



INTERNATIONAL ENERGY AGENCY

World Energy Outlook 2004

China Presentation



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Objectives & Approach

- Identify and quantify key energy-market drivers to 2030
- Core projections derived from Reference Scenario:
 - Incorporates assumptions about economic & population growth, energy prices, technology & public policies
 - Does not take account of possible, potential or even likely new energy & environment policies
- Alternative Scenario analyses impact of new environmental and energy-security policies



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Energy Market Context

- International energy markets in turmoil:
 - Soaring demand and imports in China
 - Heightened geo-political tensions in Middle East, West Africa, Russia and Venezuela
 - Surging energy prices threatening economic growth
 - Carbon-dioxide emissions rising rapidly
- Current market instability and uncertainties complicate preparation of long-term projections



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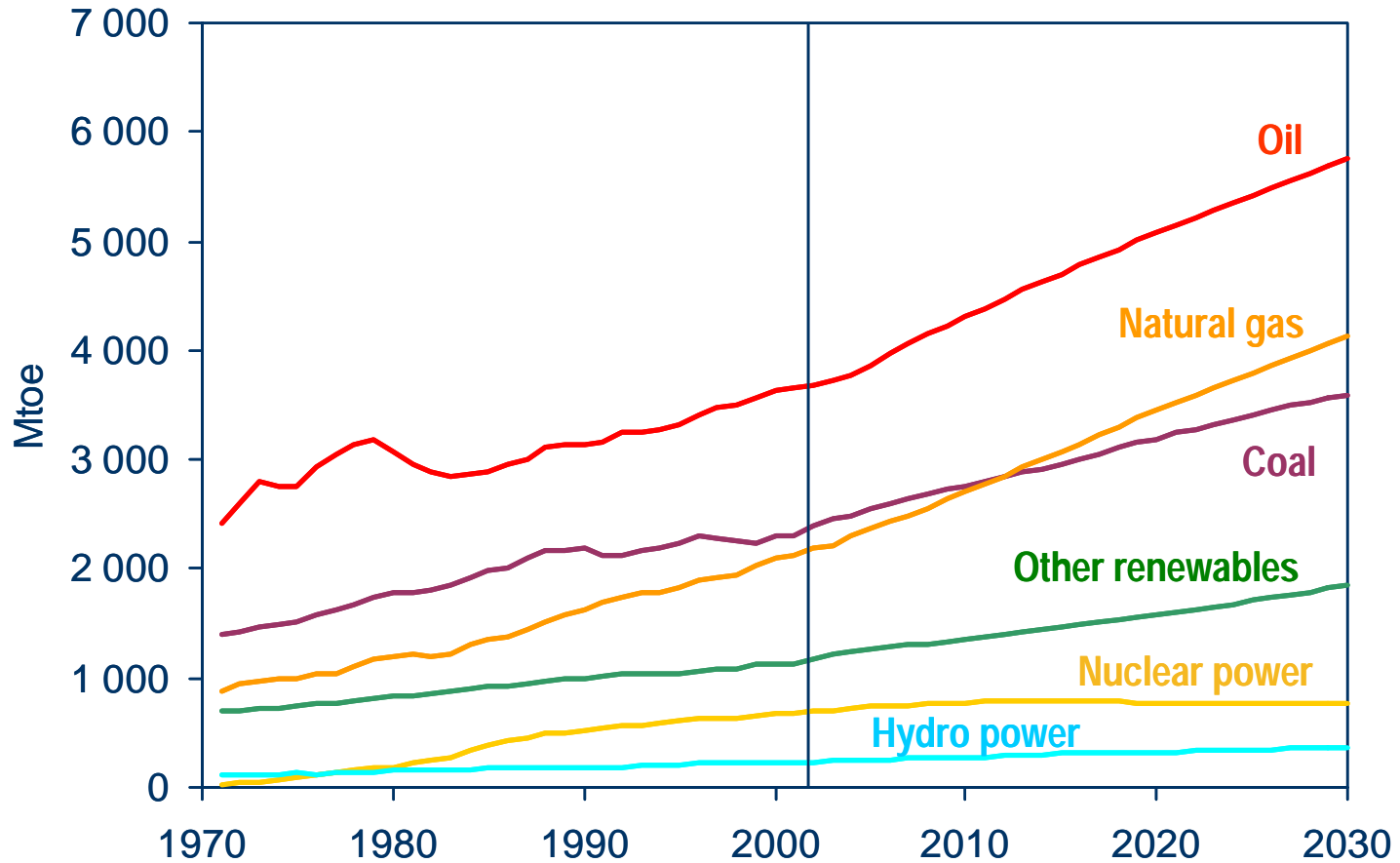
Global Energy Trends: Reference Scenario



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World Primary Energy Demand



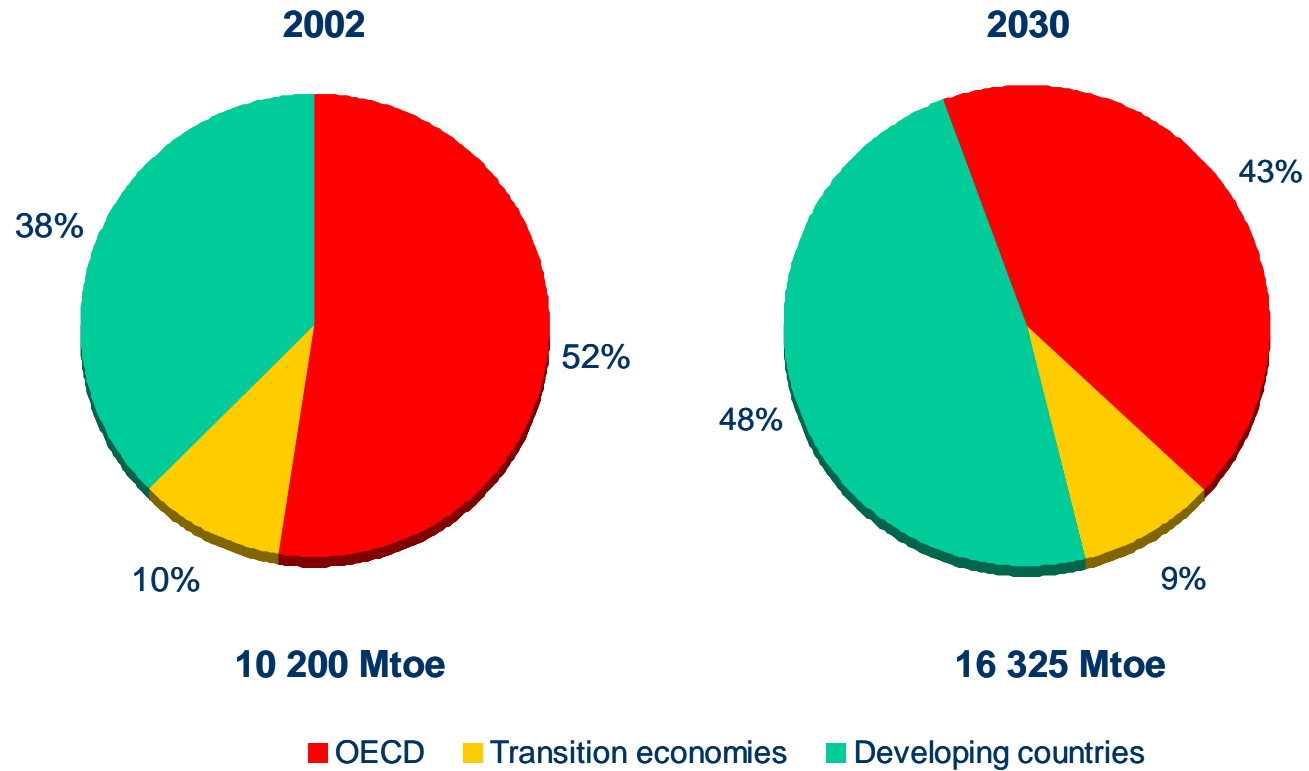
**Fossil fuels will continue to dominate the global energy mix,
while oil remains the leading fuel**



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Regional Shares in World Primary Energy Demand



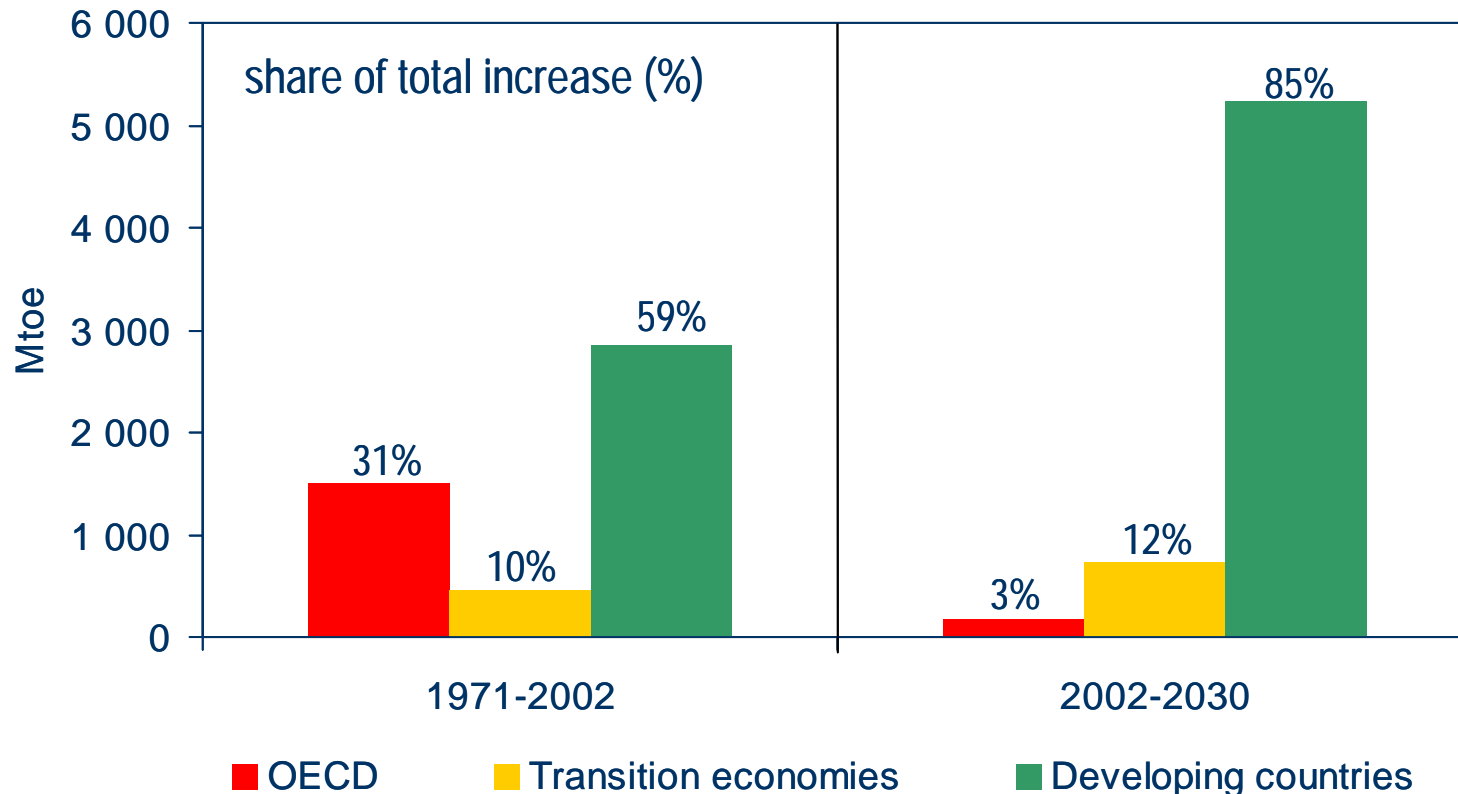
Two-thirds of the increase in world demand between 2002 and 2030 comes from developing countries, especially in Asia



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Increase in World Primary Energy Production by Region



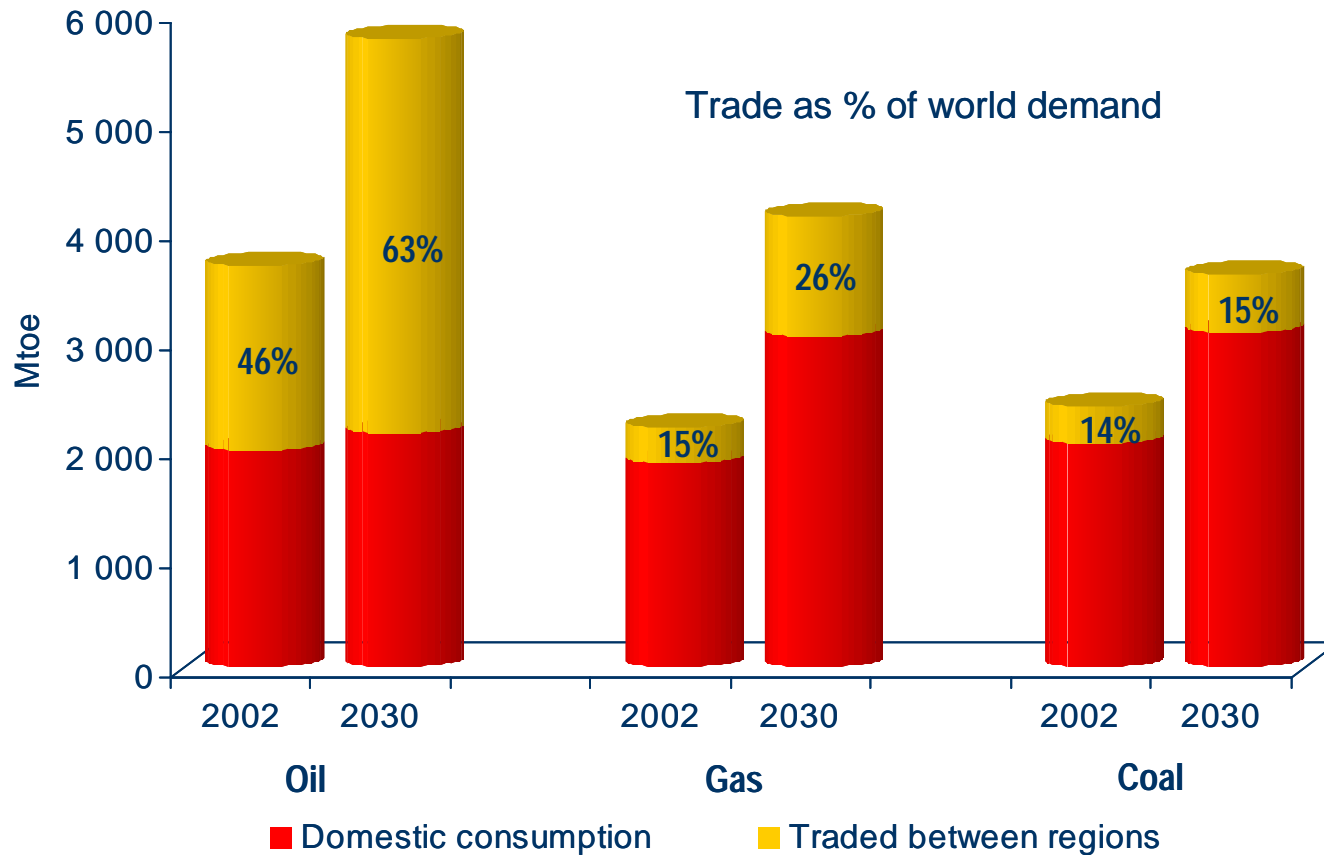
Almost all the increase in production to 2030 occurs outside the OECD, up from less than 70% in 1971-2002



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Inter-Regional Trade in World Fossil-Fuel Supply



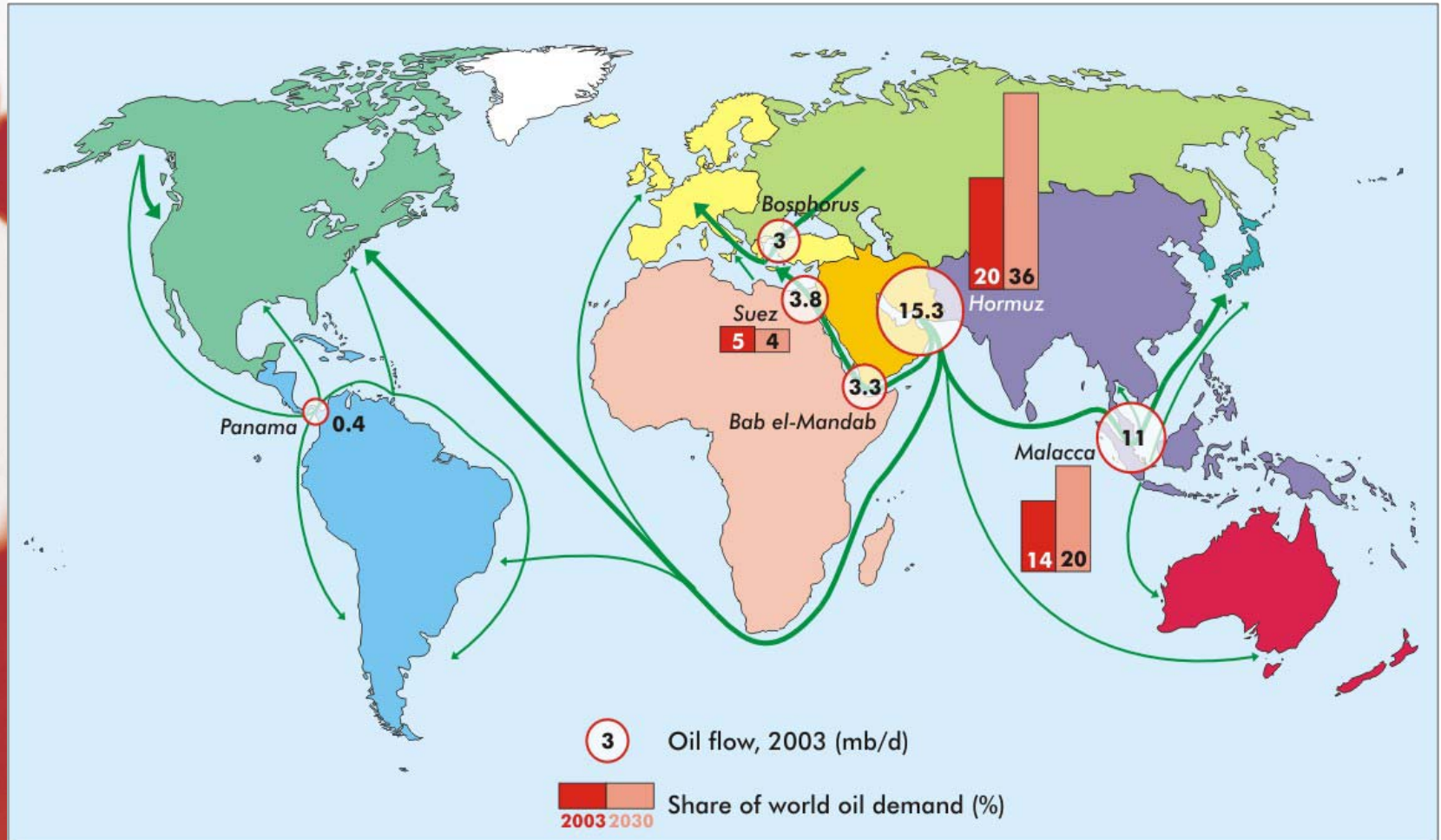
Energy trade between regions more than doubles by 2030, most of it still in the form of oil



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Oil Flows & Major Chokepoints: The "Dire Straits"



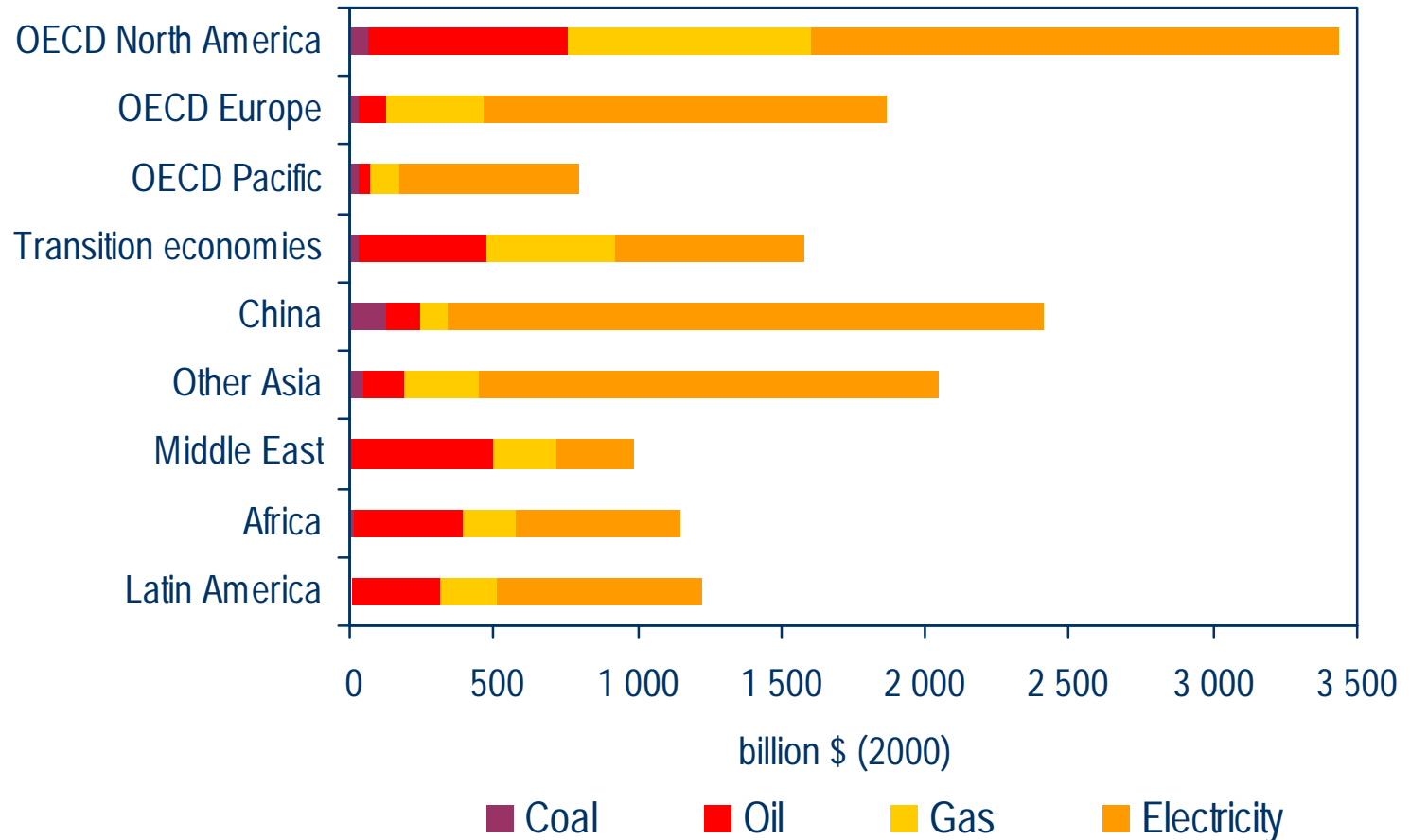
The risk of an oil-supply disruption will grow as trade & flows through key maritime & pipeline chokepoints expand



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Cumulative Energy Investment, 2003-2030



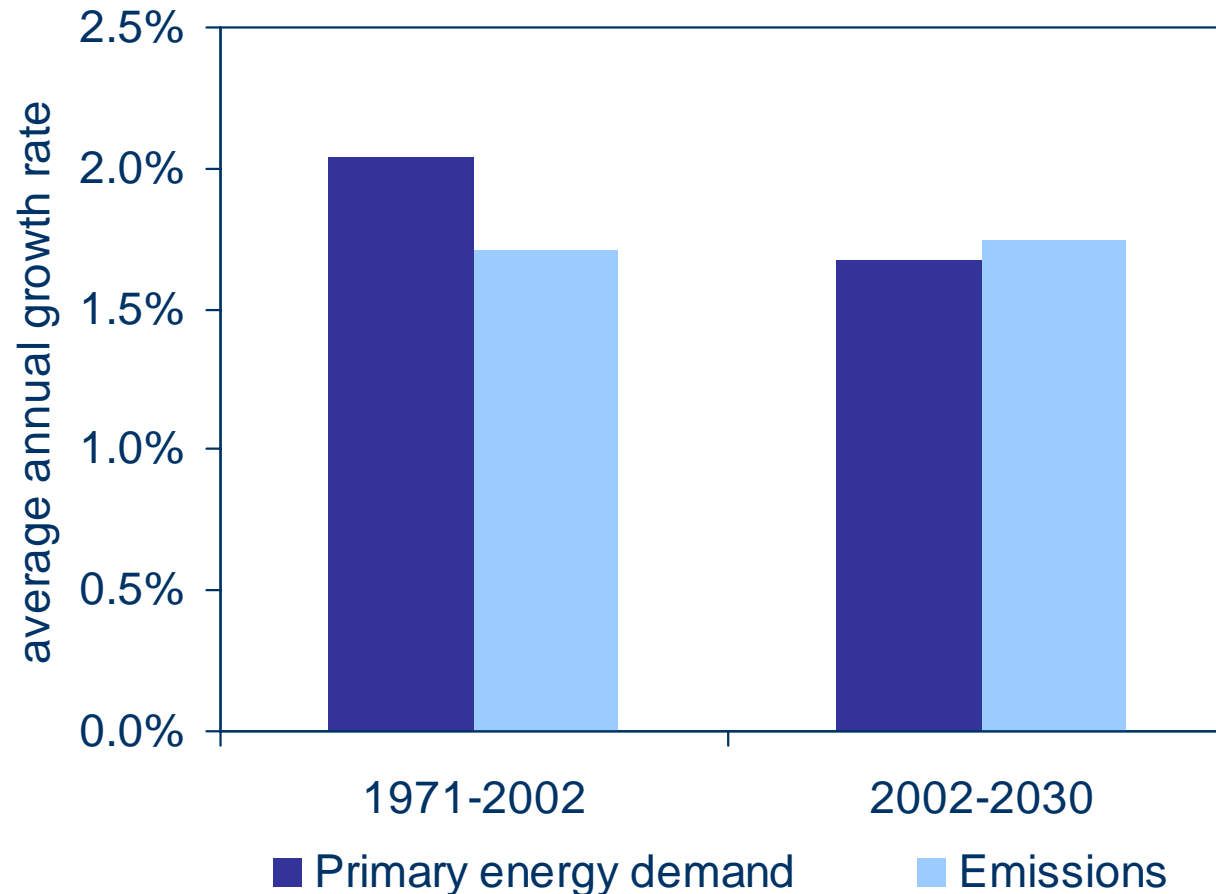
**Power sector absorbs 62% of global energy investment in
the period 2003-2030**



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Growth in World Energy Demand & CO₂ Emissions



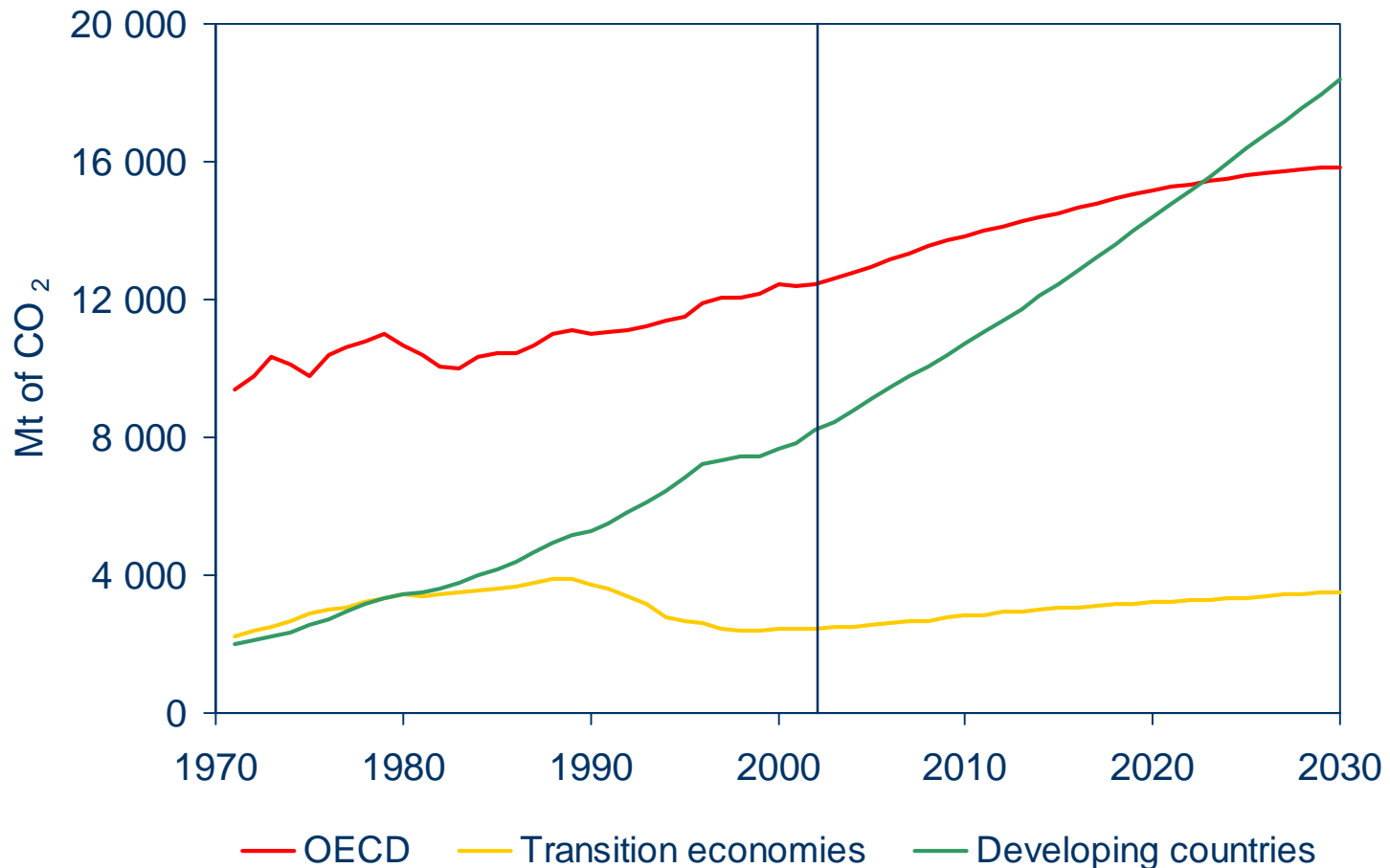
Average carbon content of primary energy increases slightly through 2030 – in contrast to past trends



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CO₂ Emissions, 1971-2030



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



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Oil Market: Key issues and uncertainties

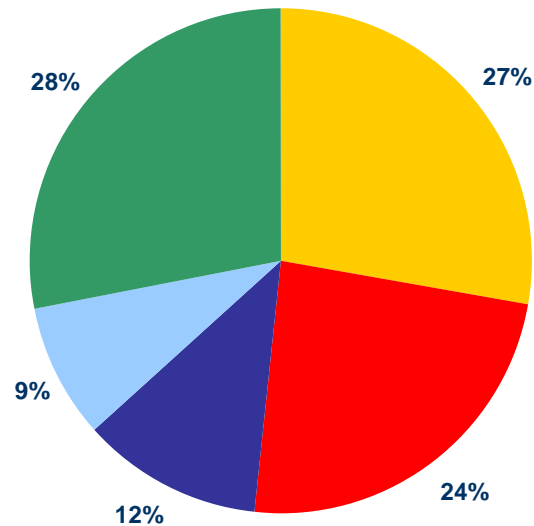


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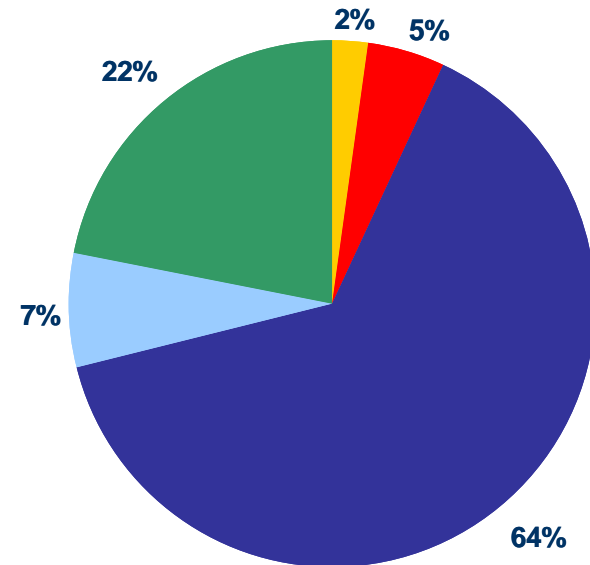
Undiscovered Oil & Gas Resources & Exploration Wells Drilled, 1995-2003

Undiscovered Oil & Gas
Resources



1.9 trillion boe

Number of New Wells Drilled
in 1995-2003



24 500 fields



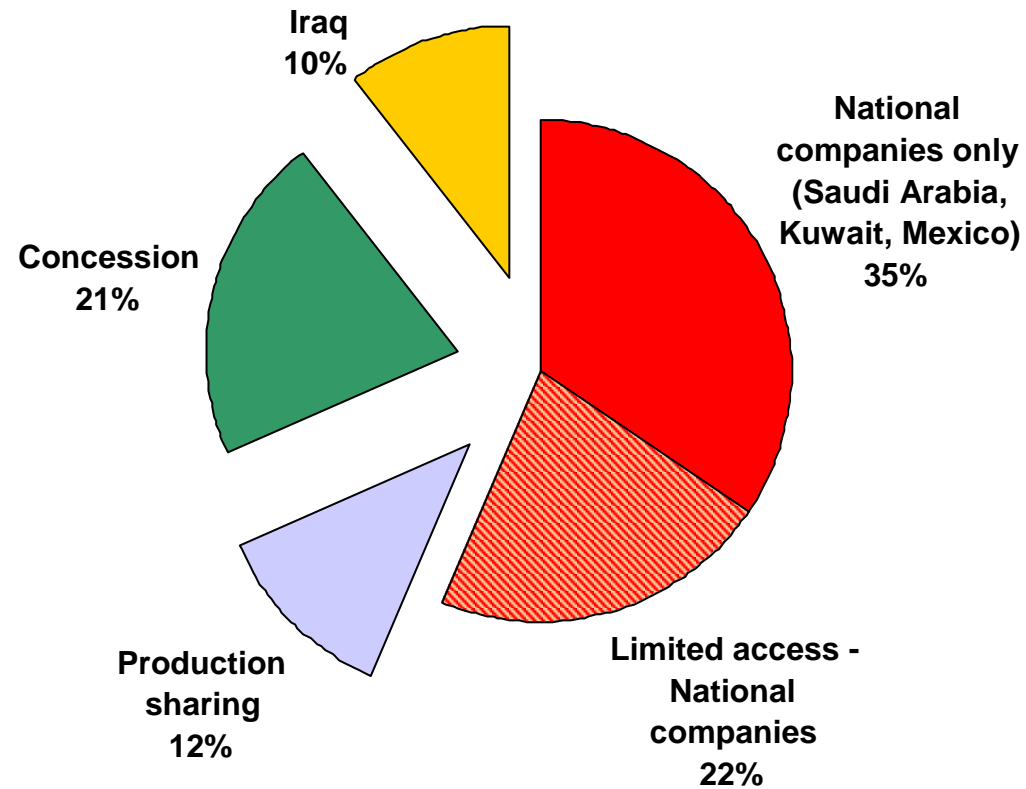
**Discoveries have fallen in recent years, mainly because
exploration has shifted to less prospective regions**



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Access to Oil Reserves



1,032 billion barrels

Access to much of the world's remaining oil reserves is restricted



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The Need for Reserves Data Reform

- Recent reserves data revisions highlight problems in assessing & reporting reserves (& production)
- A more reliable & transparent system is needed urgently
- Aim should be to
 - Create a common, universally-accepted set of reserve definitions, methodologies & operational practices
 - Establish a system of collecting, compiling & publishing primary data on national reserves



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High Oil Price Case

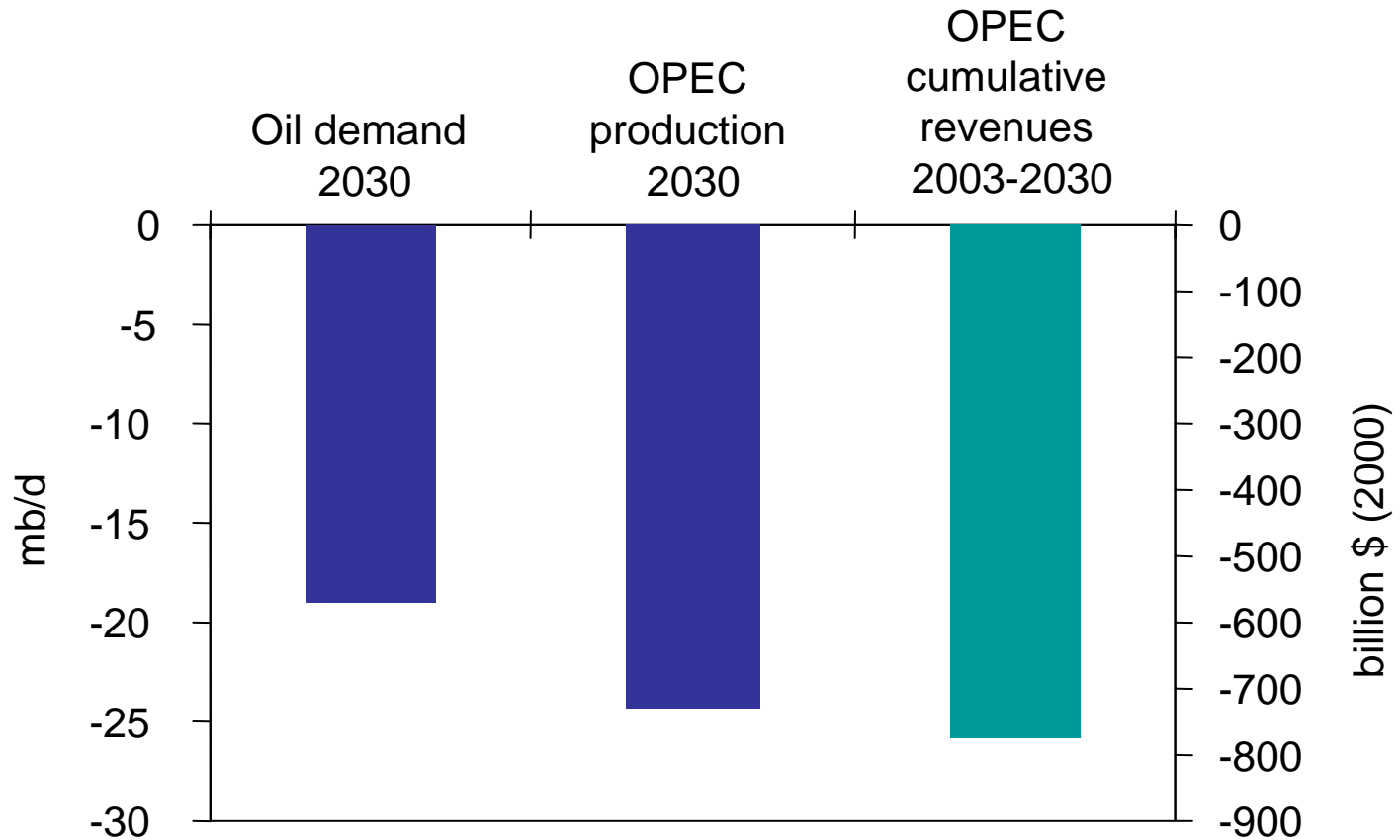
- Analyses impact on oil markets of higher oil prices than assumed in Reference Scenario
- Combination of factors could keep oil prices high in the years to come, e.g.:
 - Under-investment in supply infrastructure
 - Strong demand-side pressures
 - Lack of resource availability
 - Geo-political factors
- IEA crude oil import price is assumed to average \$35 per barrel (in year-2000 dollars) over the projection period – c.\$10 higher than in RS
- Natural gas prices are also assumed to remain high



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Oil Market Implications of High Oil Price Case vs Reference Scenario



**Crude oil price is assumed to remain at average for 2004 to date,
with major implications for global oil markets**



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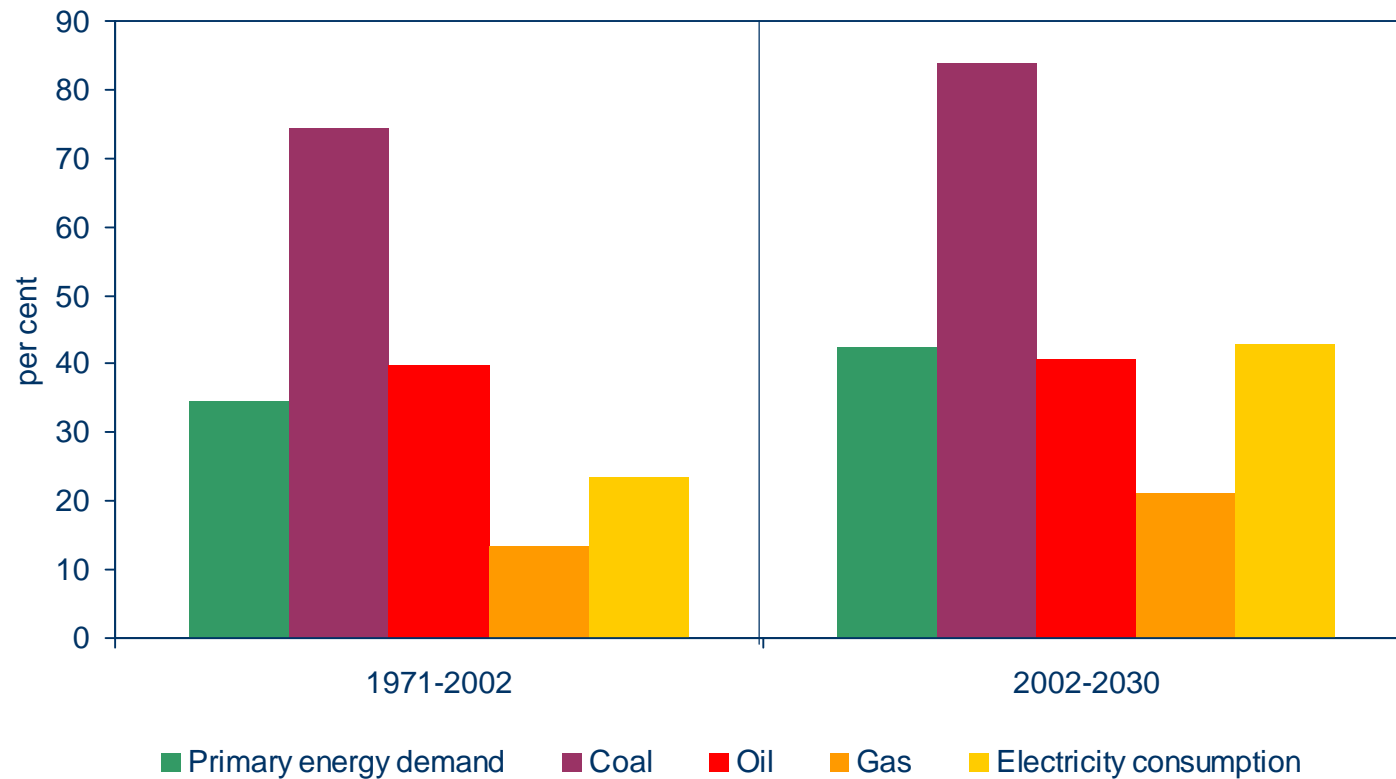
Developing Asia Energy Trends: Reference Scenario



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Share of Developing Asia in World Incremental Energy Demand



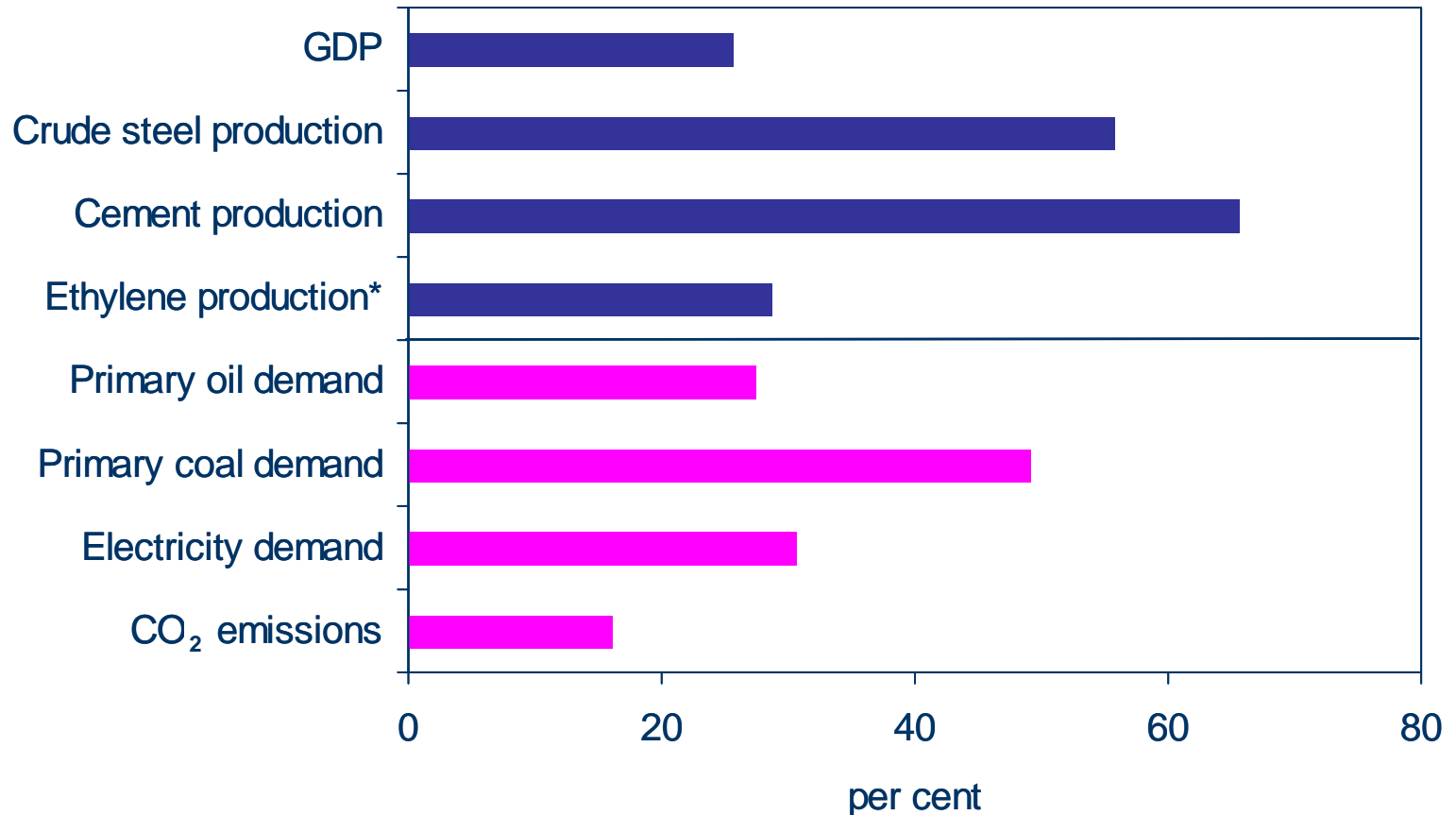
Developing Asia will account for 42% of the increase in demand through 2030, compared with 34% in the last three decades



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China's share of Incremental World Production & Energy Demand, 1998-2003



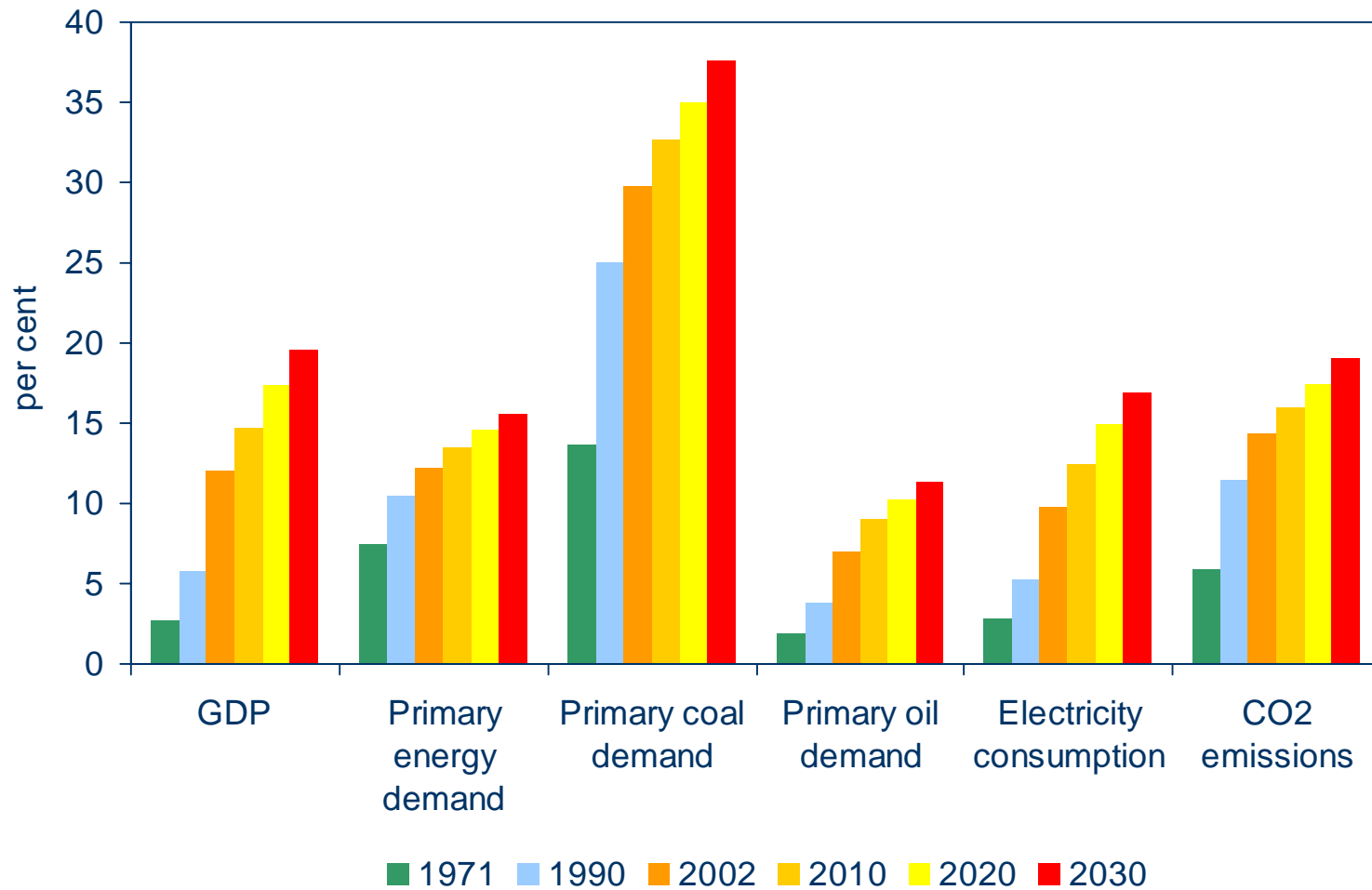
**Booming industrial production in China is driving up energy
demand & emissions - and energy prices**



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China's Share in the Global Economy and Energy Markets



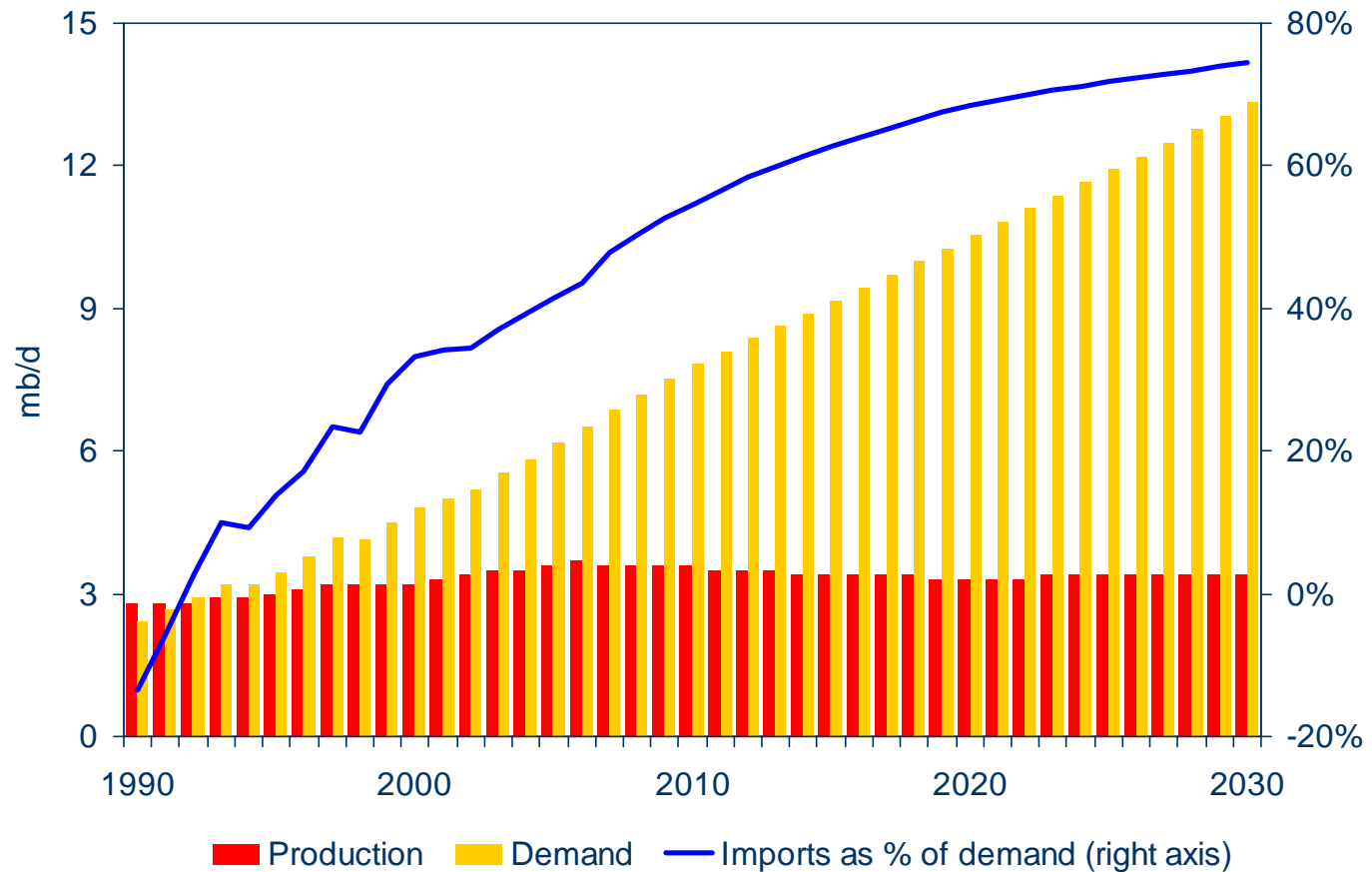
The importance of China on world energy markets will continue to grow



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China Oil Supply Balance



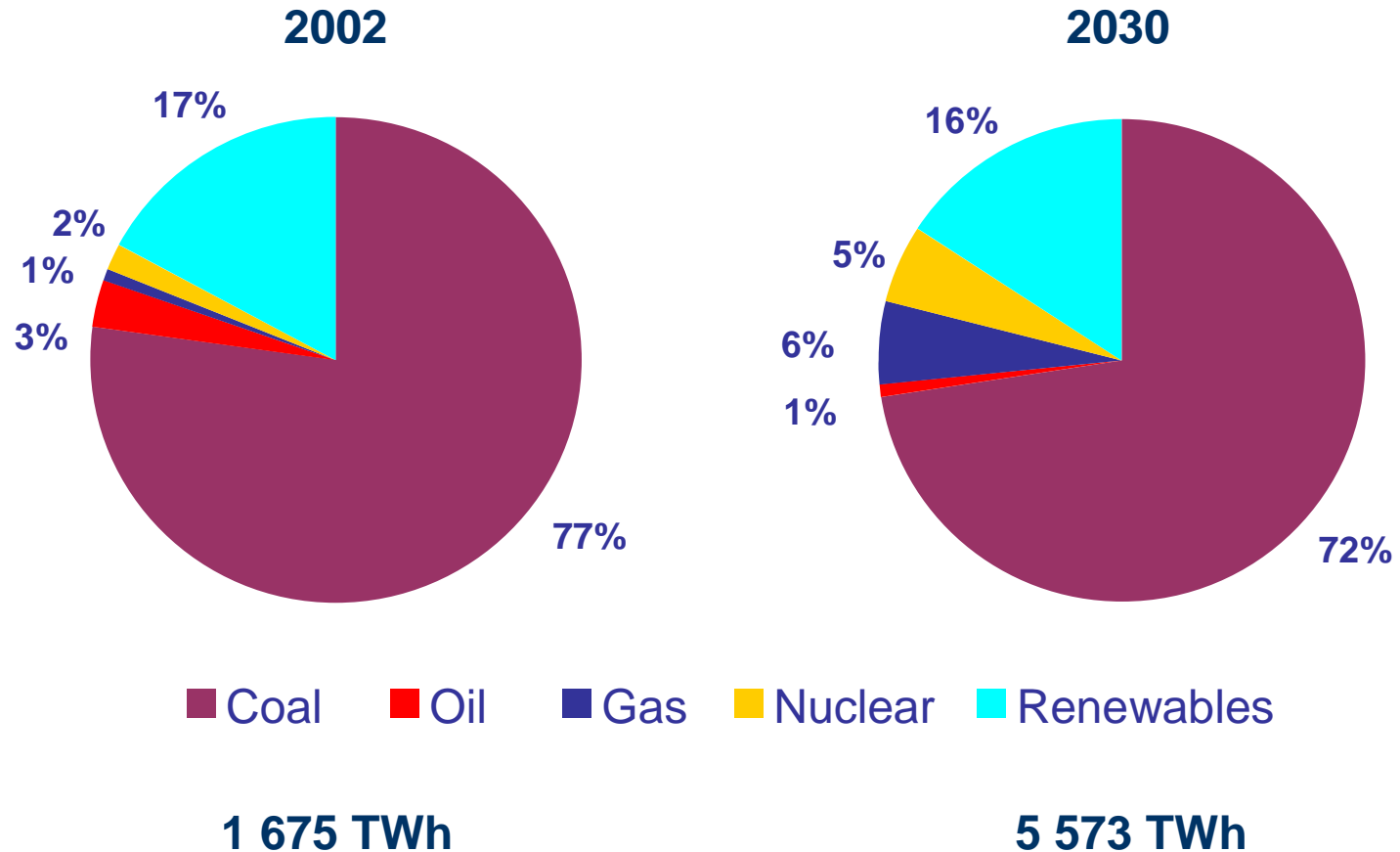
China's oil imports will soar from less than 2 mb/d now to almost 10 mb/d in 2030 – equal to over 74% of domestic demand



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China Power Generation Fuel Mix



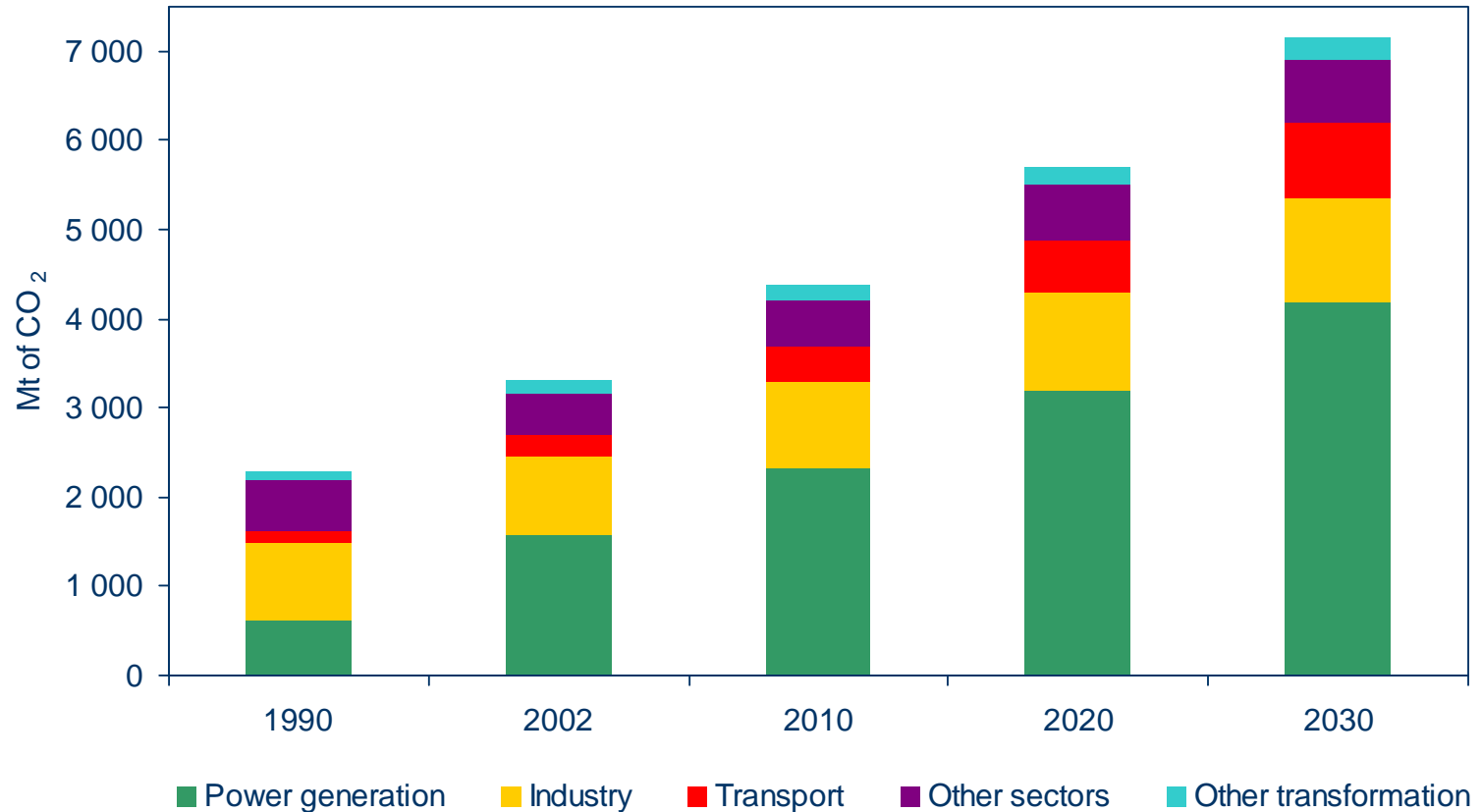
**Gas & nuclear increase their shares in Chinese power generation,
but coal remains the largest energy source**



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CO₂ Emissions by Sector in China



Most of China's growth in emissions comes from power generation, where coal remains the dominant fuel



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Alternative Policy Scenario



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Alternative Policy Scenario

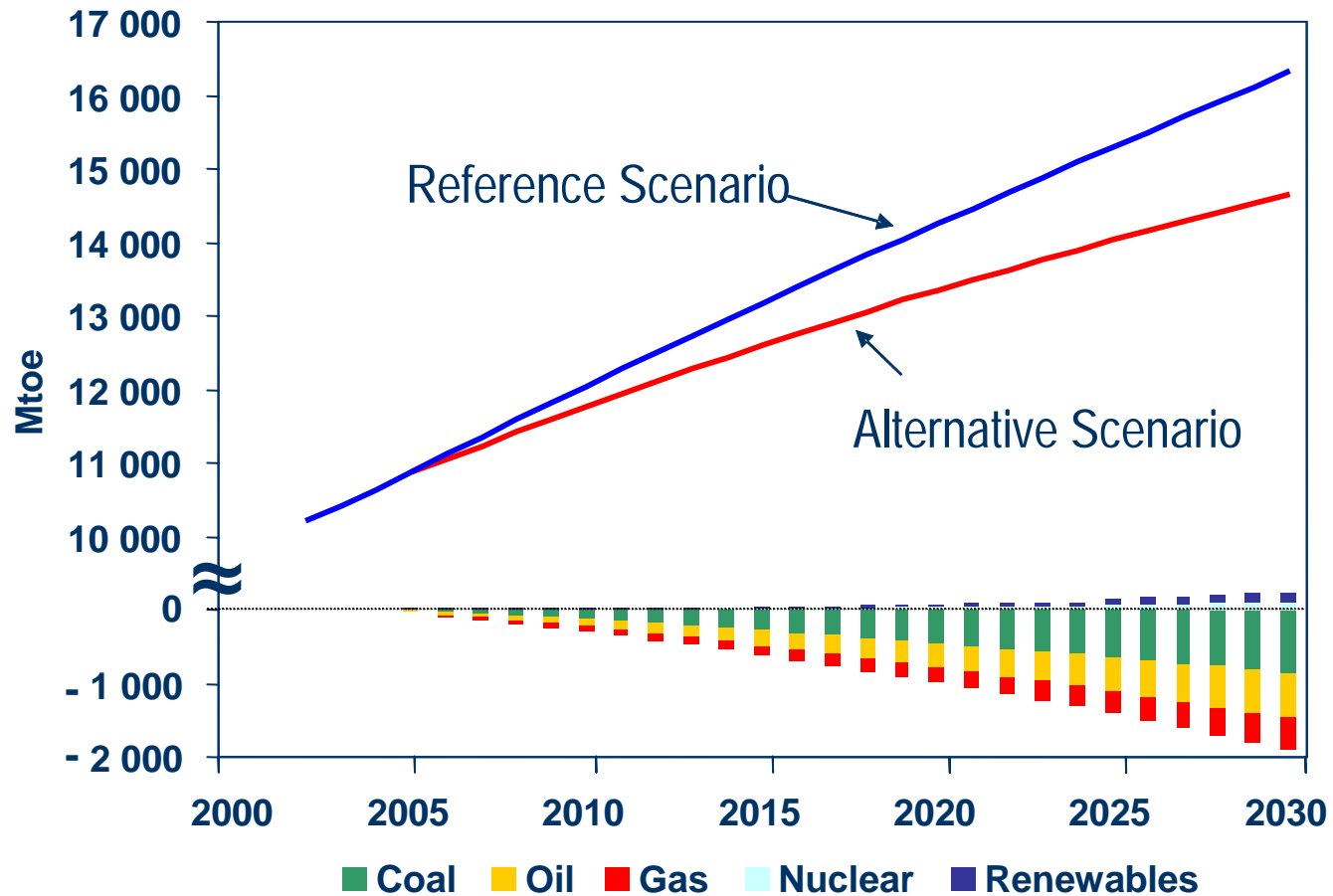
- Analyses impact of new environmental & energy-security policies worldwide
 - *OECD*: Policies currently under consideration
 - *Non-OECD*: Also includes more rapid declines in energy intensity resulting from faster deployment of more-efficient technology.
- Basic macroeconomic & population assumptions as for Reference Scenario, but energy prices change



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World Primary Energy Demand in Reference & Alternative Scenarios



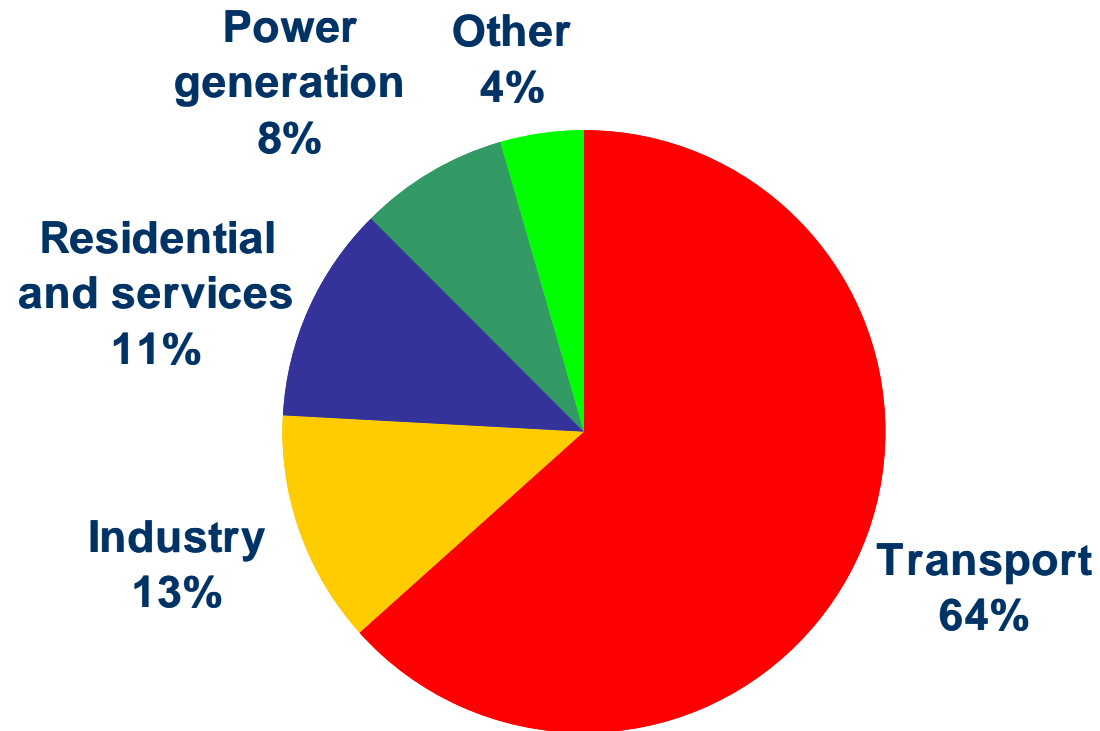
Coal demand falls most, partially offset by more use of renewables



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Reduction in Oil Demand in the Alternative vs. Reference Scenario, 2030



Oil savings = 12.8 mb/d

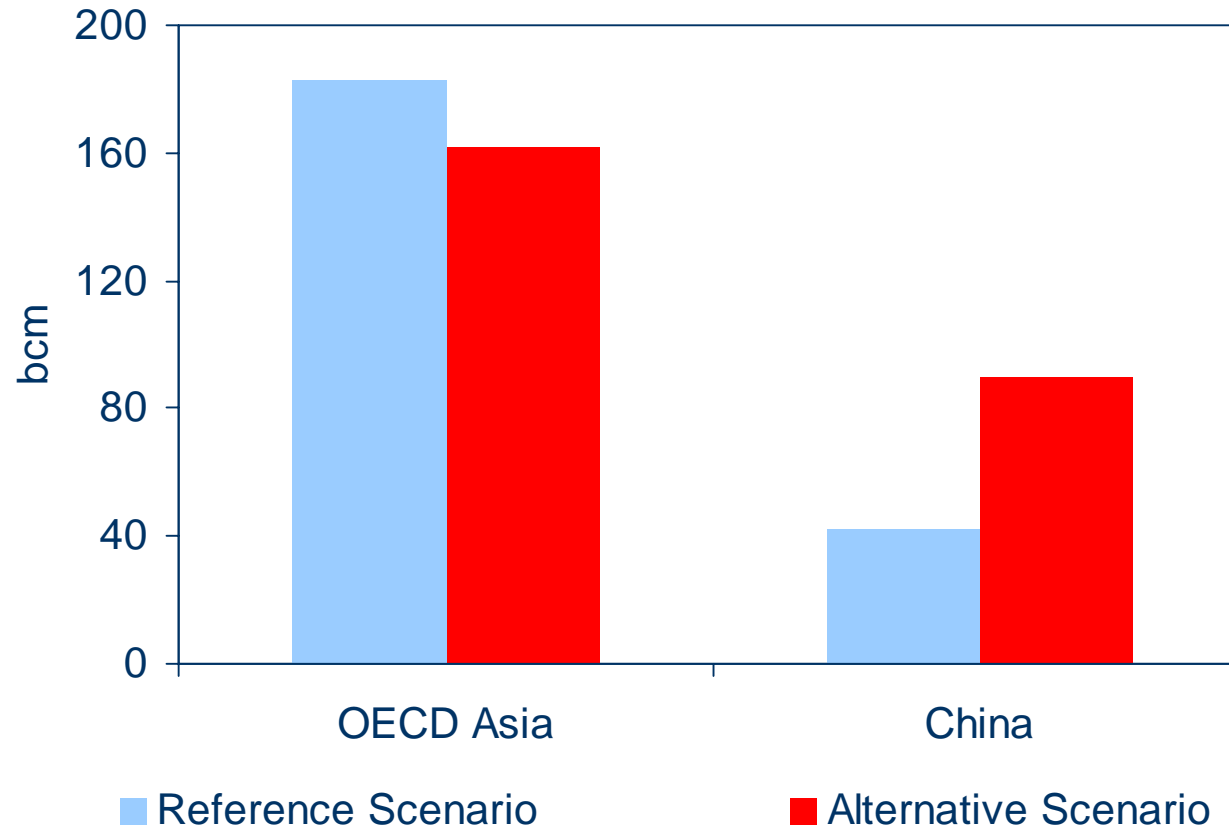
Oil savings in 2030 would be equivalent to the combined
current production of Saudi Arabia, UAE and Nigeria



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Net Gas Imports in the Alternative & Reference Scenarios, 2030



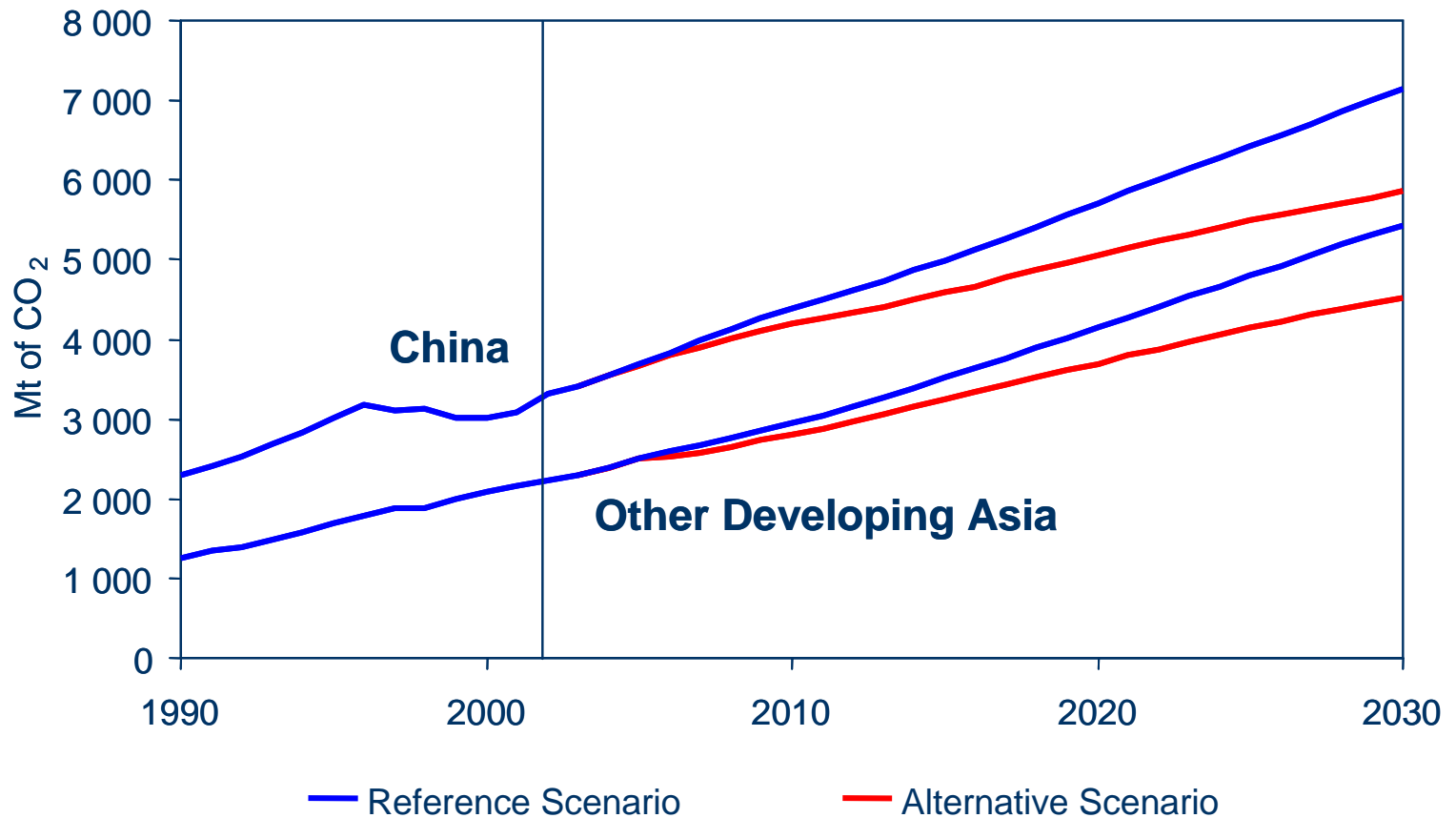
New policies reduce gas imports in OECD Asia, but increase them in China – because of switching from coal



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Developing Asia CO₂ Emissions in the Reference & Alternative Scenarios



With new policies, China curbs its CO₂ emissions by 18% in 2030 & the rest of Developing Asia by 17%



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Summary & Conclusions



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Summary & Conclusions (1)

- On current policies, world energy needs will be almost 60% higher in 2030 than now
- Energy resources are more than adequate to meet demand until 2030 & well beyond
- But projected market trends raise serious concerns:
 - Increased vulnerability to supply disruptions
 - Rising CO₂ emissions
 - Huge energy-investment needs
 - Persistent energy poverty
- More vigorous policies would curb rate of increase in energy demand & emissions significantly
- But a truly sustainable energy system will call for faster technology development & deployment
- Urgent & decisive government action is needed



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Summary & Conclusions (2)

- Asia's importance to world energy markets – and its share in CO₂ emissions - will continue to grow
 - Most of the region's incremental demand & emissions will come from developing Asia – notably China & India
- Net imports of oil & gas – and reliance on key chokepoints - will continue to grow