



# India's Energy Sector



All countries have their development challenges – but the magnitude differs enormously

- Population: 1.1 Billion
- 5th in primary energy consumption
  - 438 mtoe: commercial; 139 mtoe: traditional sources in 2001
- 72% rural population
  - Largely depending on traditional fuels
  - Likely to shift to commercial fuels with improved access & better lifestyles
- Low per capita commercial energy use
- ~35% Below Poverty Line (\$1/day, 2000 PPP)



# Challenges ...

## ➤ **Population growth.**

Second most populous country in the world with about a billion people; Home for 1/6th of humanity.

**Expected to stabilise at ~ 1.6 billion by 2060 or so.**



# Challenges ...

## ➤ **Poverty.**

26 % of population below poverty line.

- The challenge remains of not only poverty alleviation but also of generating nearly 200 million new jobs in the next two decades.

## ➤ **Poverty eradication by 2015.**



# Challenges ...

## ➤ **Health for all.**

- ☐ Life expectancy has risen from 33 years to 64 years.
- ☐ Infant mortality rate (IMR) has fallen from 148 to 71 per 1000.

However, long way to go ....

## ➤ **20% of burden of disease due to environmental health factors.**



# Challenges ...

## Provision of basic services.

- Access to water and sanitation facilities.
  - Water shortage a serious and recurring concern with ever-widening of the demand-supply gap.
  - Rural habitations remain without any identified source of safe drinking water.
  - Groundwater tables are not only depleting but also declining in quality .
  - Only 70 % of the people in urban areas have access to basic sanitation services.



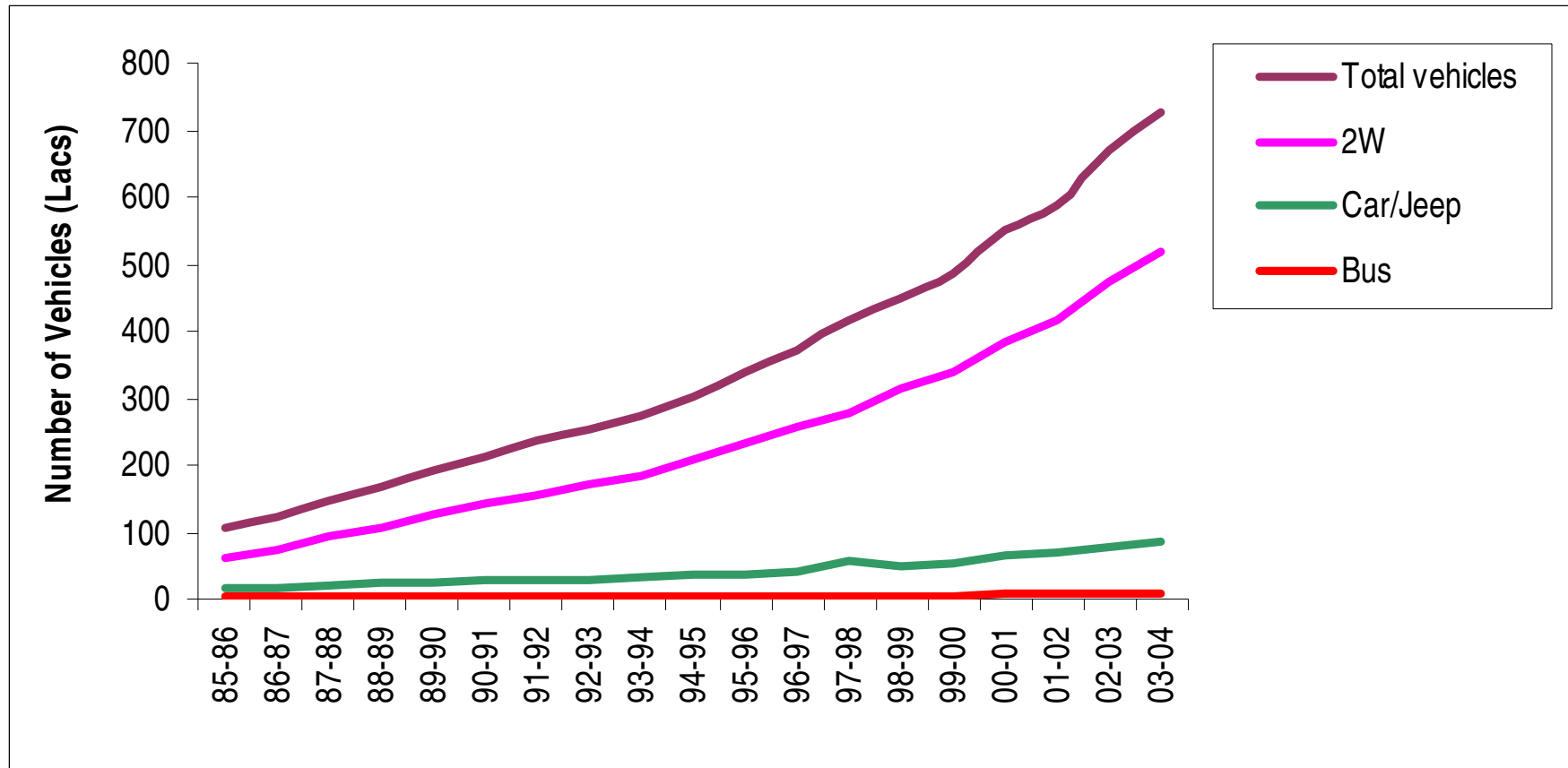
# Challenges ...

## ➤ Transport

- Road transport is the most dominant mode of transport. Over 80% of passengers and 60% of freight are moved by road
- Increasing dependence on personal modes of transport which are highly energy intensive

## ➤ National Highway Development Programme

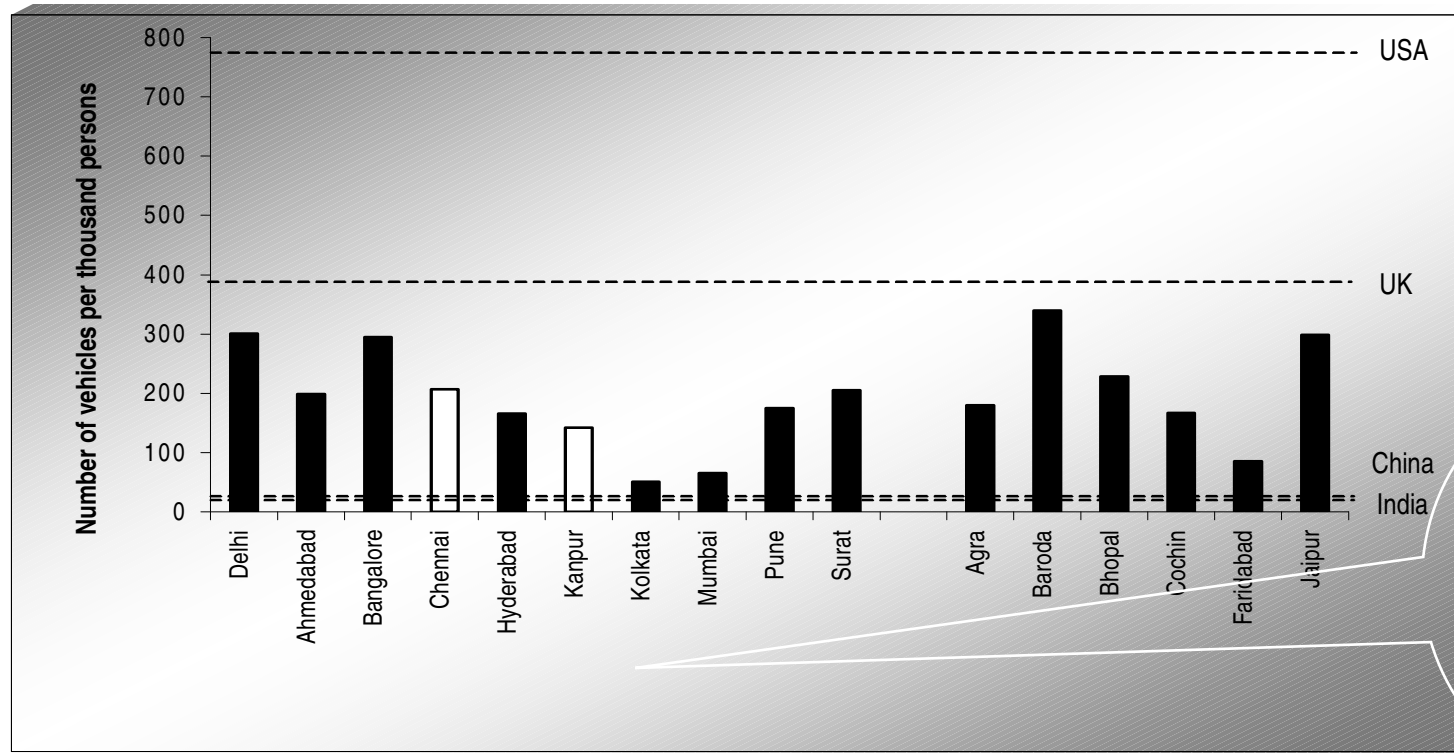
# Concerns - Vehicular growth in India



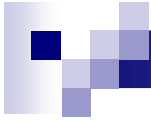


# Lack of public transport infrastructure

- ❑ Metros started in few cities
- ❑ Buses are just 1% of the total vehicular fleet
- ❑ Inconvenience in public transport leading to more private vehicle ownership in most of the cities

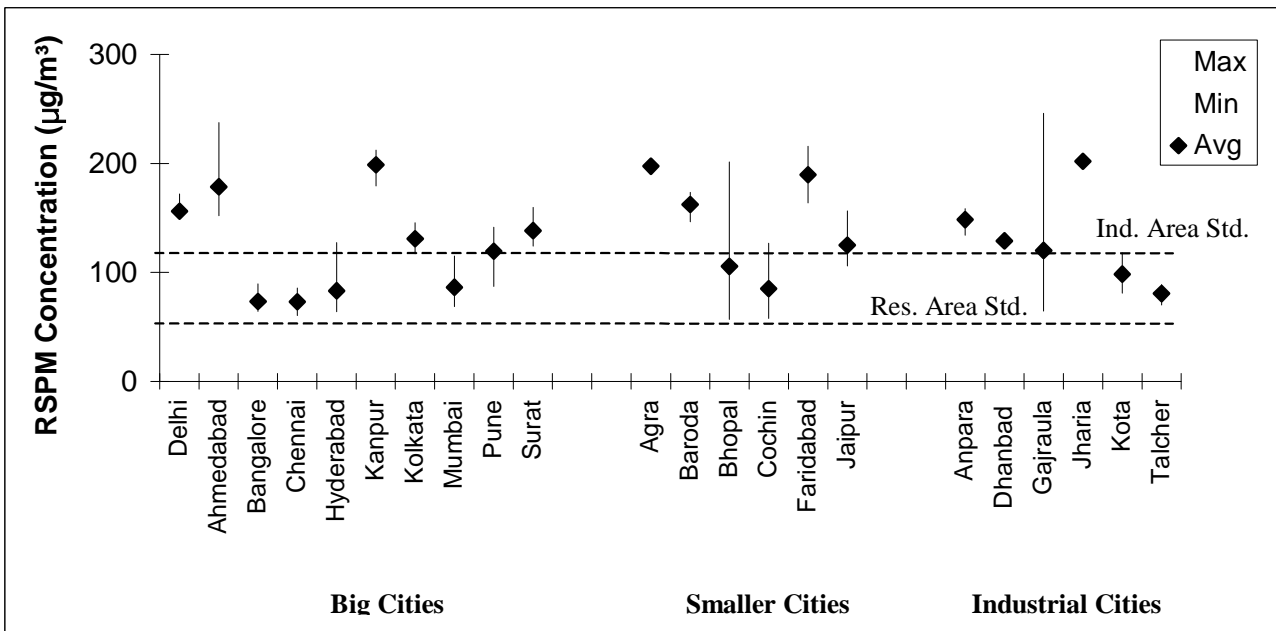
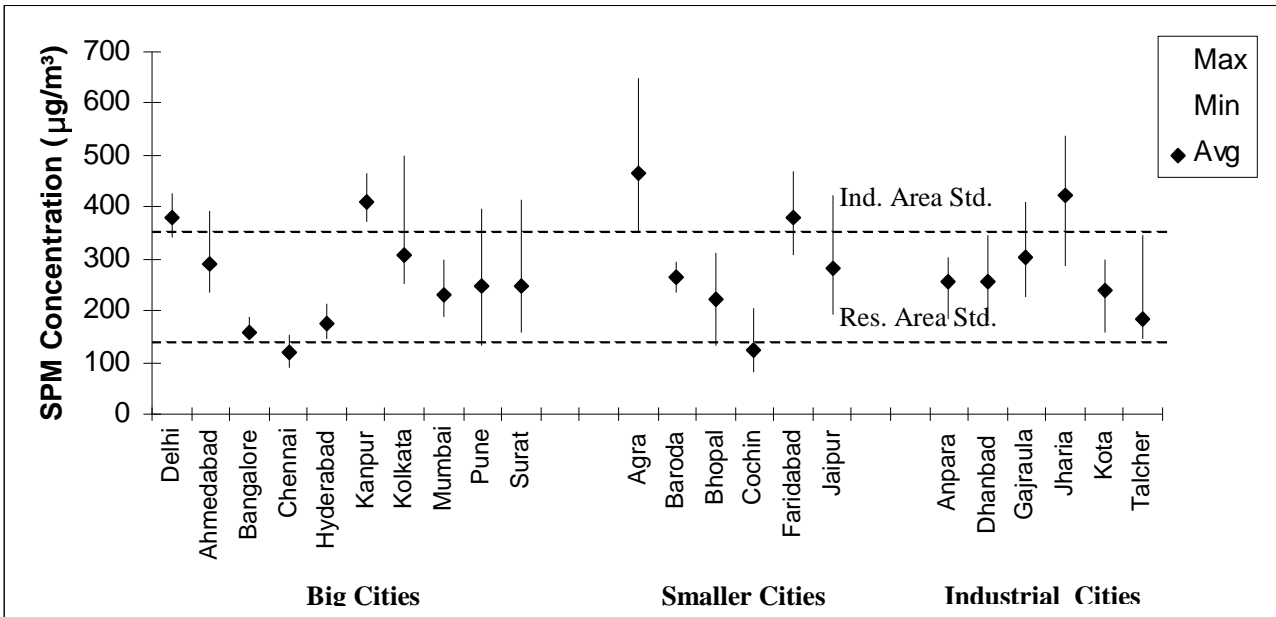


Low  
vehicles/person  
in Mumbai,  
Kolkata having  
better public



# Air Pollution

- Despite various interventions, air quality still a concern not only in big cities but also smaller cities
  - 84% of population exposed to poor/bad/dangerous air quality in 2004
  - Particulate matter (SPM/PM10) still remains the major pollutant of concern



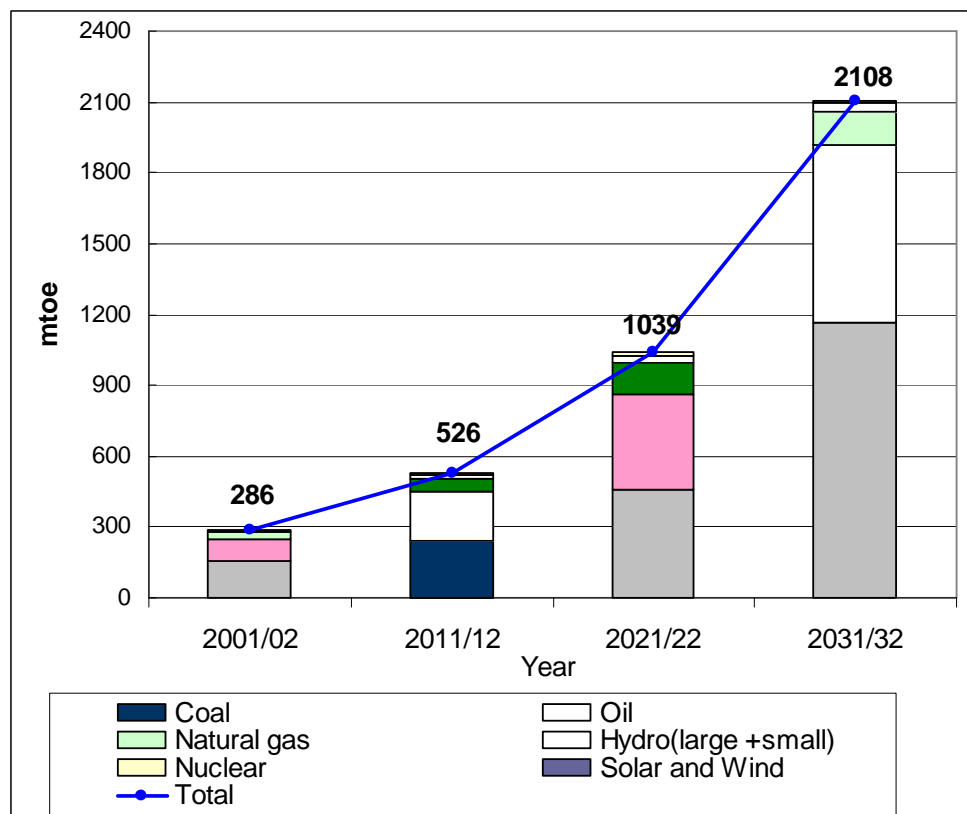
SPM/  
RSPM  
1995-  
2004



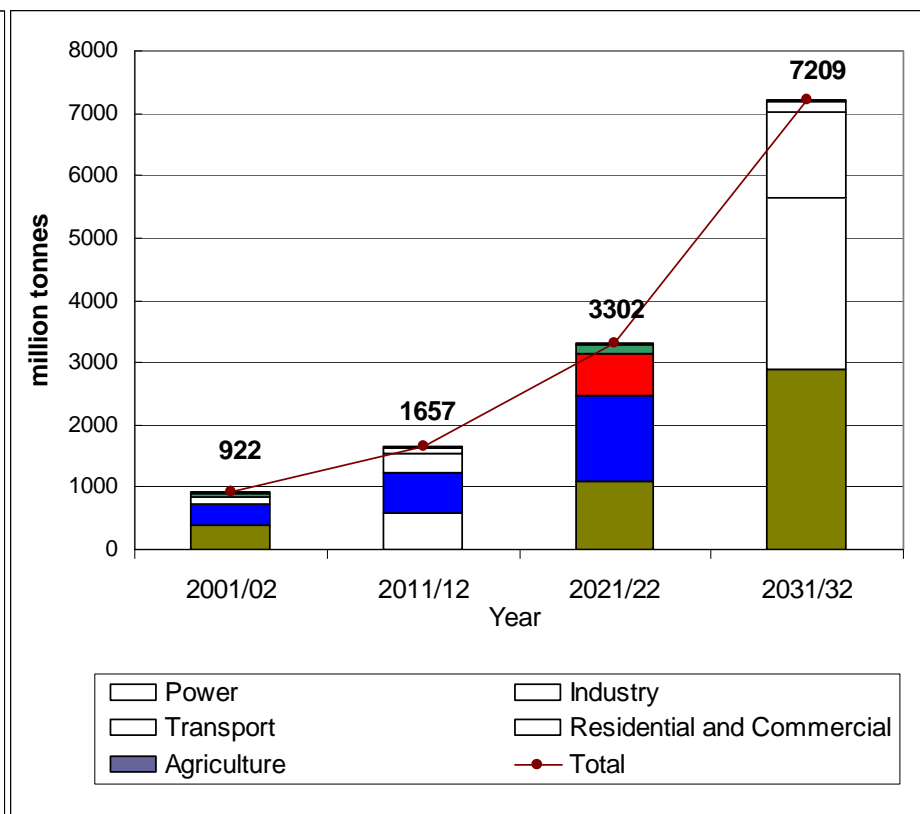
# The Macro Picture As The World Sees It....



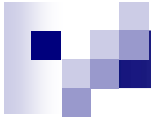
## Commercial Energy Supply in India



## CO<sub>2</sub> Emissions from Energy Use



Source: TERI estimates, (2006)



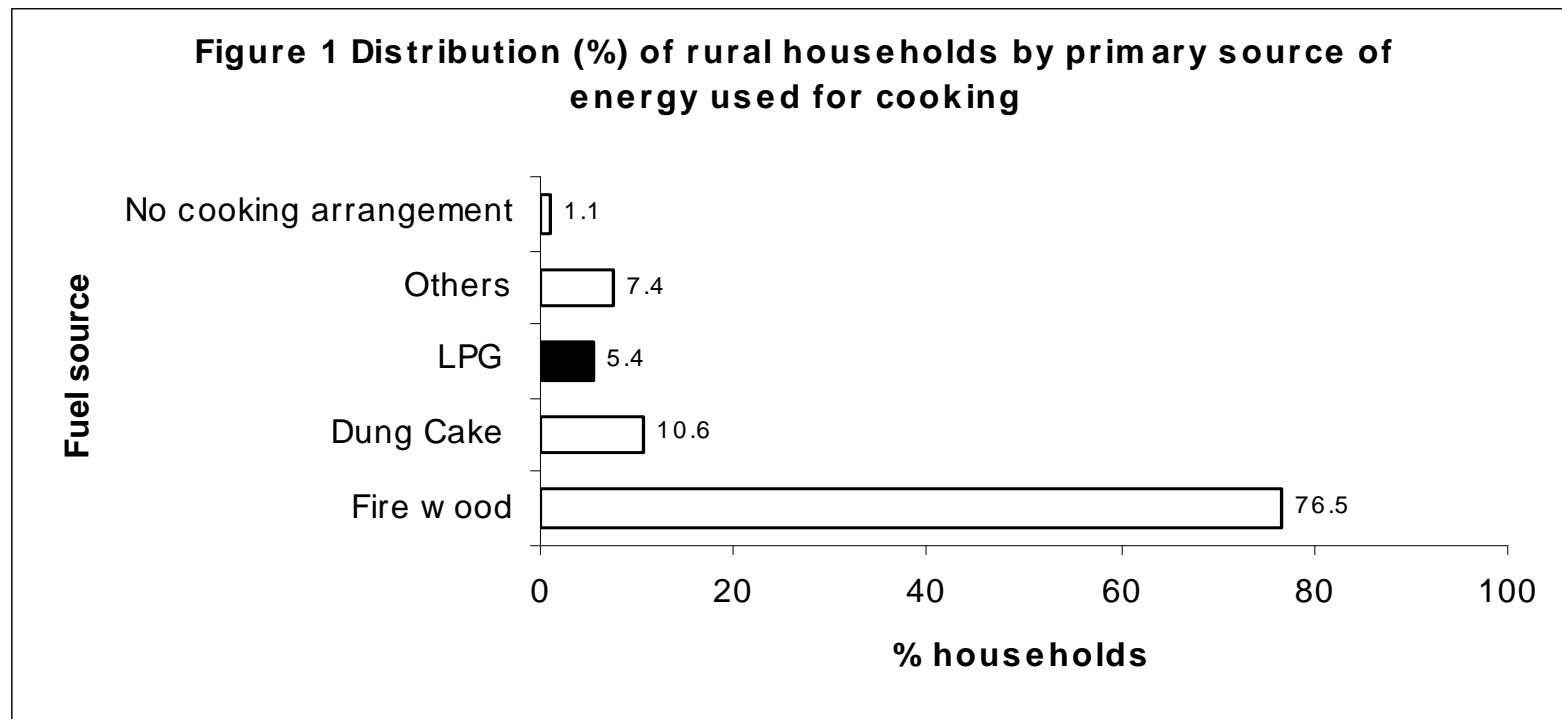
# The Ground Reality...

# Challenges ...

## Energy

### ➤ Access to energy services

More than 75% of rural and 22% of urban households still depend on wood as the primary source of energy for cooking



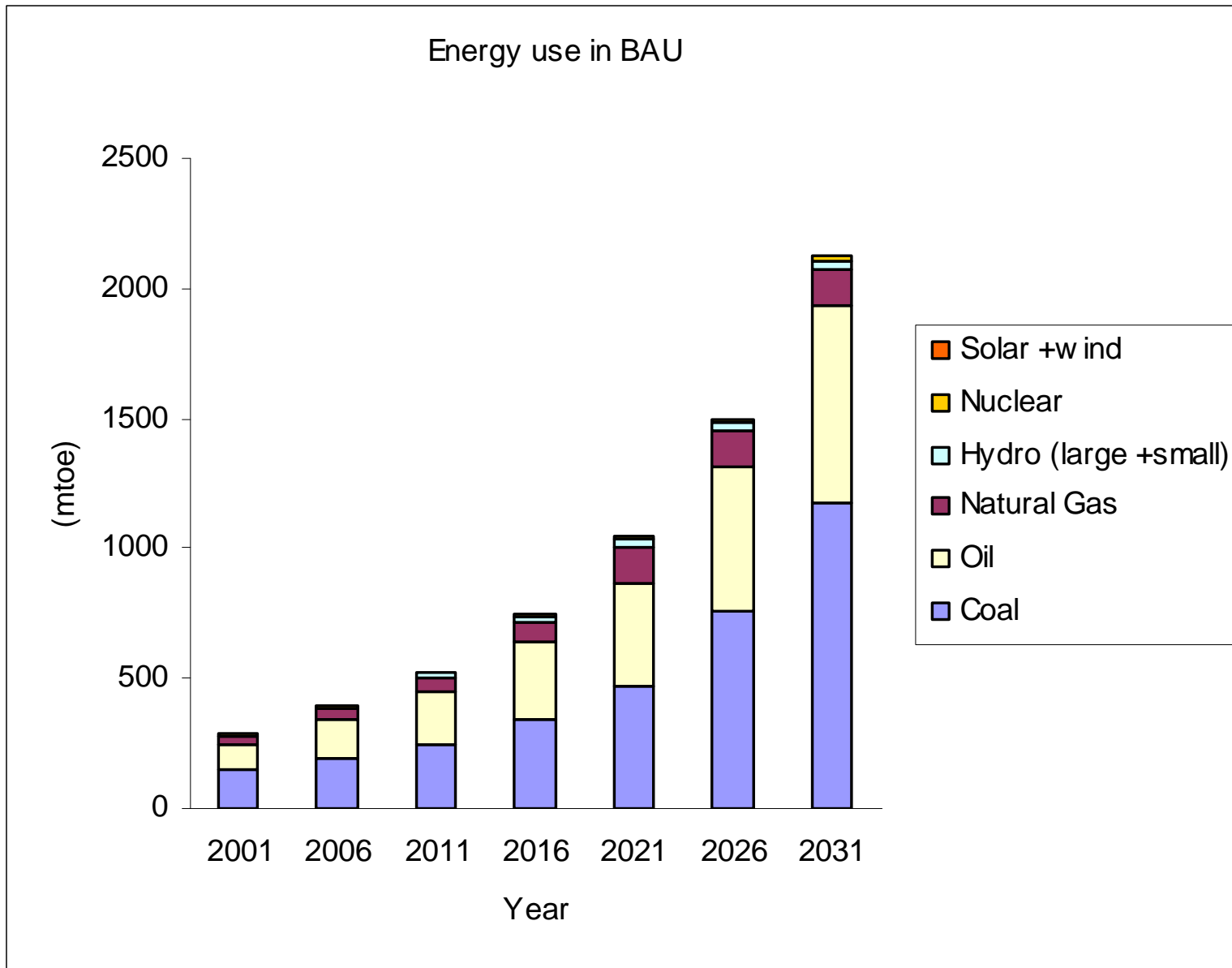


# Energy Consumption Must Increase

- 57% of rural population with no access to Energy
- Peak and energy shortages – 13.5 % and 9.9 % (2006-07)
- Per capita Electricity
  - World 2429
  - US 13066
  - India 553



# Energy Future

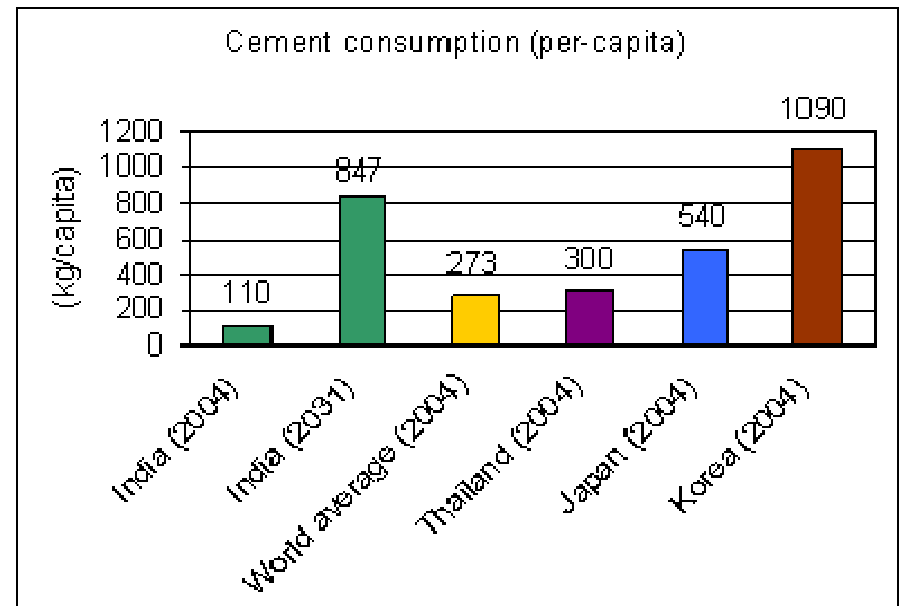
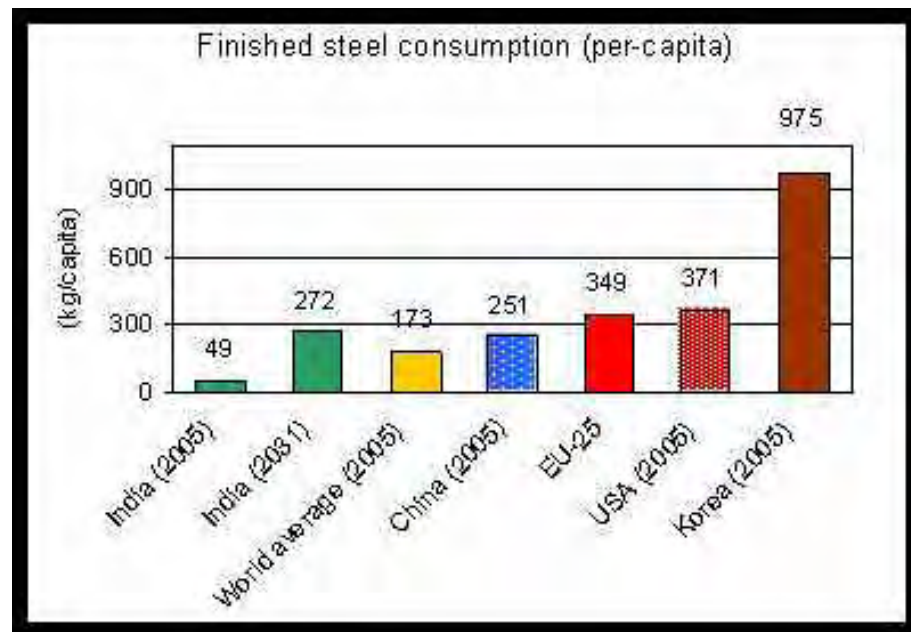


❖ Total primary commercial energy increases 7.5 times (CAGR: 6.9%)

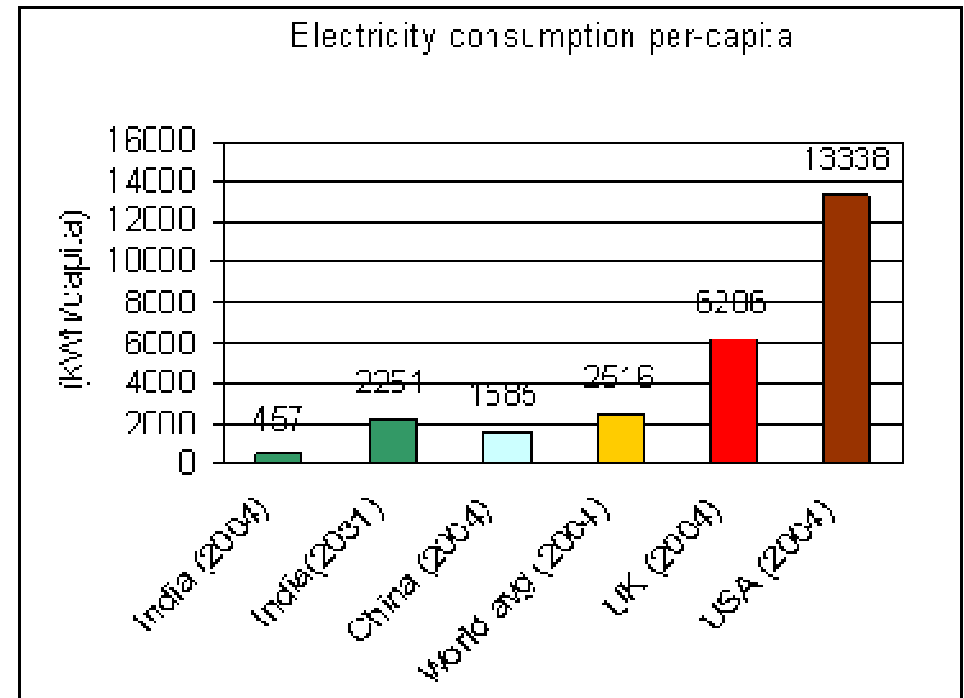
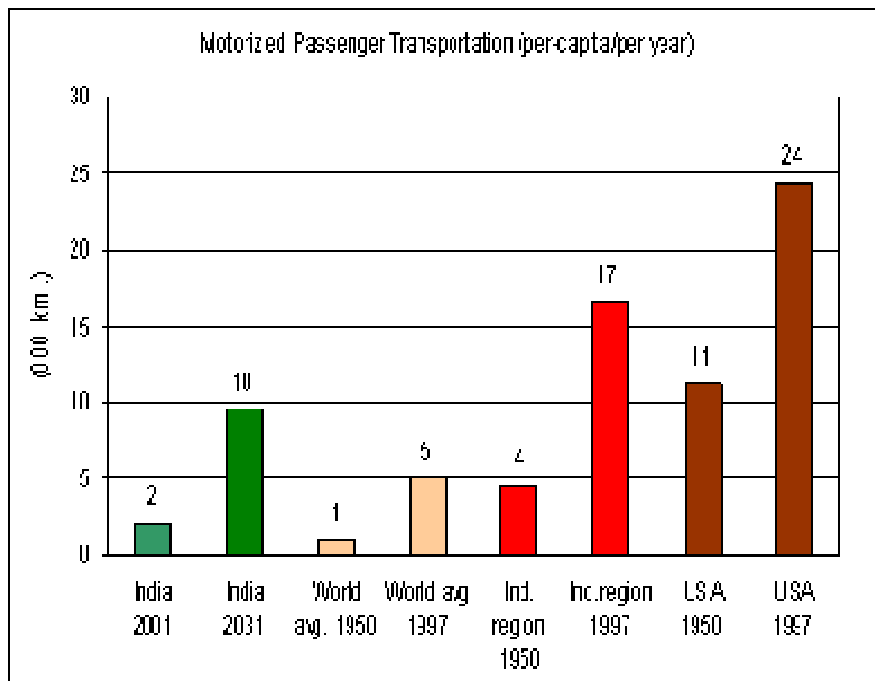
❖ Coal and Oil remain dominant fuels

# Rapid Growth Not Expected to Take India to Current Developed World Levels Even by 2031

Per capita cement and steel requirements

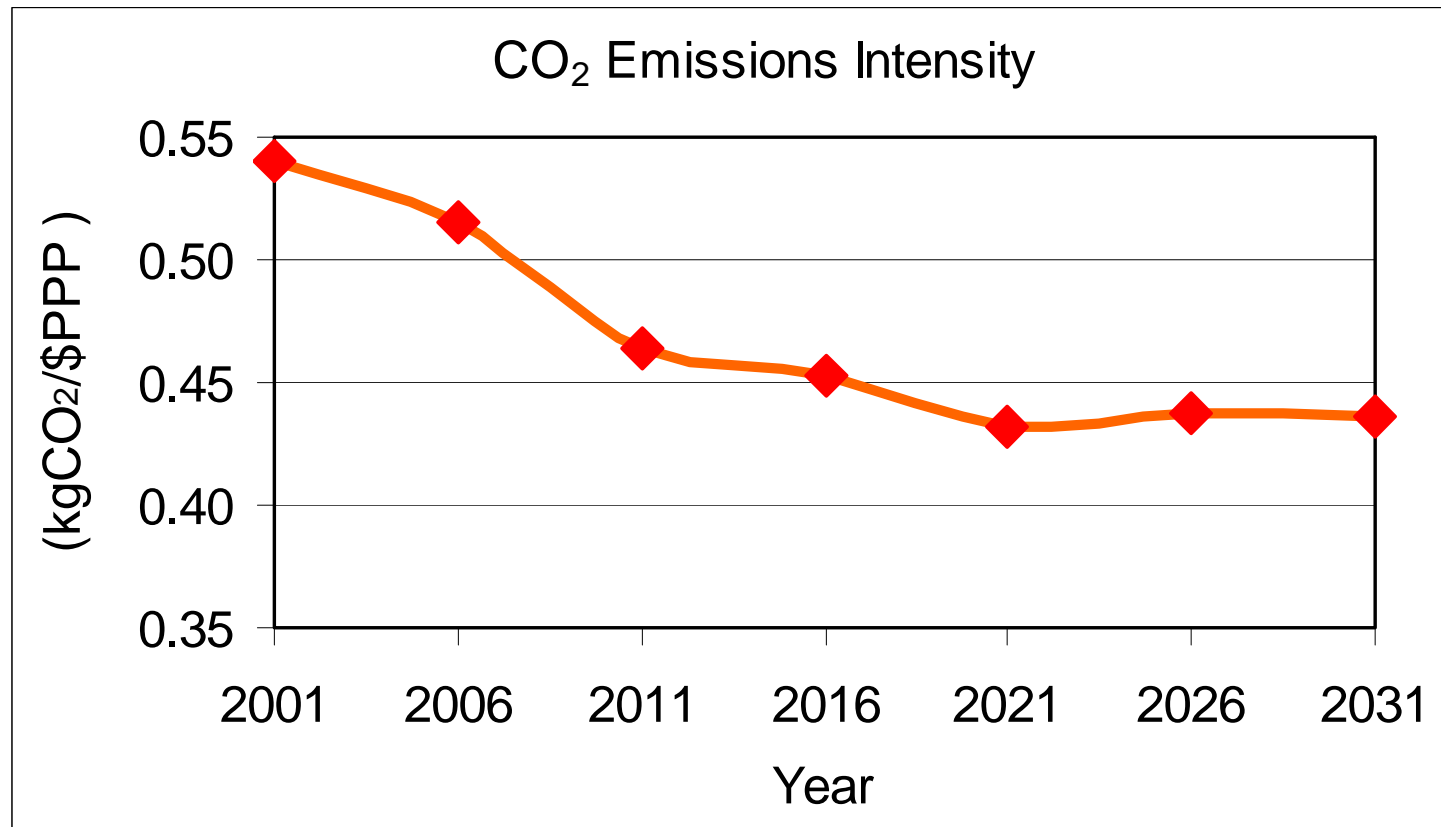


# Per Capita Electricity & Motorized Transportation Demands



# Carbon Intensity

- of economy is reducing





# Energy Security: High Import Dependency

## Fuel Import in 2031

❖ Coal import: 1438 MT

➤ ~4 times of consumption in 2001

➤ Import dependency: 78%

❖ Oil import: 680 MT

➤ Import dependency: 93%

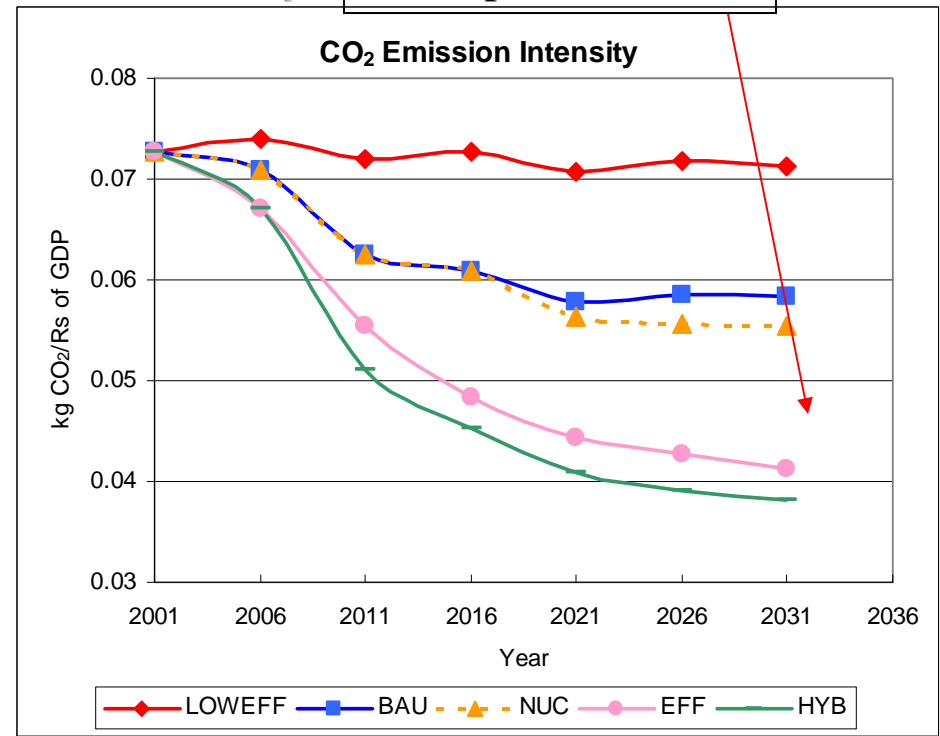
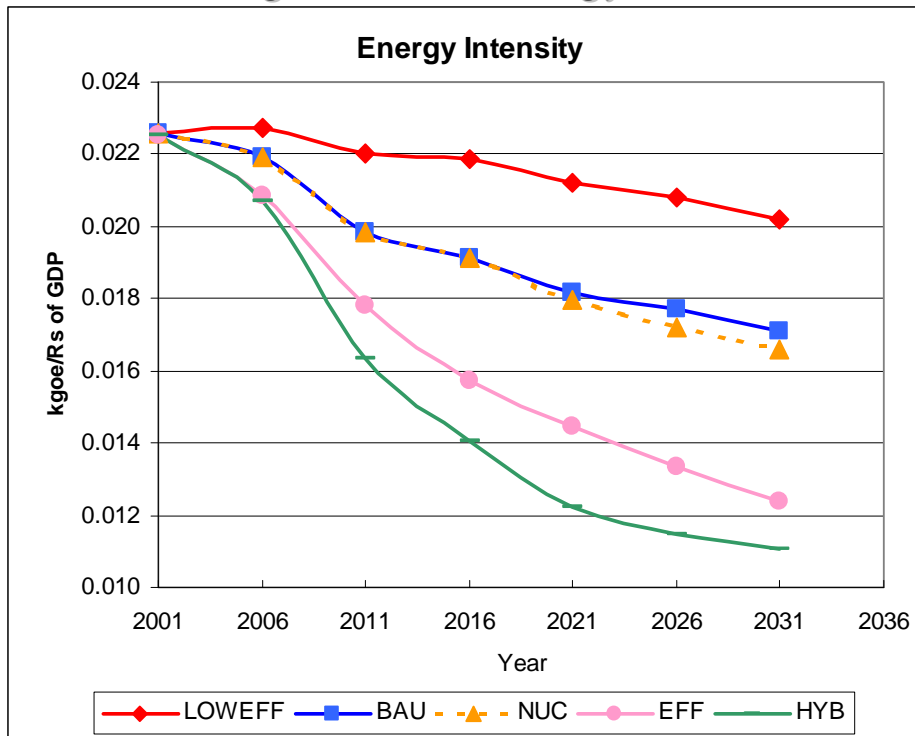
❖ Gas import: 93 BCM

➤ Import dependency: 67%

# Targeting sustainability concerns can play a role in mitigating GHG emissions

Reducing trend of Energy and CO<sub>2</sub> Emissions Intensity

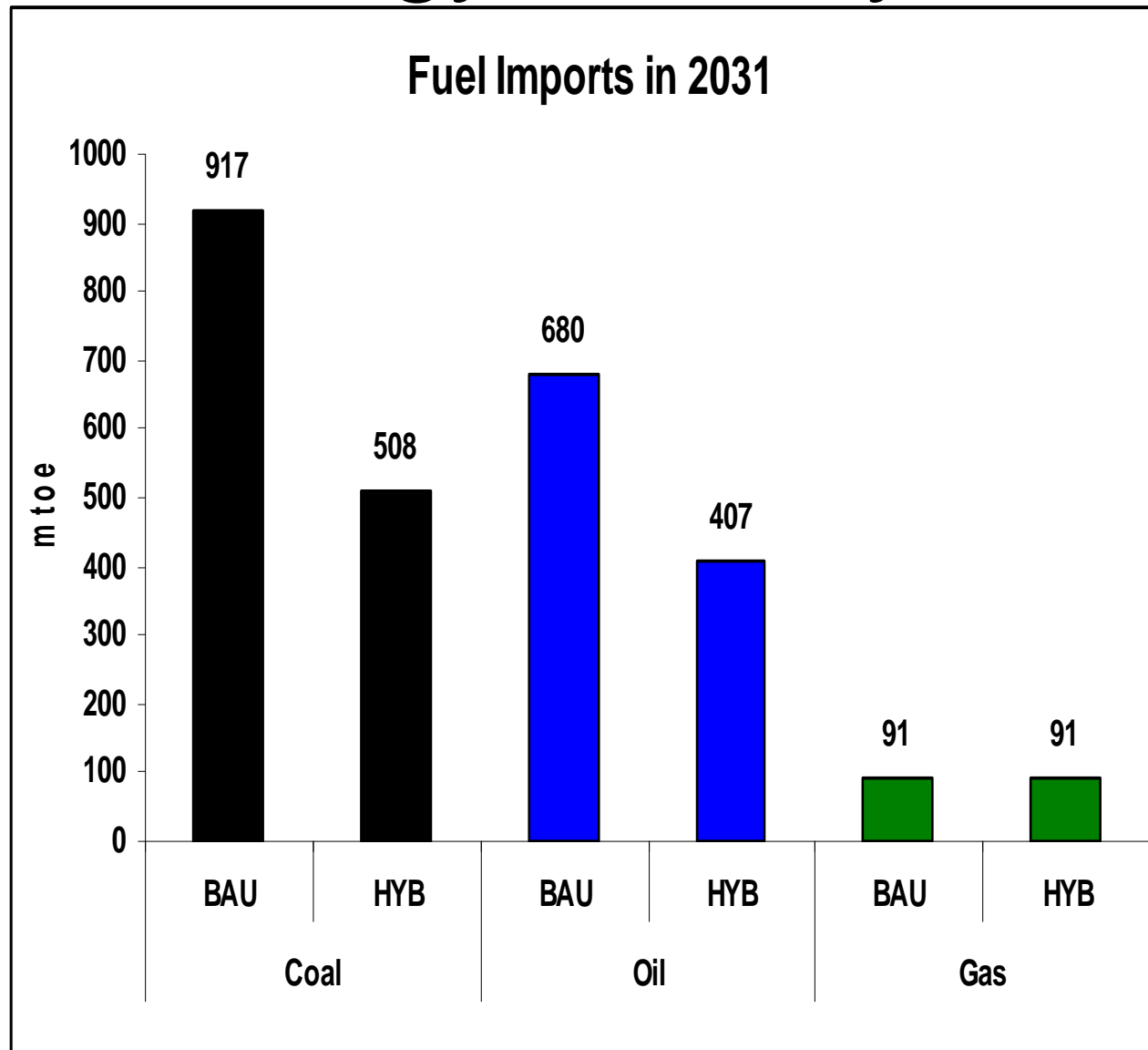
Govt. policies etc



Low carbon futures for the economy can be targeted through the introduction of ESTs

- enhanced energy efficiency; shift towards renewables and cleaner power generation options etc.

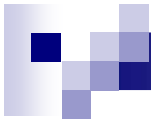
# Energy Security





# Some Current Initiatives





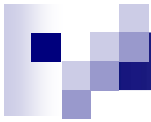
## Some Key Policies and Actions

- **Integrated Energy Policy, 2006:** Key GHG related Provisions:
  - Energy efficiency in all sectors
  - Emphasis on mass transport
  - Emphasis on renewables including biofuels and fuel plantations
  - Accelerated development of nuclear and hydropower Technology Missions for Clean Energy
  - Focused R&D on several climate change related technologies



# Some key policies and actions...

- **Reforming Energy Markets (Electricity Act 2005, Tariff Policy 2003, Petroleum & Natural Gas Regulatory Board Act, 2006, etc.):**
  - Remove entry barriers and raise competition in exploration, extraction, conversion, transmission & distribution of primary and secondary energy
  - Institute price reform. Full competition at point of sale. Net back pricing for non-traded energy if domestic market not competitive
  - Tax reform to promote optimal fuel choices.
  - Augment and diversify energy options, sources and energy infrastructure: Feed-in tariffs for renewables (solar, wind, biomass cogen)
  - Strengthen or introduce independent regulation



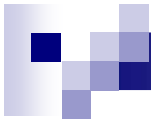
# Some key policies and actions...

- **Rural Electrification Policy 2006:**

- Promotes renewable energy technologies where grid connectivity is not possible or cost-effective

- **Energy Conservation Act, 2001:**

- Aims to reduce specific energy consumption in different sectors, and sets up a specialized Bureau of Energy Efficiency to institutionalize energy efficiency measures, monitoring, and measurement at plant and macro-levels



## Some key policies and actions...

- **New and Renewables Energy Policy, 2005:** Promotes dependence on sustainable, renewable energy sources, accelerated deployment of renewables through indigenous design, development and manufacture
- **Biodiesel Purchase Policy:** Mandates biodiesel procurement by petroleum cos.



## Some key policies and actions...

- **Ethanol Blending of Gasoline:** Mandates 5% blending of ethanol with gasoline from 1 January 2003 in 9 States and 4 Union Territories
- **Energy Conservation Building Code, 2006:** Mandatory energy efficiency code for all building with  $> 500$  kVA connected load or conditioned floor area  $> 1000$  m<sup>2</sup>



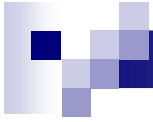
## Some key policies and actions...

- **Bachat Lamp Yojana:** Country-wide programme for replacement of incandescents by CFLs in households using CDM credits to equate purchase price; safe collection and disposal of used CFLs
- **50,000 MW Hydroelectric Initiative, 2003:** 162 hydel projects have been identified for project preparation and implementation
- **Several others:** Promotion of solar thermals, solar PVs, wind, biomass gasifiers, biogas and manure management, promotion of fuel cells, energy recovery from urban wastes, etc.



# National Action Plan on Climate Change

- National Solar Mission
- National Mission on Enhanced Energy Efficiency
- National Mission on Sustainable Habitat
- National Water Mission
- National Mission for Sustaining the Himalayan Ecosystem
- National Mission for a Green India
- National Mission Sustaining Agriculture
- National Mission on Strategic Knowledge for Climate Change



Thank you