

Energy/GHG Trends and Outlook

Presented by
Leena Srivastava



Asian Development Bank, Climate Change and Energy Study
Meeting with DMCs, 26-27 March 2009, Bangkok, Thailand

The views expressed in this paper/presentation are the views of the author and do not necessarily reflect the views or policies of the Asian Development Bank (ADB), or its Board of Governors, or the governments they represent. ADB does not guarantee the accuracy of the data included in this paper and accepts no responsibility for any consequence of their use. Terminology used may not necessarily be consistent with ADB official terms.

Structure

- **Background**
- **In this study**
- **Primary energy consumption in 2006**
 - By fuel
 - By countries
 - By sector
- **Primary energy demand projections for 2030**
 - By fuel
 - By sector
- **CO2 Emissions WEO Reference scenario**
 - By country
 - By fuel
- **Range of projections**
 - China
 - India
 - Indonesia

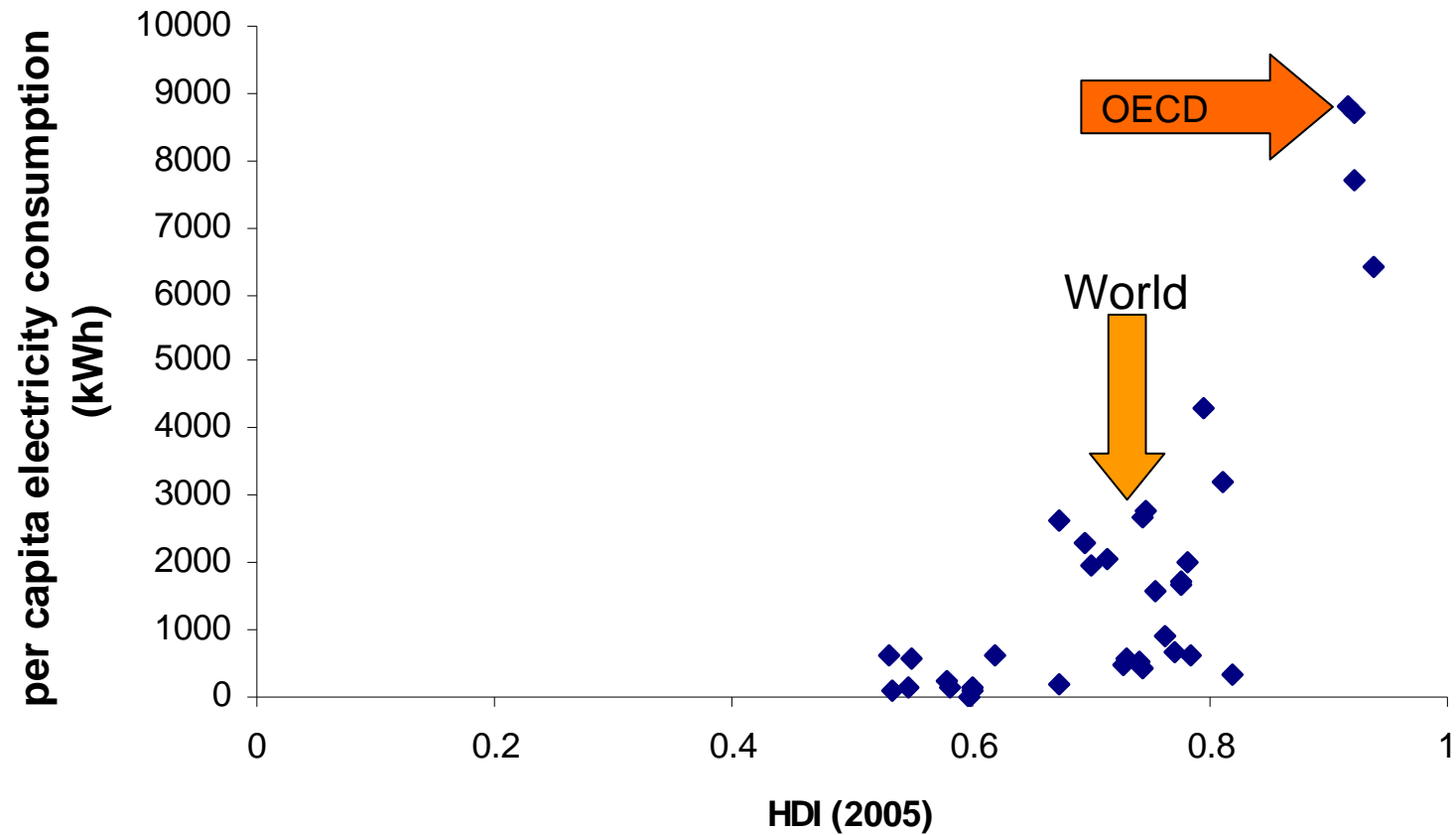
Background

- Energy demand increase depends on economic and population growth rates, technology in use and energy related policies.
- Energy consumption estimates easier to come by than demand data
- Developing countries in the Asia Pacific region, led by China and India, are among the fastest growing economies in the world today. Thus, energy demand and CO₂ emissions in this region are expected to increase sharply.
- Projections depend on underlying assumptions of the model.

In this study

- The region/Developing Countries in the Asia Pacific Region refers to the Asian Development Bank's (ADB) Developing Member countries (DMCs) as classified by the Annual Asian Development Outlook Publication, ADB
- The region is broken down in the following:
 - China (includes Hong Kong)
 - India
 - Indonesia
 - Central Asia (Armenia, Azerbaijan, Kazakhstan, Kyrgyz Republic, Tajikistan, Turkmenistan and Uzbekistan)
 - Other Developing Asia (ODA) (Developing countries in the Asia Pacific region (as defined for this study) excluding China, India, Indonesia and Central Asia)
- Data in this chapter has been taken from the World Energy Model (WEM), 2008 (World Energy Outlook, International Energy Agency).

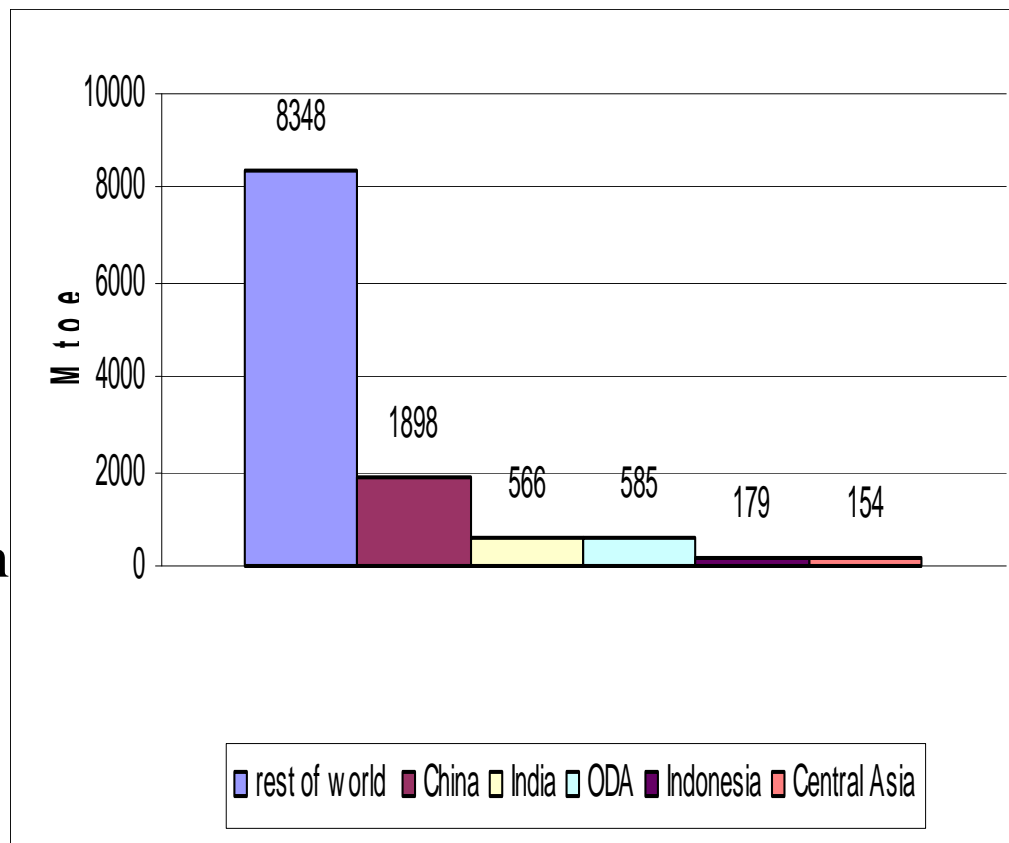
HDI & per capita electricity consumption



Source: Human Development Report 2008

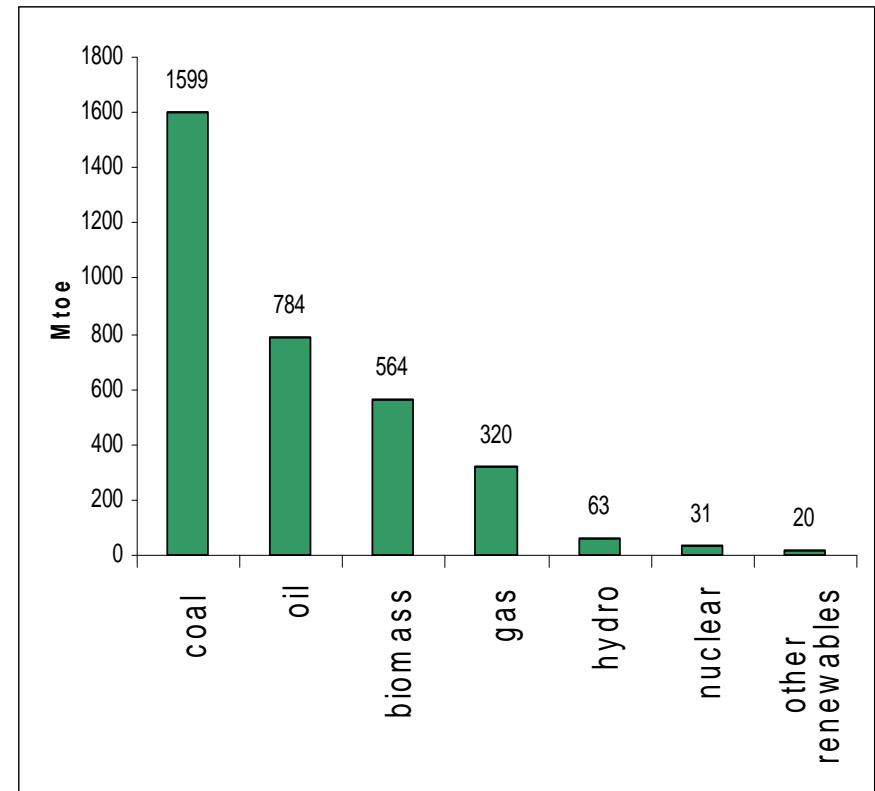
Primary Energy Consumption in 2006

- Total Primary energy consumption in the world (2006): 11,730 mtoe
- Total primary energy consumption in the Region (2006): 3381 mtoe (28% of global consumption)
- Primary energy consumption in China: 1,898 mtoe (16% of global total)
- Consumption in India: 565 mtoe (5% of the global total).



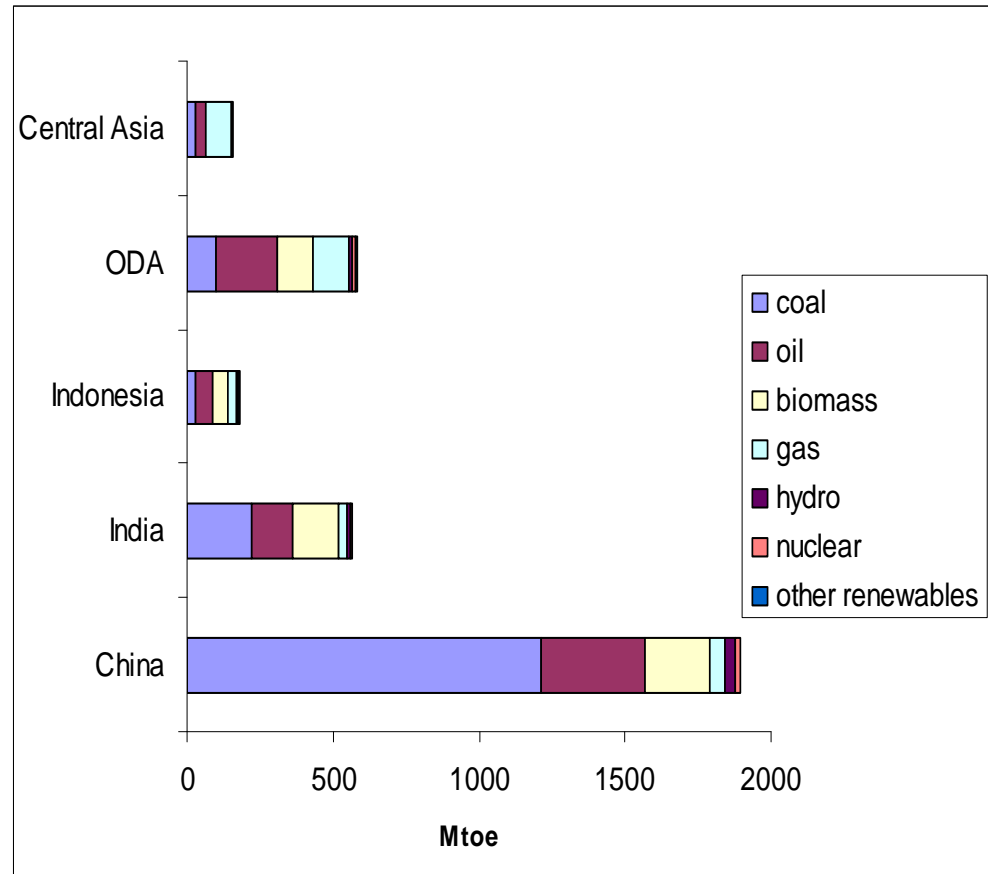
Primary Energy Consumption by Fuel (2006)

- 80% of the total energy comes from fossil fuels
- Coal accounts for 47% of the total energy consumed.
- Renewable energy accounts for less than 2.5% of total energy consumption
- Access to commercial energy is low. Large part of the population depends on energy from biomass and waste (17%).



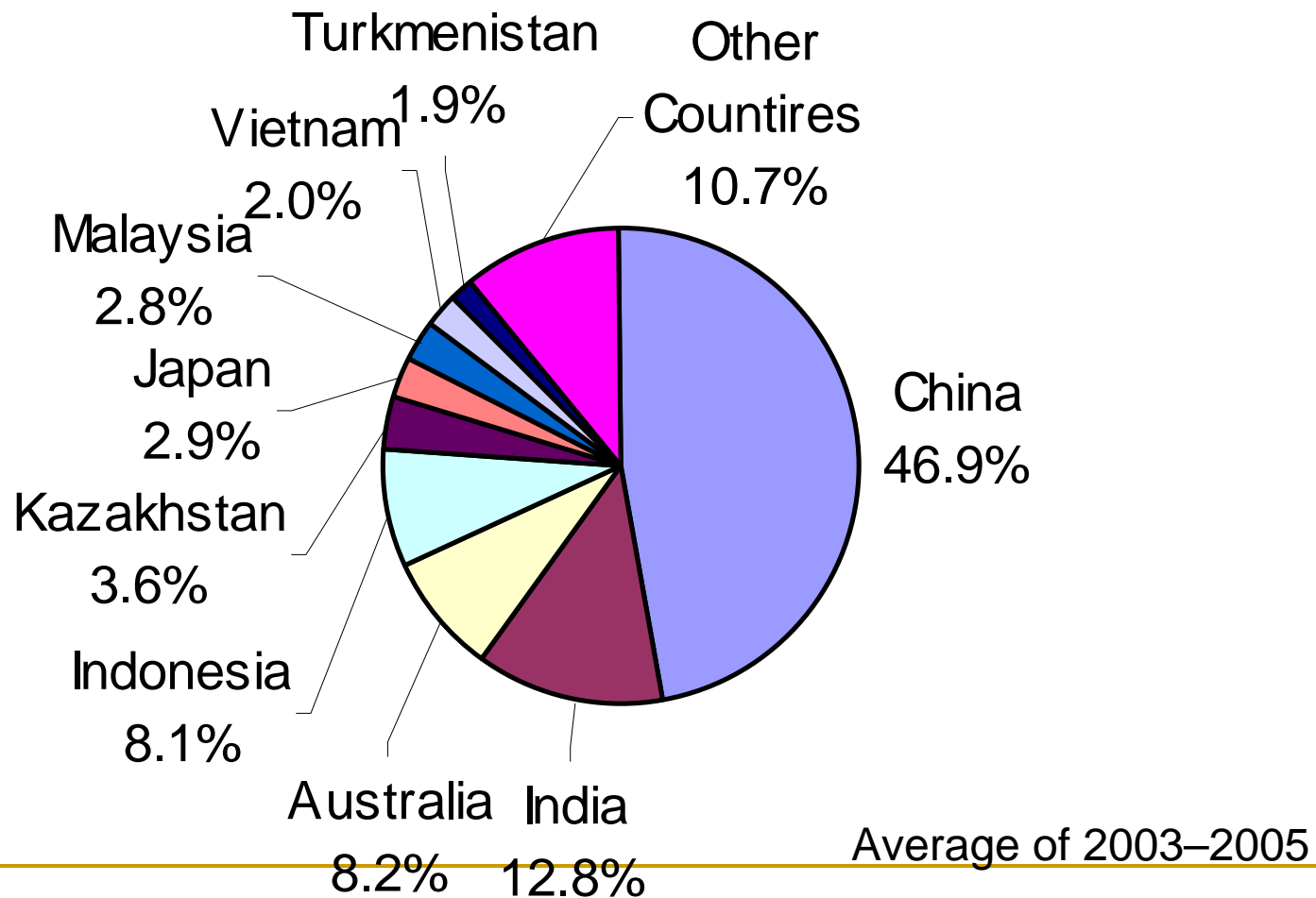
Energy Consumption in Different Countries(2006)

- Coal is the dominant fuel in China (64%) and India (39%), followed by oil.
- Gas has a larger share than coal in Central Asia, Indonesia and ODA
- Total primary energy consumption of the region: China (56%), India (17%), Indonesia (5.3%), Central Asia (4.5%)



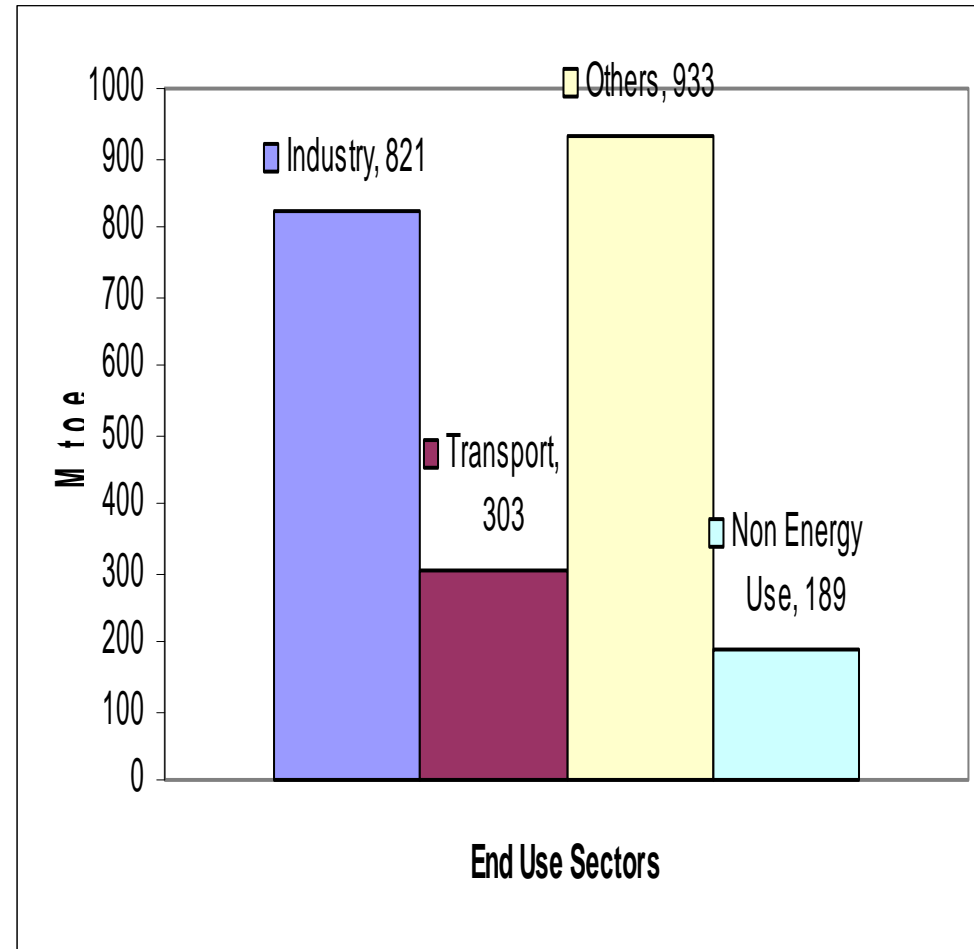
Energy Statistic:

Breakdown of Energy Production in the Asia and Pacific Region



Energy Consumption in Different Sectors (in 2006)

- Of the total final energy consumption (2,249 mtoe)
 - Industry:36%
 - Transport:13%
 - Other sectors:41.5%
 - Non energy use: 8%
- Of the total industrial demand:
 - 64% arose in China
 - 13.3% in India
 - 4.3% in Indonesia
 - 3.4% in Central Asia
- China accounted for 44% of the energy demand in the transport sector in the region



Energy Consumption in Different Sectors (in 2006)

contd..

Industrial sector: 821 mtoe.

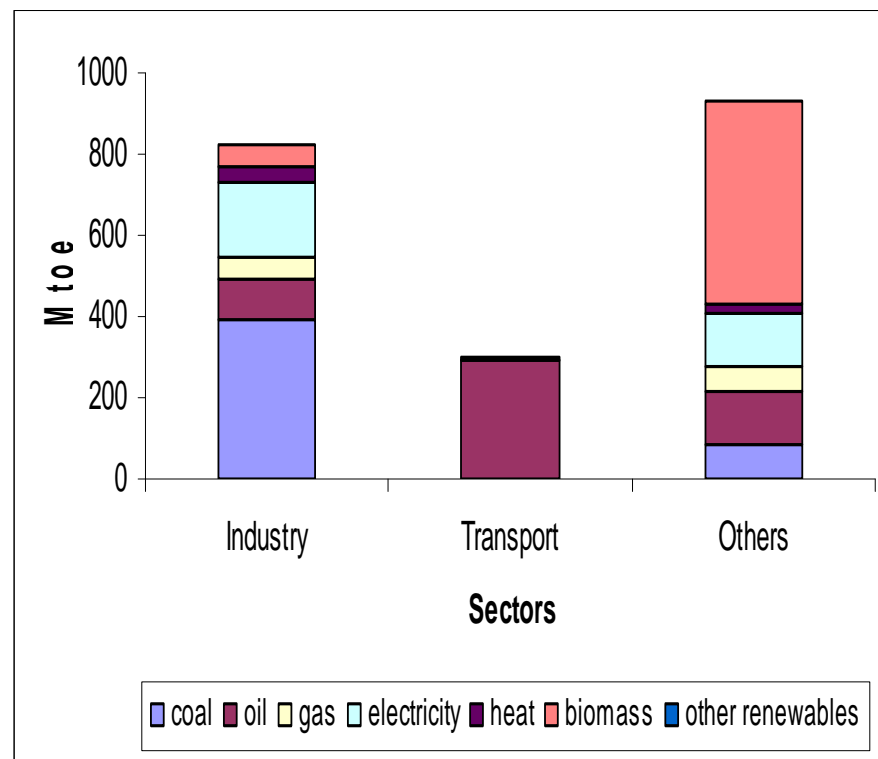
- Met by coal (48%), electricity(23%) and oil (12%)

Transportation sector: 303 mtoe.

- 96% of this met through oil.

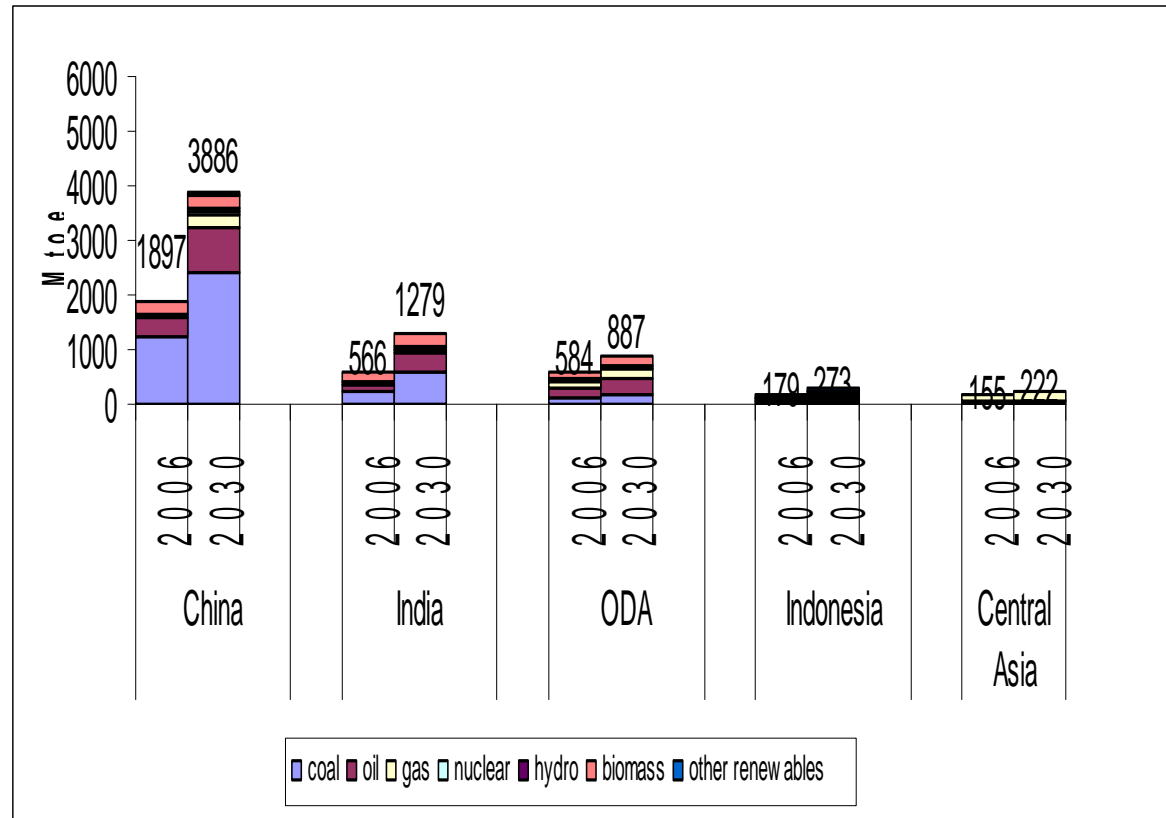
Other sectors: 933mtoe

- 53% of this was met through biomass and waste, 14% each through electricity and oil and 9% through coal.



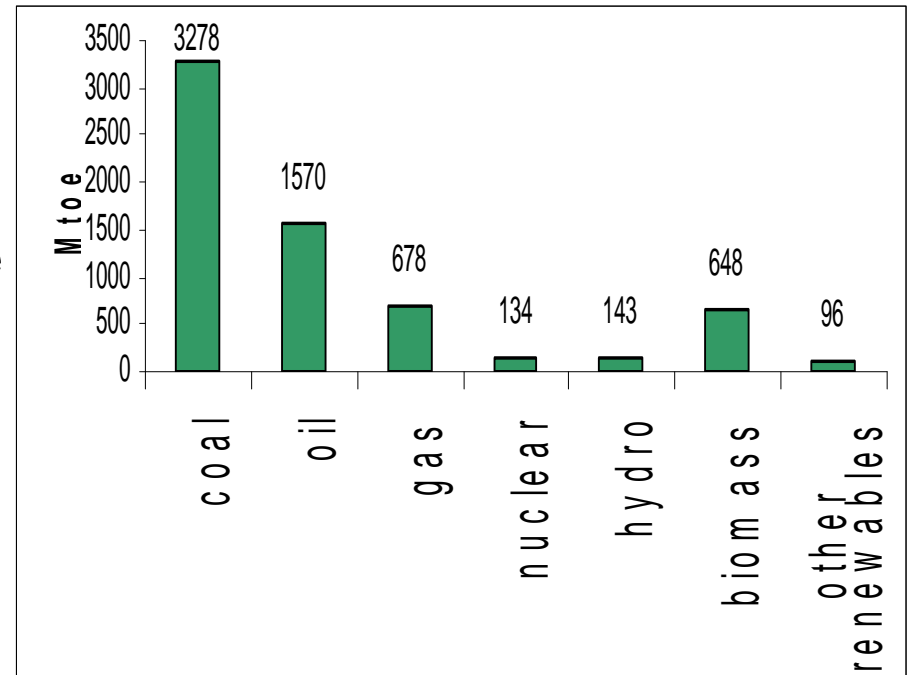
Energy Demand Projections for 2030

- Global primary energy demand projected to grow at 1.6% to 17,014 mtoe (2006-2030)
- Demand in China and India projected to grow much faster (at 3%, 3.5% respectively)
- This region (including India and China) is projected to account for 38.5% of the global demand for primary energy in 2030.

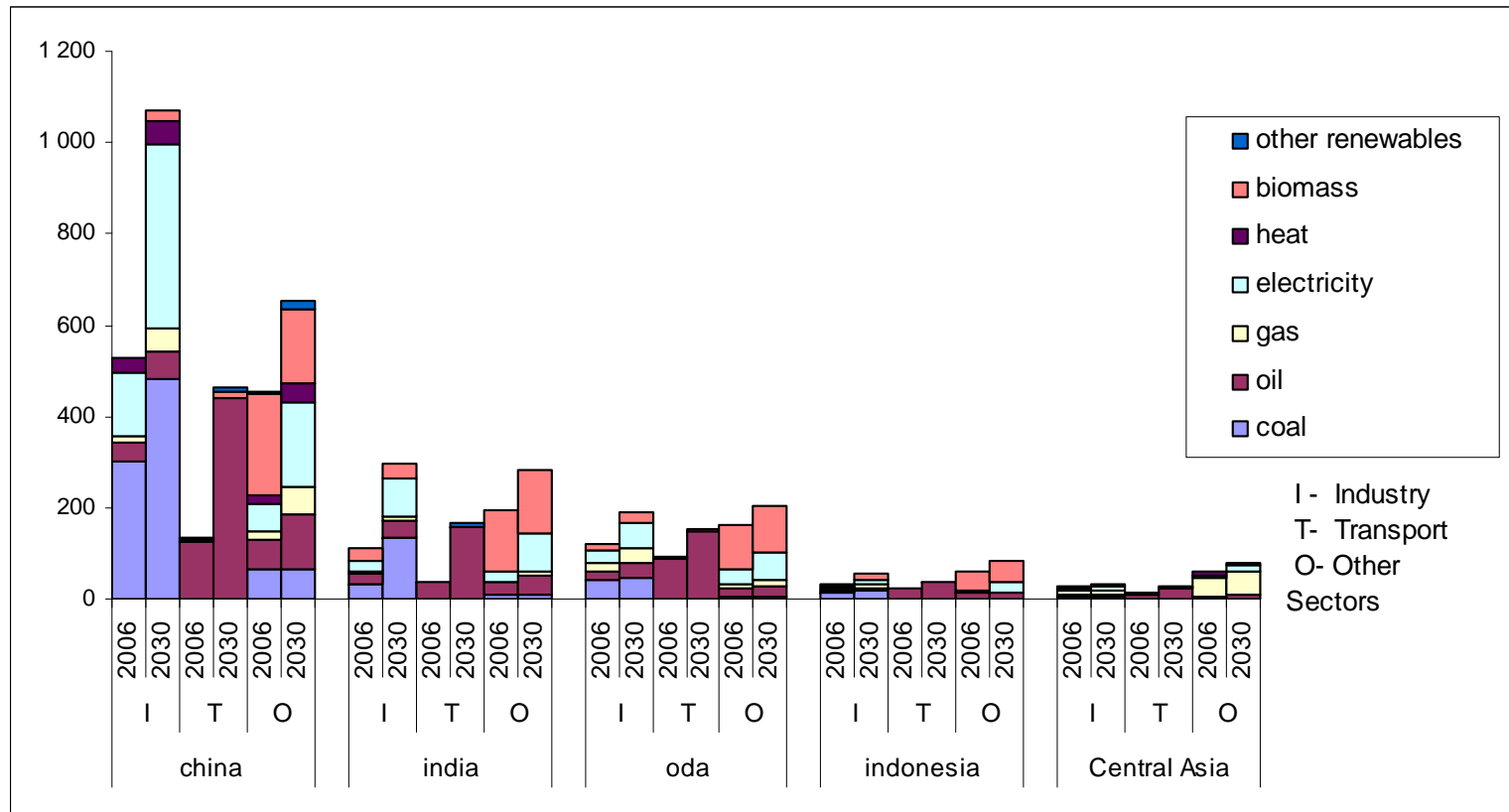


Energy Demand Projections by Fuel

- Reliance on coal of the region to become stronger - share in fuel mix to rise to 50% in 2030 (from 47% in 2006)
- Nuclear and other renewables forecast to grow fastest (at 6.3%,7% respectively) - but the share in fuel mix is expected to remain under 4%
 - But the region is expected to account for the largest increase in nuclear energy in the world
- Demand for oil led by transport sector in India and China
- Share of gas in the fuel mix is expected to rise to 10%



Energy Demand Projections by Sector



- Demand in the transport sector expected to grow fastest - to be met largely from oil (95%)
- Industrial energy demand grows by 3% - coal dominates (42%)
- Other sectors expected to remain dependent on biomass (35%)

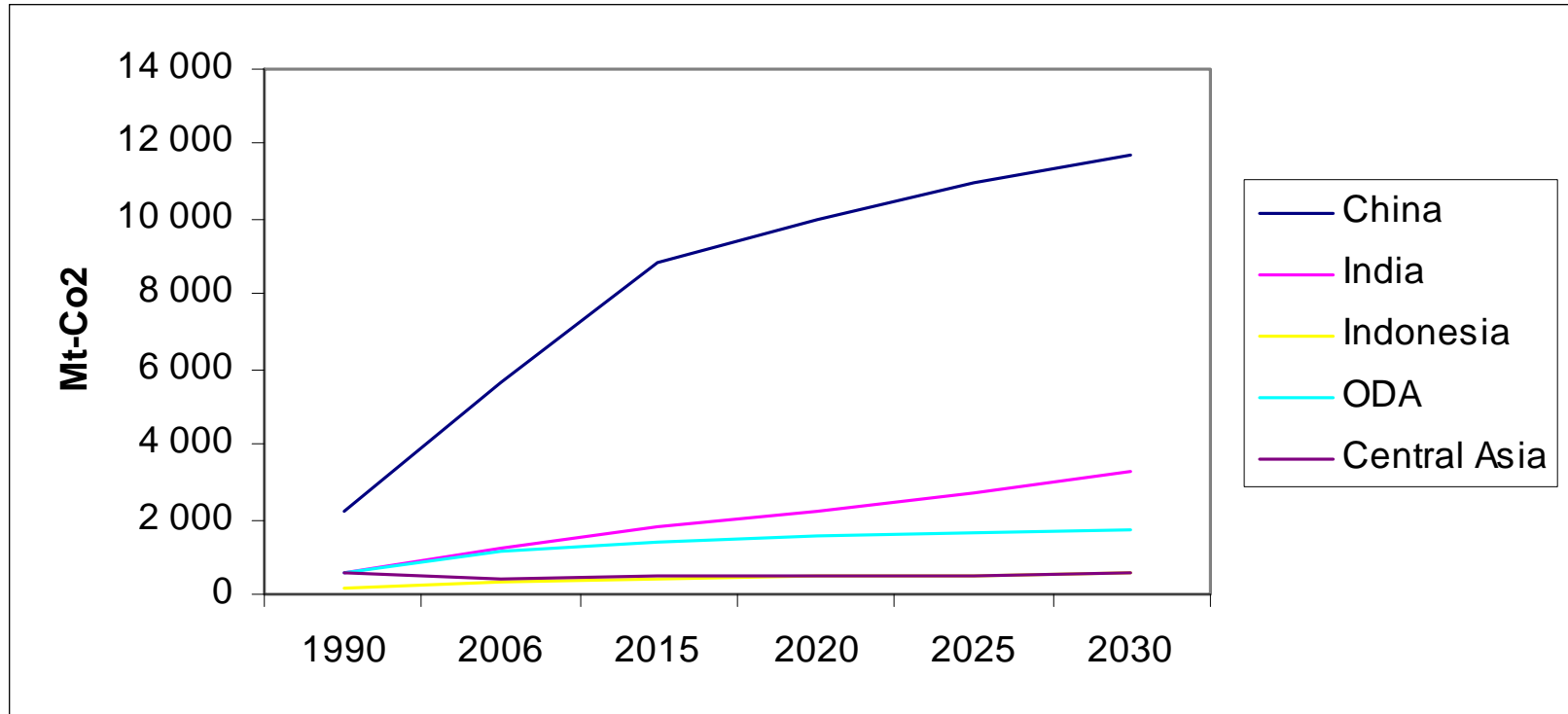
Electricity

- Electricity consumption in the region has grown by 8.1% p.a. between 1997-2004 (ADB)
- China accounts for over 40% of the total increase world-wide in 2000-2006.
- Global electricity demand projected to grow at 3.2% in 2006-2015, slowing to 2% per year in 2015-2030. Demand grows fastest in Asia due to shift in economic structure from heavy industry towards less energy intensive lighter industries.

Electricity

- In WEO (2008, Ref Scenario) electricity generation in the region expected to rise from 4787 TWh in 2006 to 8431 TWh in 2015 and 13196 TWh in 2030.
- Growing share of this region in world total power generation (from 25% in 2006 to 34% in 2015 and 40% in 2030)
- Power generation in this region to remain more dependent on coal than the rest of the world - share of coal in power generation in this region rises from 66% in 2006 to 69% in 2015 and reduces marginally to 67% in 2030

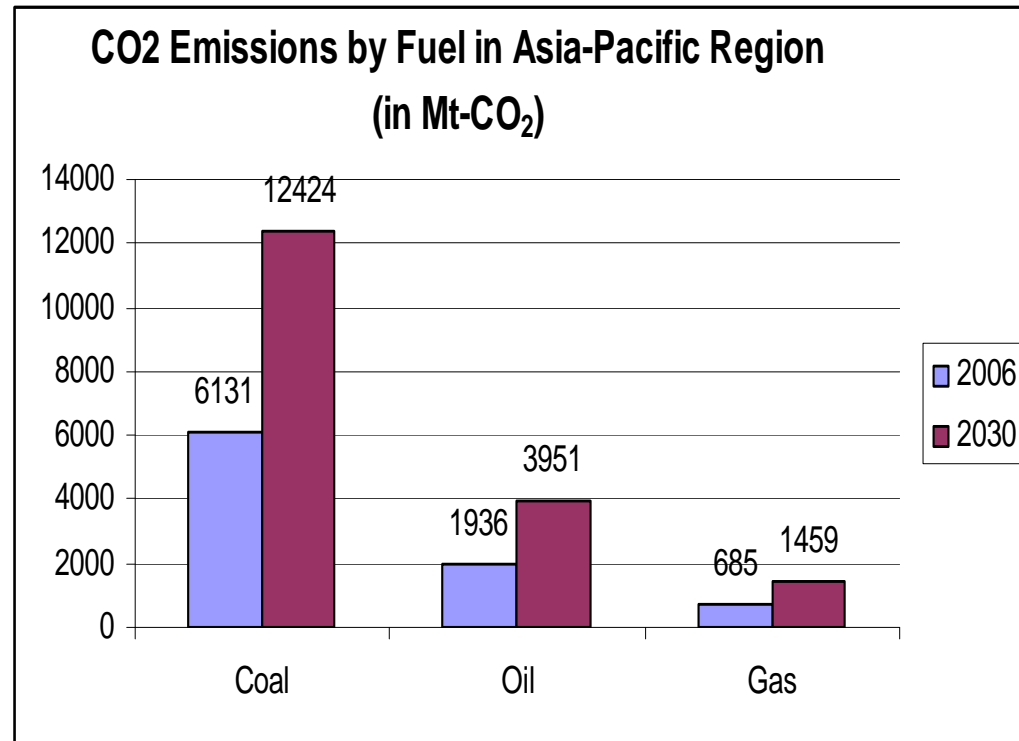
CO₂ Emissions (WEO, Ref Scenario)



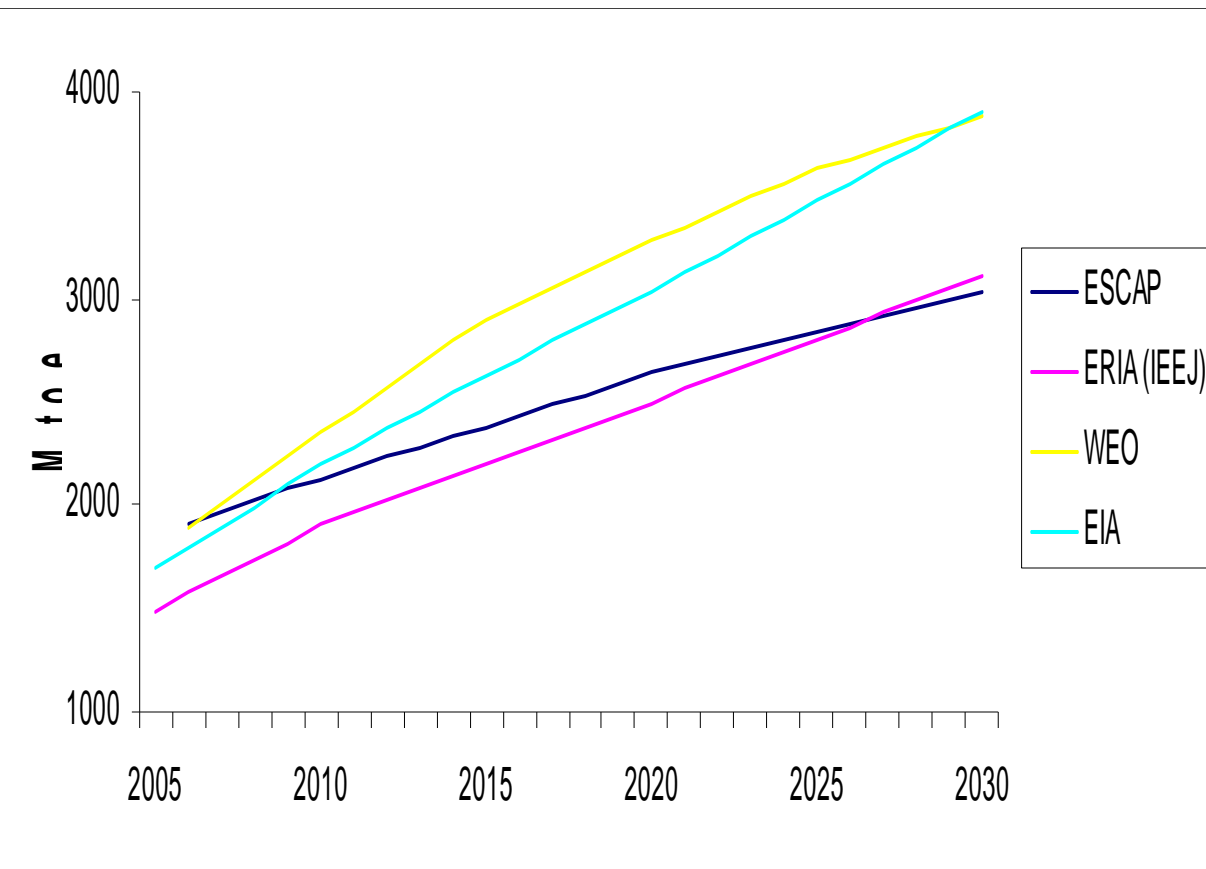
- Global CO₂ emissions expected to increase at 2% p.a.
- Emissions in China and India to grow at 3.1% and 4.1% pa resp.
- China emissions much higher than for the rest of the countries in the region.

CO₂ Emission Projections by Fuel

- Total emissions for region increase by over 2% p.a.
- Emissions from oil in the power generation sector in India, Indonesia and Central Asia are negative at -0.2%, -1.6% and -1.6% and mildly positive (0.2%) for China.
- Emissions grow fastest from oil in the transport sector because of the increase in vehicular intensity and lack of an alternate transport fuel to switch to.

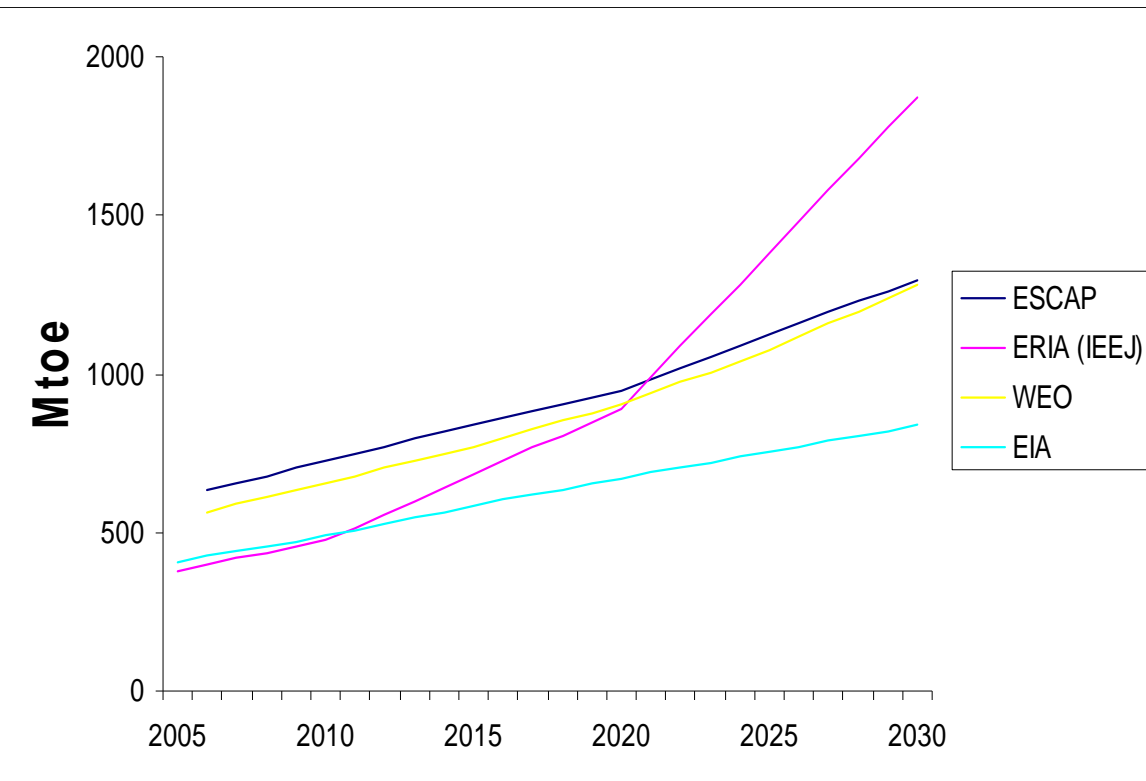


Range of Energy Demand Projections for China



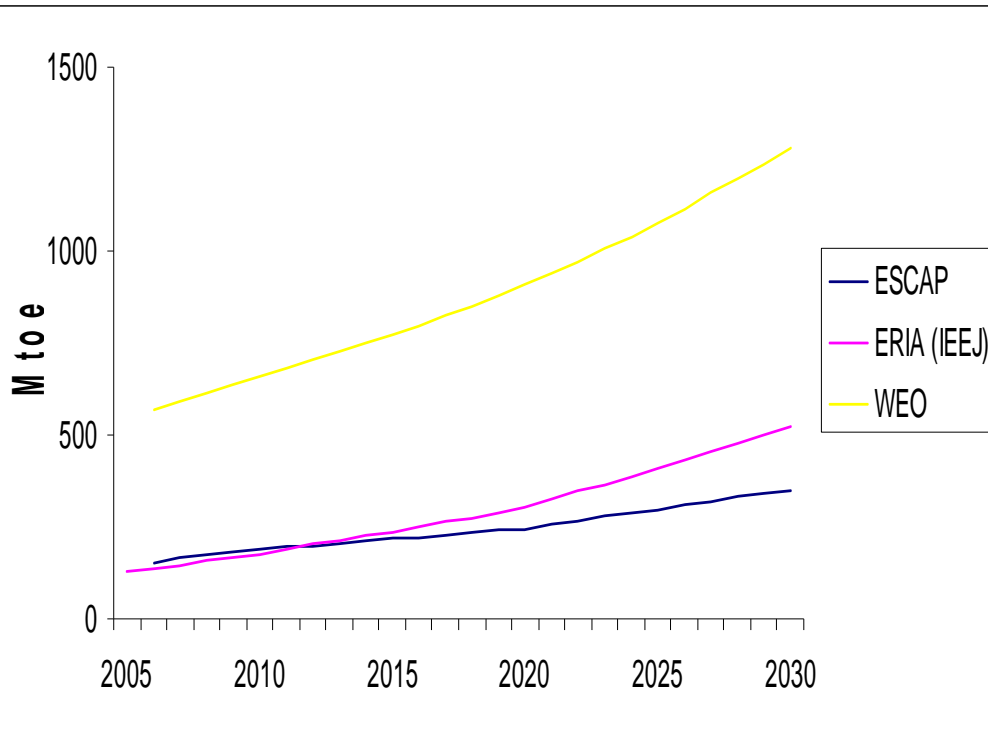
- Demand for primary energy will grow at annual rate of 3% between 2006-2030 (WEO, IEEJ)
- China will continue to be heavily dependent on coal to meet her demand for primary energy
- Among end-use, transport is expected to grow the fastest at 5.3% (WEO, 2008)

Range of Energy Demand Projections for India



- Rate of growth for the primary energy demand varies widely between 2.8% (EIA, 2008) and 6.6% (IEEJ, 2008)
- Nuclear is among the fastest growing sectors for providing energy with CAGR of 9% (IEEJ, WEO).
- Out of the end use sectors, the transportation sector is expected to be the fastest growing at CAGR of 6.3%.

Primary Energy Demand Projections for Indonesia



- Rate of growth of primary energy @ 5.8% (IEEJ, 2008), 1.8% (WEO, 2008), 3.4% (ESCAP, 2008)
- Hydro expected to be among the fastest growing sectors for primary energy supply. Annual rate @ 4.2% (WEO, 2008)
- Among end-use sectors, transport sector is the fastest growing sector with annual growth rate of 7.3%
- Projections vary due to inclusion of bio-mass in WEO projections

In sum...

- Data availability still a huge challenge in Asian developing countries
- Have to rely on macro demand projections by international bodies. May not reflect development challenges and future pathways of these countries
- Establishing baselines a difficult task – negatively impacts access to clean financing
- Disaggregated understanding of demand for energy essential for designing RE&EE programs
- Climate impact assessments difficult

Questions...

- What are the key energy challenges in your country?
 - Present?
 - Future?
- What would be the scope for energy efficiency and renewable energy?
- Do you see the climate change as a threat to your energy security? Why?

Thank you