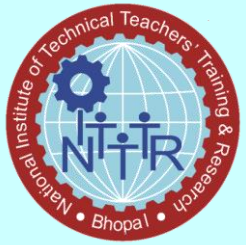
Smart City Initiative in India: Addressing Climate Change Concerns



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22nd AIM International Workshop

National Institute for Environmental Studies, Tsukuba, Japan

09-10 December 2016

Presentation Outline

- Urbanization in India
- Climate Change Mitigation Actions
- Urban Development Initiatives
- Smart City Mission: Issues and Challenges
- Developing Smart City Bhopal Scenario

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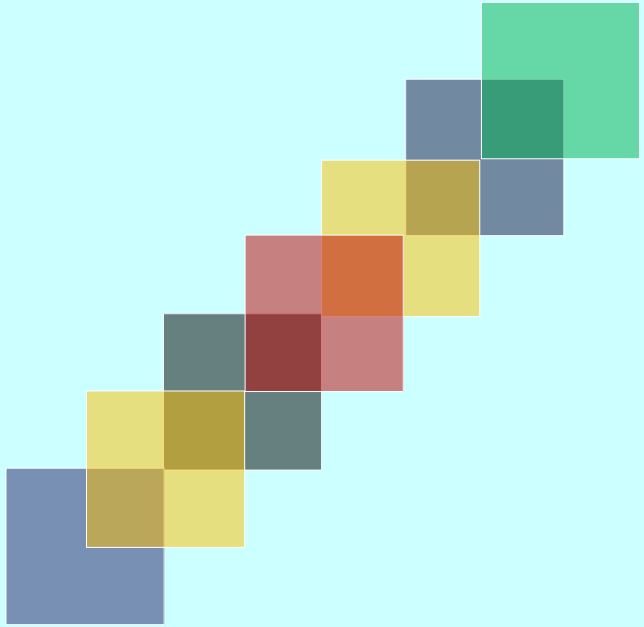
- AIM Activities in Bhopal 2015-16

URBANISATION IN INDIA



Demographic Trends

Second largest country in the World in terms of Population

- India has over 1.21 billion people (2011 census)
- Rural – Urban distribution: 68.84% & 31.16%
- Level of urbanization increased from 27.81% in 2001 Census to 31.16% in 2011 Census

Decadal Growth Rate (2001-11)

- Urban - 31.8%
- Rural – 12.2%

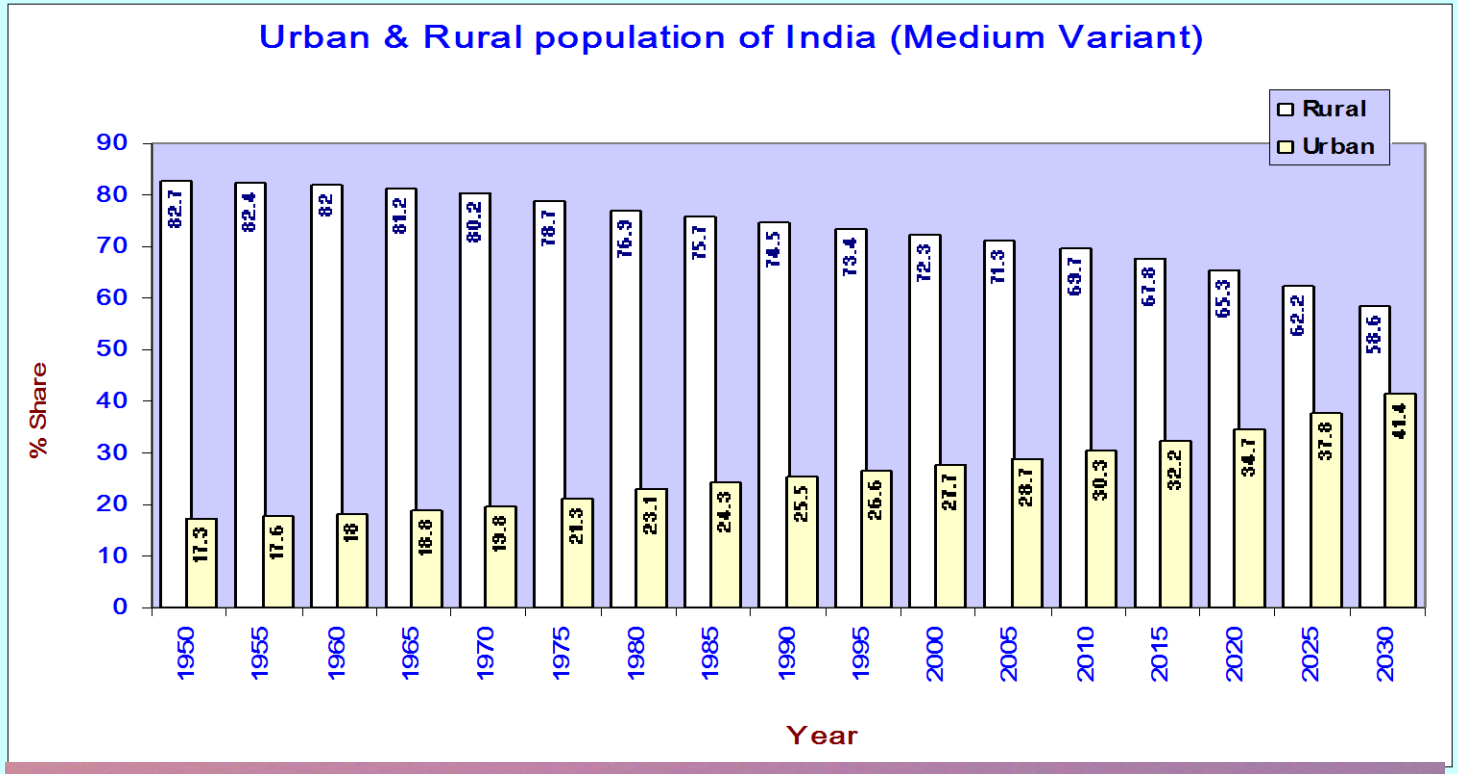
Metropolitan Cities (in number) :-

- 1991 – 23
- 2001 – 35
- 2011 – 53

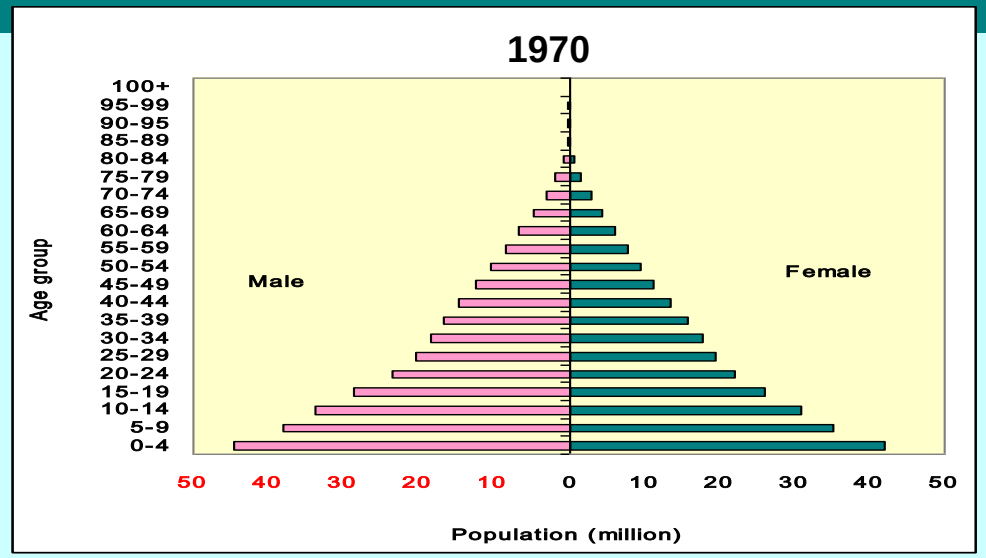
Million-plus Cities and Urban Agglomerations

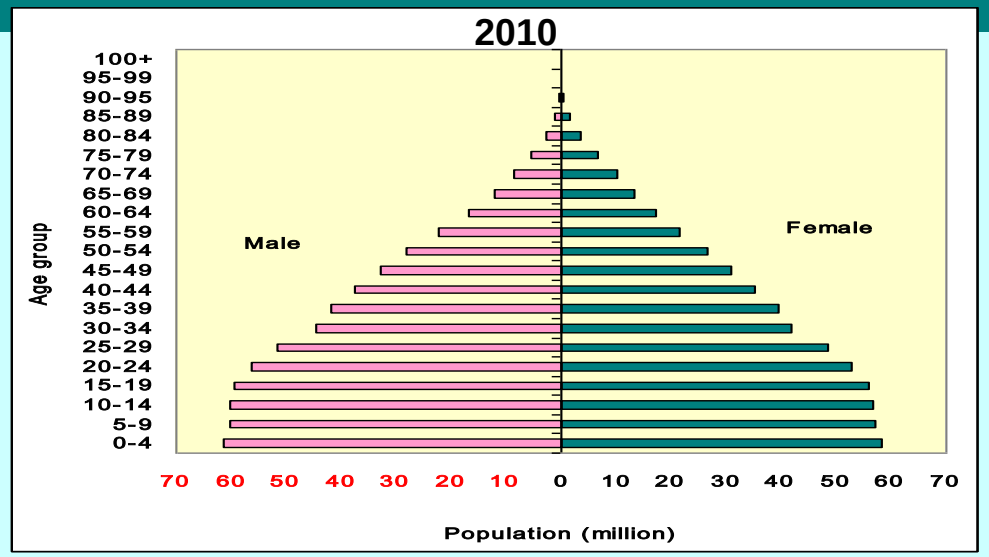
Census 2011: India's population -1.21 billion; 17.5 per cent of world (with 6900 + towns and cities)

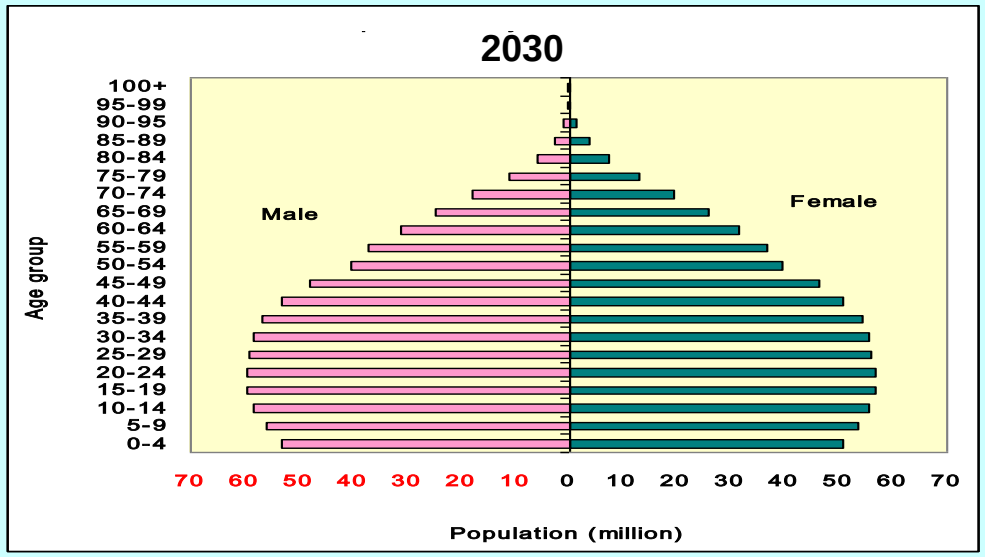
Demographic Transitions in India: Urban/Rural

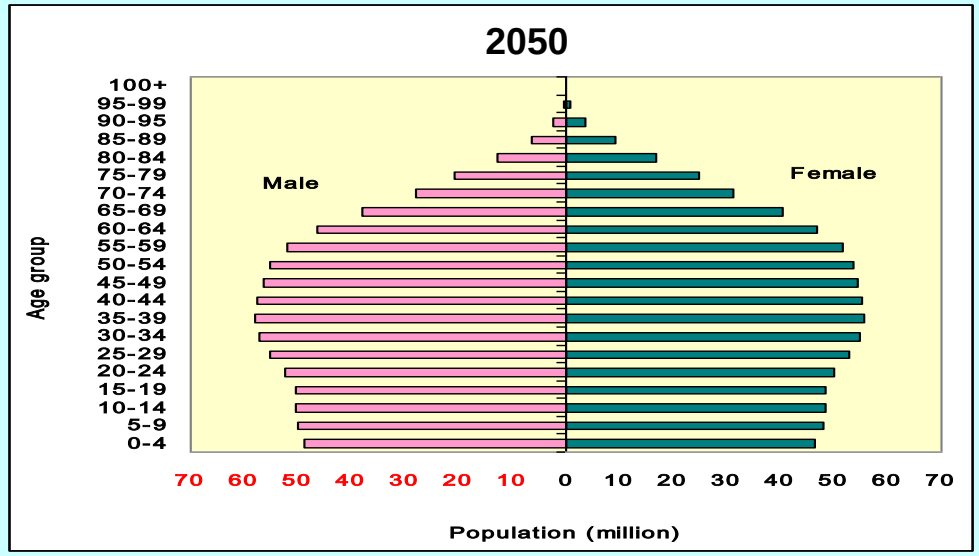


Age/Gender Profile









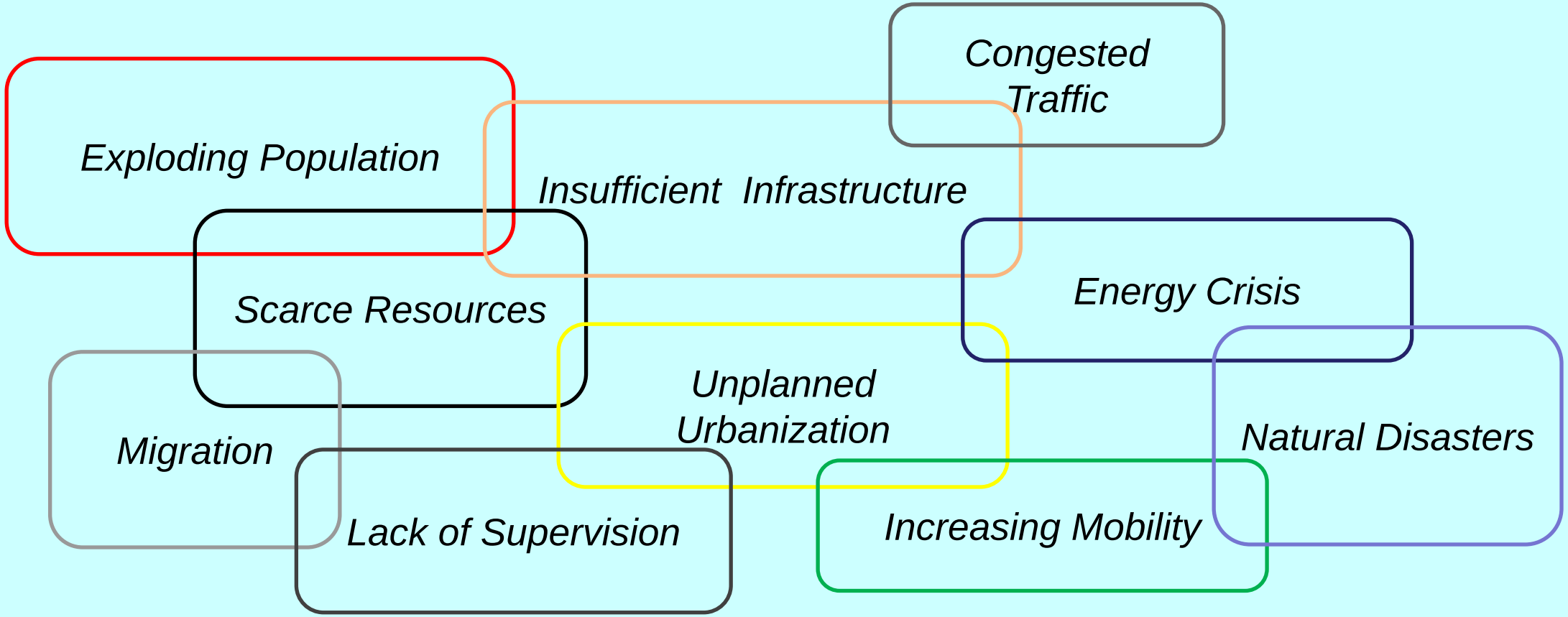
Top 20 Urban Agglomerations/Cities in India

Rank	Agglomerations /Cities	State	Population	Rank	Agglomerations/ Cities	State	Population
1	Mumbai	Maharashtra	18,414,288	**11**	Kanpur	Uttar Pradesh	2,920,067
2	Delhi	Delhi	16,314,838	**12**	Lucknow	Uttar Pradesh	2,901,474
3	Kolkata	West Bengal	14,112,536	**13**	Nagpur	Maharashtra	2,497,777
4	Chennai	Tamil Nadu	8,696,010	**14**	Ghaziabad	Uttar Pradesh	2,358,525
5	Bangalore	Karnataka	8,499,399	**15**	Indore	Madhya Pradesh	2,167,447
6	Hyderabad	Andhra Pradesh	7,749,334	**16**	Coimbatore	Tamil Nadu	2,151,466
7	Ahmedabad	Gujarat	6,240,201	**17**	Kochi	Kerala	2,117,990
8	Pune	Maharashtra	5,049,968	**18**	Patna	Bihar	2,046,652
9	Surat	Gujarat	4,585,367	**19**	Kozhikode	Kerala	2,030,519
10	Jaipur	Rajasthan	3,073,350	**20**	Bhopal	Madhya Pradesh	1,883,381

Source: Census 2011

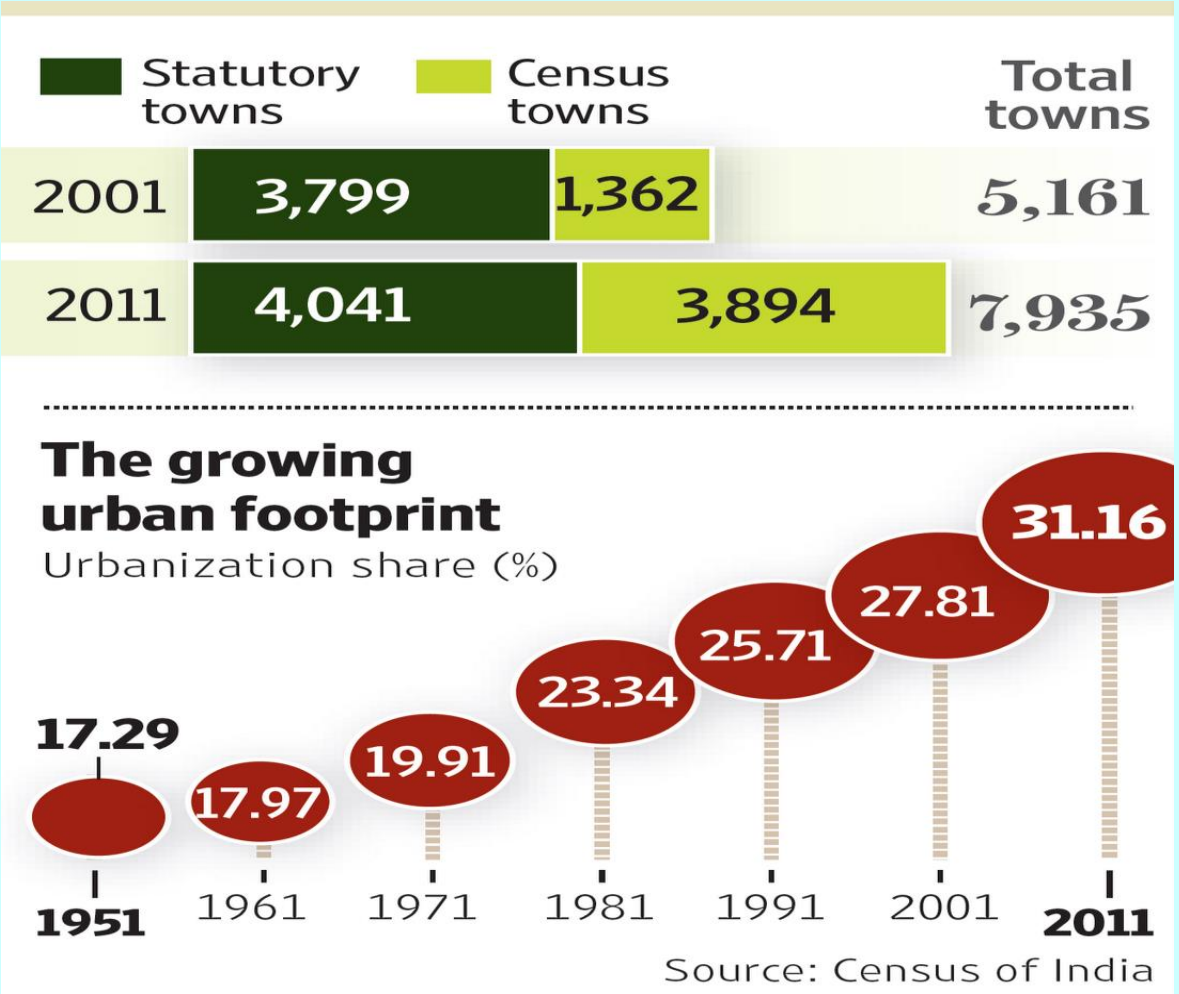
Challenge of Urbanization

More manageable and innovative cities needed considering the issues of urbanization



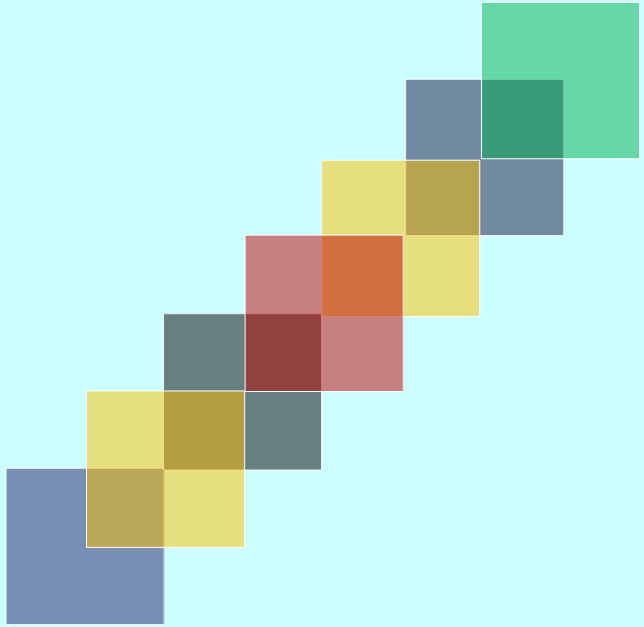
Challenge of Urbanization

- 31% of India's population lives in urban areas - contributes 63% of India's GDP (Census 2011).
- By 2030, urban areas are expected to house 40% of India's population and contribute 75% of India's GDP.
- **What is needed:** Comprehensive development of physical, institutional, social and economic infrastructure.
- **Goal:** Improving the quality of life and attracting people and investments to the City, setting in motion a virtuous cycle of growth and development.
- **Solution:** Planned Development of Cities with quality infrastructure



India has been making progress in Information Technologies.
Can ICT help in Developing Cities that are able to address the above issues?

CLIMATE CHANGE MITIGATION ACTIONS

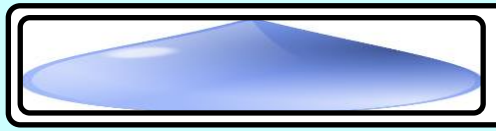


Eight Missions under National Action Plan on Climate Change


National Solar Mission


National Mission for advanced Energy Efficiency


National Mission on Sustainable Habitat


National Water Mission

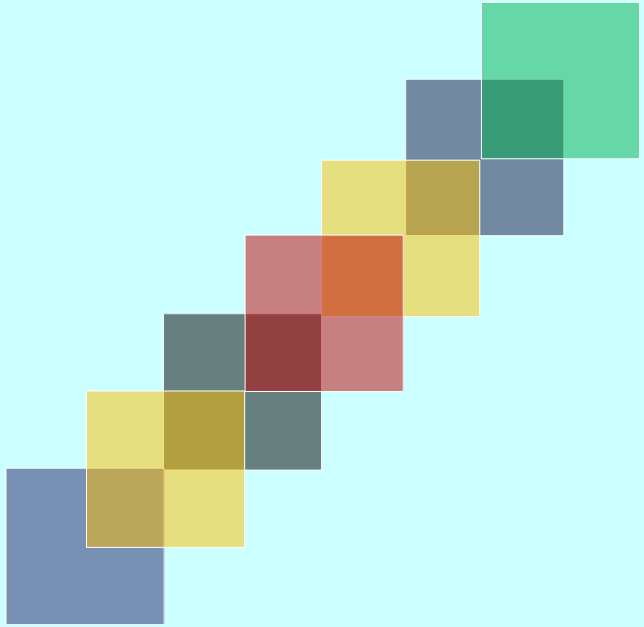

National Mission for Sustaining the Himalayan Ecosystem


National Mission for Green India


National Mission on Sustainable Agriculture

National Mission on Strategic Knowledge for Climate Change

URBAN DEVELOPMENT INITIATIVES

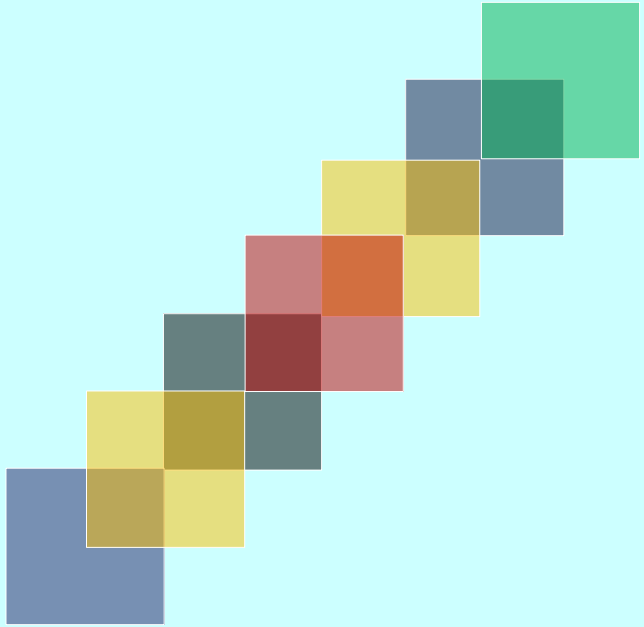


Government Schemes/Programmes

Ministry of Urban Development

Scheme	Launch
Jawaharlal Nehru National Urban Renewal Mission (JnNURM)	Jan 04, 2005
Heritage City Development and Augmentation Yojana (HRIDAY)	Jan 21, 2015
Atal Mission for Rejuvenation and Urban Transformation (AMRUT)	June 25, 2015
Smart Cities Mission	June 25, 2015

SMART CITIES MISSION



Smart Cities Mission

- An urban renewal and retrofitting program with a mission to develop 100 cities (the target revised to 109 cities) to making them citizen friendly and sustainable.
- The proposed mission duration was five years (FY2015-16 to FY2019-20) [funding now delayed by one year].
- The Mission may be continued after an evaluation to be done by the Ministry of Urban Development (MoUD) and incorporating the learnings into the Mission
- First batch of 20 cities selected in stage two is being provided with central assistance of ₹2 billion (US$30 million) each during the current financial year followed by ₹1 billion (US$15 million) p.a. during the next three years.

Smart City

Objectives

- Provide core infrastructure and give a decent quality of life to its citizens, a clean and sustainable environment and application of ‘Smart’ Solutions.
- Focus on sustainable and inclusive development
- Create a replicable model for other aspiring cities

Core Elements

- Water supply
- Assured electricity supply
- Sanitation, including solid waste management
- Efficient urban mobility and public transport
- Affordable housing, especially for the poor
- Robust IT connectivity and digitalization
- Good governance (E-Governance and citizen participation
- Sustainable environment
- Safety and security of citizens
- Health and education

Smart Solutions

Smart Utilities

- Intelligent Utility Network
- Smart Metering
- Energy Optimization
- Smart Production
- Demand Planning
- Advanced Distribution Management
- Operations Control
- River Basin and Smart Water Management
- Wastewater Treatment

Smart Health

- Smart Care Management
- Connected Health
- Smart Medicine Supply
- Mobile Health
- Remote Healthcare Management

Smart Public Services

- Smart Citizen Services
- Smart Tax Administration
- Smart Customs, Immigration, Border Management
- Smart Crime Prevention
- Smart Emergency Response
- Smart Financial Management

Smart Building

- Energy Optimization
- Asset Management
- Facility Management
- Video Surveillance
- Recycling and Power Generation
- Automatic Fault Detection Diagnosis
- Supervisory Control
- Audio / Video Distribution Management

Smart Transportation

- Intelligent Transportation
- Smart Public Transportation
- Integrated Fare Management
- Fleet Optimization
- Tolling Solutions
- Real-time Adaptive Traffic Management
- Smart Parking
- Traveler Information Systems

Smart Education

- Smart Classroom
- Performance Man.
- Asset Management

The solution set working on a common infrastructure turn into initiatives which vary by the sector/industry

Smart Solutions

E-governance citizen services	*Waste Management*	*Water Management*	*Energy Management*	*Urban Mobility*	*Others*
• Public information & grievance redressal • Electronic service delivery • Citizen engagement • Citizen's – City's eyes and ears • Video crime monitoring	• Waste to energy & fuel • Waste to compost • Waste water treatment • Recycling & reduction of C&D waste	• Smart meters and management • Leakage identification • Water quality monitoring	• Smart meters and management • Renewable sources of energy • Energy efficient & green buildings	• Intelligent Transportati • Smart Public Transportation • Fleet Optimization • Real-time Adaptive Traffic Management • Smart Parking • Traveler Information Systems	• Tele-medicine and tele-education • Incubation/trade facilitation centers • Skill development centers • Smart Classroom • Performance Man. • Asset Management

Cities may add any number of smart solutions to the area based developments to make funds cost effective.

Area based Development Models

- **Retrofitting:** Development of an existing built area greater than 500 acres so as to achieve the objective of smart cities mission to make it more efficient and livable e.g. Local Area Development (Ahmedabad).
- **Redevelopment:** Replace existing built environment in an area of more than 50 acres and enable co-creation of a new layout, especially enhanced infrastructure, mixed land use and increased density e.g. Bhendi Bazar, Mumbai; New Market, Bhopal.
- **Greenfield:** Develop a previously vacant area of more than 250 acres using innovative planning, plan financing and plan implementation tools with provision for affordable housing, especially for the poor e.g. Net Town, Kolkotta.

Components of Area-based Development

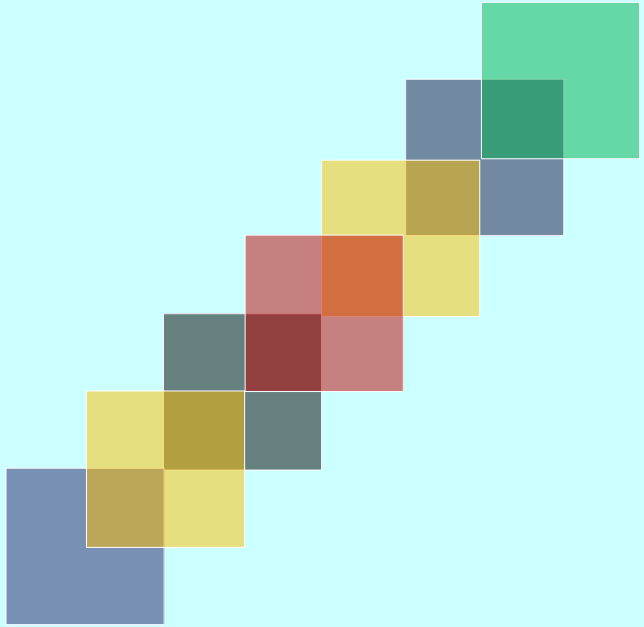
- Holistic development of existing and new areas.
  - One area catalyzes the development of other areas, and
  - Sets an example for other cities.
- Quality of life in Areas meets citizens expectations and has
  - Planned mixed land use,
  - Housing, especially for the poor,
  - Walkable localities – accessibility to parks, public transport,
  - Preservation and development of open space,
  - Public transport, last mile connectivity,
  - Governance is citizen friendly and cost effective.

Smart City Selection Process

- The city selection process is based on the idea of Cooperative and Competitive Federalism.
- Cities are diverse - Each city has to construct its idea and vision of a smart city that is aligned to its local context.
- The city selection process follows a Challenge method - two stages, in conjunct, to select cities.
  - Stage – I : Intra-State city selection on objective criteria to identify cities to compete in stage-II.
  - Stage – II: All India competition to select smart cities for multiple rounds of selection

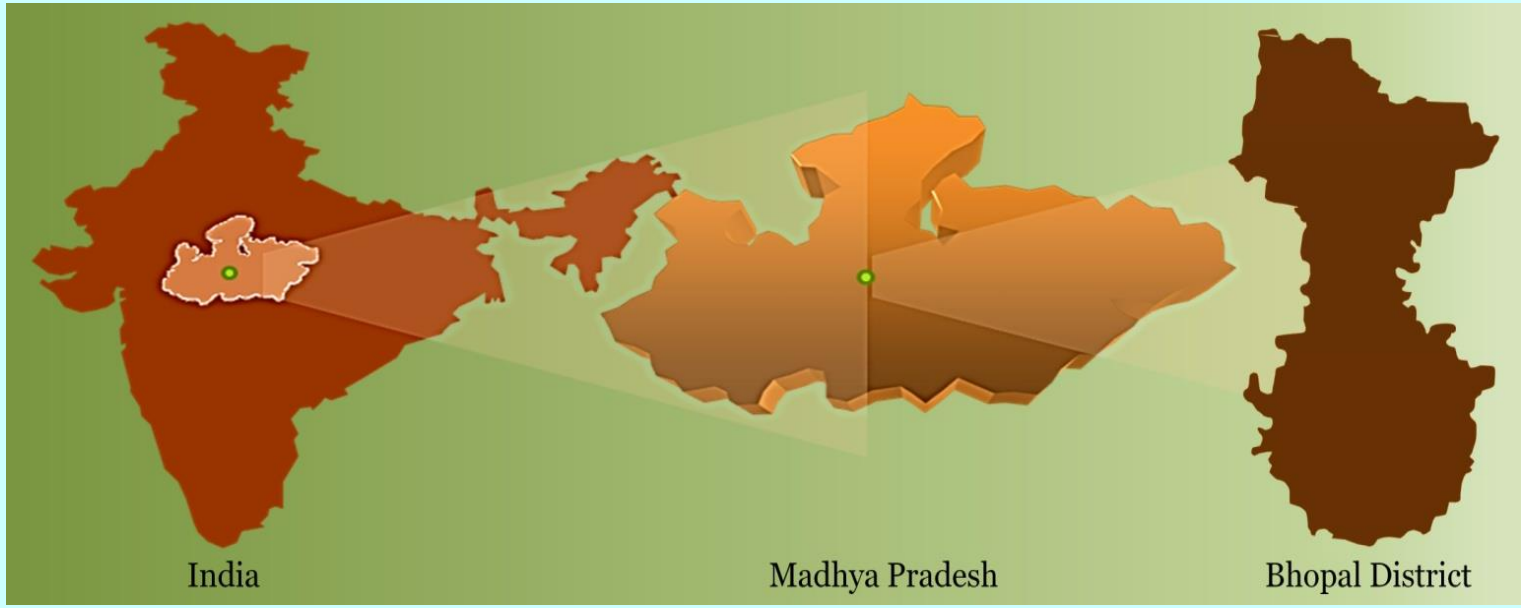
Bhopal Selected for Smart City Development in Stage –I and Stage –II of first phase

DEVELOPING SMART CITY BHOPAL

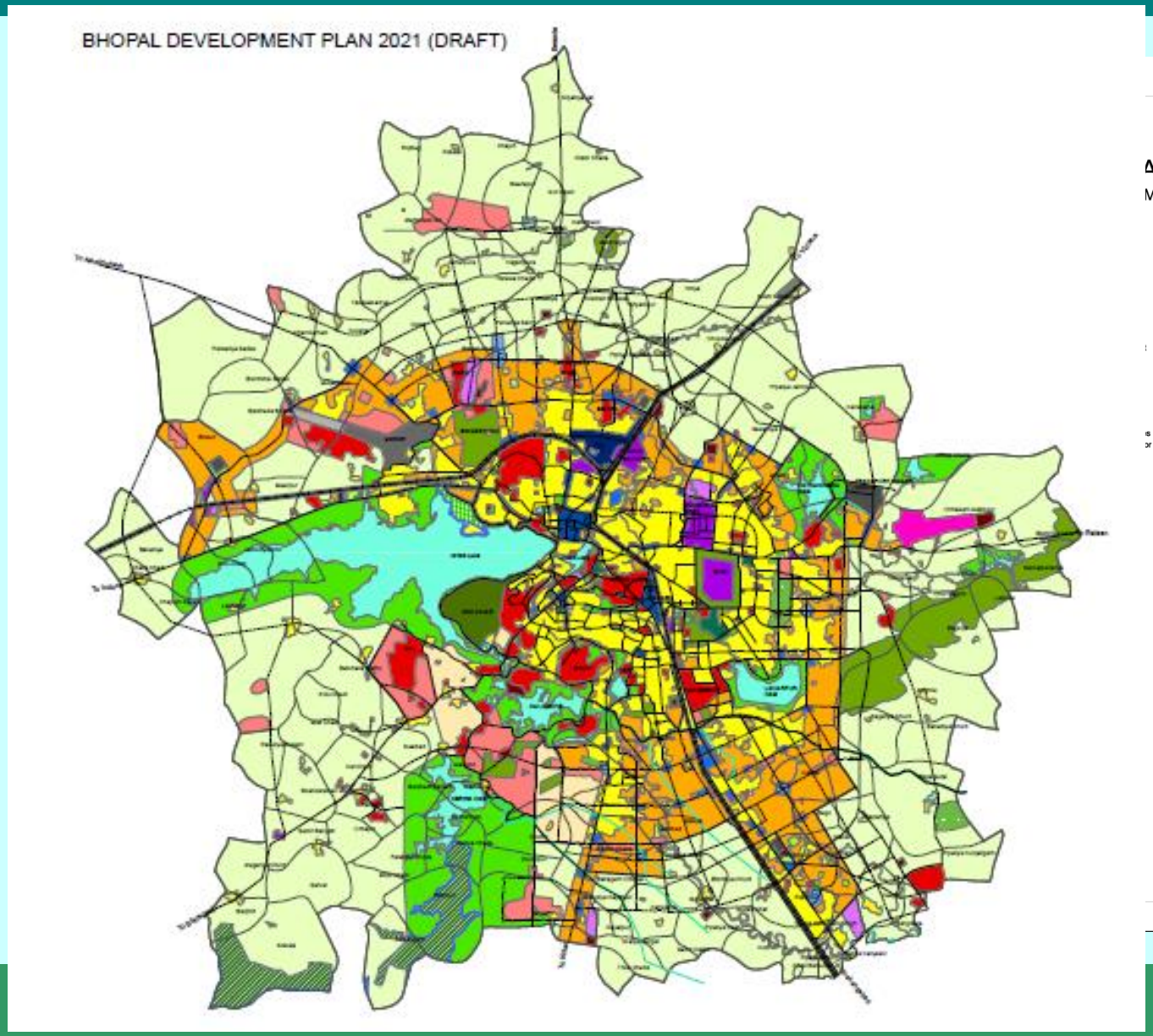


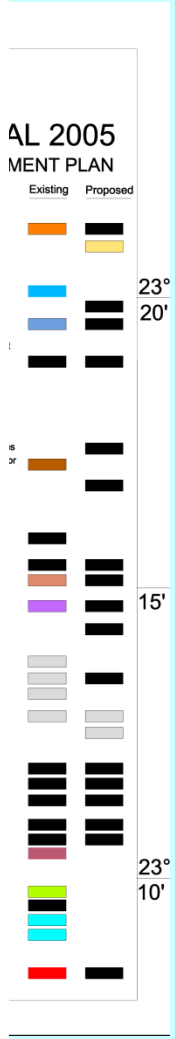
Bhopal, India

- The city is centrally located.
- The climate is composite climate representing a large part of the country.
- The city has physical features like large water body, Hills and forests for analysis of local variations.
- A million plus city, it can represent many large Indian cities.
- Amongst the 20 fastest growing cities in India.



The Study Area: Bhopal





Smart City Bhopal: LCS vision

To be a sustainable low carbon city in line with national policies

- Ready for future and resilient to change
- Conservation and green orient for quality of life
- Economic and social competitive clean and green industries
- Efficient transport system
- Community participation in city development

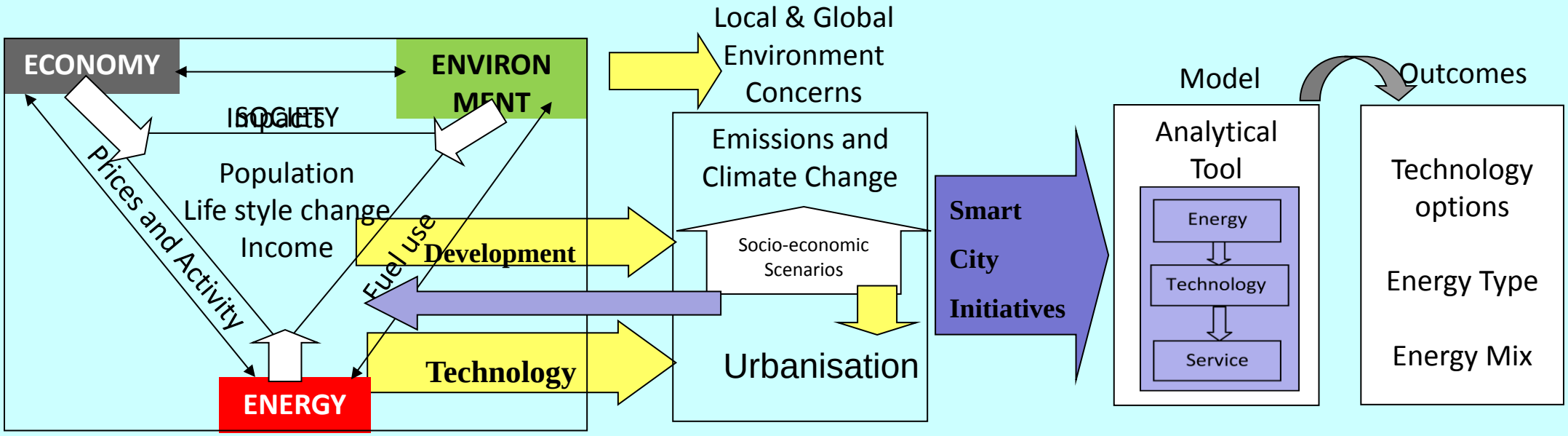
Timeline and Target

- **Extended Time Horizon:** Year 2050
  - To align smart city development plans and policies with climate change priorities to reduce energy demand and GHG emissions

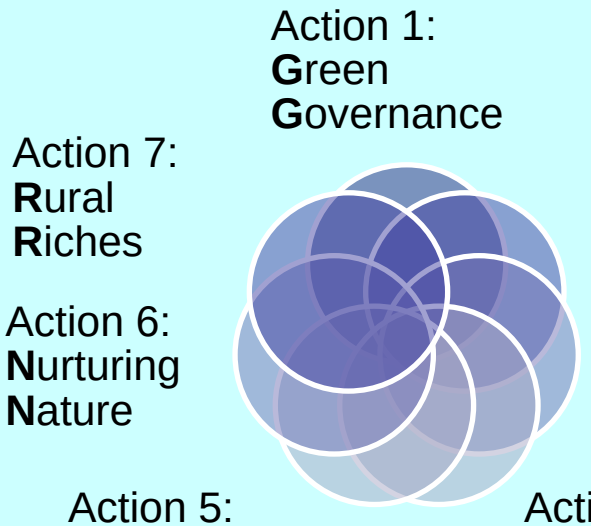
The Scenarios

- Business As Usual (BAU) scenario
  - The present trend in Bhopal has been considered with existing technology and prevailing economic and demographic trends. The BAU scenario for future energy consumption and emissions projection in Bhopal envisages the continuum of present government policies, and capture forecast for various economic, demographic, land use and energy use indicators.
- Low Carbon Society (LCS) scenario (CM1)
  - A sustainable development future scenario is drawn here for Bhopal, that is expected to take it towards ***Low Carbon Society***. The energy consumption trajectory / emissions trajectory are drawn in all the sectors of Bhopal that would result from aggressive policies to promote demand side management, energy efficiency, development of renewable energy, and other policies to promote sustainable development.
- Climate Responsive Smart City (CRSC) Scenario (CM2)
  - Coupled with the LCS vision, Smart city initiatives are superimposed to analyse how much further emission reduction can be achieved when Bhopal becomes a Smart City. (Presently developed for Residential and Transport Sector)

Analysis Framework

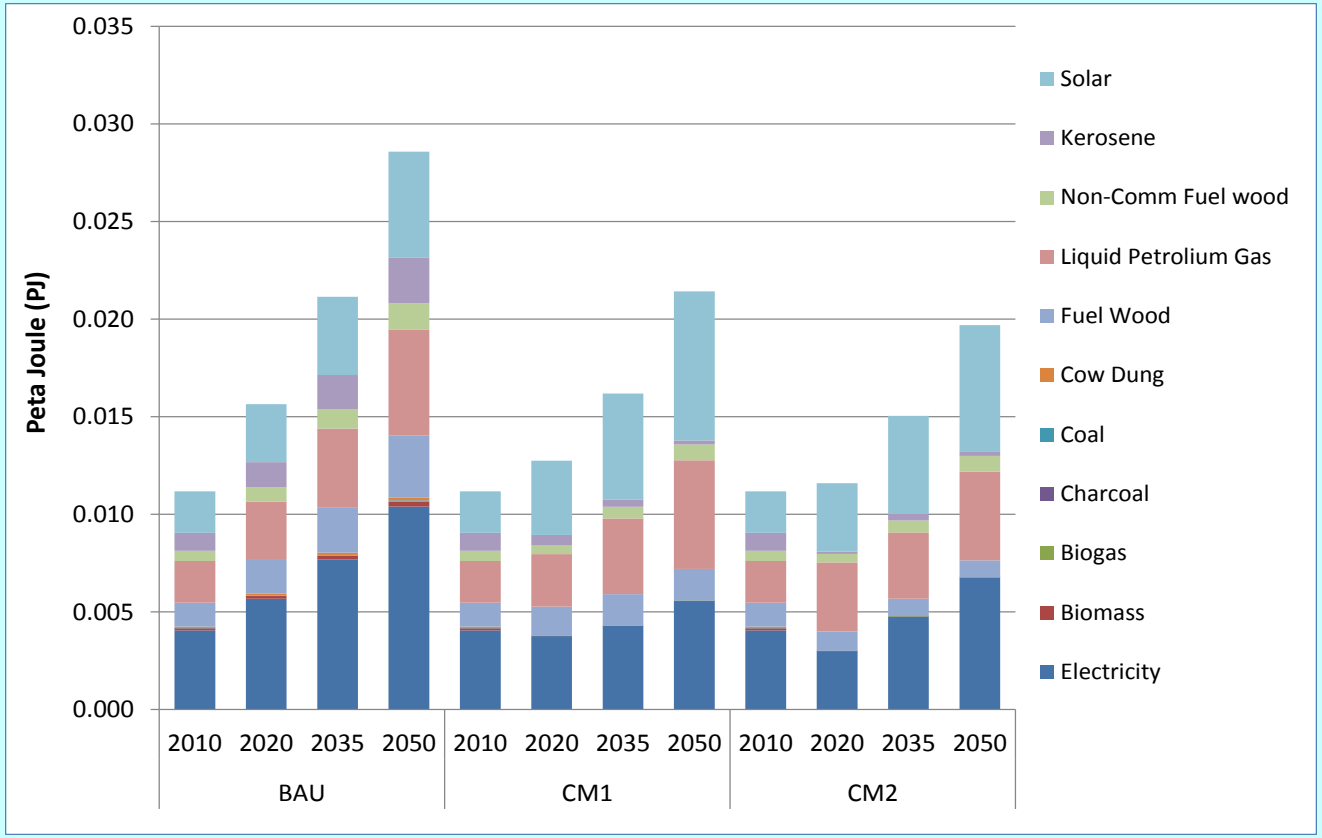


Bhopal LCS: Seven Actions

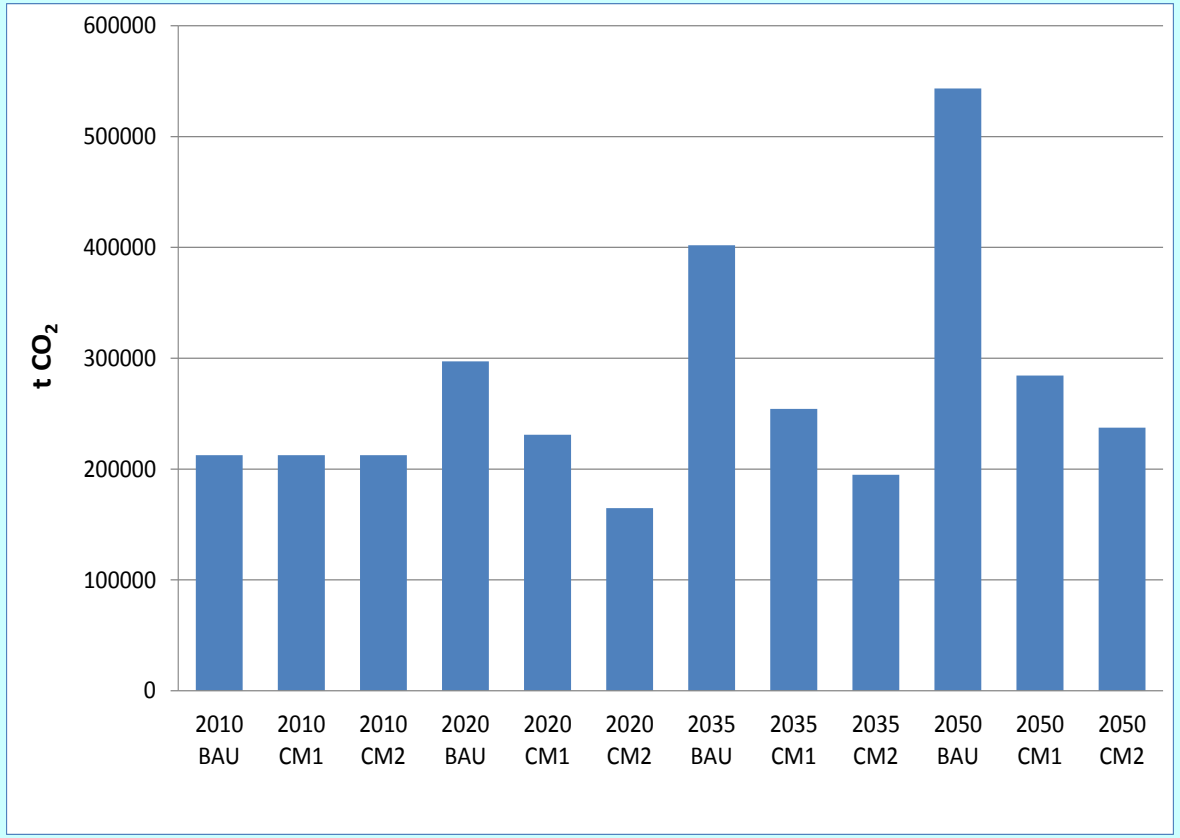


		SECTORAL CONTRIBUTION				
	ACTIONS	Residential	Commercial	Industry	Passenger Transport	Freight Transport
1	GREEN GOVERNANCE					
2	HOLISTIC HABITAT					
3	SUSTAINABLE STYLE					
4	CELLULAR CITY FORM					
5	FORM AND FLOW					
6	NURTURING NATURE					
7	RURAL RICHES					

Bhopal CRSC: Preliminary Results

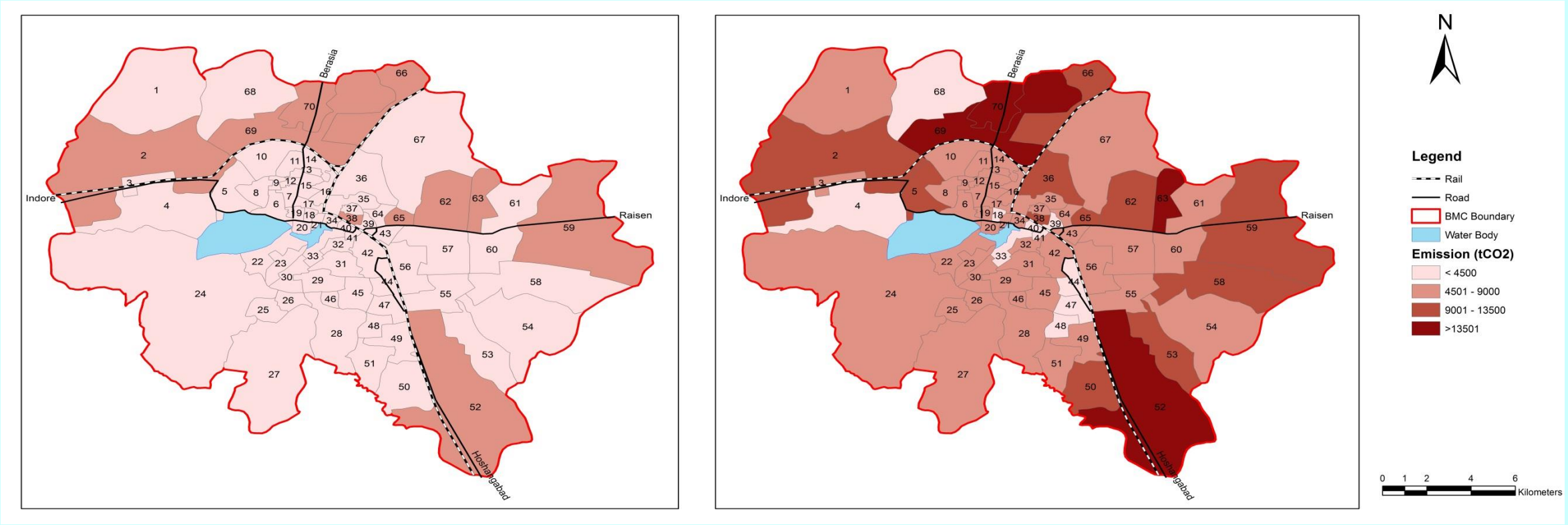


Energy Demand for different Scenarios



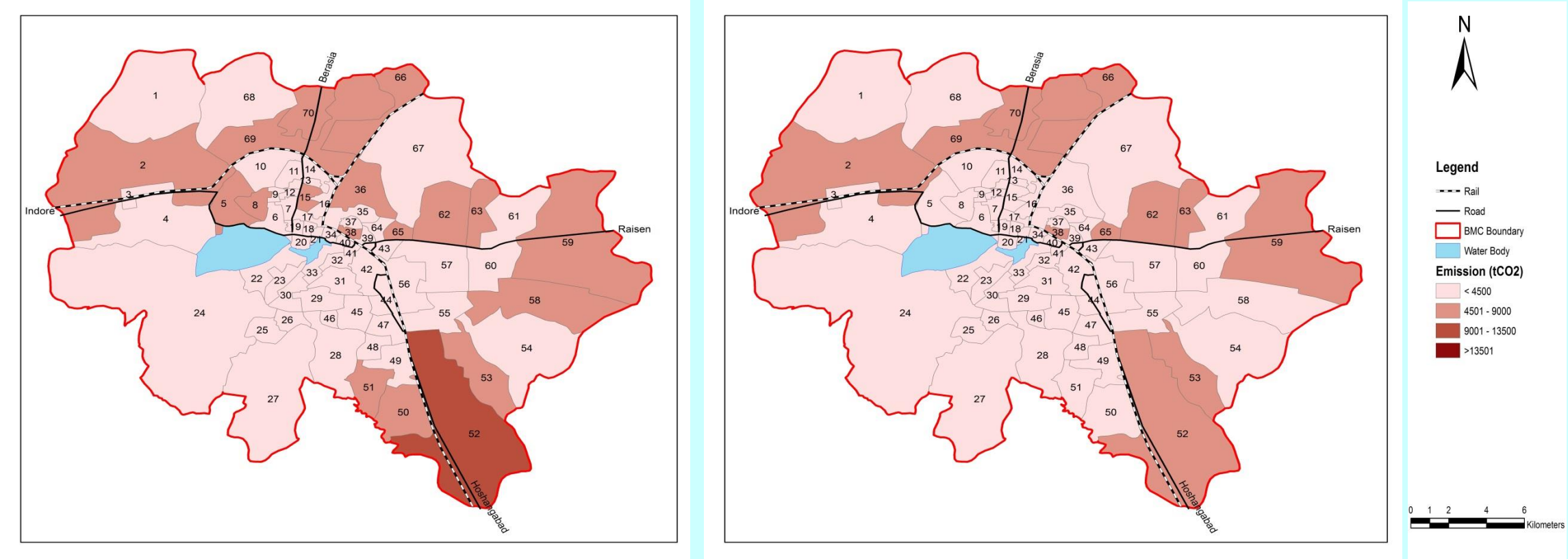
Emissions for different Scenarios

Bhopal CRSC: Preliminary Results



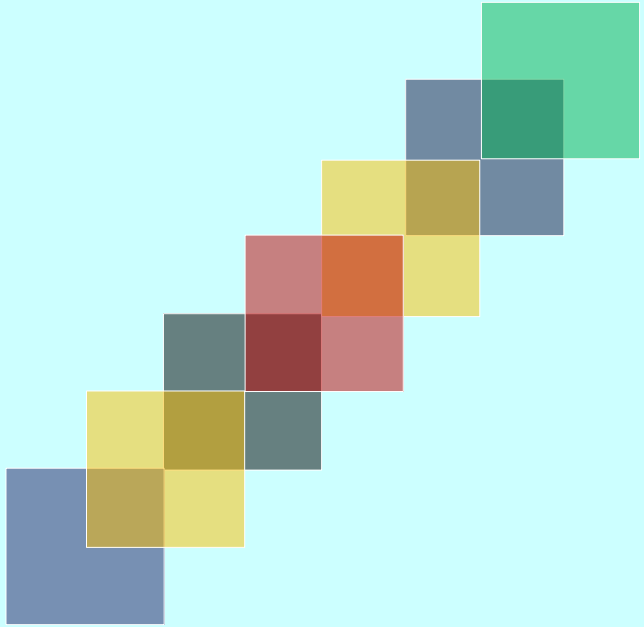
CO_2 Emissions at ward level for BAU in 2010 and 2050

Bhopal CRSC: Preliminary Results



CO_2 Emissions at ward level for CM1 and CM2 in 2050

AIM ACTIVITIES DURING 2015-16 AT BHOPAL



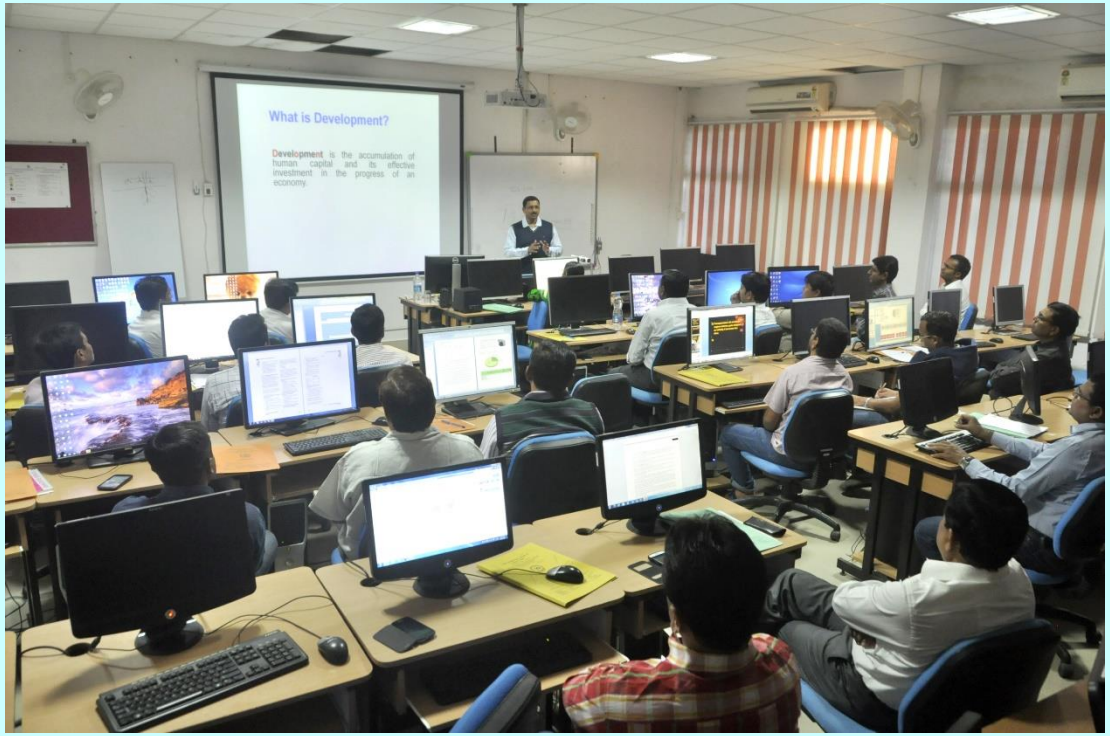
Training Workshops conducted during 2015-16

December 07-18, 2015	**Climate Change, Scenario Development for Policy Analysis**
February 01-05, 2016	**Sustainable Development Practices for Technical Institutions**
May 02-06 2016	**Green Business Development**

Programme Coordinator:
Aashish Deshpande, Department of Management
NATIONAL INSTITUTE OF TECHNICAL TEACHERS' TRAINING & RESEARCH,
GOVERNMENT OF INDIA, MHRD, BHOPAL, INDIA

Workshop on “Climate Change Scenario Development for Policy Analysis” Under Technical Collaboration Scheme (TCS) Colombo-Plan, Ministry of External Affairs, Government of India at NITTTR, Bhopal.

December 07-18, 2015



Workshop on “Sustainable Development Practices for Technical Institutions” & “Green Business Development” held at NITTTR, Bhopal.

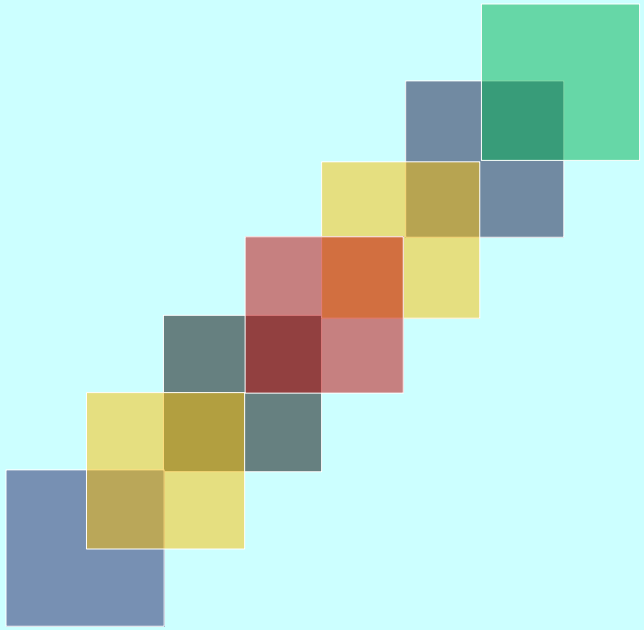
February 01-05, 2016

May 02-06, 2016

Forthcoming Training Workshops

January 09-13, 2017	**Sustainable Development for Institution Building**
Jan 23 - Feb 03, 2017	**Climate Change, Scenario Development for Policy Analysis**

Programme Coordinator:
Aashish Deshpande, Department of Management
NATIONAL INSTITUTE OF TECHNICAL TEACHERS' TRAINING & RESEARCH,
GOVERNMENT OF INDIA, MHRD,
BHOPAL, INDIA



Thank You….