



***Investing in & Financing the Hydrocarbon Sector to
Enhance Global Energy Security:***

Findings from the *World Energy Outlook 2007*



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Outline

- Global energy outlook in a business-as-usual world
- Implications for investment & energy security
- Impact of policy action to achieve a more secure & cleaner global energy system



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WEO-2007: Scope & Approach

- Focus on China & India
- Scenario approach
 - *Reference Scenario*
 - *High Growth Scenario (China/India)*
 - *Alternative Policy Scenario*



Global Energy Outlook in a Business-as-Usual World





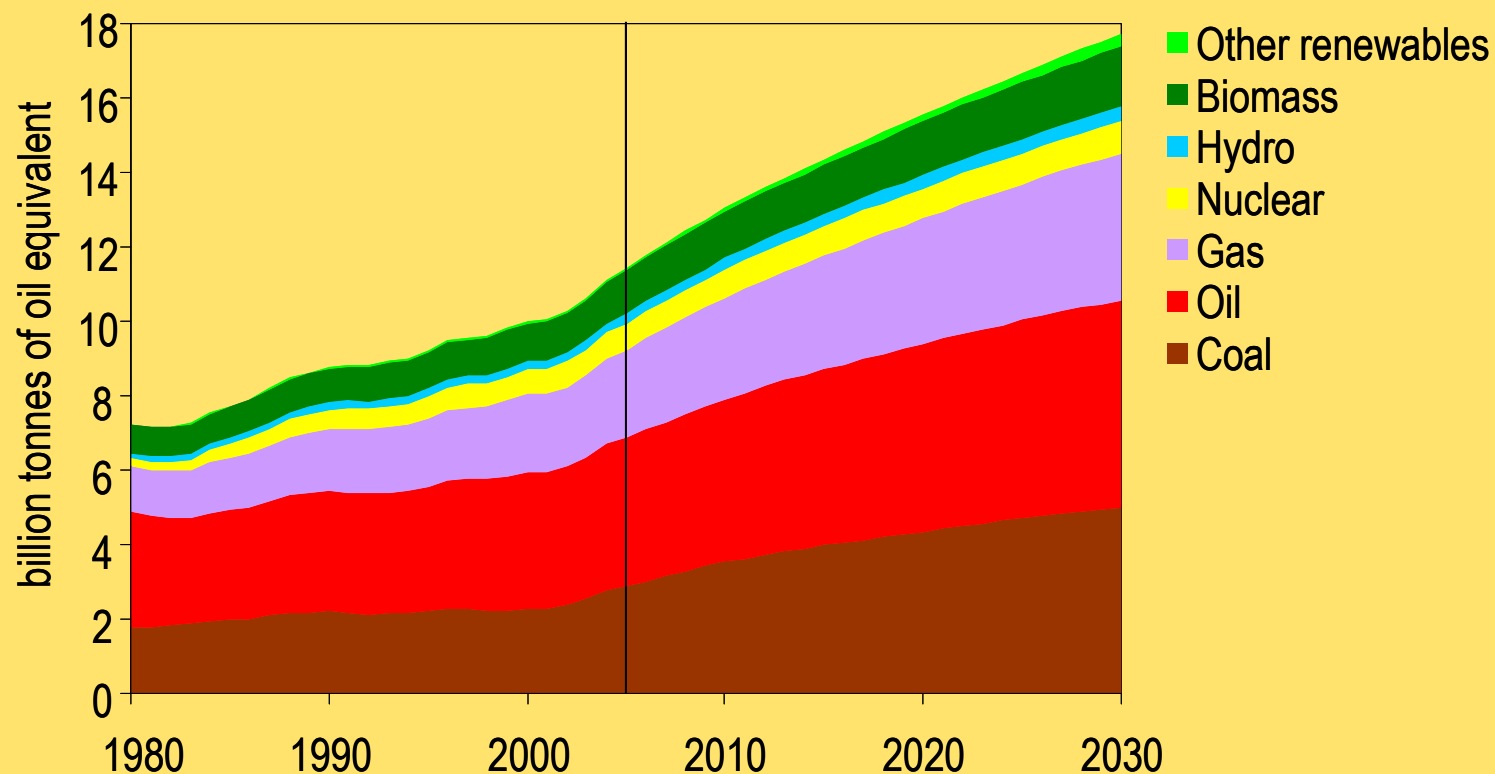
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Reference Scenario: World Primary Energy Demand



Global demand grows by more than half over the next quarter of a century, with oil remaining the single most important fuel



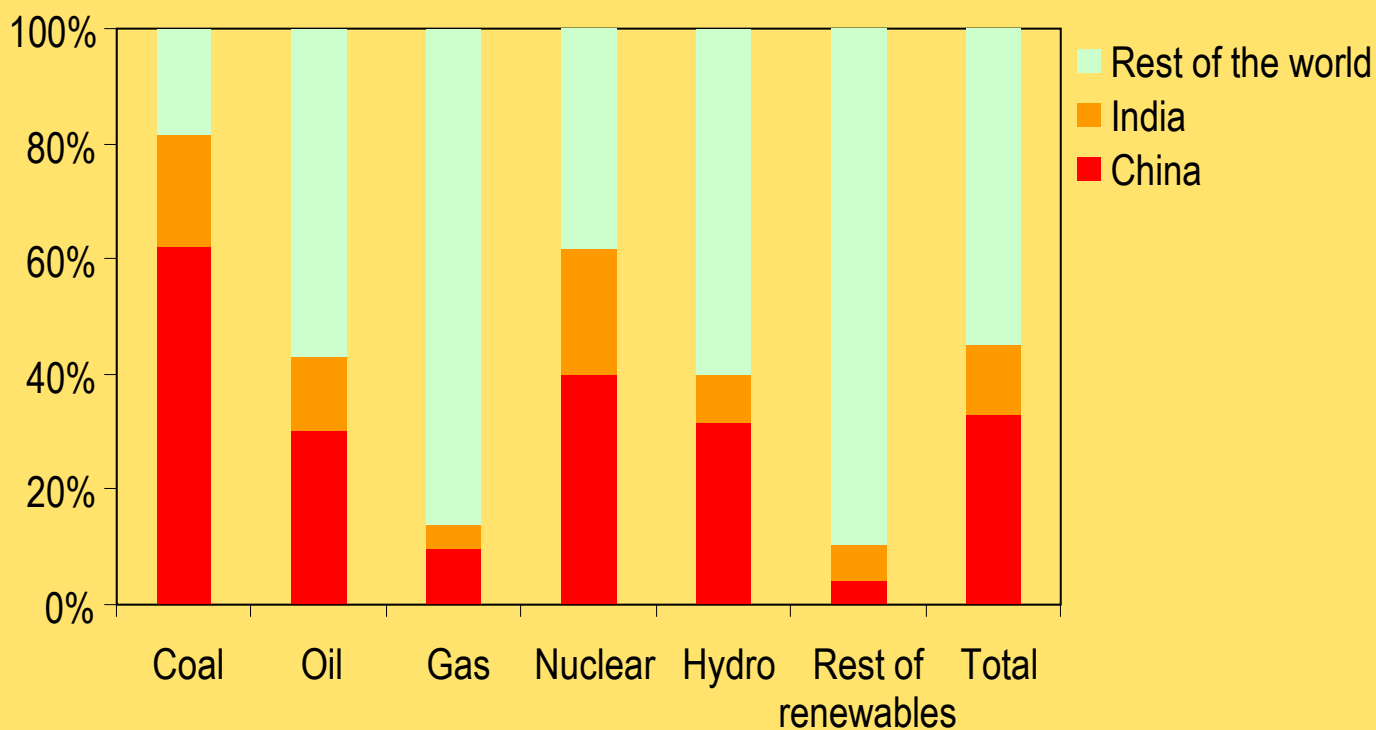
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Reference Scenario: Increase in World Primary Energy Demand, 2005-2030



China & India will contribute about 45% of the increase in global energy demand to 2030 on current trends



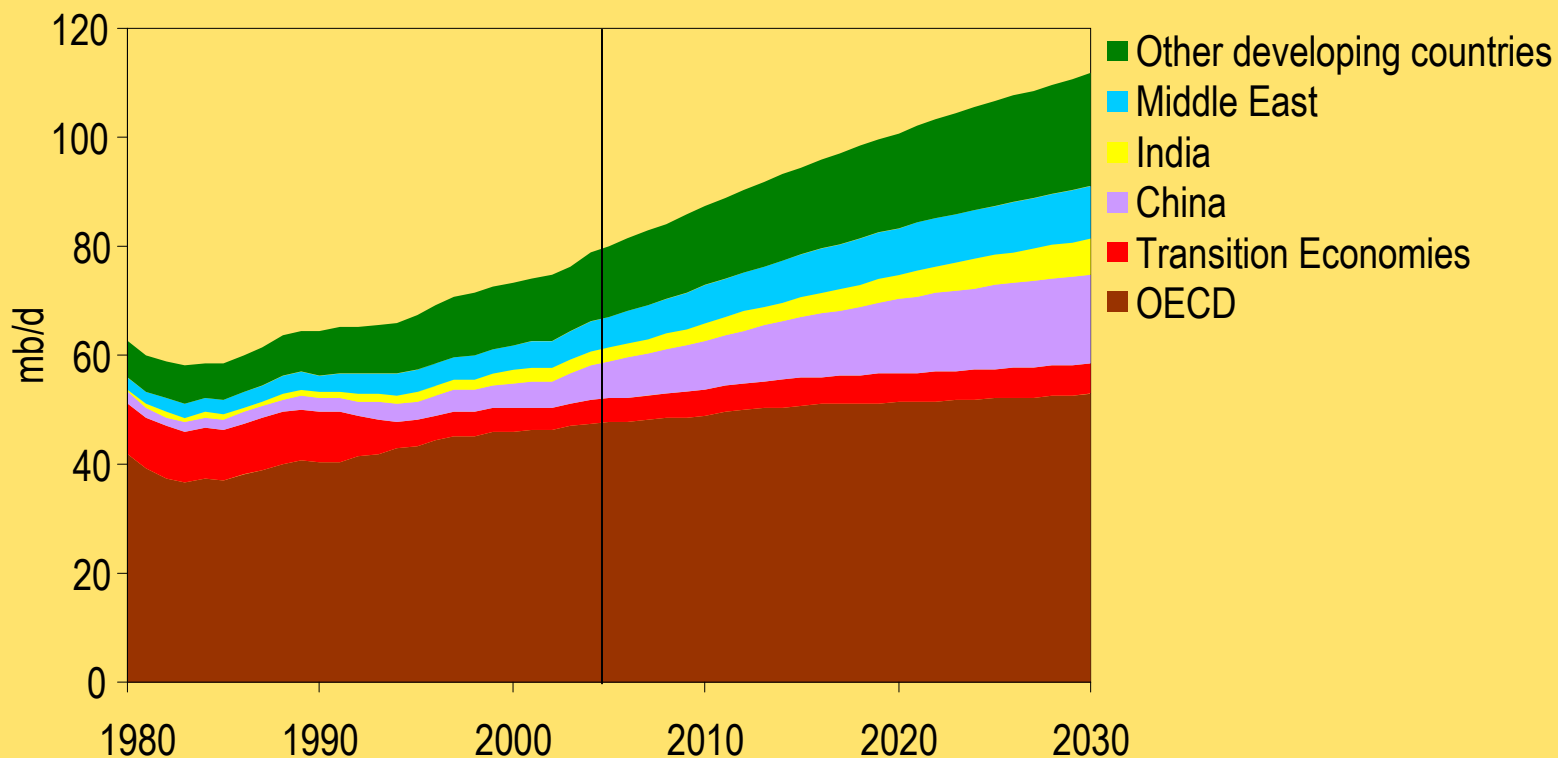
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Reference Scenario: World Primary Oil Demand



Oil demand increases most rapidly in China, India & other developing countries



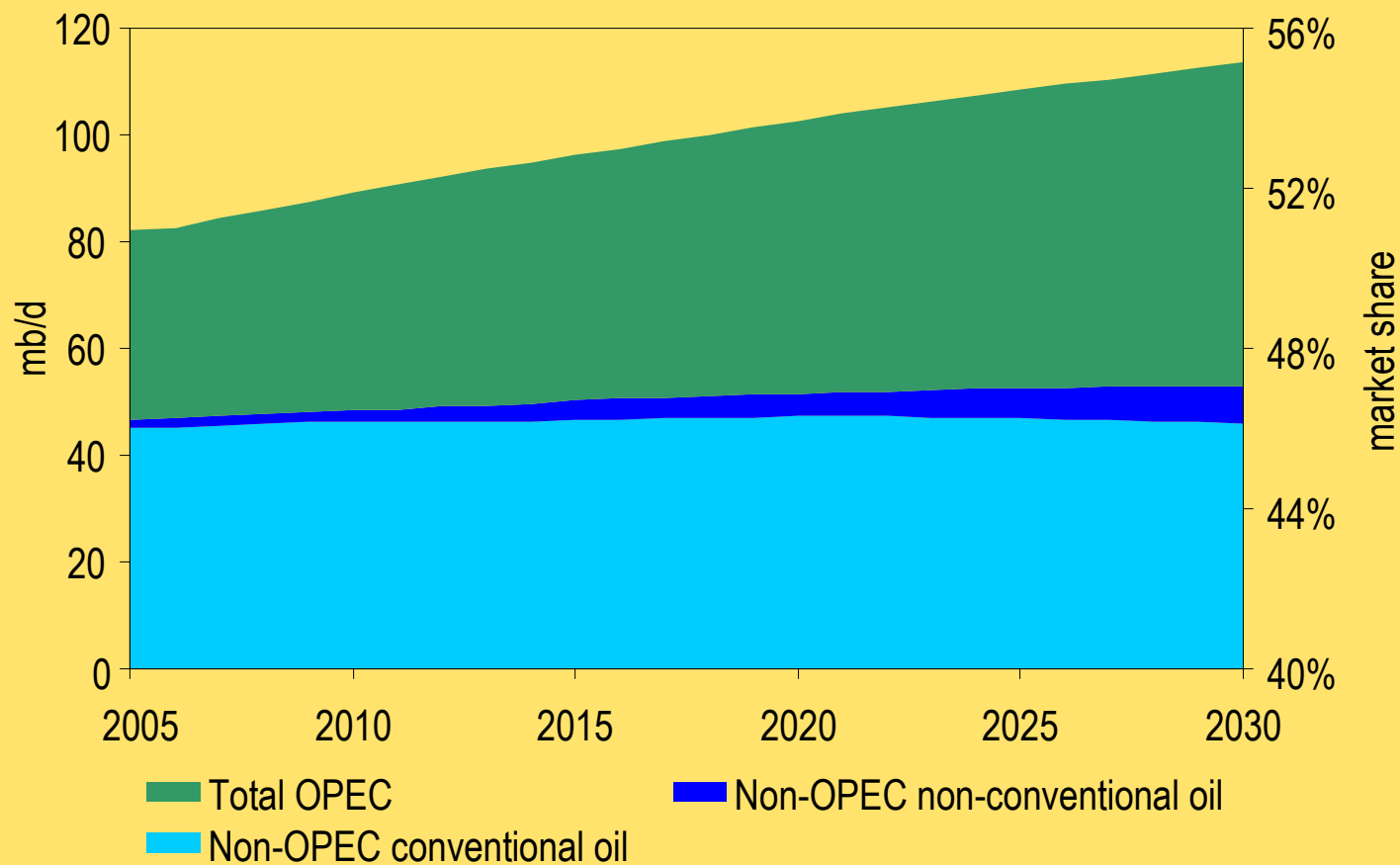
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Reference Scenario: World Oil Production



Non-OPEC conventional oil plateaus by around 2015, with OPEC providing the bulk of additional oil supply



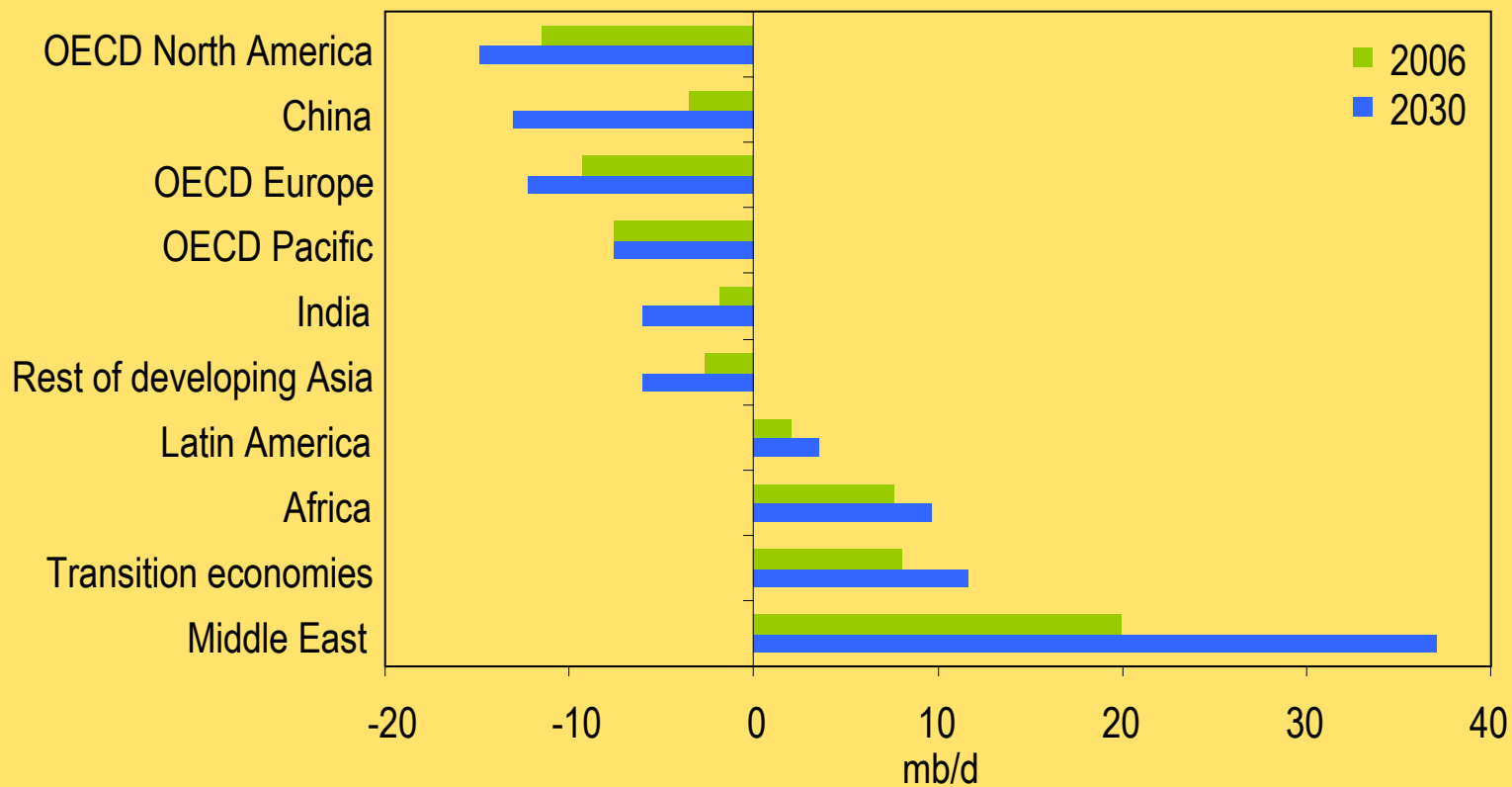
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Reference Scenario: Net Oil Trade



China sees the biggest jump in oil imports in absolute terms, but North America remains the largest importer



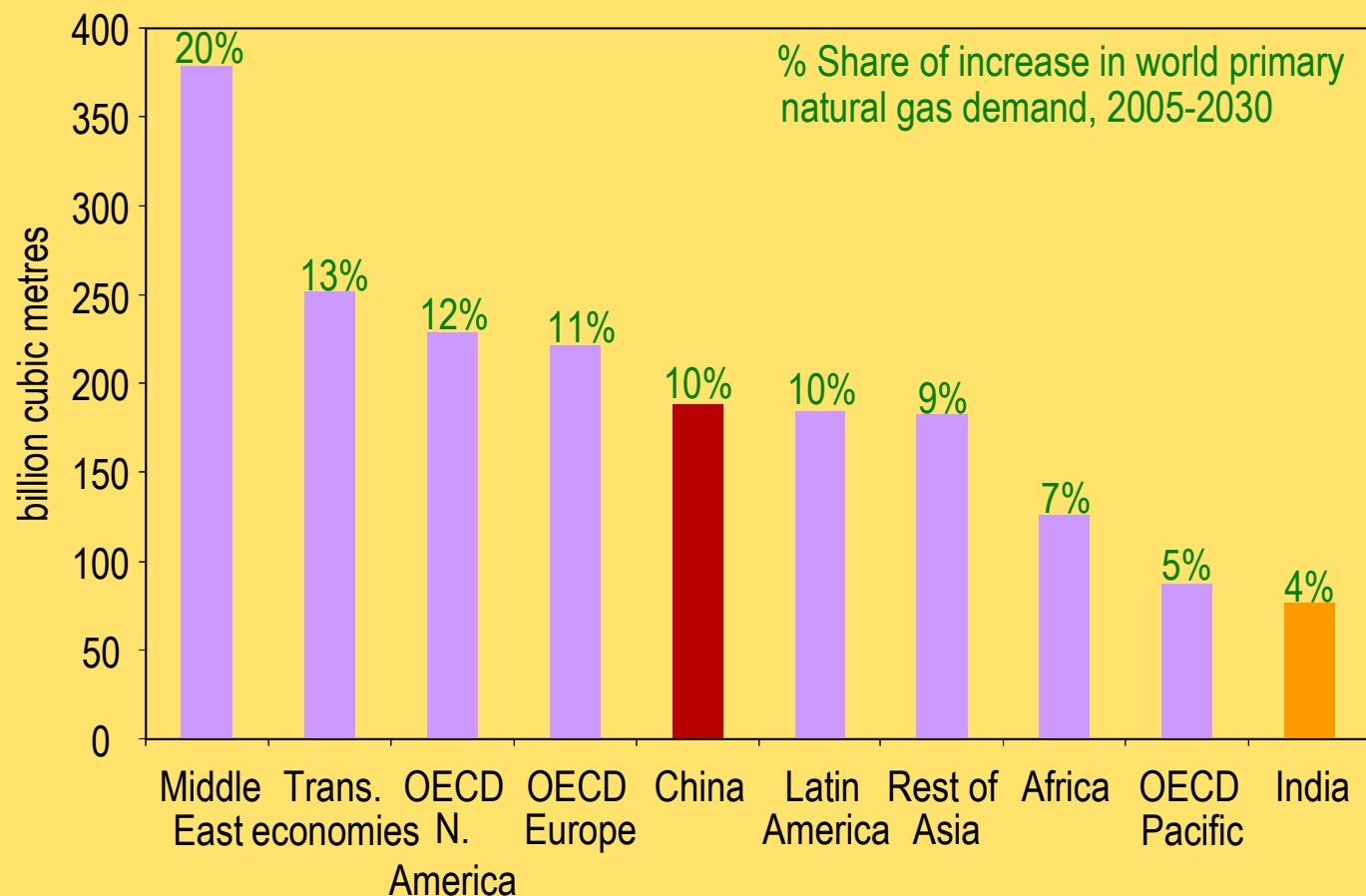
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Reference Scenario: Increase in Primary Natural Gas Demand, 2005-2030



Volume increases in gas demand are biggest in the regions with the largest remaining reserves



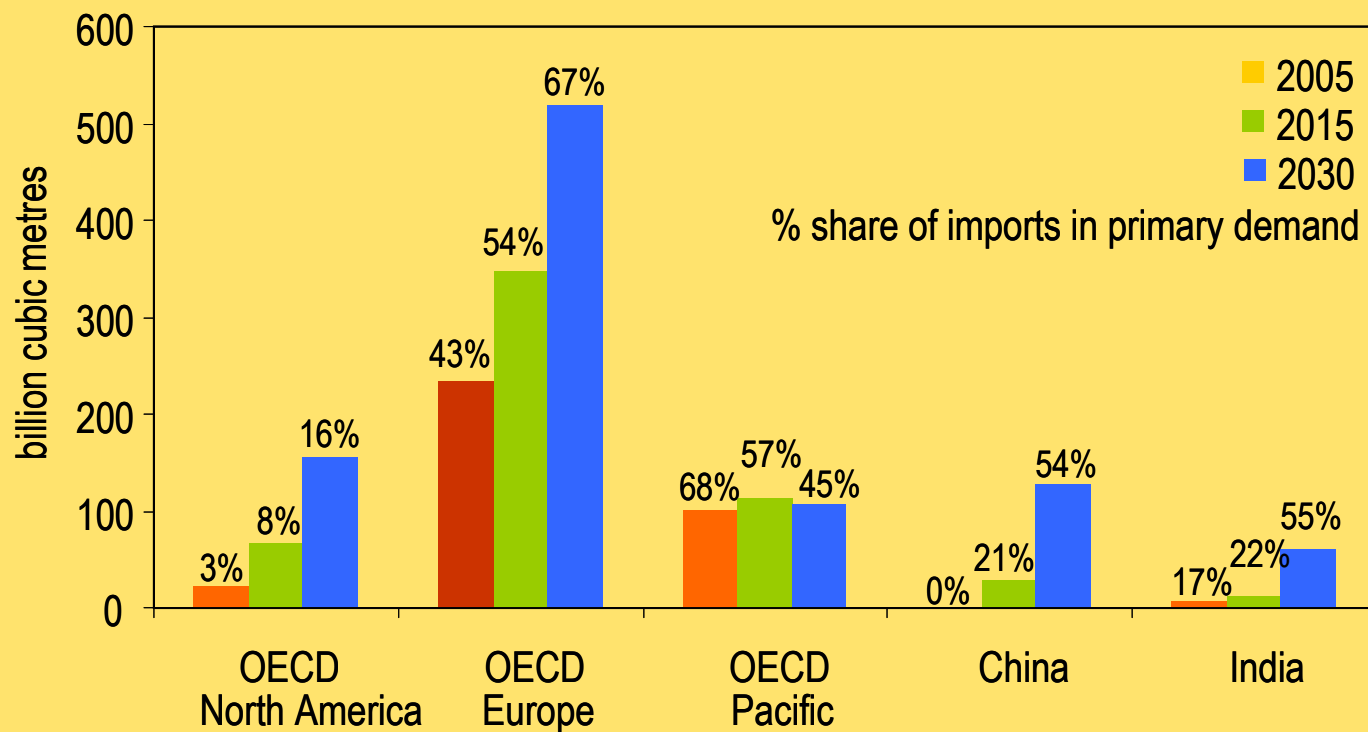
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Reference Scenario: Net Natural Gas Imports



***All gas-importing regions become more dependent on imports,
as demand outstrips indigenous production***



Implications for Investment & Energy Security



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Implications for Investment & Energy Security

- The threat to the world's oil & gas security is real & growing
- The share of transport in total oil use rises in all regions, reducing demand flexibility
- Doubts about adequacy of investment
- OECD & developing Asian oil & gas imports grow further
 - *Imports from a small number of producers – notably in OPEC Middle East – increase sharply*
 - *Growing reliance on strategic transport channels exacerbates risk of a severe supply disruption*



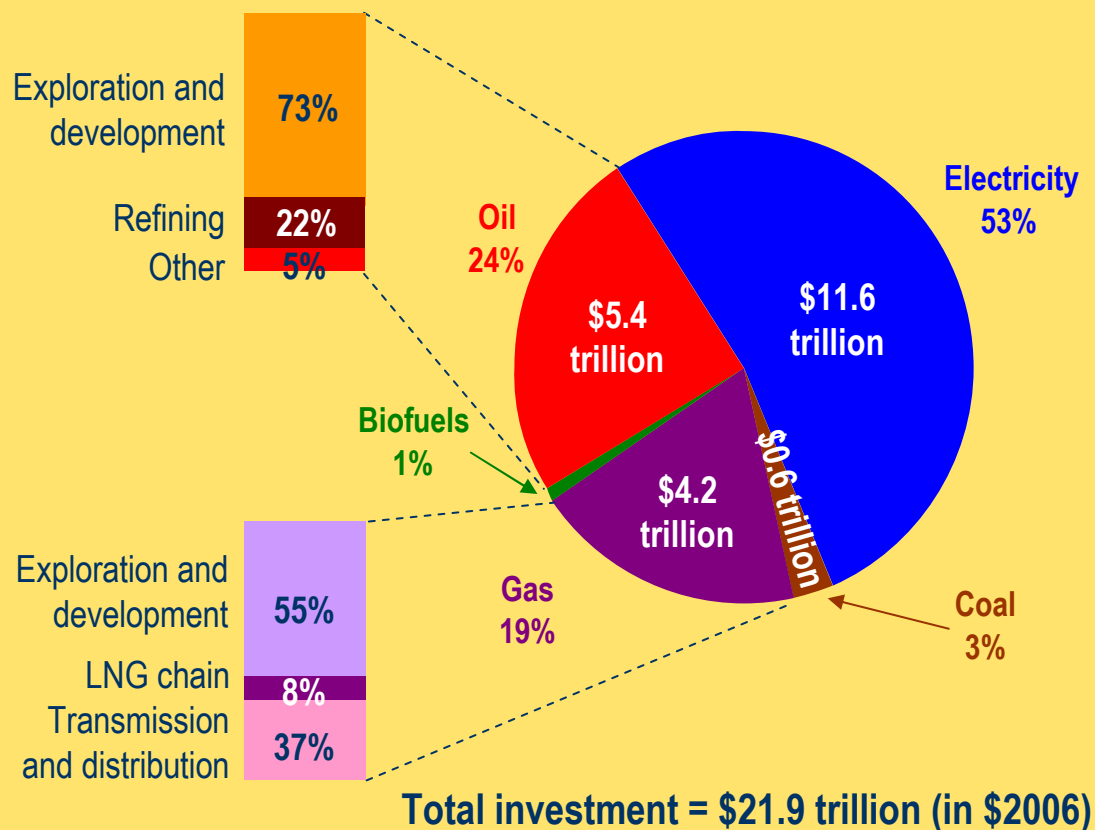
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Reference Scenario: Cumulative Investment in Energy- Supply Infrastructure, 2006-2030



Most oil & gas investment goes to the upstream, to compensate for decline at existing fields & to meet demand growth



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Global Oil Supply Prospects to 2015

- Uncertain whether all planned capacity will be built & all investment needed will occur
- Current capacity plans are insufficient
 - *OPEC plans to add 11.4 mb/d & non-OPEC producers 13.6 mb/d by 2012*
 - *Demand in Reference Scenario rises by 9.5 mb/d between by 2012*
 - *Capacity additions insufficient to offset decline in output at existing fields & meet demand growth*
- A supply crunch in the next few years cannot be ruled out



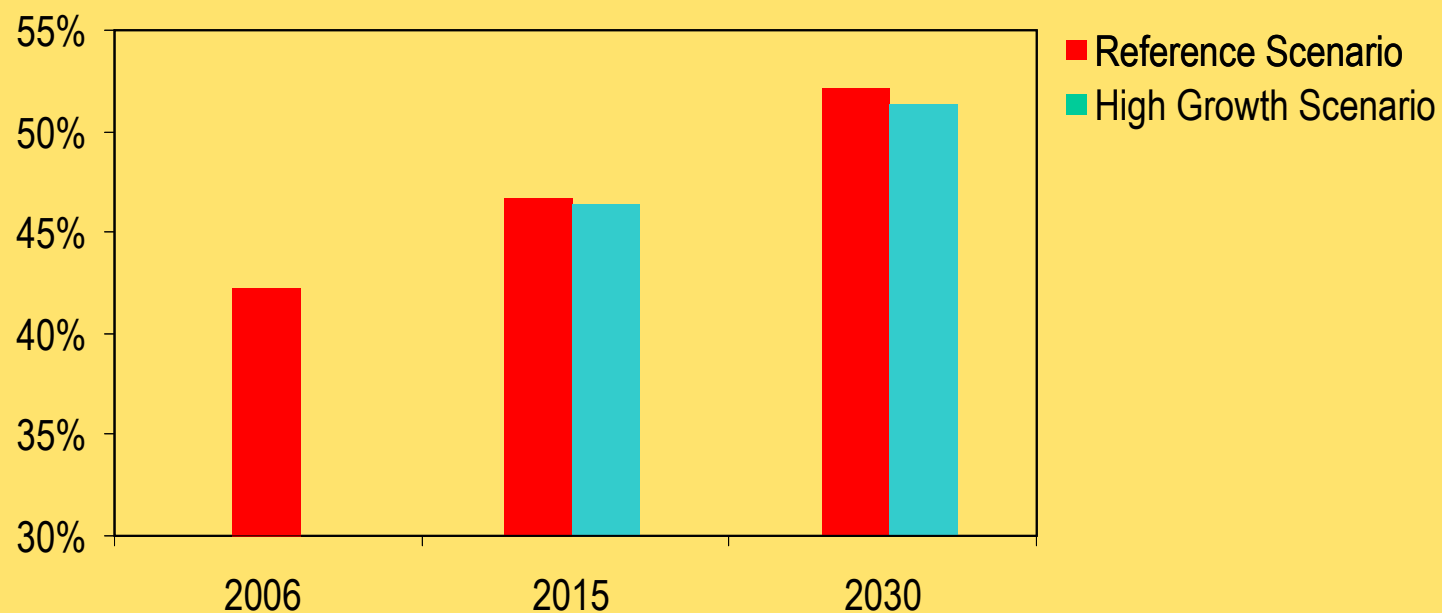
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OPEC Share of World Oil Supply



The increasing concentration of production in OPEC and other major exporters will increase their market dominance

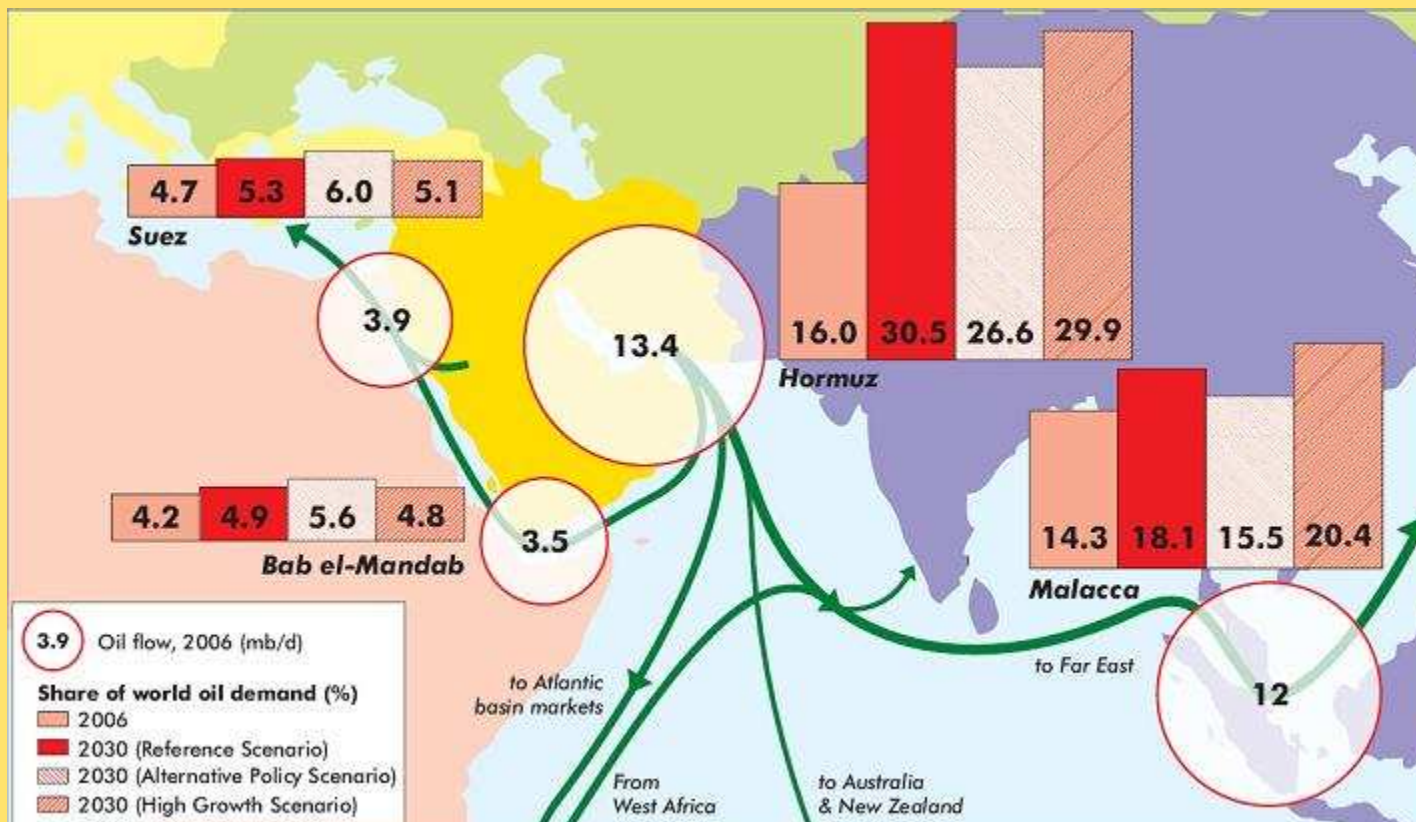


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The "Dire Straits": Oil Export Flows from the Middle East



Rising reliance on Middle East oil will increase flows through vulnerable chokepoints – heightening the risk of a supply disruption



Policies to Achieve a More Secure & Cleaner Global Energy System



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Mapping an Alternative Energy Future

- The **Alternative Policy Scenario** analyses impact of government policies under consideration
- >1 400+ different policies worldwide to
 - *Improve efficiency in energy production & use*
 - *Increase reliance on non-fossil fuels*
 - *Bolster output of oil & gas in net importing countries*
- Macroeconomic, population & oil/gas price assumptions are as per the Reference Scenario



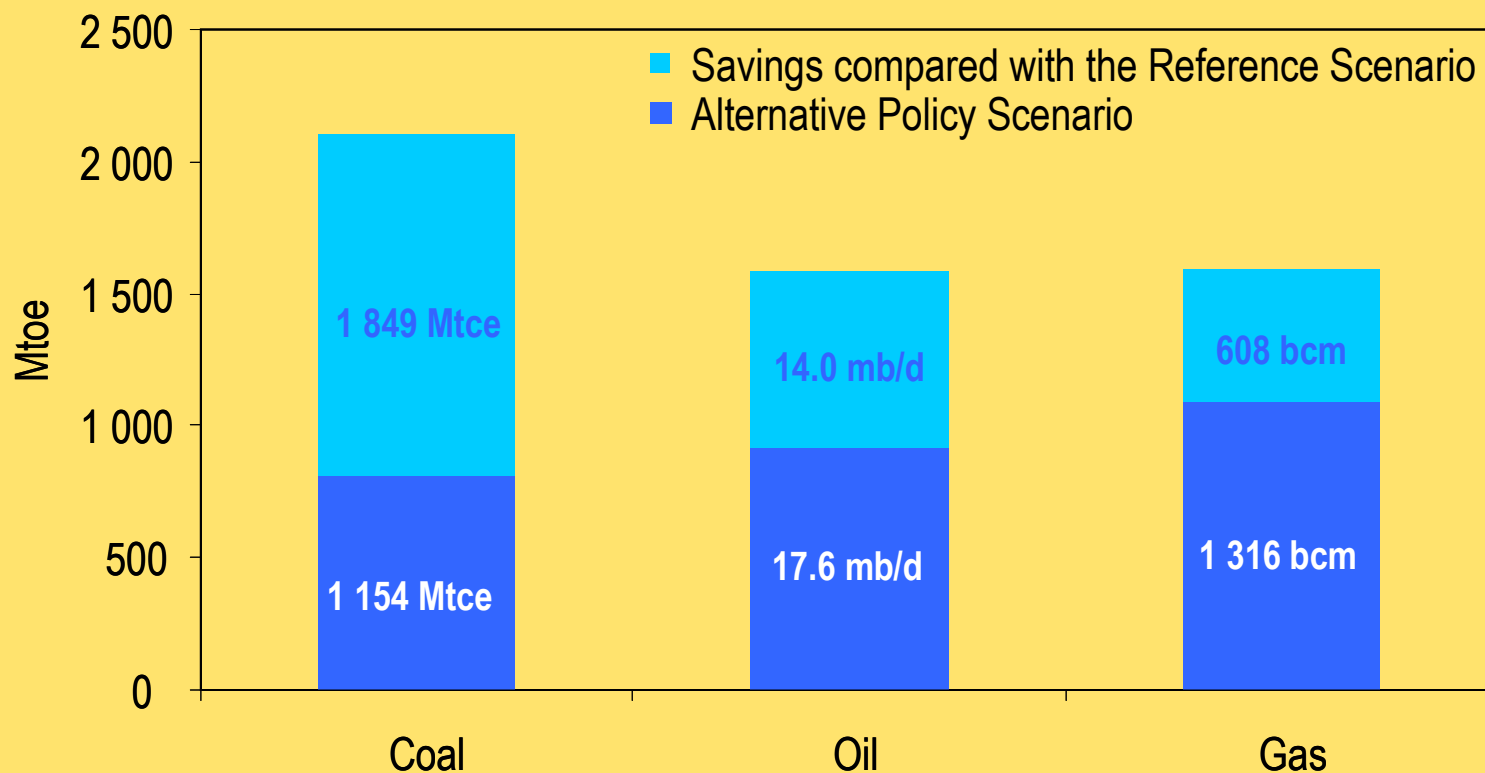
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Alternative Policy Scenario: Global Primary Fossil-Fuel Demand



Oil demand is cut by 14 mb/d by 2030 compared with the Reference Scenario, but still increases



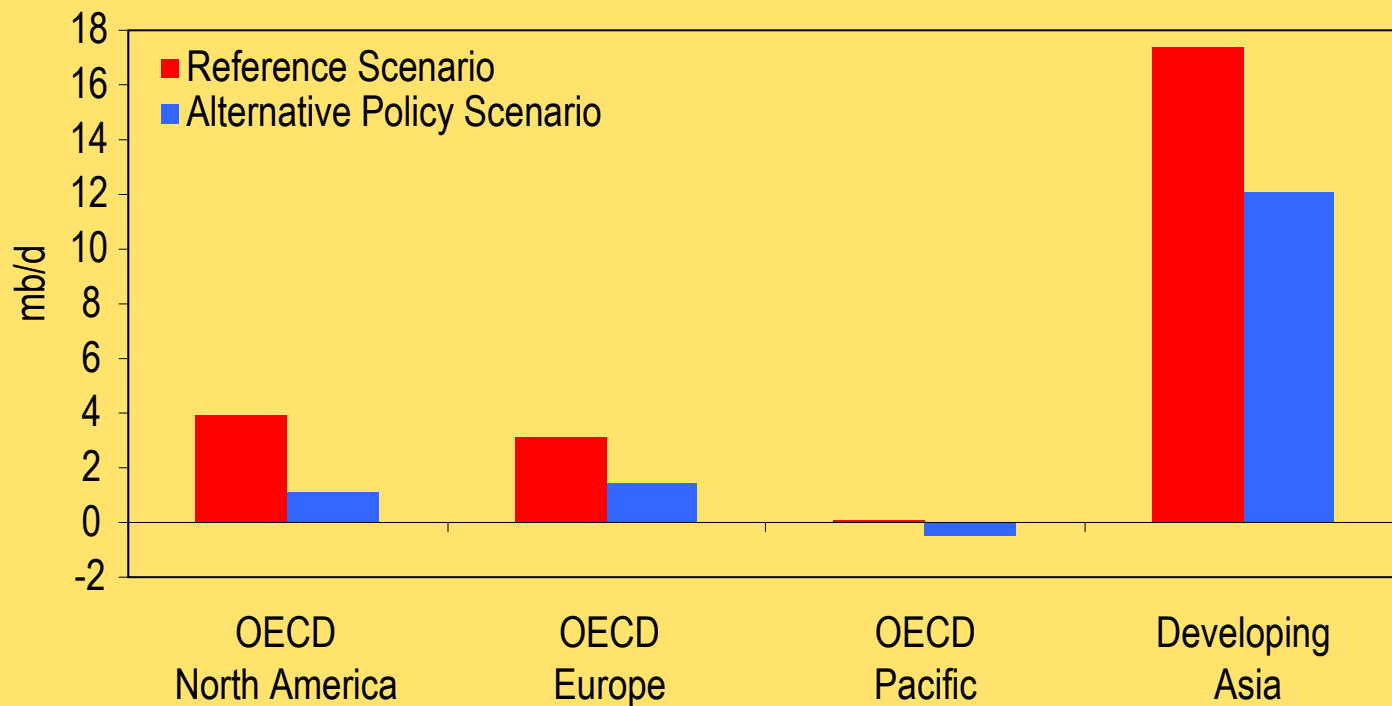
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Alternative Policy Scenario: Increase in Net Oil Imports



In contrast to the Reference Scenario, oil imports in all OECD regions peak & then begin to decline before 2030



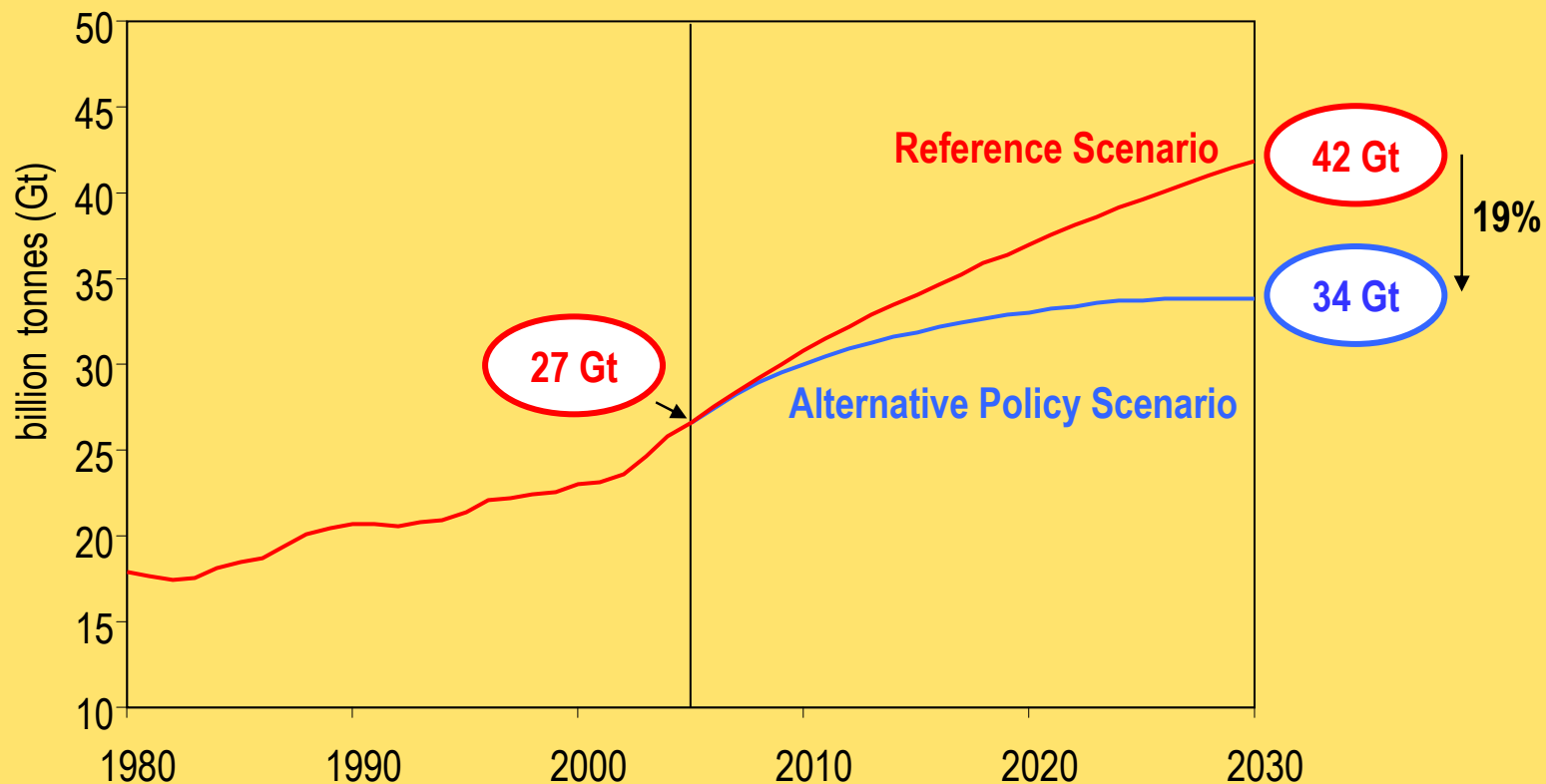
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Alternative Policy Scenario: Global Energy-Related CO₂ Emissions



Global emissions grow less than half as fast as in the Reference Scenario, stabilising in the 2020s



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Implications for Global Climate

- Reference & High Growth Scenarios trends are consistent with dramatic climate effects
 - *Atmospheric concentration of greenhouse gases would rise to 850 - 1 130 ppm of CO₂-equivalent*
 - *Implies a rise in global average temperature of more than 4.9 - 6.1°C above pre-industrial levels*
- Increase in concentration & temperature is much less marked in the Alternative Policy Scenario
 - *Concentration rises to 550 ppm & temperature by c.3°C*
- Our 450 Stabilisation Case is very ambitious
 - *Would require early retirement of energy-related capital on a large scale & at high cost*
 - *Would hinge on much stronger policy action than currently envisaged*



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Summary & Conclusions

- Absent new policies, oil & gas demand – driven by transport & power sector – will grow further
- Middle East OPEC will meet most incremental needs, heightening worries about energy security
- Oil market prospects hinge on investment & decline rates, which remain uncertain
- Policies currently being considered would go significant way to cutting imports & emissions
- Many policy actions are triple-win, bringing joint energy-security, climate & economic benefits



Thank you!



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