



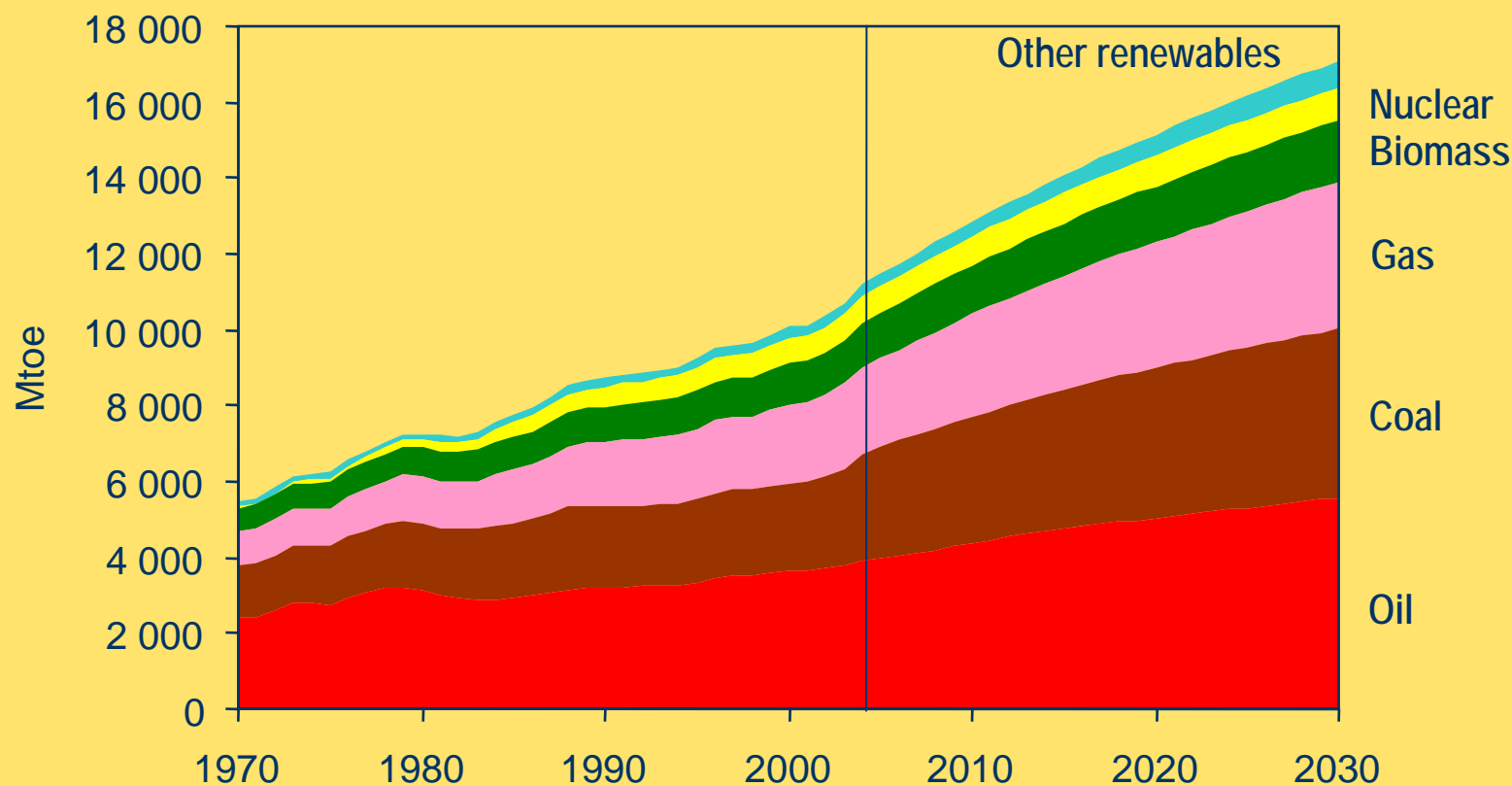
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World Energy Outlook 2006

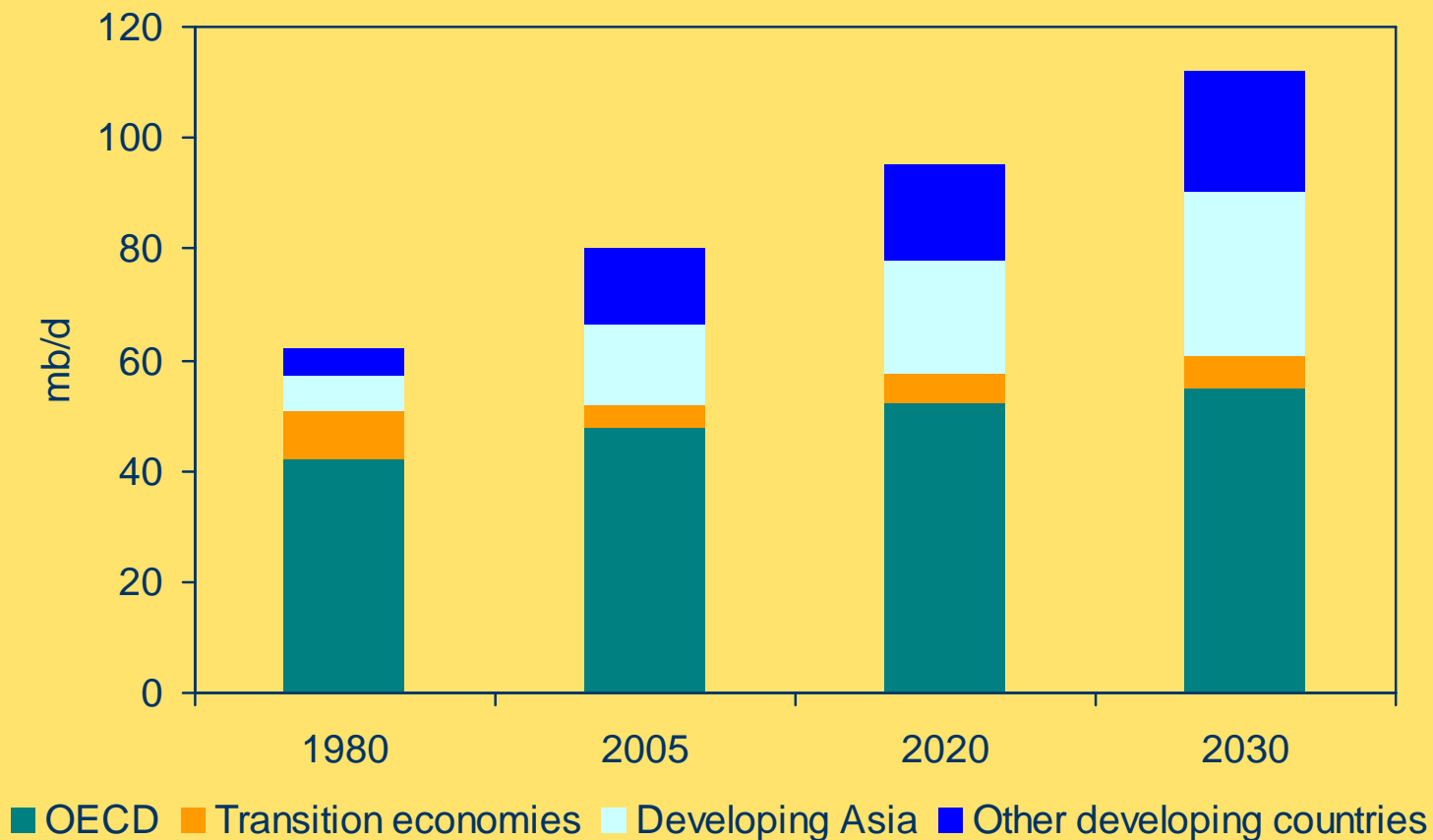
Dr. Teresa Malyshev
International Energy Agency

The Reference Scenario: World Primary Energy Demand



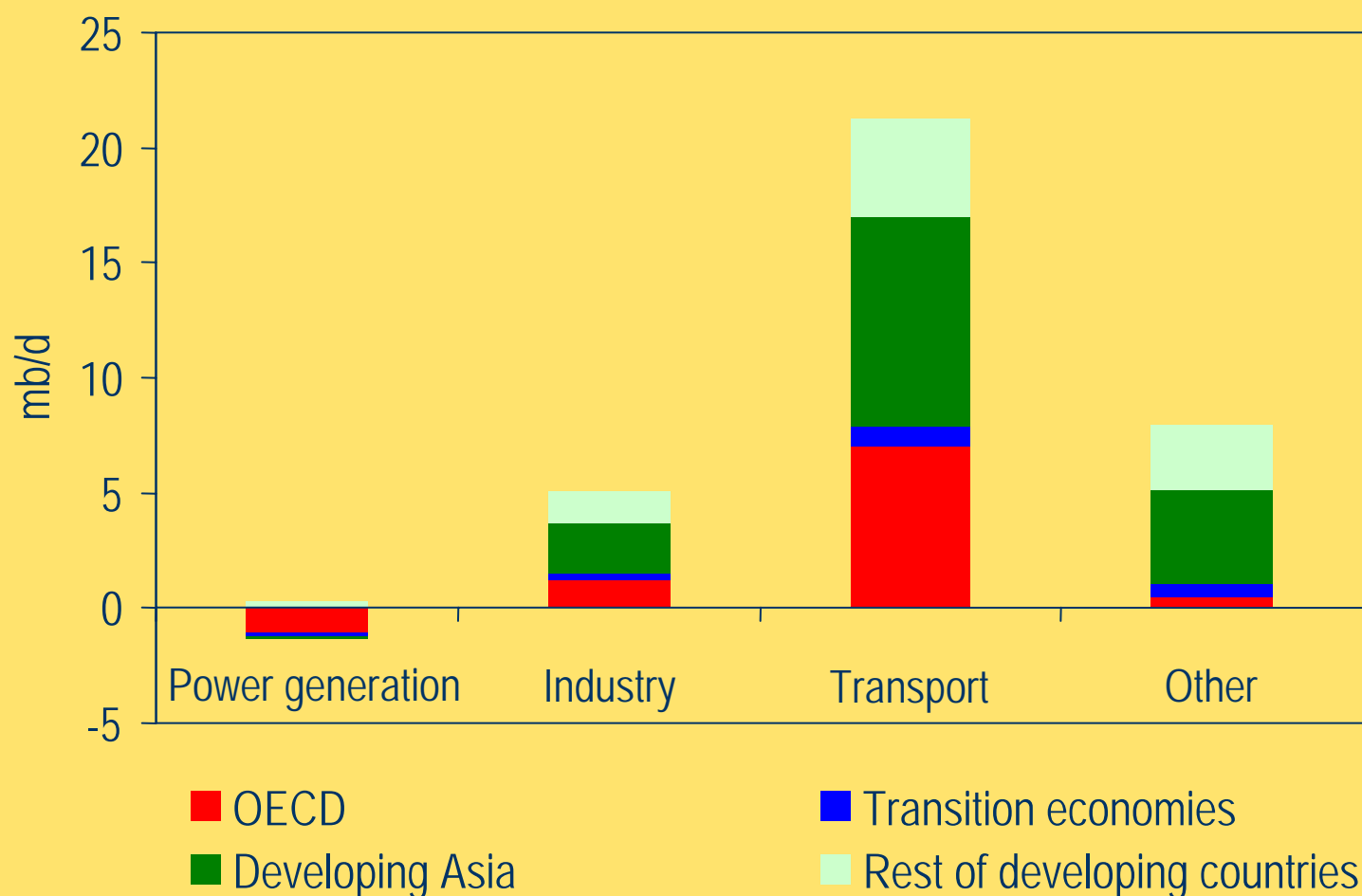
Global demand grows by more than half over the next quarter of a century, with coal use rising most in absolute terms

Reference Scenario: Primary Oil Demand



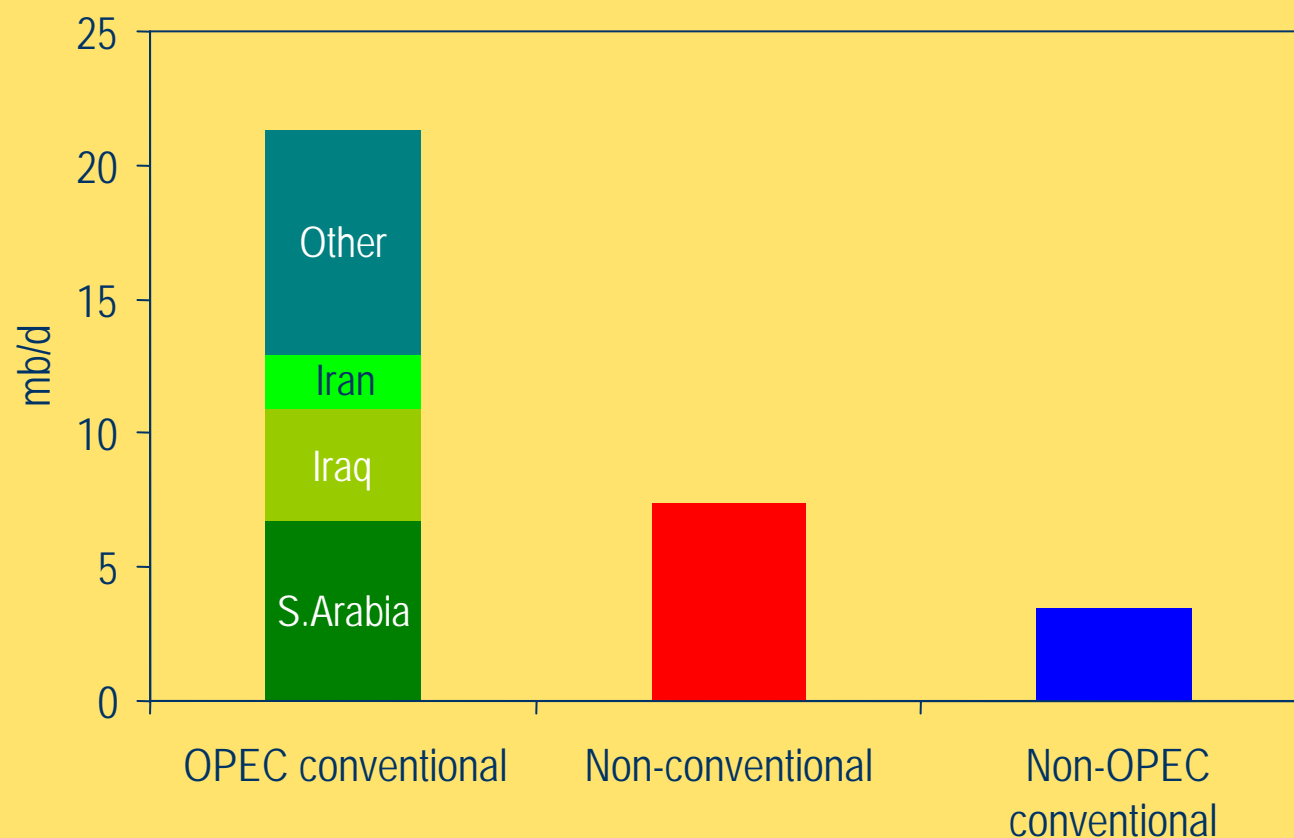
Most of the increase in oil demand comes from developing countries, where economic growth – the main driver of oil demand – is most rapid

Reference Scenario: Incremental Oil Demand, 2004-2030



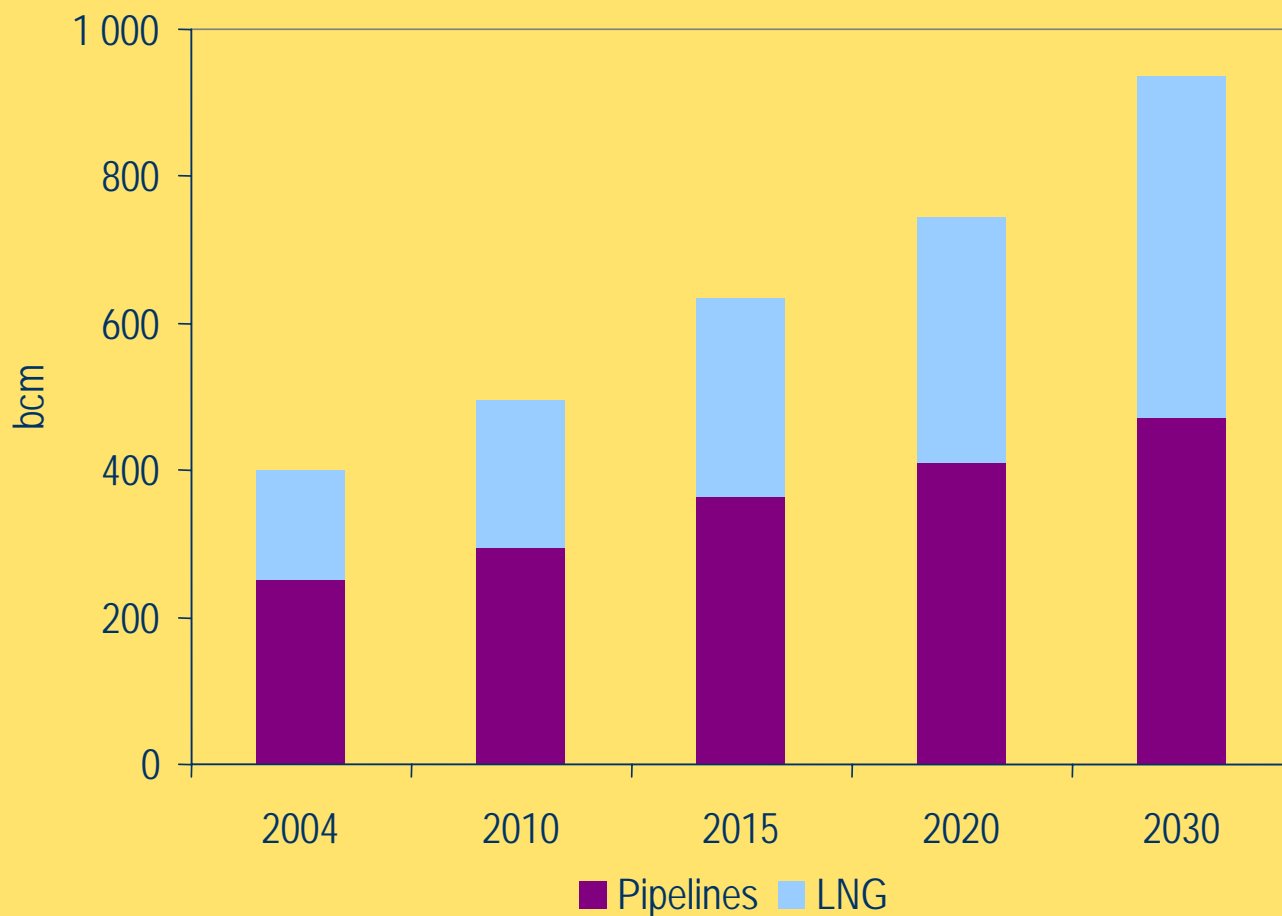
Most of the increase in oil demand comes from developing countries, where economic growth – the main driver of oil demand – is most rapid

Reference Scenario: Increase in World Oil Supply, 2004-2030



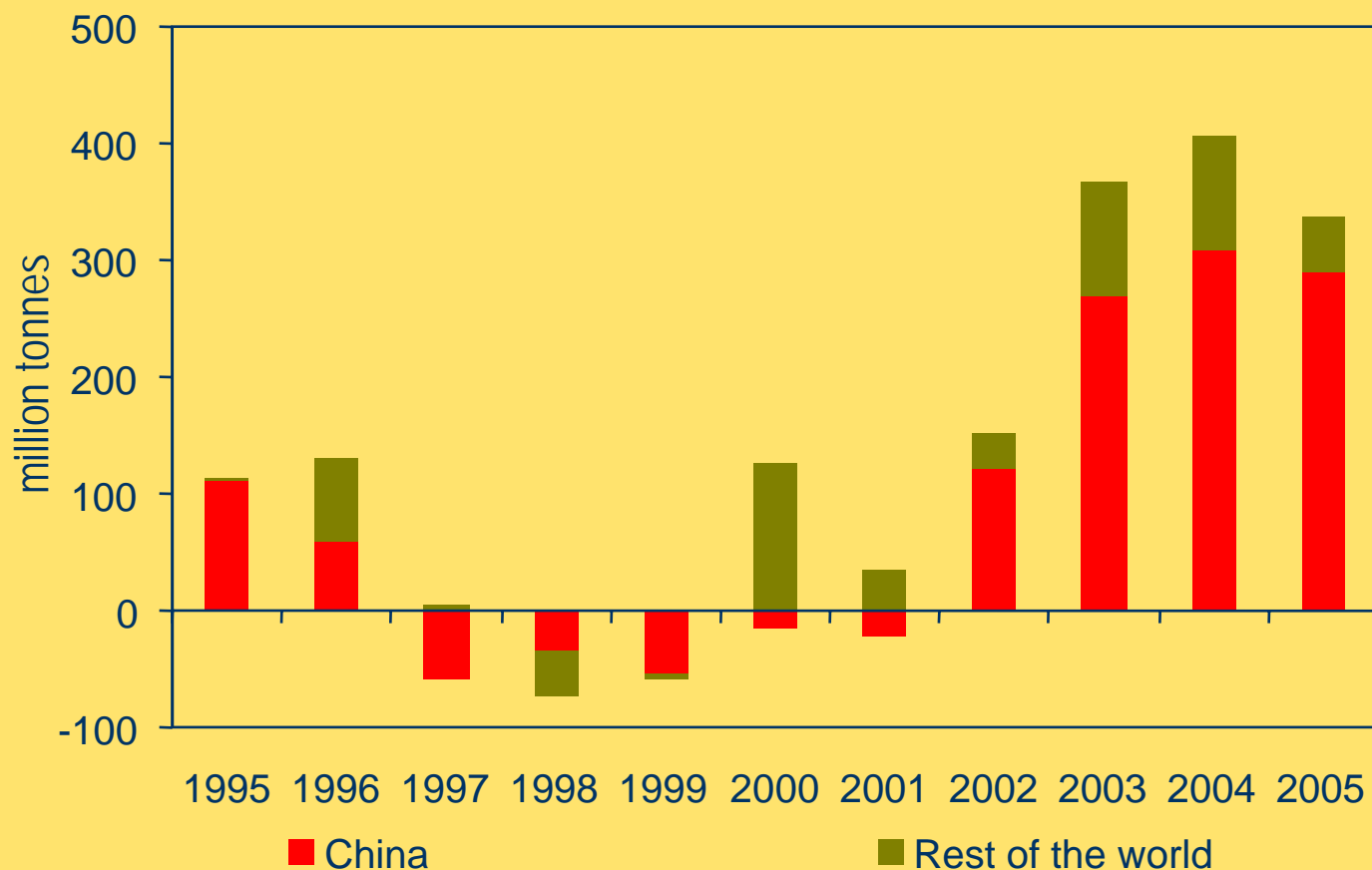
The share of OPEC in world oil supply increases sharply as conventional non-OPEC production peaks towards the middle of next decade

Reference Scenario: World Inter-regional Natural Gas Trade



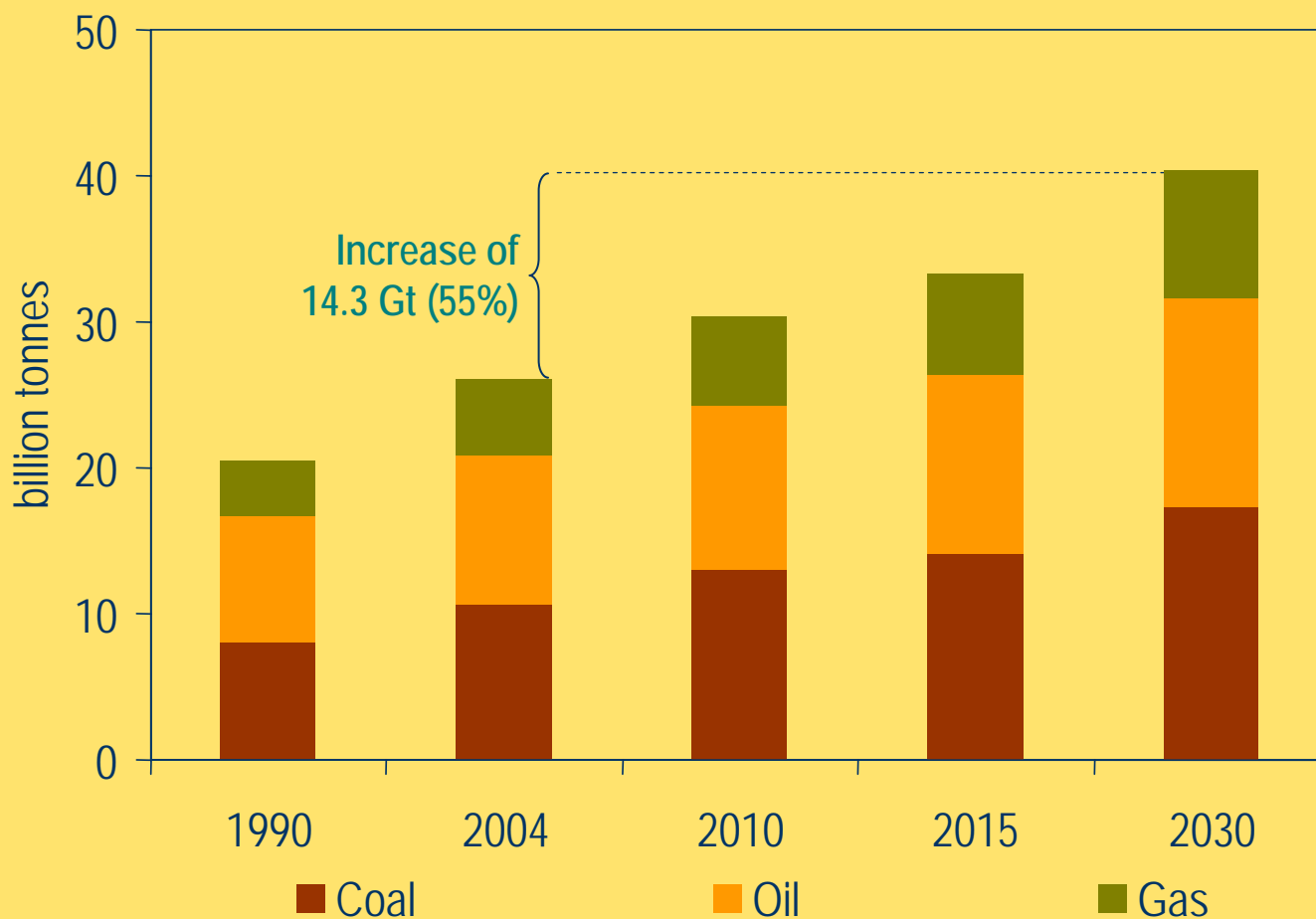
Global gas trade doubles, with two-thirds of the increase coming from Russia, the Middle East & North Africa – mostly as LNG

Reference Scenario: Annual Increase in Coal Demand



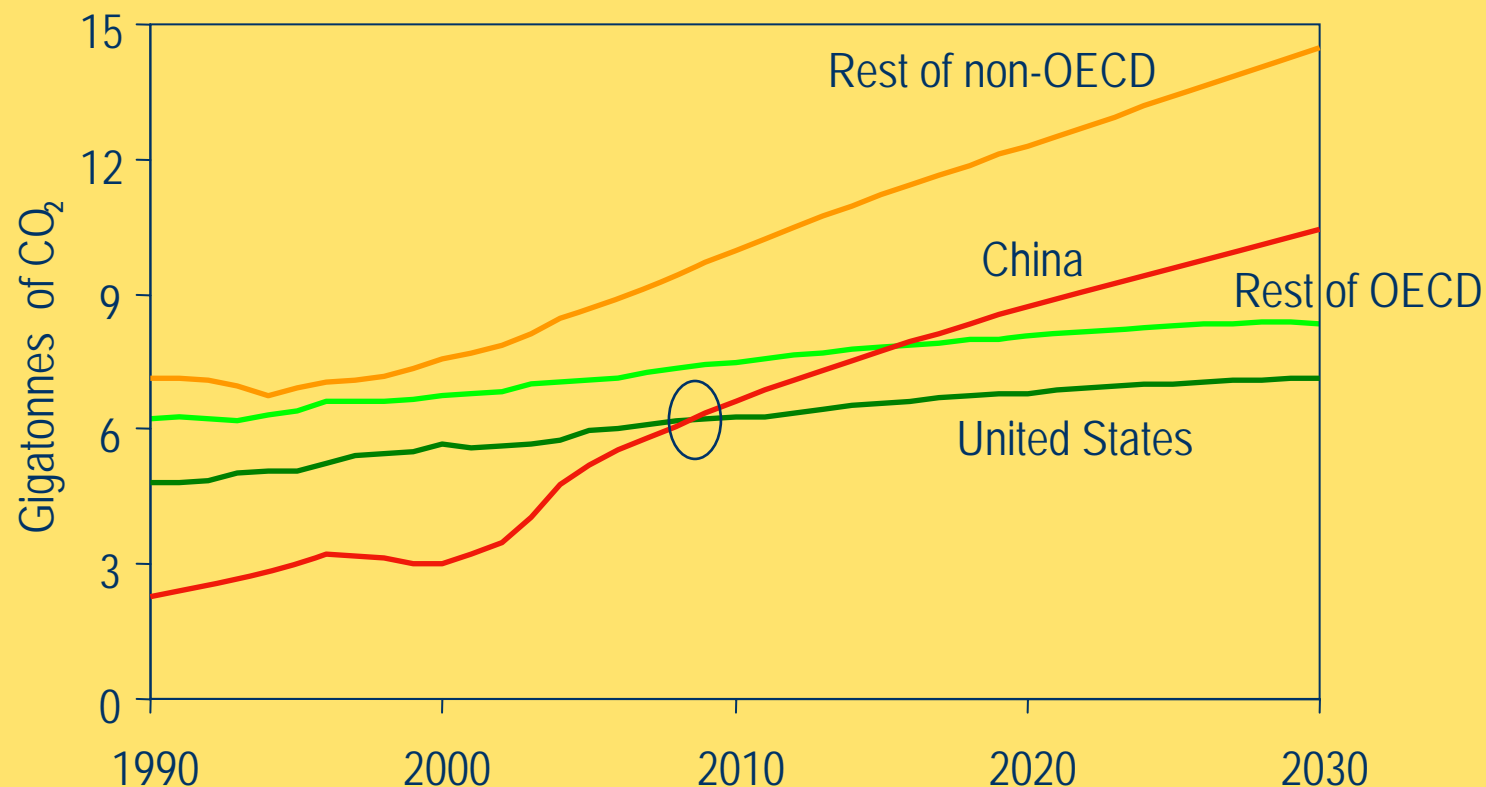
Global coal demand in the recent years has grown much faster than previously – mainly driven by China

Reference Scenario: Energy-Related CO₂ Emissions by Fuel



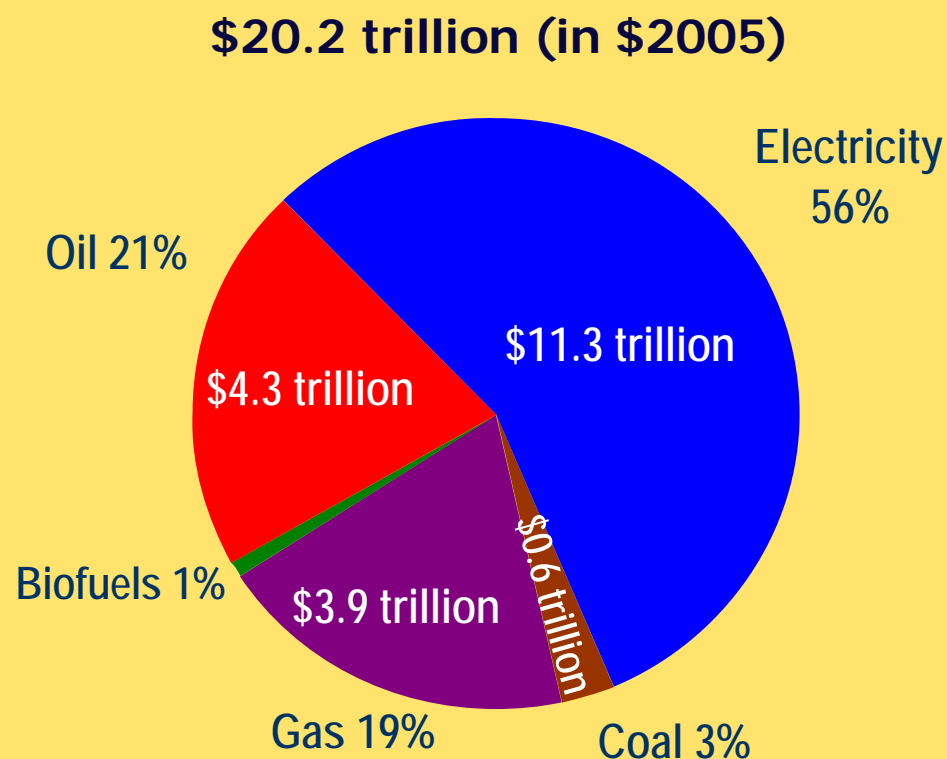
Half of the projected increase in emissions comes from new power stations, mainly using coal & mainly located in China & India

Reference Scenario: Energy-Related CO₂ emissions by Region



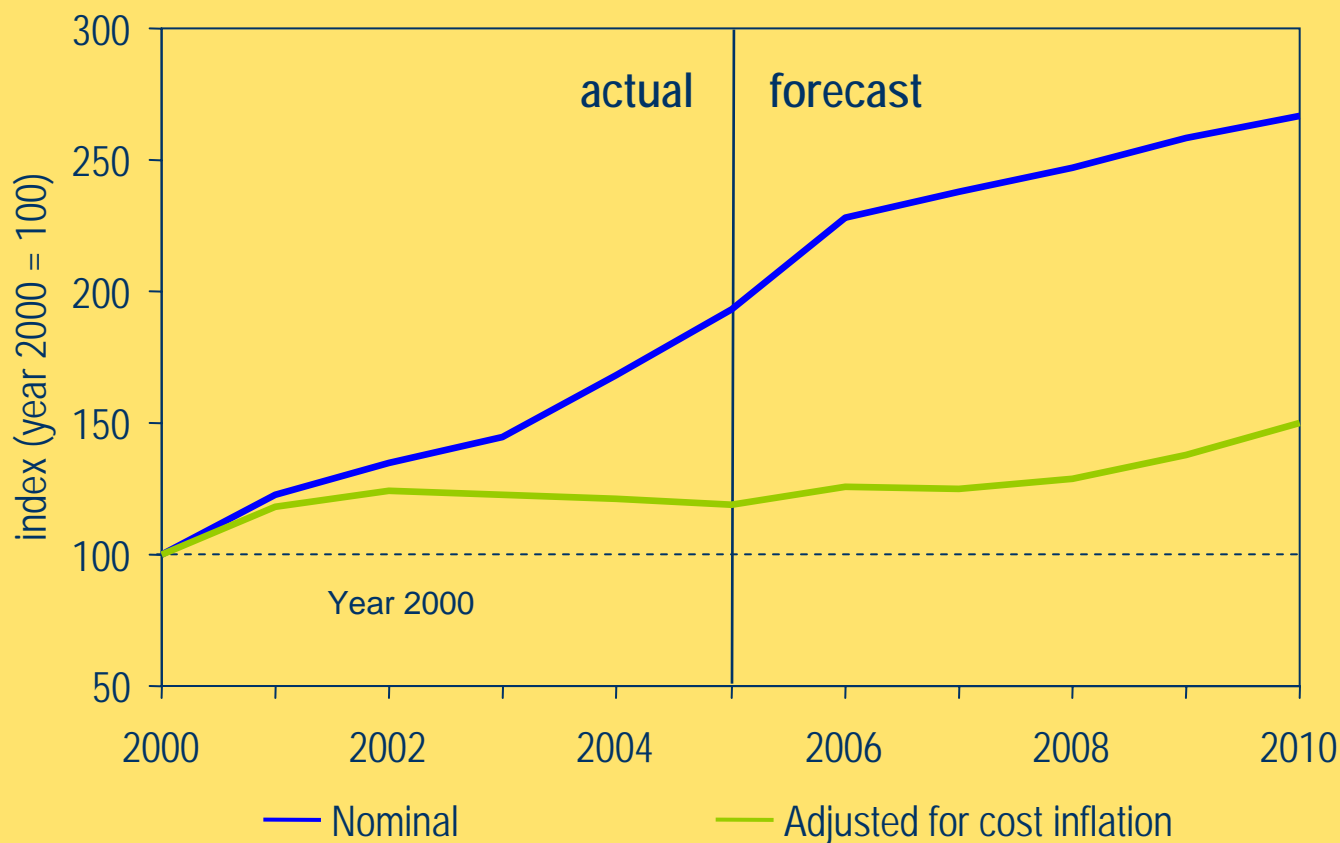
China overtakes the US as the world's biggest emitter before 2010, though its per capita emissions reach just 60% of those of the OECD in 2030

Reference Scenario: Cumulative Investment, 2005-2030



Investment needs exceed \$20 trillion – \$3 trillion more than previously projected, mainly because of higher unit costs

Global Upstream Oil & Gas Investment: Impact of Cost Inflation



Annual upstream investment doubled to \$225 billion between 2000 and 2005, but most of the increase was due to cost inflation

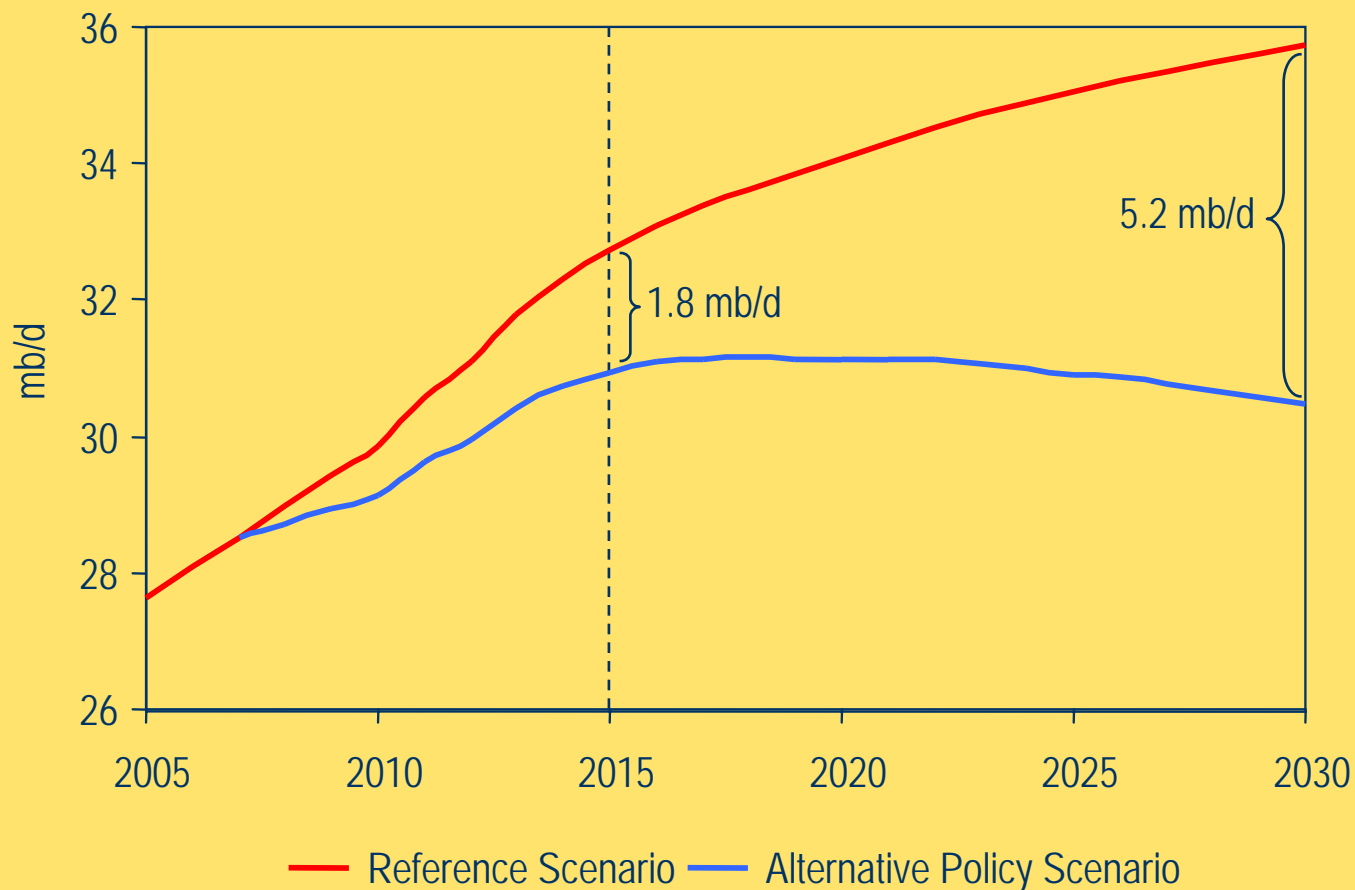
The Energy Future Absent New Policies

- Security of oil supply is threatened
 - *Oil production in non-OPEC countries is set to peak*
 - *Production will be increasingly concentrated in a small number of countries*
- Gas security is also a growing concern
 - *Europe's production has already peaked - US to follow*
 - *Import dependence in both regions & other key regions will grow absent new policies*
- Investment over the next decade will lock in technology that will remain in use for up to 60 years

Alternative Policy Scenario: Mapping a Better Energy Future

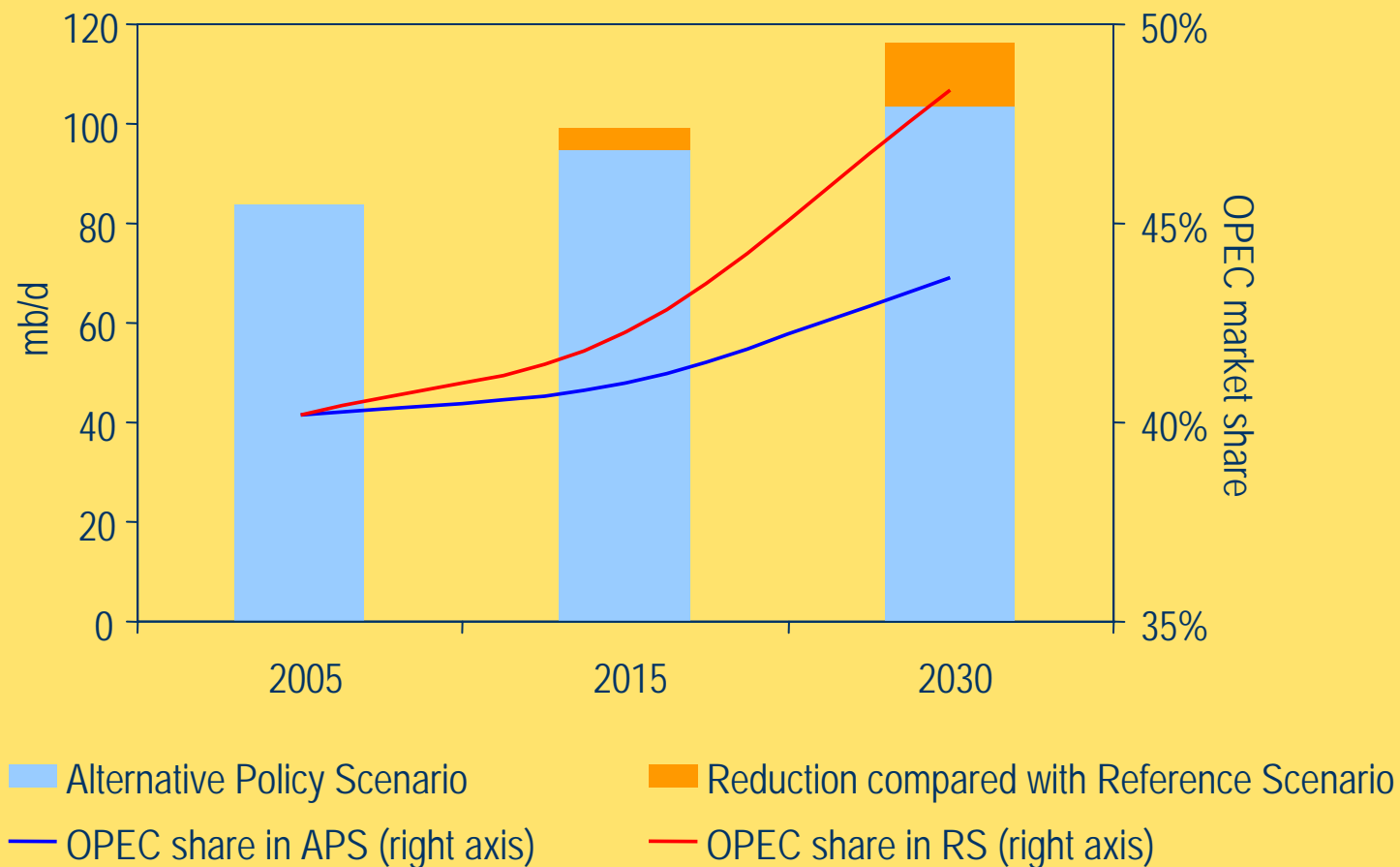
- Analyses impact of government policies under consideration to enhance security & curb emissions
- Demonstrates that we can significantly reduce growth in energy demand & emissions and stimulate alternative energy production
 - *Oil demand is reduced by 13 mb/d in 2030 - equivalent to current output of Saudi Arabia & Iran*
 - *Oil savings in 2015 savings reach 5 mb/d*
 - *CO₂ emissions are 6.3 Gt (16%) lower in 2030 – equivalent to the current emissions of US and Canada*
- Delaying action by 10 years would reduce the impact on emissions in 2030 by three-quarters

Alternative Policy Scenario: OECD Oil Imports



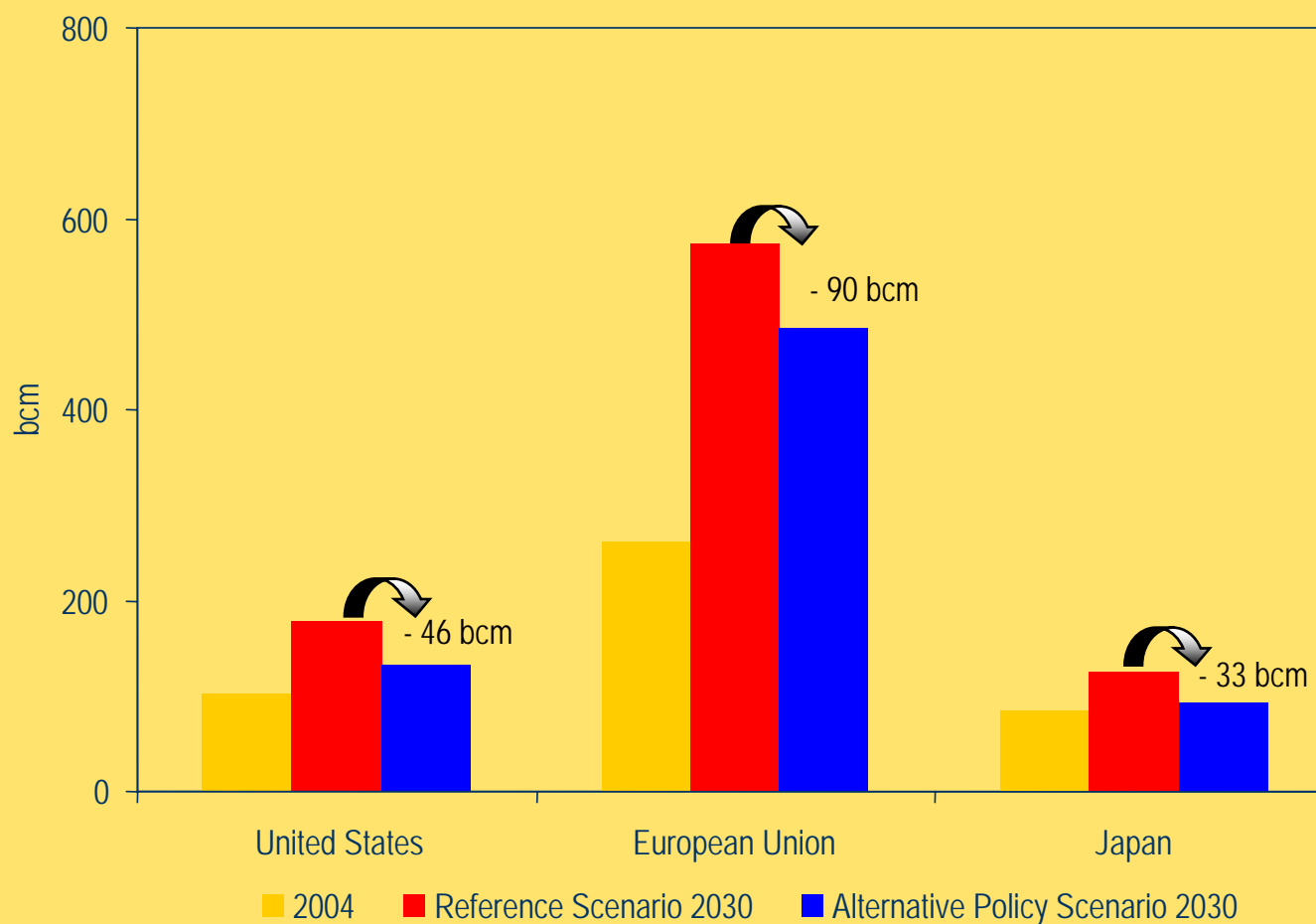
In stark contrast with the Reference Scenario, OECD oil imports level off soon after 2015 & then begin to decline

The Alternative Policy Scenario: Global Oil Supply



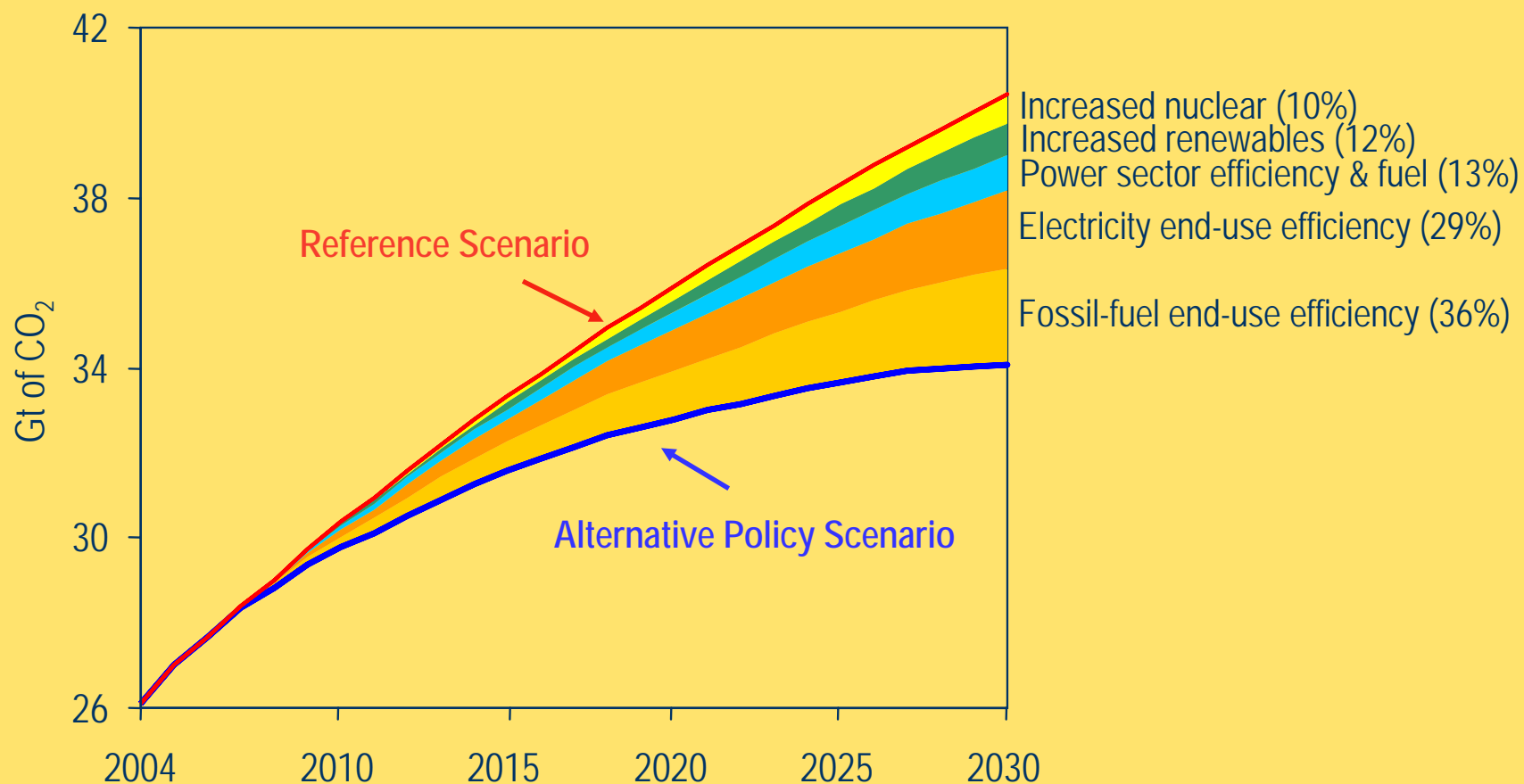
OPEC's share of global oil production rises from 40% now to 43% in 2030 in the APS, compared with a jump to 49% in the RS

The Alternative Policy Scenario: Gas Imports, 2004-2030



Gas imports in the main consuming regions are significantly lower in the APS compared with the RS

The Alternative Policy Scenario: Key Policies for CO₂ Reduction



Improved end-use efficiency accounts for over two-thirds of avoided emissions in 2030 in the APS

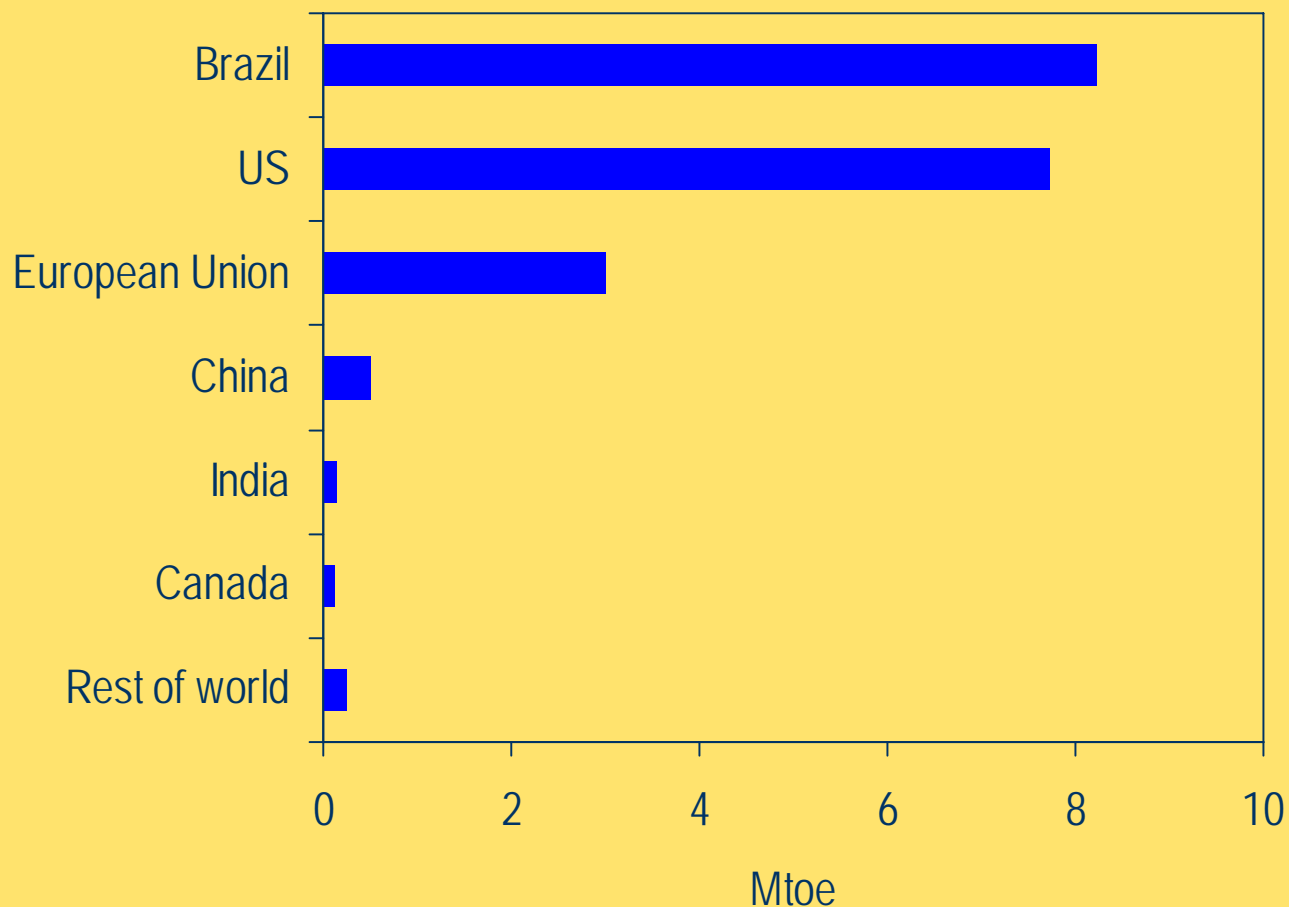
The Alternative Policy Scenario: Cost Effectiveness of Policies

- Total energy investment – from production to consumption – are lower than in the RS
- Consumers spend \$2.4 trillion *more* in 2005-2030 in more efficient cars, refrigerators etc
- ..but producers need to spend almost \$3 trillion *less*
 - *Each \$1 invested in more efficient electrical appliances saves \$2.2 in investment in power plants & networks*
 - *Each \$1 invested in more efficient oil-consuming equipments (mainly cars) saves \$2.4 in oil imports*
- The higher initial investments by consumers are more than outweighed by fuel-cost savings

Outlook for Biofuels

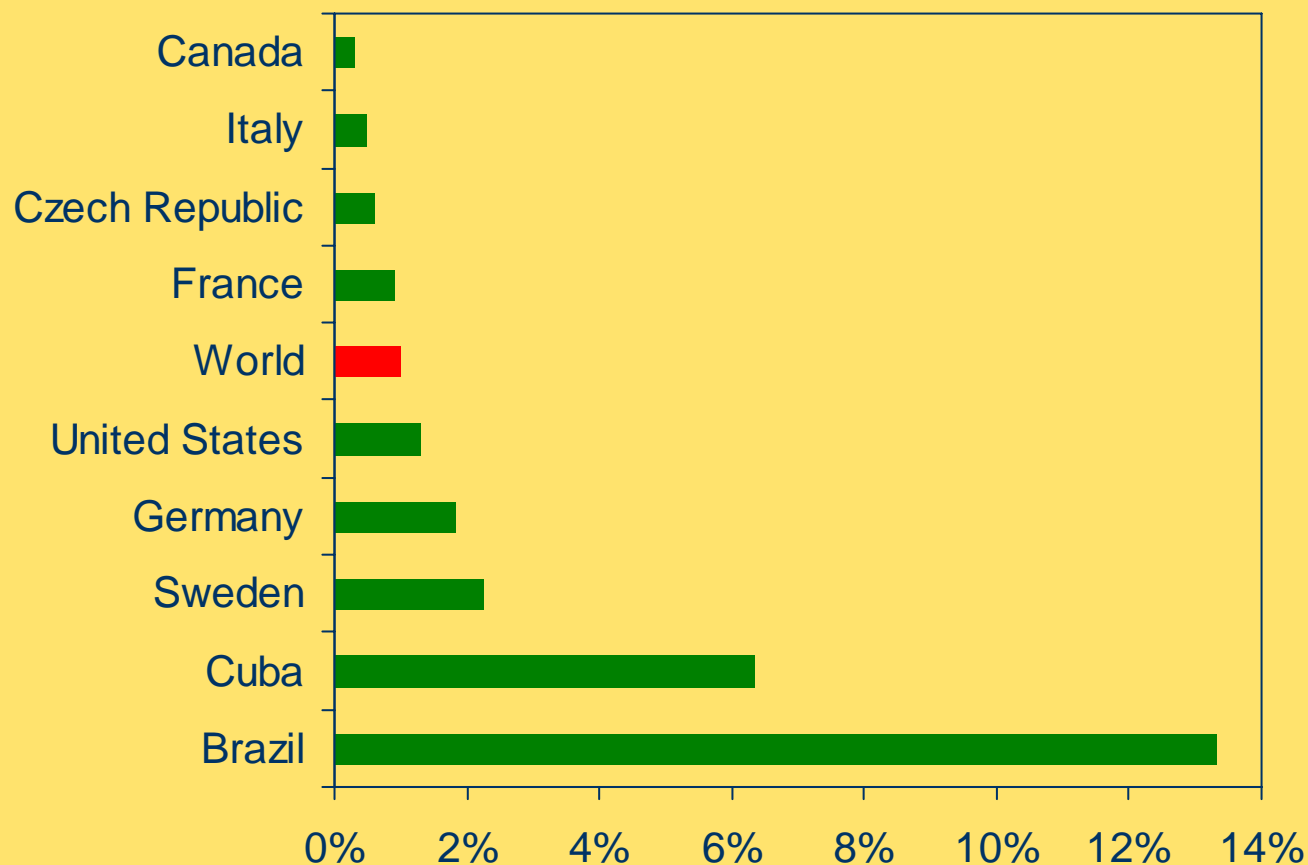
- Interest in biofuels is soaring
- Biofuels can help address twin threats of growing energy insecurity & climate change through
 - *Increased diversity of geographic & fuel sources*
 - *Lower greenhouse-gas emissions - depending on how they are produced*
- Higher oil prices have made biofuels more competitive, but further cost reductions are needed
- Availability of arable land will constrain biofuels potential in the medium term
- Long-term prospects hinge on new technology

Biofuels Production in 2005



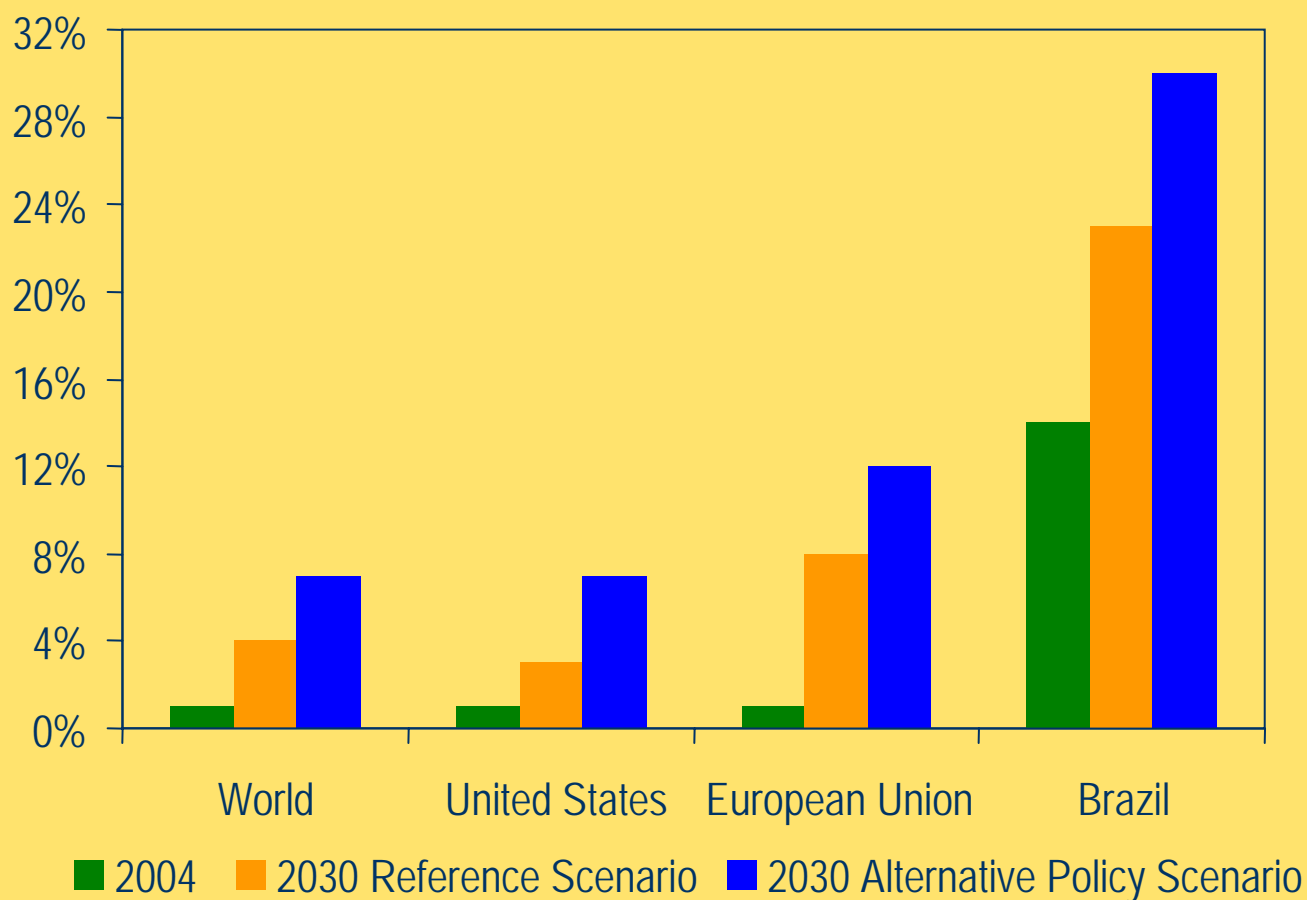
The United States is thought to have overtaken Brazil in 2006 as the world's biggest producer of biofuels

Share of Biofuels in Total Road-Transport Fuel Consumption, 2004



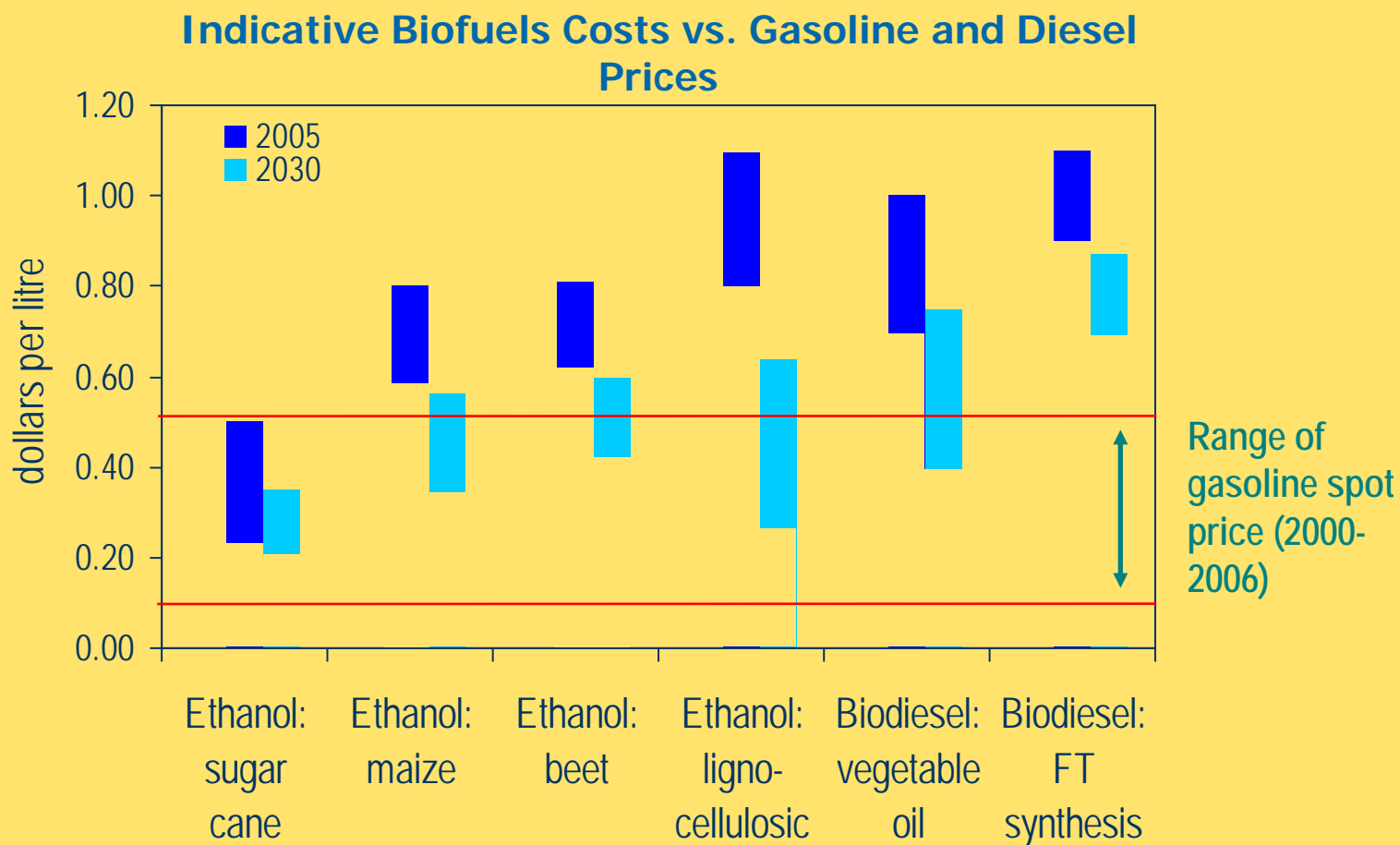
Biofuels currently meet less than 1% of road-fuel demand worldwide, but close to 14% in Brazil

Share of Biofuels in Road-Transport Fuel Consumption



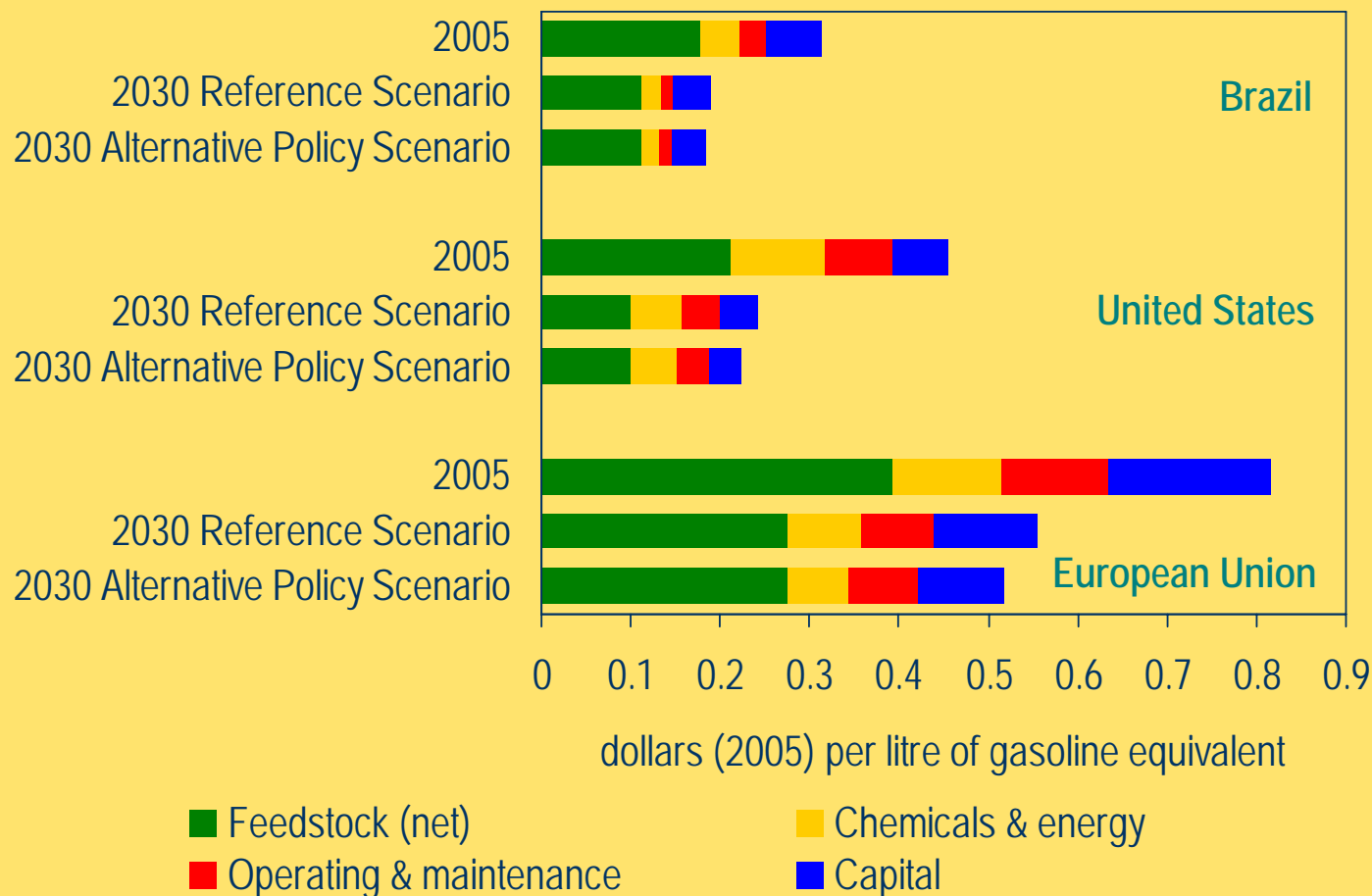
Biofuels are set to play a much larger role in meeting world road-transport fuel demand

Outlook for Biofuels Supply Costs



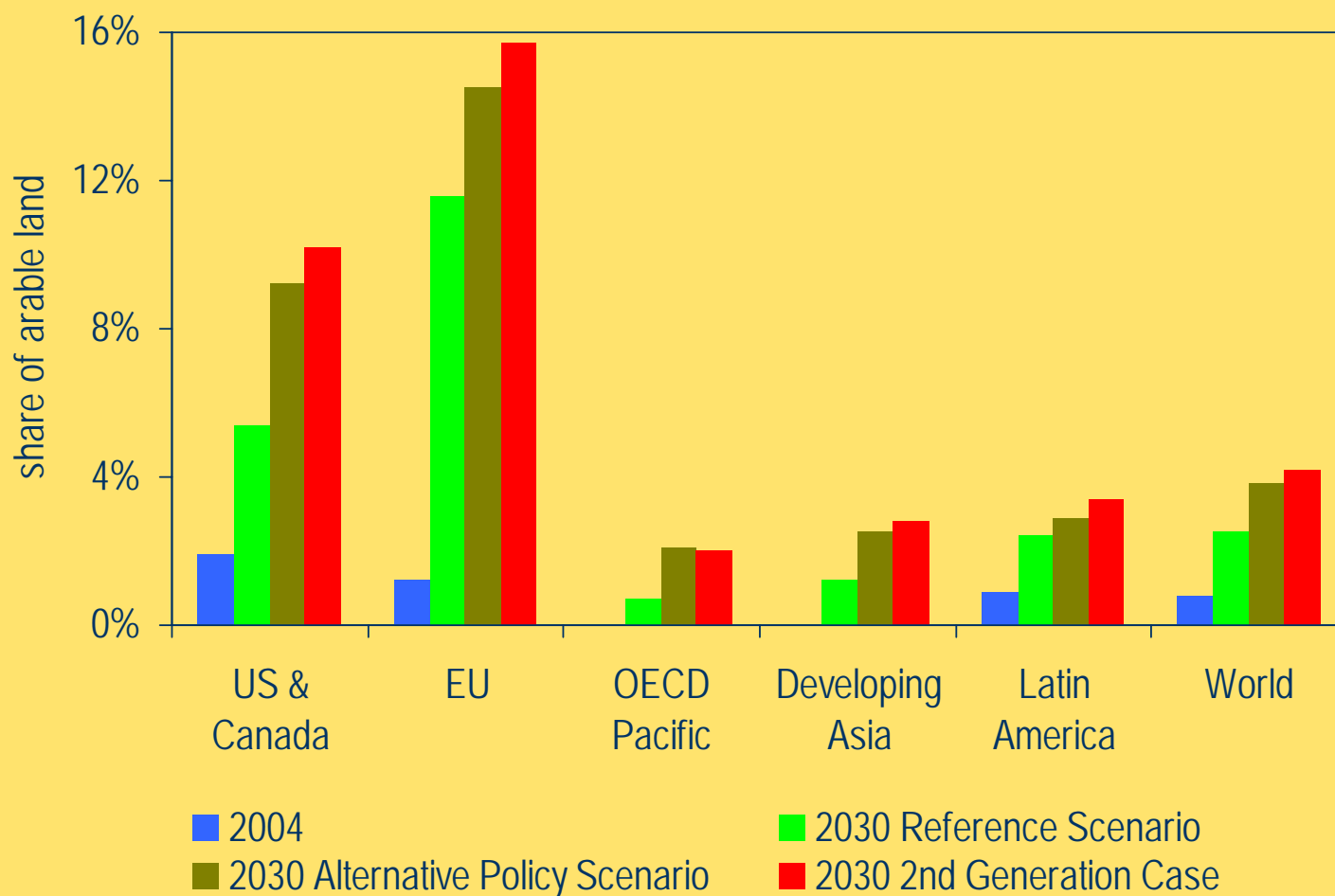
Significant production cost reductions are expected – especially for 2nd-generation ligno-cellulosic ethanol

1st-Generation Biofuels Production Costs



Production costs are expected to drop in all regions, with Brazil remaining the lowest-cost producer

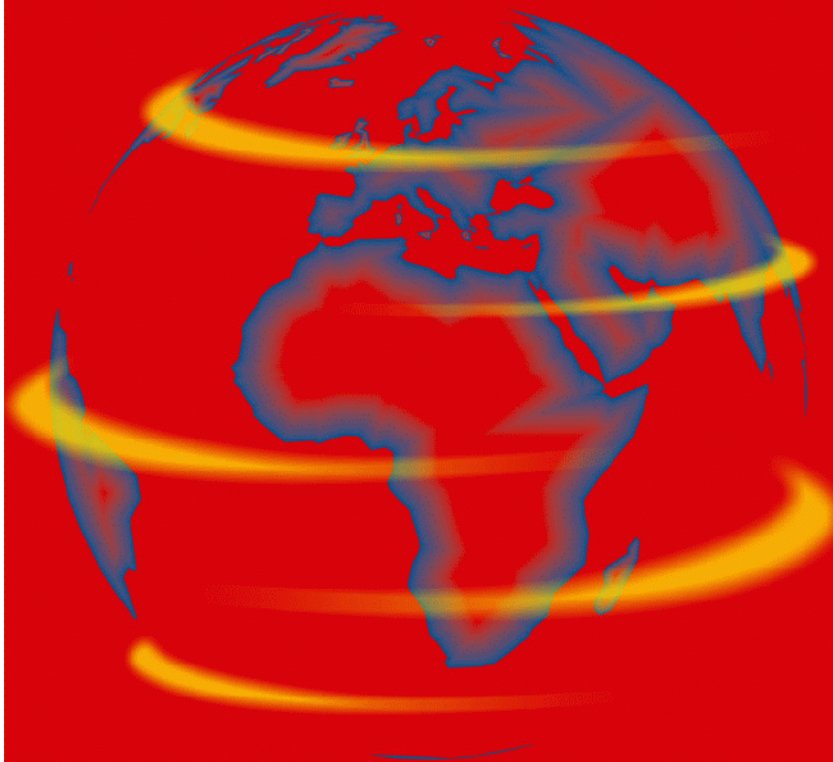
Land Requirements for Biofuels



A significant proportion of the world's arable land is turned over to biofuels production – even in the Reference Scenario

Summing Up

- The Reference Scenario projects a vulnerable, dirty and expensive global energy system
- The WEO maps out a cleaner, cleverer and more competitive energy future based on new policies
- Strong political will and urgent government action is needed to create clear incentives to change existing investment patterns
- Trade and subsidy policies will be critical to further boost market share of biofuels
- New technologies could allow biofuels to play a much bigger role in the longer term



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Thank you

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