



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

**Dr. S. Senthil Kumar**  
**Associate Professor, IGNFA**

# Line of Discussion

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

## 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**
- **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.**

# Factors guiding CC management in India



Food Security



Climate Change



Water Security

## KEY ENVIRONMENTAL ISSUES



Energy Security



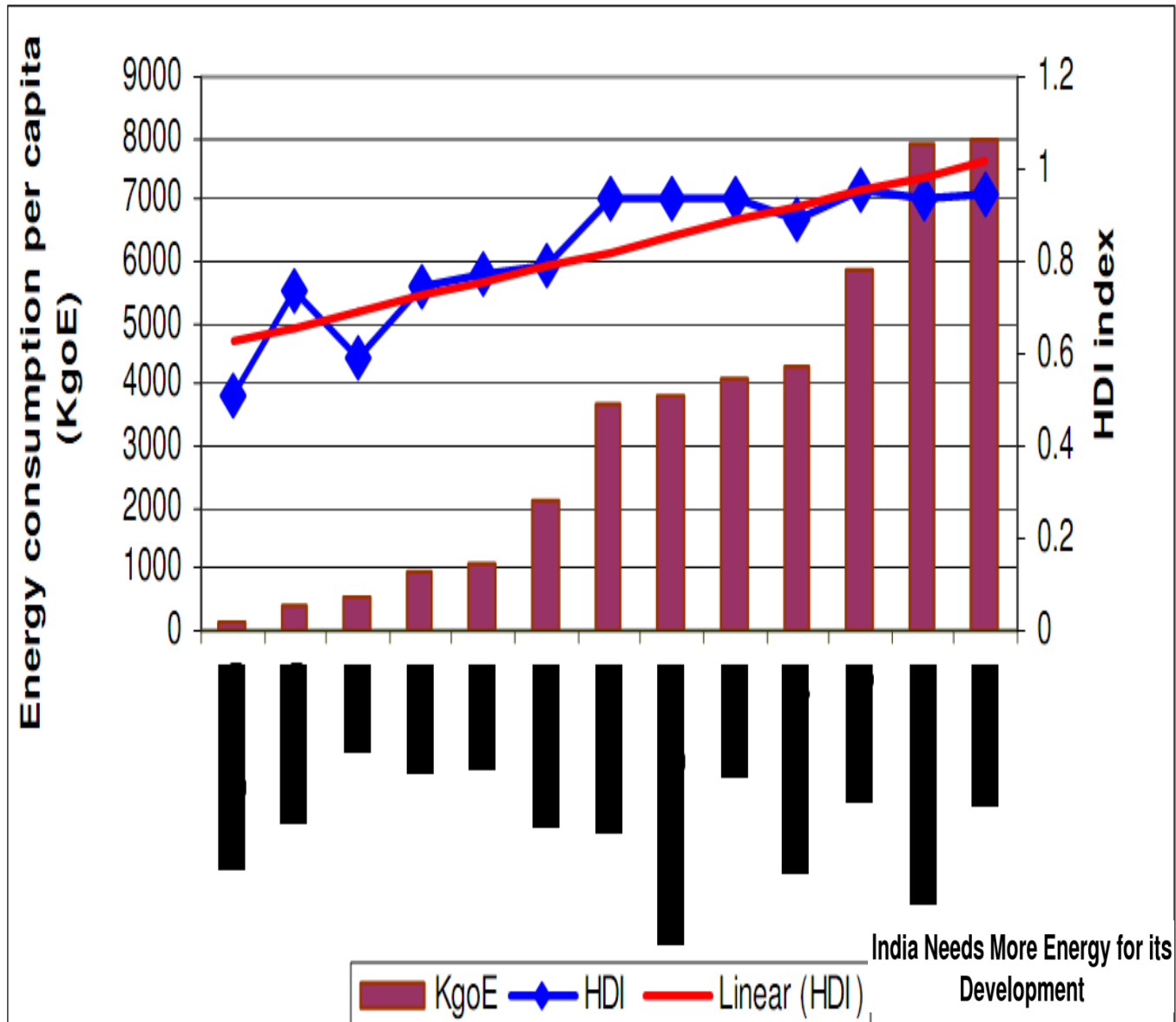
Managing  
Urbanization

**&  
Developmental goals of the country**

# 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** between 2001-2011 to 16.2%
- **Reducing** the **Infant Mortality Rate (IMR)** 28 by 2012
- **Reducing** the **Maternal Mortality Ratio (MMR)** to 1 by 2012
- **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**

# Developmental Goals - Vs - sustainable development



# Climate change management strategy of India

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



# India and Climate Change agreements & Stand

- **1972-** India participated in **UN Conference on Climate Change**
- **June 2007** - India Pledged that its **per capita emissions** would never exceed that of the developed world (**G8+5 Summit, Heiligendamm, Germany**)
- **June 2008** - *National Action Plan on Climate Change (NAPCC)* launched
- **July 2009** – India ratified **MEF Leaders Declaration (MEF and G8 Summit, L'Aquila, Italy)**
- **January 2010** - **Expert Group set up in Planning Commission** to develop a *Low-C Economy strategy* for the 12th Five Year Plan

# **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 **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 CFL for conservation of 6,000 MW electricity

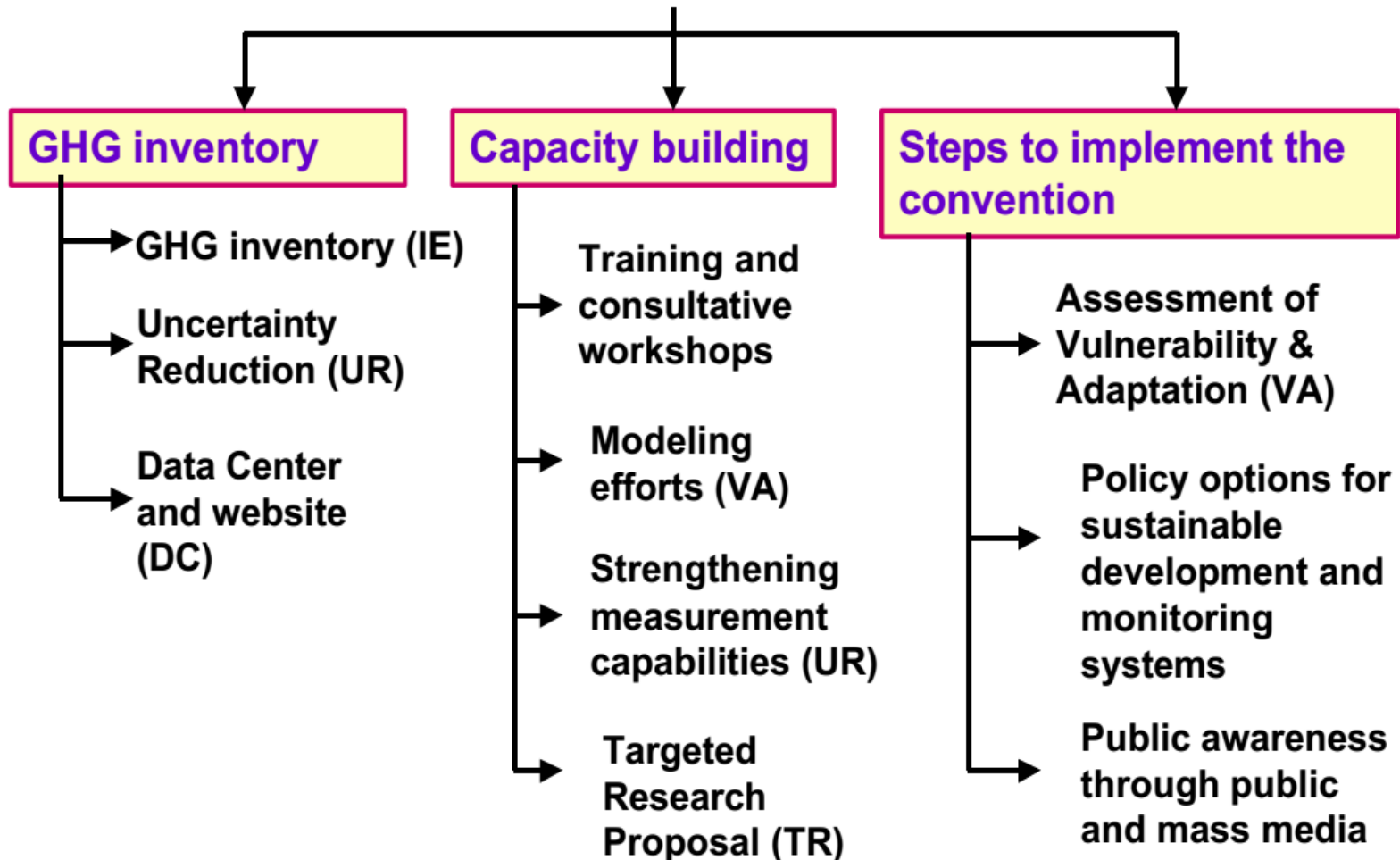
## **NATCOM initiatives**

- **NATCOM** formed to conduct national inventory emissions and Sinks.
- ✓ It developed linkage among different organs of government for holistic CC management.
- ✓ It prepared GHG Inventory for 1994, established data center & website for dissemination of information on CC and prepared roadmap for future CC research requirements in India.

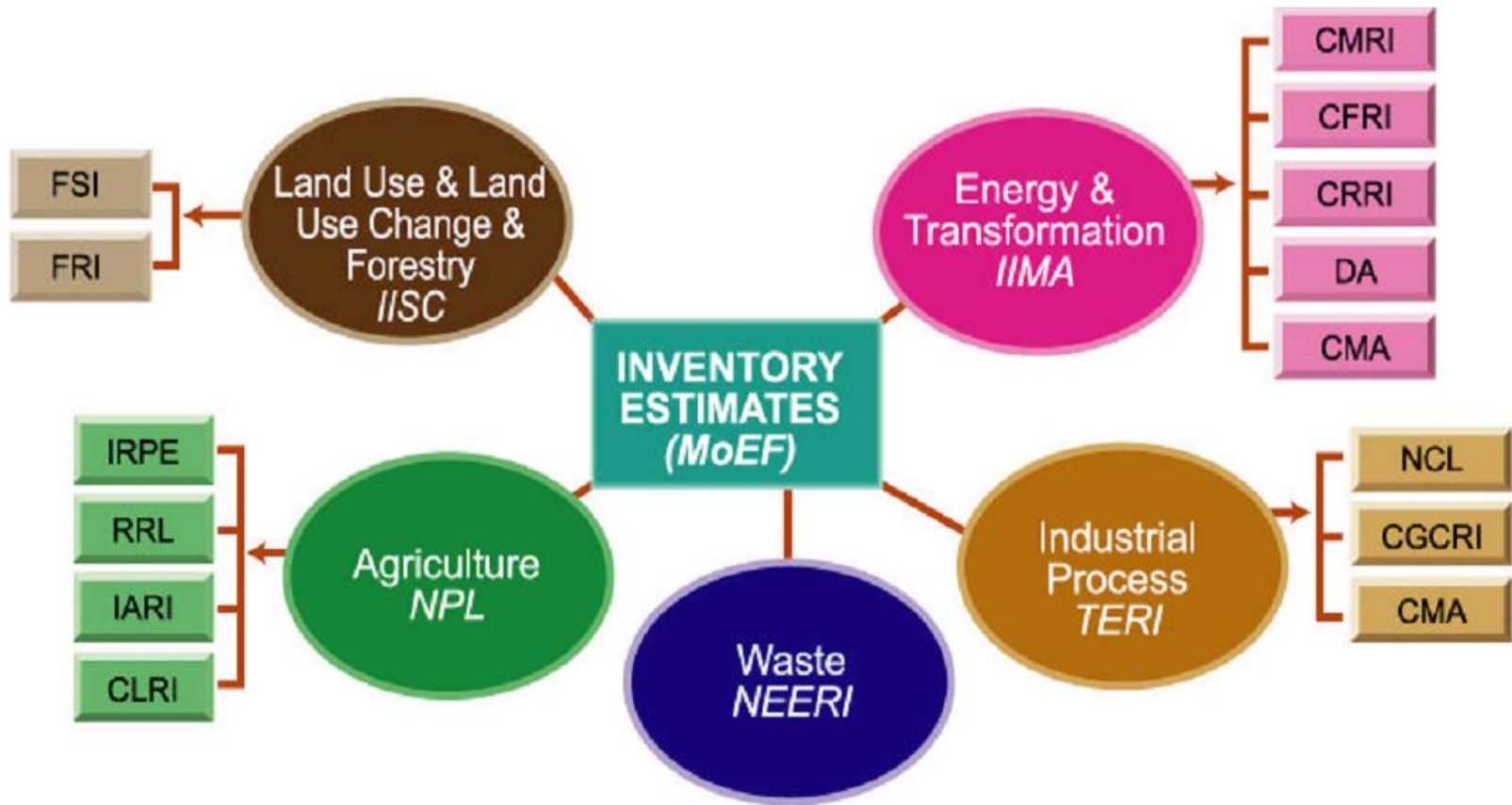
# Components of India's NATCOM

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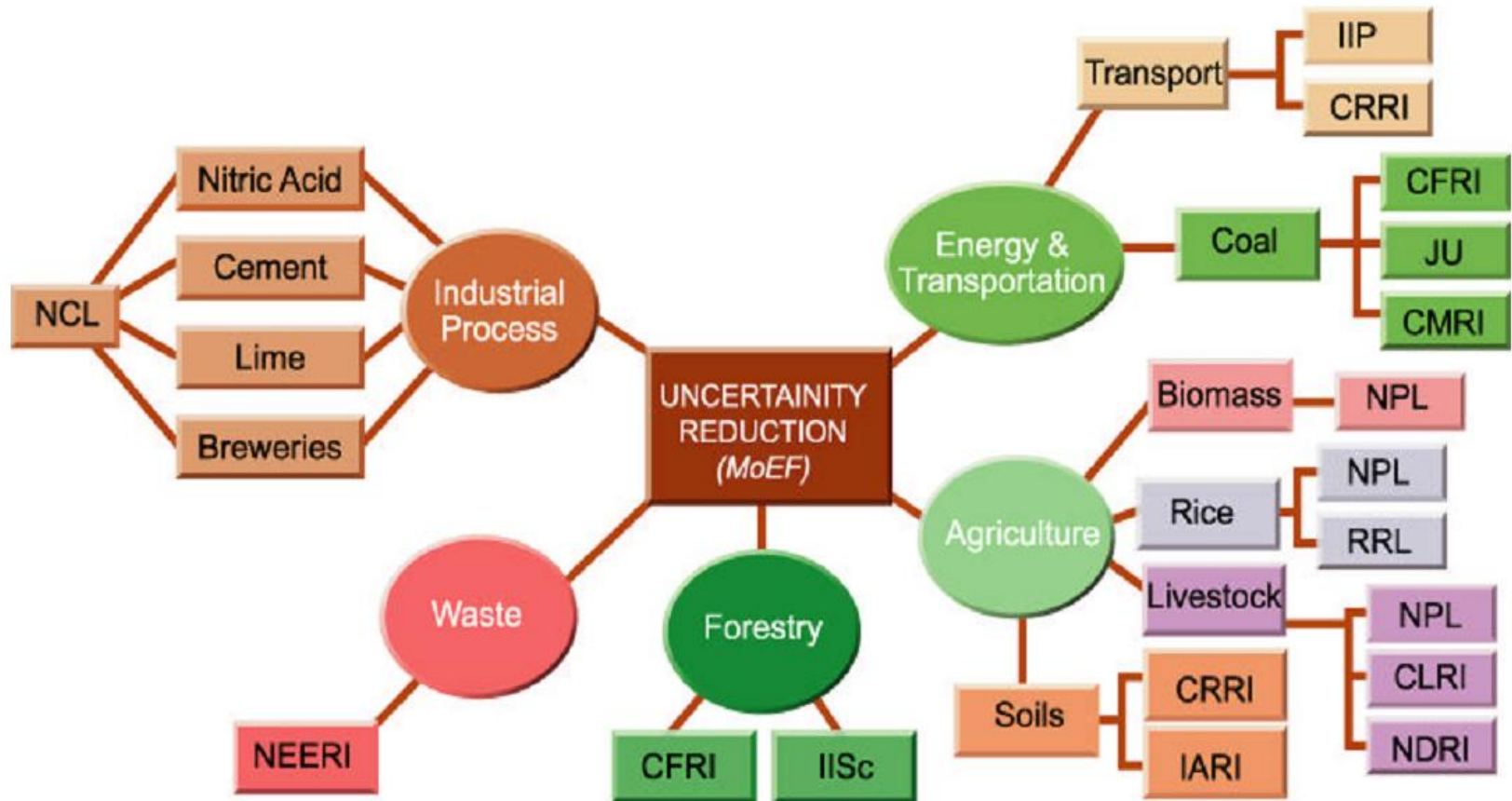
## NATCOM



# Inventory Estimation: Institutional Arrangement

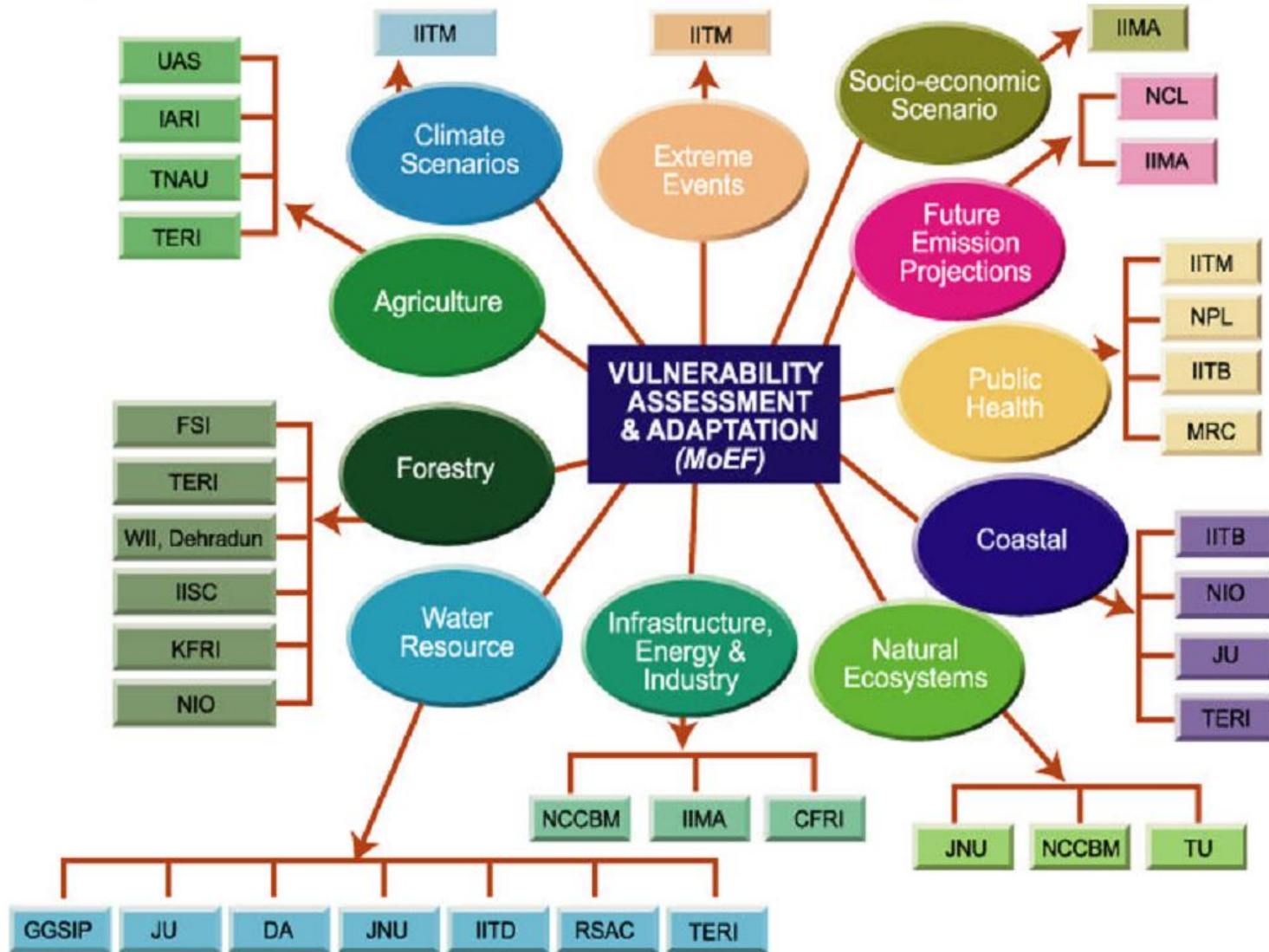


# Uncertainty Reduction : Institutional Arrangement



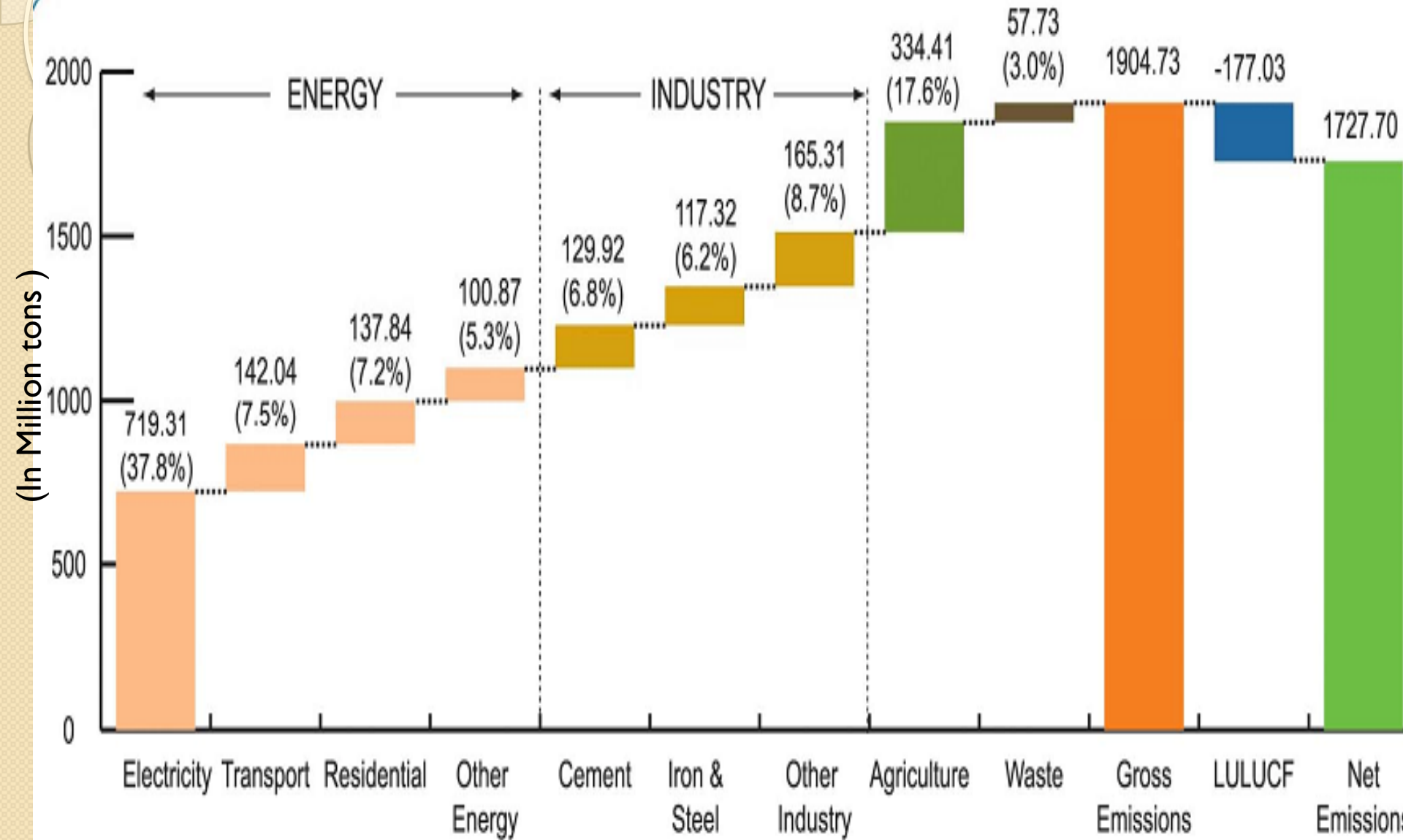


# Vulnerability Assessment and Adaptation: Institutional Arrangement





# GHG EMISSION IN INDIA 2007



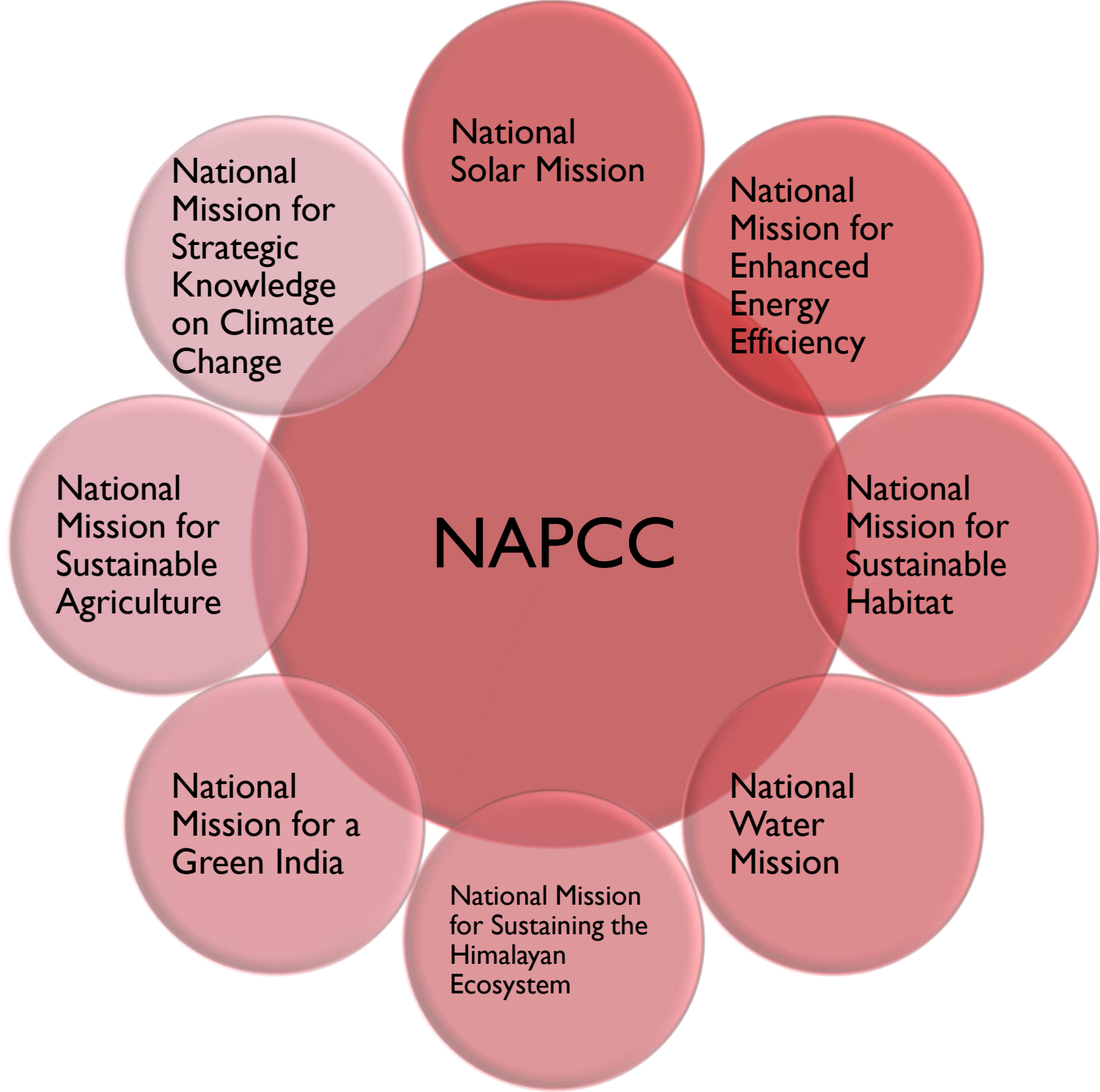
(Source : INCCA, 2009)

## 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.

## **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.

# 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**



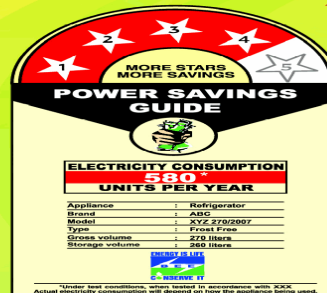
# A range of private and public institutions have a role in enhancing bankability and overall solar market development

	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**

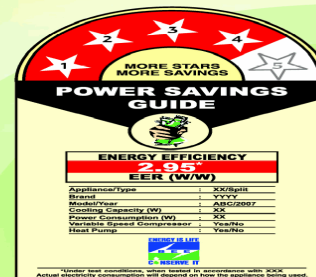
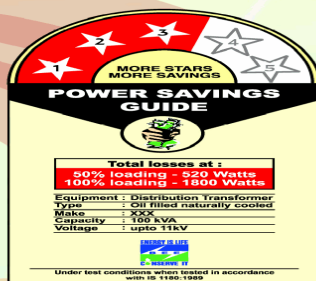
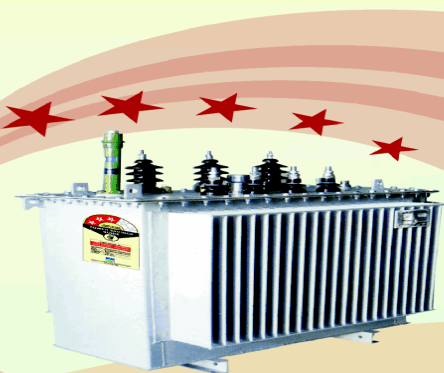


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W.E.F. 07.01.2010, Sale of Frost Free Refrigerator, Air Conditioner, Tubular Fluorescent Lamp and Distribution Transformer will not be permissible without BEE Label. Minimum 1 Star Rating will be mandatory to sell the product.

**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.**

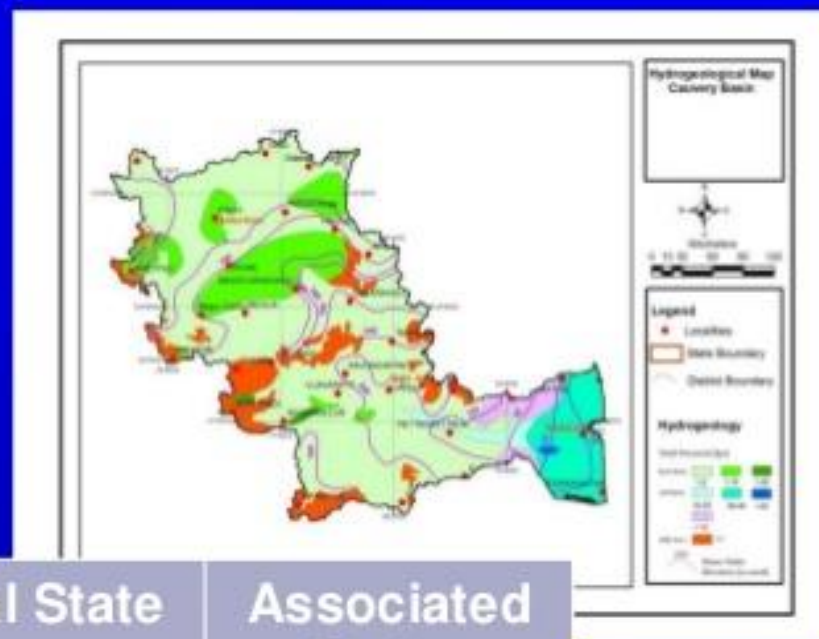
# National Water Mission

- 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

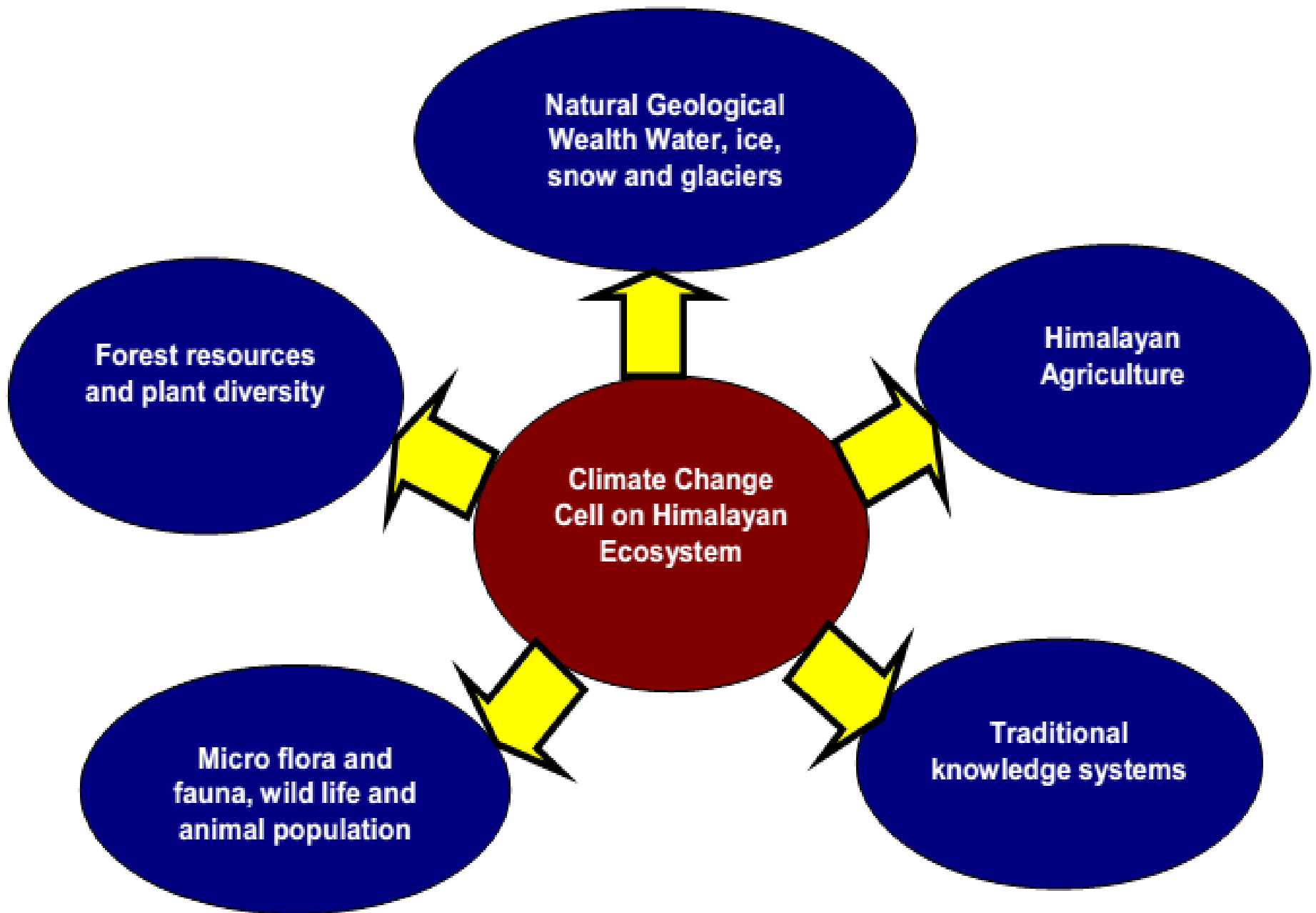
- All-India Water Systems
- 3 Pilot Sub-basins representing specific climate change risks



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





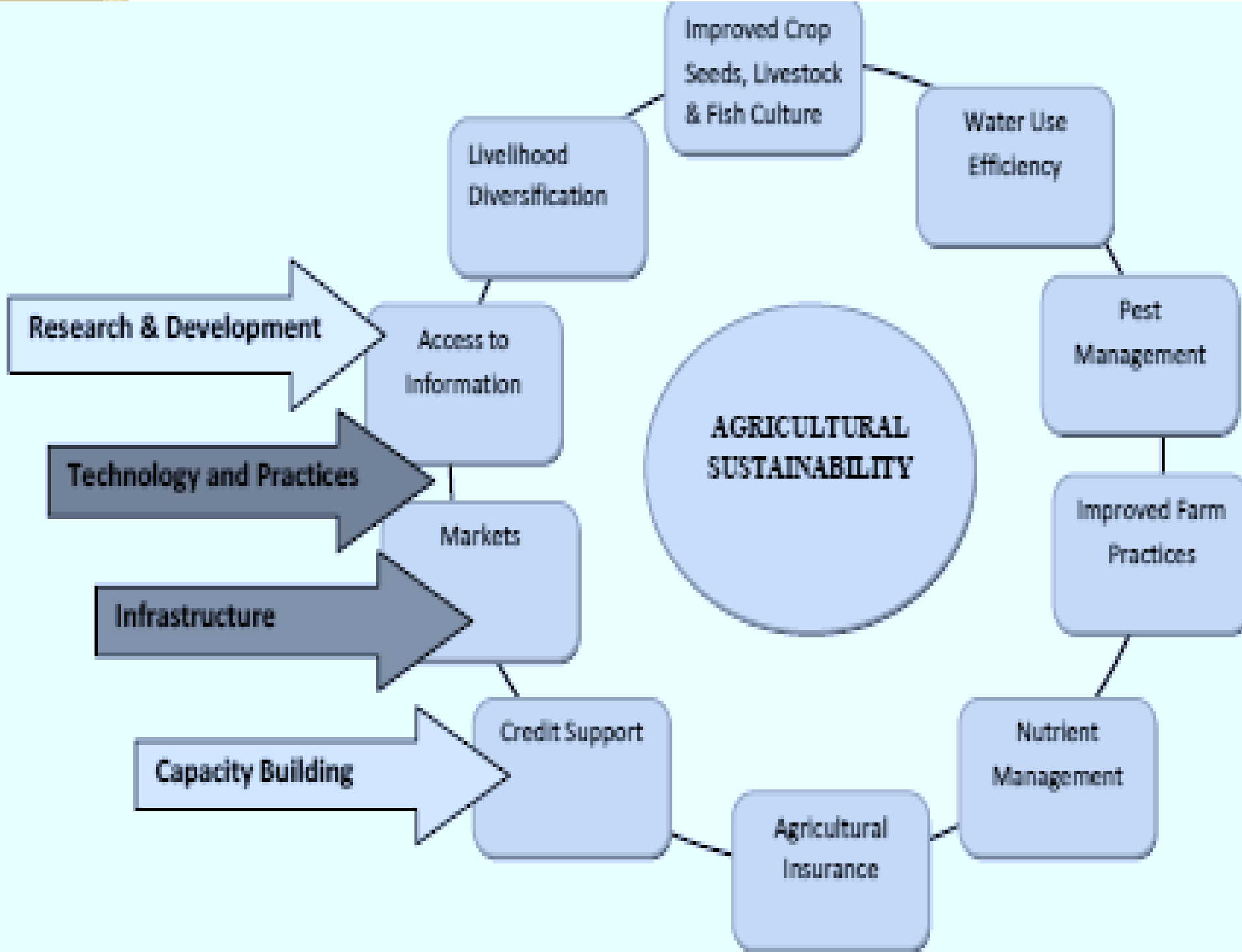
# **National Mission for a Green India**

- **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>

# 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



# **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)

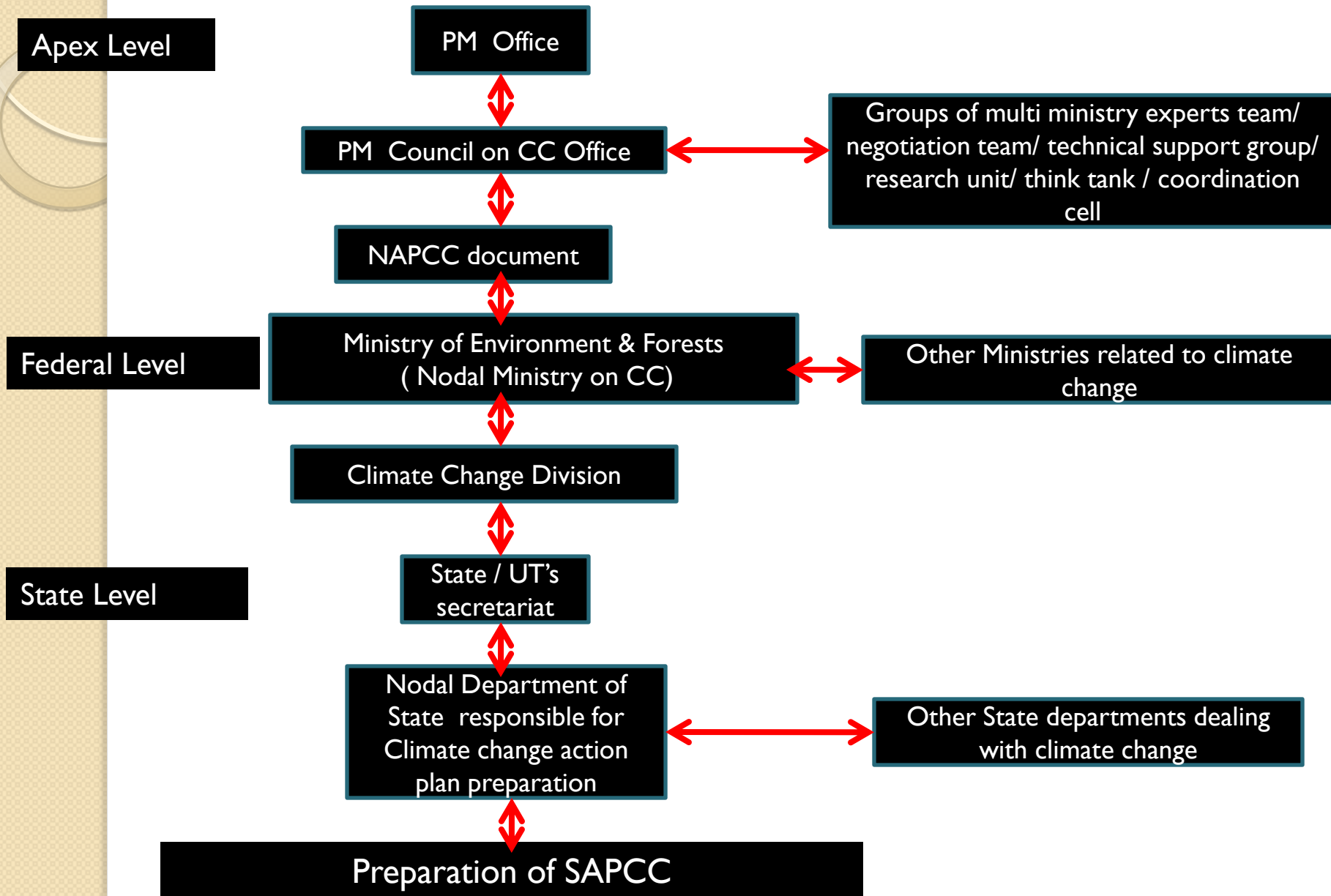
# NAPCC framework for CC management

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'

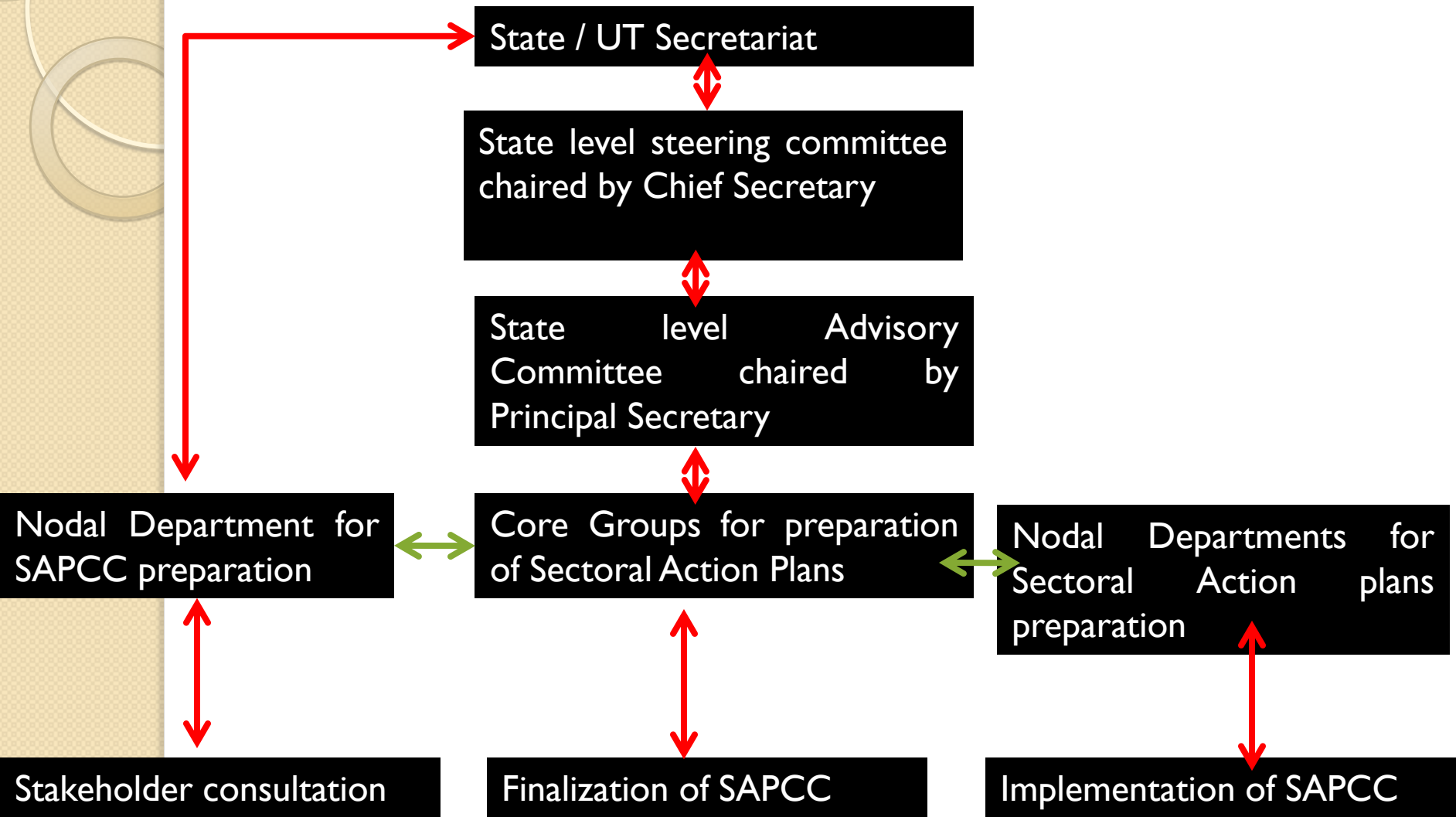
 Missions focused on 'Adaptation'

# Implementation framework





# Implementation mechanism at State level



## Major initiatives at state / UT levels

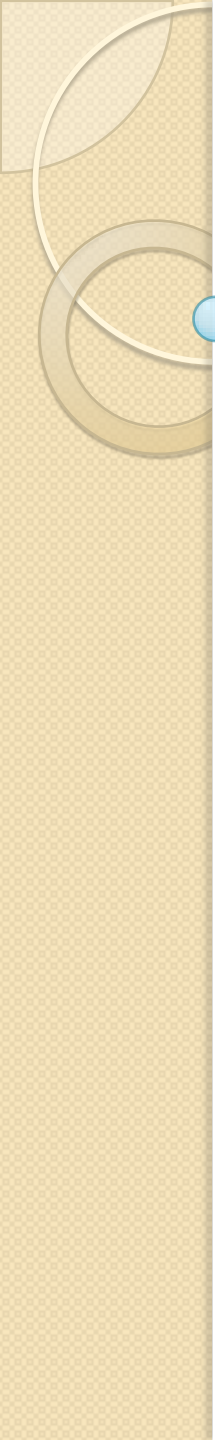
- **Nodal departments** for State Level climate change action plans (SAPCC) have been identified and in some cases new departments established.
- **Technical assistance and financial assistance** to the states have been provided
- Process of preparation of SAPCC is completed in many states
- <http://envfor.nic.in/ccd-sapcc>

# 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.

# New Missions under consideration

- **Wind energy**
- Modelled on National Solar Mission
- To be serviced by Ministry of New and Renewable Energy
- To produce 50,000-60,000 MW of power by 2022
- **Human health**
- Assess impact of climate change on human health
- Build up capacities to respond to these
- Being looked after by Health Ministry
- **Coastal resources**
- Prepare integrated coastal resource management plan
- Map vulnerabilities along the entire shoreline
- Environment Ministry to look after the mission
- **Waste-to-energy**
- Incentivise efforts towards harnessing energy from waste
- Lower dependence on coal, oil, gas
- Make power production a more earth-friendly process



**Thank You**