Environmental Impacts of Mega Economies - India

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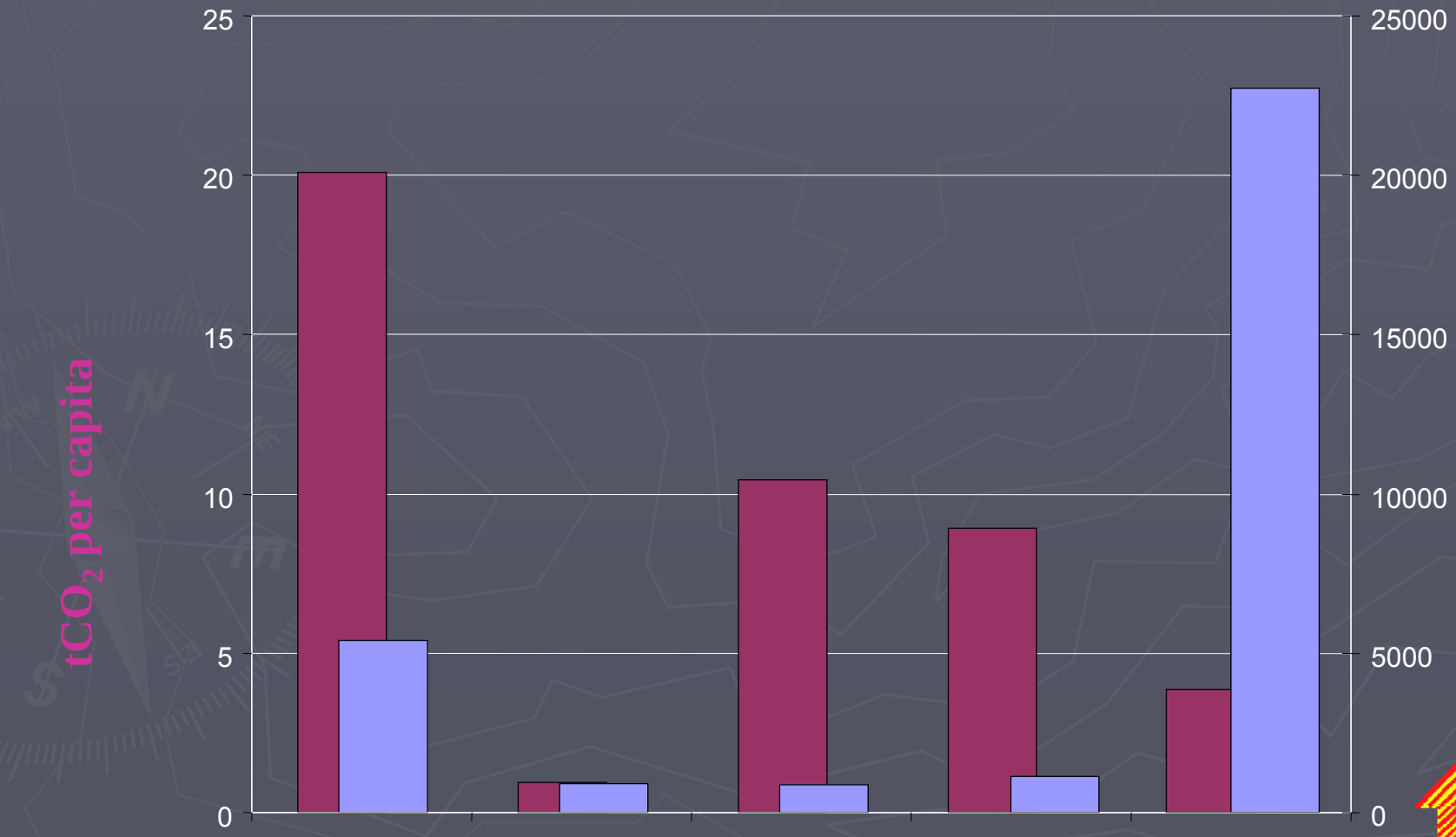
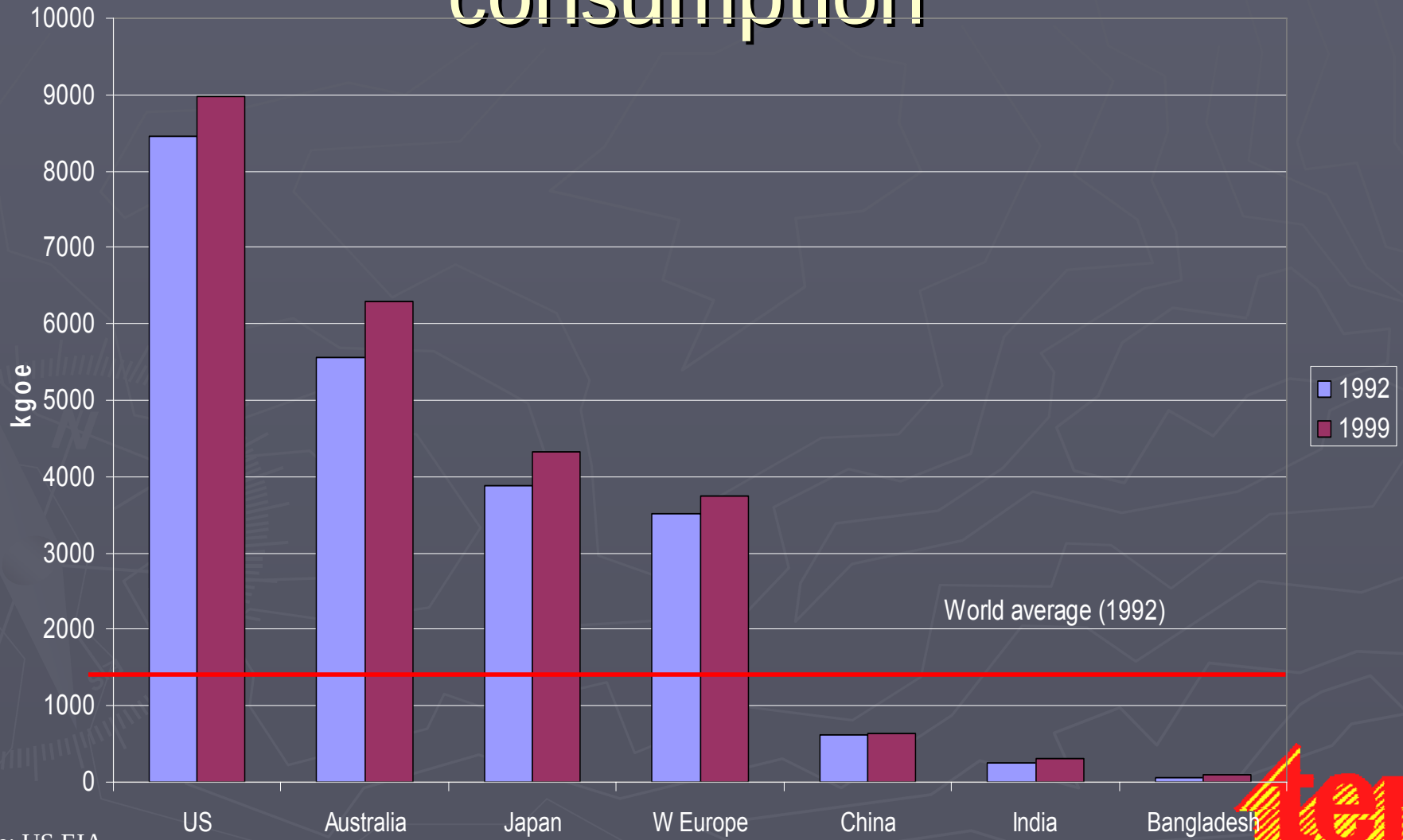
CO_2 emissions from fuel combustion



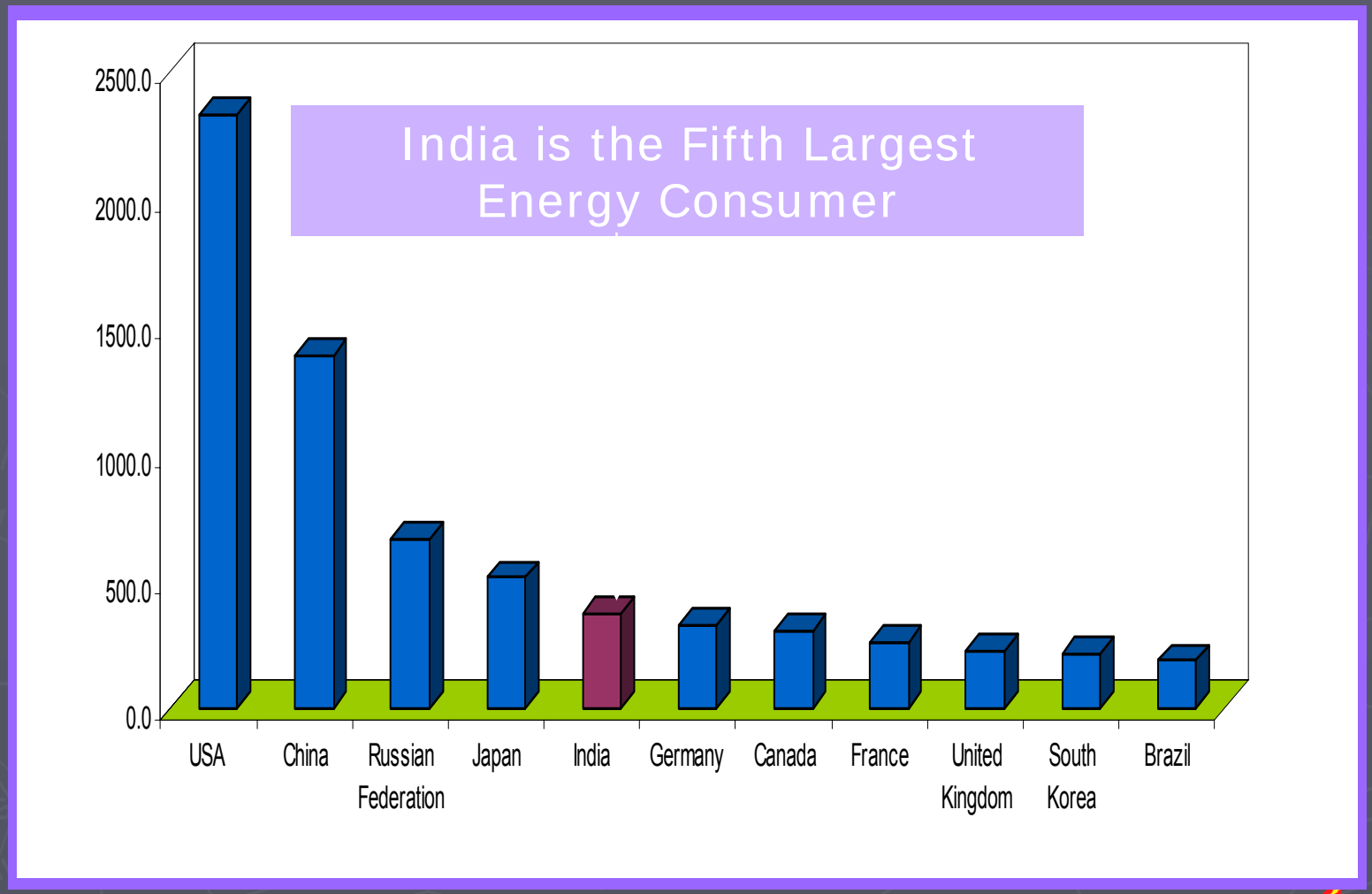
Source: IEA (1999)

Per capita primary energy consumption



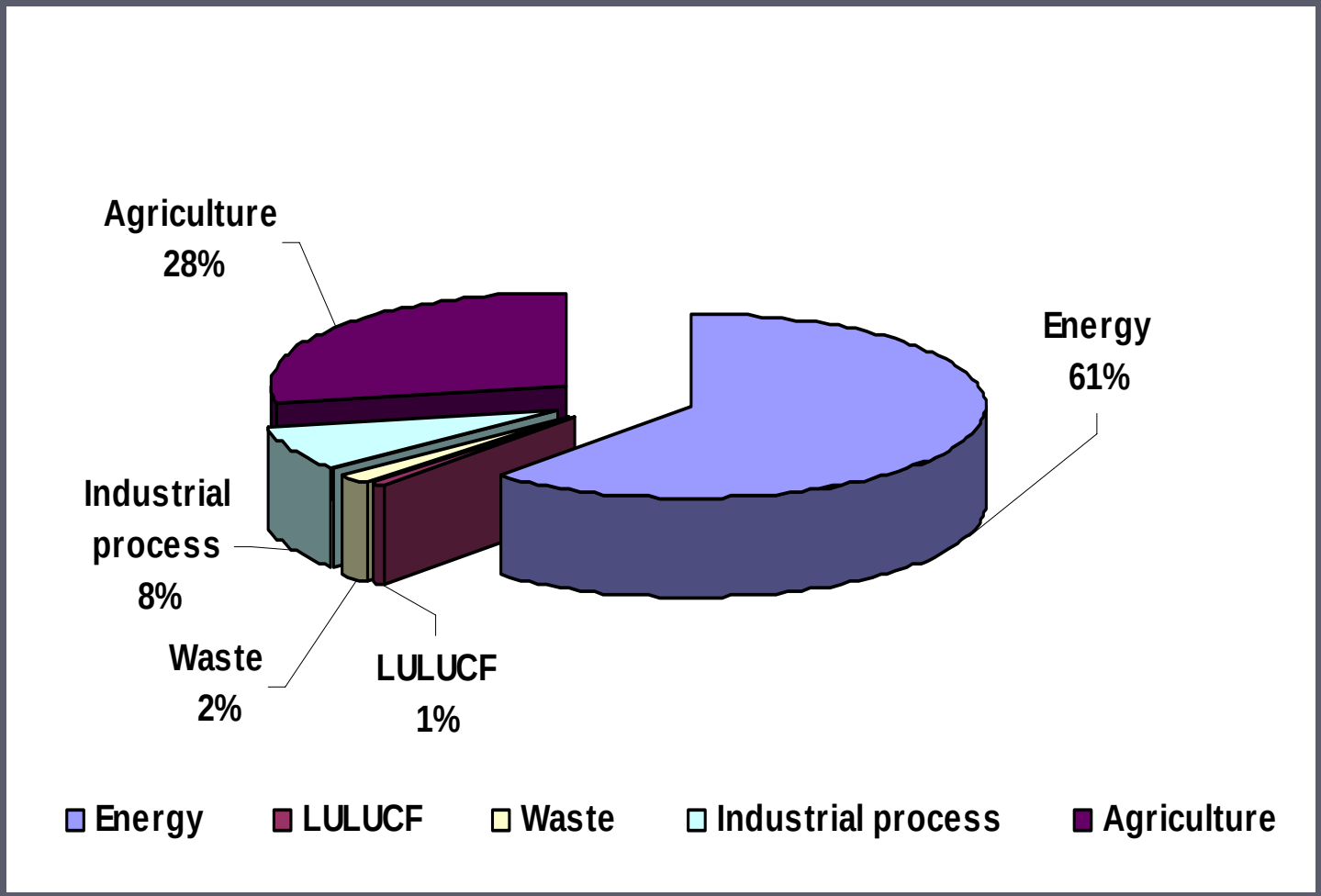
Source: US EIA

Energy Demand



Source: BP Stats 2005

Sectoral Contribution to Total GHG Emissions in India



In the 13 years...

since the climate debate started in earnest, India has experienced :

- an average annual economic growth of 5.7% (1992 to 2004 (A))
- a declining population growth from 2.16 % in 80s to 1.95 % in 90s
- economic reforms
- greater private participation in development
- greater environmental initiatives

Emphasis of development on...

- Enhanced private participation in infrastructure sectors
  - New efficient capital stock
  - Competitive efficiencies
- Efficiency improvements
  - T&D
  - Energy Conservation Act
  - Restructuring/corporatisation of PSUs

Emphasis of development on...

- Financial viability – price rationalisation
  - Import parity pricing
  - Pricing based on cost-to-serve
- Sustainable development paths
  - ensuring access/ availability
  - local environmental concerns
- Shift from manufacturing to services
  - However, basic industrial growth a must

Incidental factors...

That have contributed to economic well-being include

- Weakening US $
- Good monsoons
- Trade liberalisation

As a result...

- The share of hydroelectricity and nuclear in the total energy mix has increased from 4 (1993) to 6% (2003)
- Energy intensity has decreased from 28 kgoe/‘000’Re (1992) to 25 kgoe/‘000’Re of GDP (2002)

Current initiatives

- Rural energisation => development
  - Decentralised/distributed generation
  - Biofuels
- Integrated energy policy
  - Resource efficiency
- Mass/public transport solutions
  - Railway reforms
  - Efficient public transport in Delhi

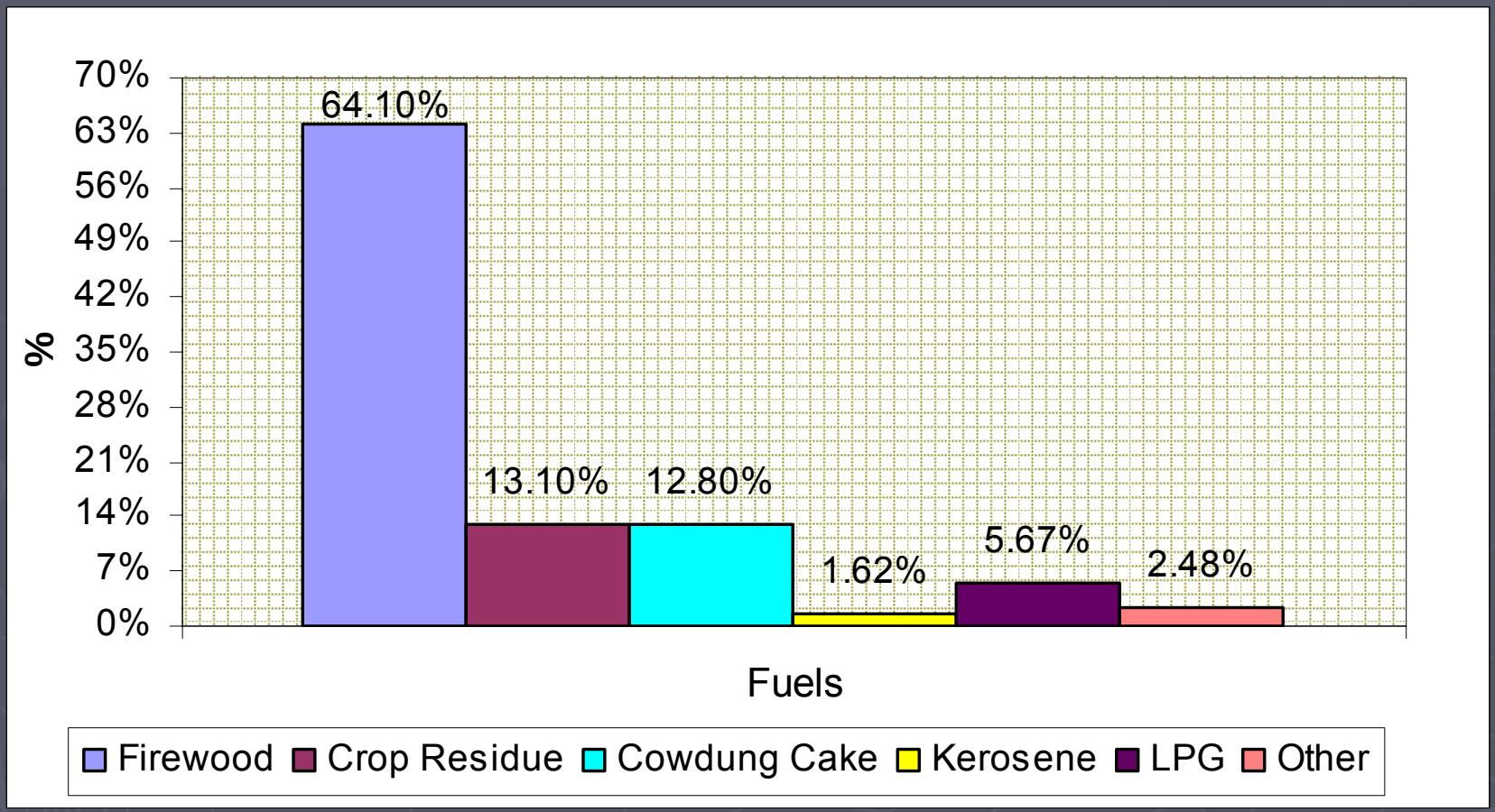
Current initiatives

- Contract farming/water harvesting
  - Efficiency in agriculture
  - Reduced water pumping
- Aforestation/ reforestation measures
  - JFM programme
- WTO pressures
  - Competitive efficencies

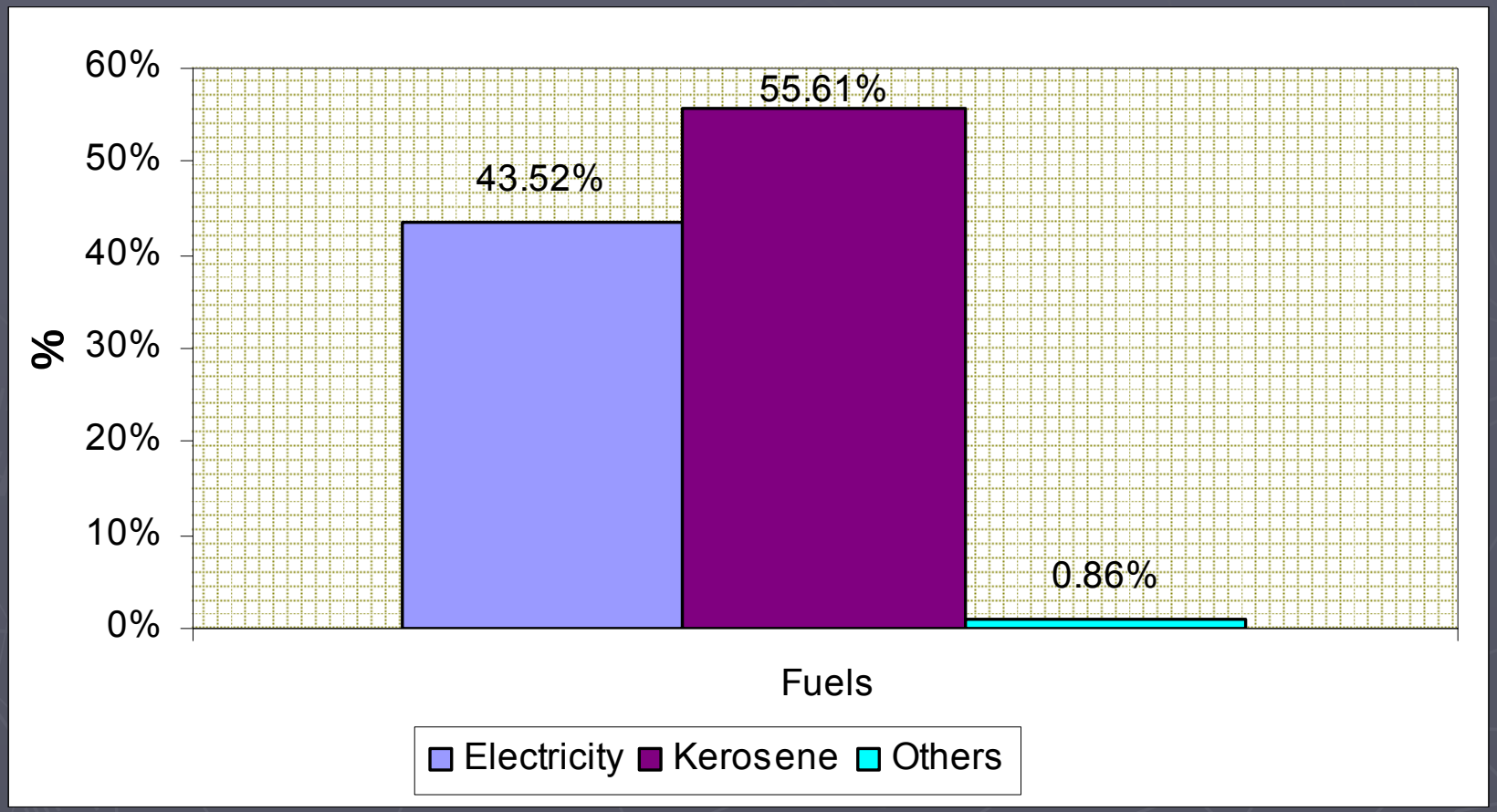
In short, India has taken several measures that have a GHG mitigative impact

Development challenges, however, remain ...

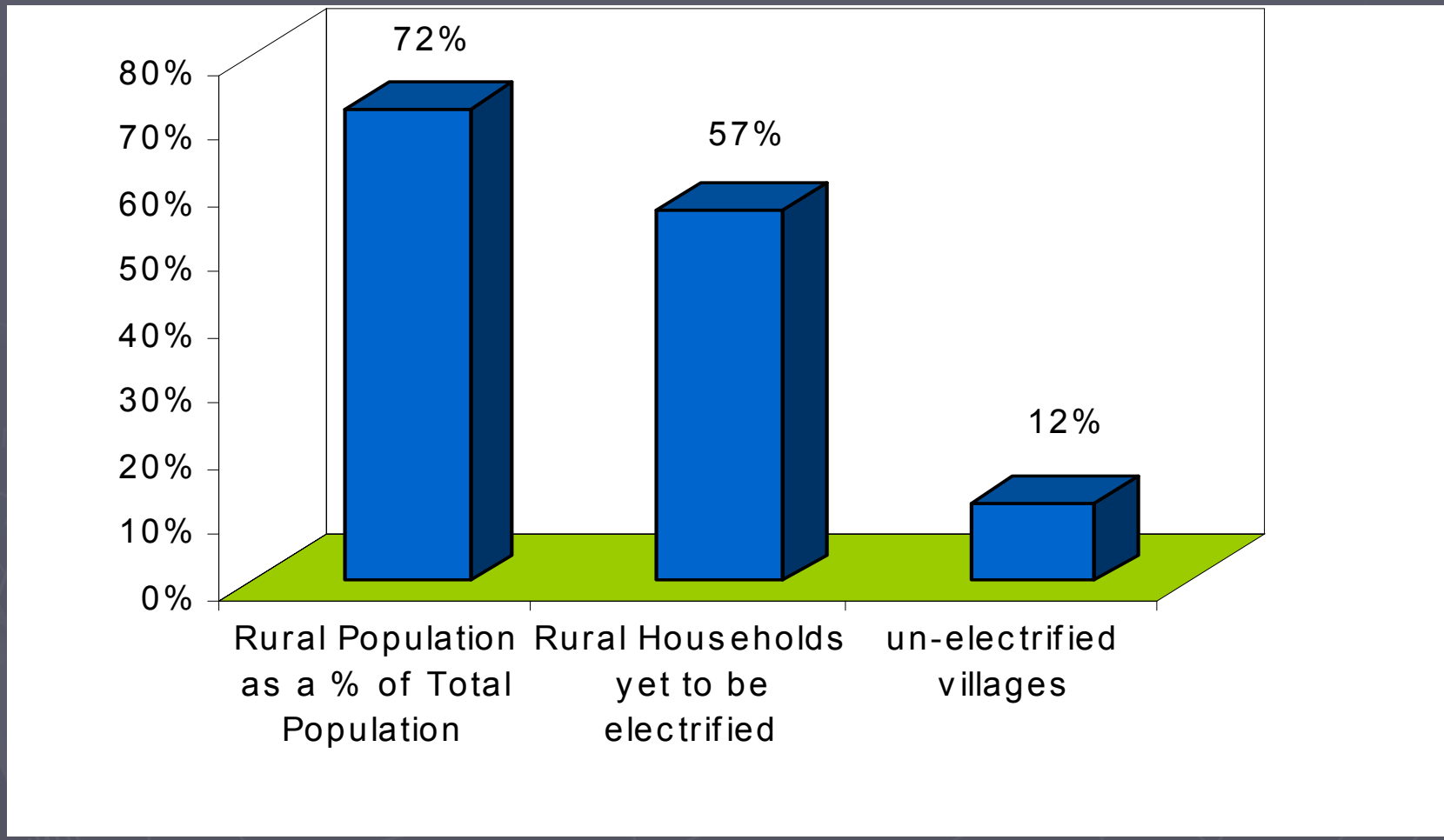
Share of Primary Fuels - Cooking



Share of Primary Fuels - Lighting

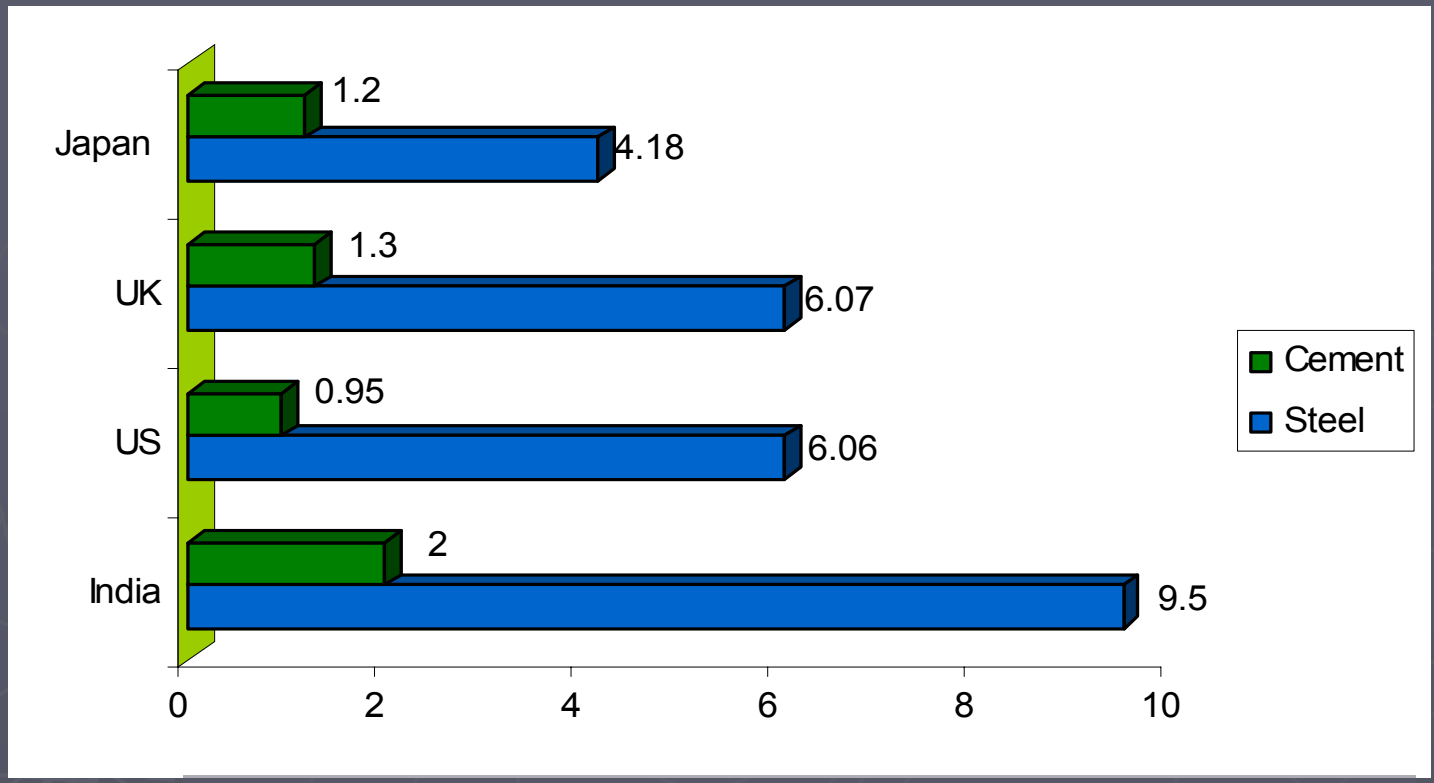


Rural Electricity Access



Source: Ministry of Power 2005

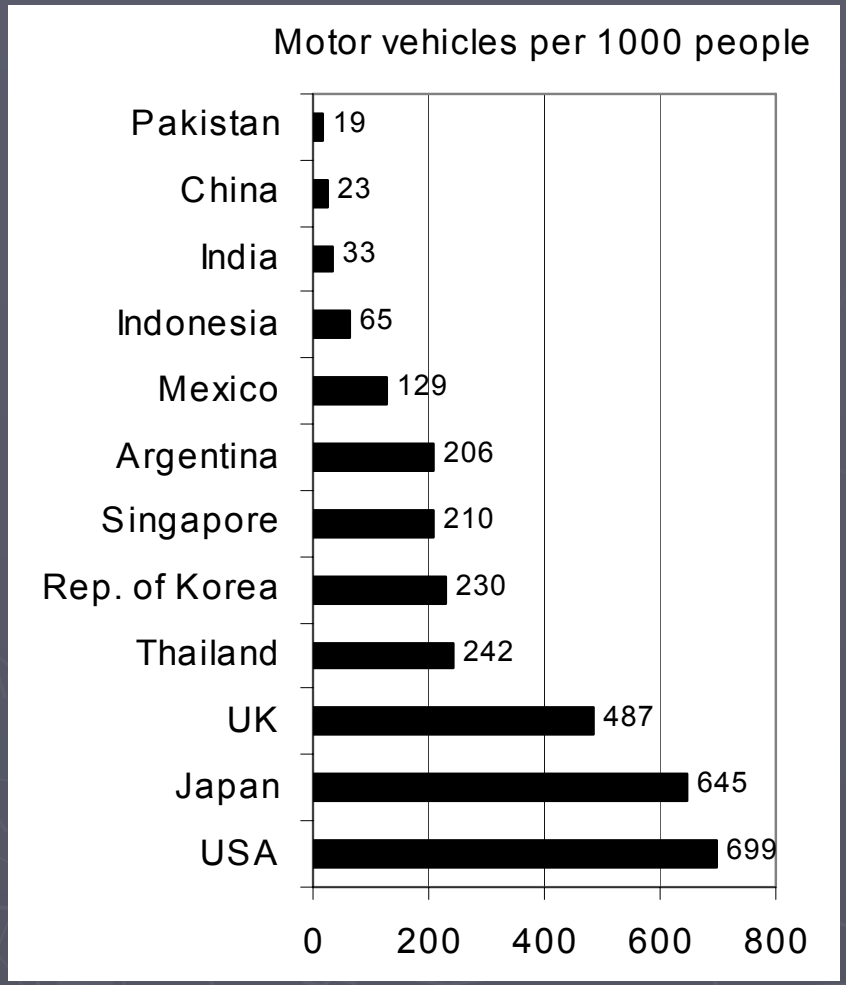
Energy Intensity

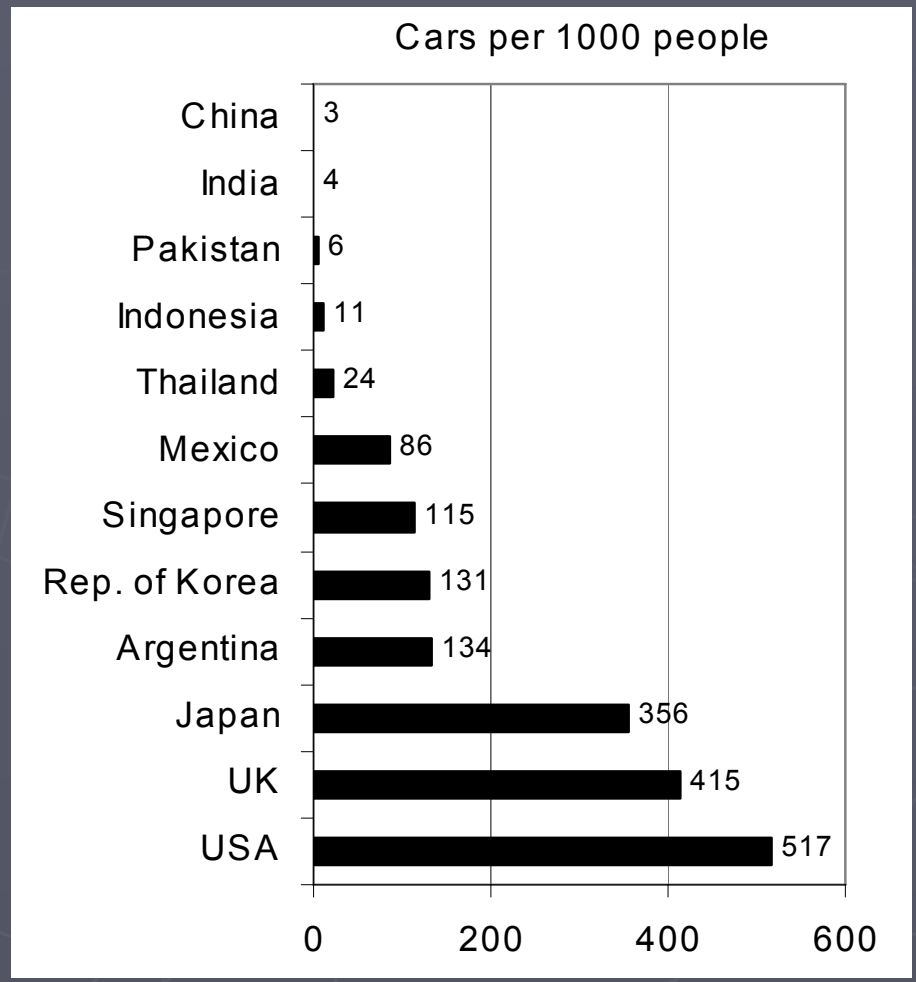


India's energy intensity per unit of GDP

- 3.7 times of Japan
- 1.4 times of Asia
- 1.5 times of USA

Compiled by TERI





Ownership of vehicles per 1000 people, 1995

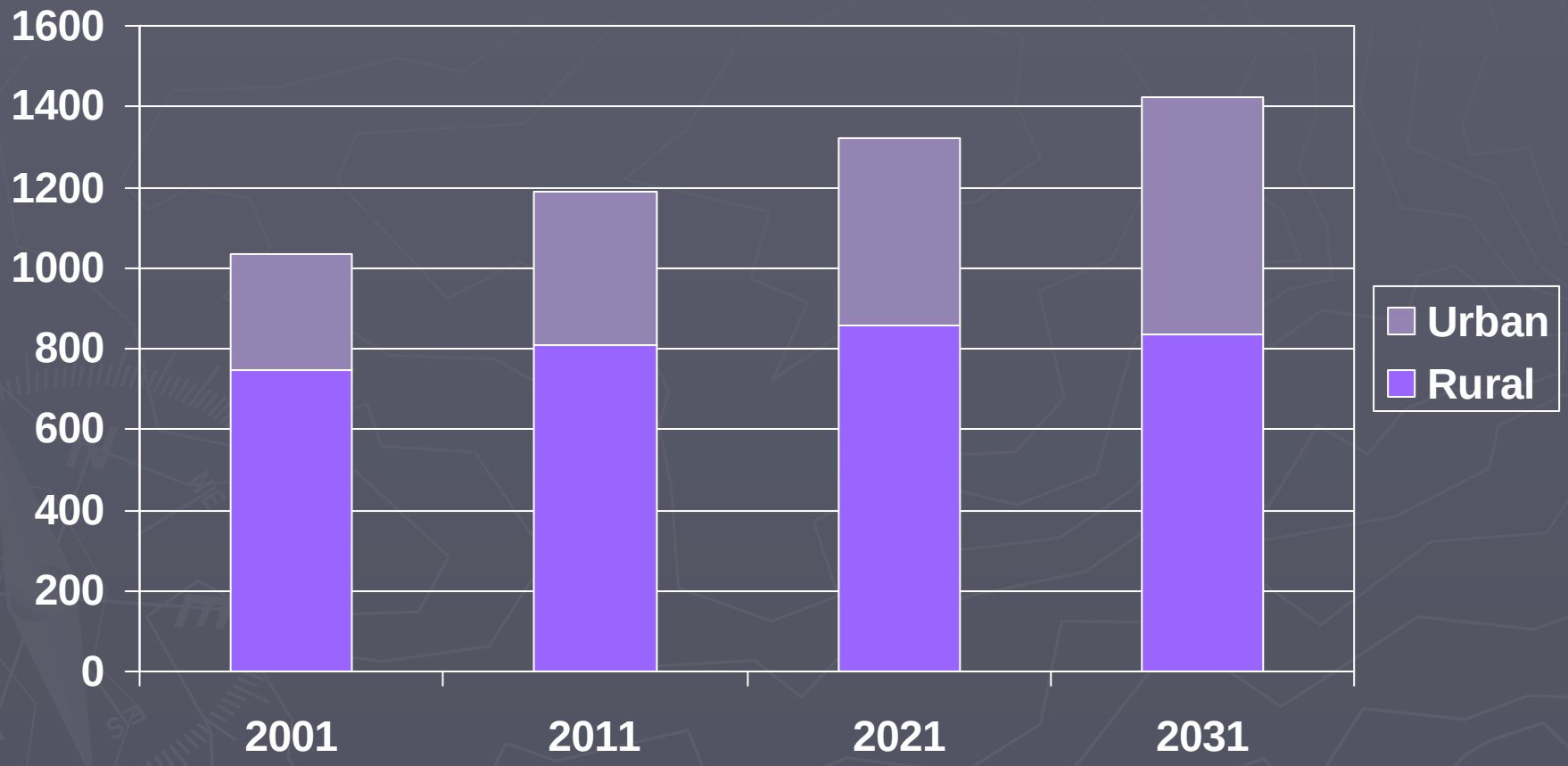
Source: AAMA,1998; HONDA, 1006; ORNL, 1997

India and Adaptation

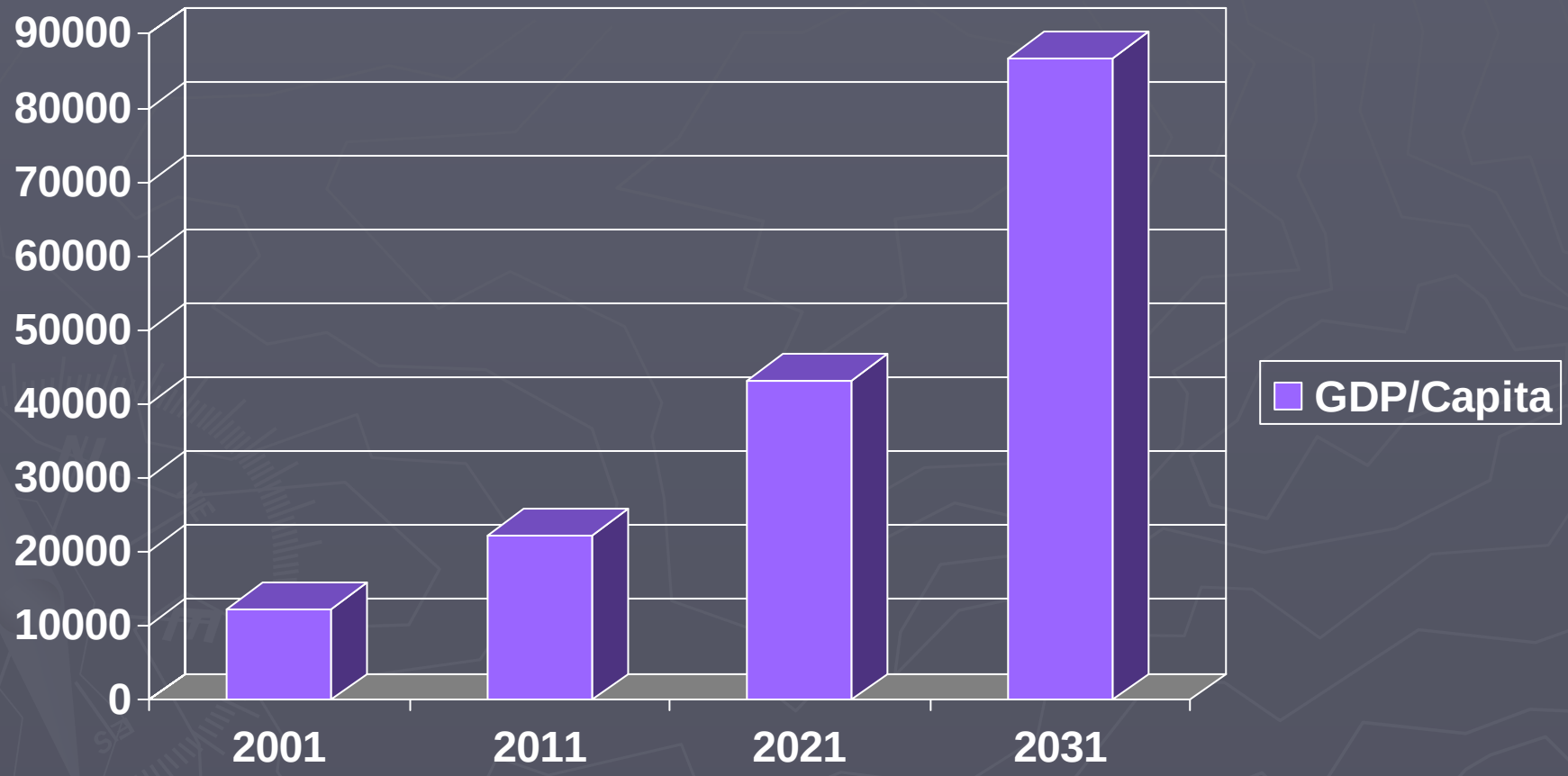
- **Initial National Communication**: Its large population depends on climate sensitive sectors like agriculture and forestry. Any adverse impact on water availability due to recession of glaciers, decrease in rainfall and increased flooding in certain pockets would threaten food security, cause die back of natural ecosystems including species that sustain the livelihoods of rural households, and adversely impact the coastal system due to sea level rise and increased frequency of extreme events. Apart from these, achievement of vital national development goals related to other systems such as habitats, health, energy demand and infrastructure investments would be adversely affected.

Future challenges....

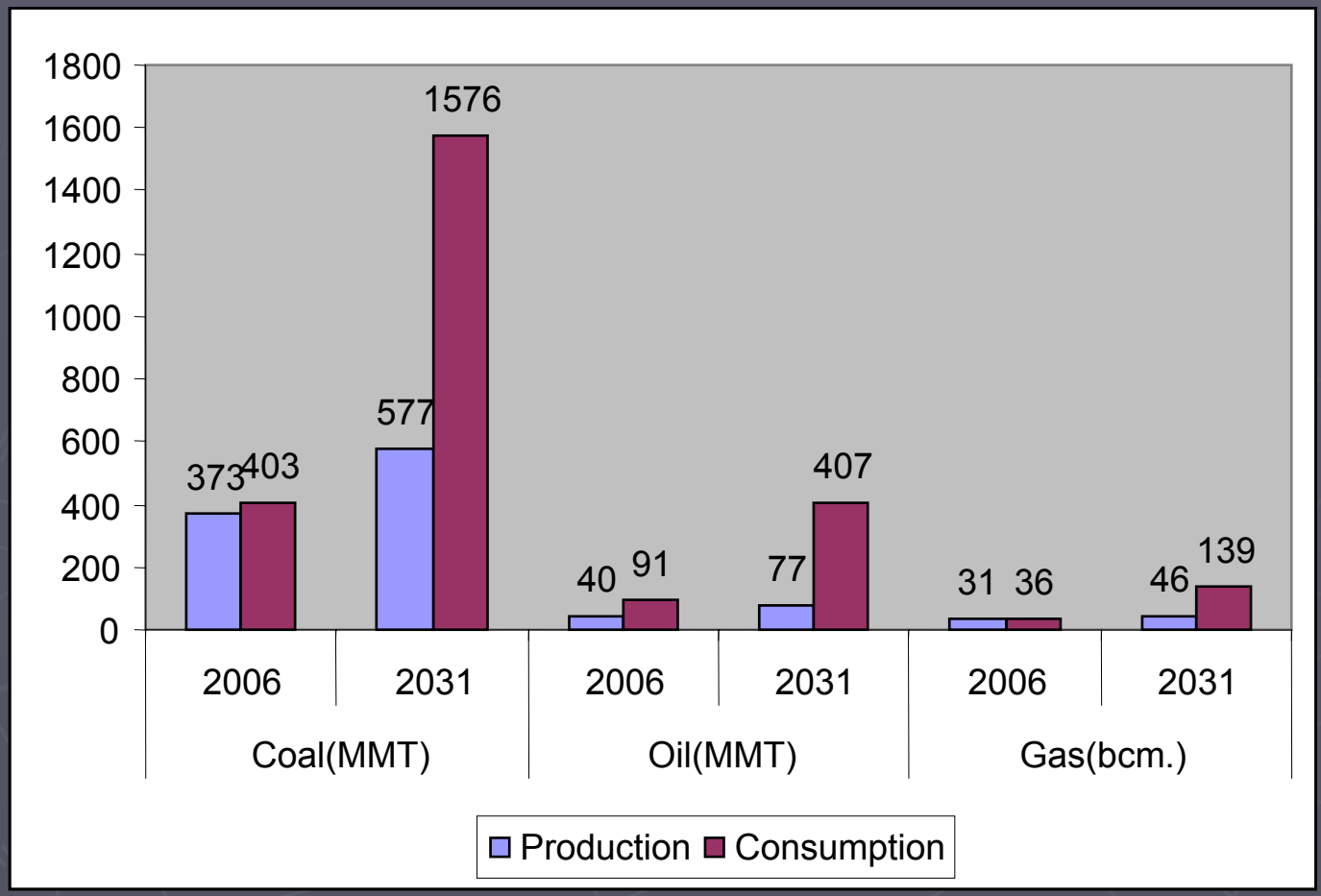
Population Growth



Per Capita GDP Growth



Burgeoning demand...but limited resource availability

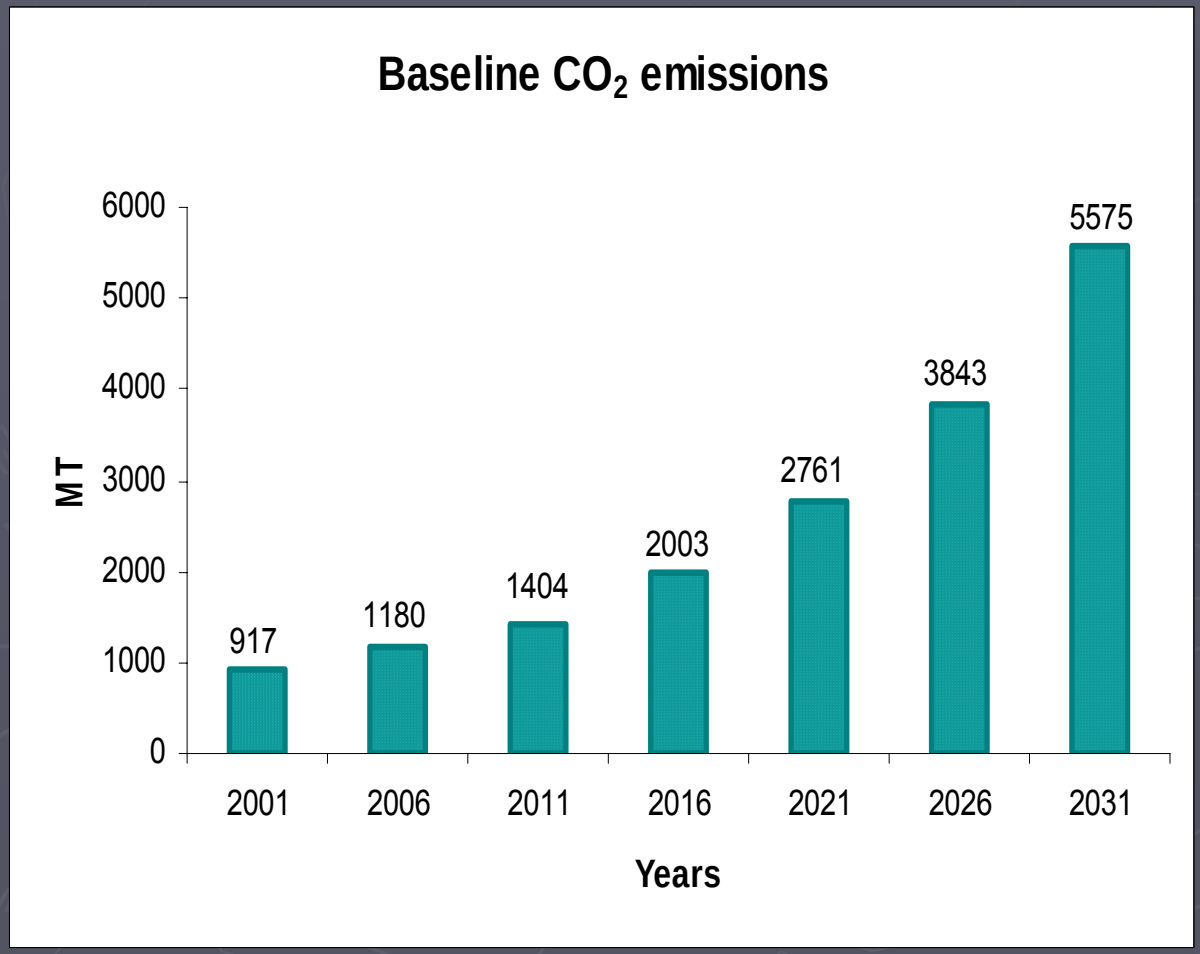


Source: TERI estimates 2005

Electricity requirements and generation mix

- Requirement to increase by around 6 times between 2001-2031
- Coal based generation to continue to play dominant role
- Challenges
  - Constraints on domestic coal availability
  - Whether to import LNG or coal??
  - Village electrification: renewables or conventional??

CO_2 emissions in India



CO_2 emission (2002) India 1017 (million tonnes), World (24102), China (3307) USA (5652)

CO_2 emissions/capita (2002): India 0.97 (tonnes), World (3.89), China (2.57), USA (19.65)

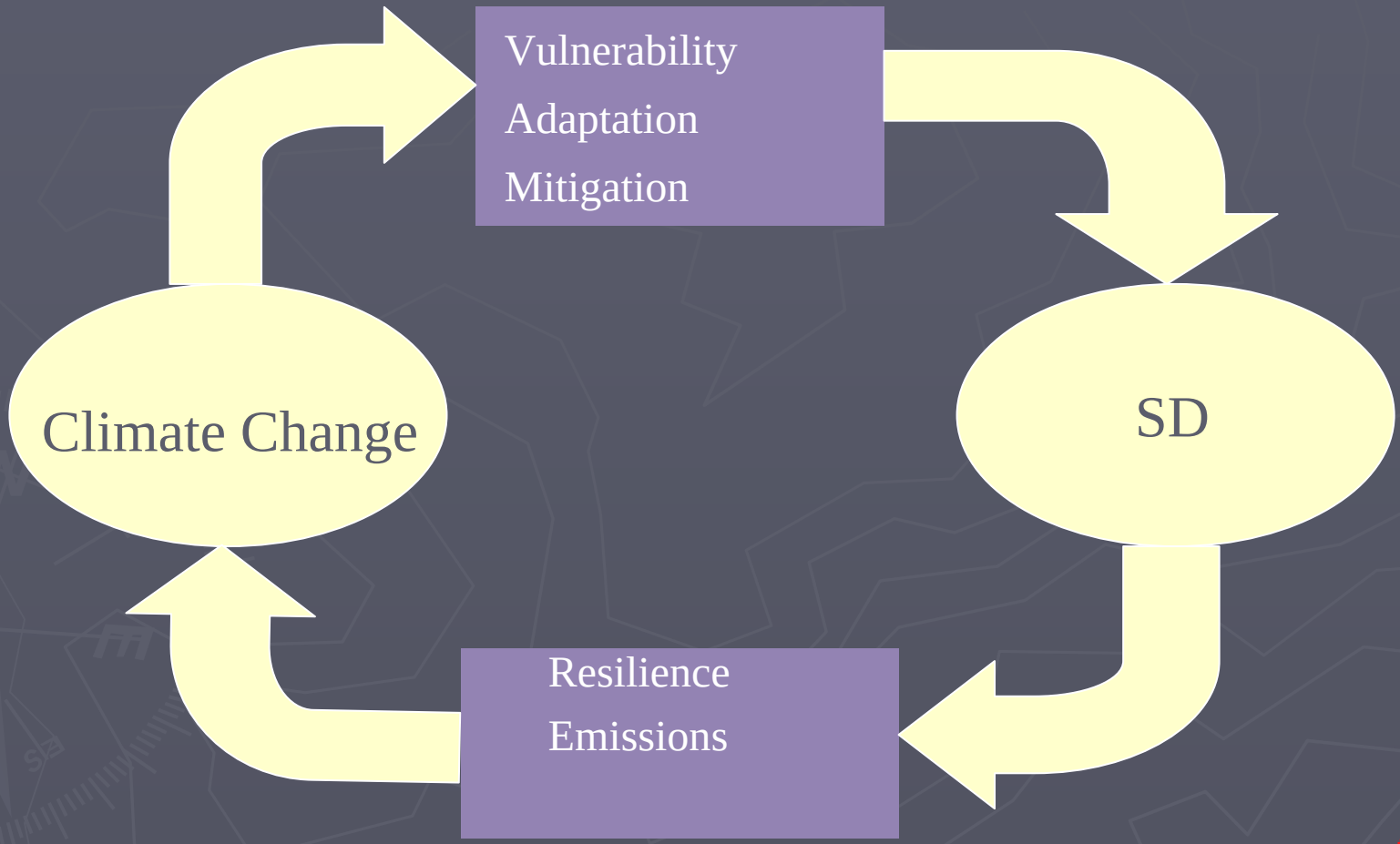
Source: (IEA, Statistics, CO_2 emissions from Fuel Combustion 1997-2002, 2004)

In 2031, India's emissions per capita at 3.9 t CO_2

Energy for Sustainable Development

- Goldemberg et al.'s 1 KW translates to 0.75 toe/capita/year
- India's energy consumption in 2020 would be approaching this and reach 1.5 toe in 2030
- US today is at ~ 8 toe while the world average is at ~ 2 toe

Cyclical relationship



Geographical distribution of impacts

DCs more vulnerable to climate change

- dependence on climate-sensitive sectors
- additional stress
- low technical, financial, and institutional coping capacity

Aggregate monetary damage for 2 x CO_2 (annual damages as % of GDP)

- OECD countries 1-2%
- Developing countries 2-9%
- World 1.5-2%

A new climate regime must

- Mandate emission reduction commitments by developed countries only
- Ensure full participation so as not to distort markets
  - Revenue loss on account of US non-participation equals revenue requirements under MDGs (CDM)
- Encourage FDI in climate friendly projects (eg. transport)
- Commit levels of funding towards the various funds established
- Re-inforce the need for SD for developing countries
- Articulate accession rules
- Strict mechanism for enforcement and compliance

A new climate regime must

- Give shape to the words linking CC and SD
- Commit to further SD in developing countries