CH2356 Energy Engineering

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Energy Demand and Supply

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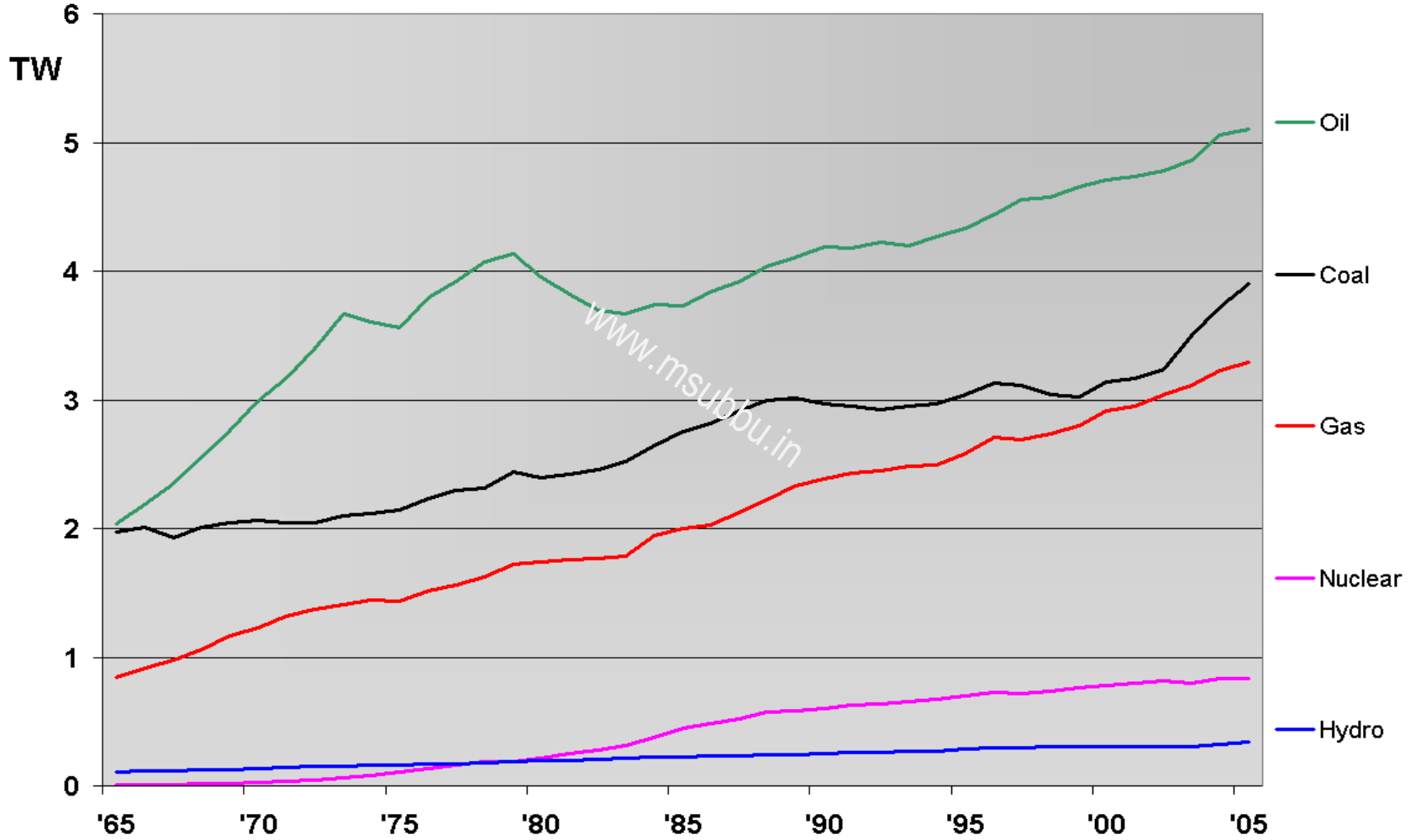
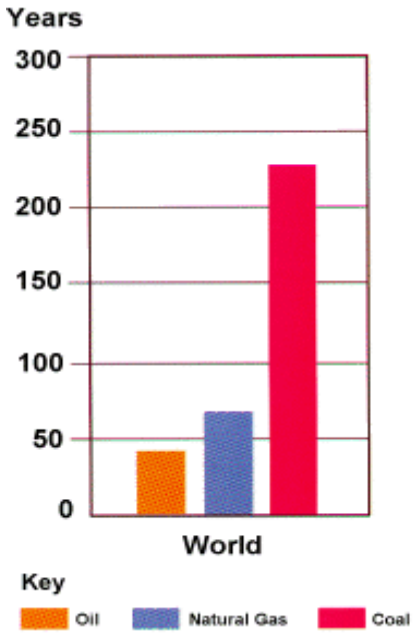
Rate of world energy usage in terawatts (TW)

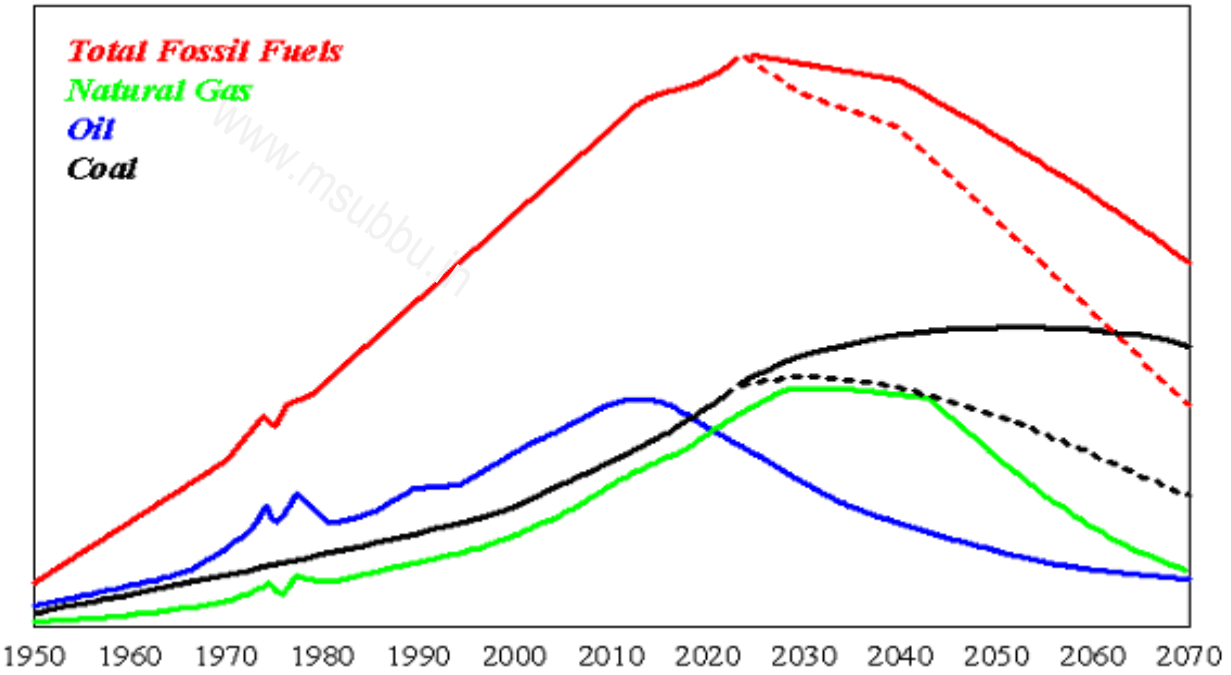
(1965-2005)



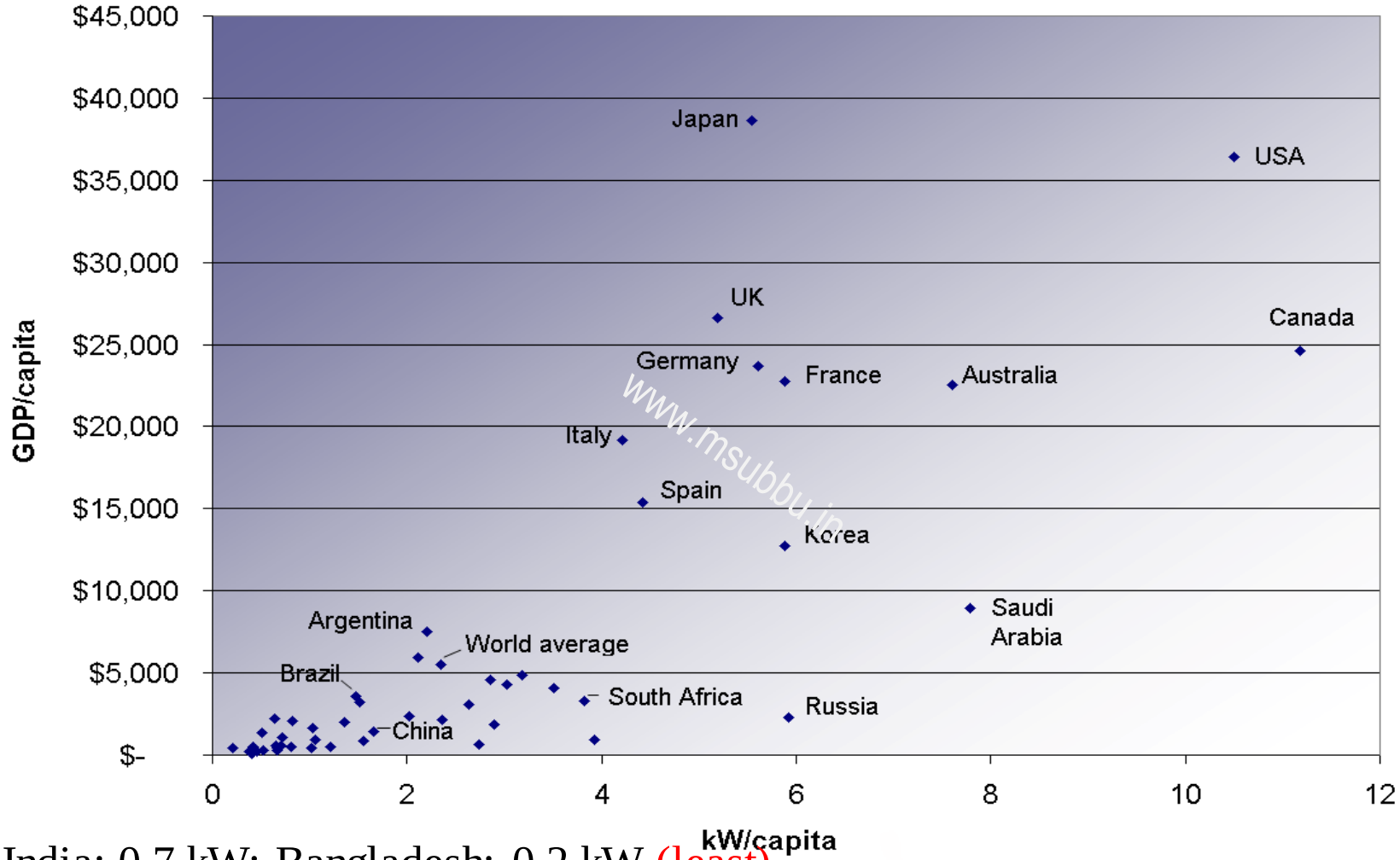
Global energy consumption rate (2006): 16 TW

Fossil Fuel Depletion





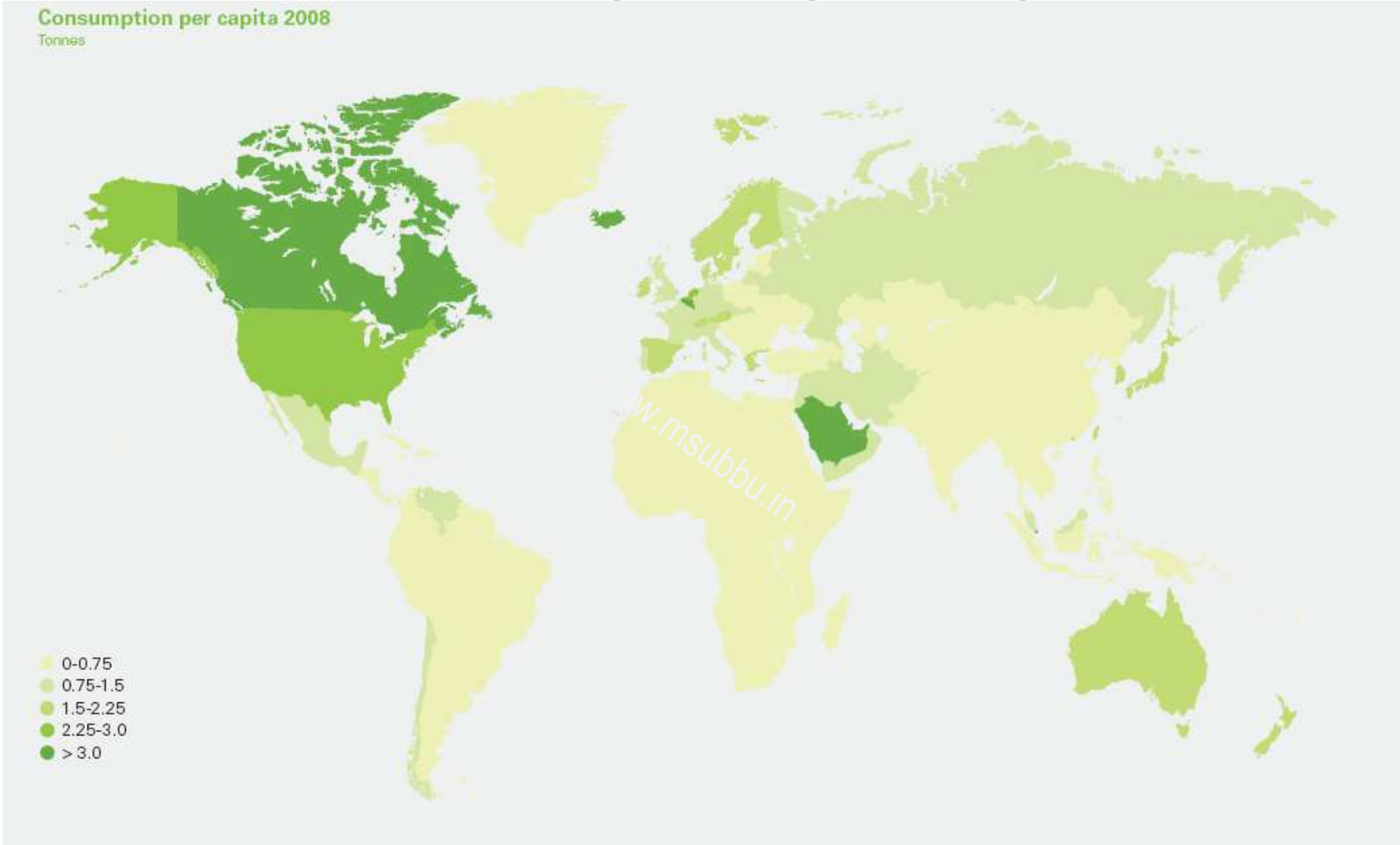
Energy Consumption Per capita (GNP) (2004)



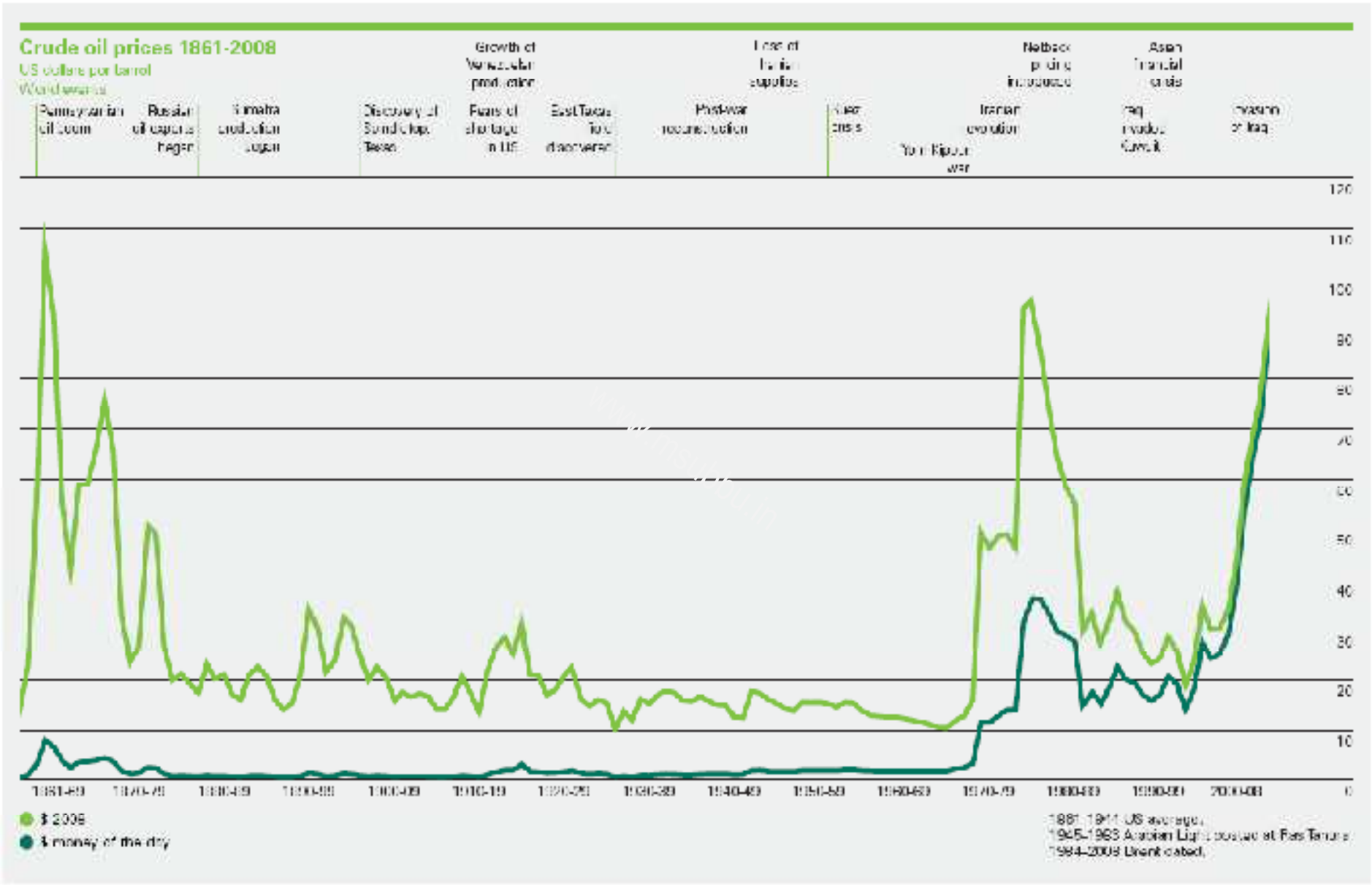
•India: 0.7 kW; Bangladesh: 0.2 kW (least)

•The US consumes 25% of the world's energy (with a share of the world population at 5%).

Oil consumption per capita



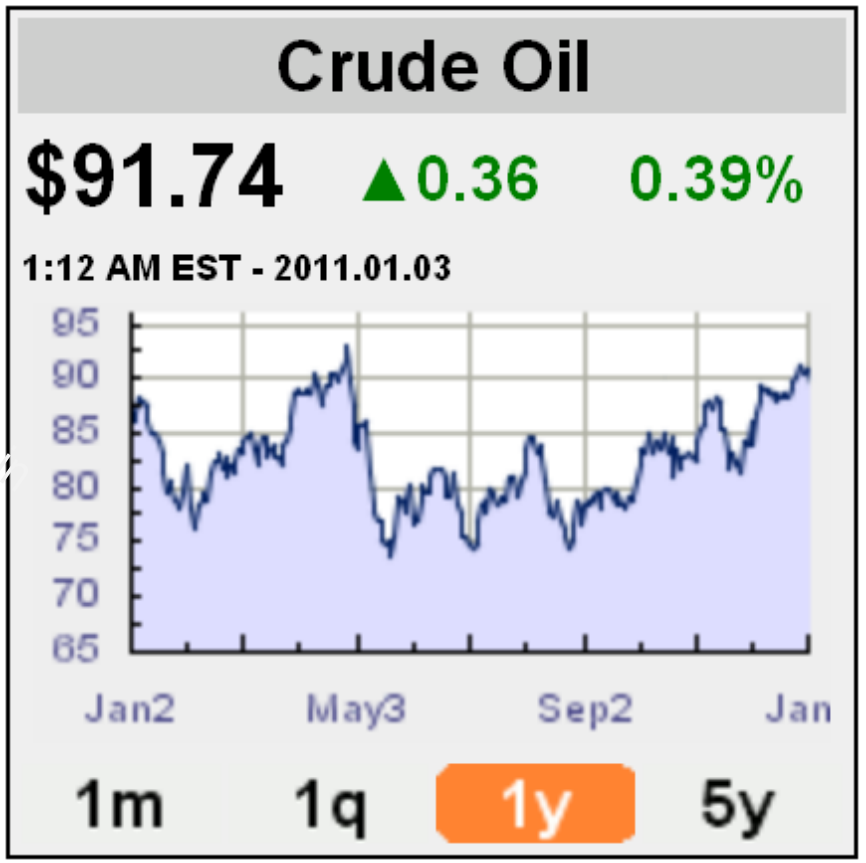
BP Statistical Review of World Energy, July 2009



BP Statistical Review of World Energy, July 2009

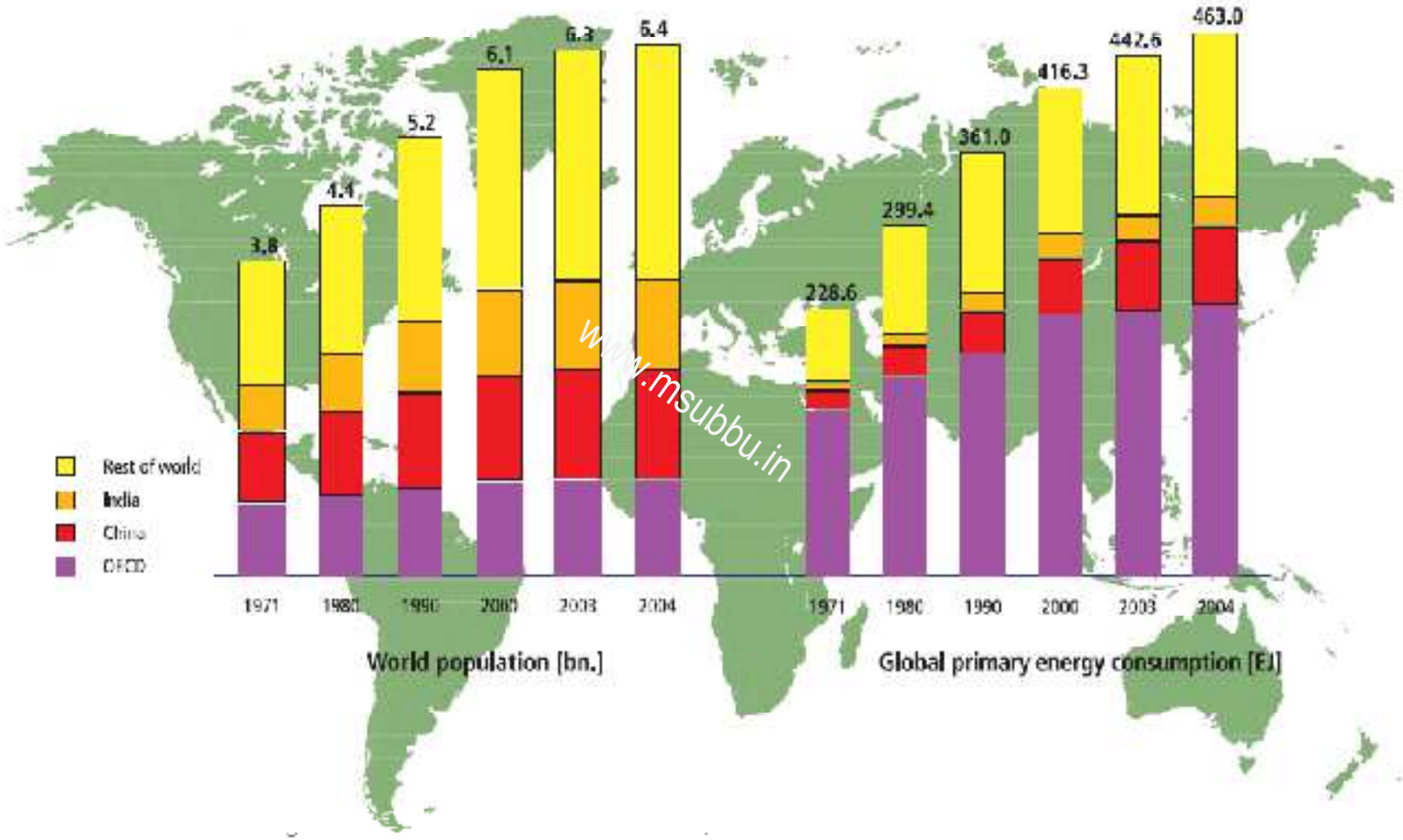
Oil Price Variation

http://www.oil-price.net/



3rd January 2011

Development of world population and global primary energy consumption



[86] Staiß, F: Jahrbuch Erneuerbare Energien 2007, Stiftung Energieforschung Baden-Württemberg (editors), Bieberstein Fachbuch Verlag, 2007.

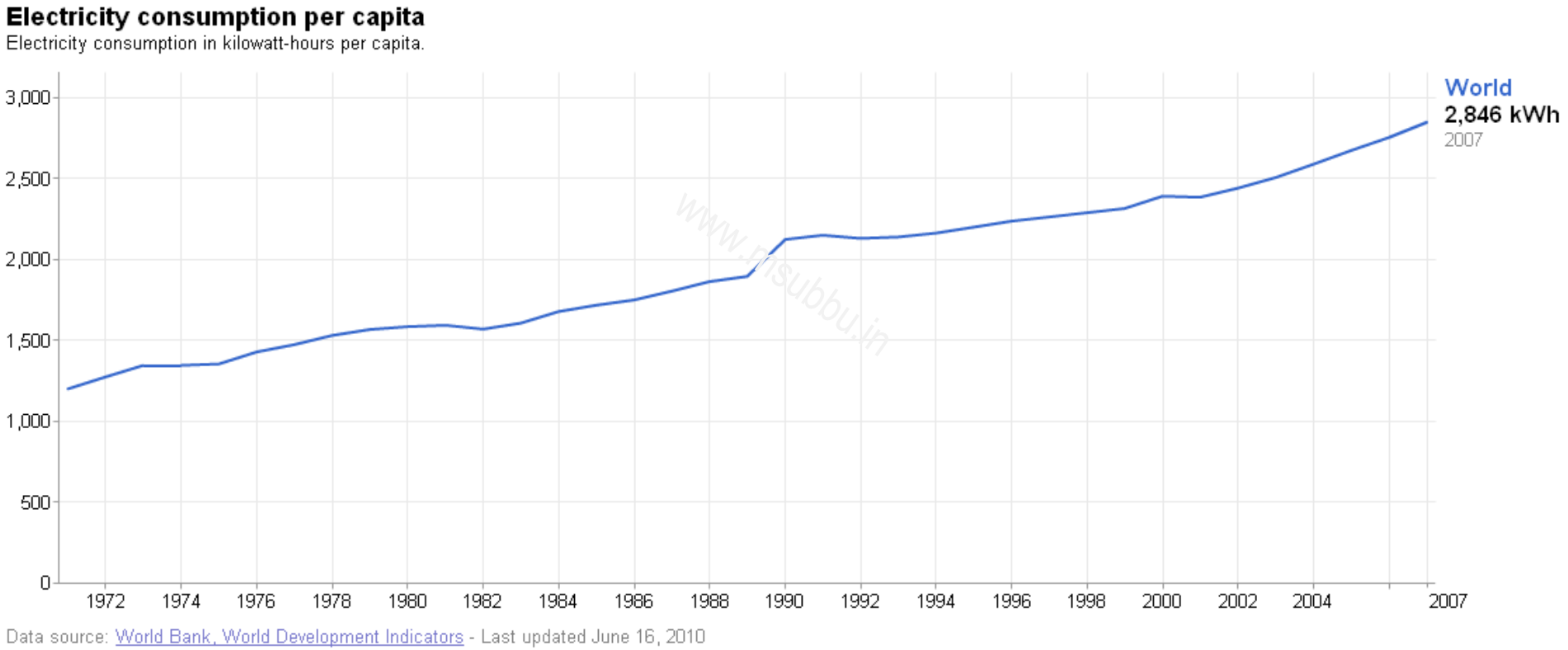
Energy Use by Sector

Industry (agriculture, mining, manufacturing, and construction)	37%
Personal and commercial transportation	20%
Residential heating, lighting, and appliances	11%
Commercial uses (lighting, heating and cooling of commercial buildings, and provision of water and sewer services)	5%
Energy losses in generation and transmission	27%

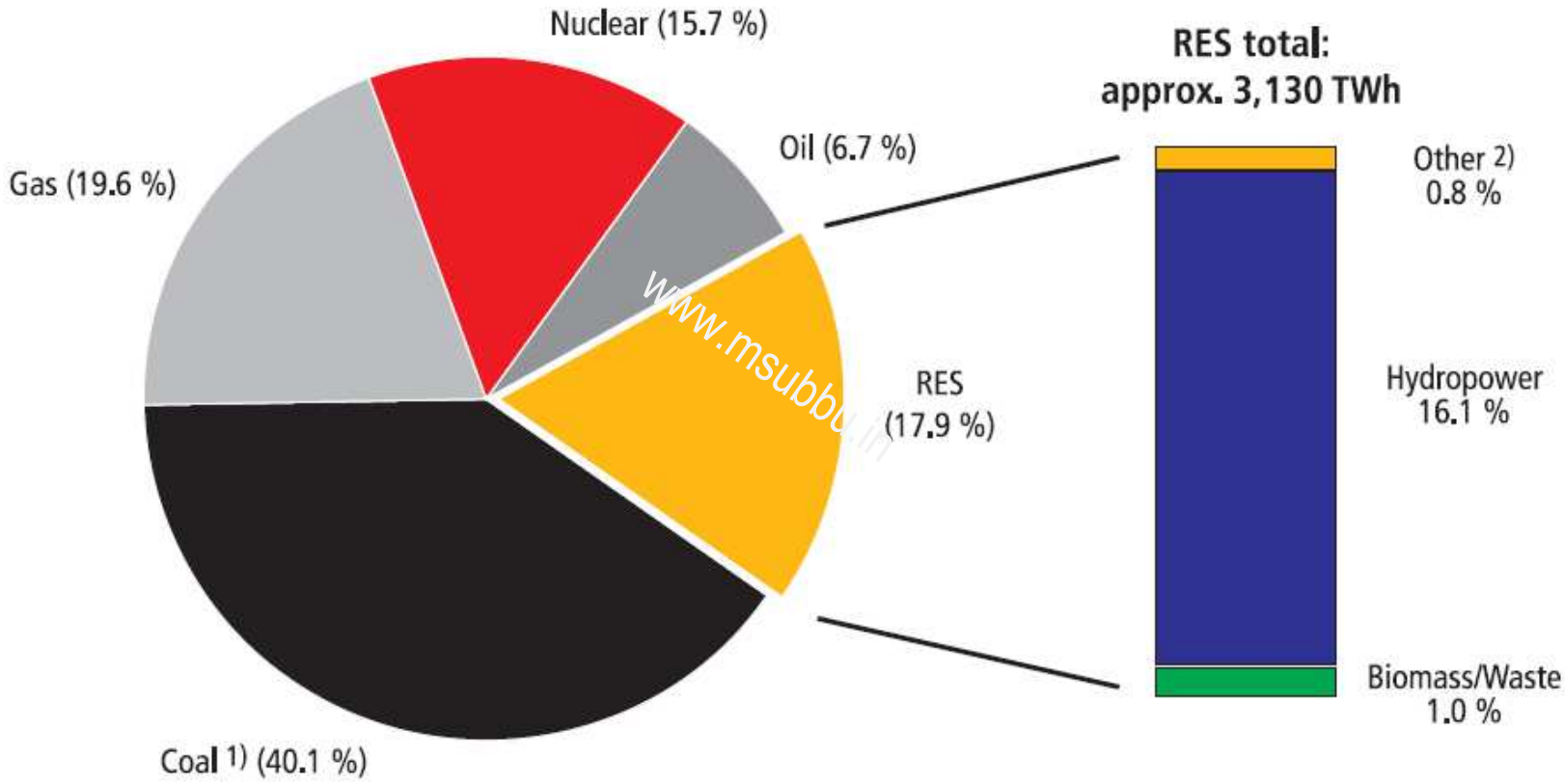
Electricity

- A typical generator's output of electricity is only 25-35% of the energy input to produce steam
- About 5 – 10% of the energy content of electricity is lost in transmission and distribution
- Heating water in a tea-kettle using electricity takes three to four times the amount of energy required than heating the water directly by flame. Heating is not a good use of electricity. A better use is providing lighting and running appliances.

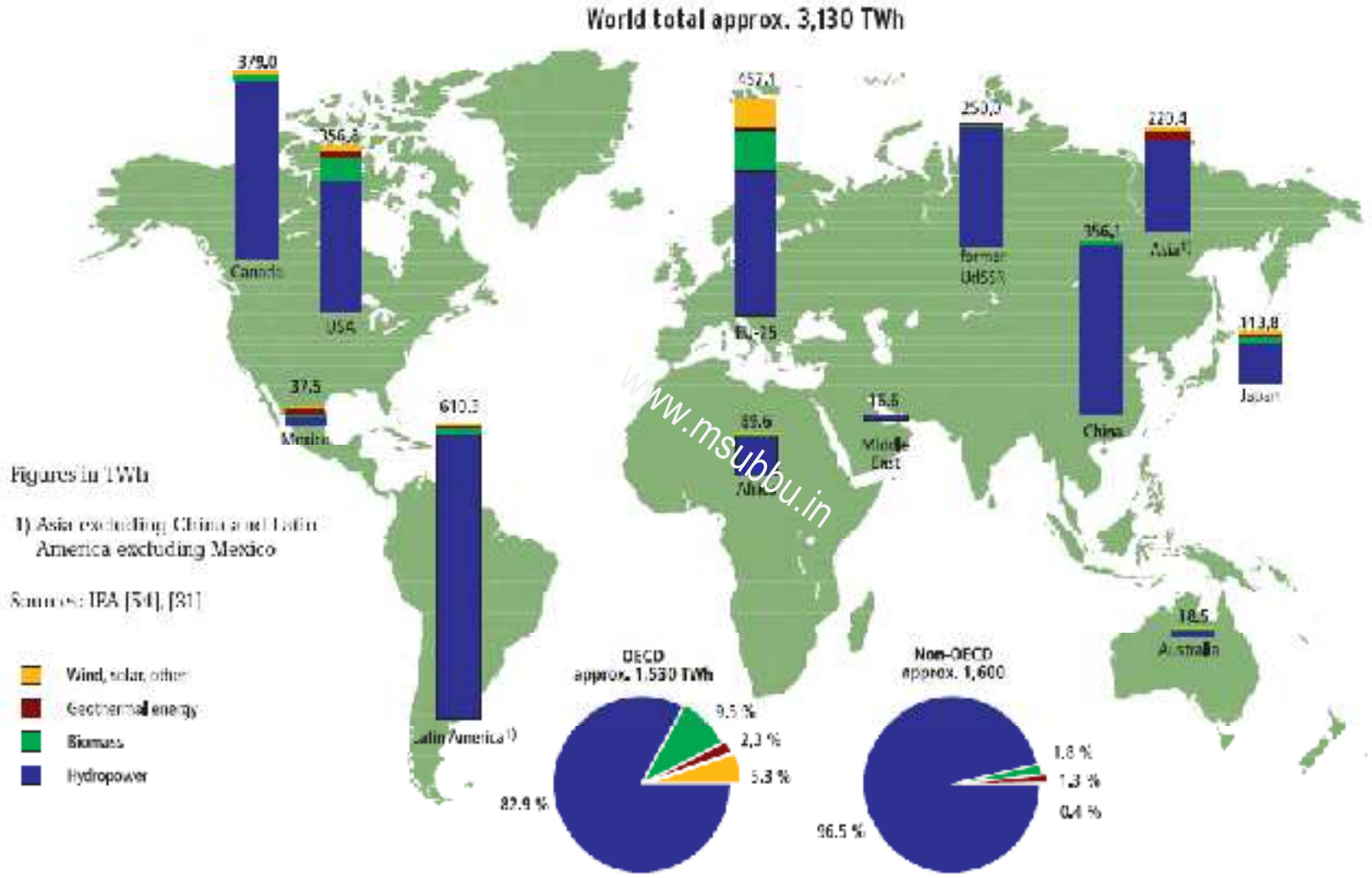
Electricity Consumption



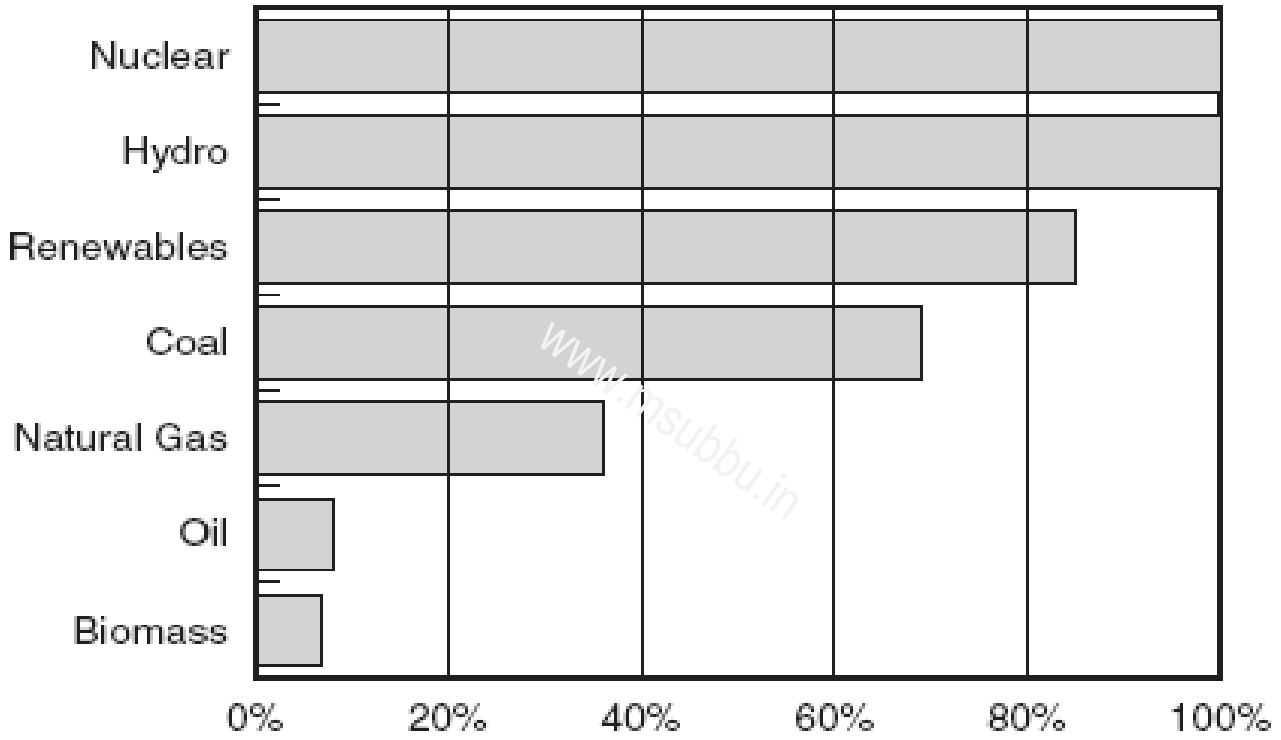
energy sources in global electricity generation, 2004



Electricity generation from renewable energy sources in various regions, 2004

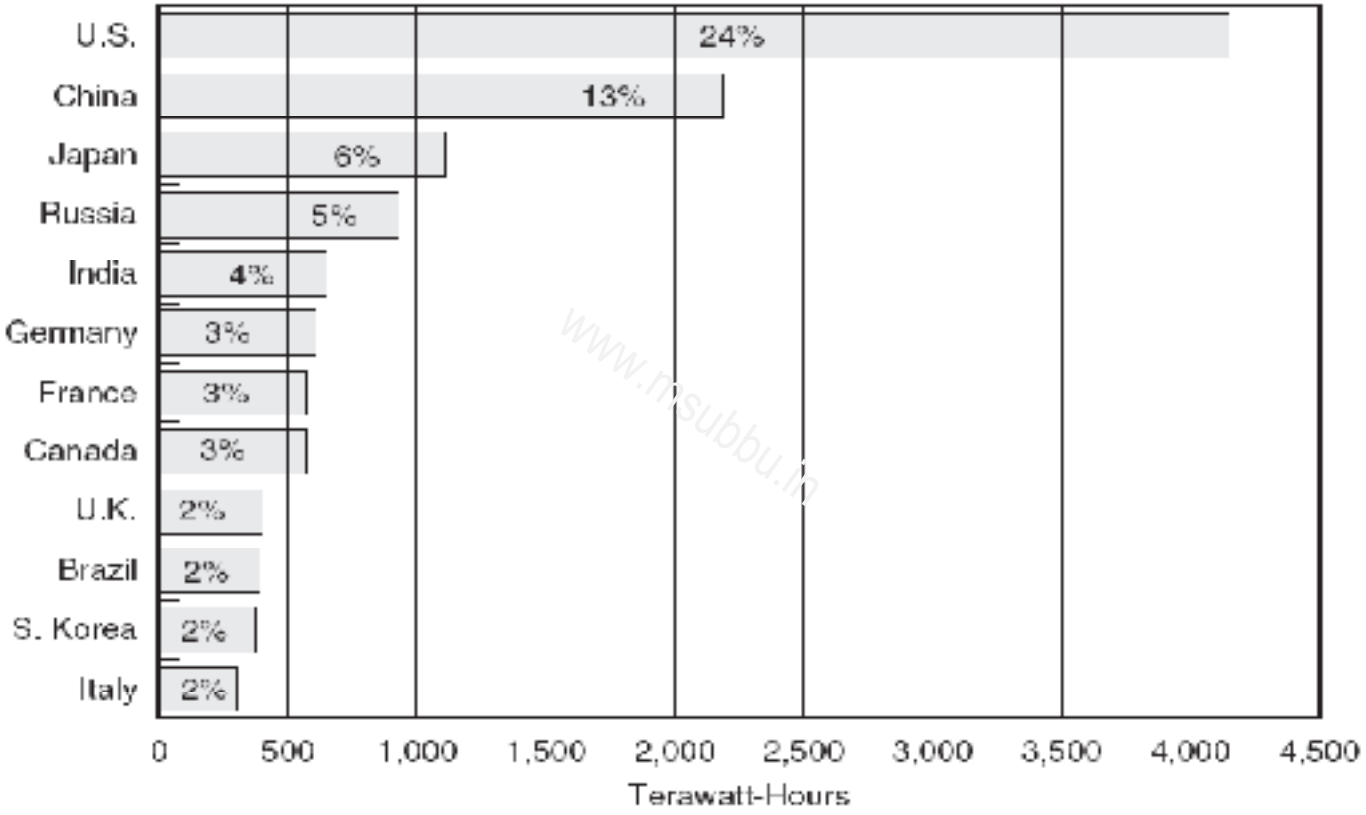


Energy type – dedicated to electricity (2004)

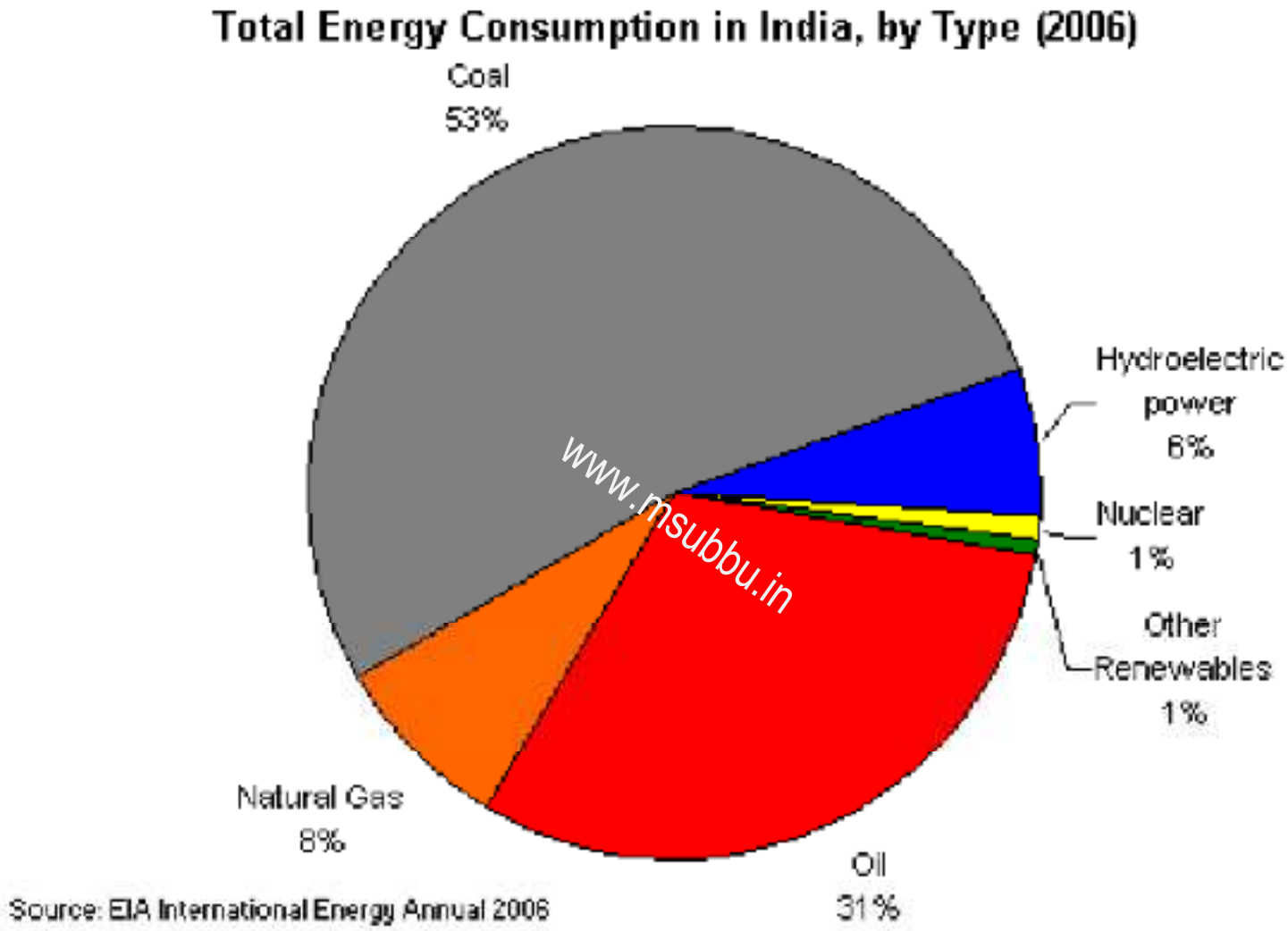


Electricity generation consumes all nuclear and hydro sources, nearly all renewables, about two-thirds of coal, and a little under 40% of natural gas

World's Electricity Generation (2002)

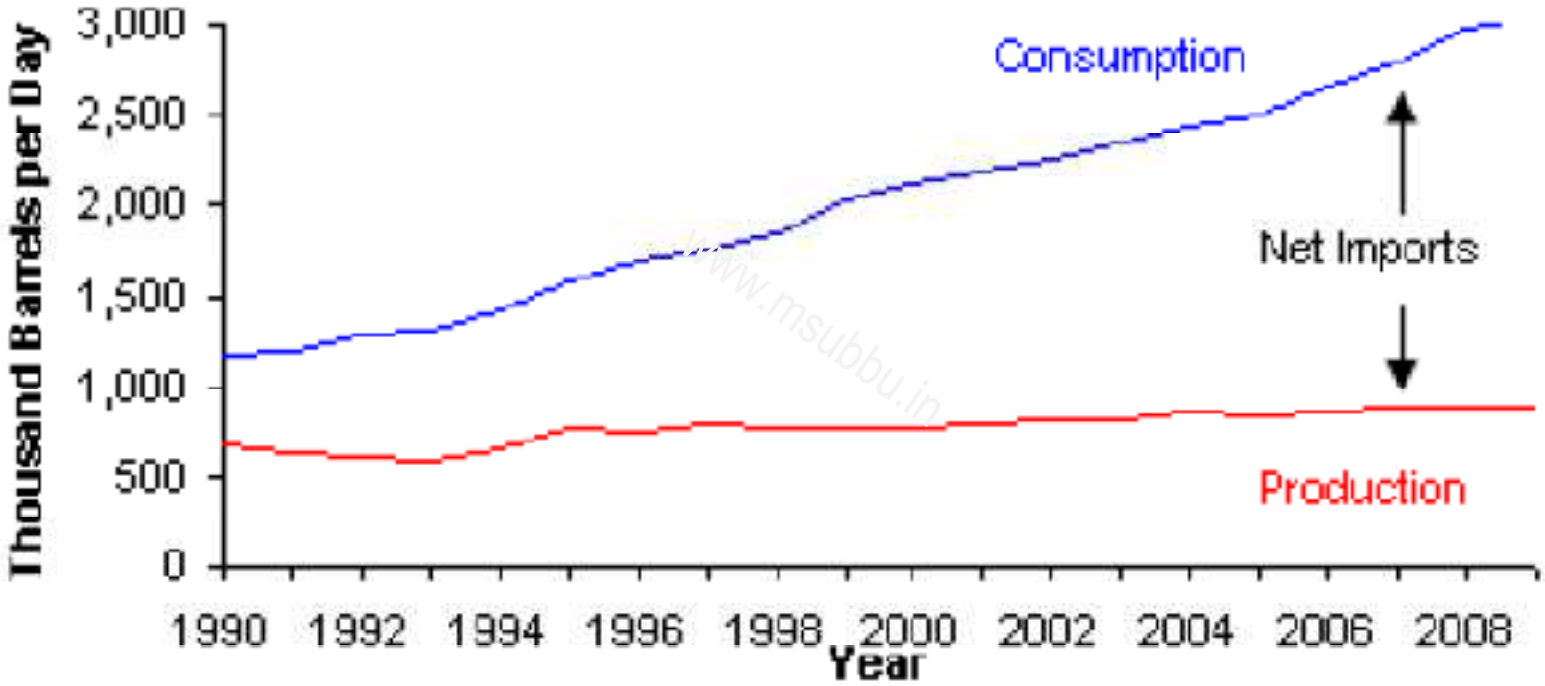


US generated 24% of World's electricity generation



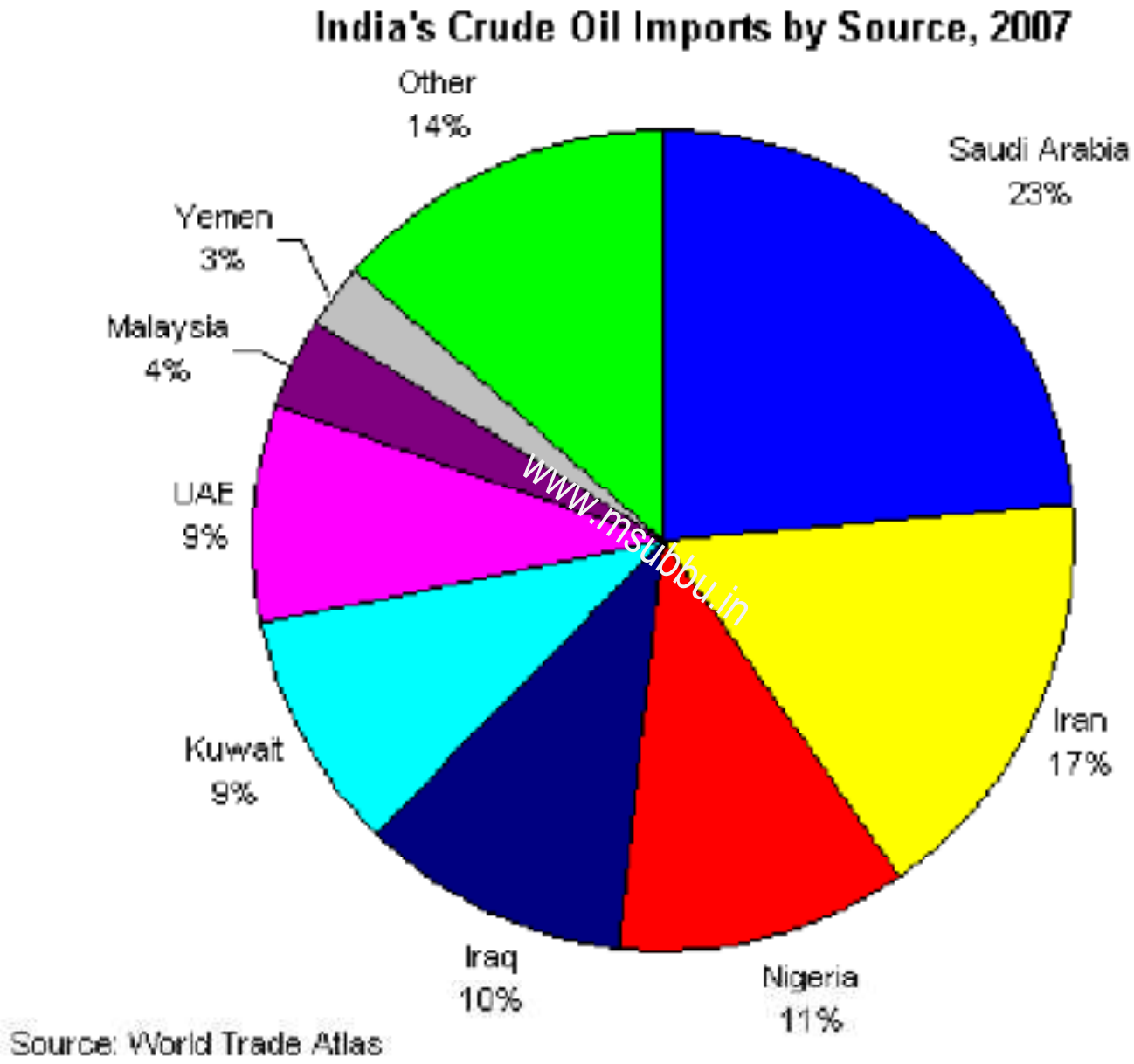
Rate of total energy consumption (in 2004): **420 GW**

India's Oil Production and Consumption 1990-2009*



*2008-09 is forecast

Source: U.S. Energy Information Administration



Total Installed Capacity of Electricity Generation in India

(As on July 31, 2009 , Source CEA)

Sector	MW	%age
State Sector	76,504.67	52.5
Central Sector	49,580.99	34.0
Private Sector	24,987.75	13.5
Total	**1,50,323.41**	

Fuel	MW	%age
Total Thermal	**96,794.24**	**64.6**
Coal	79,208.88	53.3
Gas	16,385.61	10.5
Oil	1,199.75	0.9
Hydro (Renewable)	36,916.76	24.7
Nuclear	4,120.00	2.9
Renewable Energy Sources (MNRE)	13,242.41	7.7
Total	**1,51,073.41**	

Demand and Supply of Electricity in India

Year	ENERGY (Billion Units)		
	Requirement	Availability	% Shortage
2002-03	545.7	497.6	8.8
2003-04	559.3	519.4	7.1
2004-05	591.4	548.1	7.3
2005-06	631.6	578.8	8.4
2006-07	690.6	624.5	9.6
2007-08	739.3	666.0	9.9
2008-09	774.3	689.0	11

• By 2031-32, the power generation capacity must increase to nearly 800 GW from the current capacity of 151 GW.

Rural Electrification Status

- World:
  - It is estimated that more than 1/4th of the world's population, amounting about 1.5 billions of people around the world, still lack access to electric energy. About 85% of these populations live in rural areas, mainly in Sub-Saharan Africa and South Asia.

- India:
  - As of 2005, about 380 million of people living in 71.7 million households do not have access to electricity
  - As on March 2004, the electrification was at 80.84%; and this has improved only to 83.8% by March 2009