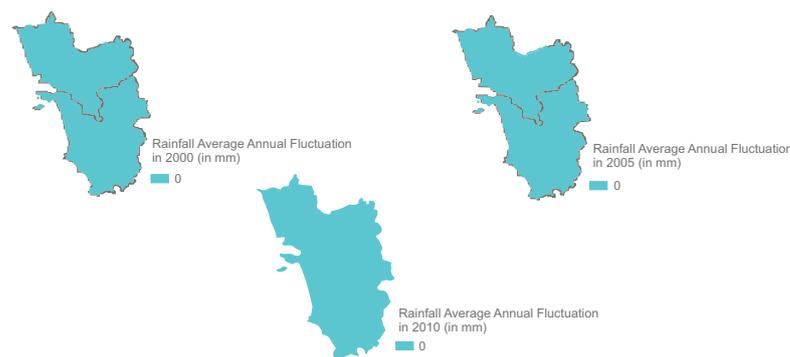
| Indicator             | Data Source | Time Series             |
|-----------------------|-------------|-------------------------|
| Rainfall fluctuations | IMD         | 2000-2010               |
| Cyclones              | IMD         | 1891-2008               |
| Droughts              | IMD         | 2002-2014               |
| Ground Water Stress   | CGWB        | 2010-2050 (Projections) |

**Rainfall Pattern**

Goa receives good rainfall on an average of 2500 mm annually from June to September. The following map shows that there has been a gradual increase in the annual average rainfall in the decade of 2000 to 2010.



**Rainfall Pattern of Goa**



**Rainfall Variation In Districts Of Goa**

The state has no major variations between the average and actual rainfall received. But there has been a gradual increase in the rainfall pattern in both the districts.

**Rainfall Variation**

**Cyclone**

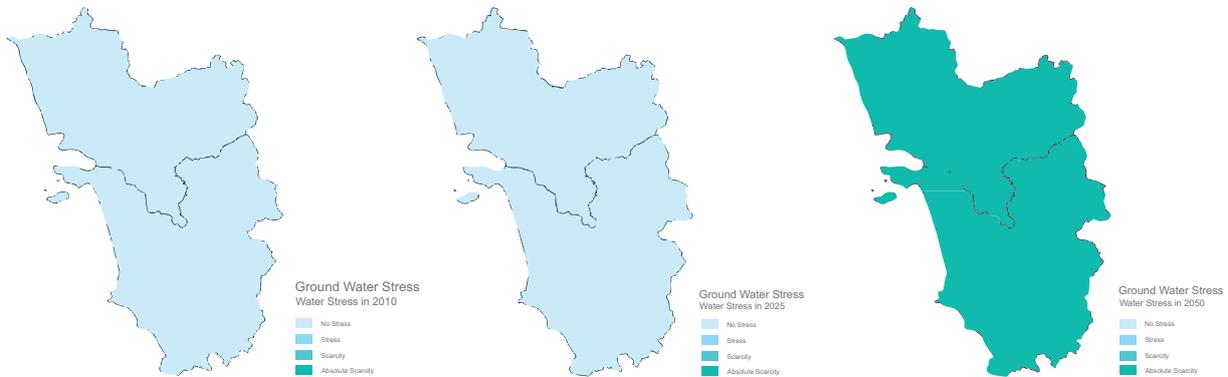
Goa is not categorized as cyclone prone state. However, during the impact of Cyclone Phailin in October 2014 (which hit the west coast of India) 10 people were killed and 50 reported missing. Losses were recorded on crops and property during the cyclone.

**Drought**

Historically, Goa has never faced a drought and hence, is not categorized as vulnerable to impacts of droughts.



Goa's ground water utilization is about 33%. The Central Ground Water Board (CGWB) has categorized districts of states based on the net annual ground water availability data. As per the prediction of CGWB, both Goa districts will not face water scarcity in 2010 and 2025. However, increasing climate stressors and anthropogenic pressures on ground water will lead to water scarcity in 2050.



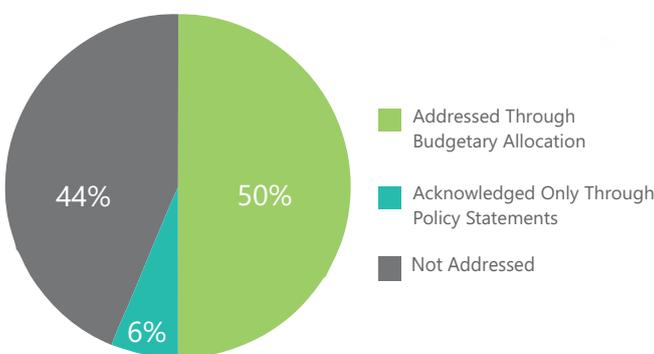
### Groundwater Stress In Goa

Goa is not far behind from the impact of climate change. The state has noted incidences of water logging in a few places and thus, some areas have become prone to seasonal water logging. Examples of water logging at Bicholim in 2000, at Mala, Panaji and Bicholim in 2005 and again in Bicholim in 2007. These incidences have caused damage to assets and to people of the state. Overall, as the state is not prone to cyclone, flood and rainfall variation, Goa is relatively less vulnerable to negative impacts of climate change.



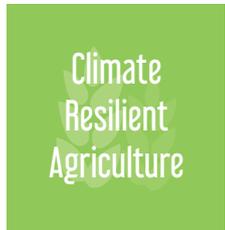
### Climate Resilient Agriculture | Climate Resilient Ecosystem | Social Adaptation | Climate Resilient Infrastructure | Sustainable Water Management | Energy | Sustainable Smart Cities

This section looks at Goa's state of preparedness with respect to seven categories mentioned above. The recommendations for each of these categories are based on references from IPCC "Summary for Policymakers" AR5 report<sup>11</sup>, and the New Climate Economy report (NCE)<sup>12</sup>.



#### Recommendations Addressed Through Climate Resilient Agriculture In Goa

50% recommendations under the IPCC AR5 and NCE, are addressed by the state of Goa through budgetary allocation. This includes dissemination on resilient crop varieties. Climate change adaptation strategies like change in planting date and crop varieties (better suited for the region) etc. have been addressed through various schemes, backed with budgetary allocation. Some of these are the Cashew rejuvenation scheme; Rastriya Krishi Vikas Yojana; the Rashtriya Krishi Vikas Yojana for enhancing agro-biodiversity, the Kamdhenu scheme for purchase of indigenous cattle breeds such as Sahiwal, Gir, Red Sindhi by farmers.



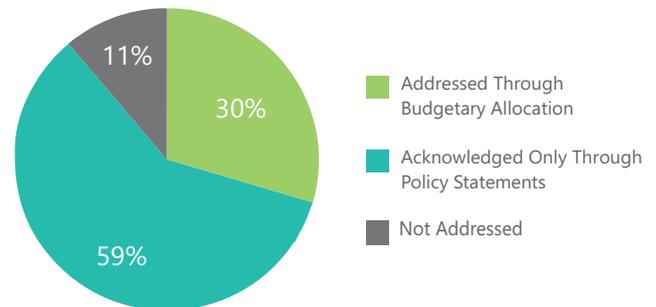
Incentives such as manure required for coconut cultivation worth Rs. 15,000 per hectare for 500-hectare area is being given to farmers. The state also lends assistance through national schemes like National Horticulture Mission (NHM). Other incentives include, use of new methods of cultivation, improved varieties of high yielding groundnut seeds made available to farmers to increase Seed Replacement Rate (SRR).

Quality seeds for Kharif and Rabi season are procured from National Seeds Corporation Ltd. (NSC). The State Level Sanctioning Committee (SLSC) under Rashtriya Krishi Vikas Yojana (RKVY), approved crop land management, grazing land management and restoration of organic soils through the Khazan Land Development project which was initiated by the Department of Agriculture, Goa for 2015-16.

6% of the IPCC and NCE recommendations are addressed only through state agriculture policy. However, 44% of these recommendation under the thematic area climate resilient agriculture remain unaddressed. Very little has been done by the state to increase awareness and knowledge about the impacts of climate change on agriculture and allied sectors.

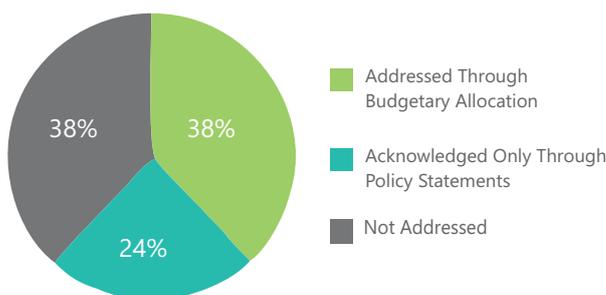
### Climate Resilient Ecosystem

Forests of Goa are at a high risk of degradation due to increased human activities such as mining and construction. These are extremely sensitive ecosystems and increasing impact of climate change are likely to exacerbate the risks. Under this thematic area, 30% of the IPCC recommendations are addressed through policy initiatives backed by allocated budget. Goa is investing in preparation of new coastal zone management plan and protective measures such as aids for conservation of mangrove areas, which in turn is an effective coastal afforestation measure. Galjibaga turtle conservation area is also a part of ecological restoration measure.



Recommendations Addressed Through Climate Resilient Ecosystem In Goa

59% recommendations are being addressed through policy measure such as the Air and Water Monitoring Act, State Forest Conservation Policy, Forest restoration programme, Western Ghat conservation programme etc. However, recommendations for strong regulatory governance and project selection mechanism to reduce risks among others, remain unaddressed and constitute of 11%.



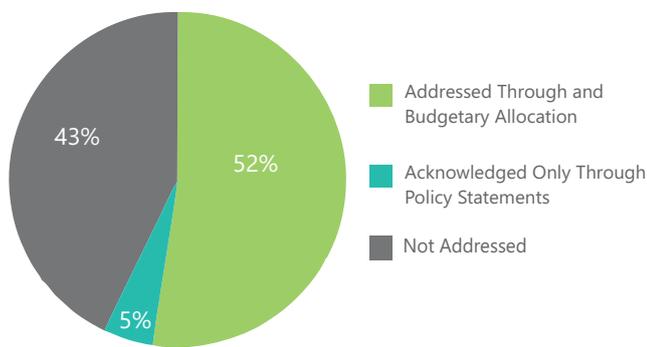
Recommendation Addressed Through Social Adaptation In Goa

The issues covered under social adaptation include gender equality, education and poverty alleviation as per the IPCC recommendations. But social adaptation in the Indian states mainly covers health sector. About 38% of IPCC recommendations are being addressed through policy provisions. These include National Vaccine Policy which mandates low profit margins to produce low cost vaccines.

### Social Adaptation

Public health services for better social adaptation comprises of, Integrated Disease Health Surveillance (IDHS) under the Ministry of Health and Family Welfare, Government of India. About 24% of the recommendations are addressed through budgetary allocation. Primarily allocated for improvement of health, education and poverty reduction. The medical infrastructure has been given an allocation of 400 lakh rupees. Among other health and education welfare schemes, MAMTA scheme provides aid for pregnant women; Beti Padhao Beti Bachao scheme is focused on education for young girls and Ladli Lakshmi Scheme is another welfare scheme for women and girls.

But IPCC recommendations relevant to address seasonal increase in vector borne diseases and infections, which have been rising in the state go unaddressed. Especially, with rise in high intensity rainfall, flooding and water logging, the incidences of vector borne diseases are likely to increase. Further, recommendations for improved nutrition mainly for women and children, creation of food banks are also unaddressed. These comprise of 38%.



**Recommendation Addressed Through Climate Resilient Infrastructure In Goa**

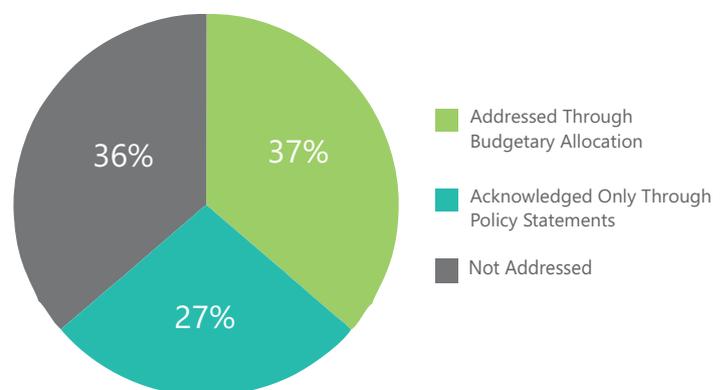
Goa addresses 52% of the IPCC and NCE recommendations on building climate resilient infrastructure through national and state level schemes. Upgradation of urban infrastructure are through National AMRUT scheme. MNREGA Goa Gram Samrudhi scheme and Rajiv Awas Yojana also have budget allocations. The schemes are also in line with the recommendations on upgrading urban infrastructure (scale and quantity), better transport and road infrastructure. Another 43% of the IPCC recommendations have been recognized through policies.

Climate Resilient Infrastructure

These include recommendation to improve disaster risk building code and disaster management through multi-purpose shelters, Disaster Management Legislation and Relief and Rehabilitation Policy. Only 5% of the recommendation remain unaddressed.

Sustainable Water Management

Goa addresses 37% of IPCC and NCE recommendations on water sector. These focus on integrated water resource management and municipal water management through the state's rural water supply programme. Also, panchayat level disaster schemes are addressed through policy initiative and budgetary allocation. Another 27% recommendations have been addressed through other state and national policy measures but without budget support. While 36% recommendations on diversifying water resources etc. remain unaddressed.

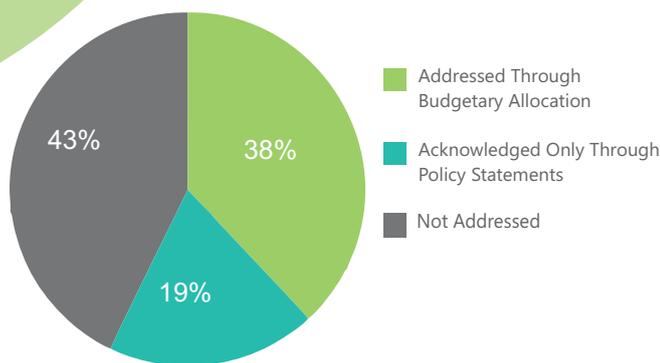


**Recommendation Addressed Through Sustainable Water Management In Goa**



38% of the IPCC and NCE recommendations have been addressed through policy initiatives and allocated budget. In fact, Goa has signed a Power Purchase Agreement with NTPC Vidyut Vyapar Nigam Limited (NVVNL). Goa has received allocation of 25 MegaWatt (MW) solar power from Solar Energy Corporation of India (SECI) for a period of 25 years.

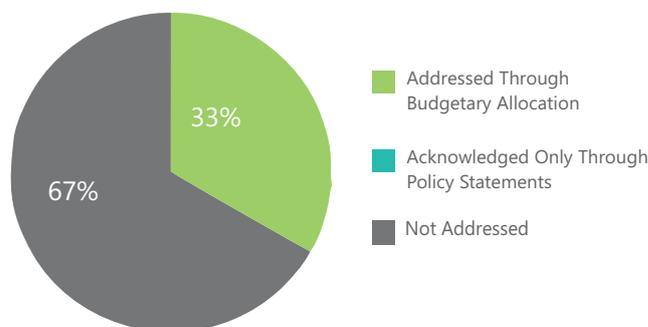
Another 43% of the recommendations have been addressed by the state, through policy measures. These include measures for mandating energy efficiency standards by adopting energy conservation norms for buildings through the National Energy Labelling Programme etc. Around 19% recommendations have not been addressed by the state.



**Recommendation Addressed Through Energy In Goa**

## Sustainable Smart Cities

Goa has not addressed 67% of the IPCC and NCE recommendations. These include reforms on rent control laws, better systems of appraise land value and determine property rights etc. have not been recognized by the states. Remaining 33% recommendations on reforms to achieve more compact, productive, green cities are being addressed through States' participation in Smart Cities Mission, being acknowledged through policy.



**Recommendation Addressed Through Smart And Sustainable Cities In Goa**

## Sources -

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- <sup>6</sup> Govt. of Goa, September 2015. Chapter5: Supply Plan, 24 X 7 POWER FOR ALL GOA: A Joint Initiative of Government of India and Government of Goa. Available online at: [goo.gl/CsH7xD](http://goo.gl/CsH7xD)
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- <sup>12</sup> New Climate Economy (NCE), September 2014, Better Growth, Better Climate: Charting a new path for low- carbon growth and a safer climate: The Global Report, The Global Commission on The Economy And Climate, Available online at: [goo.gl/Hmo8xs](http://goo.gl/Hmo8xs)



## RECOMMENDATIONS

The following recommendations have been based on the study of four states- Goa, Andhra Pradesh, Karnataka and Tamil Nadu. The recommendations are common to all the states addressed in this study.

It is further based on the review of the seven categories in the four states. Some issues /areas need to be addressed for states to enhance their capacities and preparedness to address climate change. The following recommendations are placed for concrete action for successful implementation of the respective State Action Plans on Climate Change.

This becomes important in context of the Paris Agreement being ratified in 2015, under which, countries across the globe are required to be proactive in issuing policies and programs to ensure effective implementation of the Agreement.

Within the Indian context, implementation of the Paris Agreement requires national and state governments to formulate policies and programmes to address climate change and ensure compliance of targets.

### The recommendations are as follows -

- **Long-Term Development Vision:** Goa needs to develop a long term 'Development Vision' which factors in challenges and risks emanating due to climate change
- **Road Map for Implementation:** following in line with the 'Development Vision' the state needs to develop an implementation road map with milestones and targets.
- **Institutional and Governance Structures:** to ensure holistic and integrated development planning and implementation of institutional and governance structures ought to be in place. As opposed to current pattern of planning and implementation of programmes and policies that are in silos.
- **Adequate Financing:** state ought to ensure that adequate financing is available for integrated development. Current budget allocation is based on departmental/ ministerial budgets.
- **Capacity Building and Training:** the state has a penchant for pursuing hard technological solutions to address climate change. But soft skills and capacities that are required to address climate change, tend to remain unaddressed. For example, adequate focus on capacity building, training, information sharing, creating repositories of good practices etc.
- **Context Relevant Solutions:** the state seems to be going for solutions which are often tried and tested without delving into see whether these solutions continue to be appropriate with changing times and situations. For example, a couple of decades back, coal was perhaps the most viable source of electricity, while in today's world, renewable energy has proved to be more viable source of electricity. But states, continue to pursue options of generating electricity from coal, despite this.
- **State-Centre Linkages:** the Central Government needs to ensure that States are kept abreast of developments at international climate negotiations at various forums including the United Nations Framework Convention on Climate Change (UNFCCC) from time to time.
- **Specific Institutional Arrangements at State Level:** states need to create specific institutional arrangements that can enable them to meaningfully assist the Central Government in meeting its reporting and other obligations to the UNFCCC and its governance arrangements.