

GCP Meeting, Mexico City, 4-8 September 2006

*An Assessment of Urban Development
Pathways for Delhi Using Emission
Trajectories*

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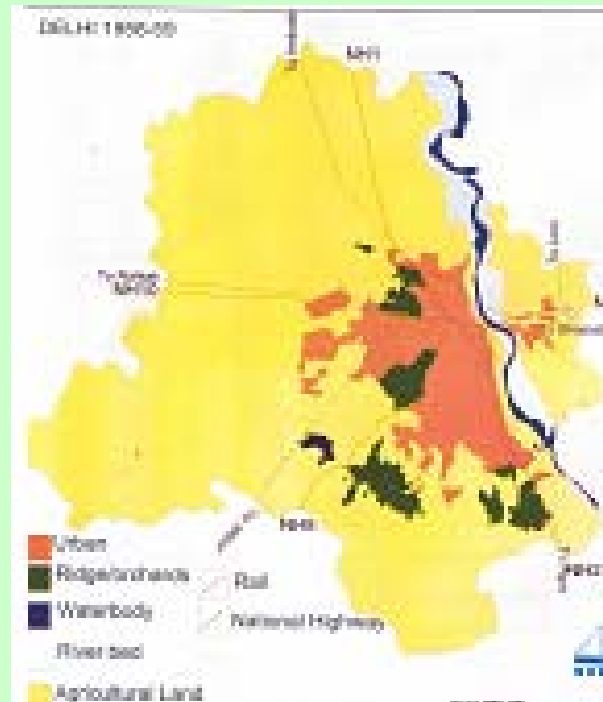
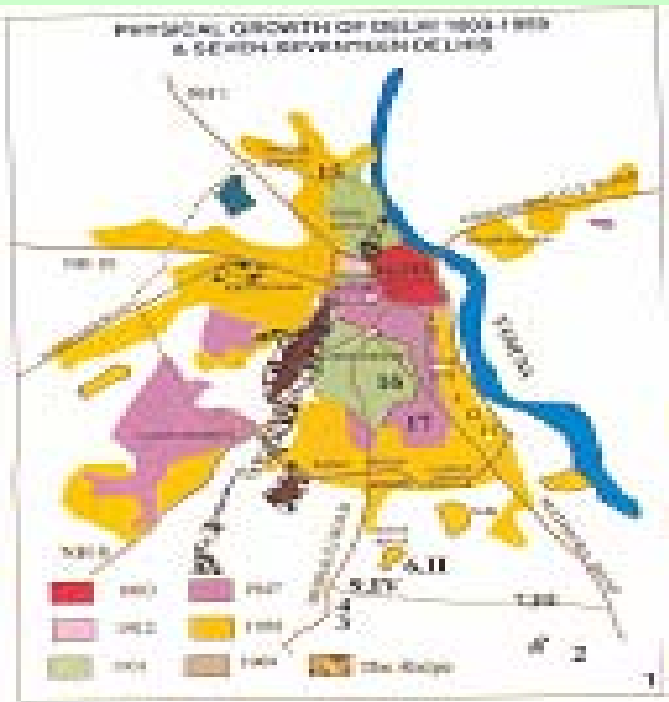
Outline of the Presentation

- Background
- Emission Estimates
- Development Pathways and Development Goals
- Conflict of interests of various stake holders
- Impacts of policy decisions
- Sum-up

Salient Features of Delhi

- Unique City State in India
- Area 1483 km²
- Highest per capita Income in India
- Constantly expanding opportunities due to capitalization of economic policy reforms
- Only 8% population lives below poverty line
- Forest Covers over 7.5% of Delhi's Geographical Area
- Fundamental problems
 - Migration
 - Power and water supply
 - Public Health
 - Public Safety

Delhi – Historic Development



1958

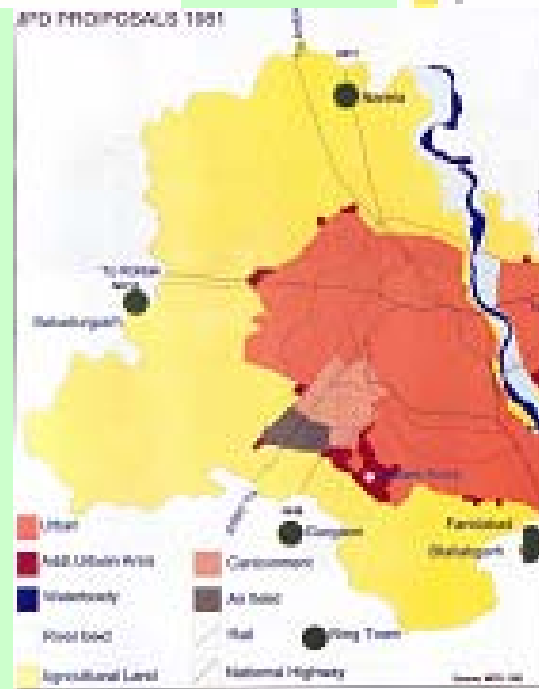
P = 1176

900 BC to 1947

P=274

1981

P =Population Density
person/km²)



2001

P = 9294

National Capital Region (NCR) Towns



NCTD – National Capital Territory of Delhi

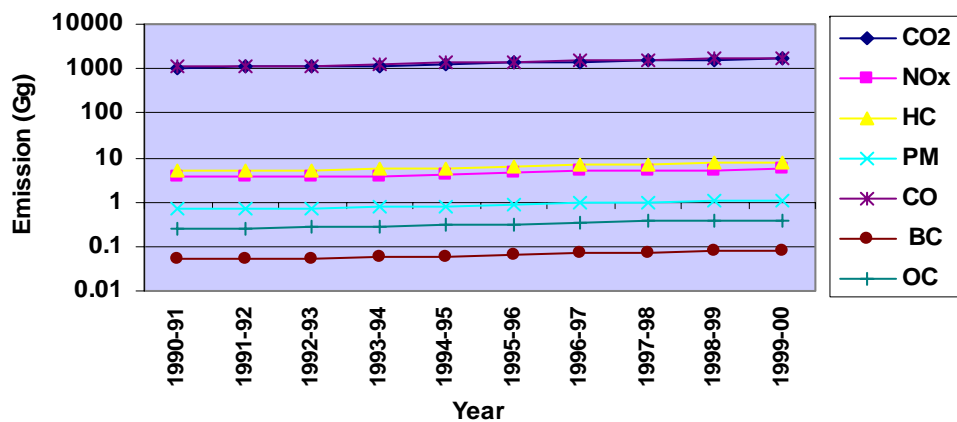
Emission Inventory: Significance sectors

Sector	CO ₂	CH ₄	N ₂ O	NO _x	CO	SO ₂	Particulate
Energy & Transformation Industries	X			X	X	X	X
Transportation	X			X	X	X	X
Biomass Burning	X	X	X	X	X		X
Industrial processes							
Cement	X						
Steel	X						
Agriculture							
Enteric fermentation		X					
Rice cultivation		X					
Agriculture soil			X				
Agricultural residue burning		X	X	X	X		X
Land-use and forestry	X						
Waste		X					
			Embodied emission				

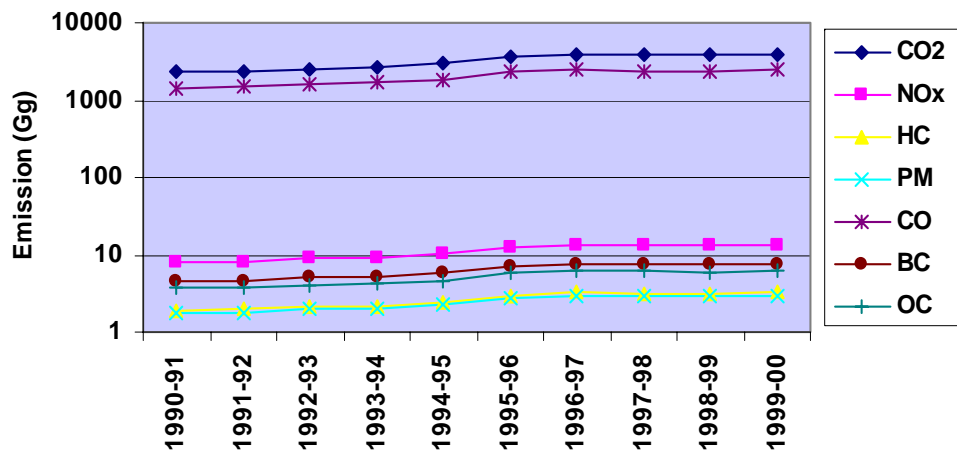
IPCC 1996 Guidelines for Inventory Preparation

Emission Inventories from Transport Sector in Delhi

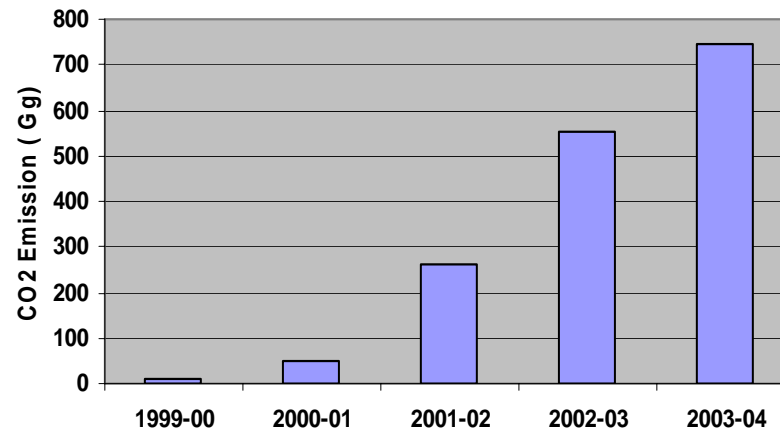
Pollutants emission from gasoline consumption in Delhi



Pollutants emission from diesel consumption in Delhi

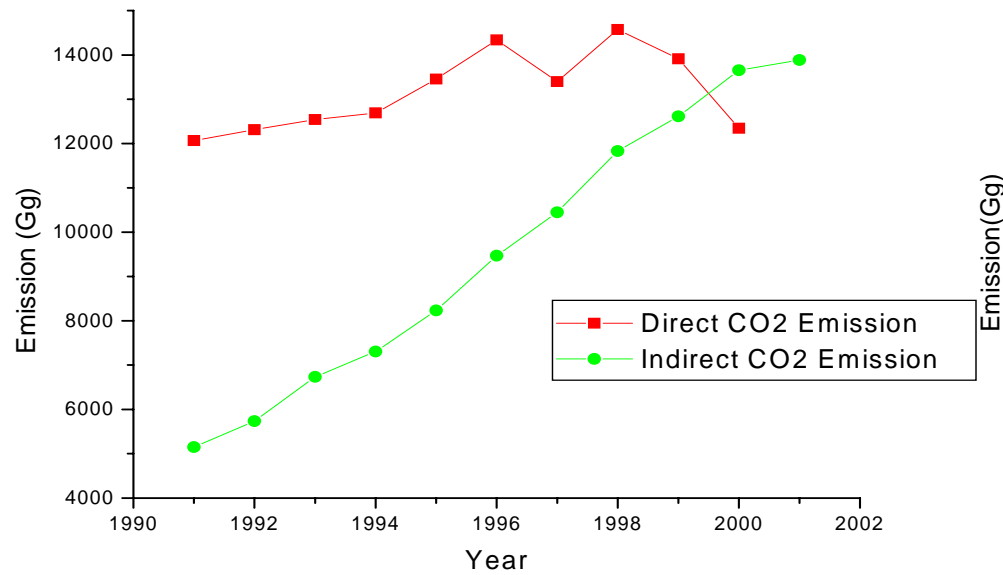


CO2 emission from CNG consumption in Delhi

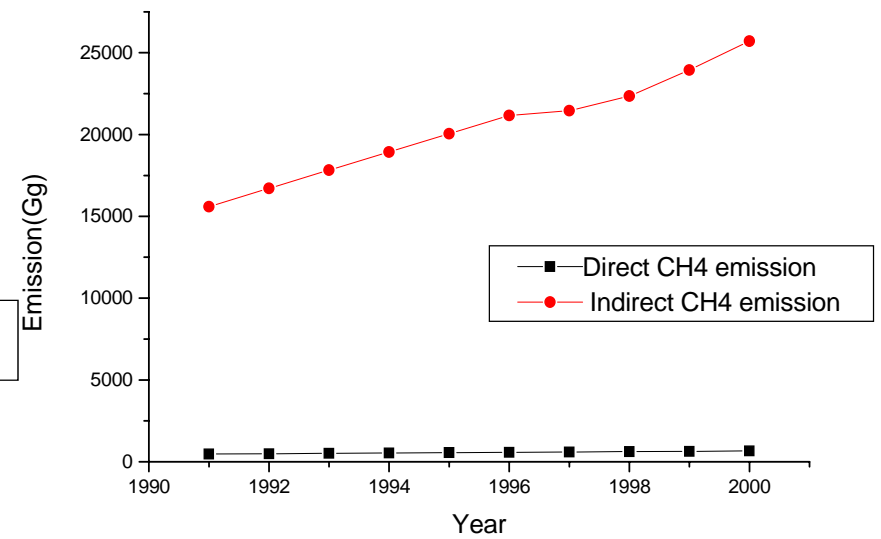


Emission Inventories for Delhi

Total CO2 emission from Direct and Indirect sources in Delhi



Total CH4 emission from direct & Indirect sources of emission



Human Development Report of Delhi (August 2006) advocates the Development Approach as:

‘..Purpose of development is to create an enabling environment for people to enjoy long, healthy, creative and secure lives.’

Delhi Development Goals

- Goal 1: Eradicate Poverty and Hunger (three targets)
- Goal 2: Achieve Universal Elementary Education (Seven targets)
- Goal 3: Promote Gender equality and Empower women (Three targets)
- Goal 4: Reduce Child Mortality (Two targets)
- Goal 5: Improve Maternal Health (One Target)
- Goal 6: Combat HIV/AIDS, malaria and Other Diseases (Three targets)

Continued...

Delhi Development Goals

- **Goal 7: Ensure Environmental Sustainability**
 - Target #20: Increased Forest Cover
 - Target #21: Reduce carbon dioxide emissions
 - Target # 22: Halve, by 2015, the proportion of people without sustainable access to safe drinking water and sanitation
 - Target #23: Increase proportion of population with access to improved sanitation
 - Target #24: Achieve a significant improvement in the lives of slum dwellers

Continued...

Delhi Development Goals

- Goal 8: Strengthen Bhagidari (Three targets)
- Goal 9: Improve Public Safety (Three targets)

Development Pathways

- Land Use Pattern is supposed to be guided by successive City Master Plans
 - Presently Master Plan 2001 is operational
 - Modification of Master Plan is expected to be notified very soon as a result of conflict of competitive interests

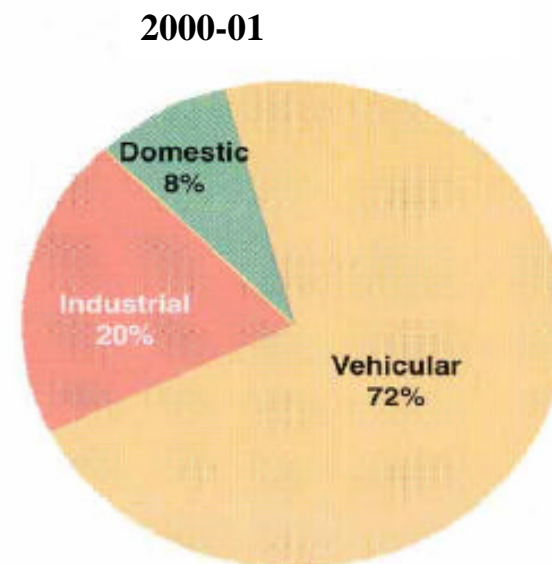
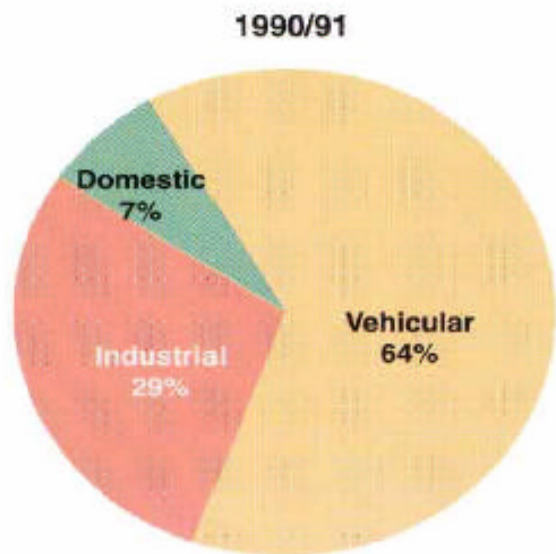
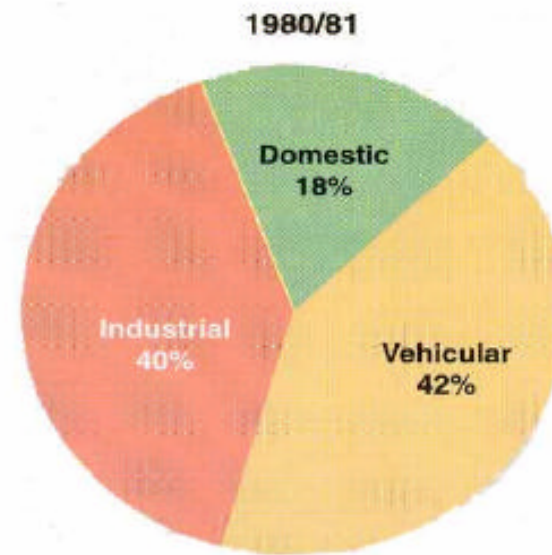
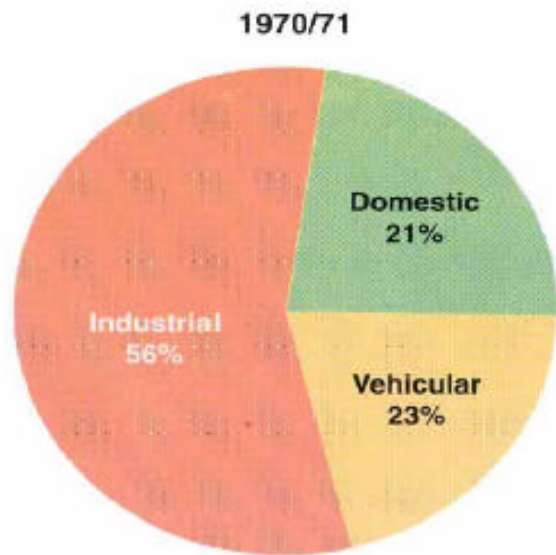
Compliance of Policy decisions are often influenced/ catalyzed by the stakeholders' activism

- Recent examples:

1. Ongoing drive for complete closure of commercial activities in residential areas ordered by superior courts to force compliance with the provisions of current Master Plan

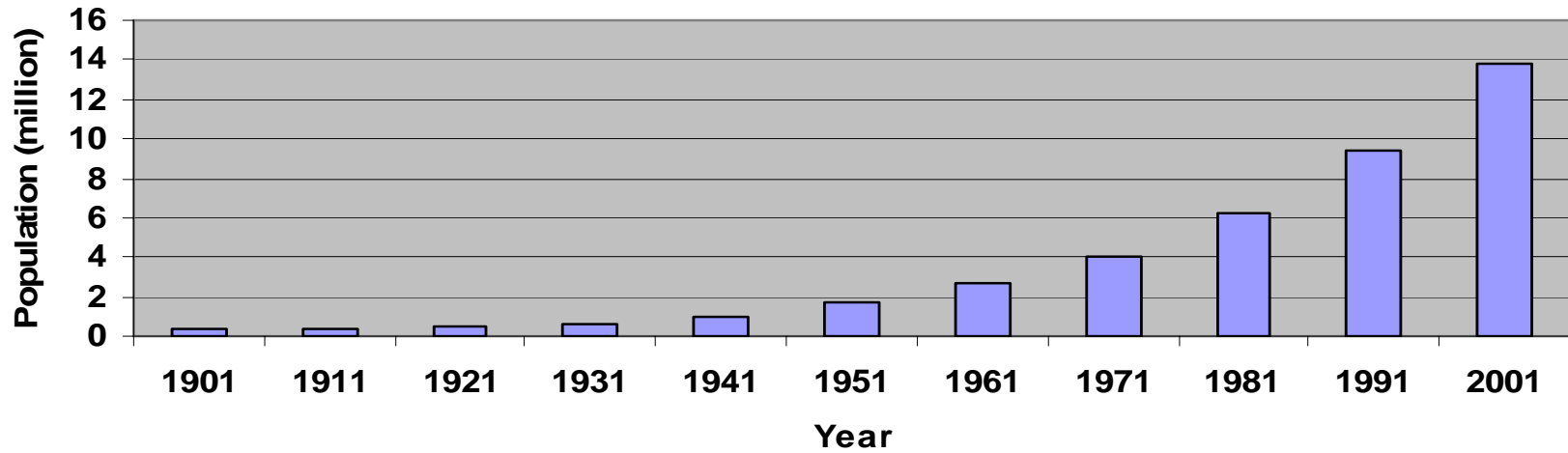
2. Implementation of reforms in transport sector to improve ambient air quality

- Introduction of CNG for Public transport
- Introduction of tougher emission norms for new vehicles
- Improvement of fuel quality
- Restriction of movement of commercial vehicles

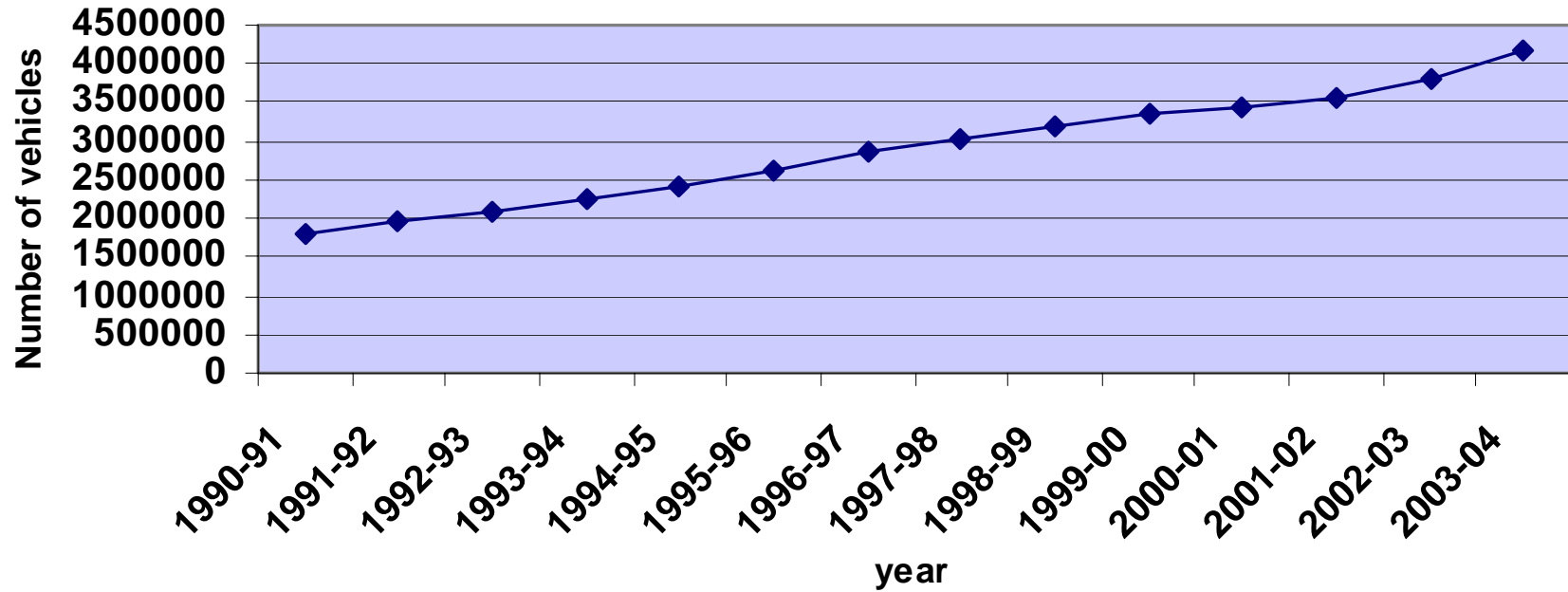


Contribution of Various Sectors to Ambient Air Pollution (Source : MoEF)

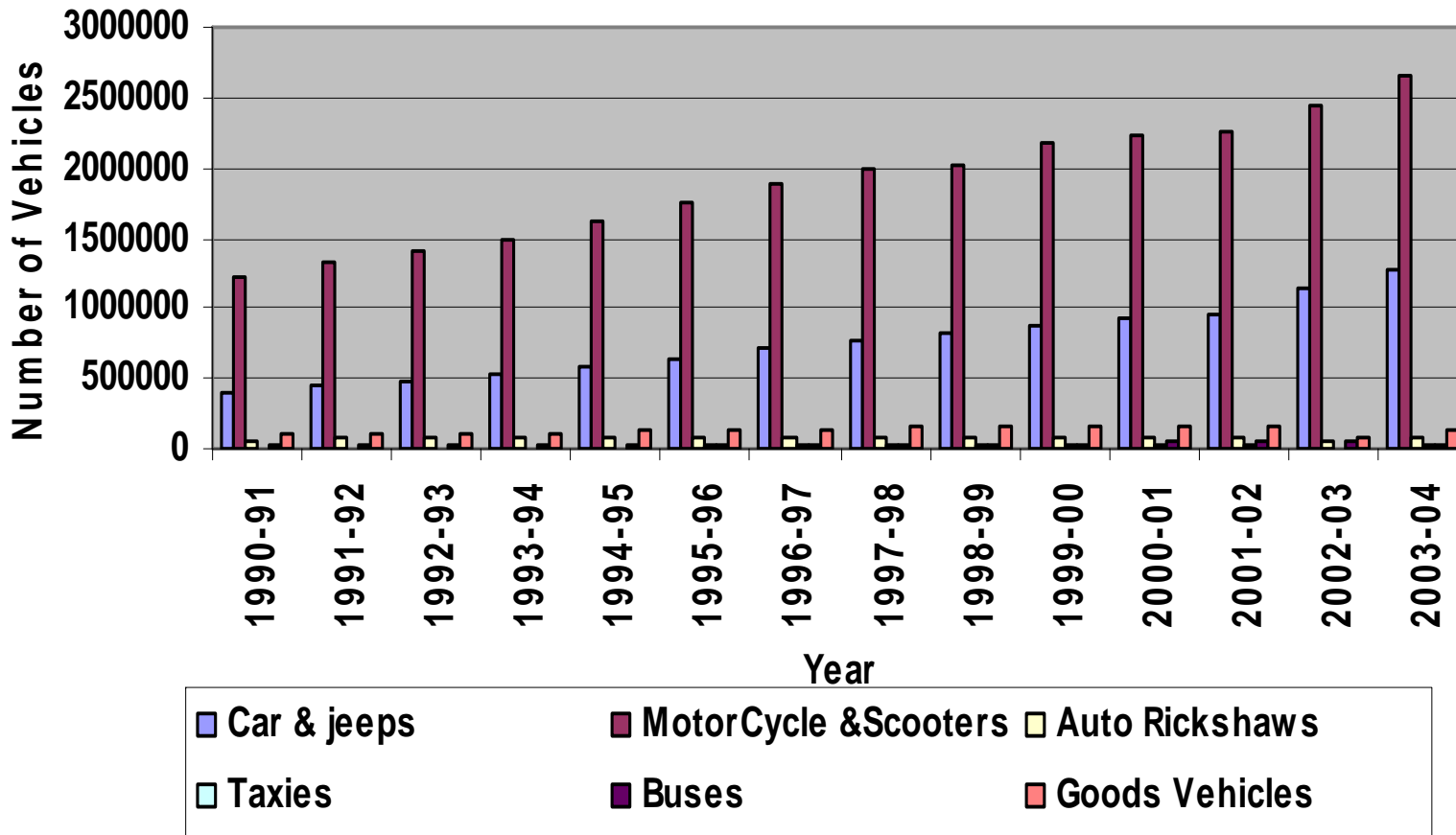
Population of Delhi



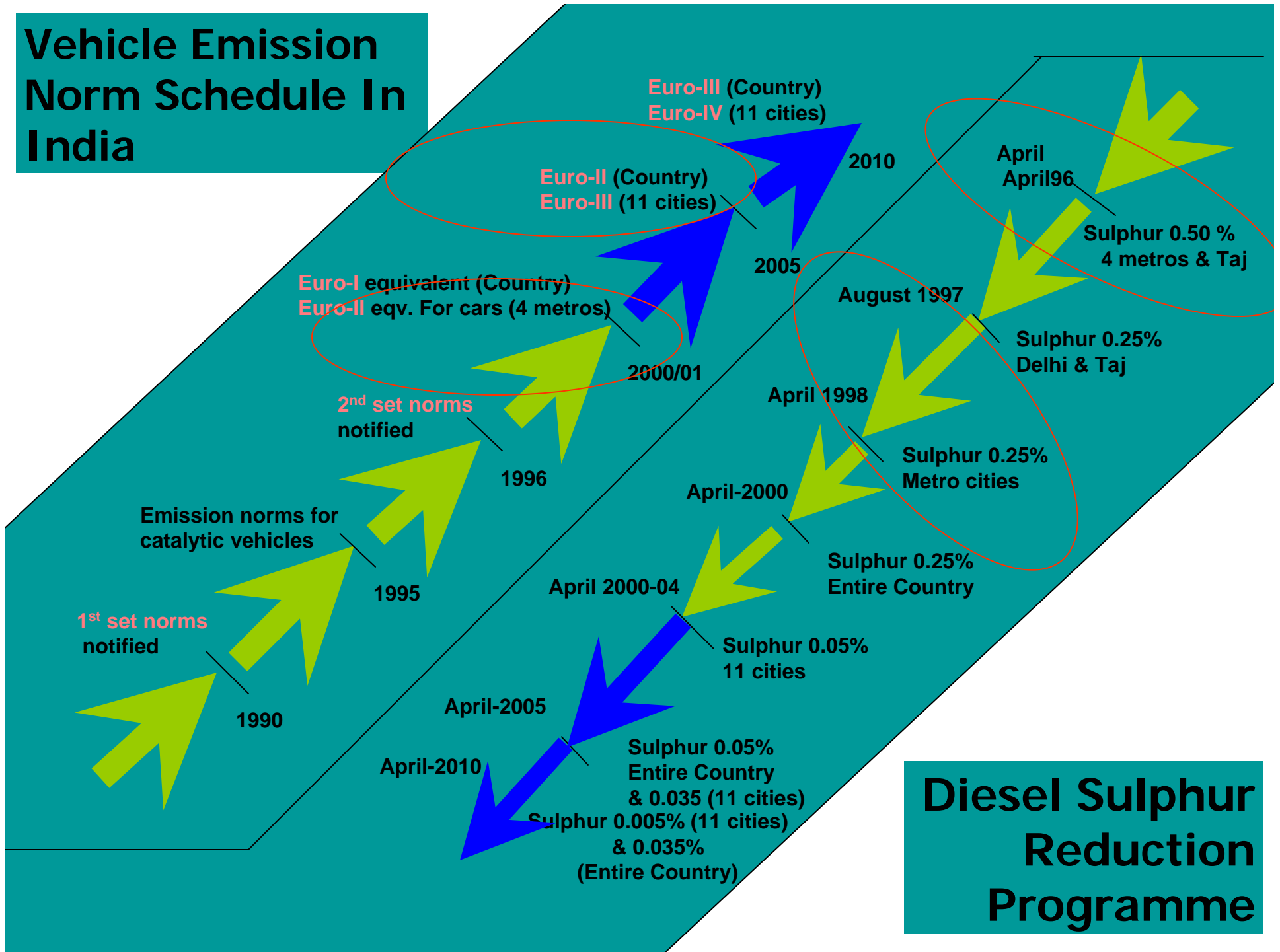
Number of Registered vehicles in Delhi



Category wise increase in Number of Vehicles in Delhi

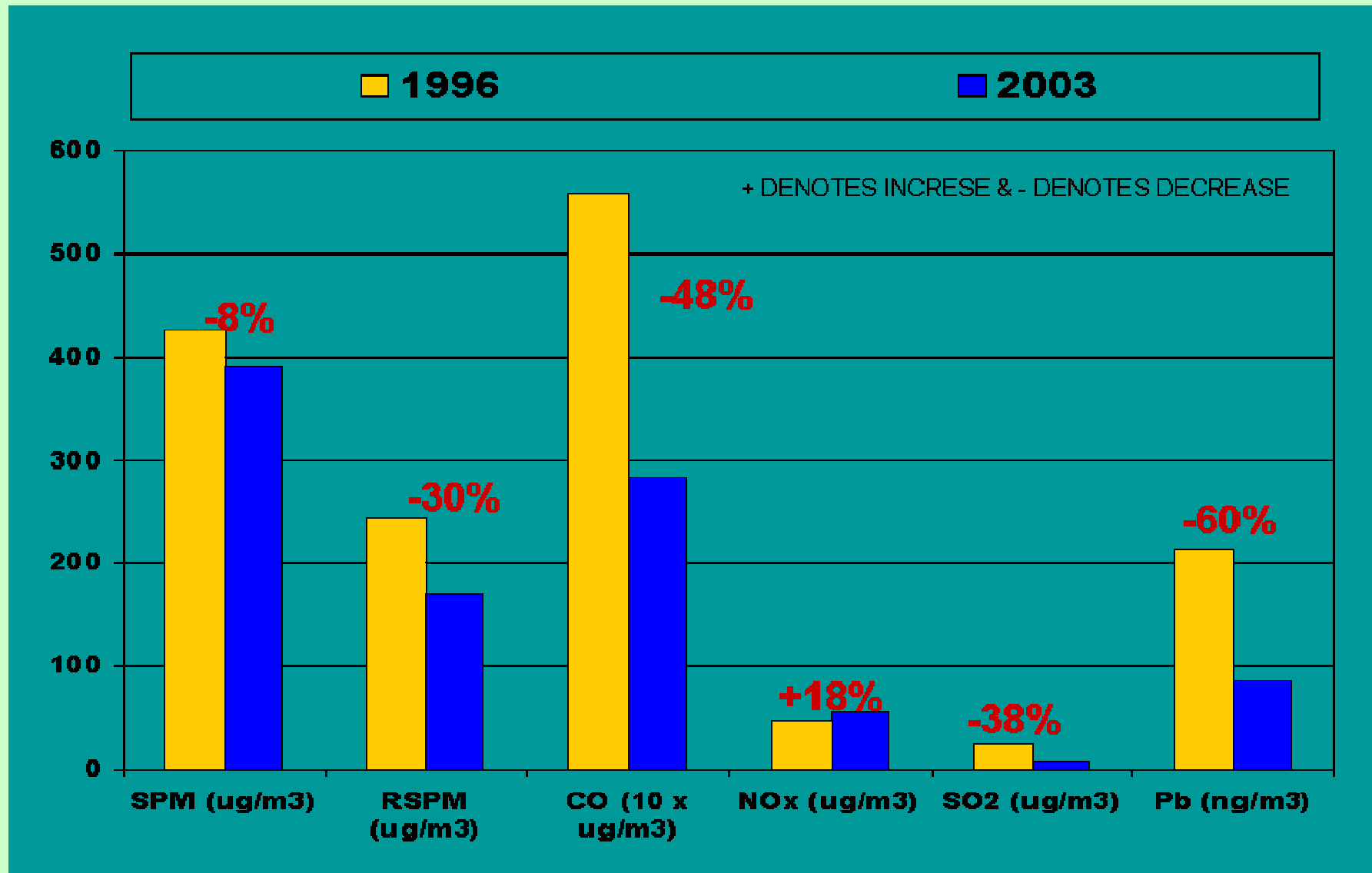


Vehicle Emission Norm Schedule In India

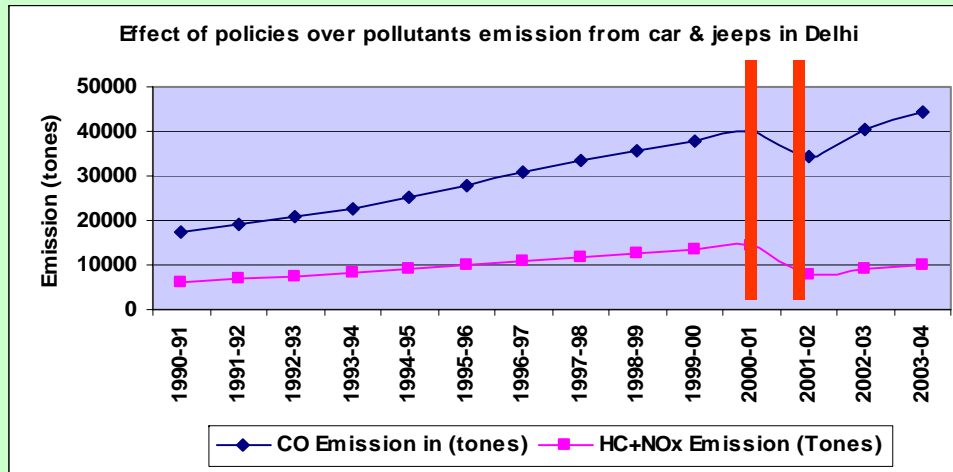


**Diesel Sulphur
Reduction
Programme**

IMPACT OF INTERVENTIONS ON AIR QUALITY OF DELHI (1996 Vs. 2003)



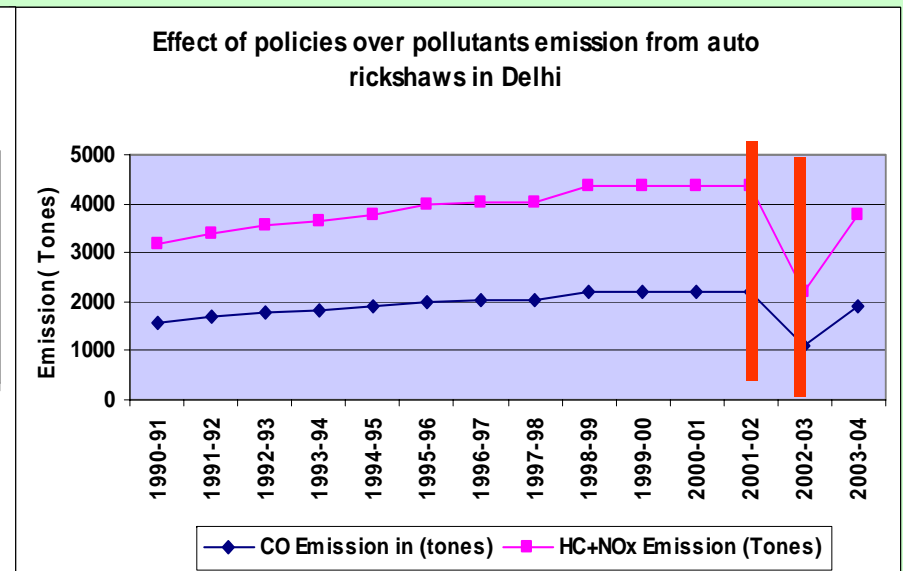
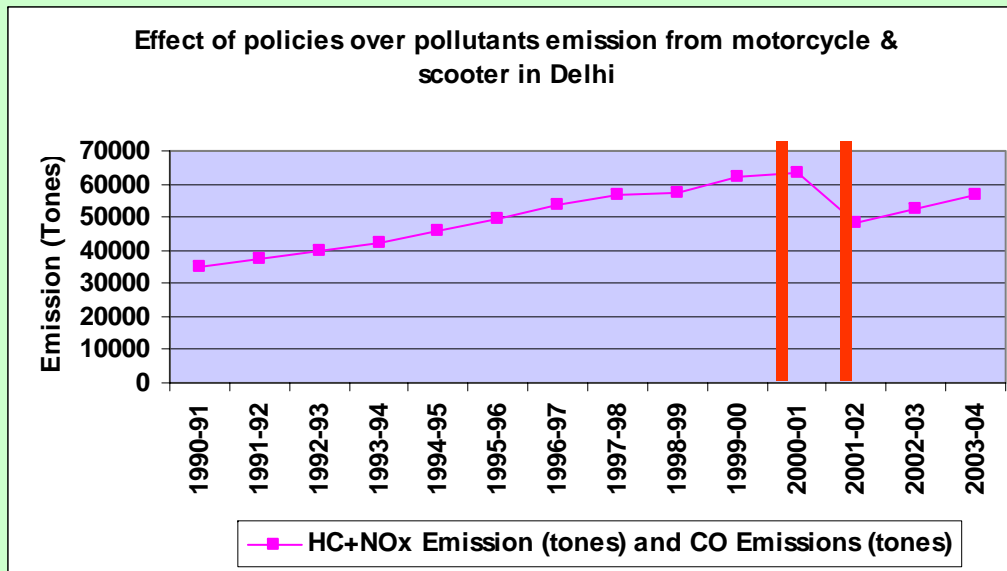
Impacts of Policy Decisions on Criteria Pollutants Emissions from Transport Sector



Application of stricter Emission Norms for Vehicles

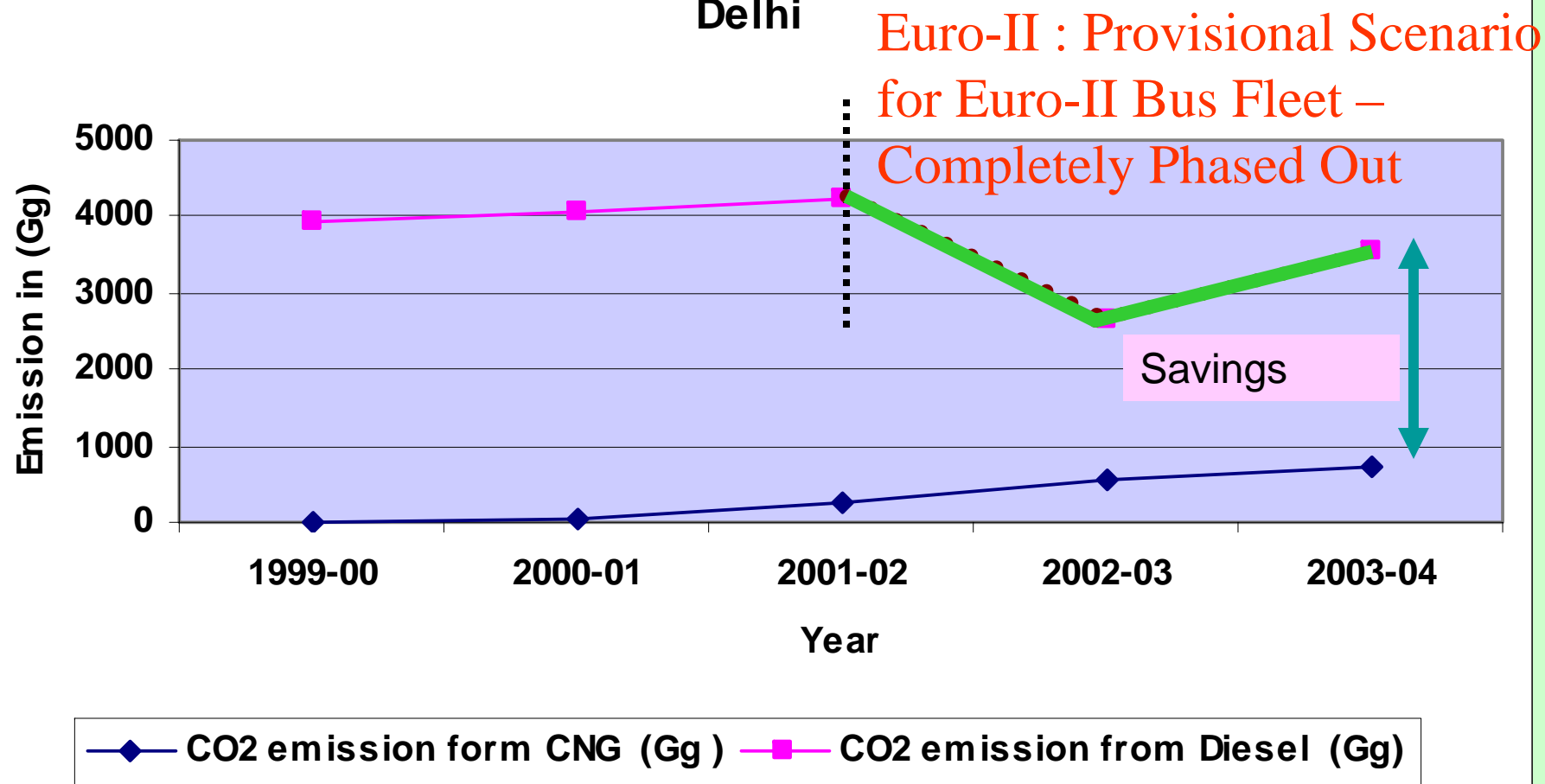
2000-01 = Euro -I

2002-03 =Euro-II



Co-benefits : Reduction in CO₂ Emission

CO₂ Emission form Diesel and CNG consumption in Buses in Delhi



New Initiative in Delhi

- Successful completion of first phase of Metro rail and start of Second Phase
- In order to prepare city for the upcoming Commonwealth Games in 2010, big infrastructure development projects are being planned
- A multi-mode transport system comprising of Metro, LRT and high Capacity Bus system is being planned

To Sum-up:

- Development trajectory is a result of complex interplay of interests of various stake-holders especially in democratic set-up
- The issue of decarbonization has been recognized but issues related to air quality improvement have dominance over CO₂ reduction issues

Acknowledgement:

ISSE/NCAR

IHDP

GCP

Thanks