



China and India's Energy Development in Global Perspective

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Today's messages

- **The global energy system faces serious challenges**
- **These can be met through action on both supply and demand sides**
- **China and India are key players in all major energy areas**
- **Collaboration between them, and with other countries, is essential**



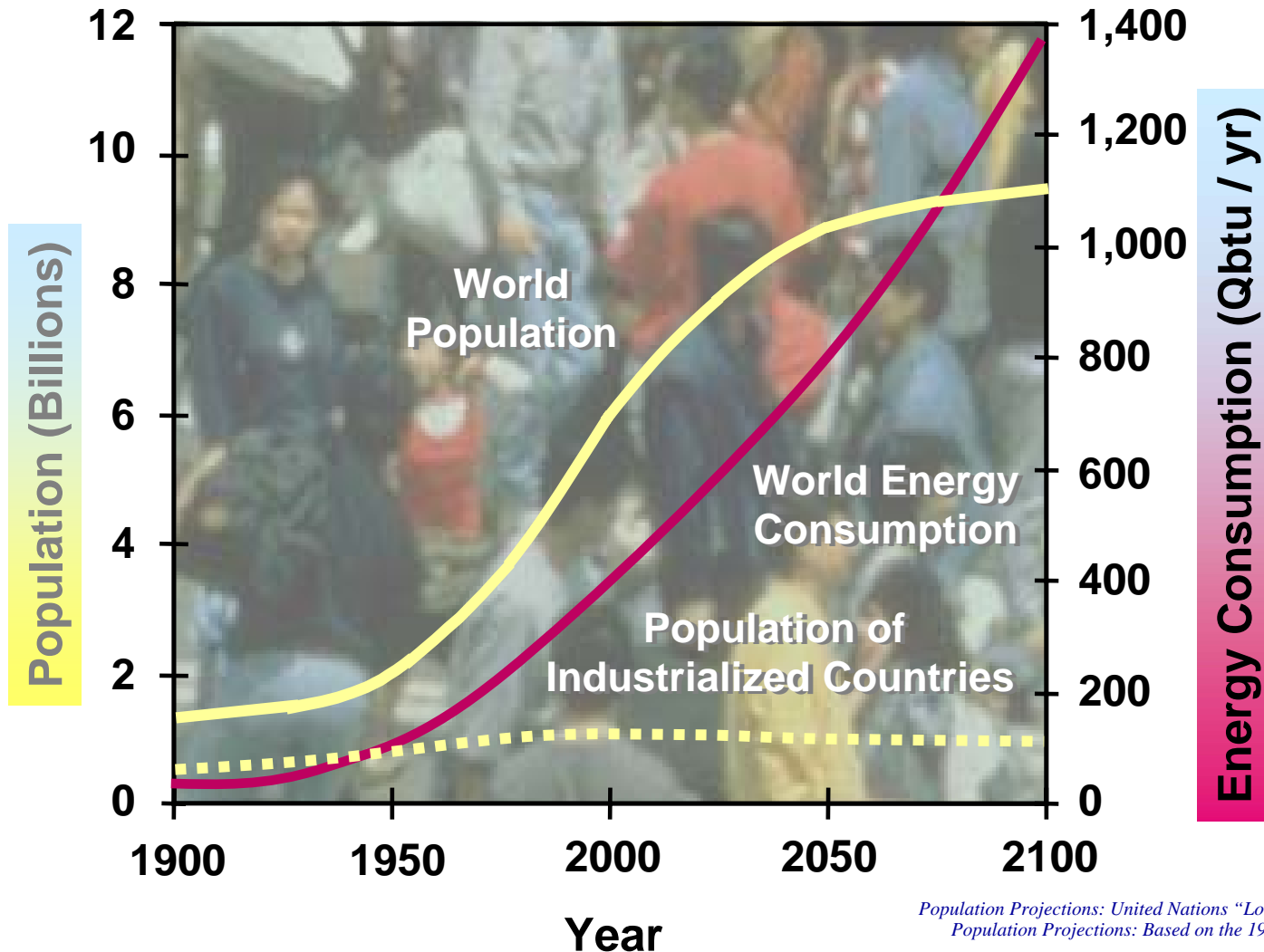
Challenges

The world needs strategies for a clean, clever and competitive energy future

- Transparent—and stable—energy markets
- More-efficient energy services in transport, buildings and industry
- CO₂ reductions through:
 - ◆ R&D for cleaner energy technologies
 - ◆ Carbon capture and storage
- Wider access to energy services
- Improved investment environment



World energy demand will keep on growing absent significant changes

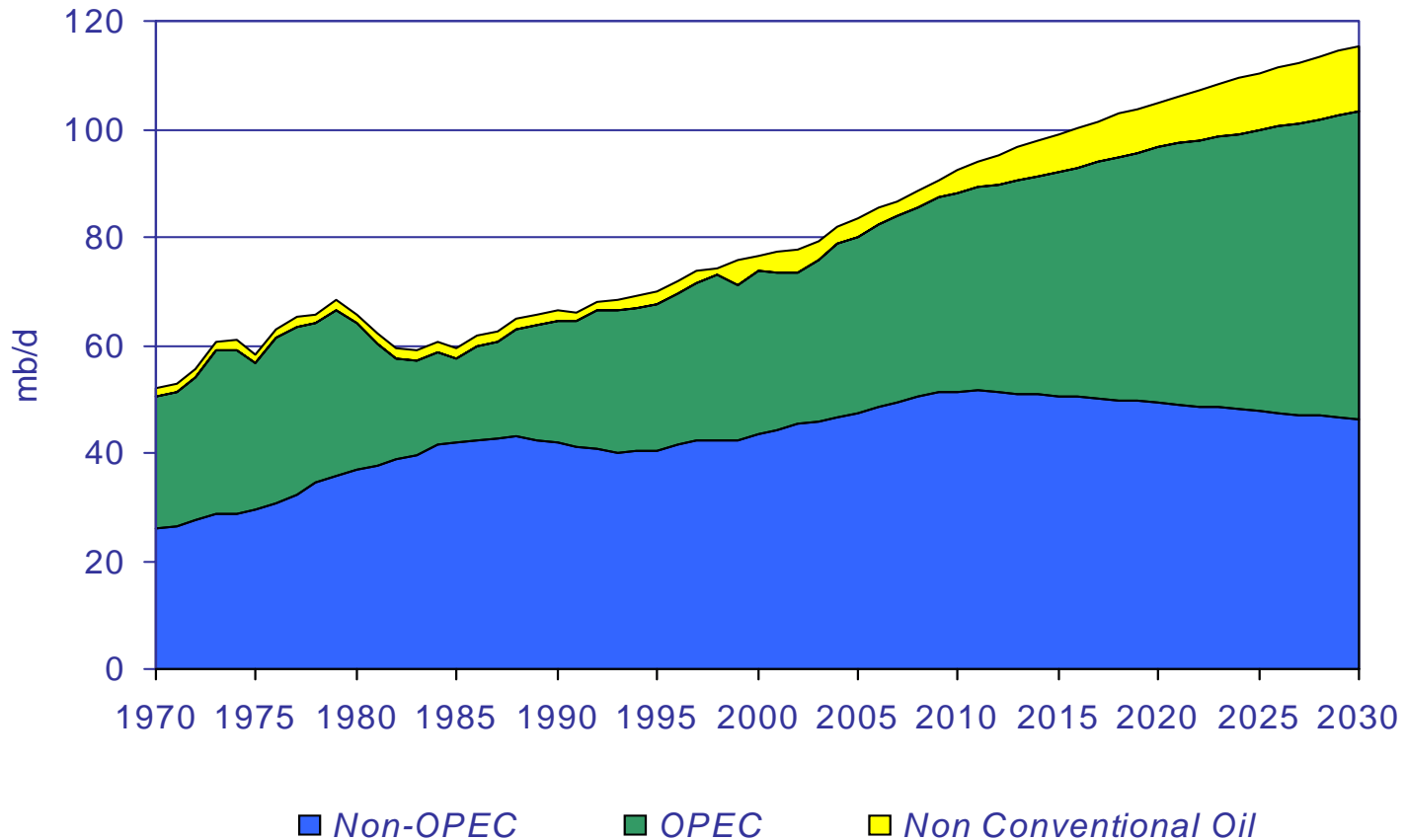


Population Projections: United Nations "Long-Range World Population Projections: Based on the 1998 Revision"

Energy Projections: "Global Energy Perspectives" ITASA / WEC



Global oil demand is set to rise further

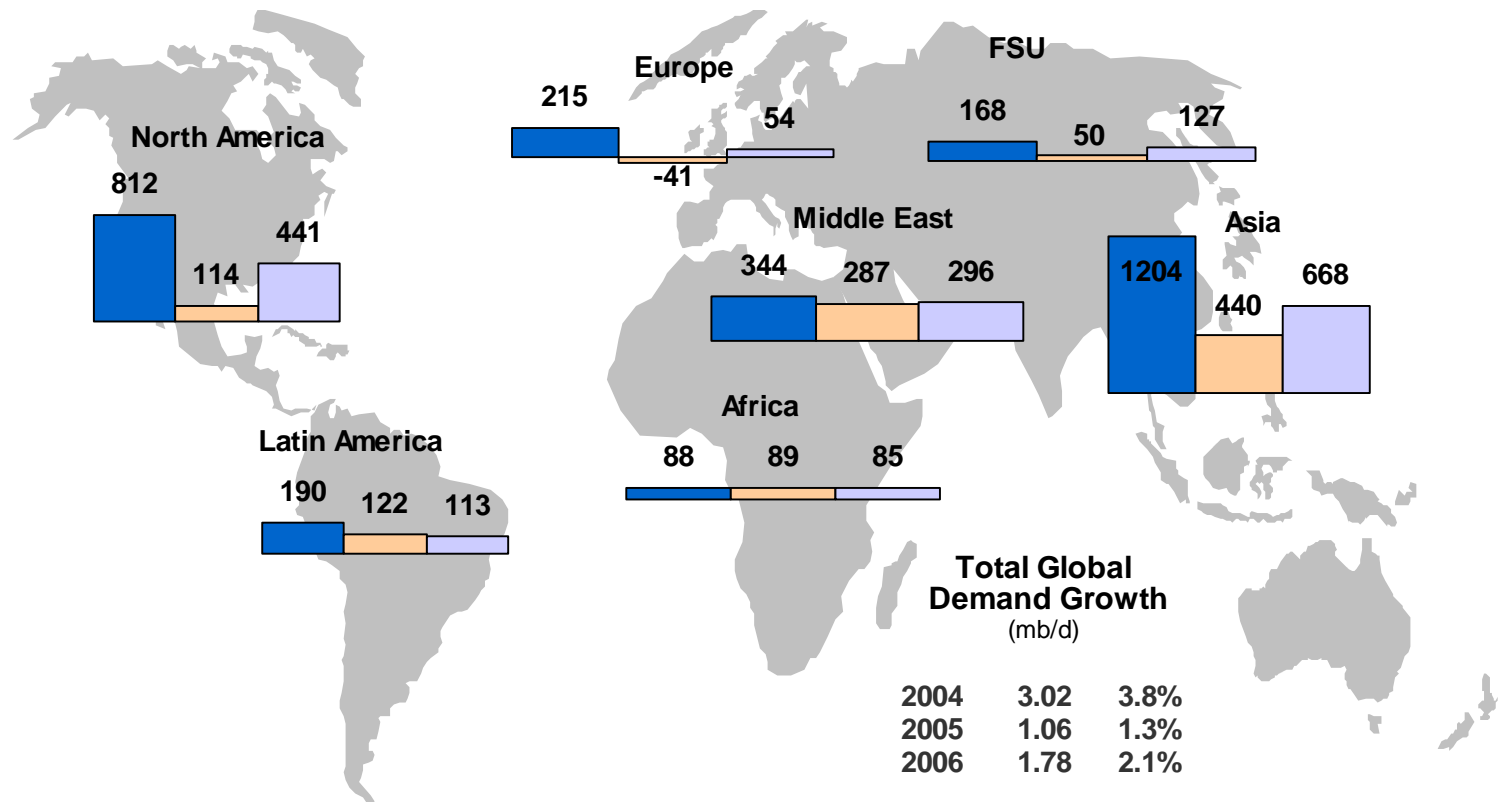


Oil demand could reach 115 mb/d by 2030, and OPEC's Share of Supply could rise to 50%



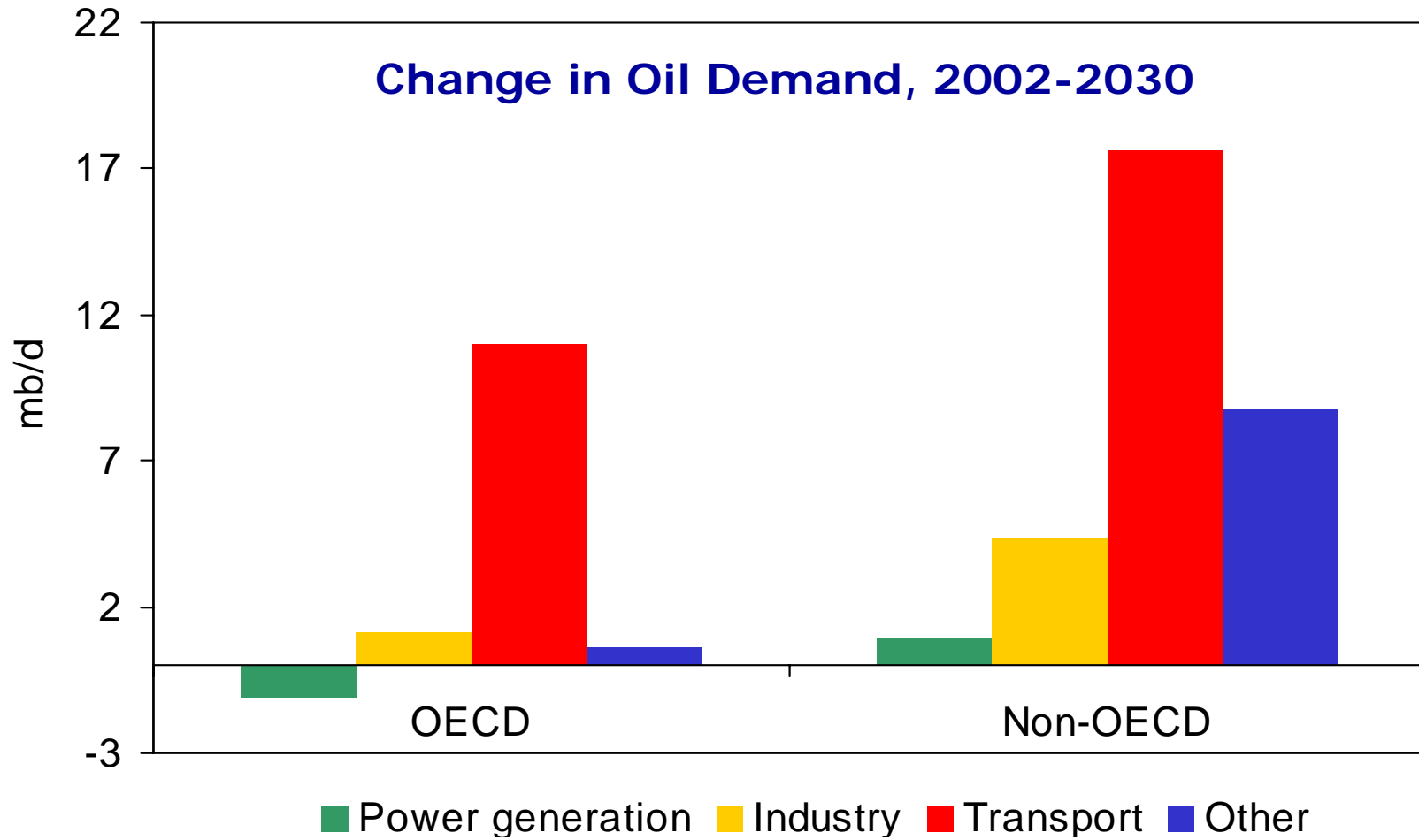
Growth in oil demand accelerated slightly in 2006

thousand barrels per day





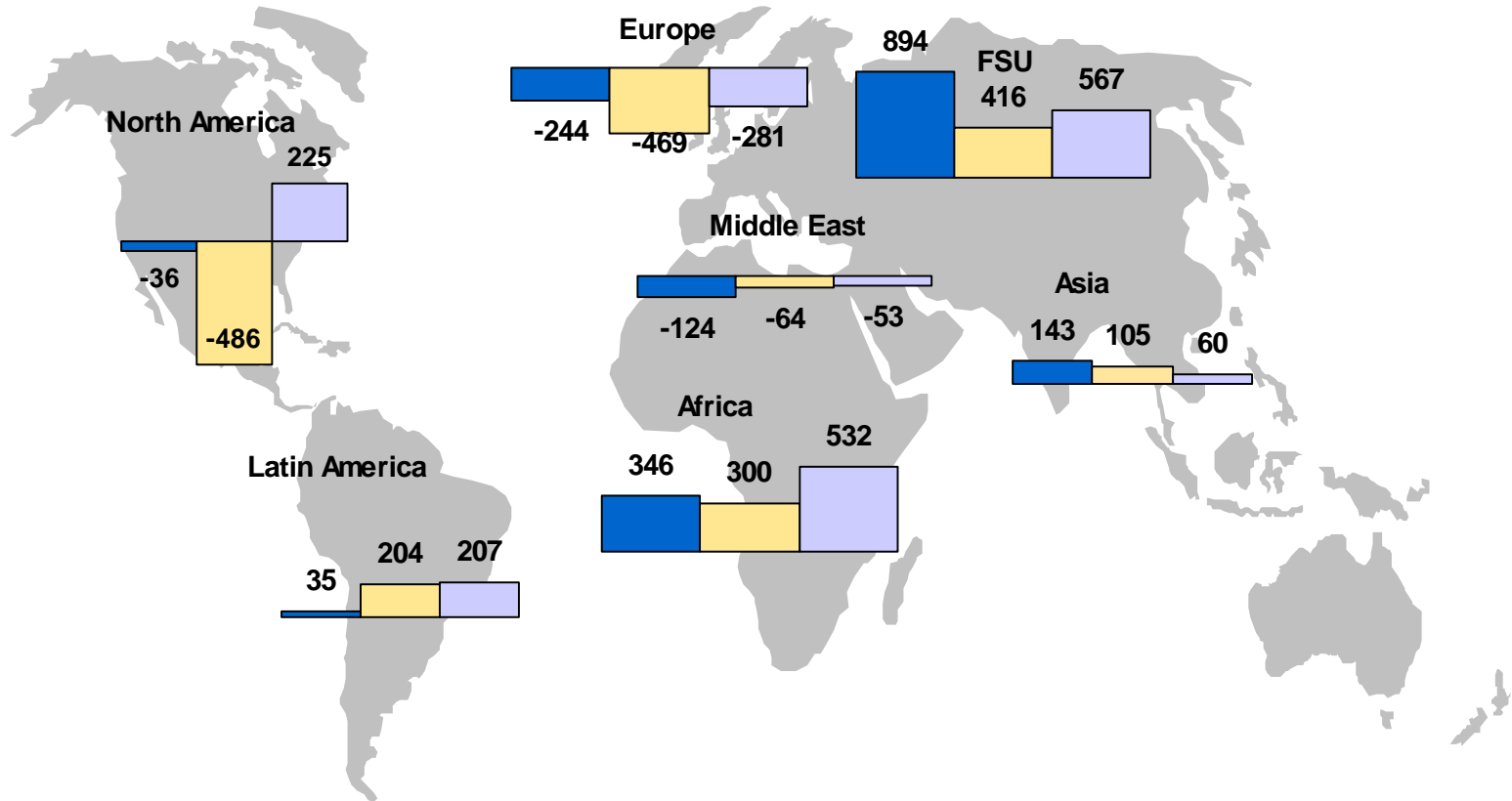
OECD demand will rise significantly, but developing country demand rise even more





Growth in non-OPEC supply is expected to rebound in 2006

thousand barrels per day



Total Non-OPEC Supply Growth (kb/d)

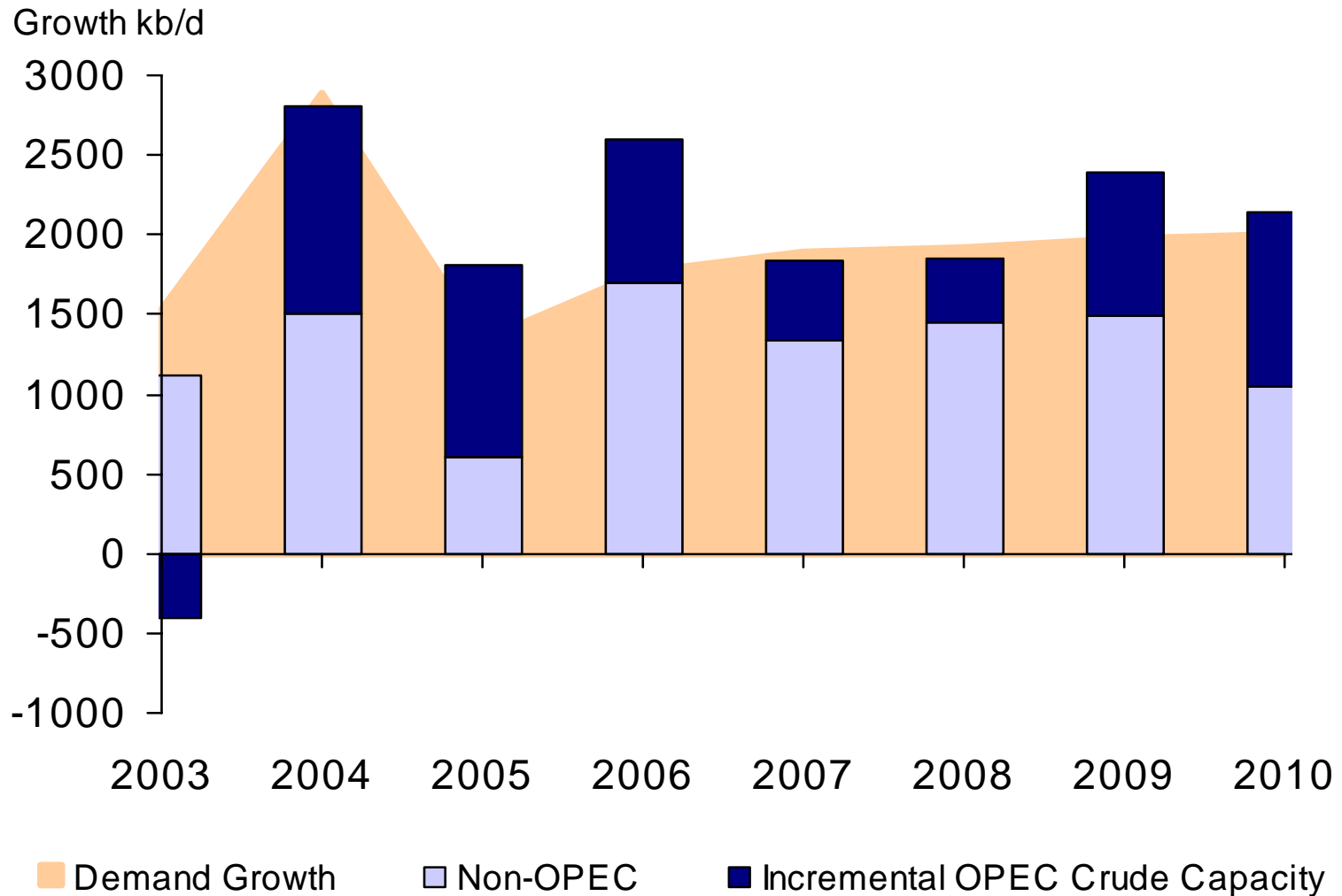
2004	1044
2005	34
2006	1294

OPEC NGLs (kb/d)

2004	425
2005	422
2006	311



Can OPEC fill the "Supply Gap" to 2010(?)





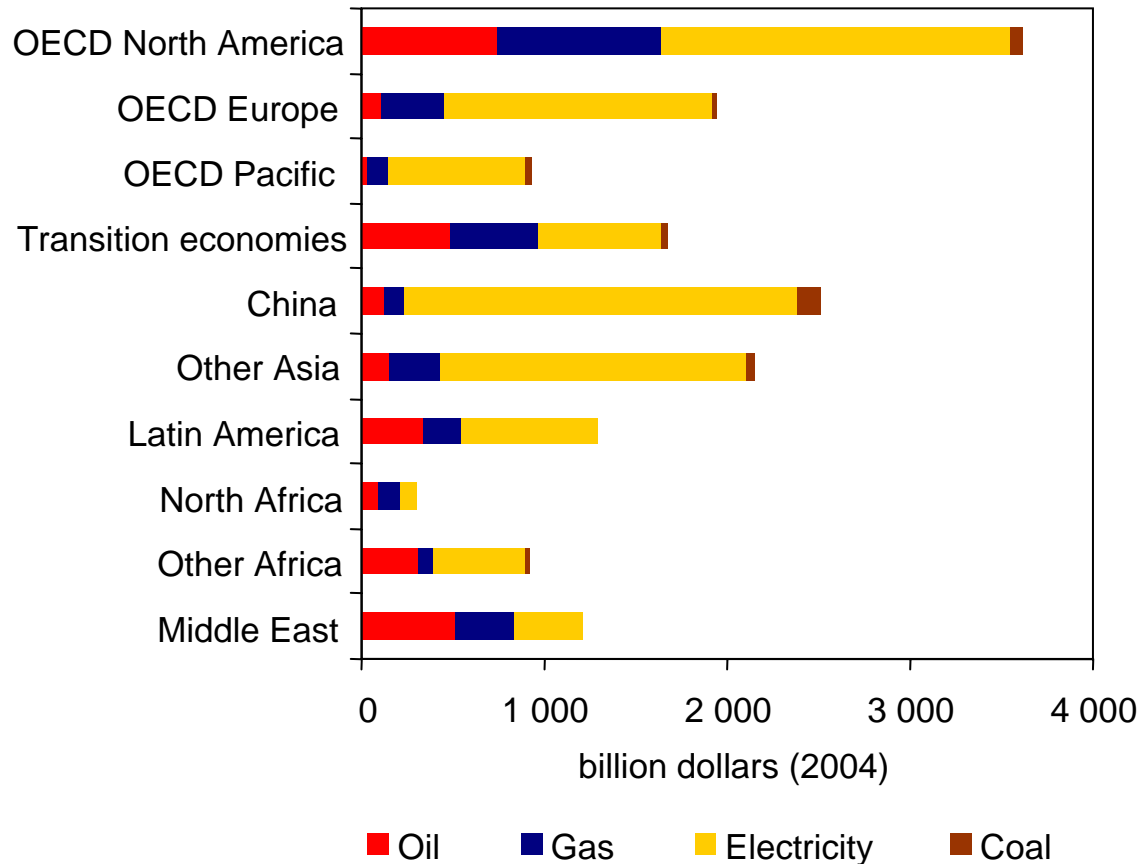
Meeting the supply-side challenges

- **Enhancing oil recovery**
- **Locating and moving gas**
- **Generating and delivering a great deal more electricity**
- **Sequestering carbon**
- **Expanding non-fossil energy**



Paying to meet the supply challenges will be expensive

Cumulative Energy Investment in the Reference Scenario, 2004-2030

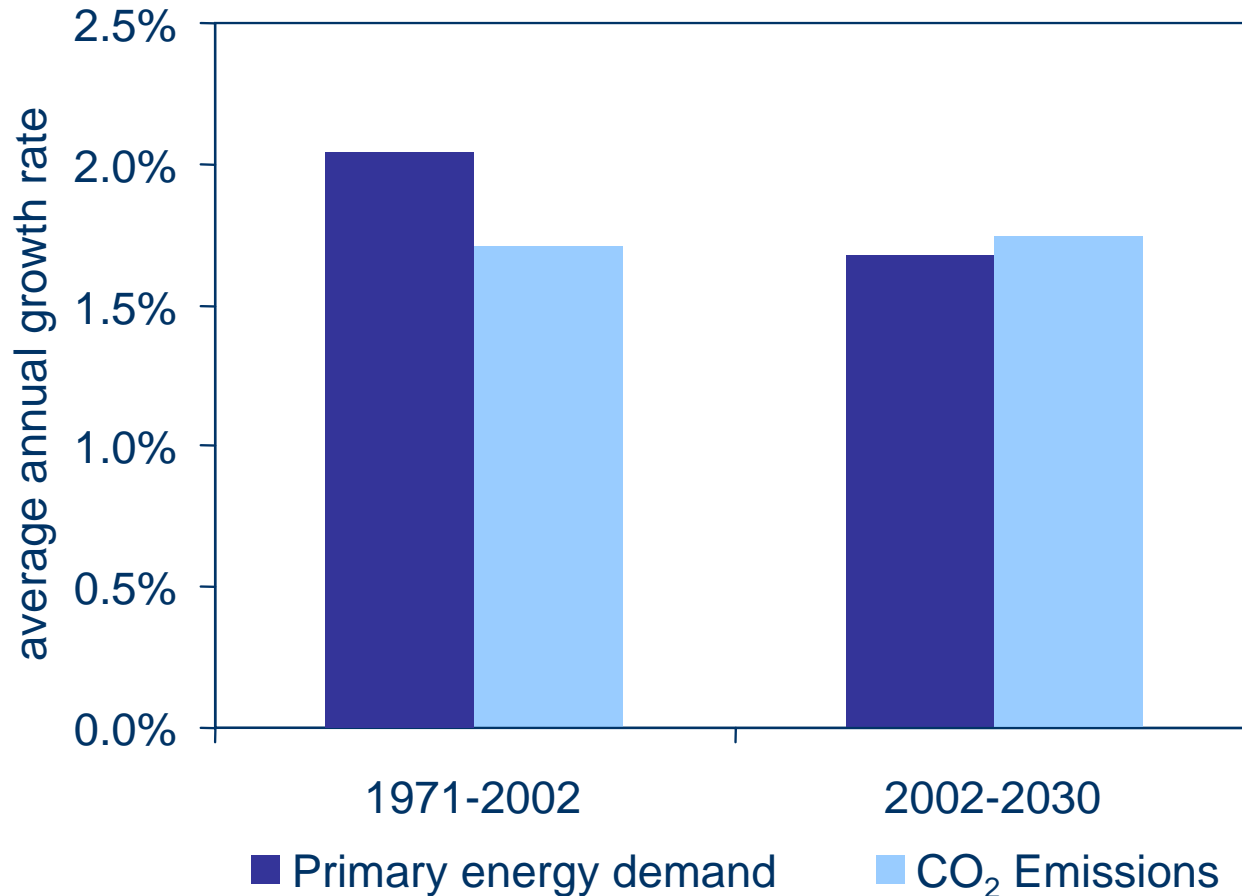


Source: WEO 2005

Over 60% of total supply investments will go to the power sector



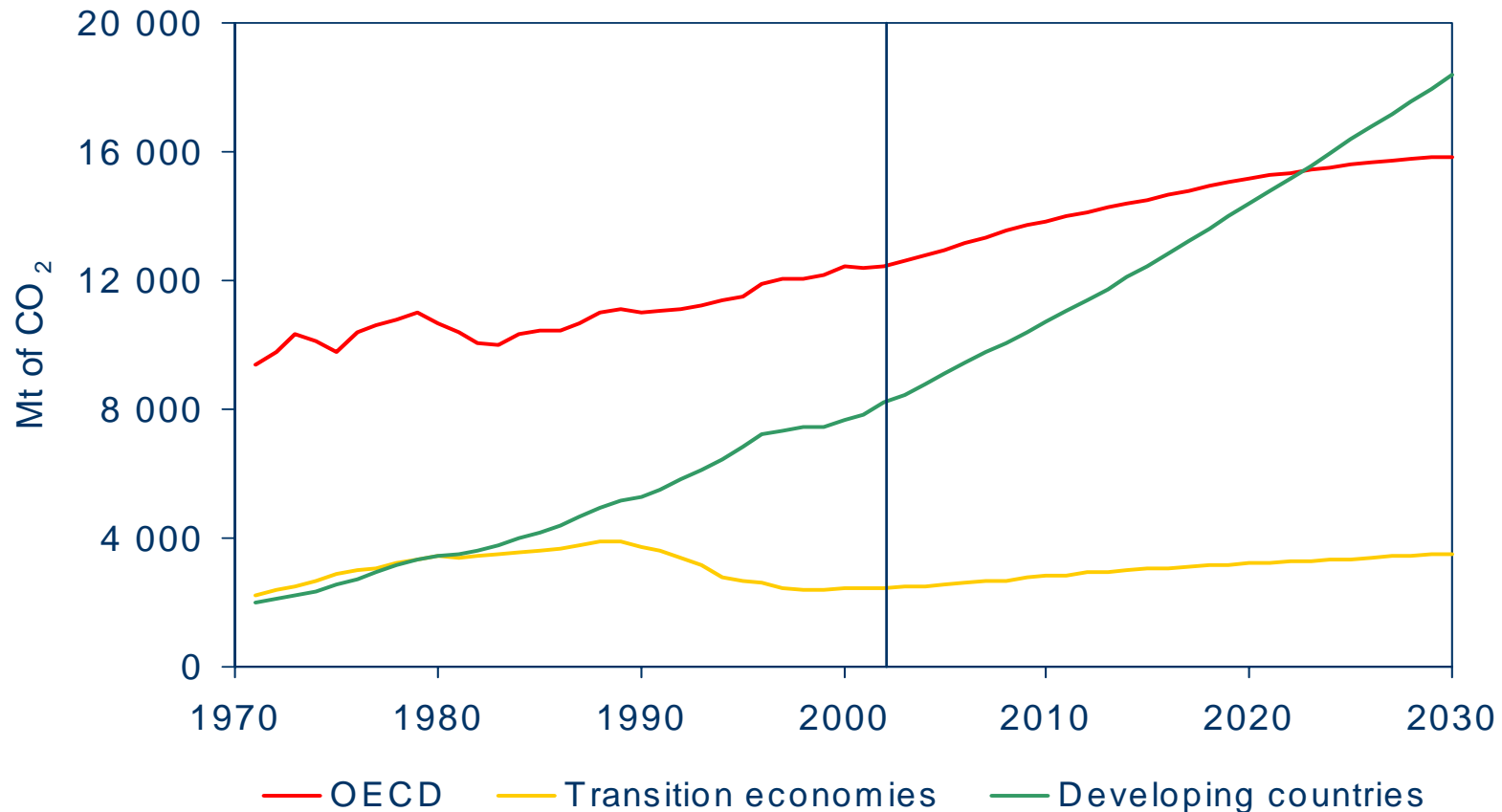
Growing dependence on coal could lead to CO₂ growing faster than energy



Average carbon content of primary energy increases slightly through 2030 – in contrast to past trends



Developing countries may account for over two thirds of CO₂ emissions growth

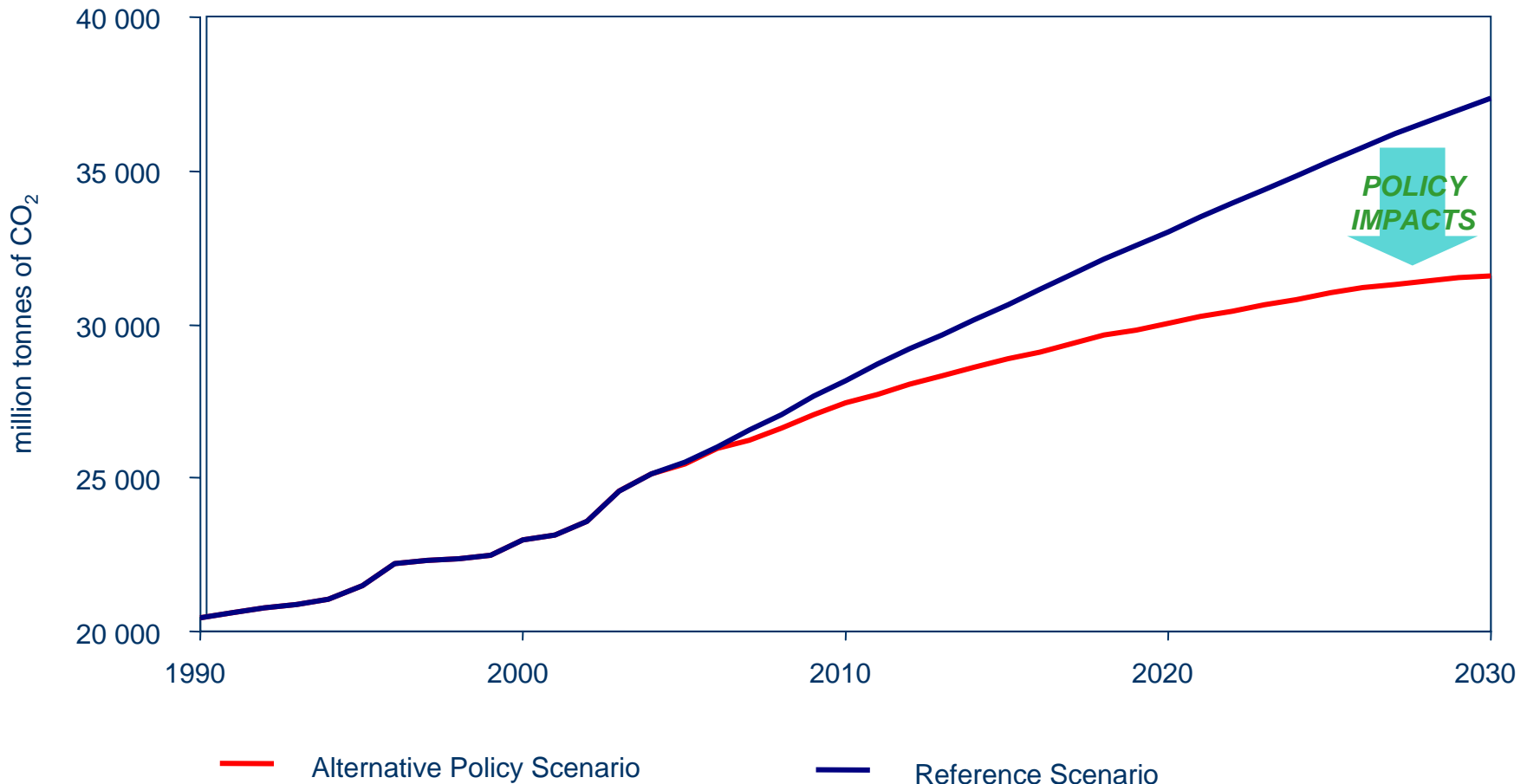


CO₂ emissions will increase fastest in developing countries, overtaking OECD in the 2020s

Source: WEO 2004



Part of the investment challenge is changing the CO₂ emission path



In 2030, CO₂ emissions in the *Alternative Policy Scenario* are 16% lower than *Reference*, but still 50% higher than 1990



Avoiding 1 billion tons CO₂ per year:

Coal

Replace 300 conventional, 500-MW coal power plants with “zero-emission” power plants, which means any one of the following...

CO₂ Sequestration

Install 1000 Sleipner CO₂ sequestration plants

Wind

Install 200 x current US wind generation in lieu of unsequestered coal

**Solar
Photovoltaic**

Install 1300 x current US solar generation in lieu of unsequestered coal

Nuclear

Build 140 1-GW power plants instead of coal plants that have no CO₂ sequestration

To meet energy demand and stabilize CO₂ concentrations, unprecedented technology changes must occur in this century

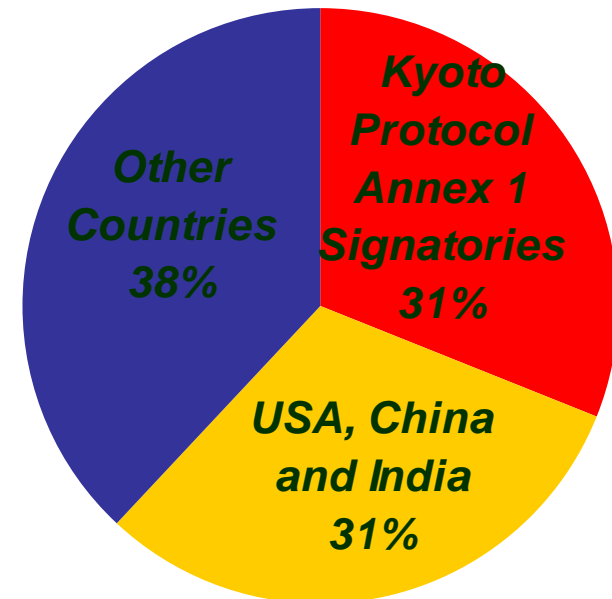
[Adapted from Pacala & Socolow, *Science* 2004]



Changes in technologies are built on changes in institutions

- Participation of all major emitters in global mitigation efforts
- New mechanisms that address cost uncertainty, promote flexibility and accommodate national circumstances
- Rapid and global diffusion of new technologies

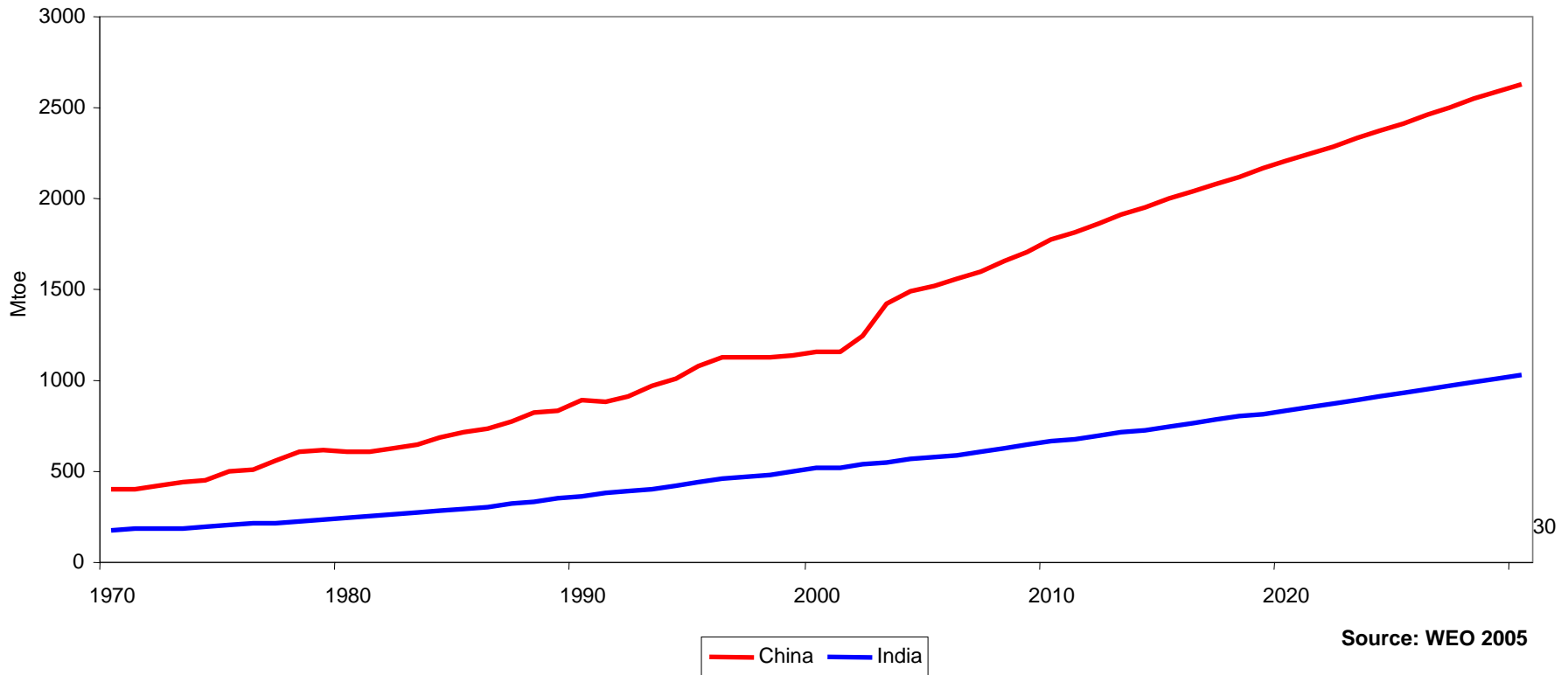
Global Emissions from Fuel Combustion





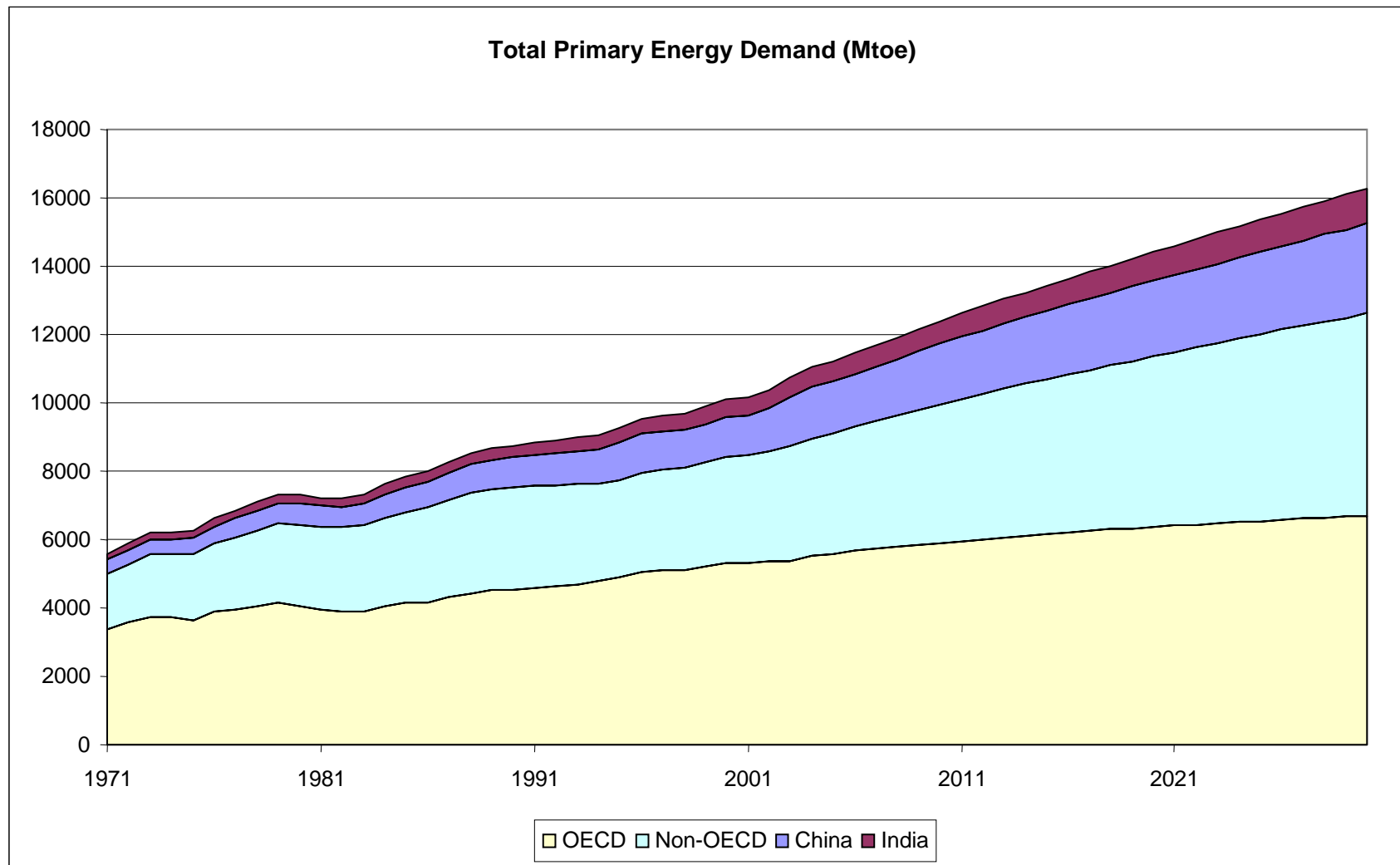
China and India in particular loom large in the minds of many

Total Primary Energy Demand





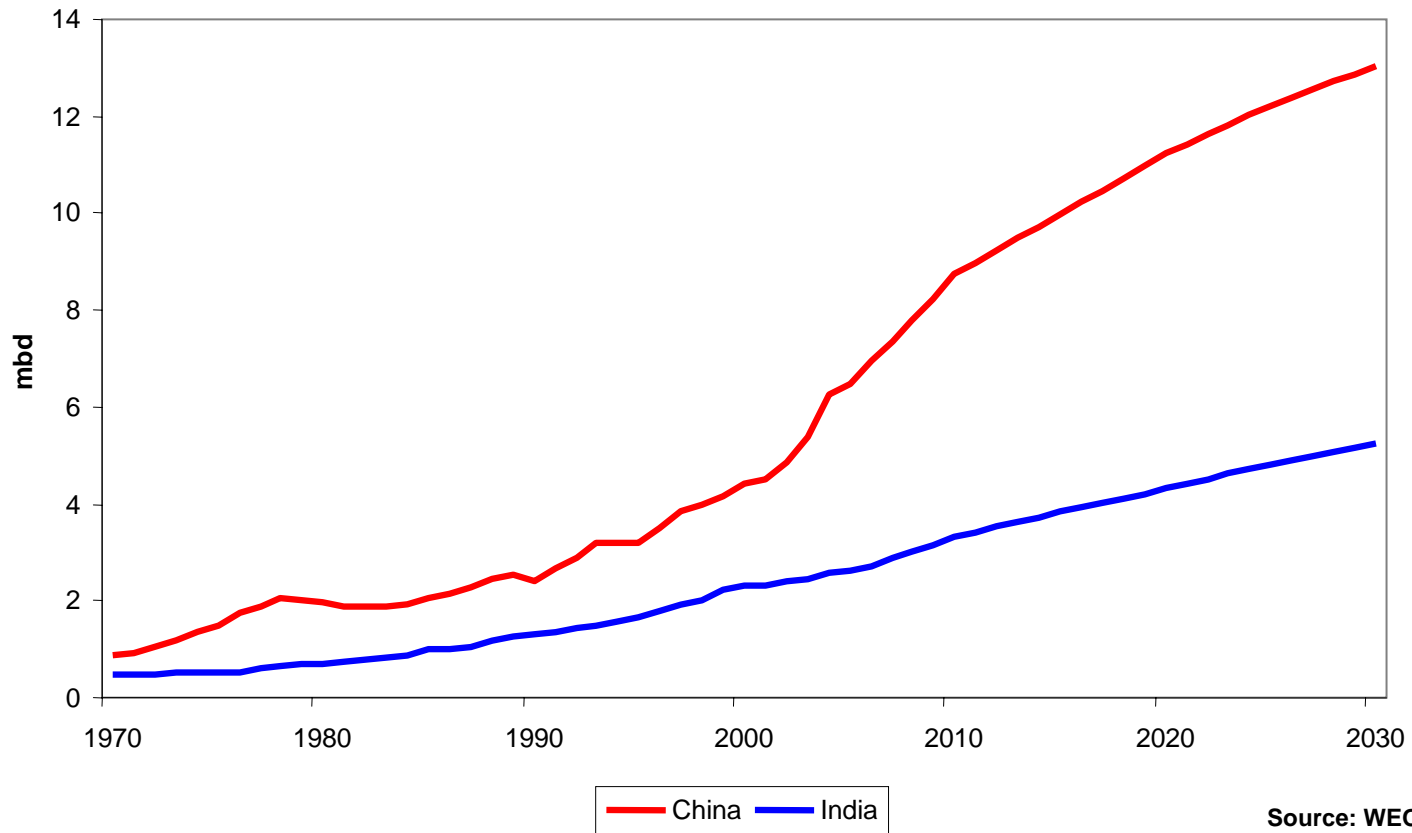
They will take a growing share of rising global demand





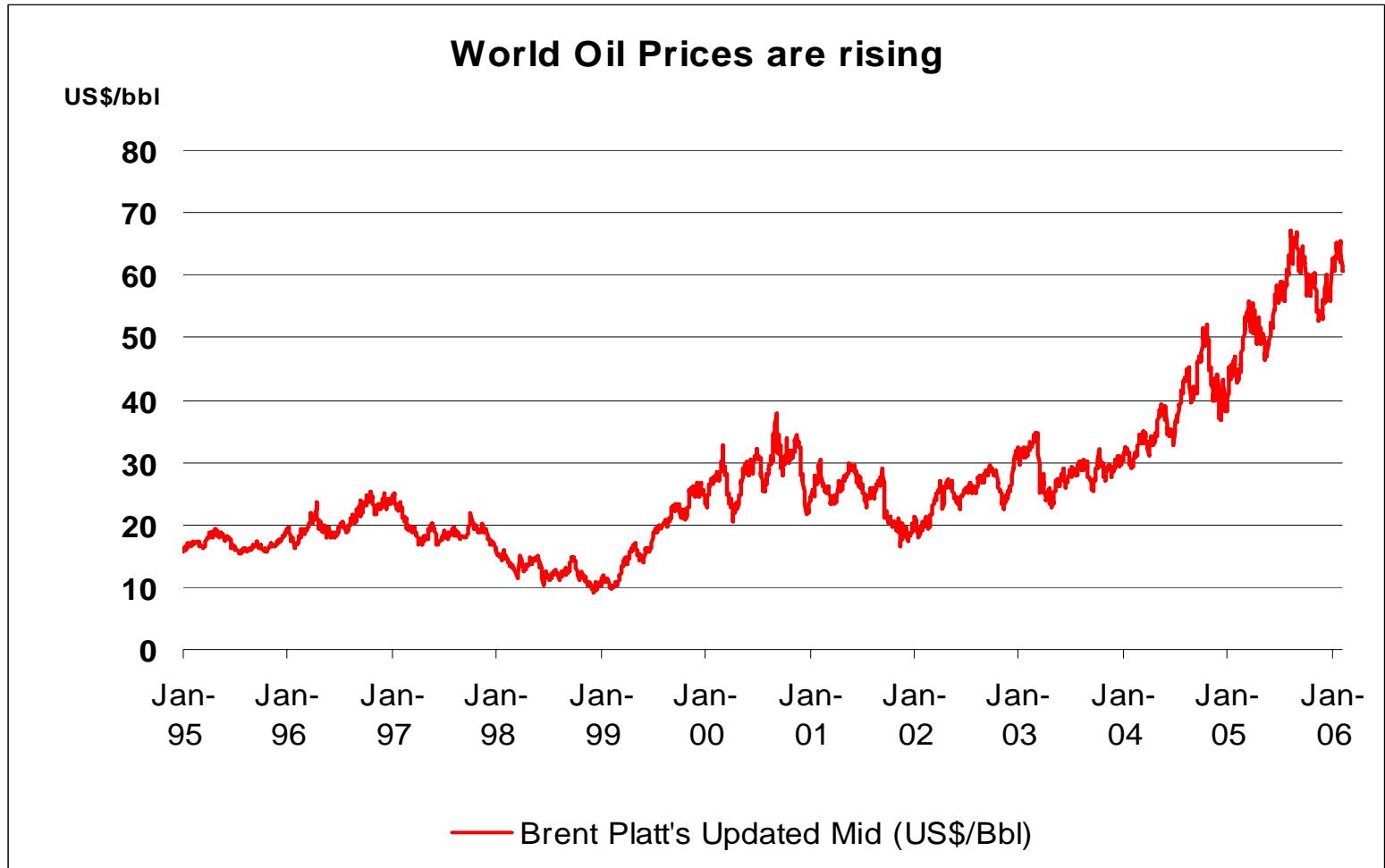
Oil has attracted particular attention recently

Oil Demand



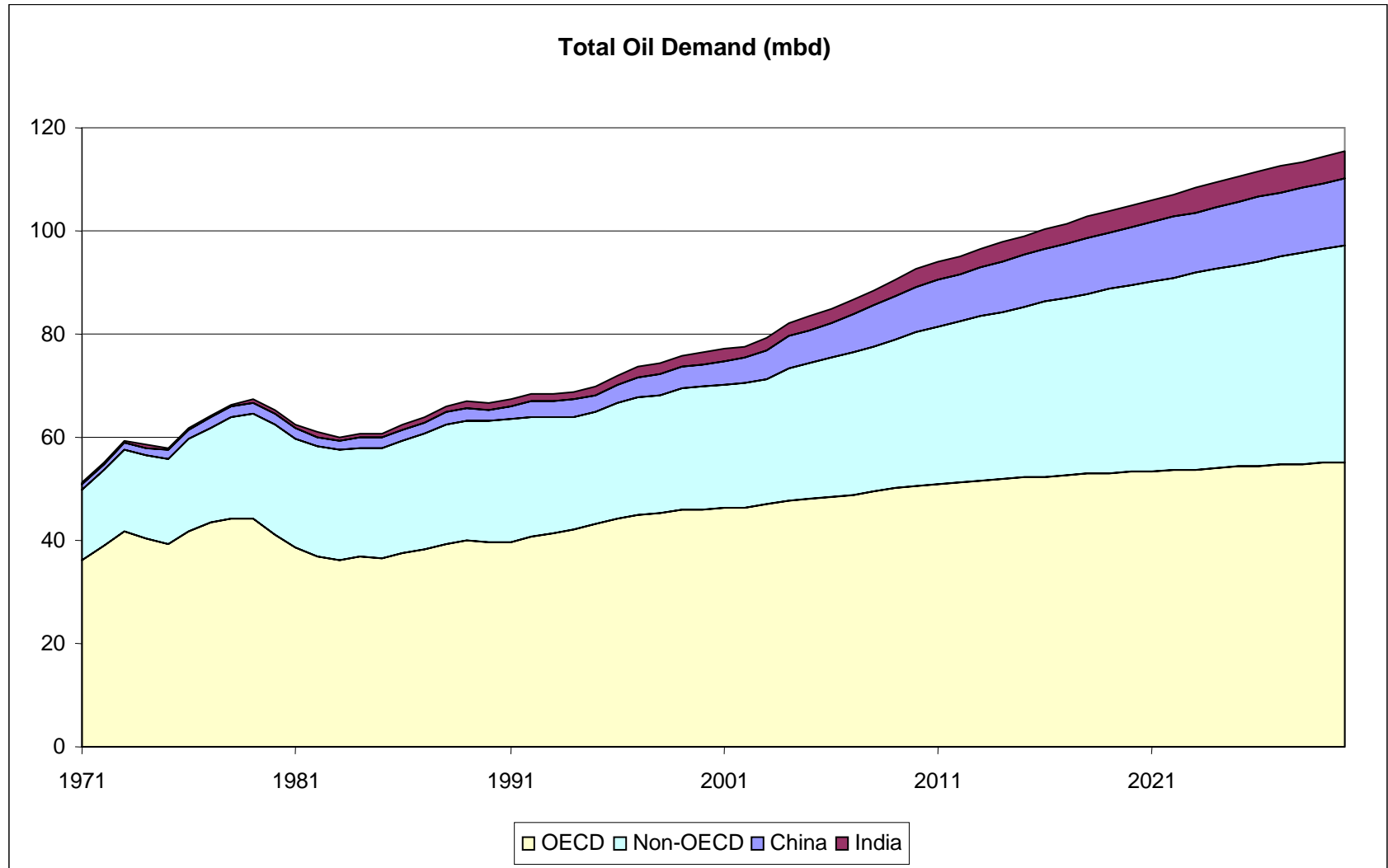


Recent price rises have roughly corresponded with China's rising oil demand...among other things





Viewed in perspective, it is hard to fix blame on China and India for the oil price changes





Chinese oil demand growth could pick up again in 2006

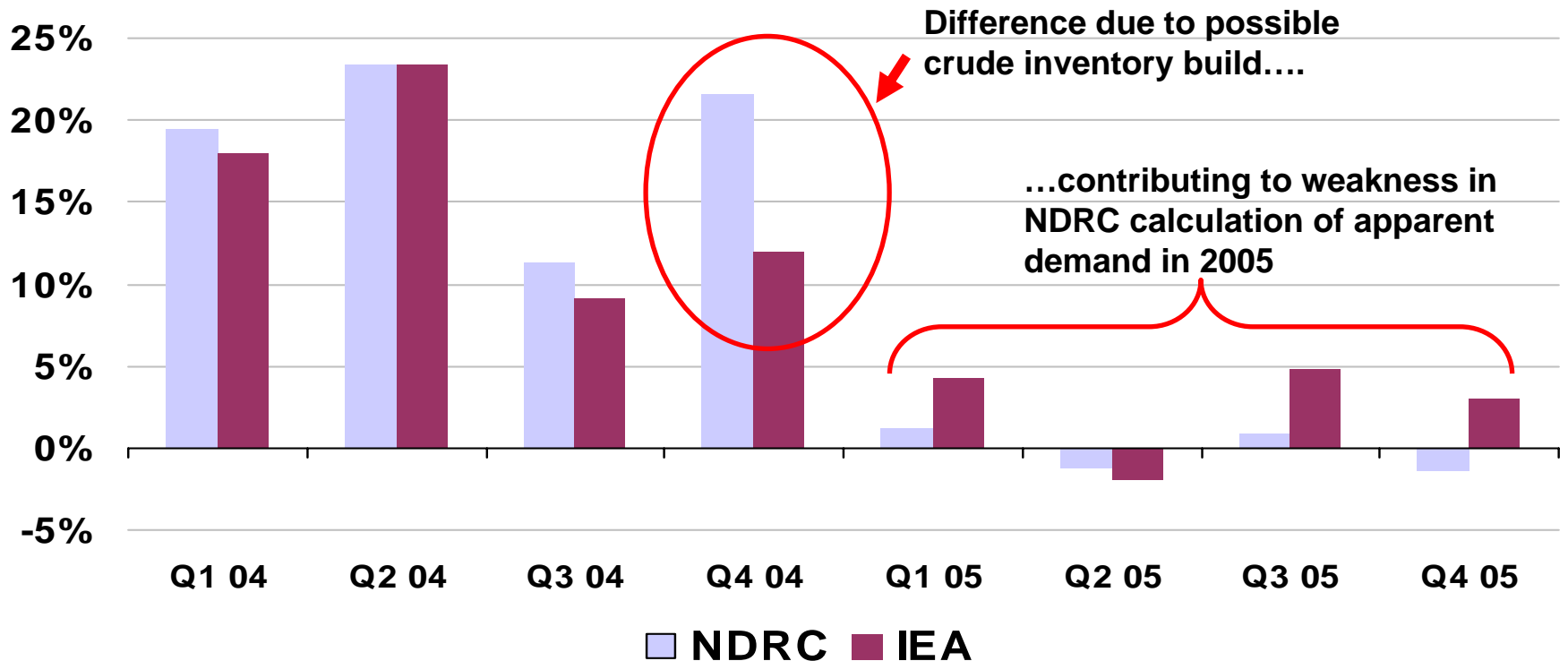
China Demand by Product

(thousand barrels per day)

	Demand			Annual Change		Annual Change (%)	
	2004	2005	2006	2005	2006	2005	2006
LPG & Ethane	633	636	658	3	22	0.4	3.4
Naphtha	684	742	814	58	72	8.5	9.7
Motor Gasoline	1069	1092	1182	23	90	2.2	8.2
Jet & Kerosene	239	245	263	6	17	2.6	7.1
Gas/Diesel Oil	2150	2264	2430	114	166	5.3	7.3
Residual Fuel Oil	829	750	721	-79	-29	-9.5	-3.9
Other Products	828	866	913	37	47	4.5	5.4
Total Products	6433	6597	6981	163	385	2.5	5.8



China Apparent Oil Demand Growth Comparison (IEA vs. NDRC calculations)





China and India Existing and Proposed Gas Lines





India and China are already showing they can work together

- **Recent proposals for collaboration:**
 - ◆ **Technical collaboration on domestic resources**
 - ◆ **Proposals for gas pipeline network**
 - ◆ **Joint development of overseas oil and gas resources**
 - ◆ **Cooperation on unconventional oil and gas (e.g., tar sands, coal-bed methane)**
 - ◆ **Equity investment in petrochemicals**



There are numerous opportunities for both to collaborate with the wider international community

- **Bilateral activities**
- **APEC**
- **Asia Pacific Partnership**
- **International Energy Forum and Joint Oil Data Initiative**
- **...**



G8 Gleneagles plan of Action 2005

Climate Change, Clean Energy and Sustainable Development



Energy Efficiency

- Building Standards
- Industry assessment
- Coal fired power
- Vehicle standards

Cleaner Energy

- Cleaner fuels
- Clean coal technologies
- Carbon sequestration
- Renewables
- Hydrogen



The IEA is a nexus for joint efforts in many of these areas

- **Gleneagles Plan of Action**
- **Implementing Agreements (Joint R&D)**
- **Information sharing (statistics, technologies, policies)**
- **Policy analysis and coordination**
- **Emergency preparedness**



IEA's activities with China

- **Statistics:** training, annual balances, JODI
- **Oil :** Emergency response training, strategic reserve management
- **Coal:** Clean-coal technologies
- **Gas:** Market development study
- **Electricity:** Sector reform study
- **Efficiency & Renewables:** Exchanges and policy development
- **Gleneagles:** IEA-China Clean Energy Dialogue



IEA's activities with India

- ***Energy Indicators & Statistics:*** training; workshops, JODI
- ***Electricity:*** Sector Reform Study
- ***Coal:*** Sector Review
- ***Oil:*** Emergency Preparedness; Strategic Stocks, Data Collaboration
- ***Gas:*** Gas Sector Study
- ***Energy Efficiency:*** Appliances, Buildings, Industry
- **Technical Collaboration & Renewables:** through IAs and NEET
- ***Gleneagles:*** existing cooperation program reflects action plan to large extent