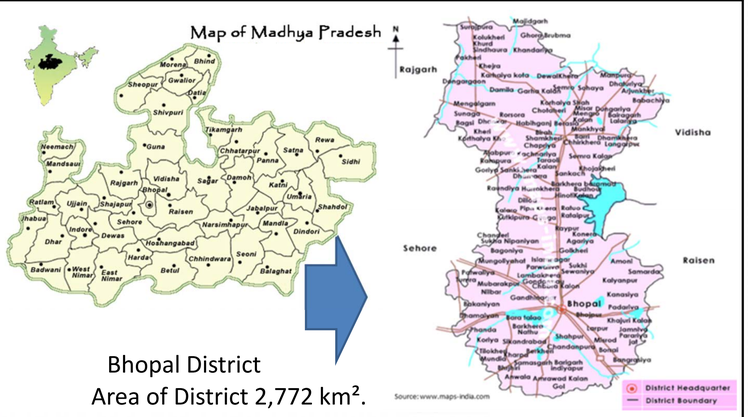
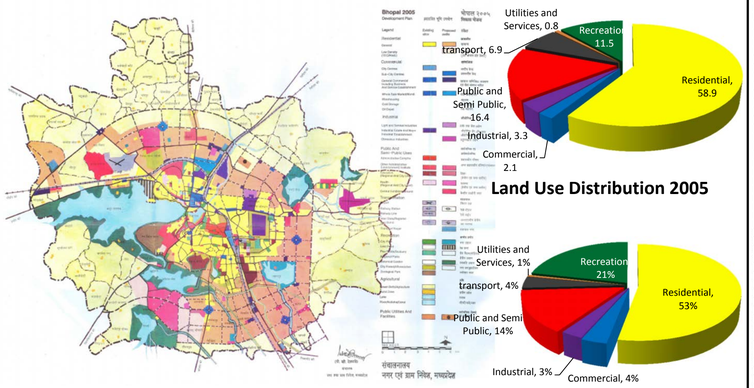
The Profile

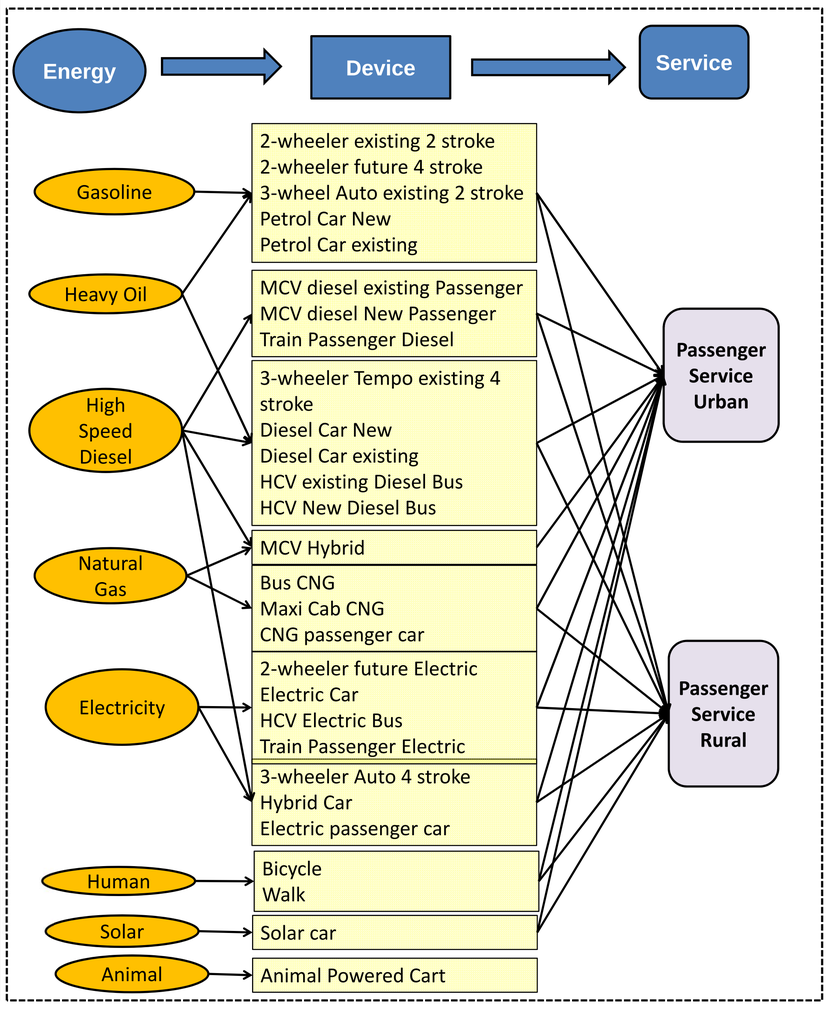
Population in year 2011	Total	Urban	Rural
India	**1.22 billion**	37,71,05,760	83,30,87,662
Madhya Pradesh		7,25,97,565	2,00,59,666	5,25,37,899
Bhopal		23,68,145	19,17,002	4,54,059

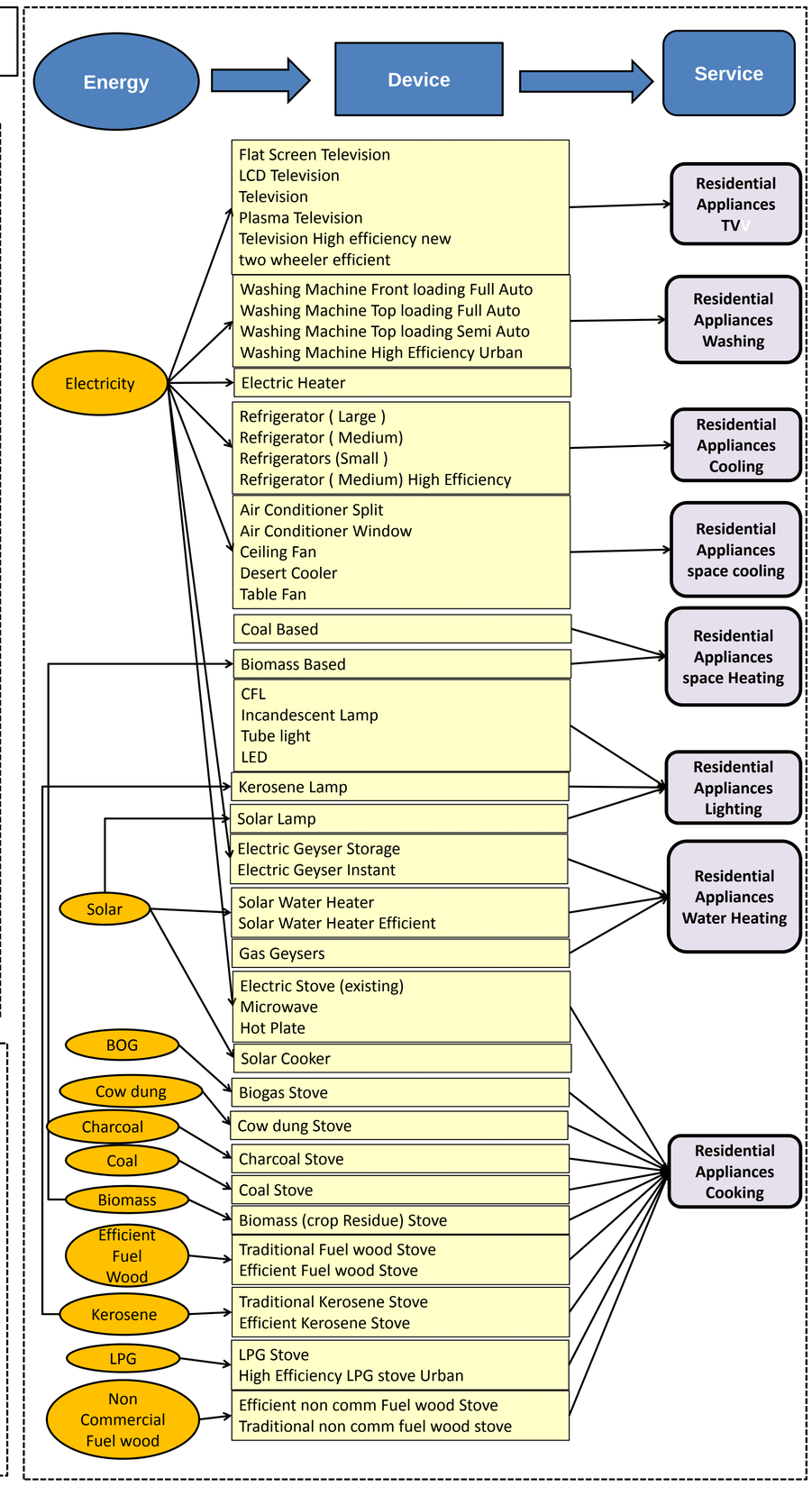
Study Area Delineated



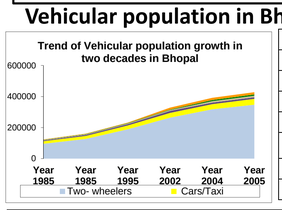


Scenario Assumptions





Vehicular population in Bhopal

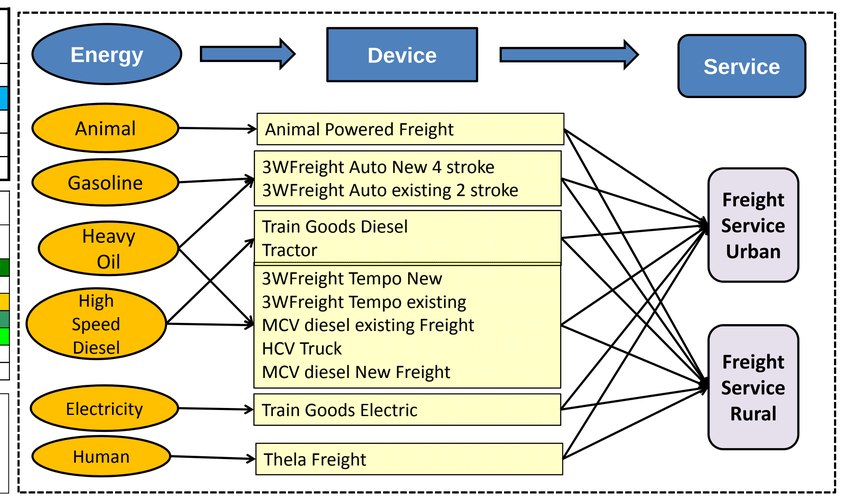


Bhopal	Year 2005
Two- wheelers	347571.00
Autos/ Tempo	10127.00
Cars/Taxi	37455.00
Buses	8294.00
Goods Carriages	9854.00
Tractors/ Others	14675.00
Total	427976.00

Population

Municipal Corporation	Total Population 2001	Total Population 1991	Decadal Growth Rate
Indore	1474968	1091674	35.11
Bhopal	**1437354**	**1062771**	**35.25**
Jabalpur	932484	741927	25.68
Gwalior	827026	690765	19.73

Source: Census of India, 2001, 1991



SECTORAL CONTRIBUTION in Seven Actions for LCS Scenario						
	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					

Sustainable Style – Low Carbon Lifestyle
- Introduction to environmental concerns
- Use of energy efficient appliances
- 3R principle
- Change in lifestyle

Form and Flow – Integrating Transport with City Structure
- Migration to Sustainable Technology
- Connecting Cells
- Enhance Public Transport
- Traffic Management

Scenarios

Four scenarios were developed to understand the emission and energy demand in Bhopal for year 2030. One scenario is business as usual and three scenarios as Low Carbon Scenarios are considered with change in taxes for emissions and energy demand and introduction of efficient technologies to reduce the carbon emissions.

In **first Scenario Business as Usual** the present trends of energy consumption, demography and vehicular growth is considered to continue in future. The business will run as usual and the shares of present technologies remain the same to fulfill the future demand with increased population and urban area.

In Scenario Counter measure 1,new technologies are introduced with limitation of maximum share. In this scenario no taxes are introduced and the discount rate remains the same.

In **Scenario Counter measure 2,** new technologies are introduced with limitation of maximum share. In this scenario high taxes on emission and energy are introduced and the discount rate is reduced.

In **Scenario Counter measure 3**, new technologies are introduced with no limitation of maximum share thus a free economy for selecting the technology. In this scenario high taxes on emission and energy taxes are introduced and high discount rates are introduced.

Share of Human and Animal energy is restricted as it becomes the first option due to its emission characteristics.

Sector wise energy use (2007-08)

Sector	Energy/ Fuel	Quantity
1.Residential	Electricity (Mkwh)	340.10
	LPG (MT)	49,240.00
	Fuel wood (MT)	1,275.30
	Kerosene (kL)	2,388.00
2.Transportation	Diesel (kL)	59,369.80
	Petrol (kL)	48,842.50

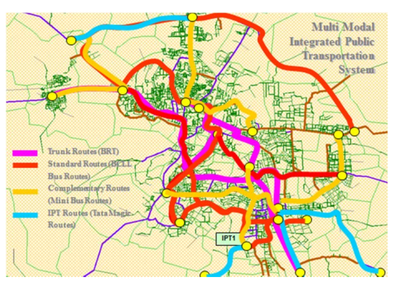
Sector wise emission in urban area (2007-08)

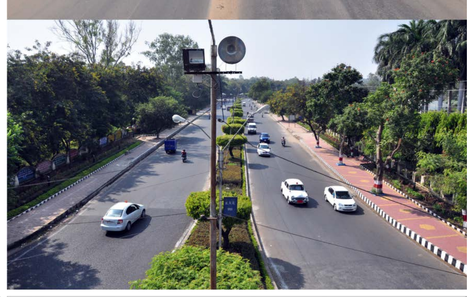
S. No	Sector	CO2 Emissions
1	Residential	36%
2	Transportation	39%

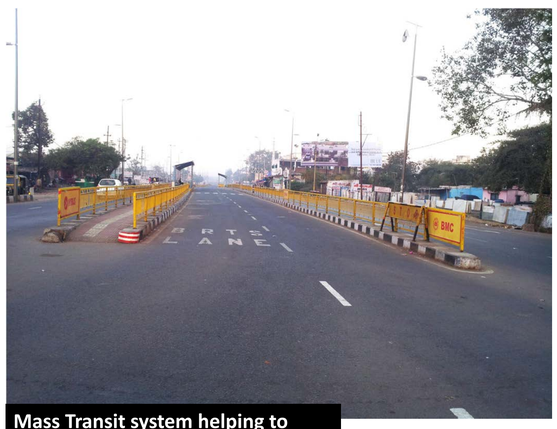
Taxes and Discount Rate

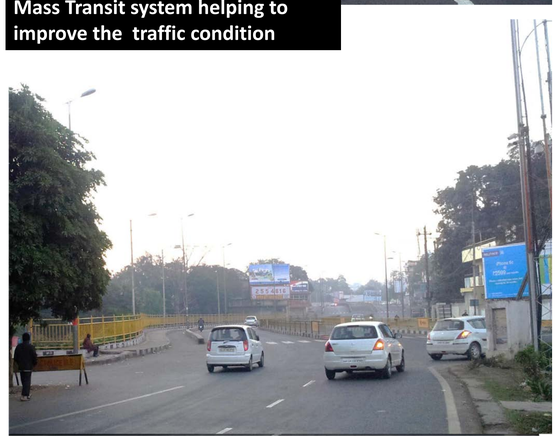
CASE NAME	BL	CM1	CM2
EMS_TAX	0	10	10
ENE_TAX	0	30	50
Discount RATE	33	33	5

Scenario	Key Drivers	Critical Parameters
Sustainable Low Carbon Residential Sector Scenario	Energy Efficiency, Sectoral demand, improved housing designs, shared facilities	Energy demand (↓), improved efficiency (↑), use of non conventional energy sources (↑)
Sustainable Low Carbon Transport Sector Scenario	Shift from fossil fuels, high share of mass transit system, efficient Land development to reduce demand	Energy demand (↓), improved efficiency (↑), use of non conventional energy sources (↑)
Climate Centric Scenario	Carbon Tax, Global Environmental Concerns, Rate of technological improvement, Technology transfer	Early penetration of advanced and clean technologies, Technology rate (↑)









Simulation Output

The simulation is performed for Transport and Residential Sector. It was observed that Bhopal has 60% GHG emission reduction potential over BaU level in the possible Low Carbon Society Scenario in transport sector.

The simulations show that the GHG emission and energy consumption for transport sector increases in all the scenarios. The GHG emissions in transport sector of Bhopal in 2005 were around 22 thousand ton CO_2 which rise by around 3 times to 61 thousand ton CO_2 in the target year 2030 under the BaU.

The simulation assessment of Counter measure 2 shows that in the scenario introducing free technology selection and high emission and energy taxes, technology using energy with minimum emissions is selected in which mainly animal and human energy. In reality this is not possible to use such energy completely. Some limit for maximum allowable energy supply needs to be assigned. Counter measure 1 and 3 displays the possible emission and energy demand reduction potential.

Conclusions:

The simulations for energy demand and emissions BAU and LCS scenarios are carried based on the technologies and service demand assumptions using AIM/Enduse Model in this study. Policy paths formulated in these scenarios show the likely rise in energy consumption, technology shift and CO2 emission in transport sector Bhopal. The study demonstrates that significant emission mitigation can be achieved in LCS compared to the BAU scenario.

Policy decisions are crucial for reducing the emissions. With increasing concerns on environmental issues and rising public awareness the LCS scenario assumes a greater significance. The precise decisions on government policies promoting efforts for emission reduction and use of cleaner fuels and technologies have a major contribution to make.

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LCS Scenario in Transport and Residential Sector for Bhopal.

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