

Greenhouse Gas Inventories for India: AIM Project Assessment

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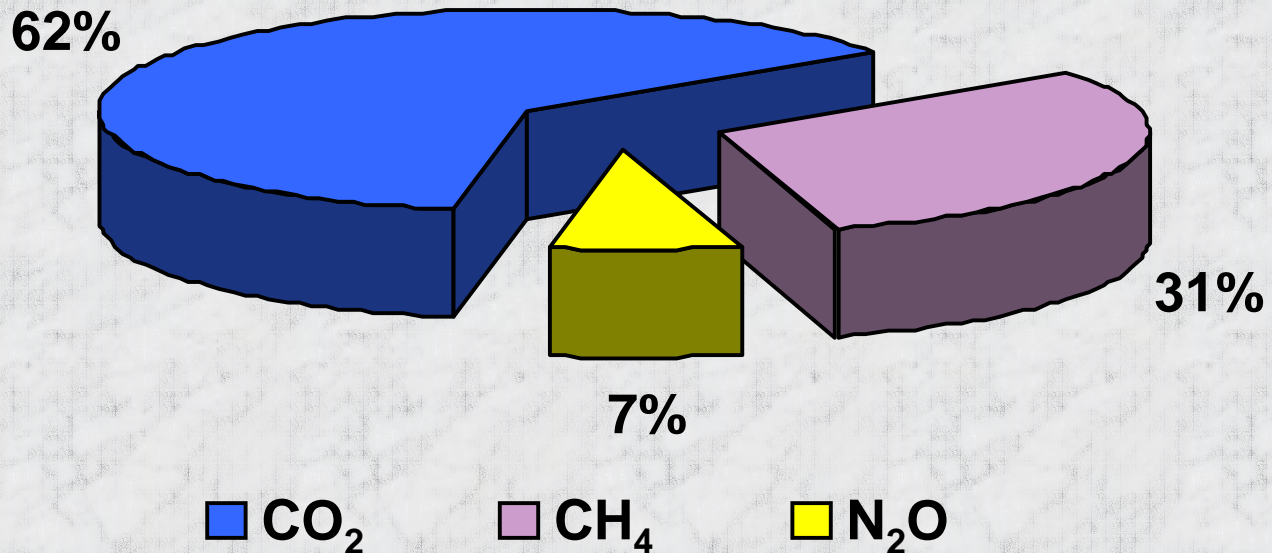
GREENHOUSE GAS INVENTORY FOR INDIA

-  **466 district level inventory data**
-  **Coverage of gases:**
 -  **CO₂, CH₄, SO₂, N₂O, NO_x**
-  **Emissions factors for India**
-  **Sectoral and hot spot analysis**
-  **Large Point Source Data**

Indian Emissions in 1995 (Million Ton)

CO₂	780
CH₄	18.3
N₂O	0.3
NO_x	3.6
SO₂	4.7

GWP Share (1995)

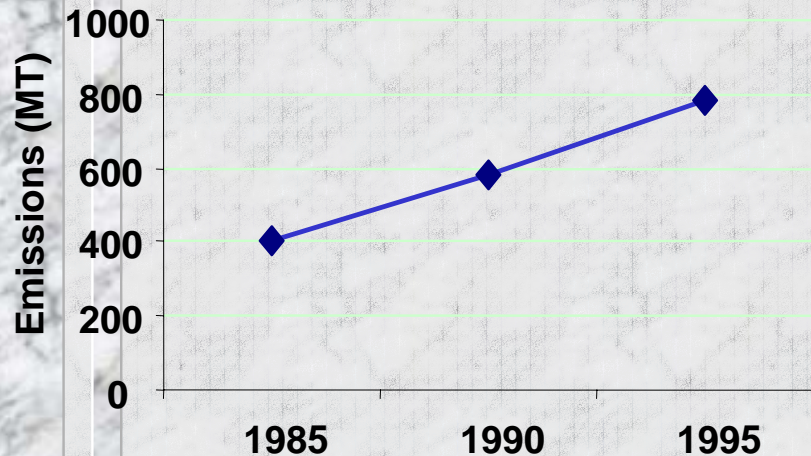


**CO₂ equivalent GWP
Growth rate (1990-95)**

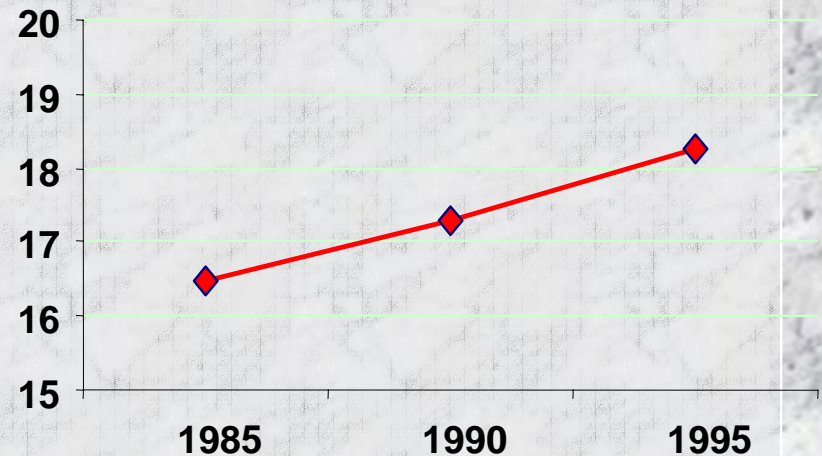
**1254 MT
4.1 %**

Trends of Indian emissions (Million Ton)

Carbon dioxide
Growth rate 6.4 %

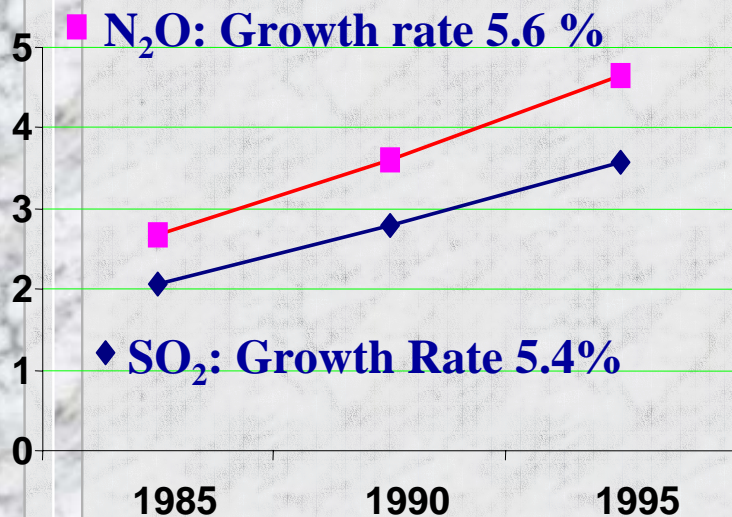


Methane
Growth rate 1 %

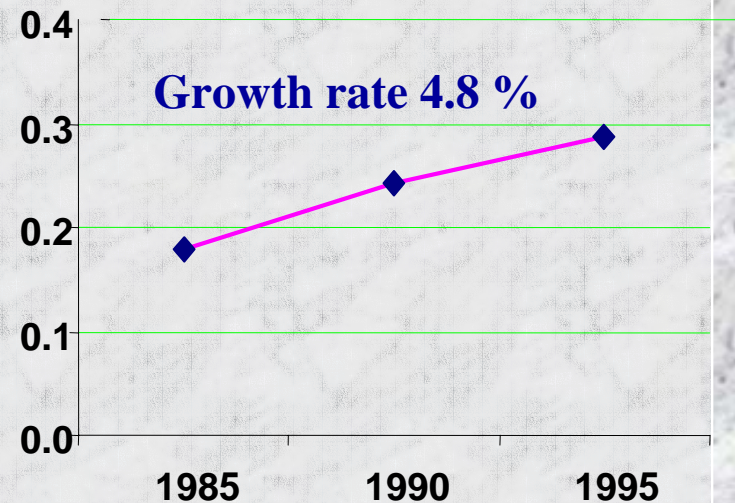


Trends of Indian emissions (MT)

N₂O and SO₂



NO_x

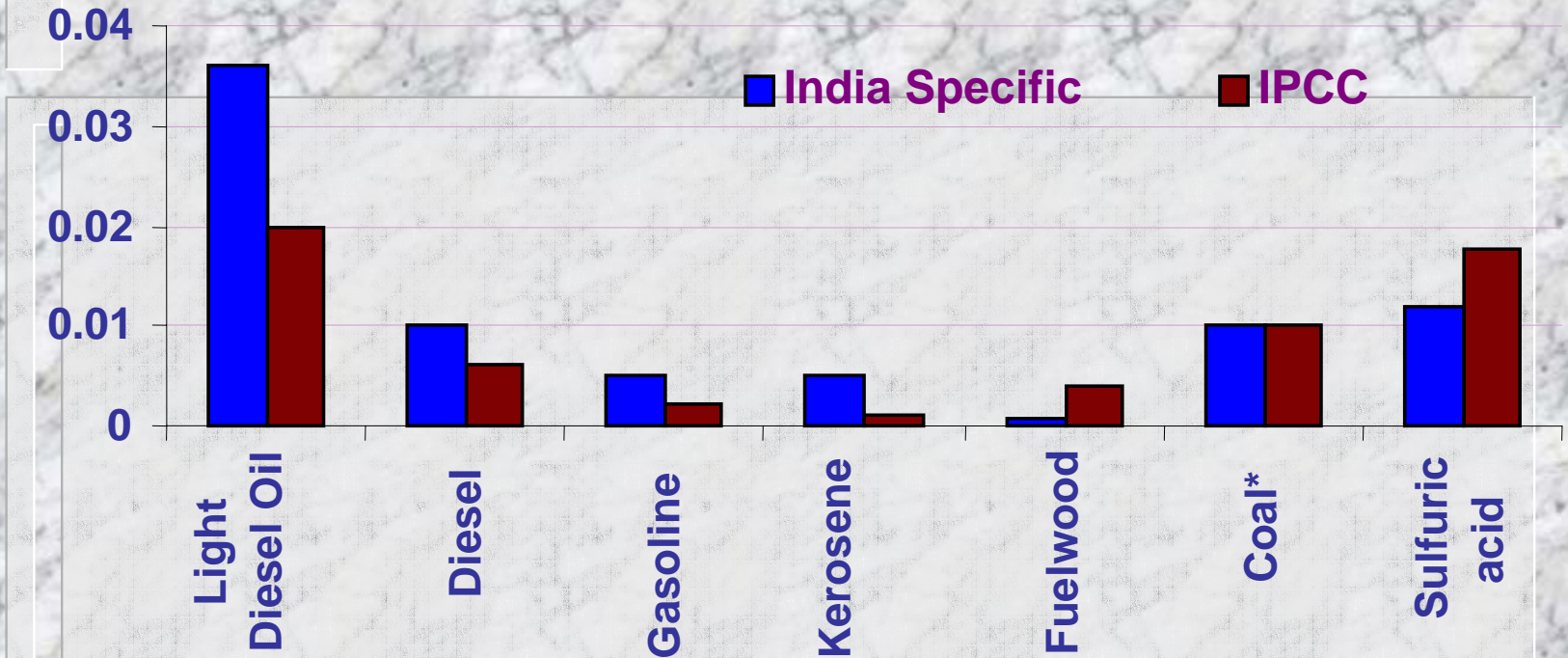


Indianized Emission Coefficients

Methane

- **Age profile specific livestock emissions**
- **Paddy Co-efficients**
- **Four level coal mine categories**
- **Composition of MSW**

Differences in SO₂ Emission coefficients (Ton/Ton)

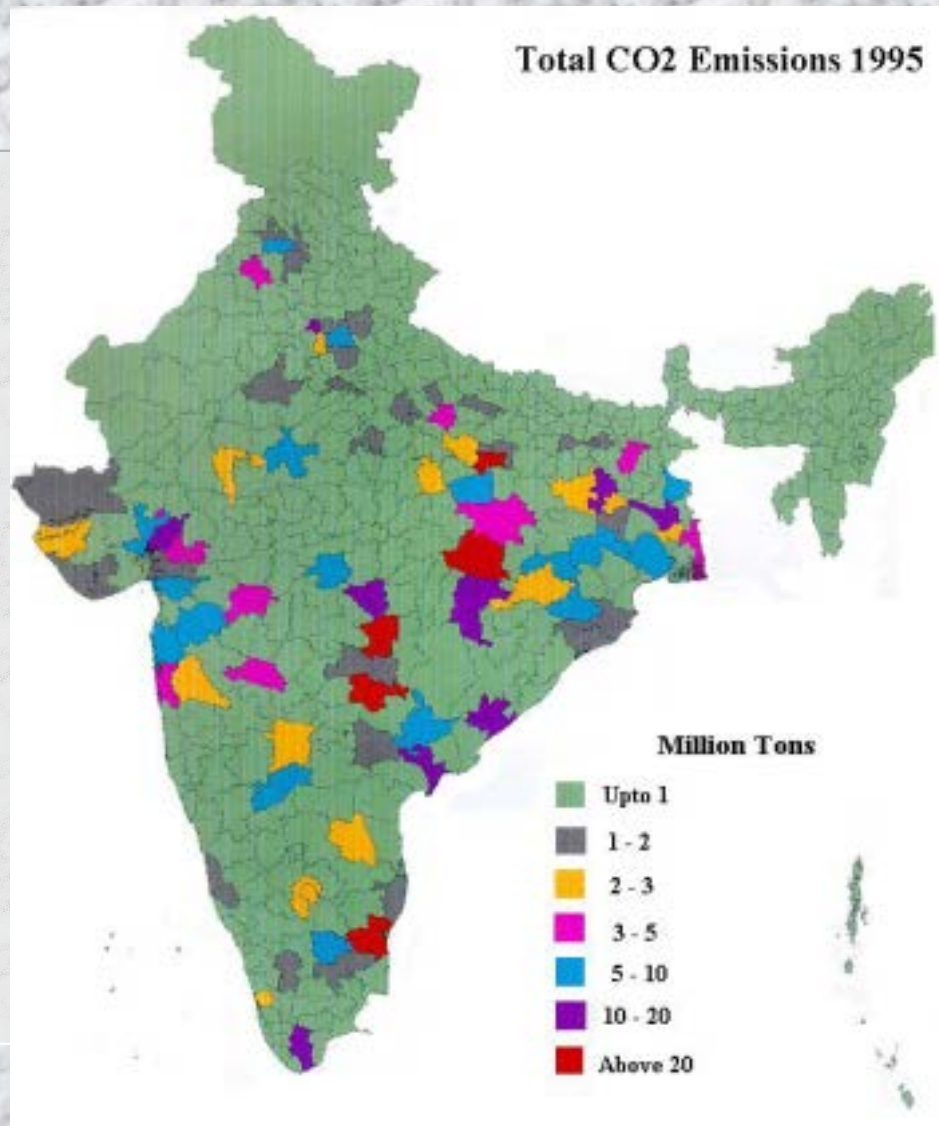


Emissions (MT)	1990	1995
Indian coefficients	3.61	4.65
IPCC coefficients	4.14	5.04

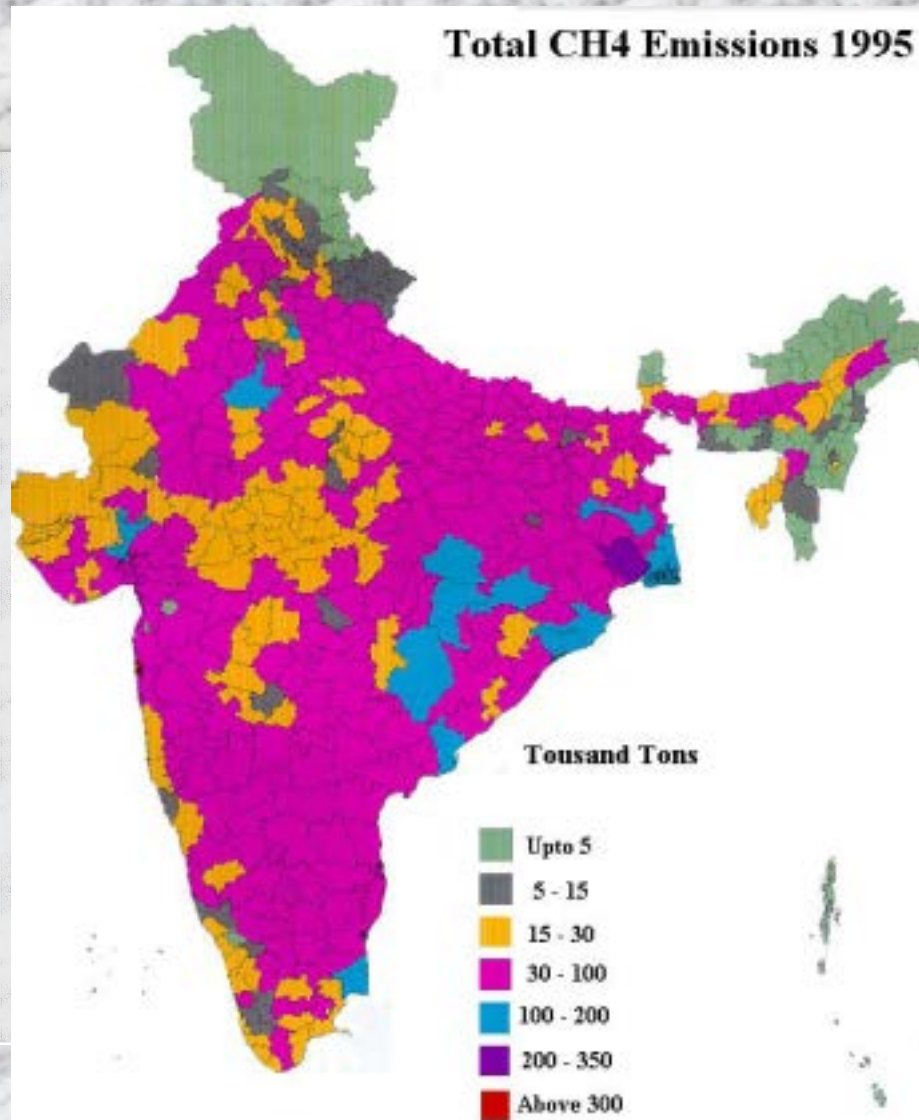
* Coal coefficients compared with IPCC low sulfur coal



CO₂ Emission Distribution



Methane Emissions



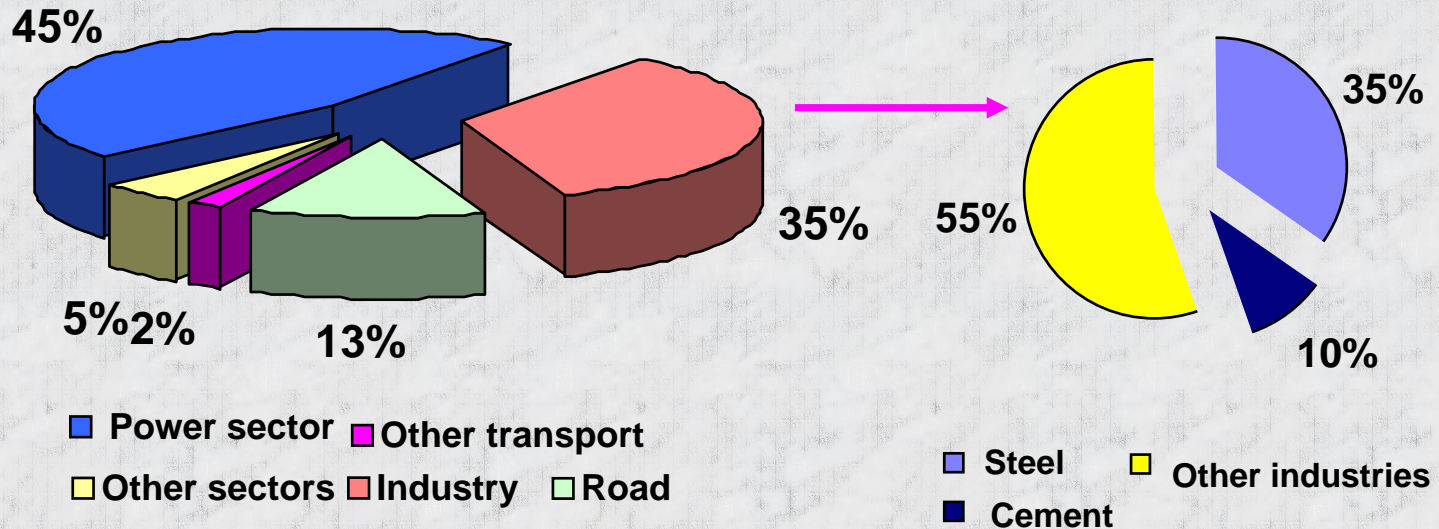
Sectoral Emissions

Methane

- **Age profile specific livestock emissions**
- **Paddy Co-efficients**
- **Four level coal mine categories**
- **Composition of MSW**

CO₂ Emissions (1995)

62 % contribution to GWP



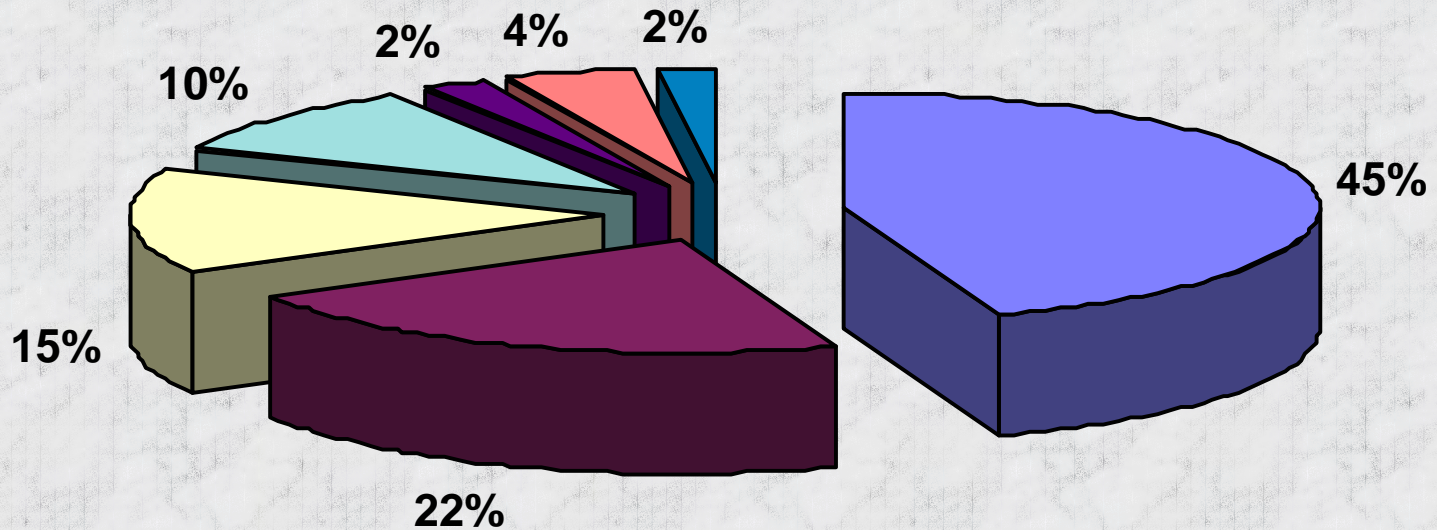
▶ **Power sector has 80% emissions from 30 plants**

▶ **Industry emissions are relatively dispersed**

📄 **10% districts emit 70% (including 5 steel plants)**

Methane : Major Contributors

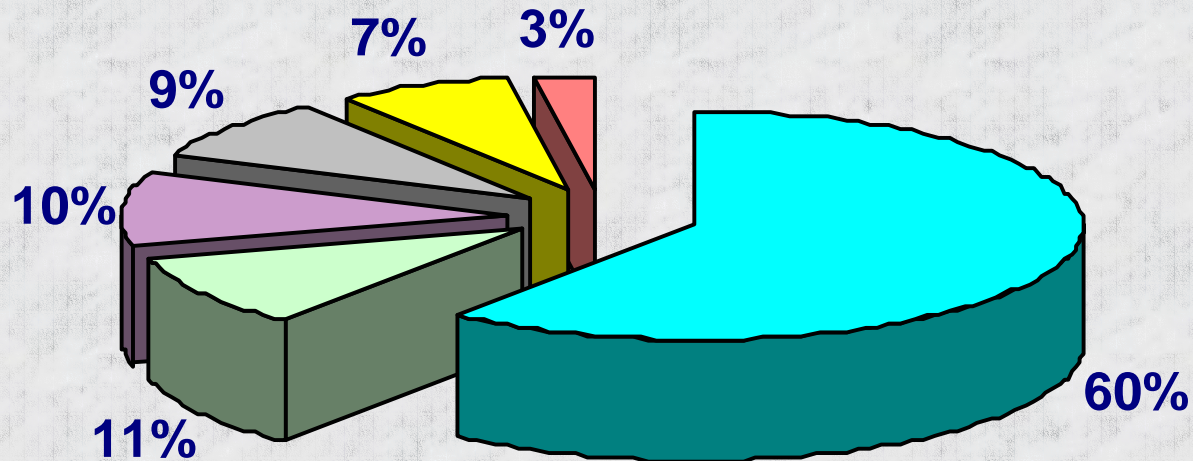
31 % contribution to GWP



- Livestock
- Paddy cultivation
- Biomass burning
- Municipal solid waste
- Waste water
- Oil & gas production & transportation
- Coal production

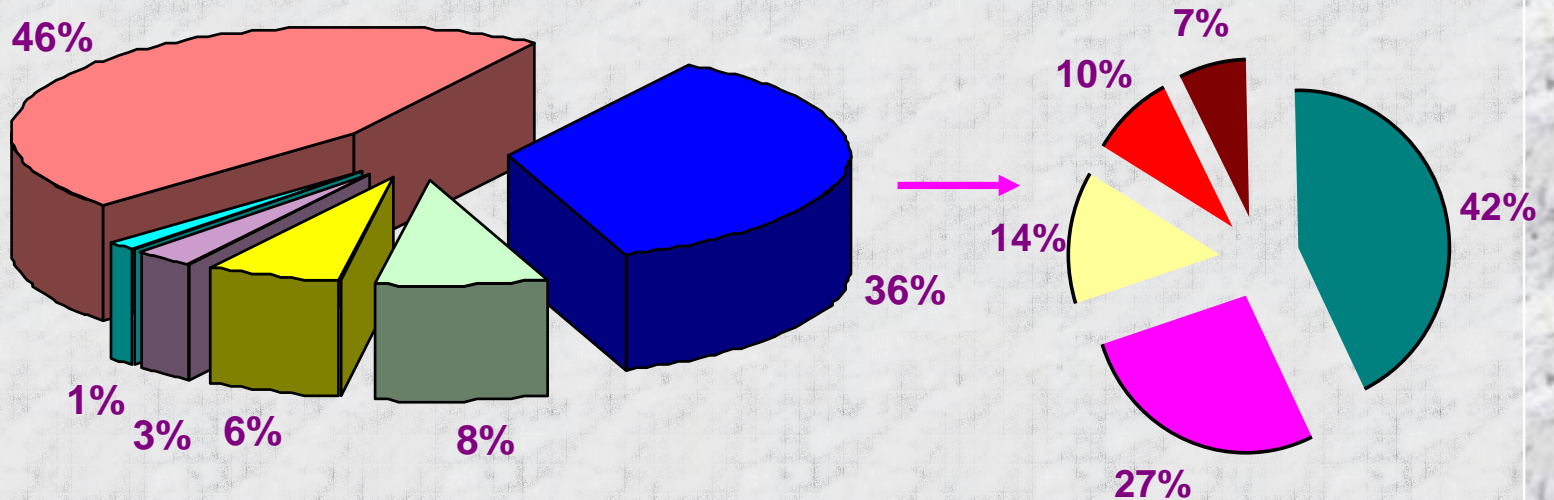
N_2O : Major Contributors

7 % contribution to GWP



- Nitrogen fertilizer use
- Biomass burning
- Fertilizer production
- Livestock
- Others
- Industry (non-energy)

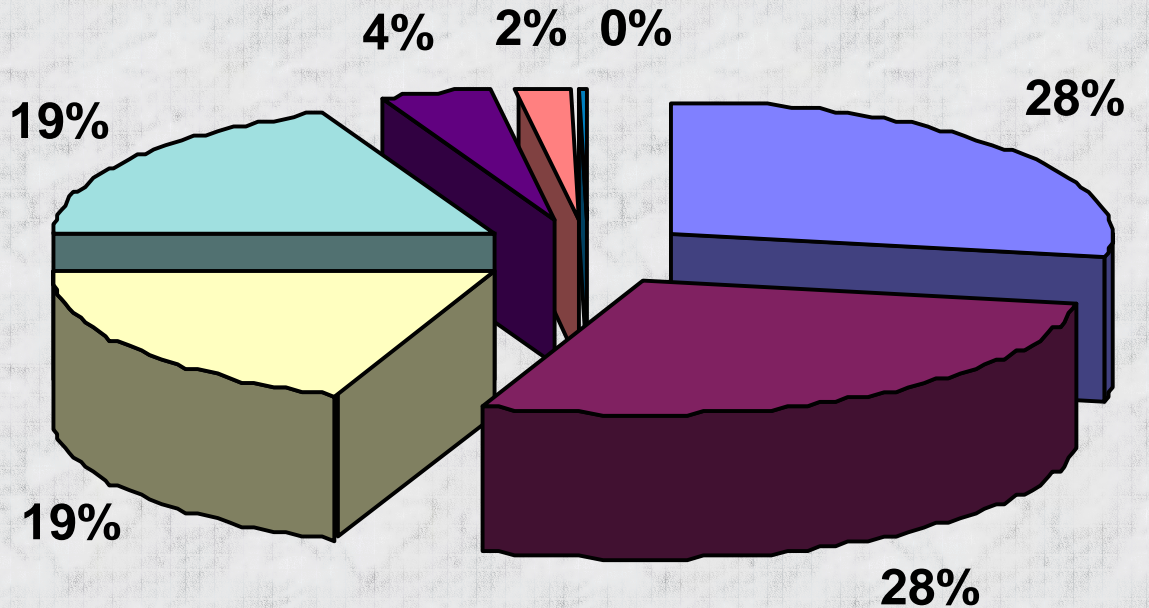
SO₂ : Major Contributors



- Power sector
- Industry
- Other industries
- Steel
- Agriculture
- Road
- Fertilizer
- Cement
- Others
- Other transport
- Industry (non-energy SO₂)

Emission sources same as CO₂ emissions

NO_x : Major Contributors

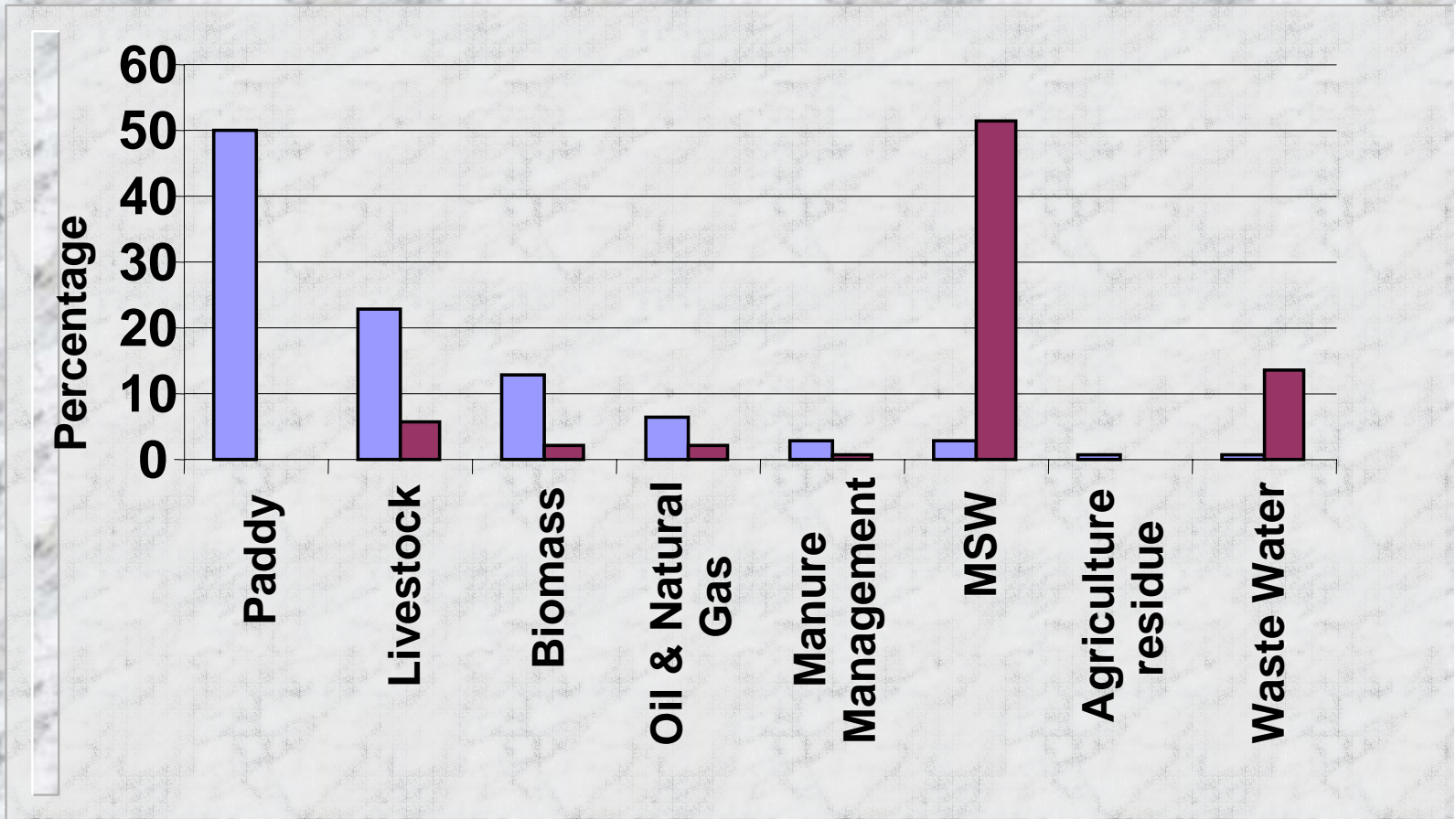


- Electric power generation
- Industry (energy use)
- Other transport
- Industry (non-energy)
- Road transport
- Biomass burning
- Others

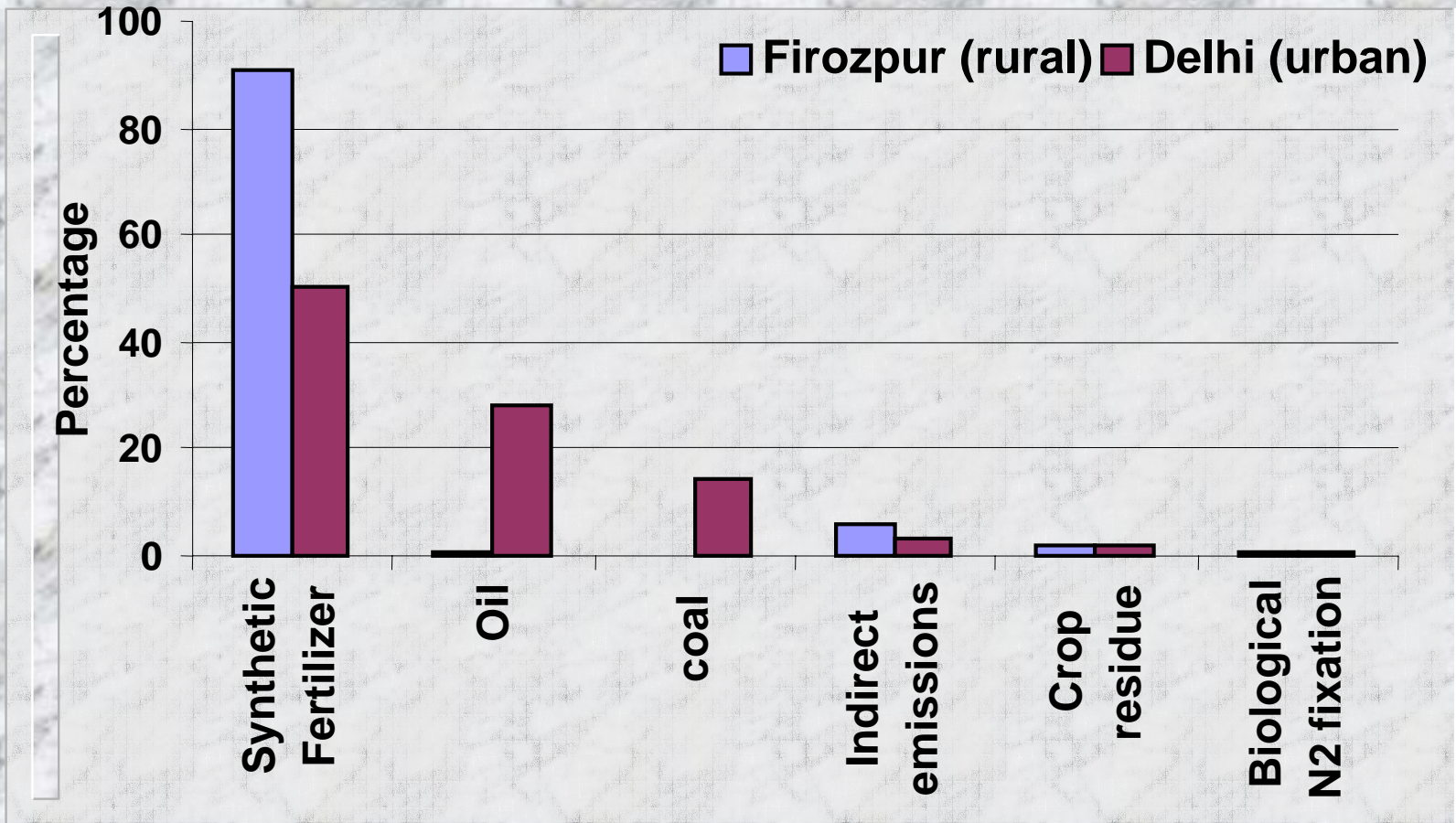
Methane Emissions : Urban - Rural Comparison

Medinipur (Rural)

Delhi (Urban)



N₂O Emissions : Urban - Rural Profiles



Sectoral Shares in Indian Emissions (1995)

<u>Sectors</u>	<u>CO₂</u>	<u>CH₄</u>	<u>N₂O</u>	<u>NO_x</u>	<u>SO₂</u>
Power generation	47	---	4	28	47
Industry	33	---	4	20	37
Transport	15	---	---	32	8
Agriculture	0.4	81	92	19	5
Services/ Residential	4.6	19	---	1	3
Total Emissions (MT)	780	18.3	0.29	3.59	4.66

Emissions from Large Point Sources

Large Point Source Emissions

Sector	Sources	% of All India Emissions	
		Carbon	SO ₂
Electricity (Coal)	81	45.2	45.3
Electricity (Gas)	12	1.7	0
Steel	13	6.2	6.4
Cement	92	8.7	4.7
Fertilizer	31	1.8	5.6

Power Sector Point Source Carbon Emissions

- ❖ Largest 10 sources contribute 40% of power sector and 18% of all India emissions
- ❖ 40 sources contribute 85% (power) & 39% (all India)

