



# **Second National Communication: Emissions from Residential and commercial sector**

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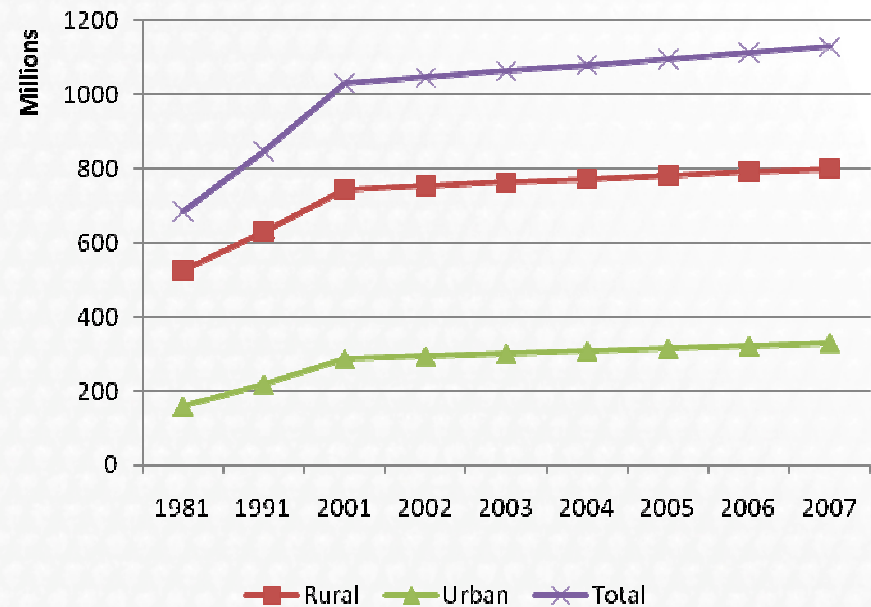


# Overview

## Key features

- Fuel consumption is on a rise in residential and commercial sectors
- Fuels used in residential sector are: biomass based fuels -fuel wood, dung cake, electricity, kerosene and LPG
- Urban lifestyles leading to more energy consuming
- Fuels used in Commercial sector: electricity consumption, petroleum fuels and captive generation
- Overall increase in the carbon emissions over the years

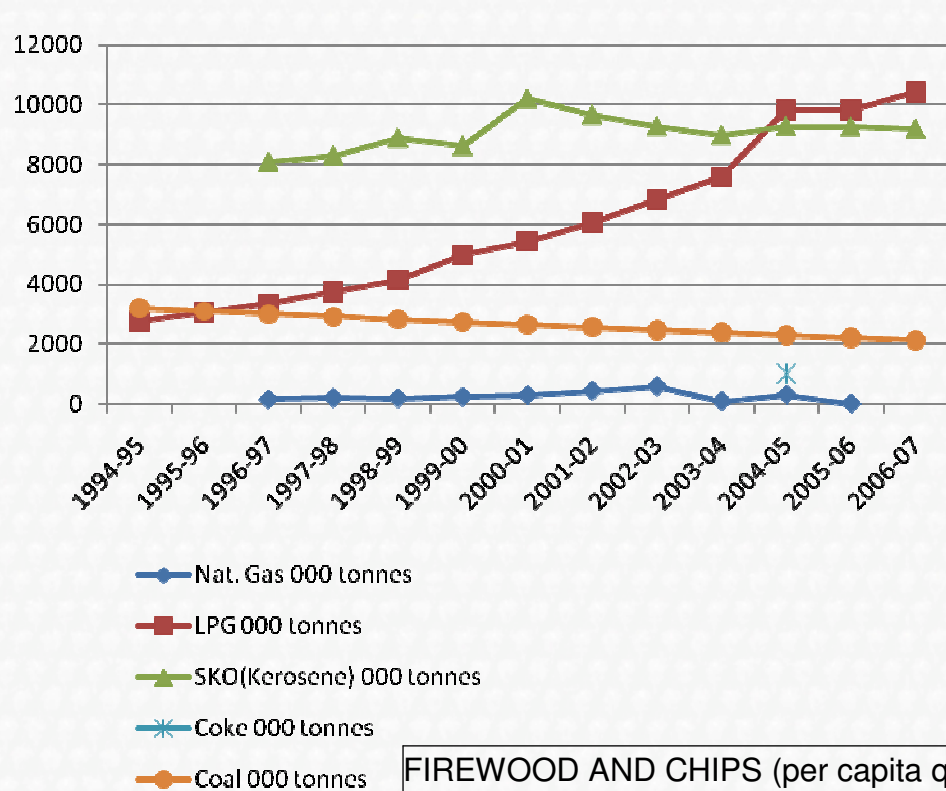
## Key Drivers: Population & Urbanization



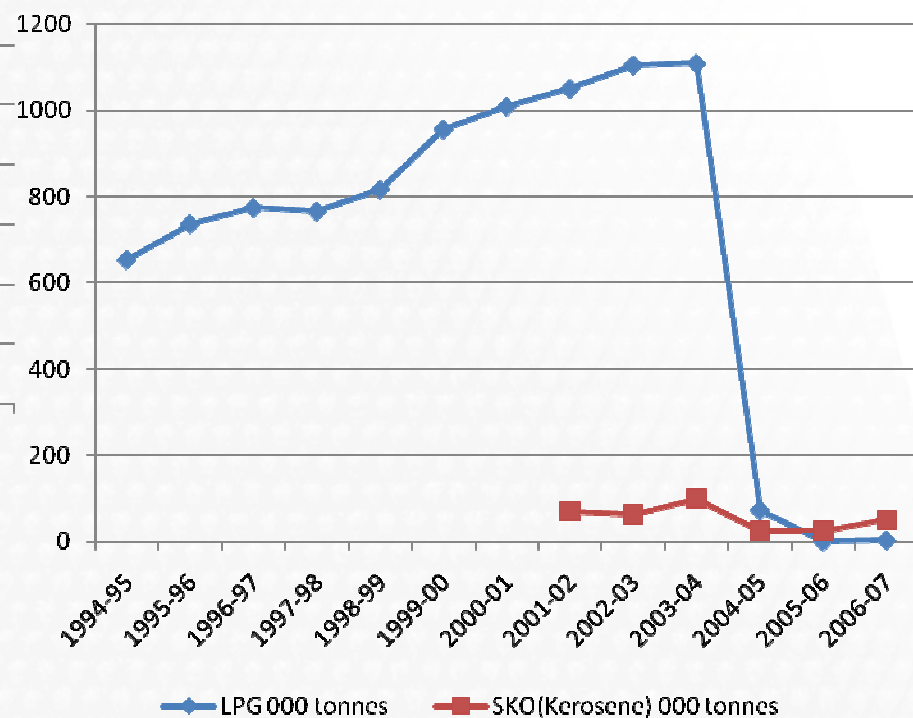
Average rate of urbanization has been ~ 28%

# Trends in fuel consumption

## Residential sector



## Commercial sector



FIREWOOD AND CHIPS (per capita qty consumed in 30 days (kg) Source: NSSO

	Rural	Urban	Total
1993-94	17.27	6.09	23.36
1999-00	17.7	5.34	23.04
2004-05	21.44	6.29	27.73

# Methodology

- **Tier I approach** followed for both the sectors
- Appropriate statistical techniques of interpolation adopted for non time-series data
- *Data sources:* Only published Government data referred
  - MoPNG (various years),
  - NSSO (1993-94, 1999-2000, 2004-05)
  - Census of India data for population,
  - National Commission on Population projections

# Emission Factors considered

<b>Fuels</b>	<b>Conversion factors used (TJ/unit)</b>	<b>Carbon Emission factor (tC/TJ)</b>
Gas/Diesel oil	49.49	20.21
Residual Fuel Oil	42.01	21.11
LPG	52.25	17.21
Naptha	42.01	19.99
Petroleum coke	34	26.59
Coking coal	24.18	25.53
Sub-bituminous coal	19.63	26.13
Lignite	9.69	28.95
coke oven coke	24.18	12.11
Natural gas	38.67	15.3
Jet Kerosene	46.44	19.5
Wood/wood waste	19.12	30.55

## IPCC default emission factors (kg / TJ):

### CH<sub>4</sub>:

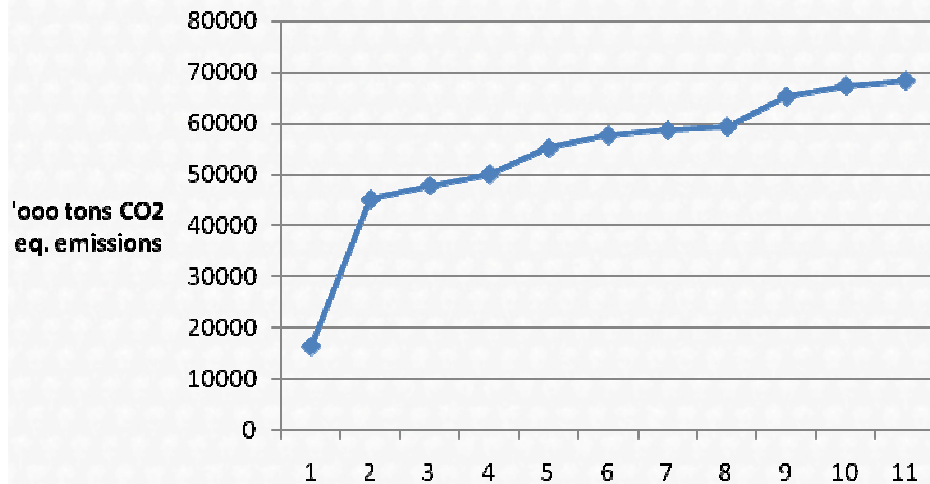
Coal = 300,  
 Natural Gas = 5,  
 Oil = 10,  
 Wood & Biomass = 300,  
 Charcoal = 200

### N<sub>2</sub>O:

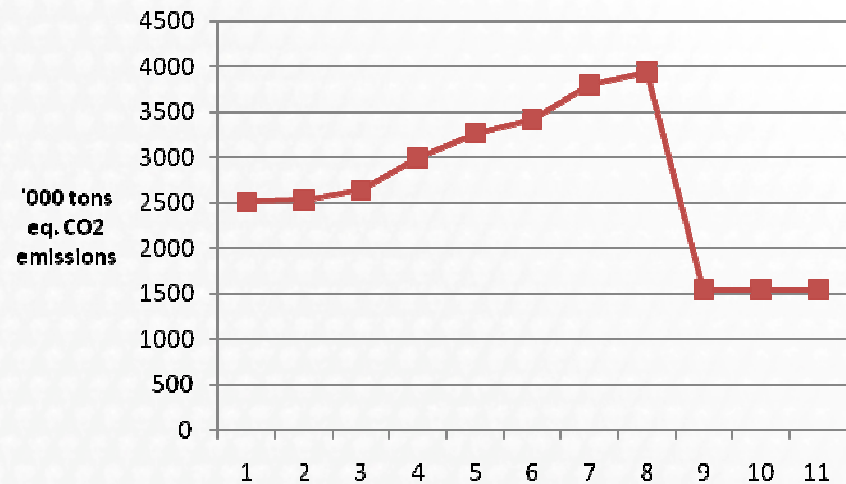
Coal = 1.4,  
 Natural Gas = 5,  
 Oil = 10,  
 Wood & Biomass = 4

# Trends in CO<sub>2</sub> emissions from Residential/Commercial sector

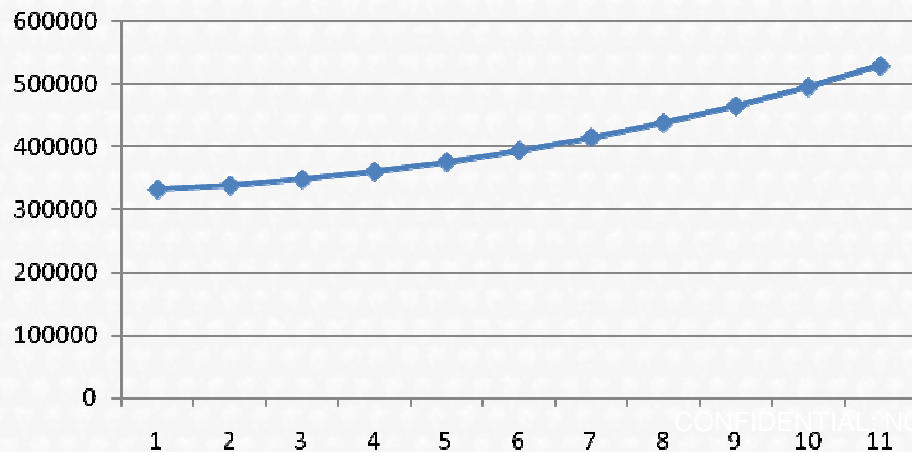
## Residential



## Commercial



## Biomass (Residential)



## Other Emissions for 2007 (Gg)

Total Methane – 2420.07

Nitrous Oxide – 32.62

Over 95% contribution is from biomass



# Challenges & Scope for Improvement

## Residential

- Lack of time-series data for Coal and firewood.
- Kerosene data not available for all the years
- Emissions from the following was not accounted due to lack of data:
  - Captive power generation by Gensets
  - Dung cake a major source of energy for cooking

## Commercial

- Emissions from the following was not accounted
  - Captive power generation
  - By - products (gas) from effluent treatment plants
  - Use of fuels other than (LPG, SKO) Ex: Biomass

OVERALL THE ACTUAL CO<sub>2</sub> EMISSIONS ARE EXPECTED TO BE HIGHER THAN THE CURRENT ESTIMATES

**Thank you**

CONFIDENTIAL: NOT TO BE QUOTED

