



Enabling activities for the preparation of India's Initial National Communication to the UNFCCC

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Conference on Climate Change: Issues and Opportunities

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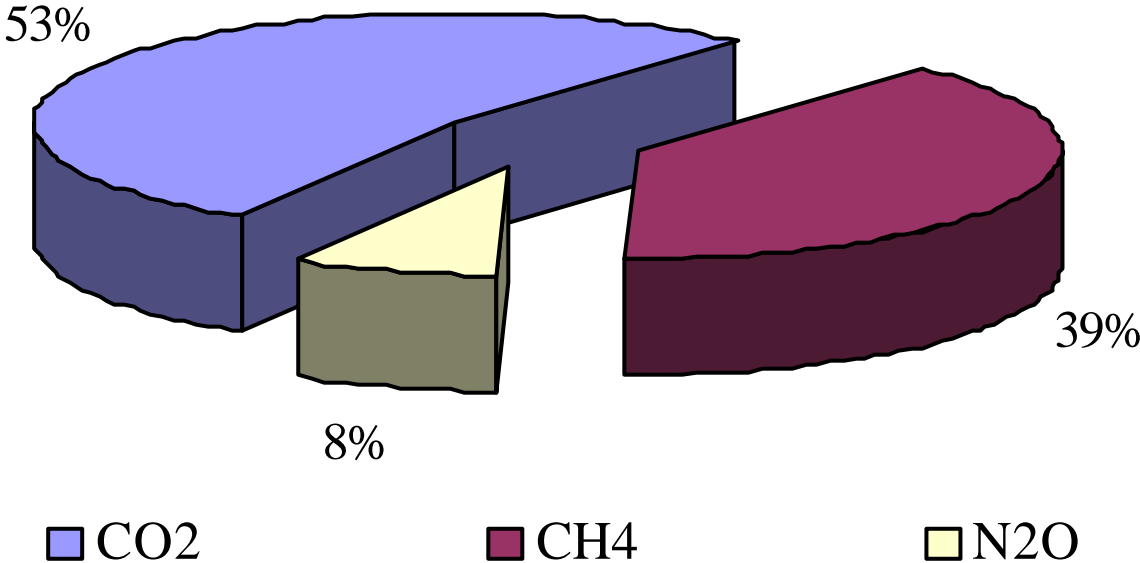
India's Initial National Communication to the UNFCCC:

Presentation Sequence

- **Status of Indian GHG Inventory Estimation**
- **India's NATCOM: Approach, Components and Institutional Arrangements**
- **Inventory Estimation**
- **Uncertainty Reduction**
- **Vulnerability Assessment and Adaptation**
- **Data Center and Website**
- **Targeted Research and Capacity Building**
- **Conclusion**

Status of Indian GHG Inventory Estimates

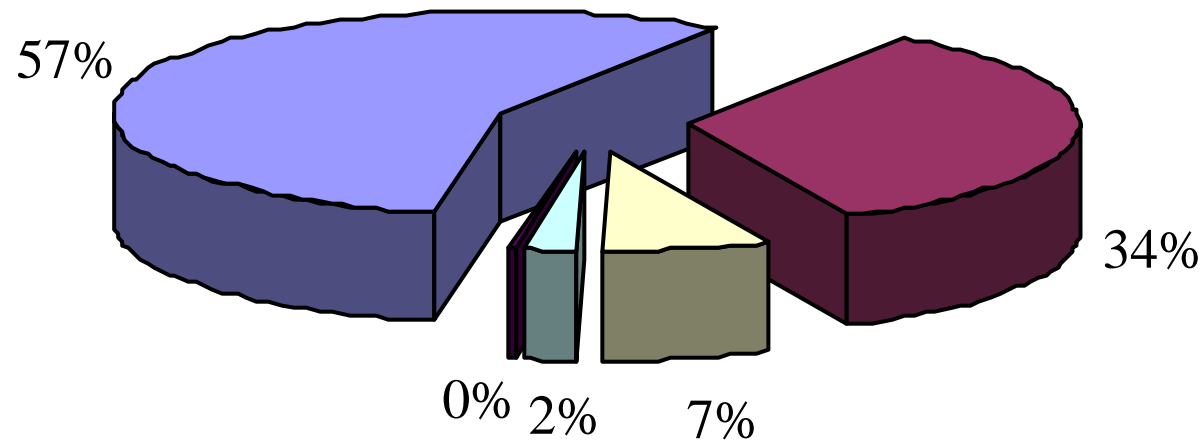
Contribution to GWP (1990)



CO₂ equivalent GWP 1001 MT

CO₂ Equivalent: Major Contributors

All India Emissions = 1001 MT



Energy sector (fuel combustion + fugitive)

Agricultural sources

Waste

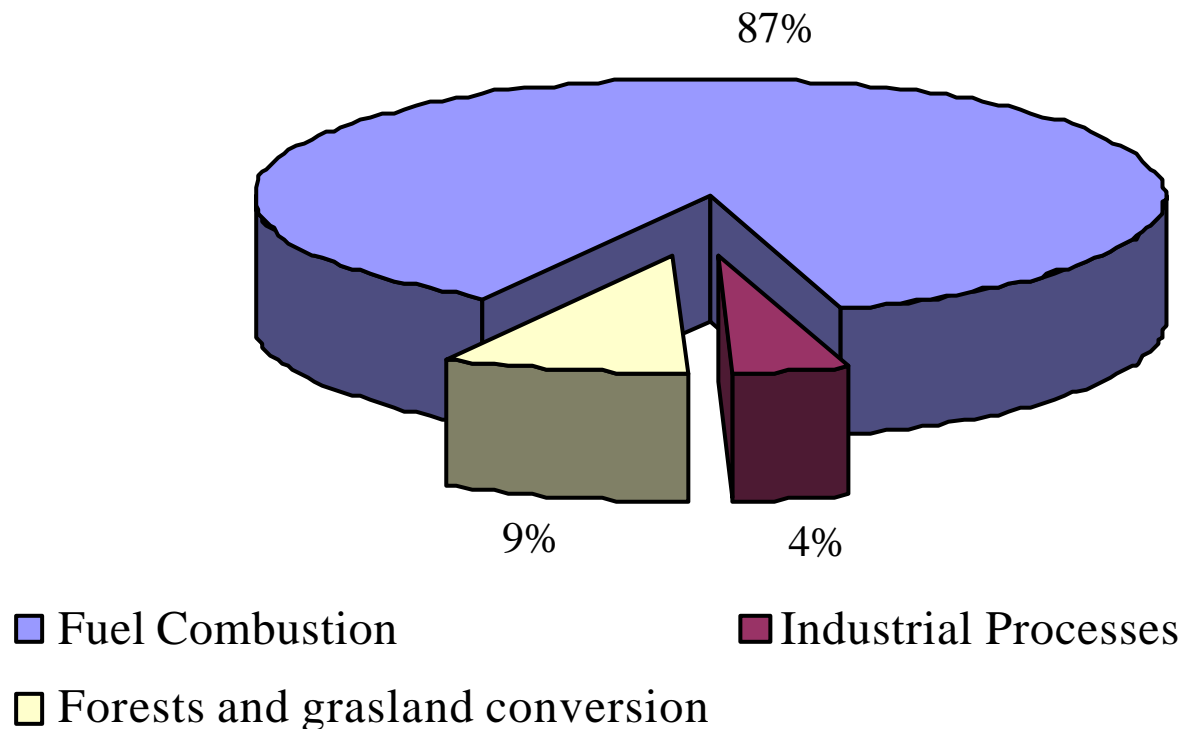
Industrial Processes

Land use change and forestry sector

CO₂ Emissions: Major Contributors

53% contribution to Indian CO₂ equivalent GHG emissions

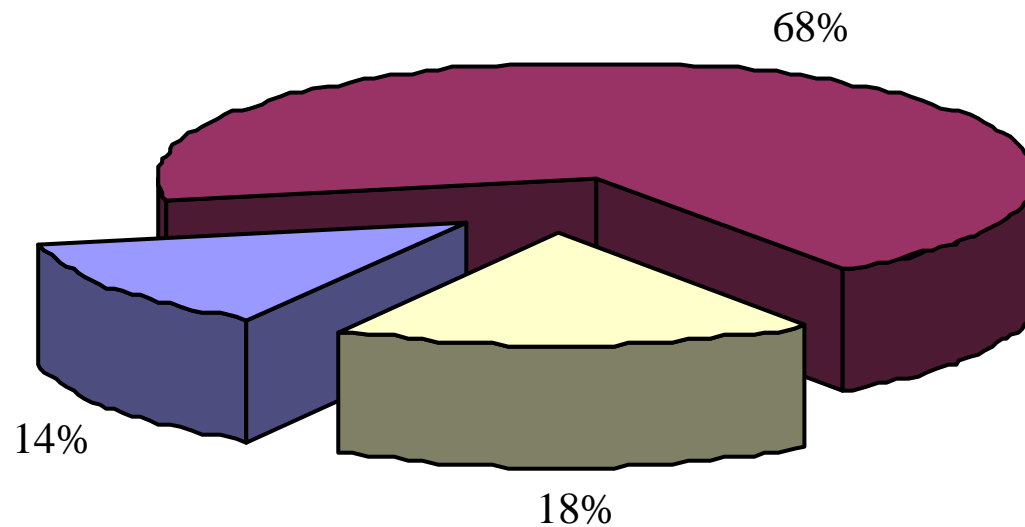
All India Emissions = 534 MT



CO₂ emissions from biomass burning are not included in national totals

Methane:Major Contributors

All India Emissions = 18.5 MT

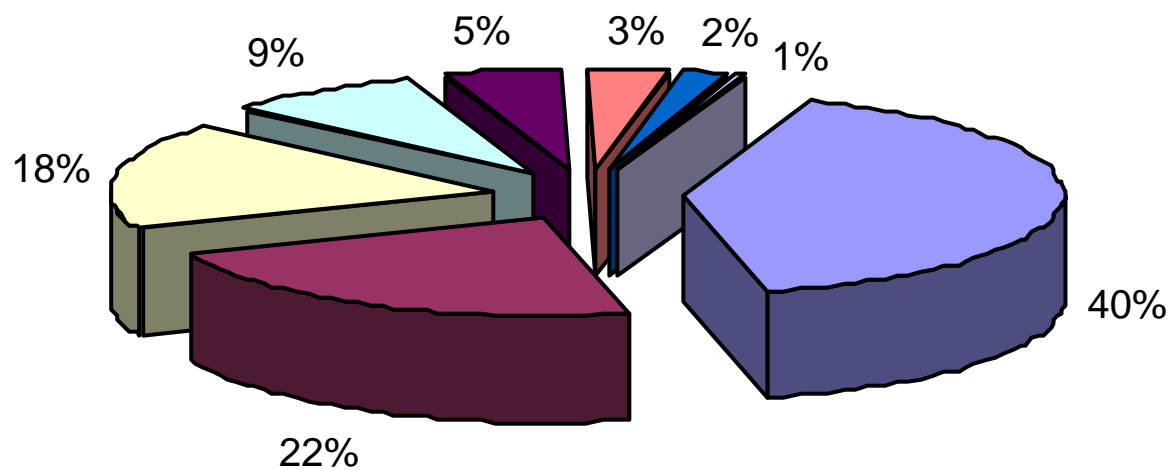


- Total Emissions from energy sector (fuel combustion + fugitive)
- Total Emissions from agricultural sources
- Total emissions from waste

Methane : Sectoral Contributors

39% contribution to Indian CO₂ equivalent GHG emissions

All India Emissions = 18.5 MT



Enteric fermentation

Waste

Manure management

Solid fuels

Rice cultivation

Biomass Burning

Oil and natural gas

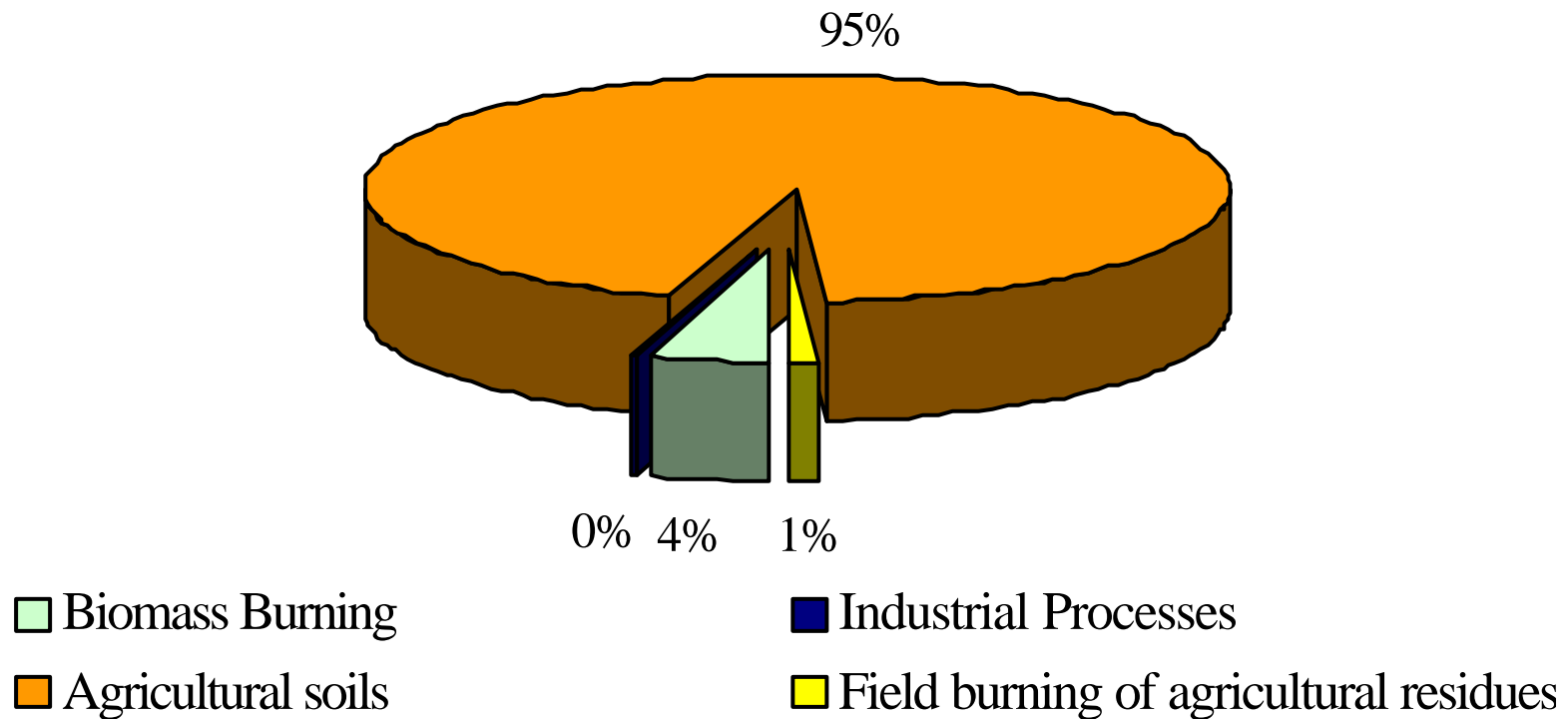
Field burning of agricultural residues

CH₄ Emissions according to 1996 methodology

N₂O : Major Contributors

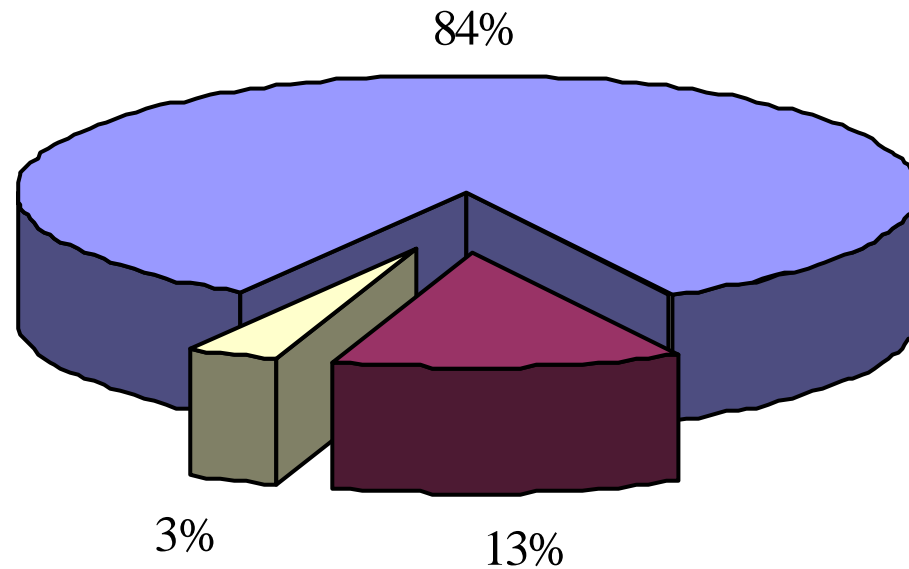
8% contribution to Indian CO₂ equivalent GHG emissions

All India Emissions = 0.255 MT



NO_x : Major Contributors

All India Emissions = 3.19 MT

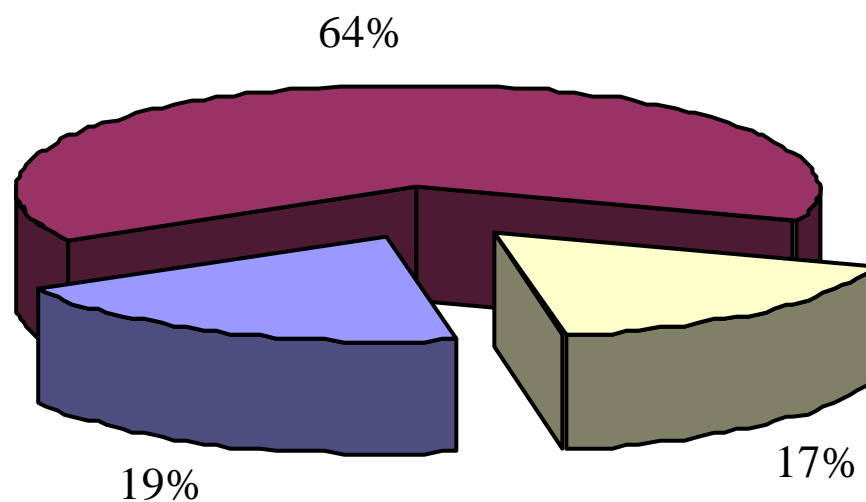


- Energy and transformation industries * ■ Biomass Burning
- Field burning of agricultural residues

* NO_x emissions are computed for the transport sector

CO : Major Contributors

All India Emissions = 18 MT



- Energy and transformation industries *
- Biomass Burning
- Field burning of agricultural residues

* CO emissions are computed for the transport sector

Research Gaps and Uncertainties

- **Our purpose is to refine the India inventory estimates as much as possible based on the resources provided**
- **Emission coefficients in some Key Source Categories (like Thermal power plants, transport, livestock etc.) to be measured for India**
- **Activity data attribution to technologies (like in transport sector)**
- **Analyze the estimation gap between top-down and bottom-up inventory estimates**

LULUCF Emission Inventory In India - Uncertainties

§ In India, estimation of GHG Emissions from LUCF sector is done mainly from Empirical methods and there are no field based measurements on GHG Emissions from LUCF sector

§ For Example CO₂ emissions from LUCF sector in India for the year 1990 is estimated as

41 MT release of CO₂ - Houghton (1991)

20.2 MT release of CO₂ - Ahuja

0.67 MT release of CO₂ - Pauchuri (1992)

42.2 MT release of CO₂ - Mitra (1992)

0.4 MT release of CO₂ - Ravindranath (1992)

§ Uncertainties in Estimation of GHG Emissions arise due to lack of reliable ground based data on emission factors from different sources.

**India's NATCOM:
Approach, Components and
Institutional Arrangements**

What Requires To Be Done

- **Emanates from general commitments under the Convention**
- **Preparation of Initial National Communication**
- **Inventories of GHGs**
- **Promote sustainable development, resource conservation and sink enhancement**
- **Take climate change considerations into national planning process**
- **Promote and cooperate**
 - ★ **Scientific Research**
 - ★ **Training**
 - ★ **Public Awareness**

Approach to NATCOM Preparation

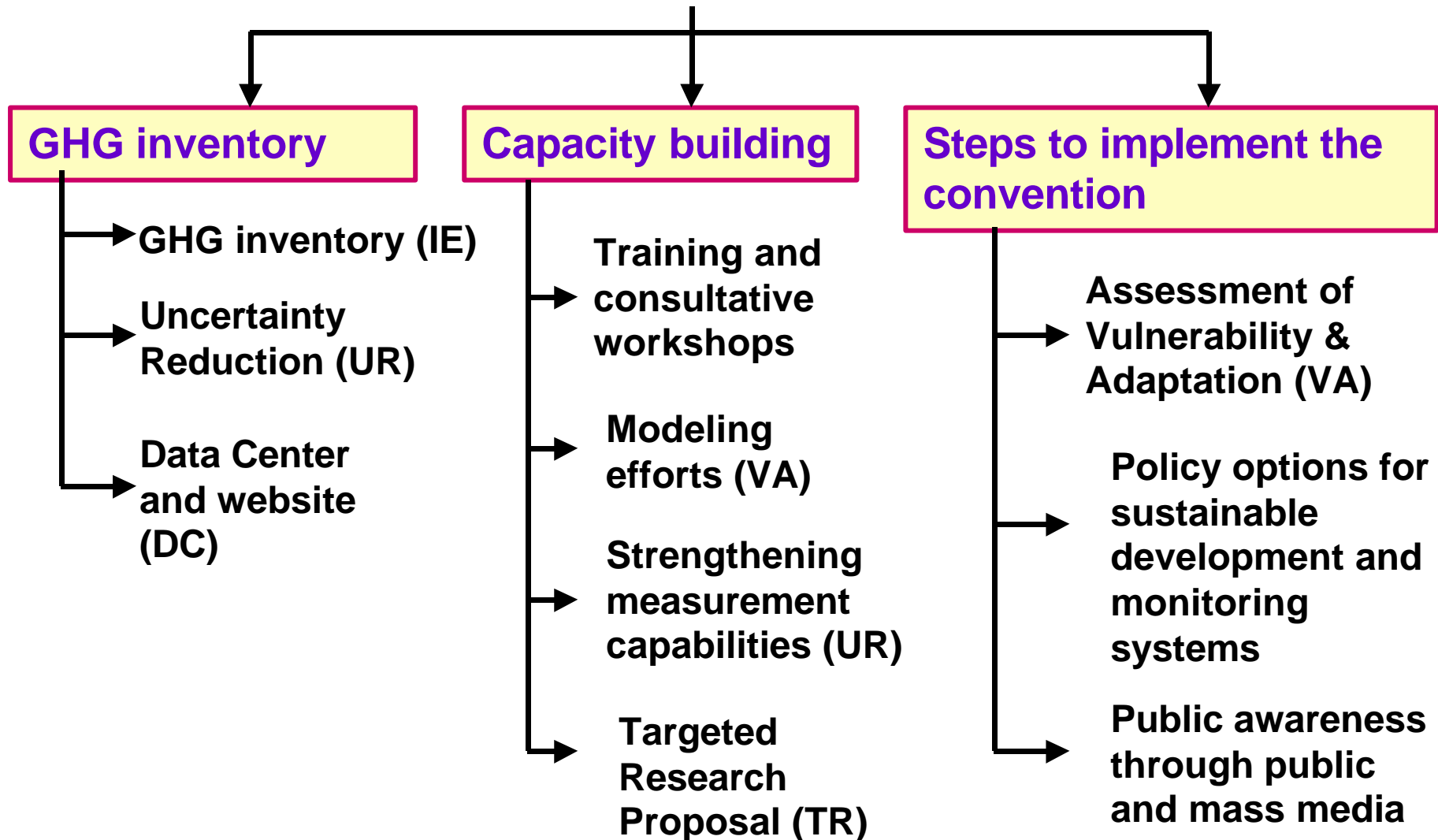
- ❖ Broad based Participatory Planning Process for
 - ★ Development of Comprehensive Inventory GHGs for 1994
 - ★ Improve its reliability vis-a-vis reducing uncertainties of GHG emission coefficients in key source categories (IPCC guidelines and methodologies)
- ❖ Identification of key steps to implement the Convention
- ❖ Capacity Building and networking of National Institutions and Agencies through
 - ★ Consultative Meetings
 - ★ Planning and Training Workshops

CONTD.....

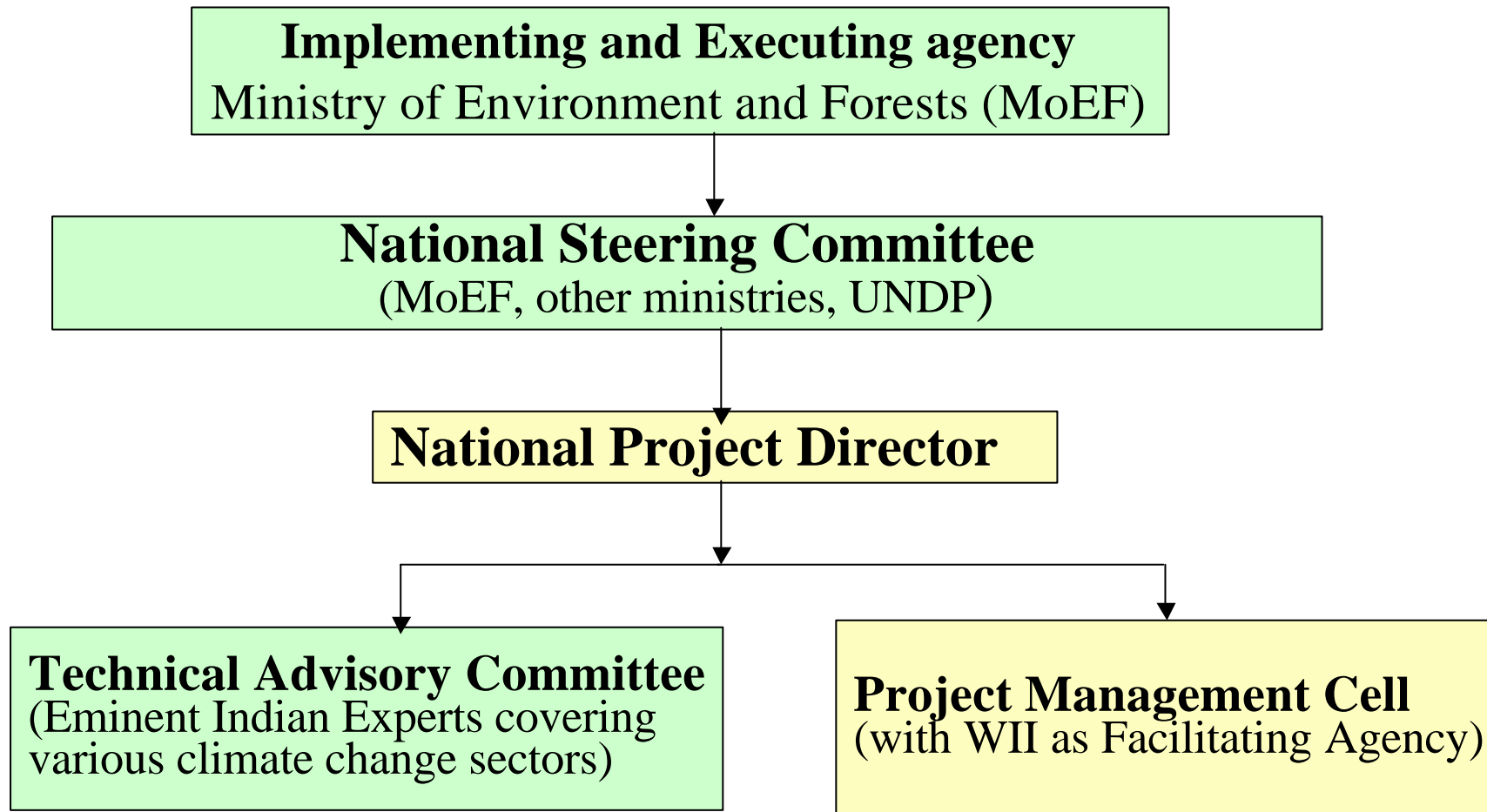
- ❖ Participation of policy makers, planners and researchers for developing linkages between climate change issues and developmental/economic processes
- ❖ Articulate the Indian and regional requirements for further targeted research in climate change and related areas

Components of India's NATCOM

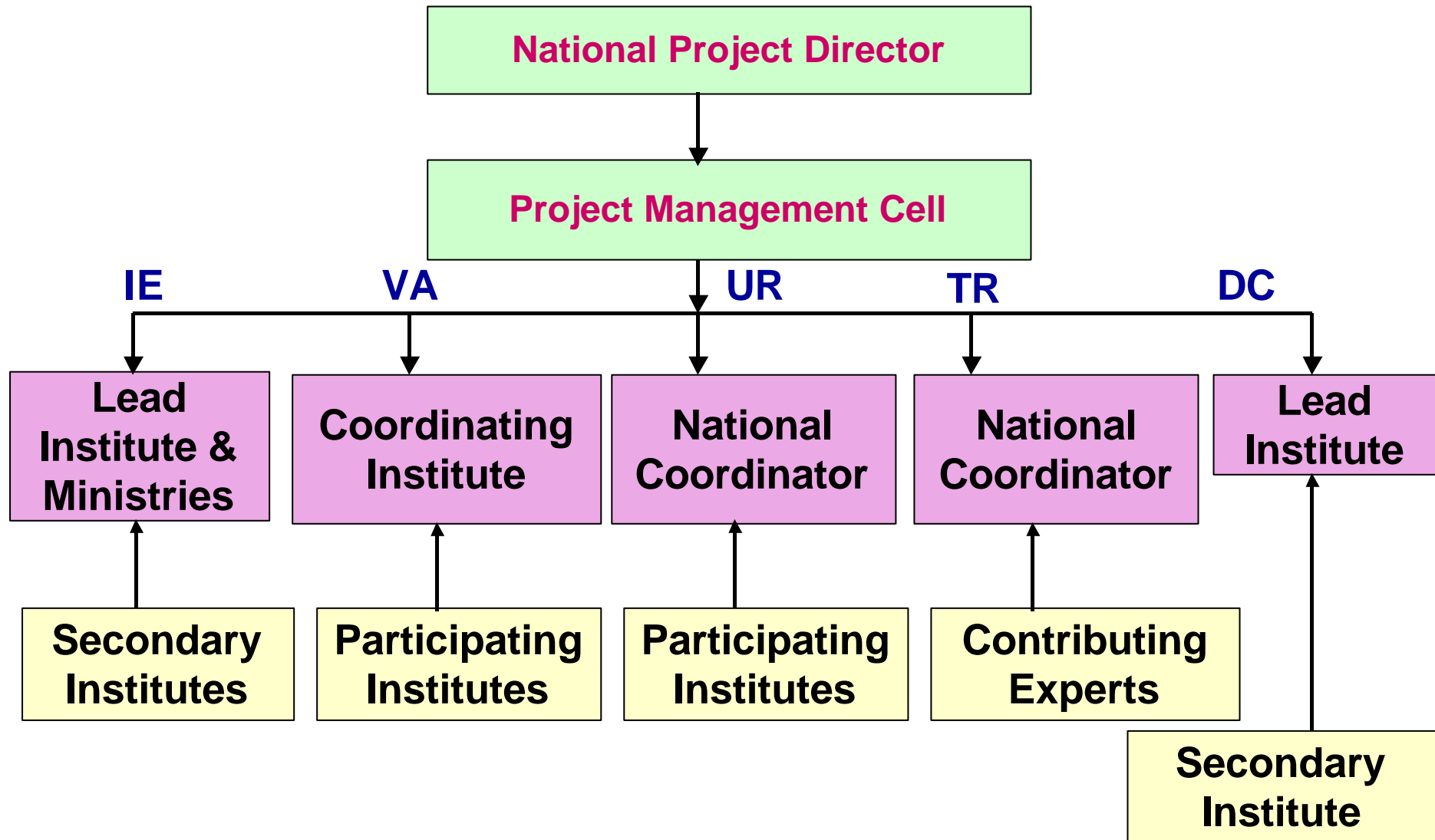
NATCOM



Project Implementation Arrangements



Institutional Mechanism for NATCOM Components



Interlinkages

Uncertainty Reduction

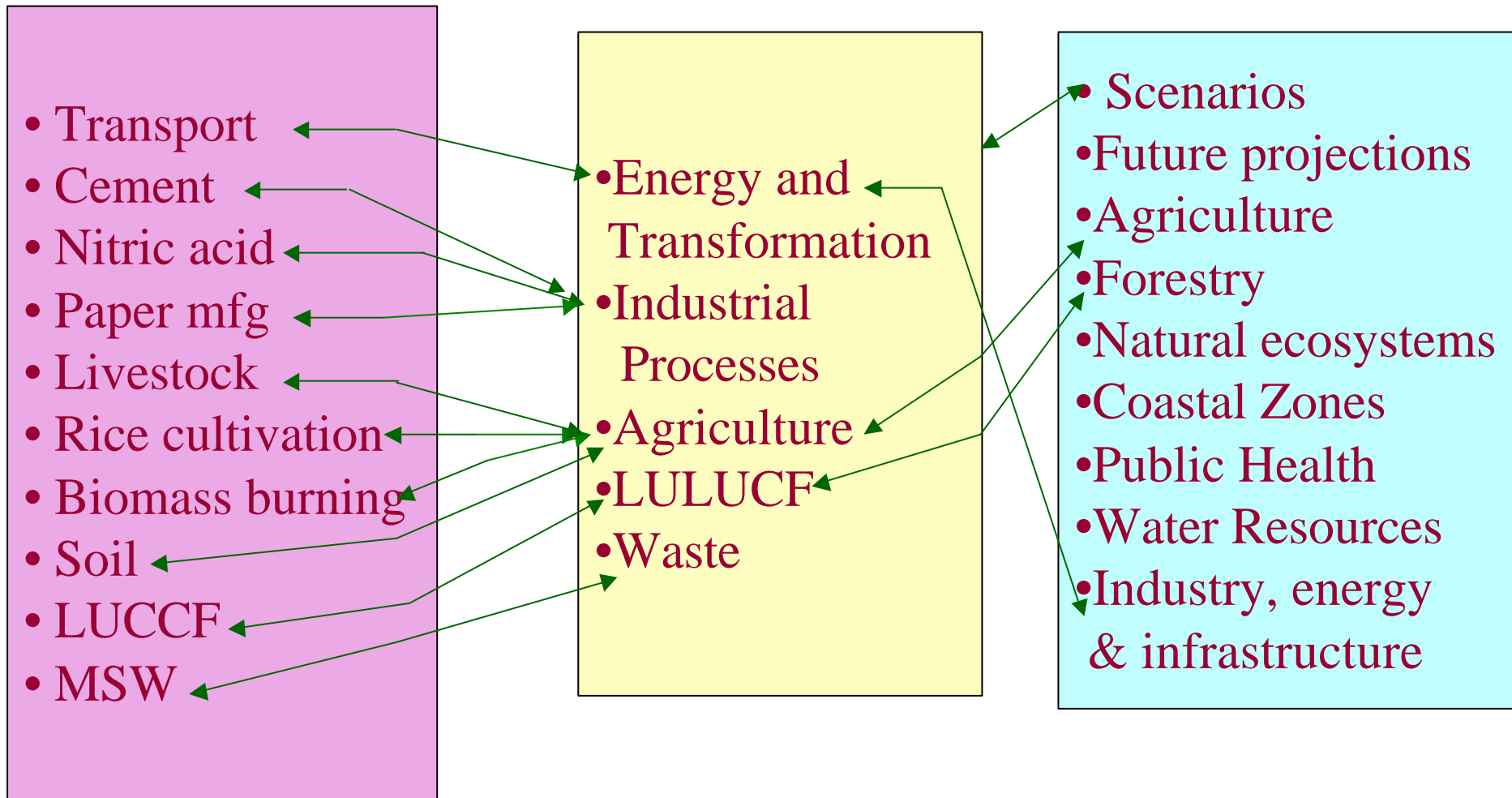
- Transport
- Cement
- Nitric acid
- Paper mfg
- Livestock
- Rice cultivation
- Biomass burning
- Soil
- LUCCF
- MSW

Inventory Estimates

- Energy and Transformation
- Industrial Processes
- Agriculture
- LULUCF
- Waste

Vulnerability Assessment

- Scenarios
- Future projections
- Agriculture
- Forestry
- Natural ecosystems
- Coastal Zones
- Public Health
- Water Resources
- Industry, energy & infrastructure



Implementation Plan

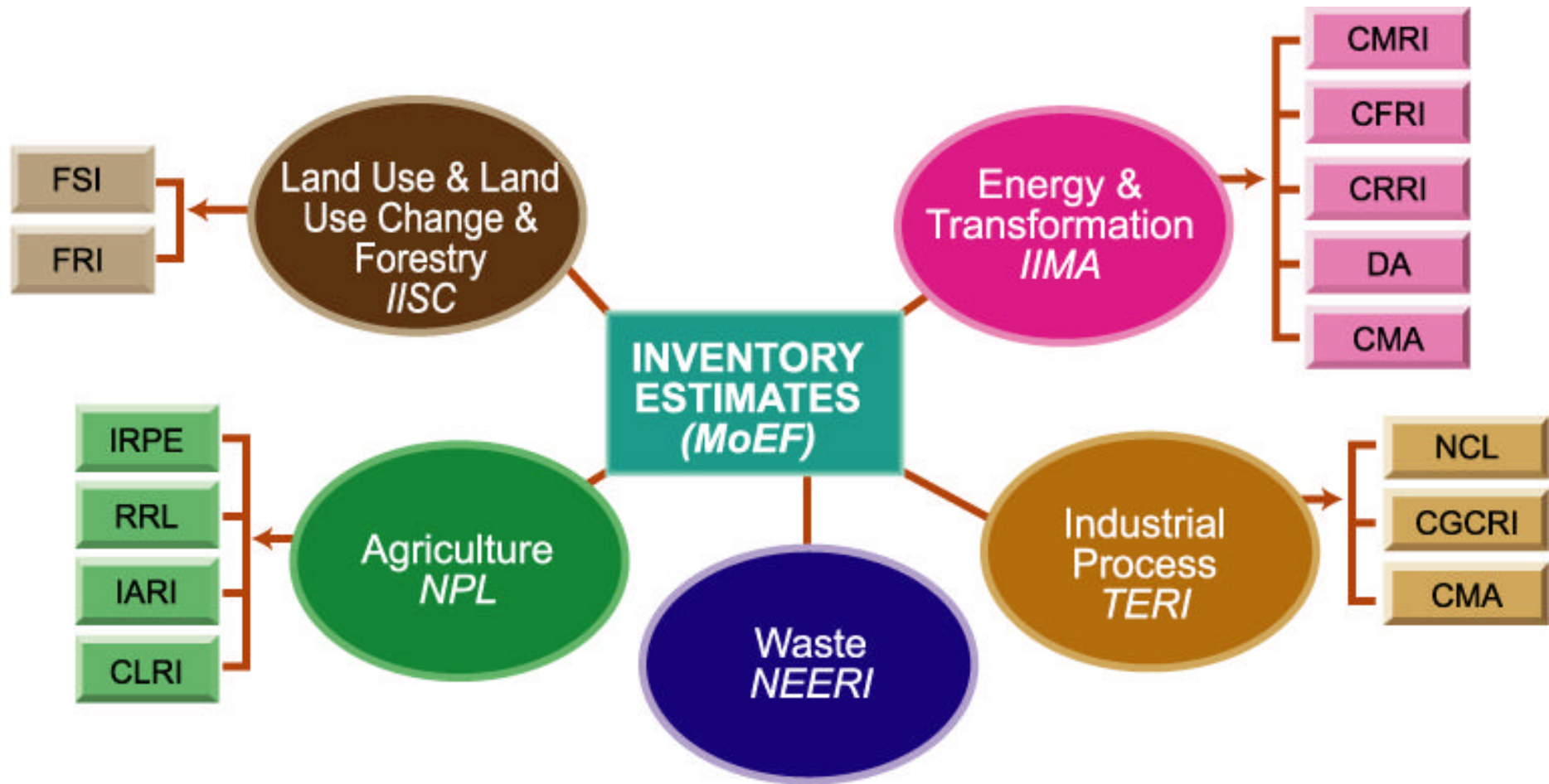
- Broad based participatory approach involving almost 100 institutions and over 350 Experts
 - ★ Government Ministries and Departments (Central, State)
 - ★ Government Institutions (FRI, FSI)
 - ★ Autonomous Institutions (IIMs, IITs, IISc)
 - ★ Scientific Institutions
 - ☞ CSIR labs (over 15 involved)
 - ☞ IARI labs and extension services
 - ☞ ISRO (SAC, NRSA)
 - ★ Universities (JU, JNU, DU, KU, TU, JKU)
 - ★ Industry Federations (CII, FICCI, CMA)
 - ★ NGOs (TERI, DA, AFPRO)
 - ★ Private organizations (DCA)
- Sub contract various activities to the above agencies
- Extensive monitoring, workshops and consultative meetings
- Synthesis, review and final NATCOM report

Institutions Directly Involved

A. Inventory Estimation	19
B. Uncertainty Reduction	18
C. Vulnerability Assessment and Adaptation	34
D. Data Center and Website development	2
E. Targeted Research proposal	11
F. Ministries/ Departments	12

Total	96
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Inventory Estimation: Institutional Arrangement



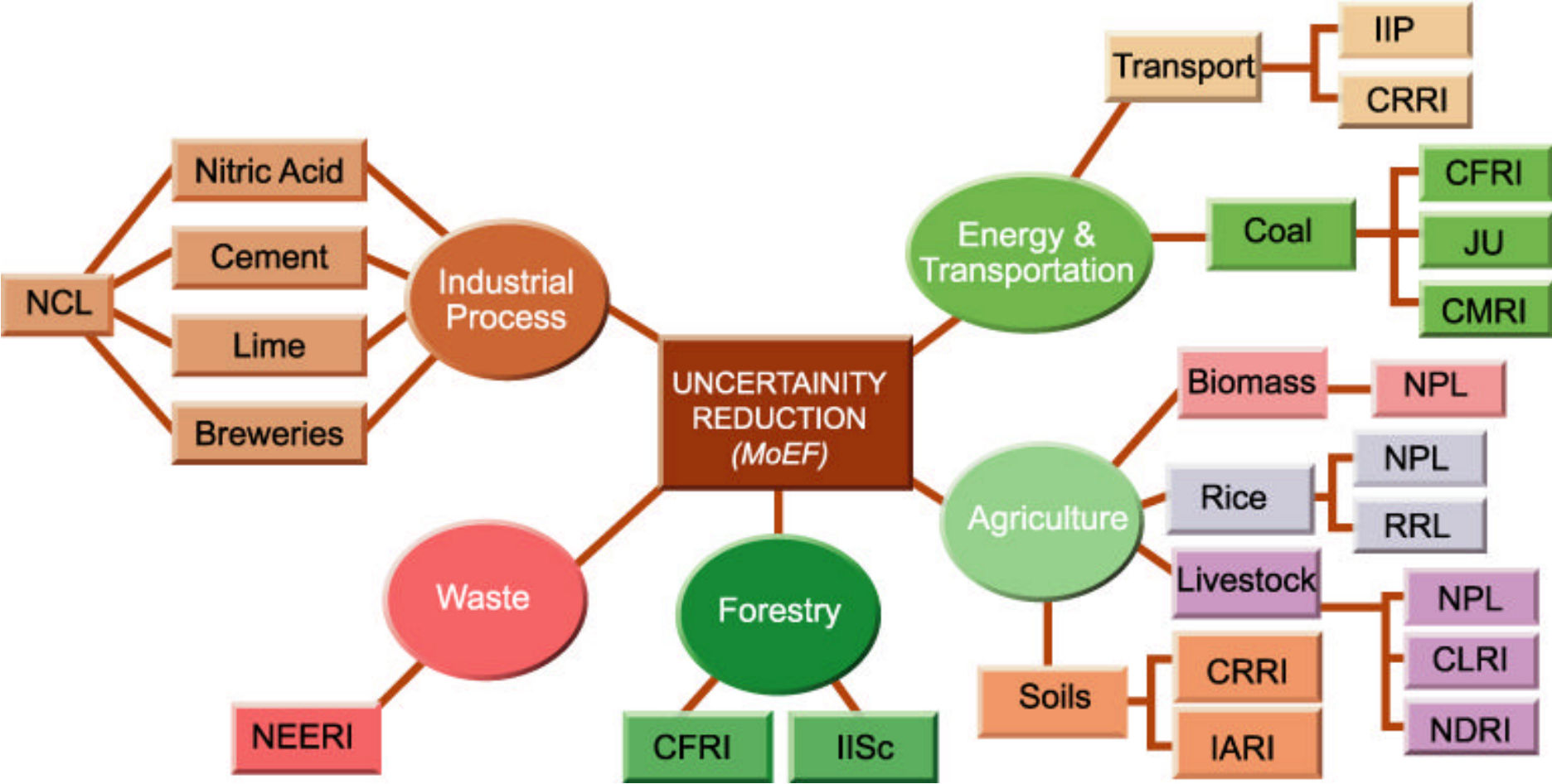
IE: Geographical Institutional Distribution



Uncertainty Reduction Emission Coefficient Measurements

- **Road transport** CO_2 , N_2O , other HC
- **Biomass burning for fuel** CH_4 , N_2O
- **Cement, Nitric acid, Lime, Paper** CO_2 , N_2O , CH_4
- **Enteric fermentation in animals** CH_4 , N_2O
- **Manure management** CH_4 , N_2O
- **Rice paddy cultivation** N_2O , CH_4
- **Synthetic fertilizer application** N_2O
- **Forest growth** CO_2 , CH_4
- **Municipal Solid Waste** CH_4

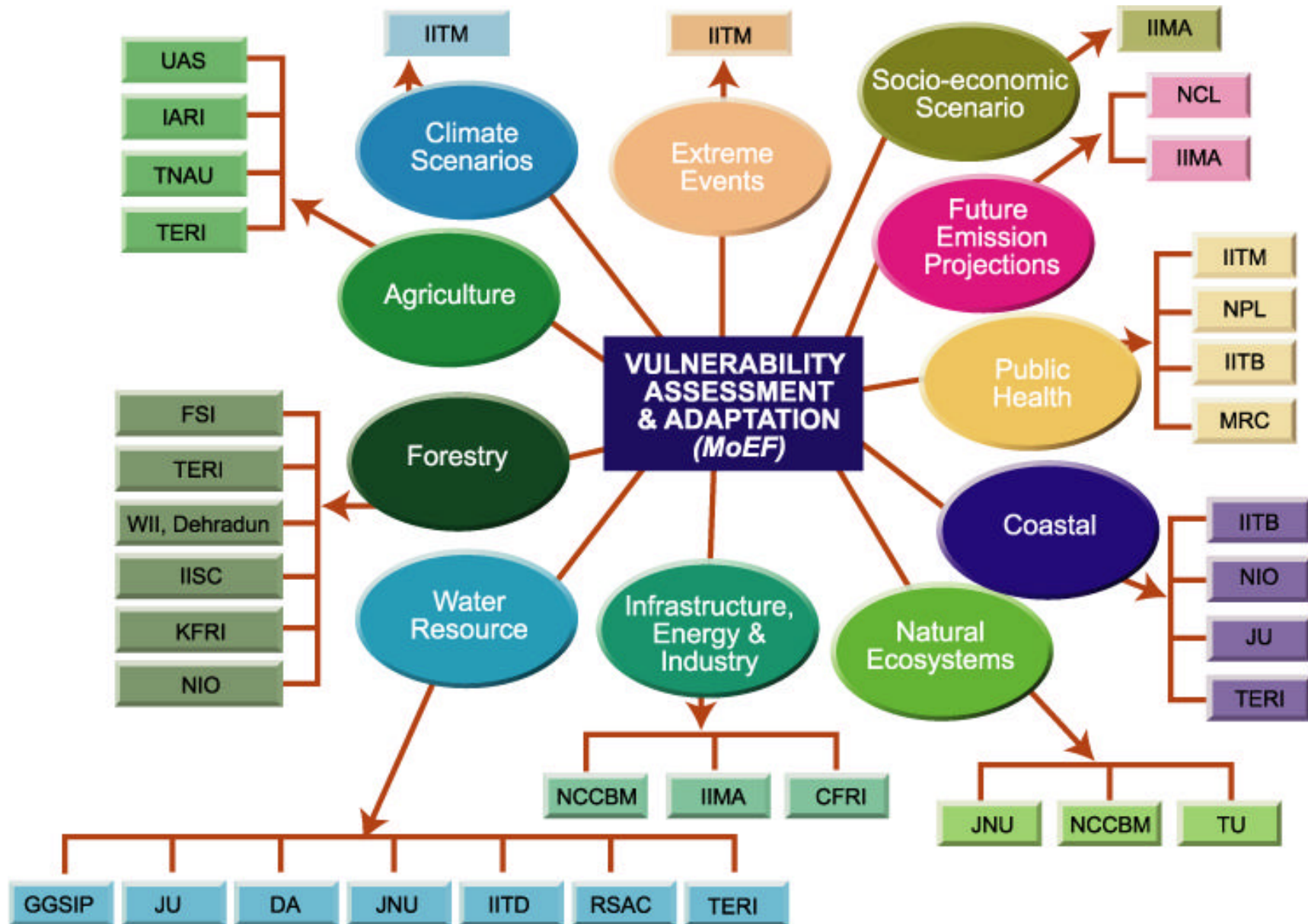
Uncertainty Reduction : Institutional Arrangement



UR: Geographical Institutional Distribution



Vulnerability Assessment and Adaptation: Institutional Arrangement



VA: Geographical Institutional Distribution



Data Center and Website

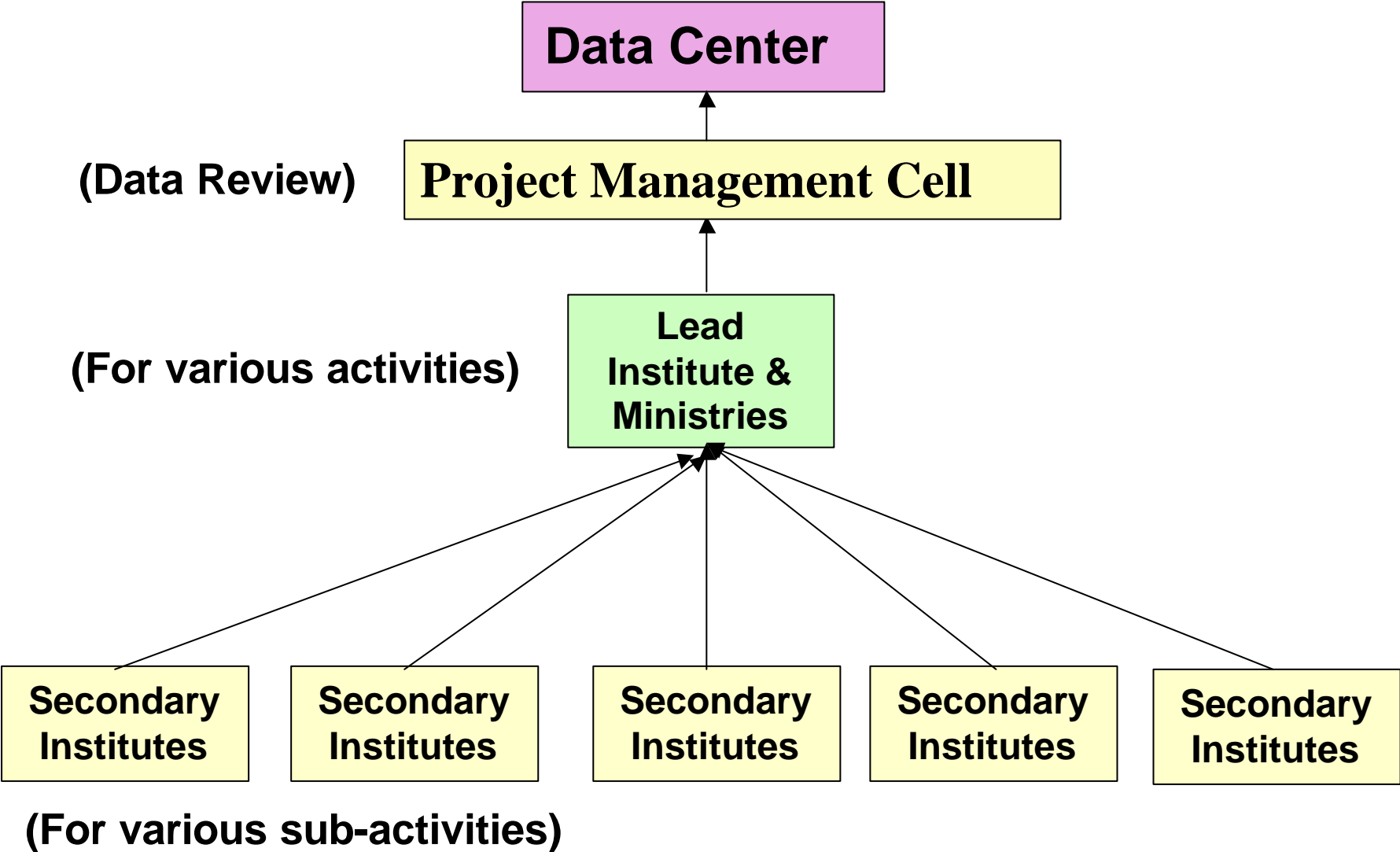
OBJECTIVE

Development of a comprehensive data base of activity data, emission coefficients and other aspects of NATCOM.

ACTIVITIES

- ☆ To archive the database generated
- ☆ To design interactive software programmes for data management and analysis
- ☆ To develop a website for dissemination of data reports and publications.

Institutional Data Flow



DC Activities & Outputs

DC Outputs

Top down & Bottom up databases

Data Archives based on Sectors/Fuels/Gases/Regions/Years

Graphs/Charts

National Communication Website

Data Management Activities

Hardware setting up

Standardization

Formatting

Compilation

Sanitation as per QA/QC practices

Collation

Interactive analysis

Dissemination through website

Website Activities

Domain creation

Space/ channel organization, Hosting arrangements

Content creation including site map, visual impacts, page design

Create access codes/ passwords

Register with Search Engines

Targeted Research and Capacity Building

Why Targeted Research

“To strengthen regional scientific capacity in order to respond to the climate change challenge as well as to lay the foundation for further national communications and implementation of the Convention”.

TR: Likely Components

- Identification of technology and capacity building needs, modalities to acquire and absorb them, design and evaluate host projects.
- Capacity building for participation in systematic observation networks in the region.
- Studies leading to the preparation of national and regional capacities to address climate change, further improvement of remaining emission coefficients for India and the region.
- Maintenance and enhancement of regional capacities to prepare national communications on a continuous basis.
- Developing and strengthening activities for public awareness, education and access to information.

Capacity Building

★Workshops (sixteen)

- Facilitation and Planning (Inception, Targeted Research)
- Training (IE, VA, Good Practices, UR)
- Dissemination (IE, UR, V&A, Final)

★Institutional

- Strengthening infrastructure
- Data Center
- Inducting new Institutions

★Human Resources

- Trained man power

Project Outputs

1. Inventory of greenhouse gases for 1994
2. Reduced uncertainties in GHG emission inventory estimates for some key source categories
3. Enhanced institutional and individual capacities
4. Data Center and Website
5. Identification of vulnerable hotspots in India
6. Roadmap for future climate change research requirements
7. Indian NATCOM Scenarios
8. Other information