



# **National Response to Climate Change in India**

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# Line of Discussion

- Climate Change (CC) & India
- Factors deciding CC Response strategy
- NAPCC
- Mode of implementation
- Role of States & SAPCC
- Emerging issues

# Climate Change History

- Historical Emissions since 1880 has resulted in **rise in global temperature** by **0.85° Celsius**
- Historical **carbon space** occupied by various countries in 2009 (1850 as base year):
  - **USA:** 29%
  - **Other Developed countries:** 45%
  - **China:** 10%
  - **Other Emerging Economies:** 9%
  - **India:** 3%

## Likely impact of Climate Change (CC) in India - I

- **Rise in annual mean surface air temperature** ranges from 1.7°C to 2.0°C.
- **Marginal increase in annual precipitation.**
- **Daily extremes** in air temp. & rainfall **to intensify.**
- **Increase in storm surge** levels by 15% to 20%.
- **Sea level** along the Indian coast is likely **to rise** about 1.3mm /year on an average.
- **Productivity of major food crops to decrease** marginally initially and 30-40% around 2100.

## Likely impact of Climate Change (CC) in India - II

- **Droughts and floods intensity** to vary
- Rise in sea water temperature **to increase fish breeding, migration, and harvests in initial stage**
- **Animal productivity to decrease due to heat stress** and loss of 1.5 mt. of milk production is likely by 2020.
- The change in temperature, rainfall, weather conditions likely to increase **health hazards and nutritional security.**
- Increase rainfall, **glacier melted** water likely to increase run off, erosion, flood and **stability of water harvesting structures.**

# National Circumstances & Challenges

- **India:** 2.4% of world surface area  
17.5% of world's human population  
17.5% of world's cattle population
- **Poverty:** 30% of the population lives in poverty
- **Housing :** 20% of population without proper housing
- **Electricity:** 25% without electricity  
Per capita consumption 1 / 10<sup>th</sup> of developed world
- **Drinking Water:** 92 million without safe drinking water
- **Human Development Index:** 0.586  
Global rank of 135
- India's priority: **Poverty eradication**  
**Sustainable growth**

# Developmental goals of India

- **Reducing the poverty ratio**
- Providing gainful **employment to the labor** force
- **universal education** for all children
- Reducing **gender gaps** in literacy and wage rates
- Raising the **literacy rate** to 75%
- **Reducing** the decadal rate of **population growth**
- **Reducing** the **Infant Mortality Rate (IMR)**
- **Reducing** the **Maternal Mortality Ratio (MMR)**
- **Increasing** the forest and **tree cover to 33%**
- Providing **access to portable drinking water** to all villages
- Electricity for all.
- Cleaning of all **major polluted rivers**

# Factors guiding CC management in India



Food Security



Climate Change



Water Security



Energy Security

## KEY ENVIRONMENTAL ISSUES



Managing  
Urbanization

**&  
Developmental goals of the country**



# India and Climate Change agreements & Stand

- **1972- India participated in UN Conference on Climate Change**
- **1997 Kyoto Protocol- Annex I Parties commit to take binding reduction targets**
- **2007 Bali COP:** Introduction of Nationally Appropriate Mitigation Actions (NAMA), to engage developing countries in voluntary mitigation effort
- **June 2008 - *National Action Plan on Climate Change (NAPCC)* launched**
- **2009- 2010 (Copenhagen & Cancun COP):** Major developing countries (including India) announced voluntary mitigation pledges
- **January 2010 - Expert Group set up in Planning Commission** to develop a *Low-C Economy strategy* for the 12th Five Year Plan
- **COP in Warsaw (2013) -** All countries required to prepare INDC (Intended Nationally Determined Contributions) and present them before COP 21 in Paris
- **COP in Lima (2014) - INDC:** not mitigation centric and can include other components as per country priorities

# Climate change management strategy of India

- International **standards ratified** by the country
- **Data generation and planning** for CC management
- Policy and **frameworks evolutions**
- **Inclusive approach** and strategy
- Implementation & follow up

# Data Generation and planning

- **Indian Network for Climate Change Assessment (INCCA) launched on October 14, 2009.**
- **It comprises of 127 institutions and 228 scientists across India**
- **Assess the drivers and implications of CC by scientific research**
- **CC assessments once every two years (GHG estimations and impacts of CC, associated vulnerabilities and adaptation)**
- **Develop decision support systems & Build capacity for management of CC**

# Policies and frameworks for CC management

- Development of a **roadmap for low carbon development** & “Carbon Tax” on Coal to develop National Clean Energy
- **Perform, Achieve & Trade (PAT)** Mechanism for Energy Efficiency in Energy Savings Certificate (**ESCerts**) trading
- Initiatives on Reducing emissions from deforestation and forest degradation (**REDD + promotion**)
- **Regional and international cooperation on CC** ( SAARC initiatives, UNFCCC submission, organizing conferences and hosting of COP)
- **Integration of INCCA findings** in national planning
- **CDM Activities** – Distribution of energy efficient lamps for conservation of 6,000 MW electricity

# NATCOM initiatives

- **NATCOM** formed to conduct national inventory emissions and Sinks.
- ✓ It developed linkage among different organs of government for holistic CC management.
- ✓ India prepared its first GHG Inventory in 1994, established data center & website for dissemination of information on CC and prepared roadmap for future CC research requirements in India.
- Two NATCOM reports have been released ( 2004 and 2012). The NATCOM is updated through Biennial Update Report. (BUR)



## INDIA

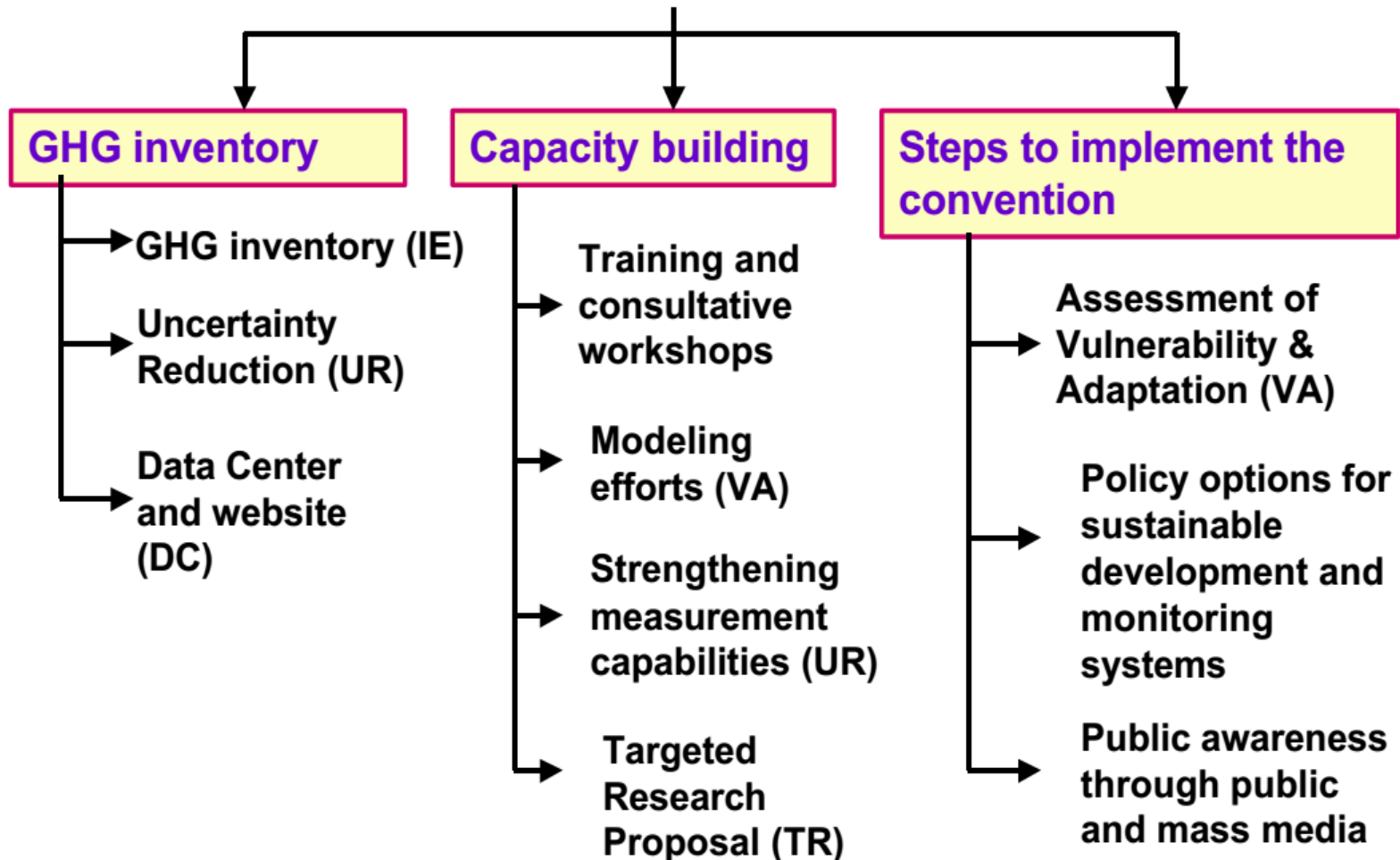
First Biennial Update Report to the  
United Nations Framework Convention  
on Climate Change



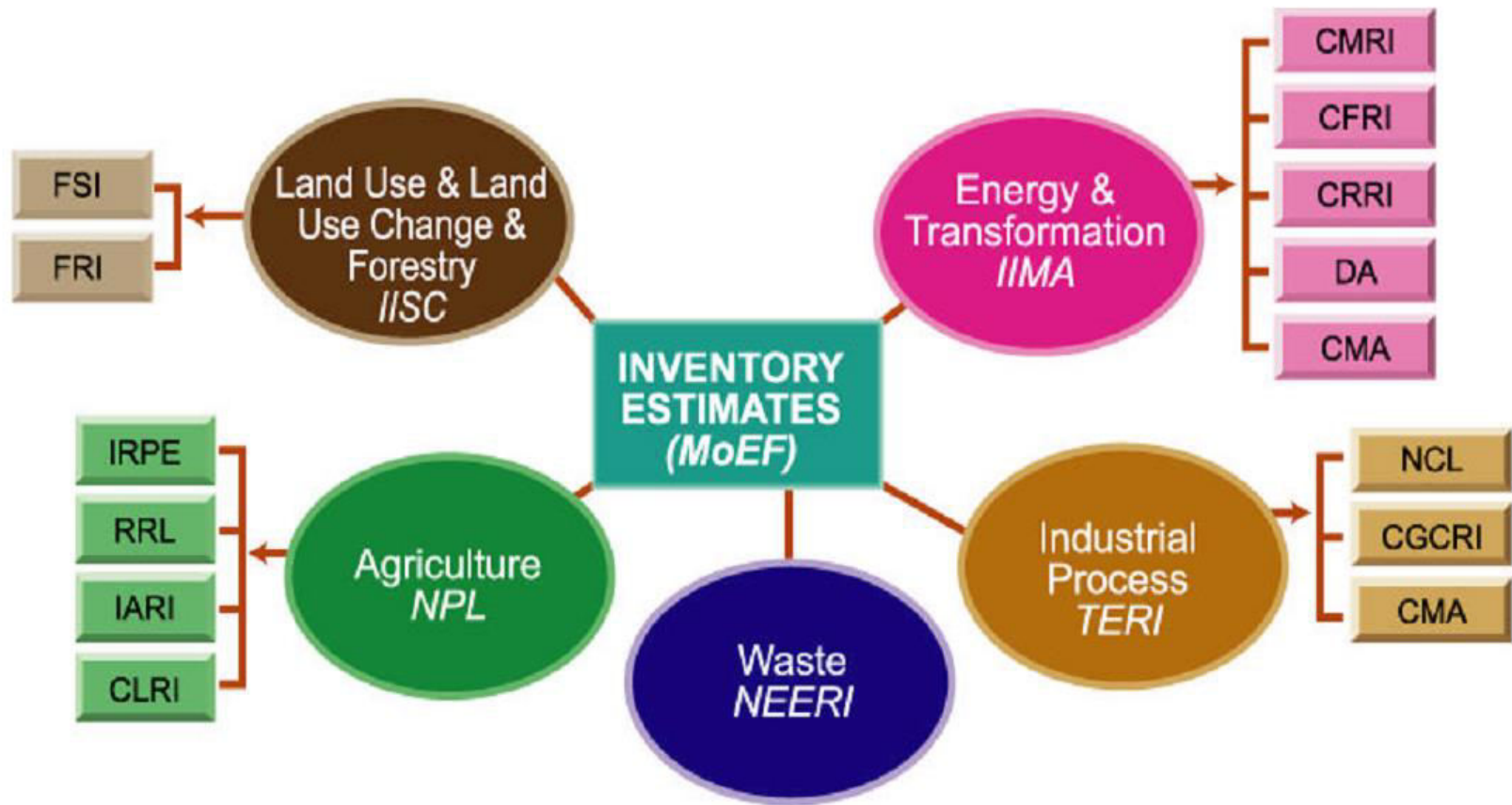
# Components of India's NATCOM

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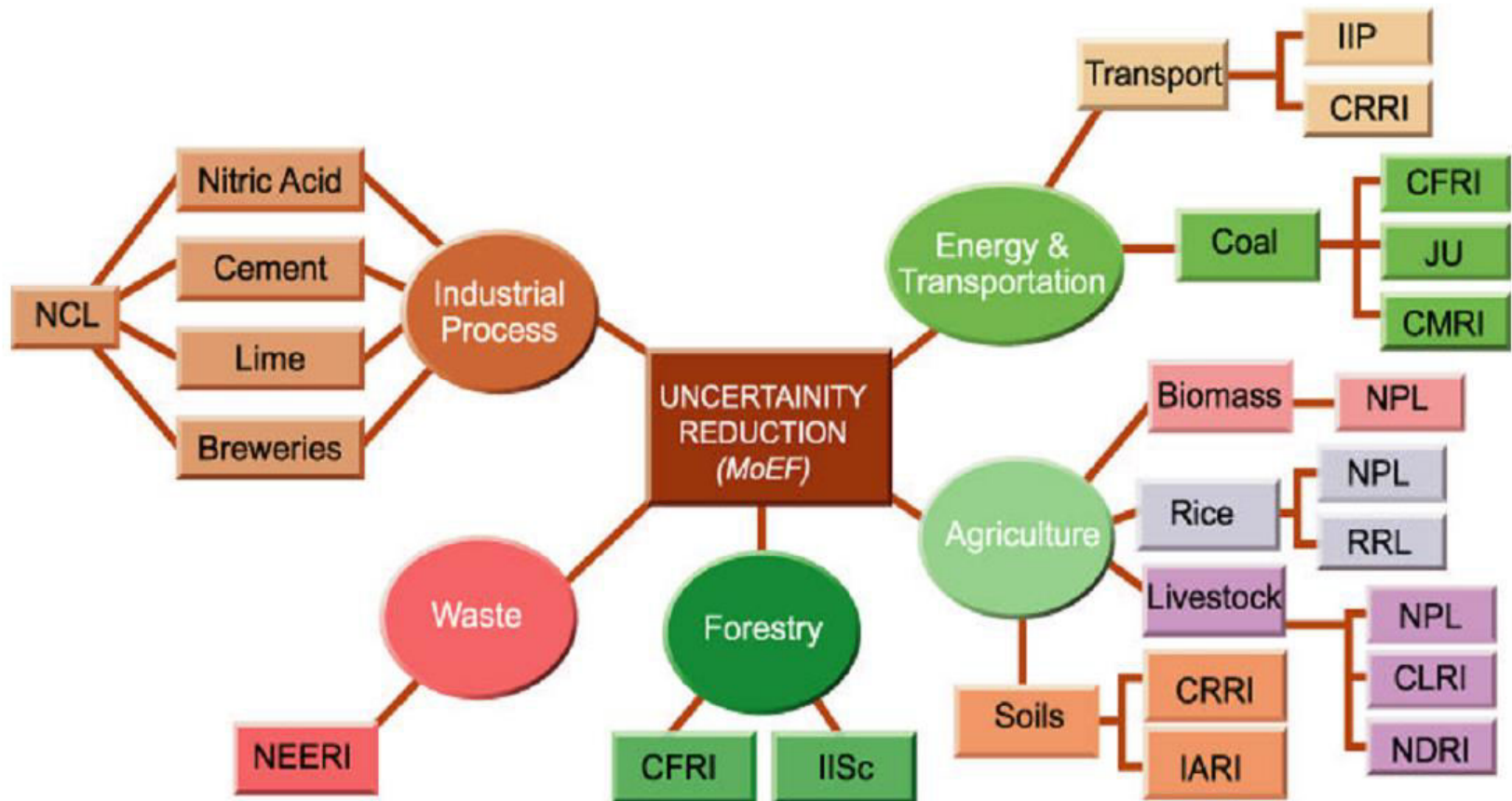
## NATCOM



# Inventory Estimation: Institutional Arrangement

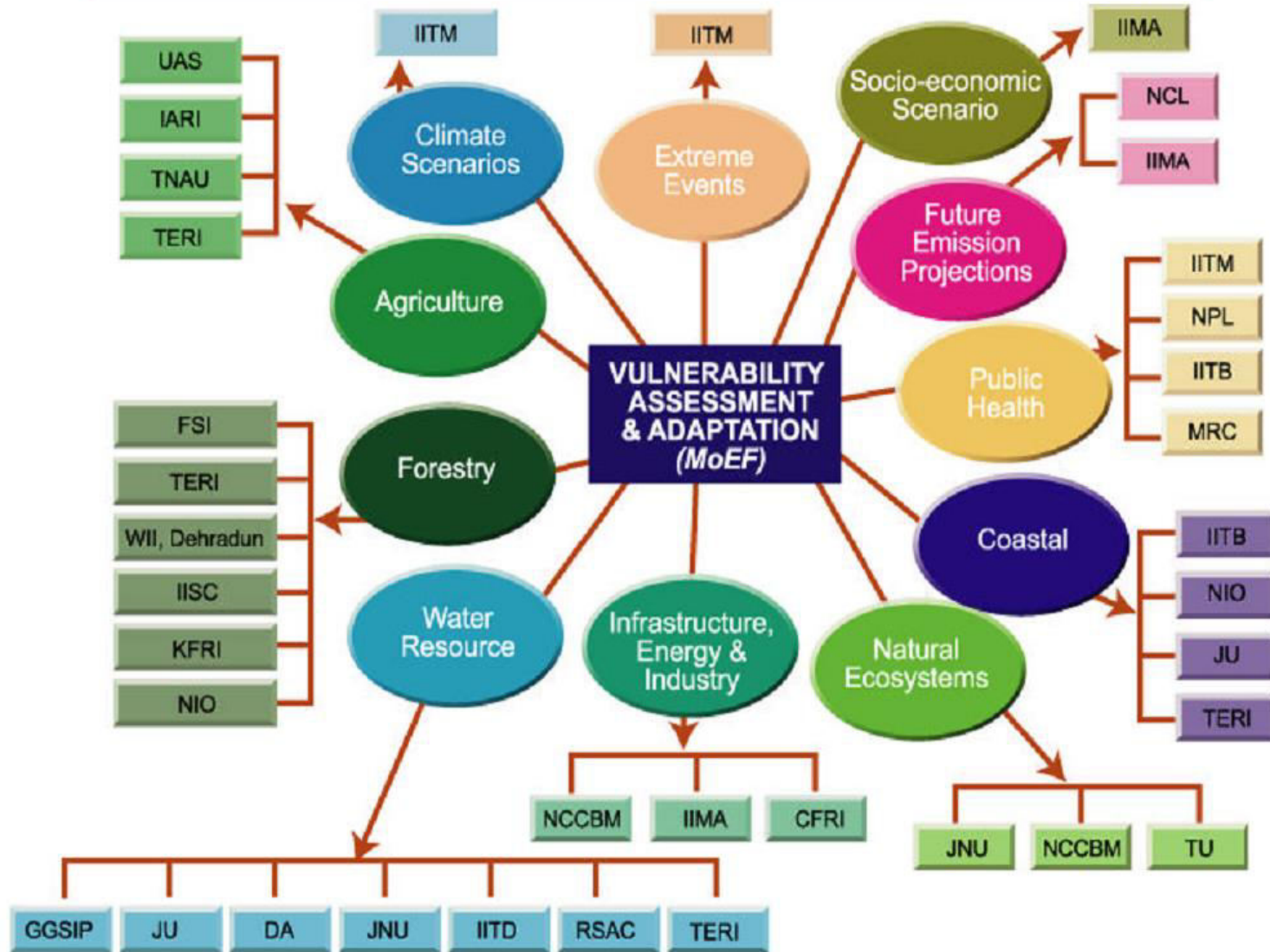


# Uncertainty Reduction : Institutional Arrangement

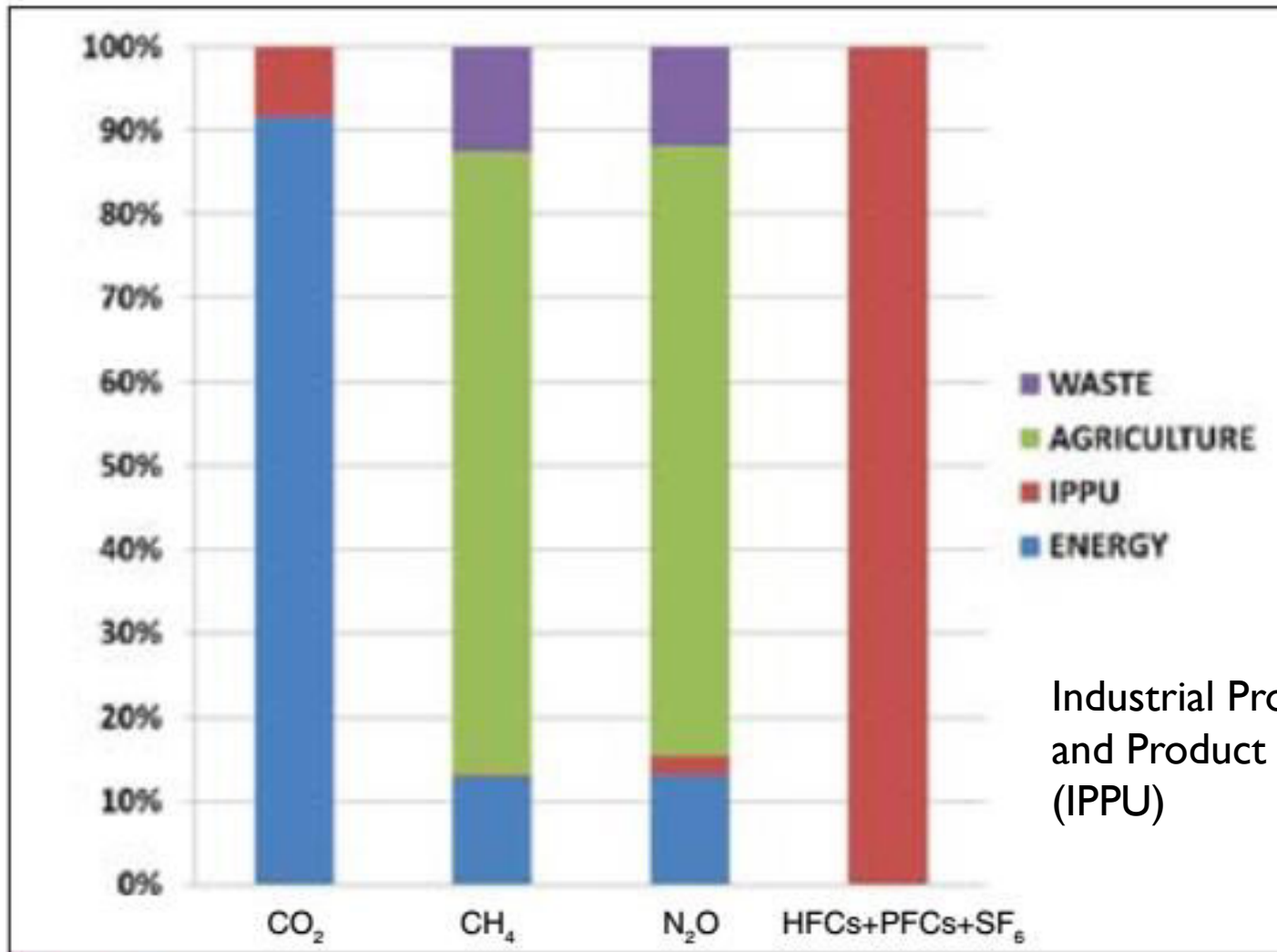




# Vulnerability Assessment and Adaptation: Institutional Arrangement



# GHG EMISSION IN INDIA 2010



Distribution of GHG emissions, by sectors, in 2010

(Source : BUR, MOEF&CC, 2015)

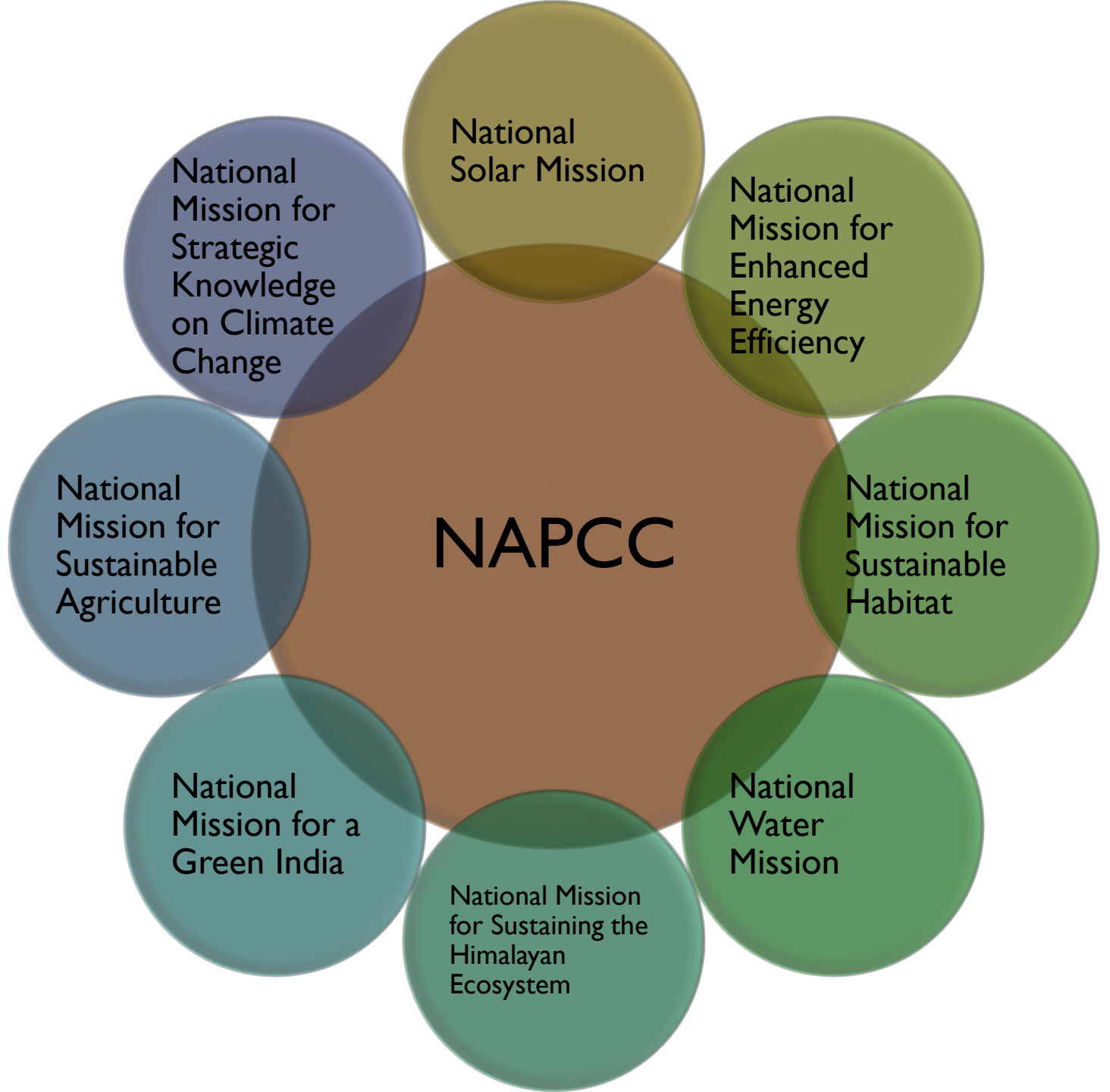
## CDM initiatives

- **India – leads as a non Annex-I Countries** in CDM implementation mainly in the fields of renewable energy, biomass and energy efficiency.
- It has established **Designated National Authority (DNA)** to issue Host Country Approval for CDM projects. Projects registered by the DNA have facilitated investment more than \$26.558 Million
- Scope for CDM projects on **Renewable energy, municipal solid waste/ wastewater treatment plants, industrial process Petrochemical Sector, Railways, Transportation Projects and Forestry sector projects are galore in India.**

Name of Sector	<b>CDM project status in India</b>		No of Projects	CER upto 2012
Afforestation and Reforestation	28	10,860,666		
Agriculture	3	74,393		
Chemical Industries	18	11,793,853		
Energy Demand	224	27,109,485		
Energy Distribution	9	657,149		
Energy industries(Renewable/Non-renewable sources)	2309	487,466,079		
Fugitive emissions from fuel(Solid, Oil and gas)	4	165,438		
Fugitive emissions from production and consumption of halocarbons and sulphur	6	82,095,771		
Manufacturing Industries	243	64,405,361		
Metal Production	5	5,425,126		
Mining/Mineral Production	4	19,053,935		
Solvent use	1	103,579		
Transport	13	1,238,906		
Waste handling and disposal	71	12,498,337		
Total (No. of Projects)	<b>2938</b>	<b>722,948,079</b>		

## **NAPCC**

- Released on **30<sup>th</sup> June, 2008**
- **India is the first country to release** such a plan to combat the impacts of Climate Change
- Vision is to create prosperous, but not wasteful society, an **economy that is self-sustaining.**



# Principles of NAPCC

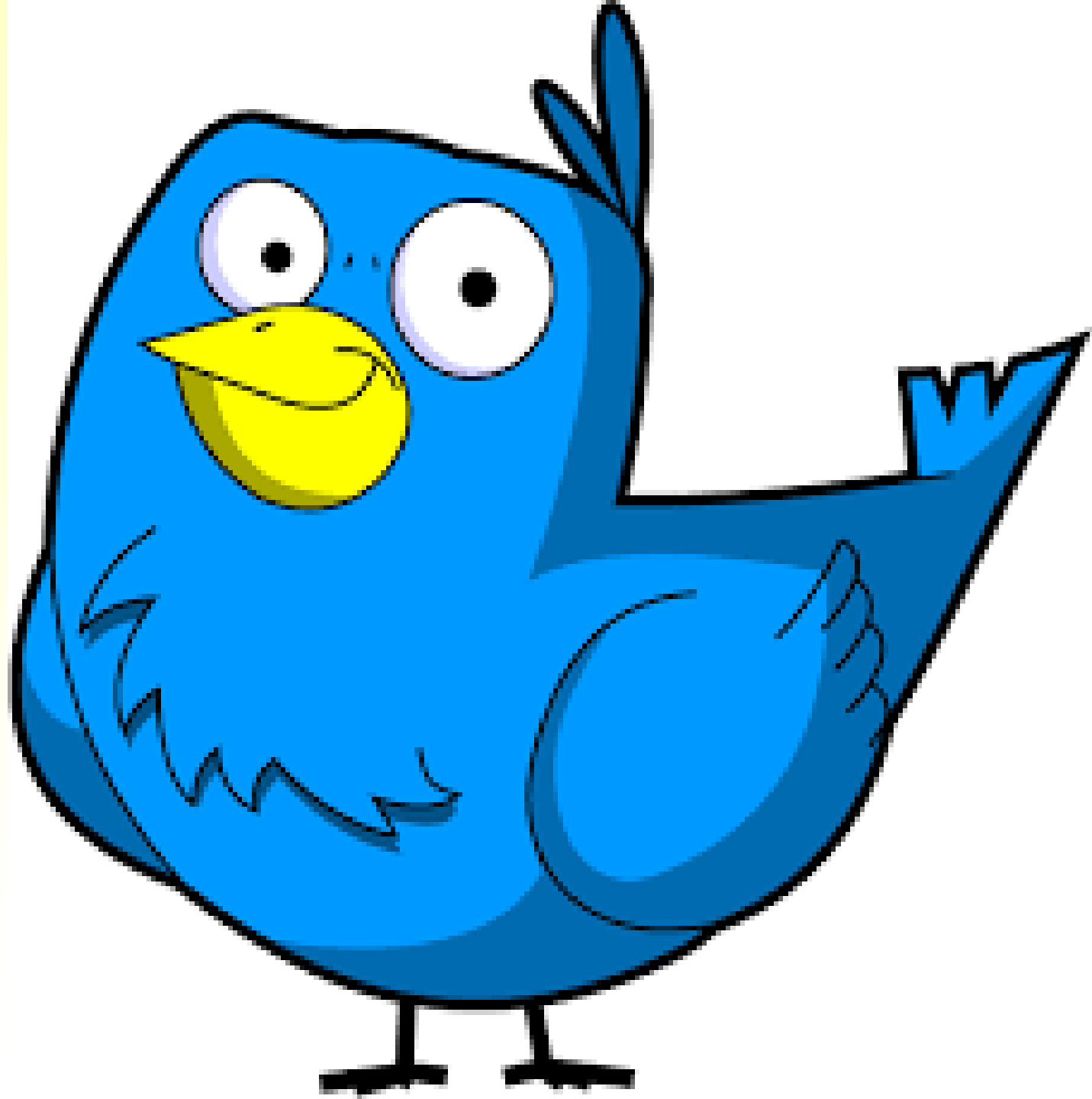
- **Inclusive and sustainable development**
- Achieving **national growth objectives** through a qualitative change in direction that enhances **ecological sustainability**.
- Devising efficient and **cost-effective strategies** for end use Demand Side Management.
- Deploying appropriate **technologies** for both **adaptation and mitigation of greenhouse gases emissions** extensively as well as at an accelerated pace.
- Engineering new and **innovative forms** of market, regulatory and voluntary mechanisms to **promote sustainable development**.

# Principles of NAPCC

- Effecting implementation of programmes through **unique linkages**, including with civil society and local government institutions and through public private partnership.
- Welcoming **international cooperation** for research, development, sharing and transfer of technologies enabled by additional funding and a **global IPR regime** that facilitates technology transfer to developing countries under the UNFCCC.



GOALIN





**Question 5 : National Action Plan on Climate Change was launched in the year:**

- a) 2007**
- b) 2008**
- c) 2009**
- d) 2010**

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# National Solar Mission

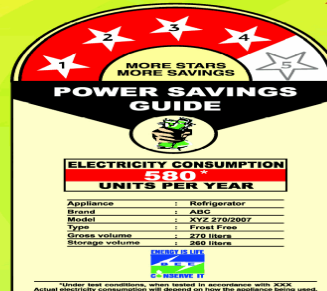
- **Increase the share of solar energy in the total energy mix**
- **Expand the scope** of other renewable and **non-fossil options** such as nuclear energy, wind energy and biomass
- Advantage of permitting a **decentralized distribution of energy**, thereby empowering people at the grassroots level
- Launch a **major R&D programme**, which could draw upon international to promote innovations that enable the storage of solar power for sustained, long-term use.
- **Jawaharlal Nehru National Solar Mission towards Building SOLAR INDIA**
- **International Solar Alliance (ISA) - cop 21 – Indian initiative**

# A range of private and public institutions have a role in enhancing bankability and overall solar market development

	INSTITUTIONAL EXAMPLES	ACTUAL/POTENTIAL ROLE
STRATEGIC LEVEL	<b>Indian Public Sector (non-bank) Financial Intermediaries:</b> Reserve Bank of India; IREDA; Life Insurance Corporation	Priority sector lending; Concessional loans; Long-term debt
	<b>Non-Financial Supporting Institutions:</b> Solar Energy Corporation of India; Indian Banks' Association; Solar Energy Centre; BEE; C-WET	Channeling funds; Information provision; Skills; R&D; Component certification
	<b>Multilateral Funding Channels:</b> International Finance Corporation; Asian Development Bank; World Bank; Clean Technology Fund; Green Climate Fund (potentially)	Payment guarantees; Capacity building (esp. due diligence); R&D
PROJECT LEVEL	<b>Indian Banks:</b> Axis Bank; Bank of Baroda; ICICI; IDBI; Indian Overseas Bank; State Bank of India	Debt financing; Non-recourse project finance; Innovative finance (such as IDFs)
	<b>Non-Bank Financial Institutions:</b> IDFC; Infrastructure Debt Funds	Project finance; Support for market upscaling; Bridging finance gaps
	<b>Overseas Funding:</b> US-EXIM; US-OPIC; KfW (Germany); Multilateral Funding Channels	Concessional finance; Long-term debt
	<b>Other:</b> Venture Capital; Private Equity (Domestic and Overseas); Other early stage investors	Market entry support; Market upscaling; R&D
ANCILLARY MECHANISMS AND MEASURES	<b>Fiscal support:</b> NVVN/NTPC (Bundling); CERC (FiT); MNRE (Payment Guarantee Scheme)	Lowering costs; Incentivizing investment; Increasing market confidence
	<b>Market Mechanisms:</b> Carbon Market (CDM and Voluntary Market); Renewable Energy Certificates	Additional revenue support to incentivize investment
	<b>Other:</b> Bilateral Funding; Private Companies; Educational Institutions; National Skill Development Corporation	R&D; Skills development and training

# National Mission on Enhanced Energy Efficiency

- The **Energy Conservation Act of 2001** provides a legal mandate for the implementation of the energy efficiency measures through the institutional mechanism of the **Bureau of Energy Efficiency (BEE)** in the Central Government and designated agencies in each state.
- **Four Mechanisms:**
  - PAT - Perform, Achieve and Trade - **ESCerts**.
  - MTEE – Market Transformation For Energy Efficiency
  - Creation of **mechanisms** to **finance** demand side management programmes in all sectors by capturing future **energy savings**.
  - Developing **fiscal instruments** to **promote energy efficiency**

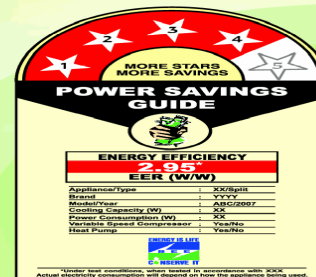
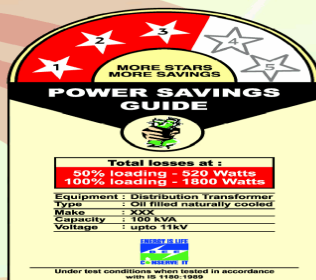
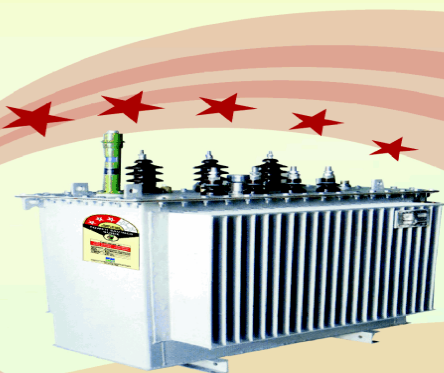


# BEE STAR LABEL

is now

# MANDATORY!

- for Frost Free Refrigerators, Room ACs, Tubular Fluorescent Lamps and Distribution Transformers



★ ★ ★ Bachat ke sare ★ ★ ★

## ATTENTION MANUFACTURERS !

W.E.F. 07.01.2010, Sale of Frost Free Refrigerator, Air Conditioner, Tubular Fluorescent Lamp and Distribution Transformer will not be permissible without BEE Label. Minimum 1 Star Rating will be mandatory to sell the product.

**BEE Labeling is still in the voluntary phase for Direct Cool Refrigerators, Electric Motors & Pumps, Colour Televisions, LPG Stoves, Electric Geysers and Ceiling Fans.**



MINISTRY OF POWER  
(Government of India)



BUREAU OF ENERGY EFFICIENCY (BEE)  
(Ministry of Power, Government of India)  
4th Floor, Sewa Bhawan, R.K. Puram, New Delhi - 110 066  
Tel. : 011-26179699 (5-Lines), Fax No. : 011-26178328/52  
For any details and clarification,  
kindly visit our website : [www.bee-india.nic.in](http://www.bee-india.nic.in)

**SAVE ENERGY. SAVE MONEY. BEE HAPPY**

# **National Mission on Sustainable Habitat**

- To make **sustainable habitat** through improvements in **energy efficiency in buildings, management of solid waste and modal shift to public transport.**
- Three initiatives:
  - **The Energy Conservation Building Code**
  - **Recycling of material and Urban Waste Management**
  - **Better urban planning and modal shift to public transport**
- Address the need to adapt to future climate change by improving the **resilience of infrastructure, community based disaster management**, and measures for improving the **warning system for extreme weather events.** Capacity building would be an important component of this Mission.

**Extension of the Energy Conservation Building Code.**

**Better Urban Planning and Modal Shift to Public Transport; Greater Use of Non-Motorized Mode (Dedicated lanes for cycles, use of battery operated and electric vehicles; use of alternate fuels etc.)**

**Recycling of Material and Urban Waste Management.**

**Water Resource Management and Drinking Water Supply in Urban Areas; waste water management.**

**Municipal Solid Waste Management (vermicomposting; Landfills;**

**Urban Storm Water Management.**

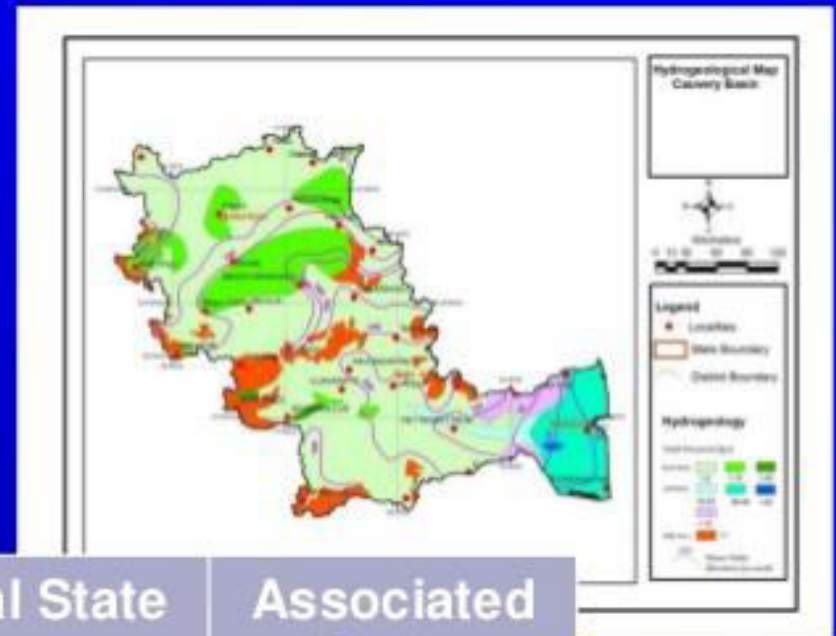


# National Water Mission

- Ensuring **Integrated water resource management**
- **Increasing water use efficiency** by 20% through regulatory mechanisms with differential entitlements and pricing
- Ensure that water needs of **urban areas** are met through **recycling of waste water**
- Adoption of **new** and appropriate technologies such as low temperature desalination **technologies that allow for the use of ocean water**
- Incentive structures will be designed to **promote water-neutral or water-positive technologies, recharging of underground water sources** and adoption of large scale irrigation programmes which rely on sprinklers, drip irrigation and ridge and furrow irrigation

# India: National Action Plan for Climate Change: Support for the National Water Mission

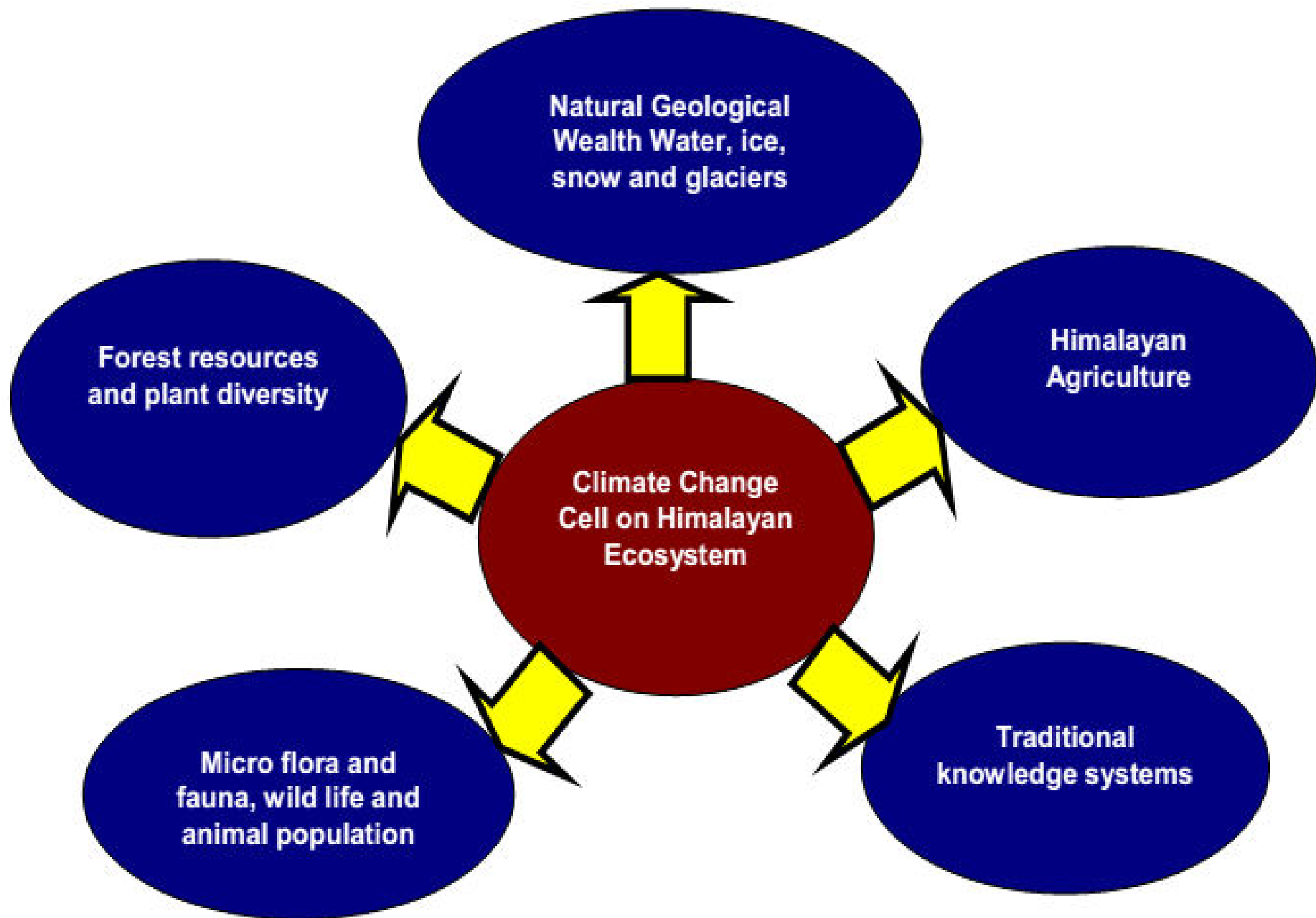
- All-India Water Systems
- 3 Pilot Sub-basins representing specific climate change risks



Category	Pilot Basin	Focal State	Associated States
Snow-fed	Sutlej	Punjab	Himachal Pradesh
Groundwater	Chambal	Madhya Pradesh	Rajasthan
Coastal	Cauvery (delta)	Tamil Nadu	Pondicherry

# **National Mission for Sustaining the Himalayan Ecosystem**

- Evolve management measures for sustaining and safeguarding the **Himalayan glacier and mountain ecosystem**
- **Community-based management** of these ecosystems will be promoted with incentives to community organizations and panchayats for protection and **enhancement of forested lands**
- In mountainous regions, the aim will be to maintain **two-thirds of the area under forest cover** in order to prevent erosion and land degradation and **ensure the stability** of the fragile eco-system



# **National Mission for a Green India**

- **Improving quality** of the forest & ecosystem services of the forests
- **Involvement of Gram Sabha** in implementation (strengthening of local institutions)
- **Generation of livelihood for local communities**
- **Provision of fuel-wood and fodder for local communities**
- **Strengthening of regulatory framework for conservation**

Sub Missions Area	(Mha)	Incremental annual mitigation potential 2020 (MtCO2)
Moderately dense forest cover, but showing degradation (MDF)	1.5	6.7
Eco- Restoration of degraded open forests (D/O)	3	27.0
Restoration of Scrublands + Grasslands (S/G)	1.2	5.4
Restoration of Mangroves +Wetland catchment (M/W)	0.2	1.6
Avenue, City forests, Municipal parks/ gardens, Households,Institutional lands+ Agro-forestry on fallows, Shelter belts, Roads, canals , tank bunds, schools etc (AF_SF_UF)	3.2	8.3
Others (Rehabilitation of Shifting Cultivation areas, Restoring /planting Seabuckthorn, Ravine Reclamation and Restoration of abandoned mining areas)	0.9	6.0
	<b>10</b>	<b>55.0</b>

# Enhancing Forests Carbon Sink

- To Create **additional carbon sink of 2.5 -3 billion tonnes of CO<sub>2</sub>** equivalent through additional forest and tree cover (increase of **about 680 - 817 million tonne of carbon stock**)
- Enhance carbon sink:
  - Full implementation of **Green India Mission**
  - **Green Highways Policy**: 140,000 km long “tree-line” along both sides of national highways. 1% of project cost to be earmarked for plantation
  - **Plantation along Rivers**: part of the Namami Gange Mission







**Question 6 : The target for treating forest area in terms of quality and quantity under Green India Mission is:**

- a) 2.5 m ha
- b) 5.0 m ha
- c) 7.5 m ha
- d) 10.0 m ha



# Enhancing Forests Carbon Sink

- **Finance Commission (FC) Incentive** for creation of carbon sink: devolution of funds to states from federal pool (attaches 7.5 % weight to area under forest).
- Reduction in consumption of wood/ biomass as fuel
- Funds from **Compensatory Afforestation Fund Management and Planning Authority (CAMPA)**: **USD 6 billion** proposed to be given to States
- Other Policies including:
  - REDD-plus
  - National Agro-forestry Policy (NAP)
  - Joint Forest Management
  - National Afforestation Programme

# Adaptation Component

- Strategies and initiatives include actions in agriculture, water, health, coastal region & islands, disaster management, protecting biodiversity and Himalayan ecosystem and securing rural livelihood.
- New missions on Health and Coastal Areas. redesigning National Water Mission & National Mission on Sustainable Agriculture
- India has set up a INR **350 Crores** (USD 55.6 million) **National Adaptation Fund**

# National Mission for Sustainable Agriculture

- Strategies to make Indian **agriculture** more **resilient** to climate change
- Identify and develop new varieties of crops and especially **thermal resistant crops** and alternative cropping patterns
- Convergence and **integration of traditional knowledge** and practice systems, information technology, geospatial technologies and biotechnology
- New **credit and insurance mechanisms** will be devised to facilitate adoption of desired practices

<http://nmsa.dac.gov.in/>





## **National Mission for Strategic Knowledge on Climate Change**

- Ensure funding of high quality and **focused research** into various aspects of climate change
- **Socio-economic impacts of climate change** including impact on health, demography, migration patterns and livelihoods of coastal communities
- Support the establishment of dedicated **climate change related academic units** in Universities and other academic and scientific research institutions in the country which would be networked
- Climate Science **Research Fund**

<b>Elements of distributed functions of the Mission</b>	<b>Nodal Ministries/ Departments responsible for implementation</b>
Climate observations, monitoring, modeling and climate Science; Ecosystem Modelling	Ministry of Earth Sciences (MoES)
Development of Technologies for adaptation & mitigation in CSIR laboratories	Council for Scientific and Industrial Research (CSIR), Ministry of Science & Technology
Agro biotechnological Initiatives for adaptation to climate change	Department of Biotechnology (DBT), Ministry of Science & Technology
Technology Watch, Technology foresight, Extra Mural Research, S&T International Cooperation and linkages	Department of Science & Technology (DST), Ministry of Science & Technology
Space based environmental data base	Department of Space (DOS)
International Negotiation and Policy development and dialogue	Ministry of Environment and Forests (MoEF)
International cooperation and collaboration	Ministry of External Affairs (MEA)

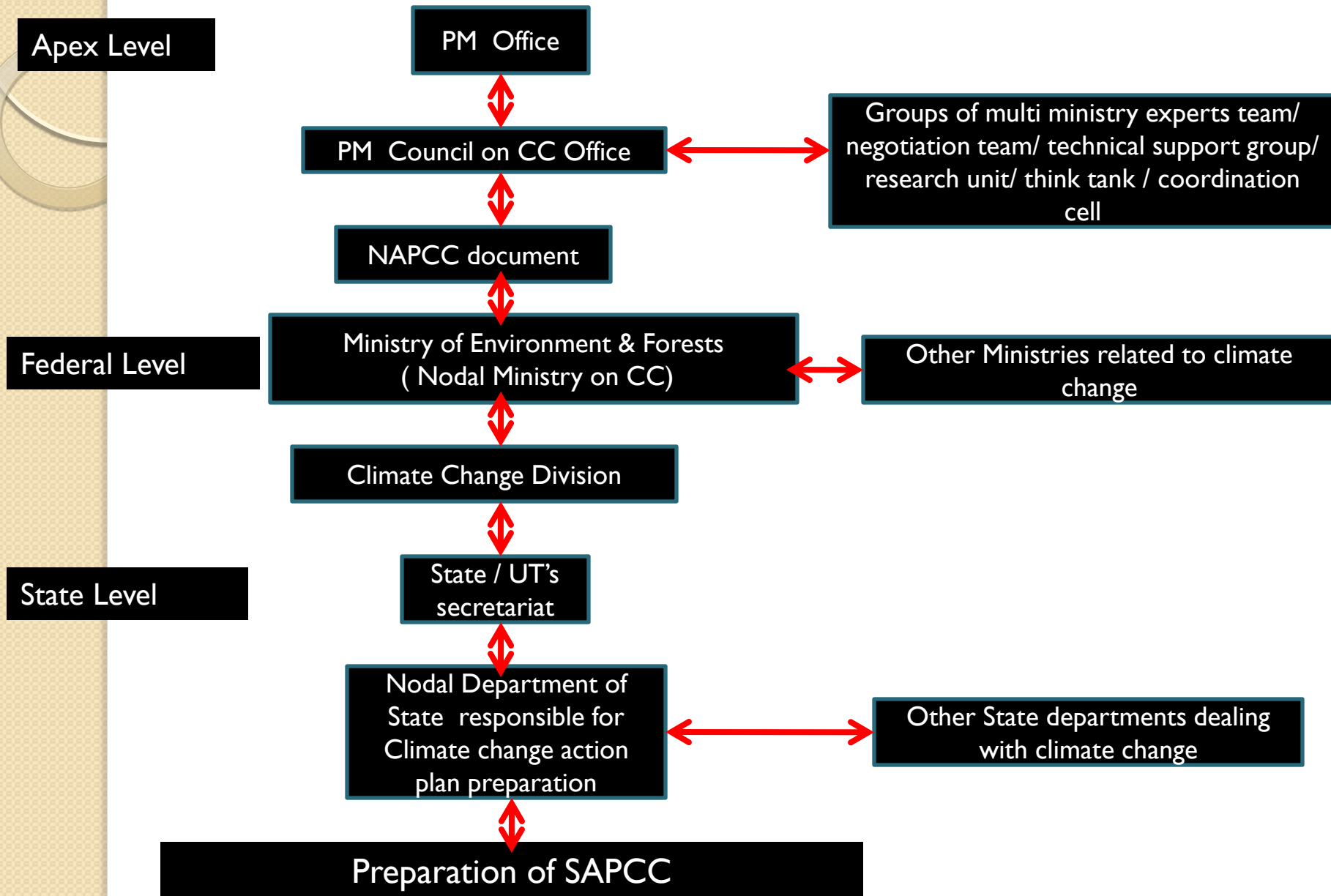
# NAPCC framework for CC management

Mission	Objective	Responsible Entity
<i>National Solar Mission</i>	<ul style="list-style-type: none"> <li>20,000 MW of solar power by 2020</li> </ul>	Ministry of New & Renewable Energy
<i>National Mission for Enhanced Energy Efficiency</i>	<ul style="list-style-type: none"> <li>10,000 MW of EE savings by 2020</li> </ul>	Ministry of Power
<i>National Mission for Sustainable Habitat</i>	<ul style="list-style-type: none"> <li>EE in residential and commercial buildings, public transport, Solid waste management</li> </ul>	Ministry of Urban Development
<i>National Water Mission</i>	<ul style="list-style-type: none"> <li>Water conservation, river basin management</li> </ul>	Ministry of Water Resources
<i>National Mission for Sustaining the Himalayan Ecosystem</i>	<ul style="list-style-type: none"> <li>Conservation and adaptation practices, glacial monitoring</li> </ul>	Ministry of Science & Technology
<i>National Mission for a Green India</i>	<ul style="list-style-type: none"> <li>6 mn hectares of afforestation over degraded forest lands by the end of 12<sup>th</sup> Plan</li> </ul>	Ministry of Environment & Forests
<i>National Mission for Sustainable Agriculture</i>	<ul style="list-style-type: none"> <li>Drought proofing, risk management, agricultural research</li> </ul>	Ministry of Agriculture
<i>National Mission on Strategic Knowledge for Climate Change</i>	<ul style="list-style-type: none"> <li>Vulnerability assessment, Research &amp; observation, data management</li> </ul>	Ministry of Science & Technology

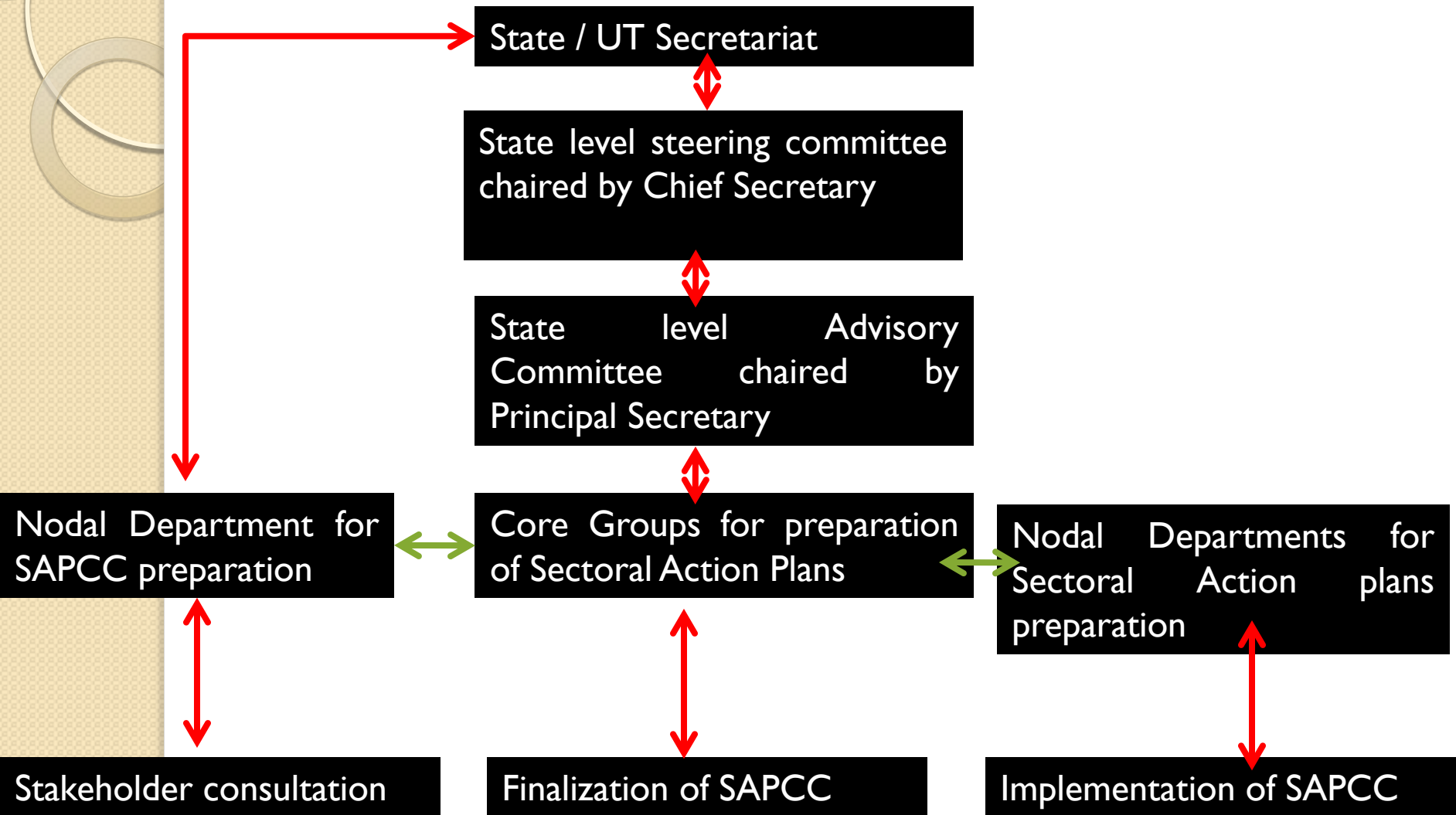
Missions focused on 'Mitigation'
  Missions focused on 'Adaptation'



# Implementation framework



# Implementation mechanism at State level



## Major initiatives at state / UT levels

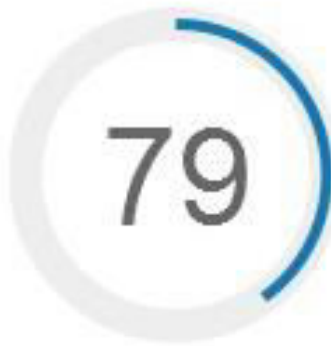
- **Nodal departments** for State Level climate change action plans (SAPCC) have been identified and in some cases new departments established.
- **Technical assistance and financial assistance** to the states have been provided
- Process of preparation of SAPCC is completed in many states
- <http://envfor.nic.in/ccd-sapcc>

# SAPCC of ANI

<b>Mission</b>	<b>Objective</b>	<b>Nodal dept.</b>
<b>Mission on Sustainable Water</b>	Augmentation and efficient use of Water Supply	Andaman Public works dept.
<b>Mission on Sustainable Agriculture</b>	Vulnerability mappings, Micro level weather forecasting & crop insurance, soil and water conservation programs and development of climate resilient crops.	Agriculture department
<b>Green India Mission</b>	Protection and qualitative improvement of forests and efficient use of forest resources	Dept. of Env. and Forests
<b>Mission on Solar Energy</b>	Promotion of power from renewable energy sources	Electricity Dept.
<b>Mission on Energy Efficiency</b>	Adoption of Energy Conservation Building Code (ECBC) and promotion of use of efficient electrical appliances	Electricity Dept.
<b>Mission on Strategic Knowledge</b>	Enhanced research and net working on climate change, capacity building, dissemination of information, data sharing and evolution of policies	Dept. of Science and Technology
<b>Mission on Sustaining Island Ecosystem</b>	Protection of coastal ecosystems by bio shields and monitoring impact of CC on island ecosystems and forests / wildlife habitats	Dept. of Env. and Forests
<b>Mission on Sustainable Habitats</b>	Study on reduction of carbon footprints in building constructions, revamping of urban public transport facilities, solid waste management and Energy Efficiency in the Residential & Commercial Sector.	Andaman Public works dept.

# Emerging issues

## PARIS AGREEMENT - STATUS OF RATIFICATION



**79 Parties have ratified of 197 Parties to the Convention**

On 5 October 2016, the threshold for entry into force of the Paris Agreement was achieved. The Paris Agreement will enter into force on 4 November 2016. The first session of the Conference of the Parties serving as the Meeting of the Parties to the Paris Agreement (CMA1) will take place in Marrakech in conjunction with COP 22 and CMP 12.

[Information on the Paris Agreement, including status of ratification](#)

**QUIZ**





**Question 7: COP 22 will be held in**

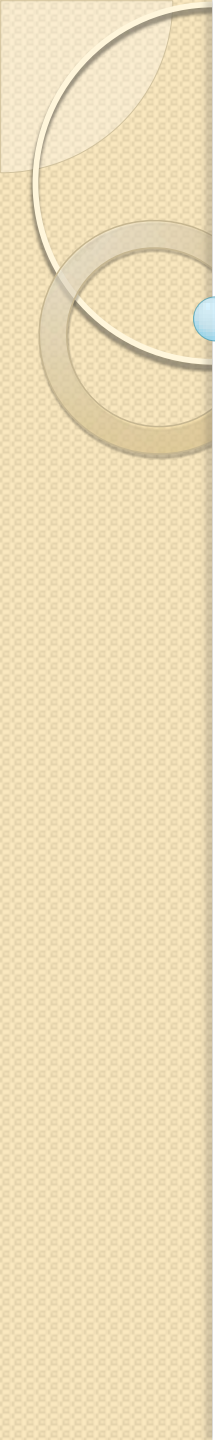
- a) Cancun**
- b) Milan**
- c) Nairobi**
- d) Morocco**



## **New Missions under consideration**

- to promote wind energy
- to build preparedness to deal with impacts on human health
- mission' on India's coastal areas
- waste-to-energy mission





**Thank You**