

IEA and Four Challenges

April 2008 at Tokyo

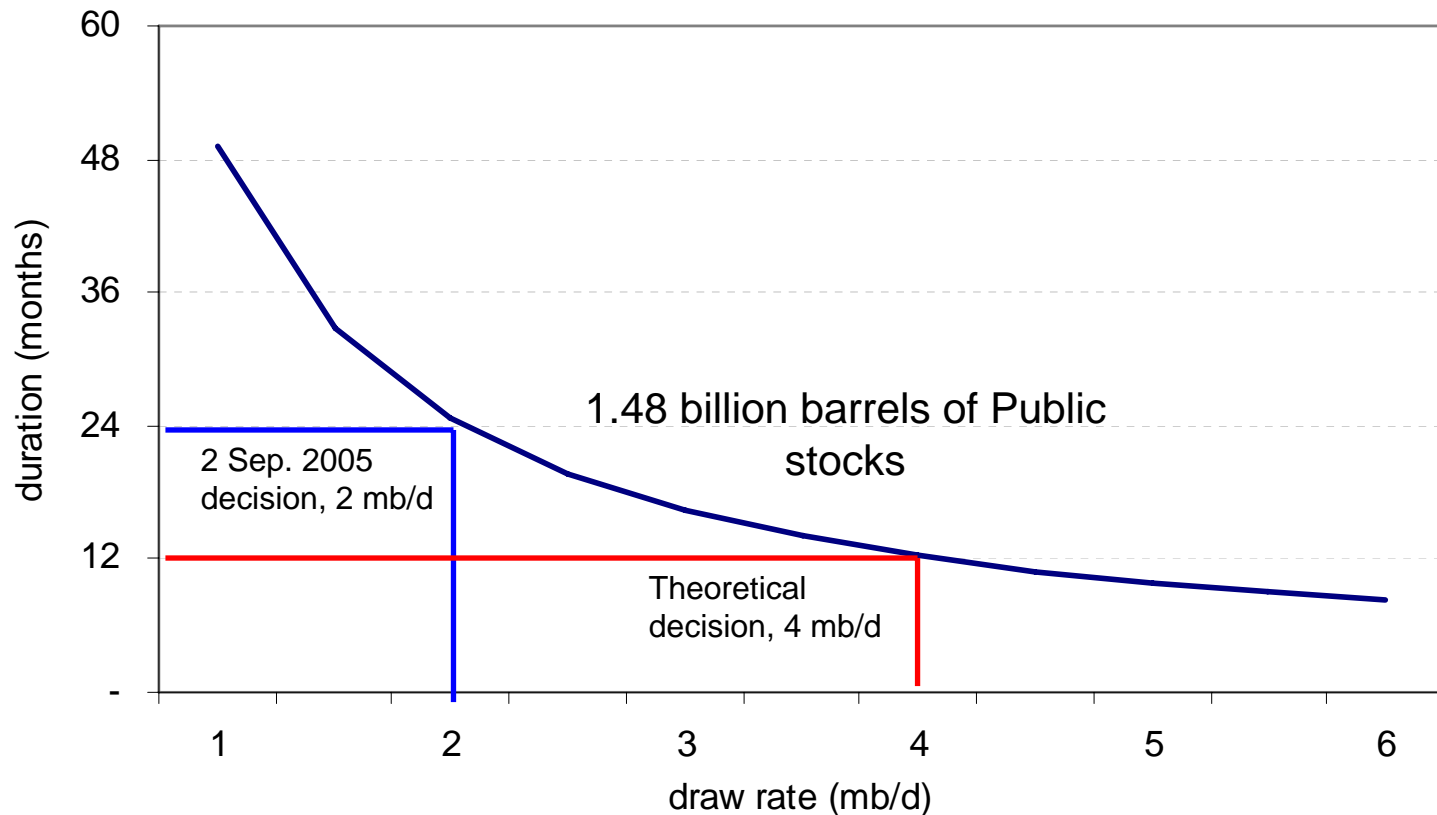
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I use these slides to present my personal views which I prescribed in the campaign. This presentation is not necessarily reflecting the IEA's official views. Nobuo TANAKA

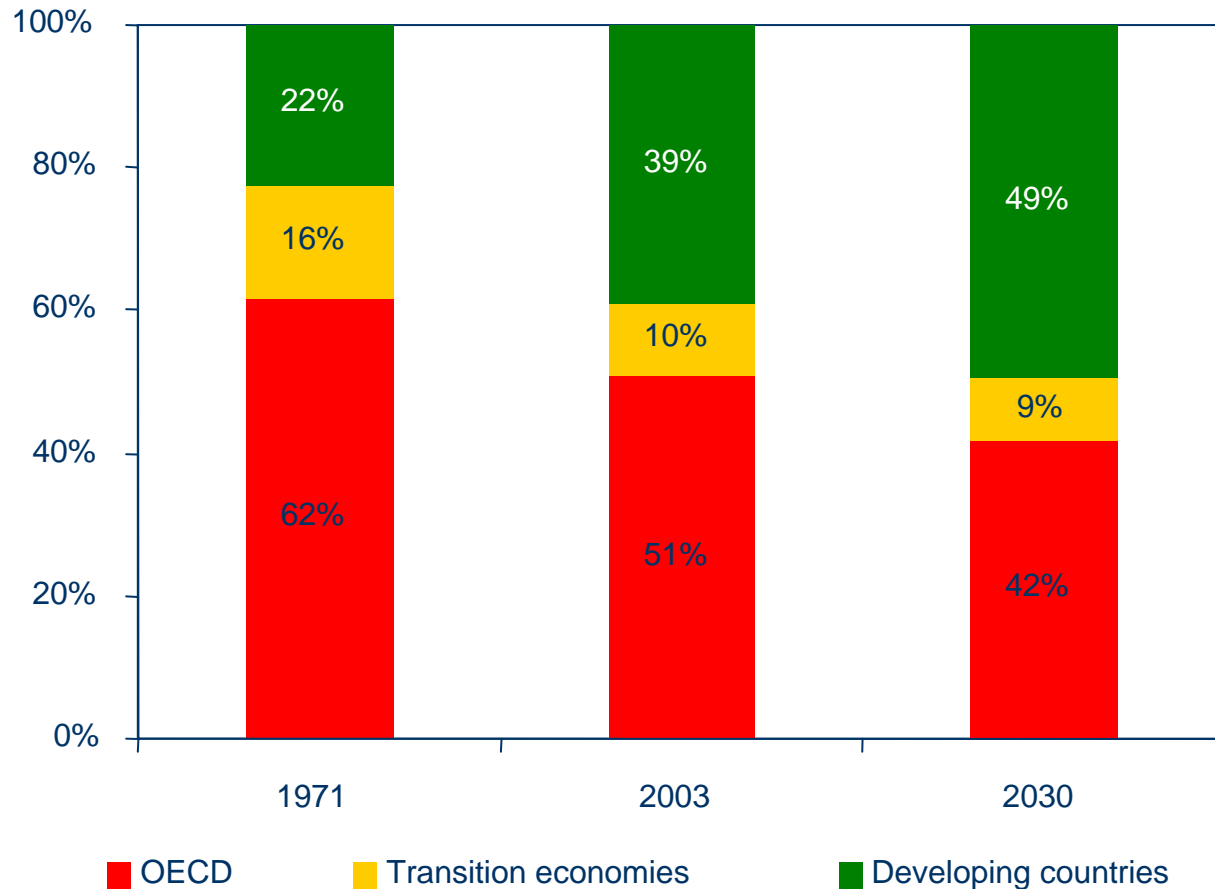
Challenge 1. Emerging Major Players

A Safety Net: Emergency Preparedness Remains Crucial



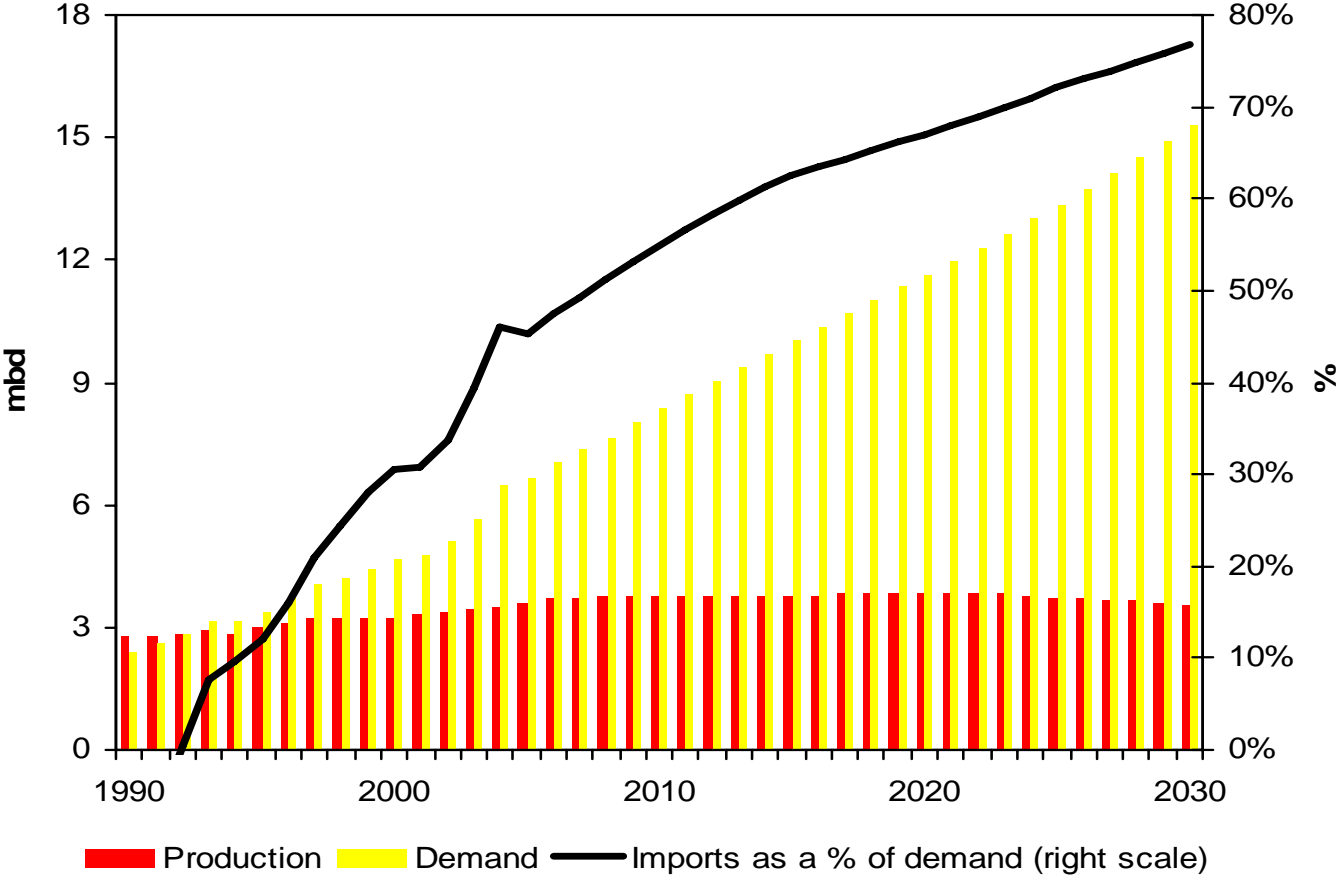
IEA Public Stocks could replace an oil supply disruption of 2 mb/d for nearly 2 years

Changing Pattern of Energy Demand



About 70% of the increase in energy demand will come from developing countries due to their more rapid economic and population growth

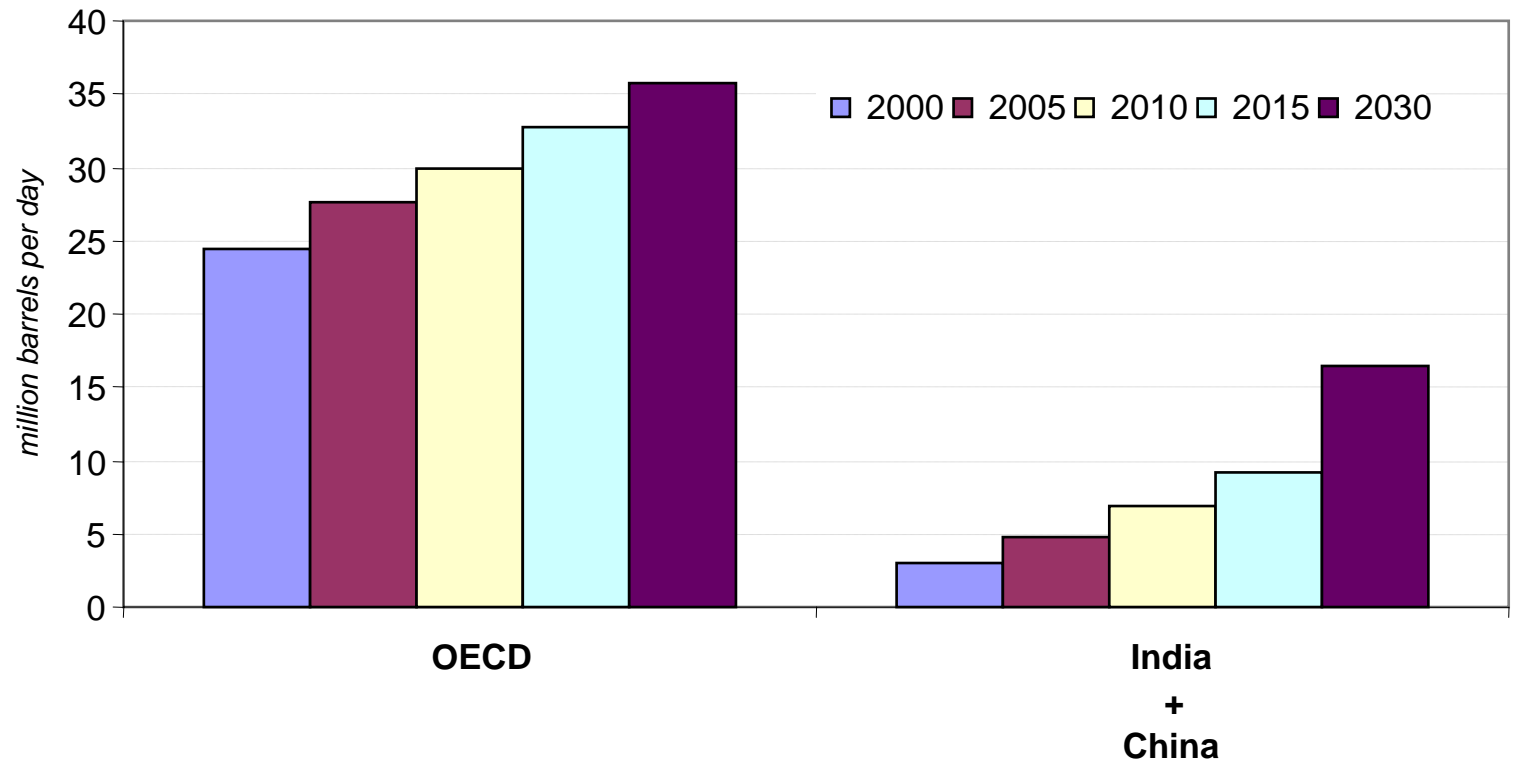
China Oil Outlook



China's oil imports will soar from around 3 mbd today to almost 12 mbd in 2030

Outreach increasingly important

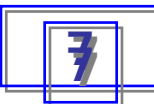
Expected Total Oil Net Imports (mb/d)



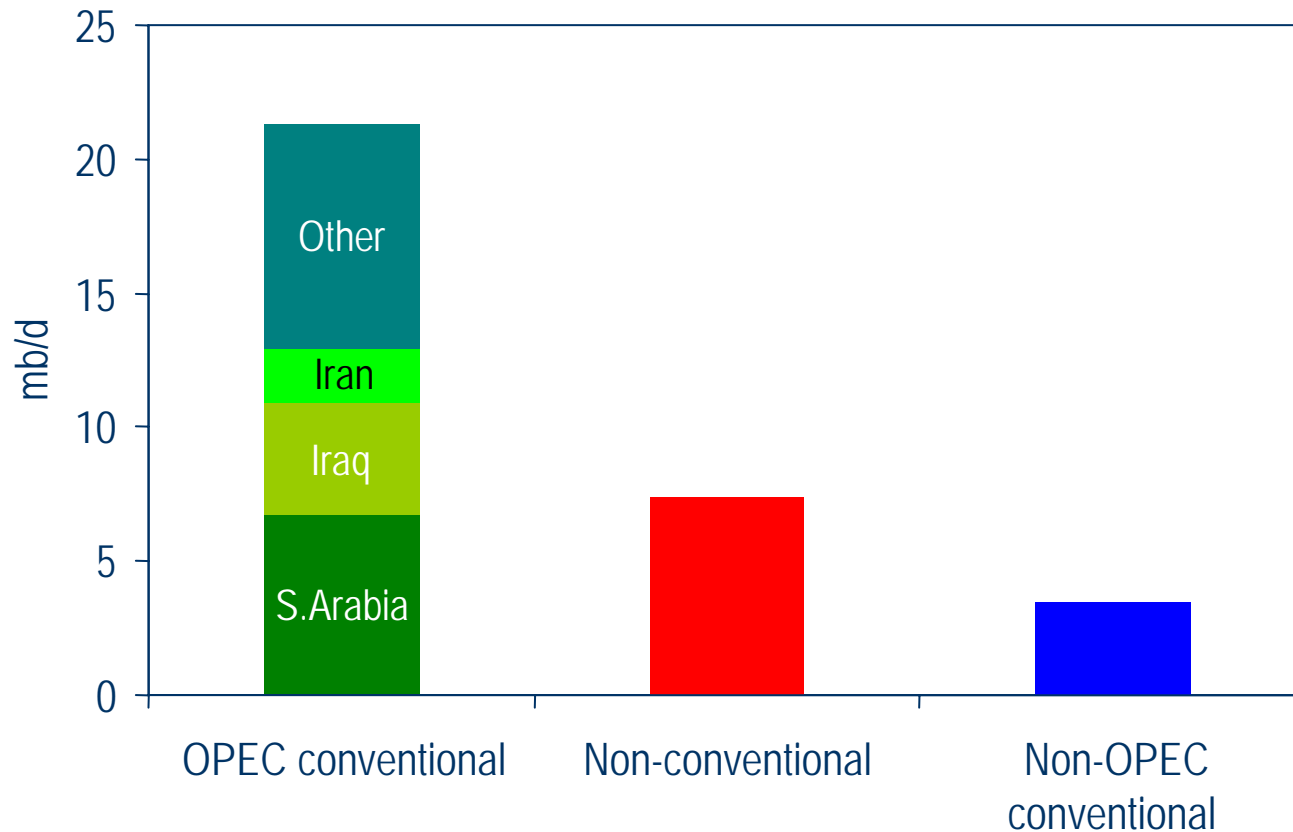
Stocks: - China: 14 Mt for the first phase

- India: 5 Mt for the first phase

(plan to triple such capacity at later phases)

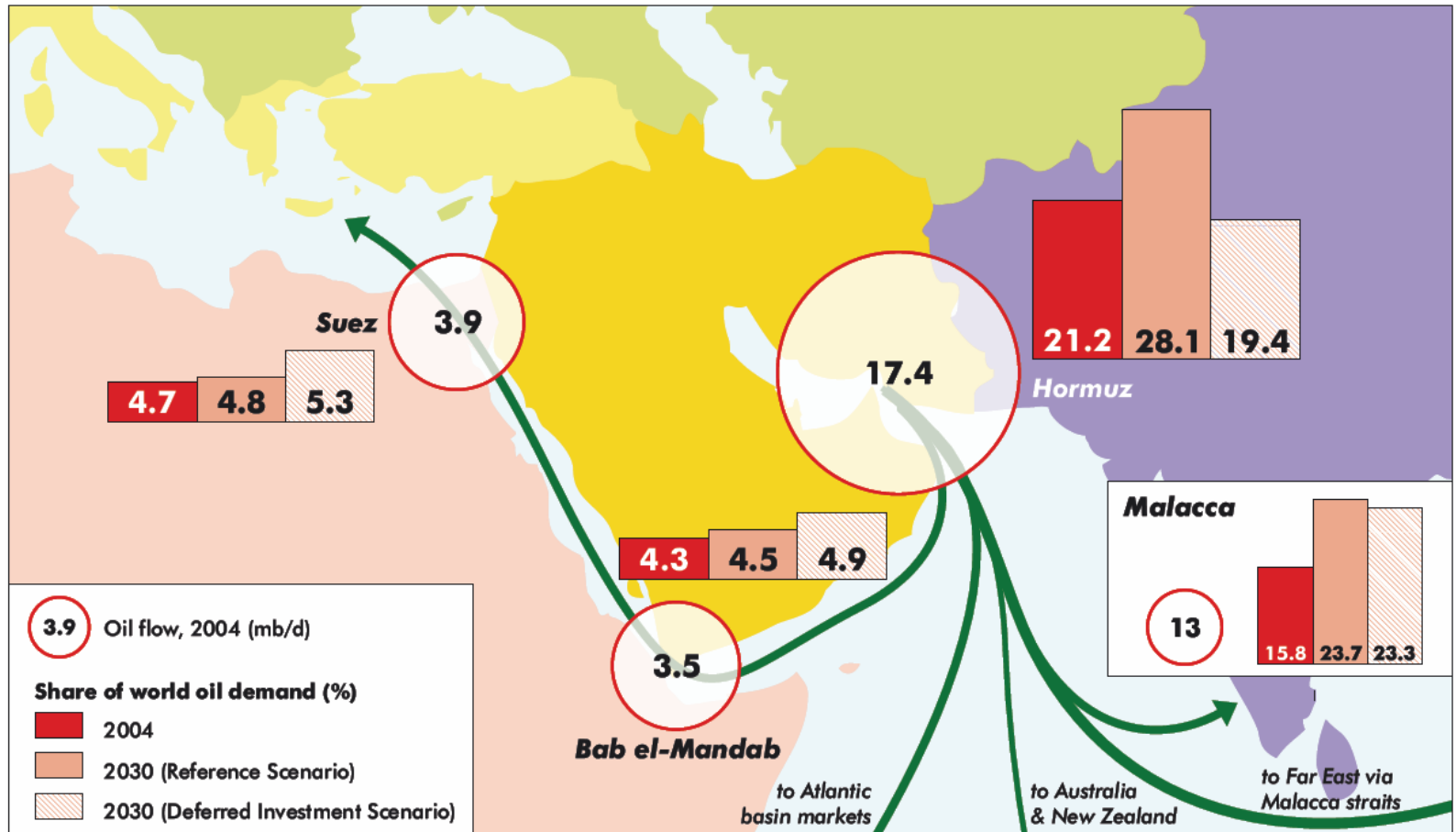


Reference Scenario: Increase in World Oil Supply, 2004-2030



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

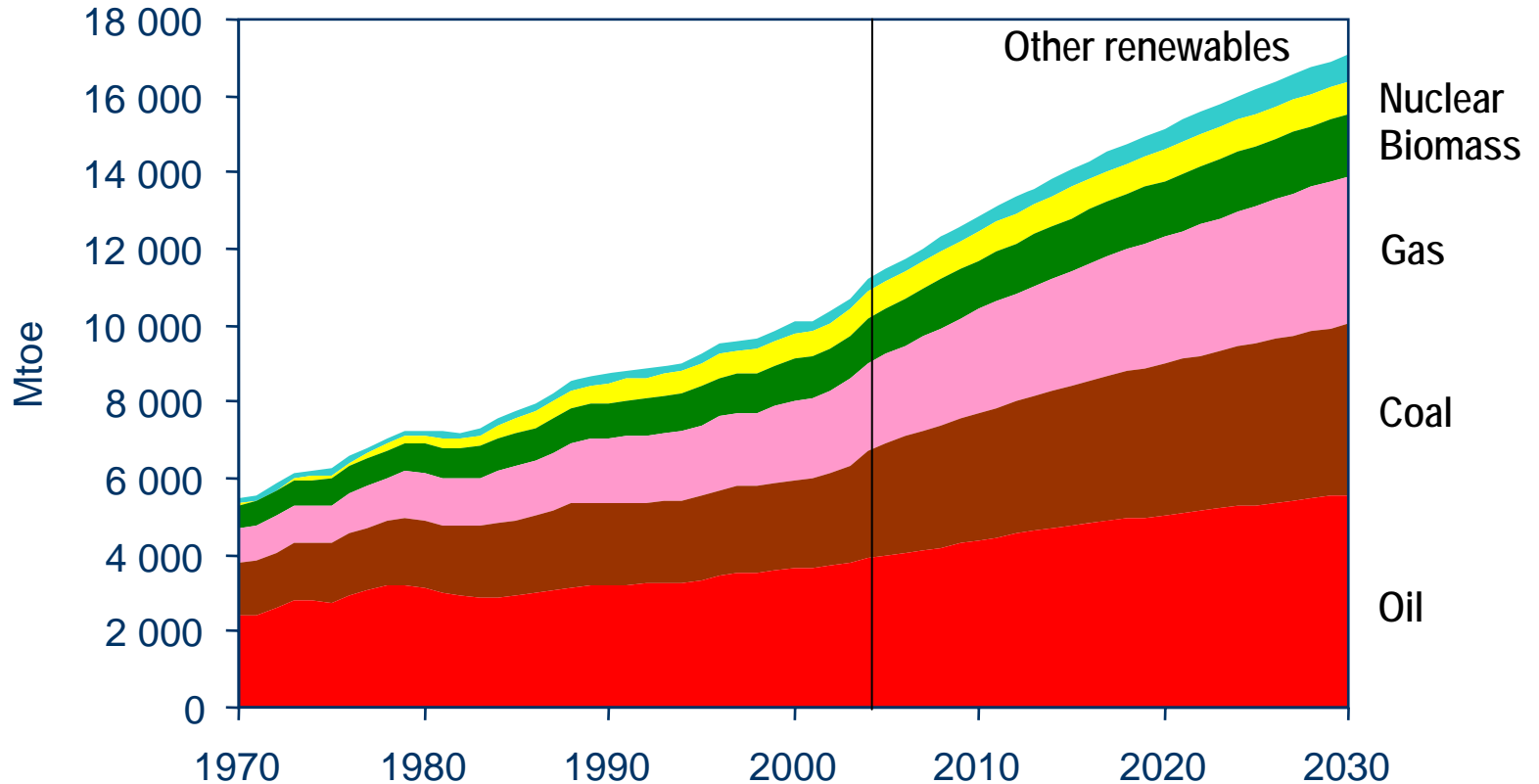
Exports through the "Dire Straits"



Much of the additional oil and LNG exports from the Middle East will be shipped through just three maritime routes

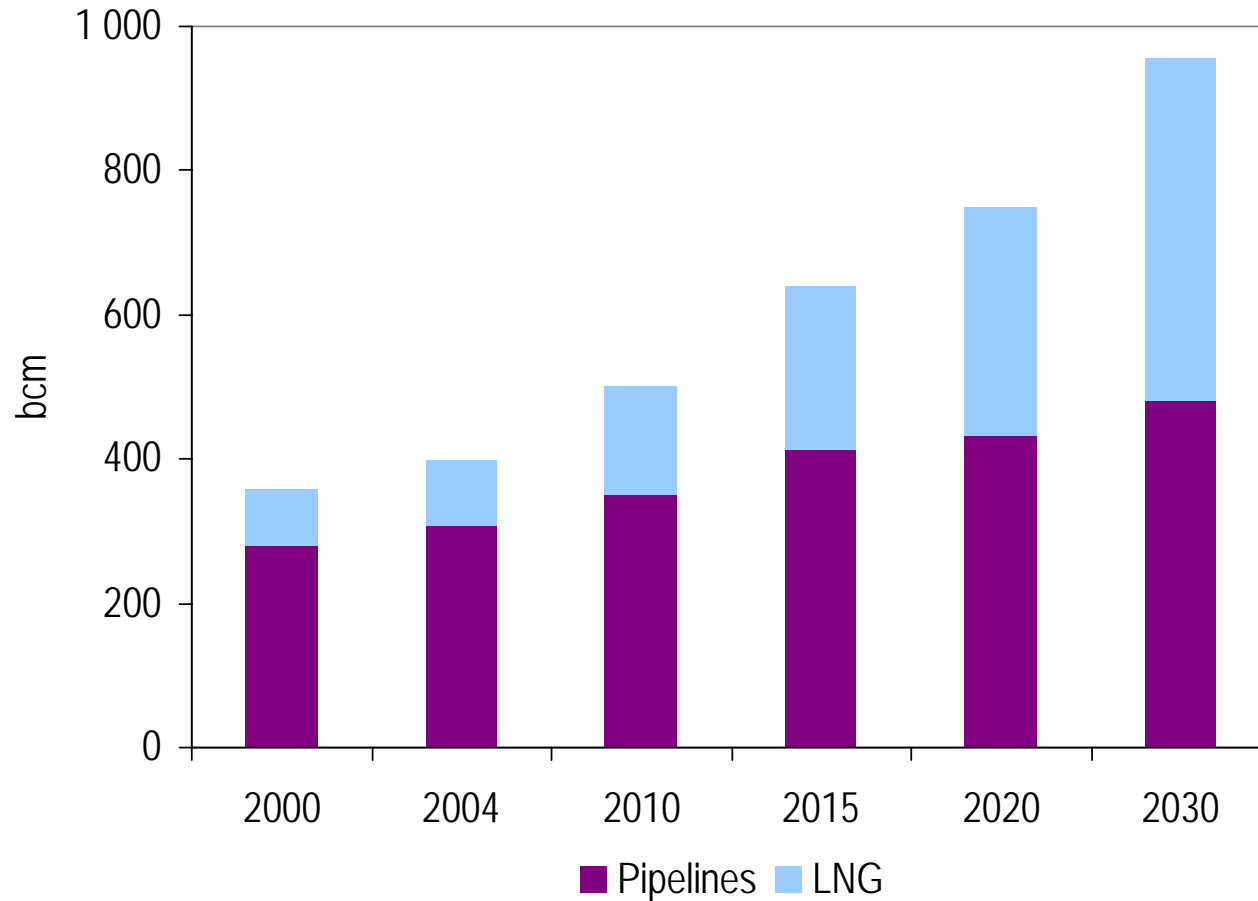
Challenge 2. Natural Gas

Reference Scenario: World Primary Energy Demand



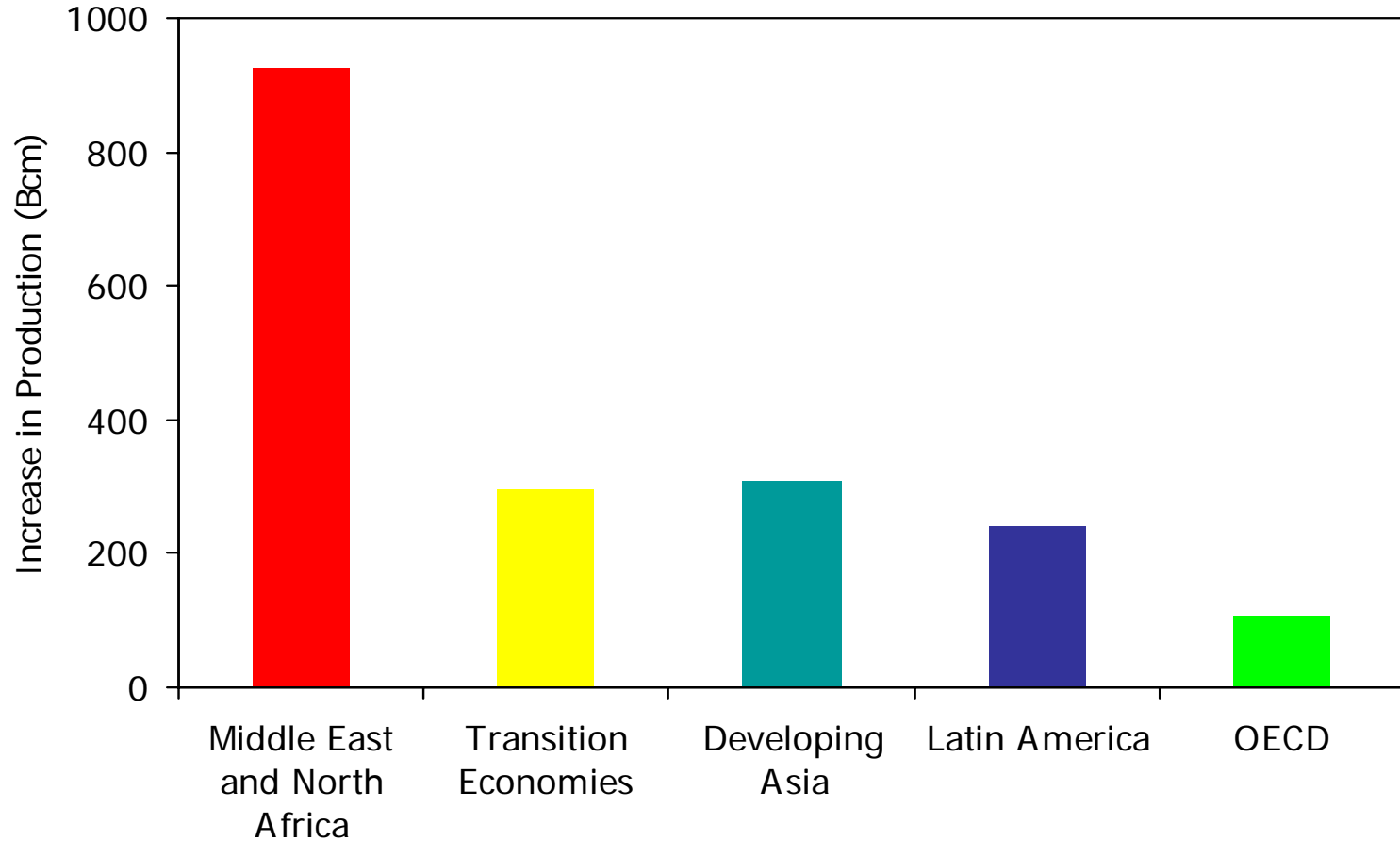
Global demand grows by more than half over the next quarter of a century, with coal use rising most in absolute terms

Reference Scenario: World Inter-regional Natural Gas Trade



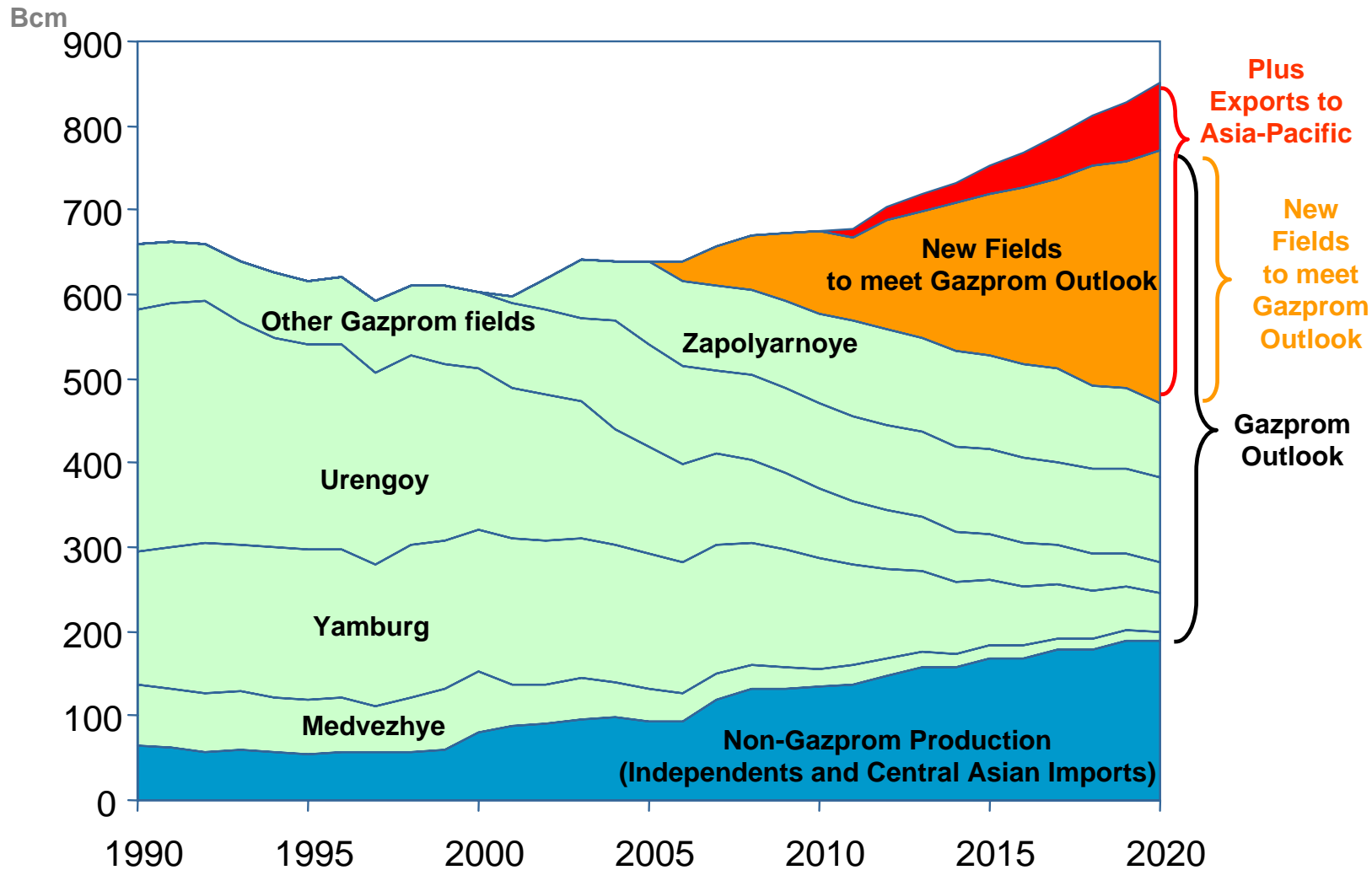
Global gas trade expands by 1.5 times, with two-thirds of the increase coming from Russia, the Middle East & North Africa – mostly as LNG

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



The Middle East and North Africa account for the bulk of the growth in global gas production.

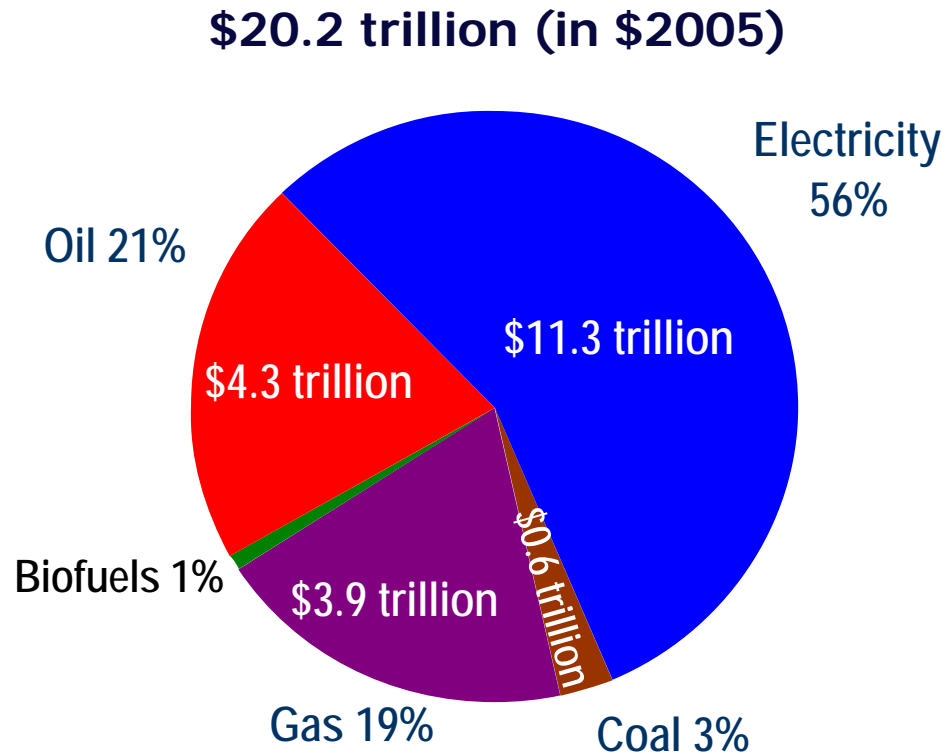
Russian Gas Supply Outlook



An apparent growing gap in Russian gas supply underscores the need for investment in new production capacity, an improvement in efficiency and a reduction in flaring.

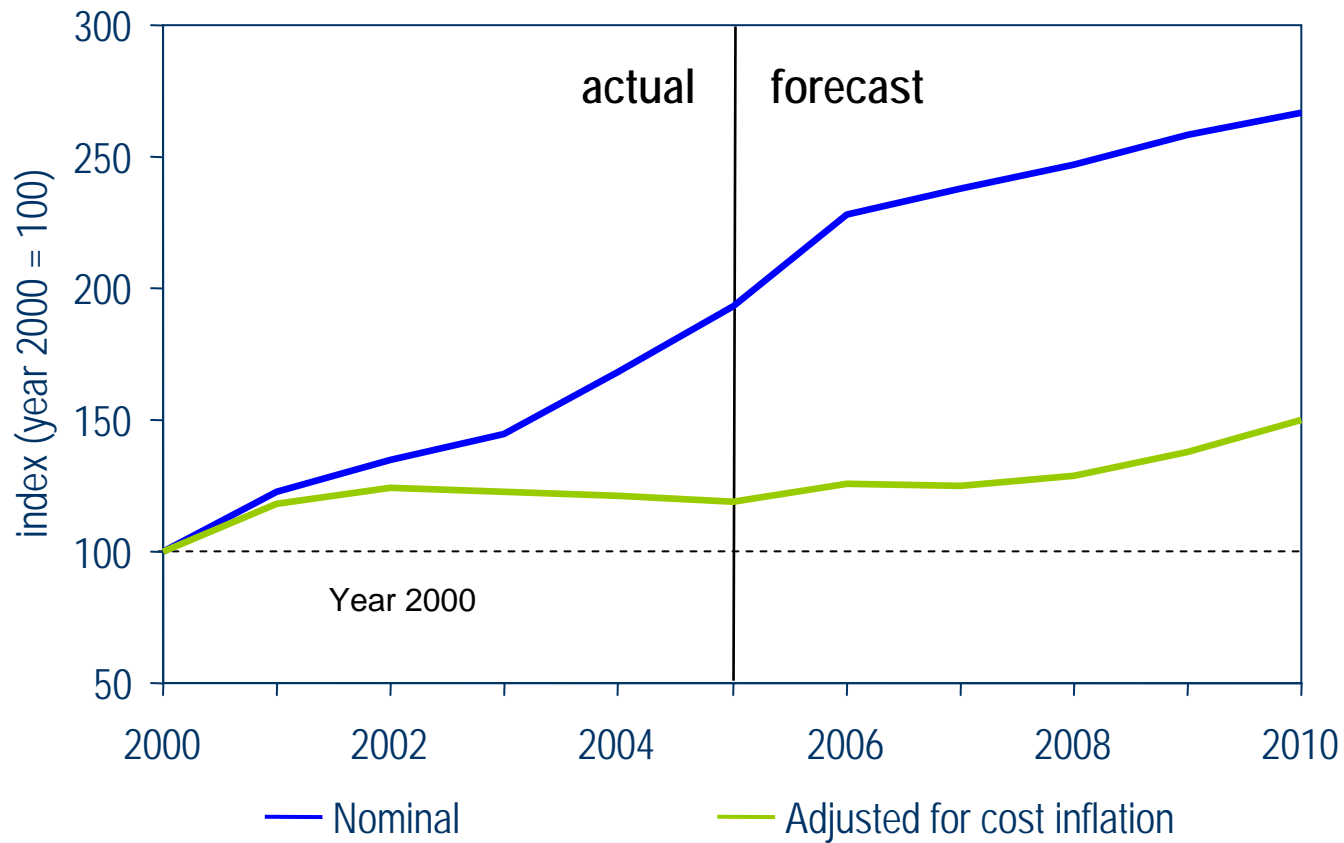
Challenge 3. Lack of Investment

Reference Scenario: Cumulative Investment, 2005-2030



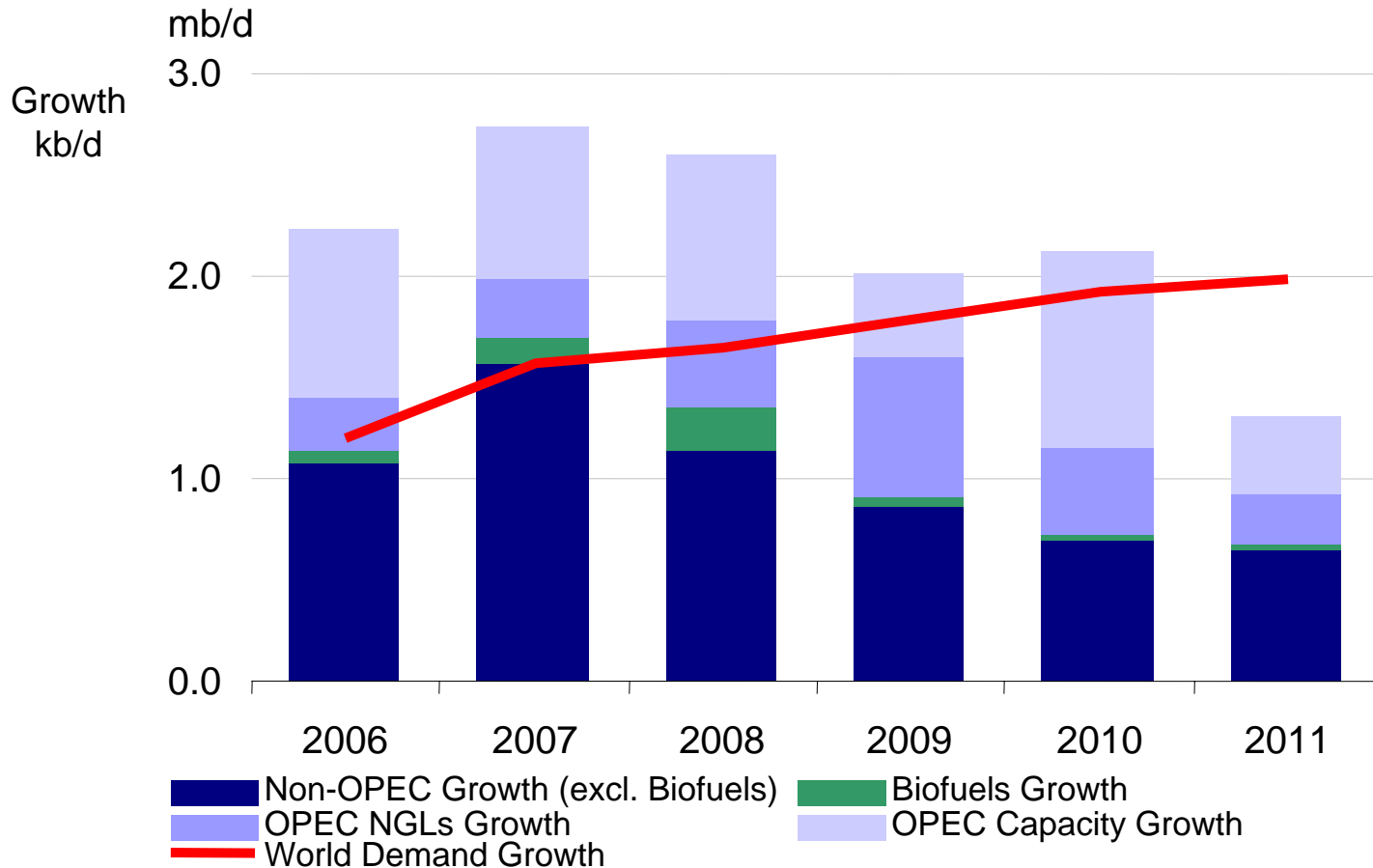
Investment needs exceed \$20 trillion – \$3 trillion more than previously projected, mainly because of higher unit costs

Global Upstream Oil & Gas Investment: Impact of Cost Inflation



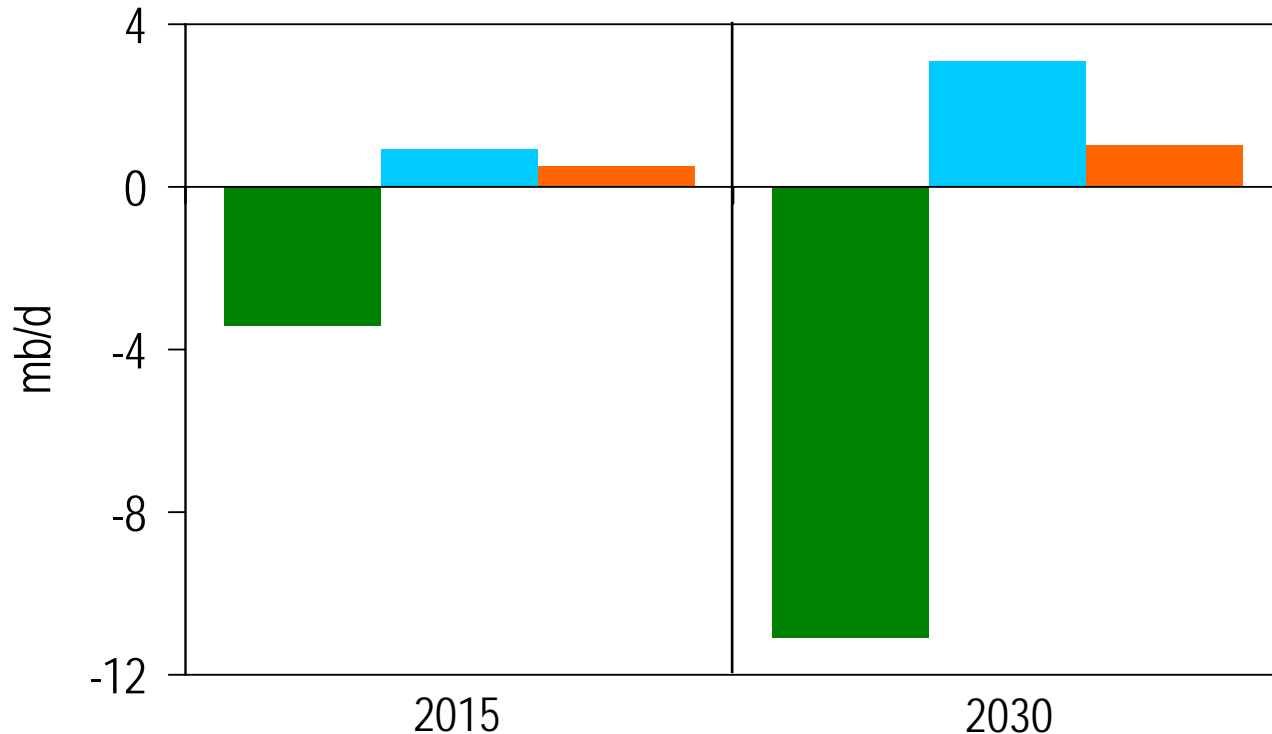
Annual upstream investment doubled to \$225 billion between 2000 and 2005, but most of the increase was due to cost inflation

Investment: Spare Oil Production Capacity



Based on current projects and plans, the level of spare production capacity should rise but the quality of this incremental crude will have important implications for the refining industry and product markets.

Impact of Deferred Investment on Supply (Versus a 22 mb/d rise in the Reference Scenario)

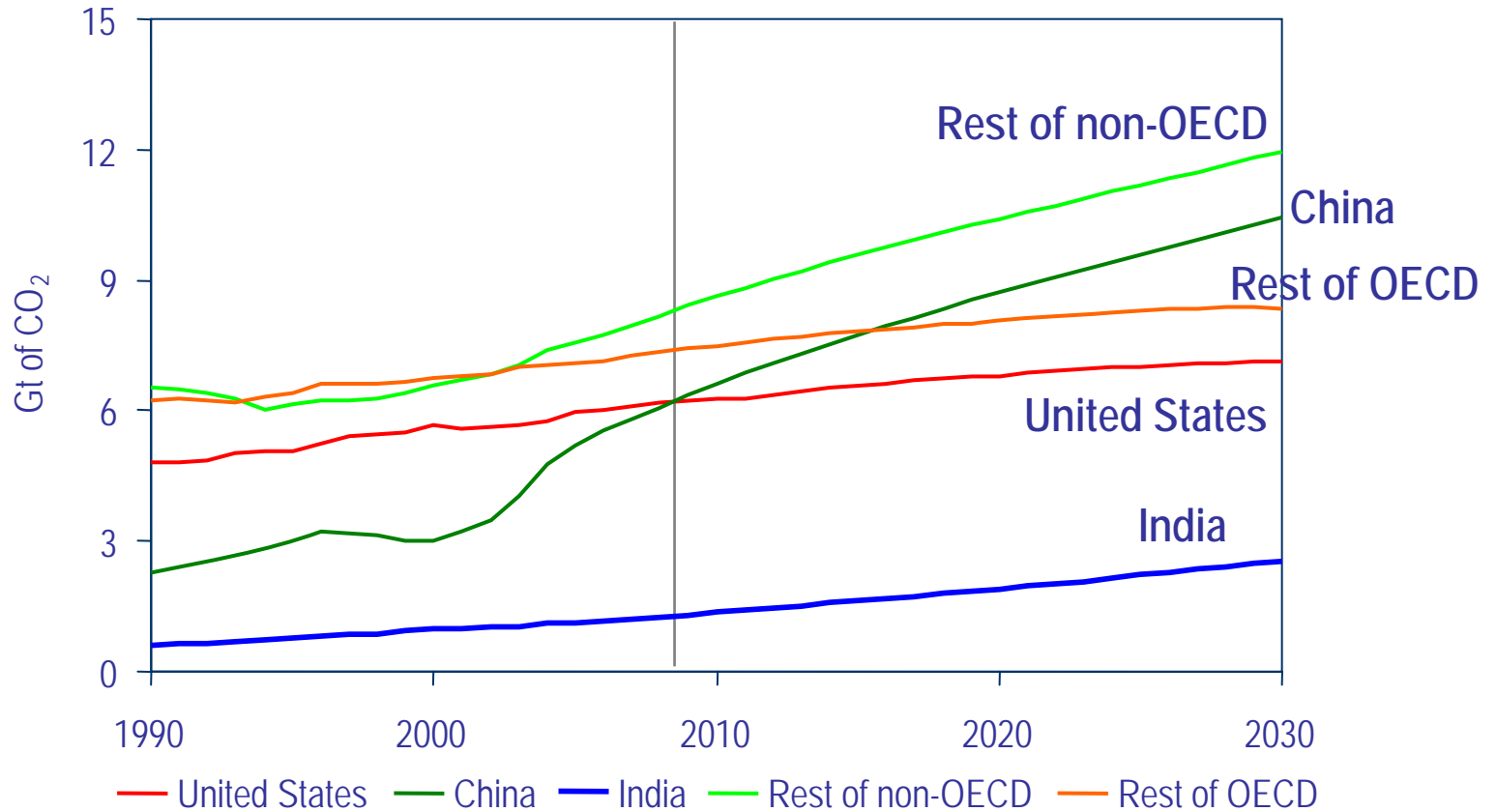


■ OPEC ■ Non-OPEC: conventional ■ Non-OPEC: non-conventional

*Deferred investment in OPEC countries lowers their market share and pushes up prices.
Higher prices stimulate higher investment in non-OPEC countries, driving up their
conventional & non-conventional output*

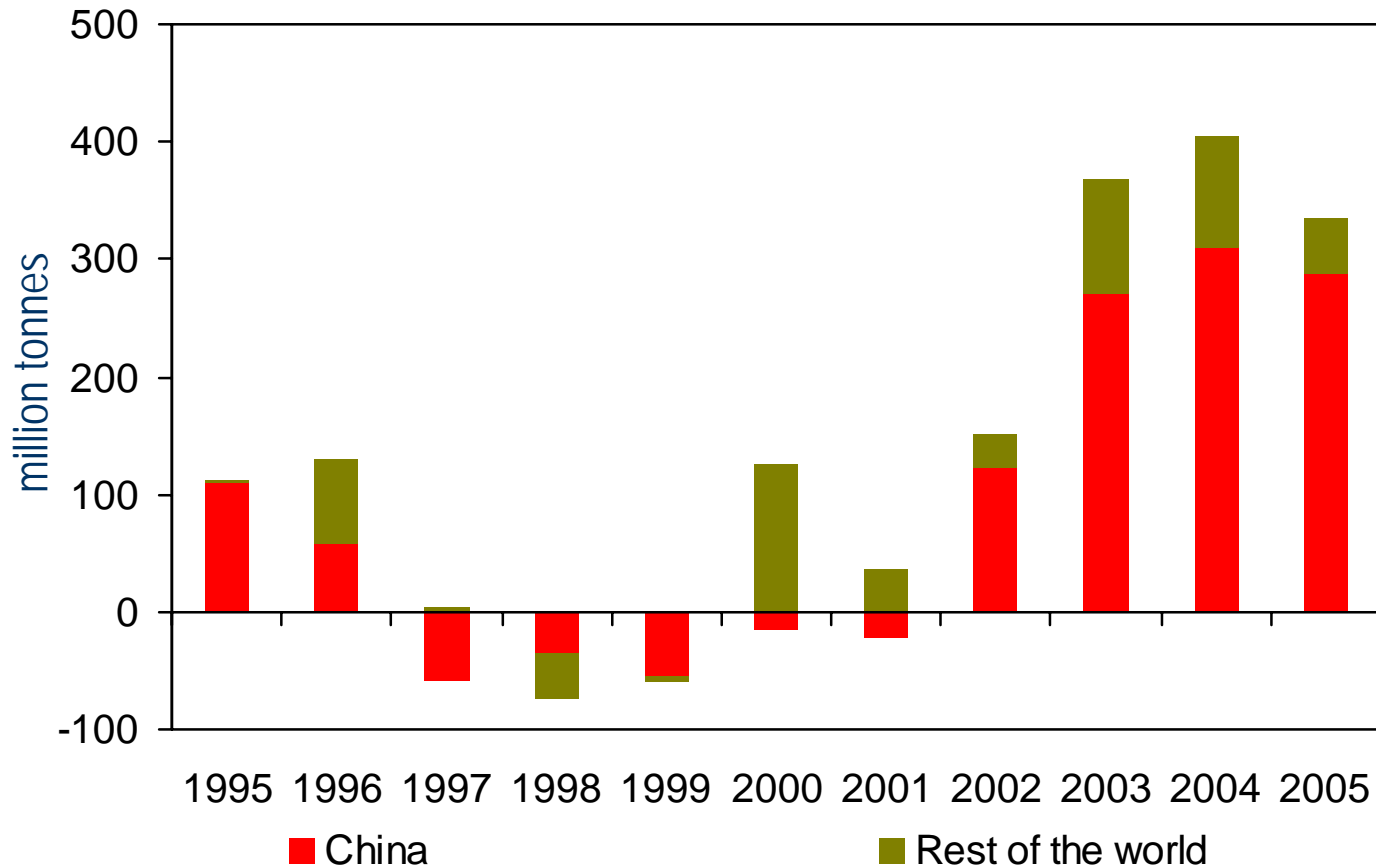
Challenge 4. Climate Change

Energy-Related CO₂ Emissions



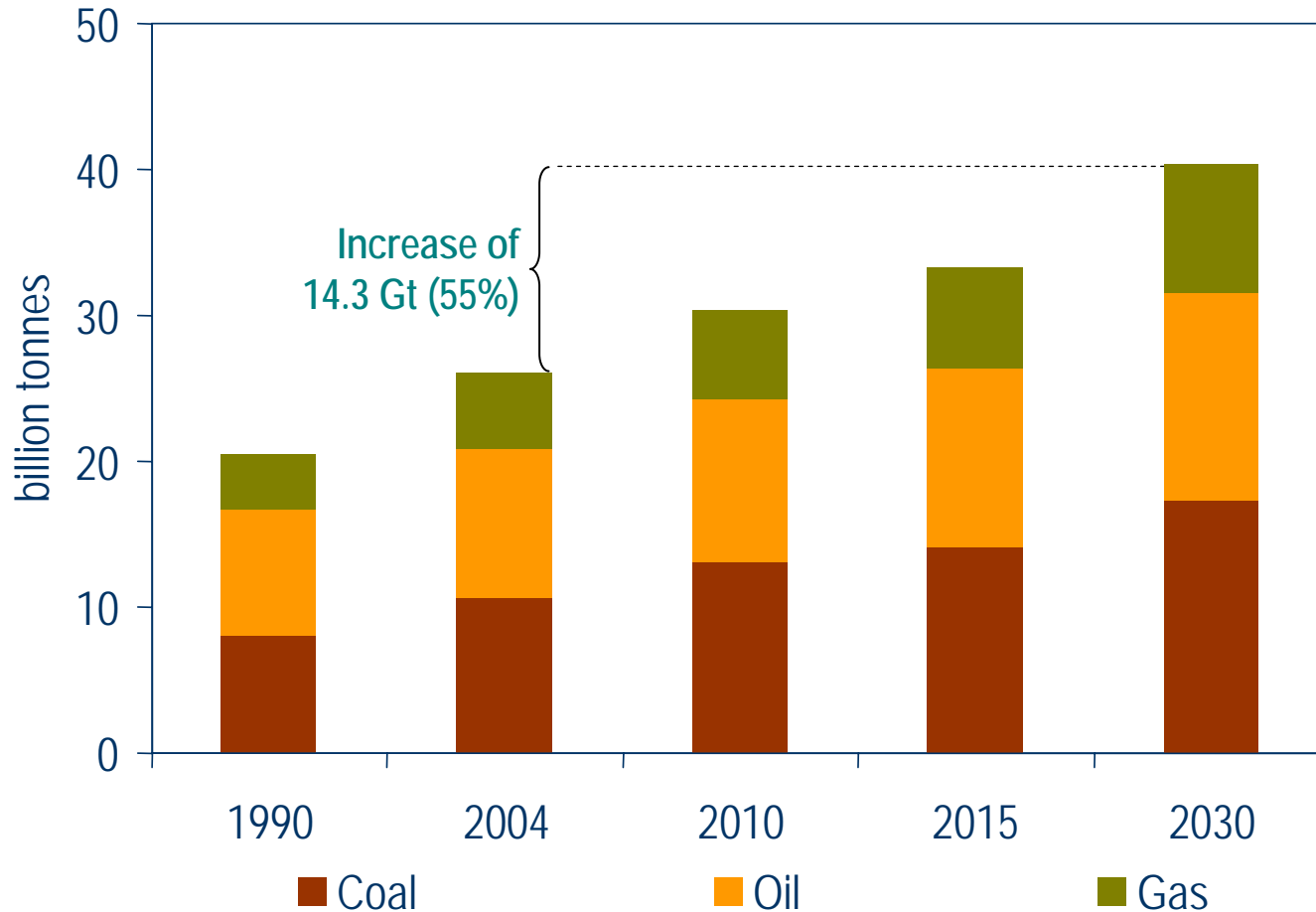
Developing countries account for over three-quarters of the increase in emissions to 2030 however their per-capita emissions still remain well below those of the OECD.

Annual Increase in Coal Demand



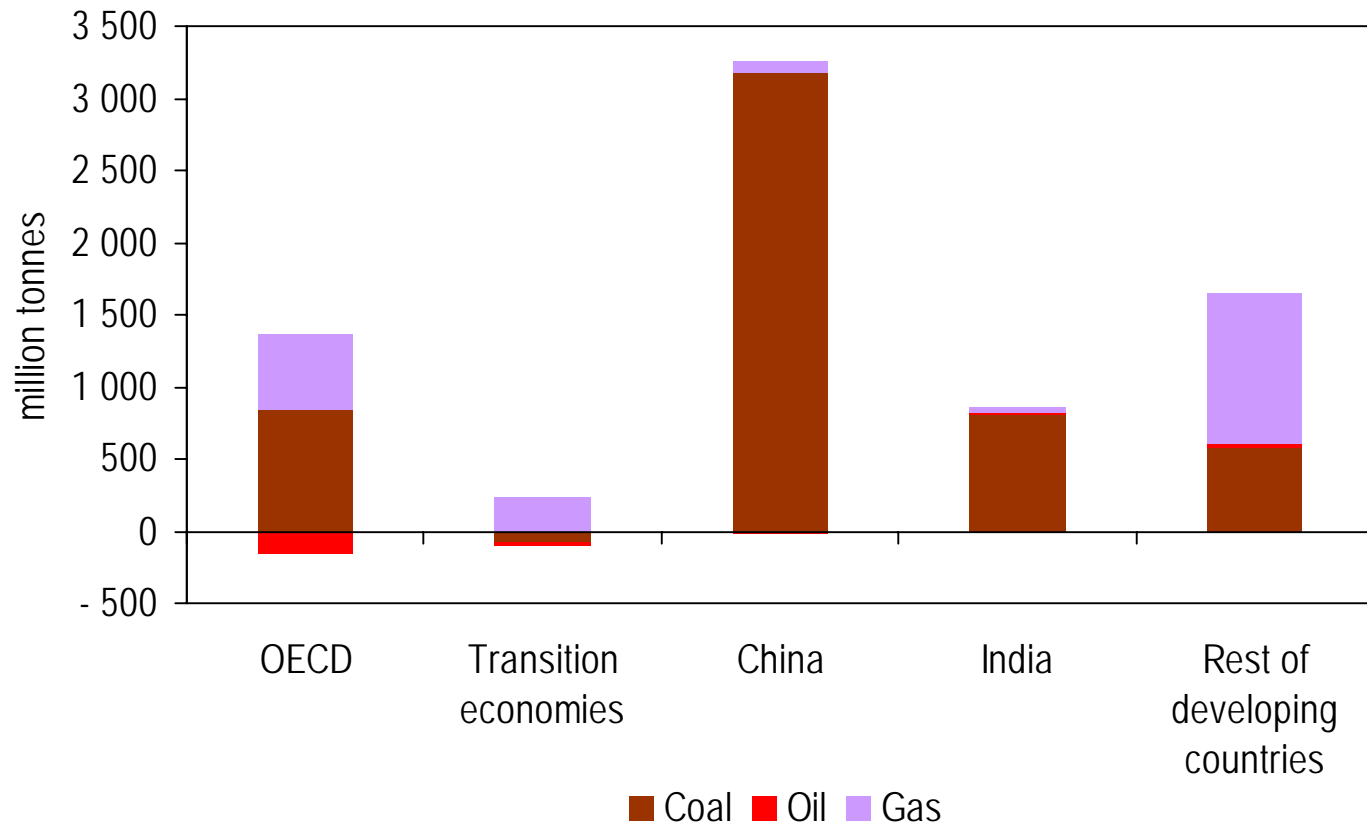
Global coal demand in the recent years has grown much faster than previously – mainly driven by China

Reference Scenario: Energy-Related CO₂ Emissions by Fuel



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

Reference Scenario: Increase in Power Sector CO₂ Emissions by Fuel, 2004-2030



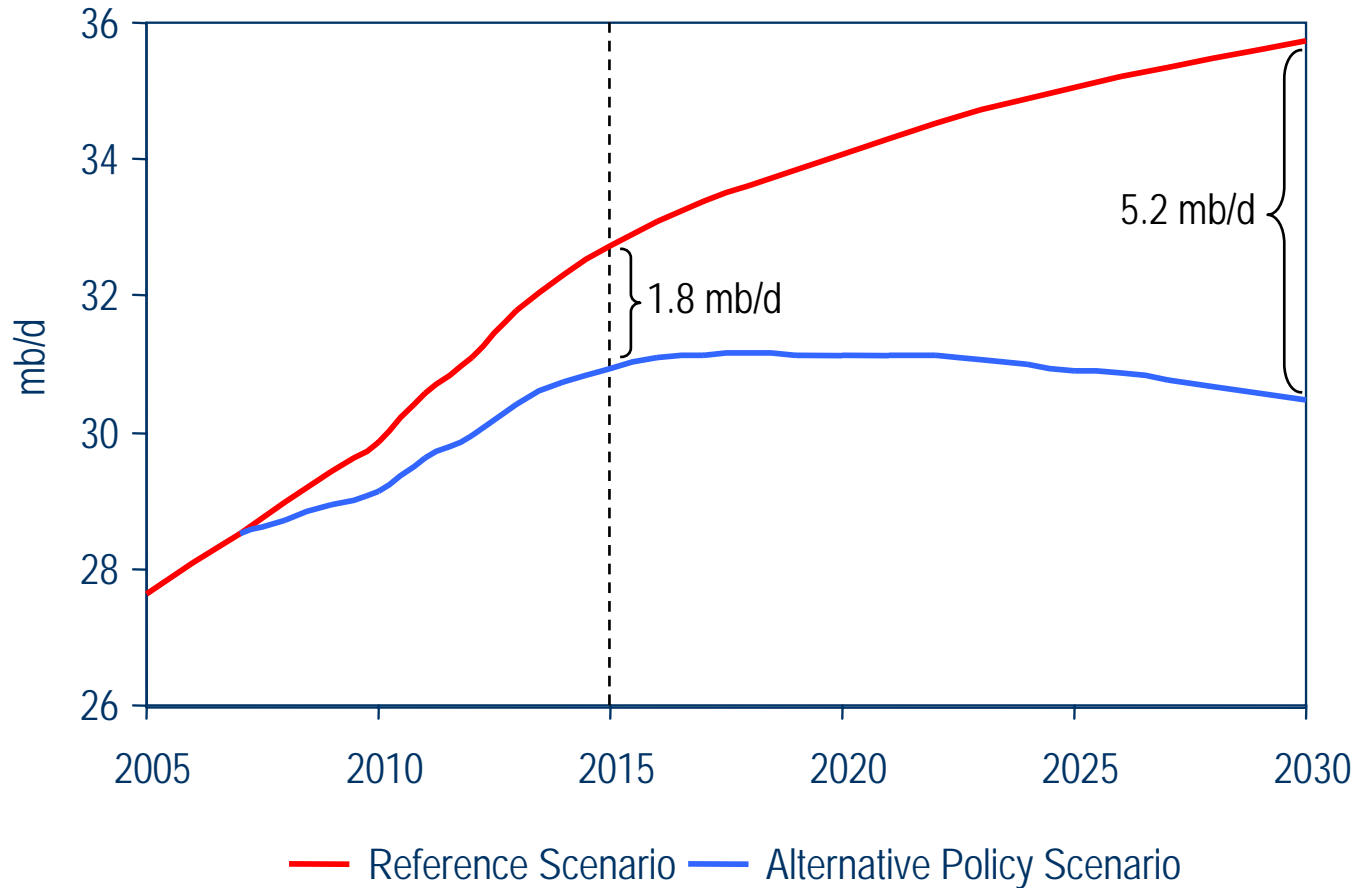
China and India account for 58% of the increase in power sector CO₂ emissions to 2030

The answer of the IEA is
“the Alternative Policy Scenario.”

Alternative Policy Scenario: Mapping a Better Energy Future

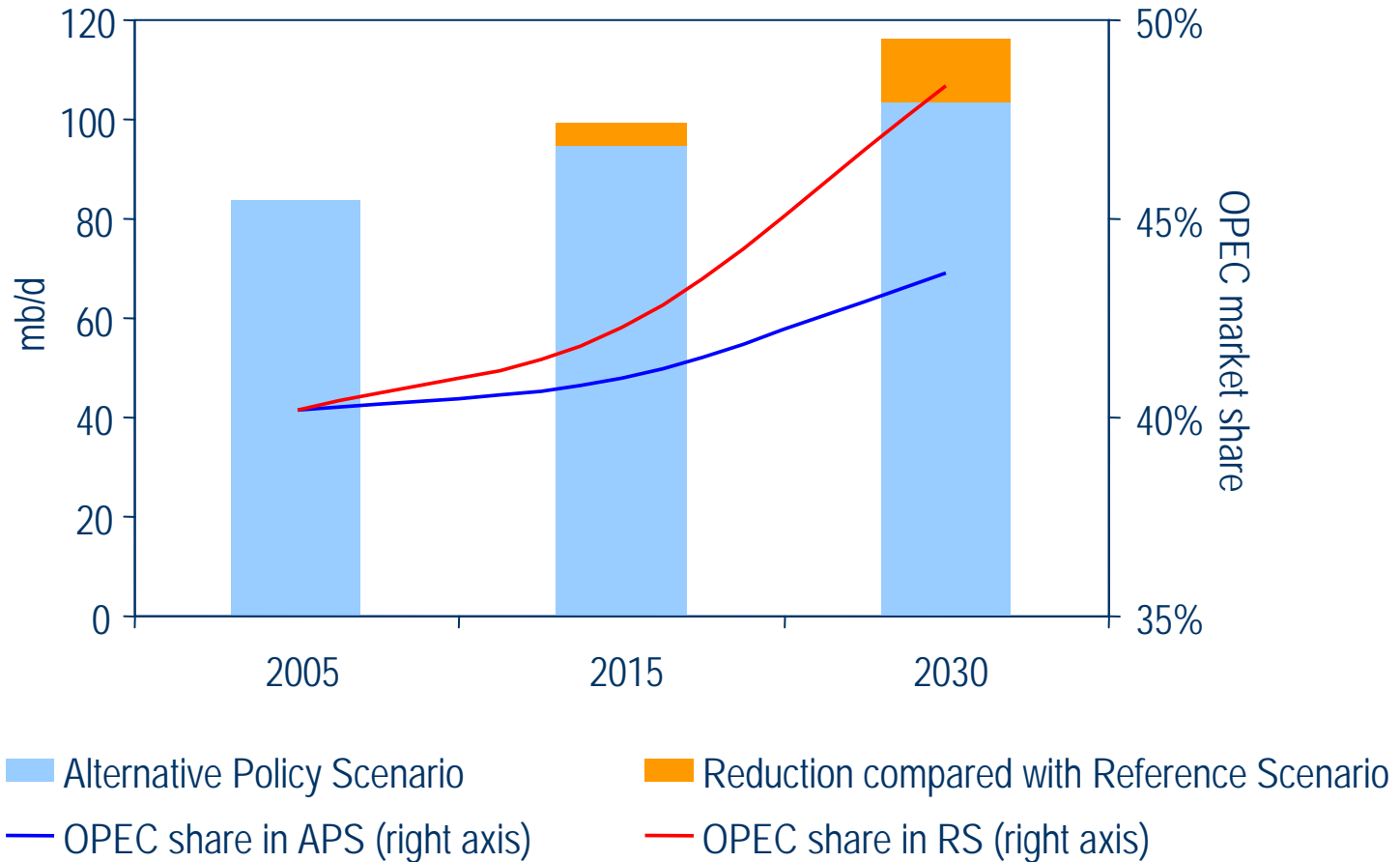
- **Analyses impact of government policies under consideration to enhance security & curb emissions**
- **Demonstrates that we can significantly reduce growth in energy demand & emissions and stimulate alternative energy production**
 - ❑ *Oil demand is reduced by 13 mb/d in 2030 - equivalent to current 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



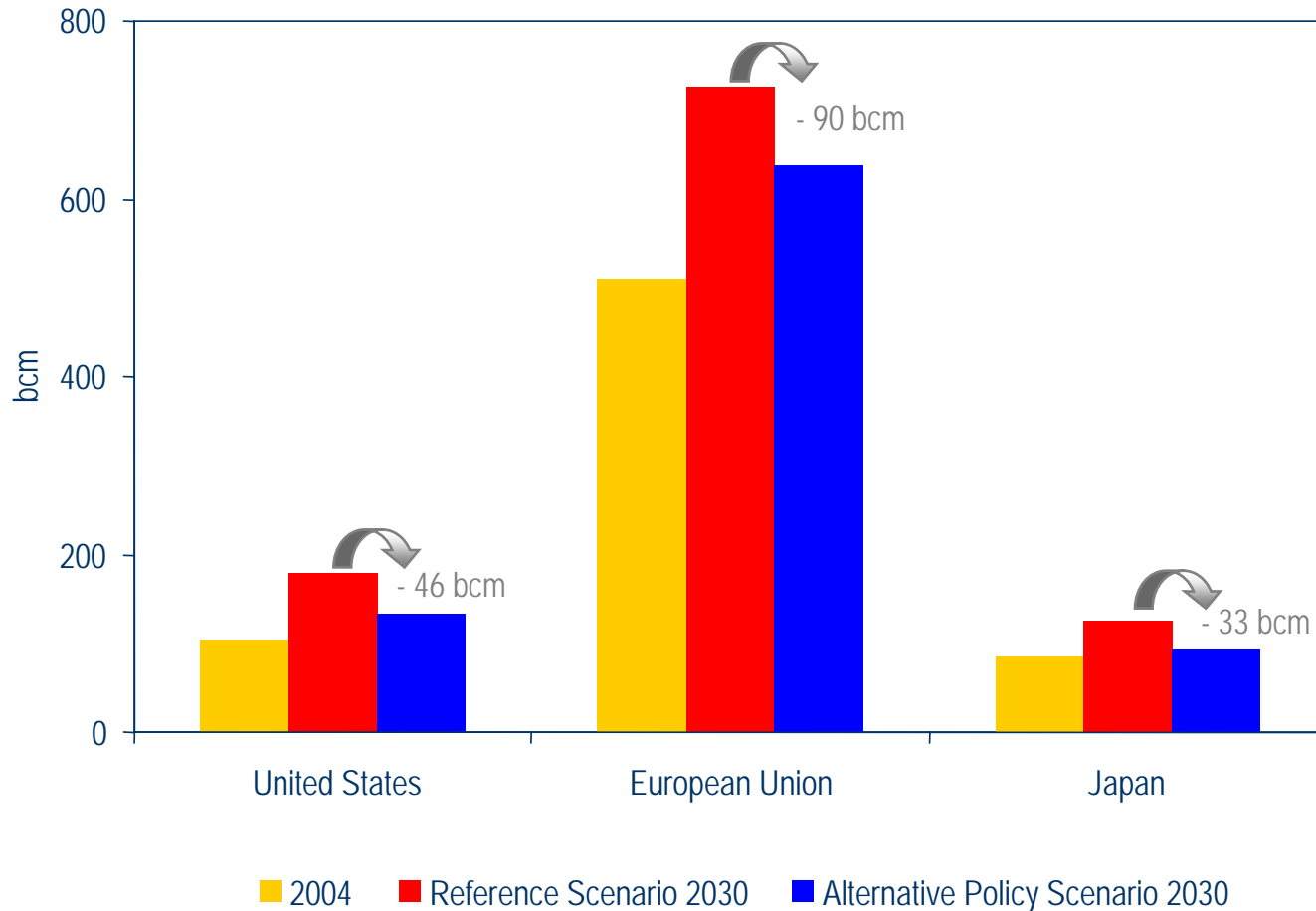
In stark contrast with the Reference Scenario, OECD oil imports level off soon after 2015 & then begin to decline

Alternative Policy Scenario: Global Oil Supply



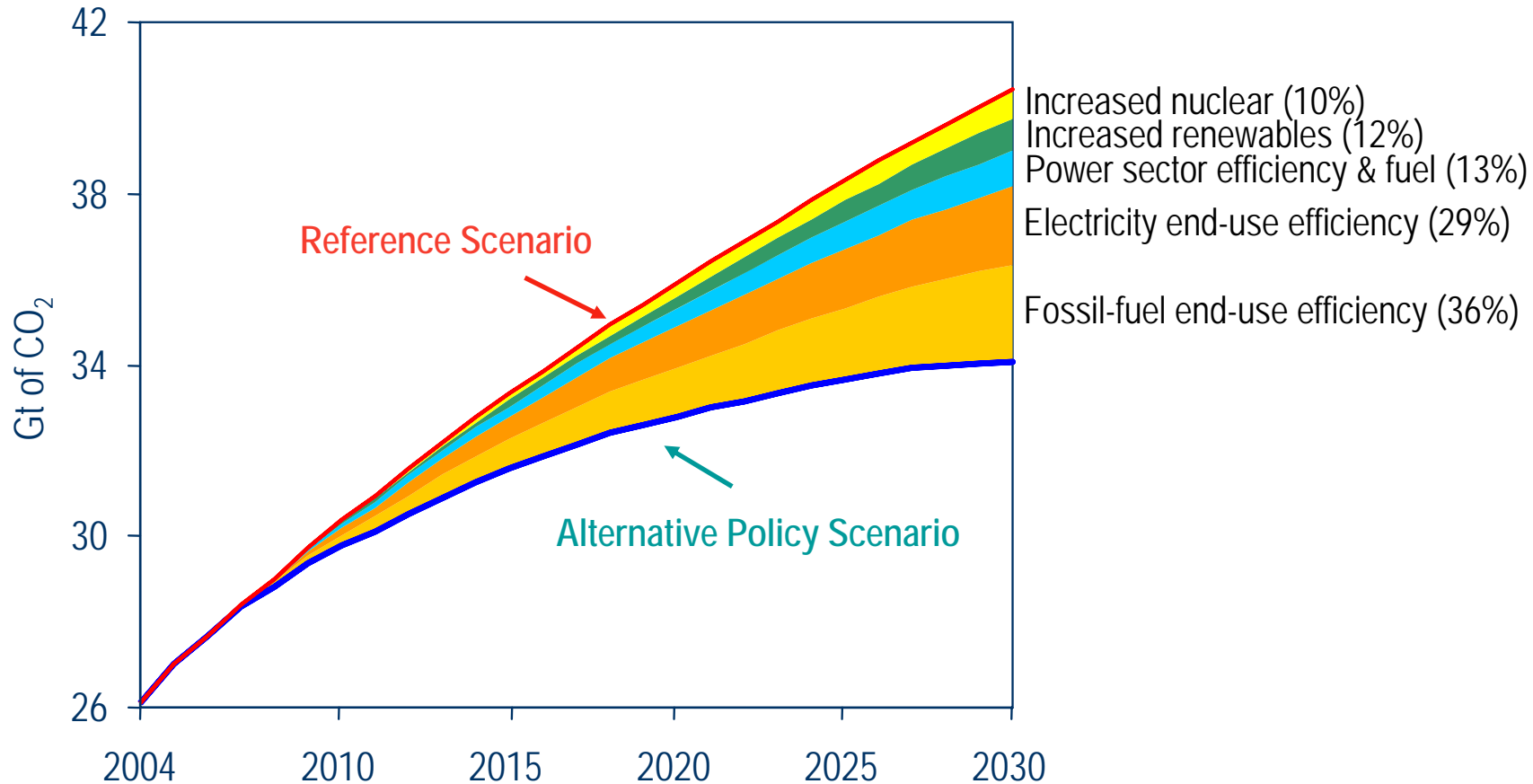
OPEC's share of global oil production rises from 40% now to 43% in 2030 in the APS, compared with a jump to 49% in the RS

Alternative Policy Scenario: Gas Imports, 2004-2030



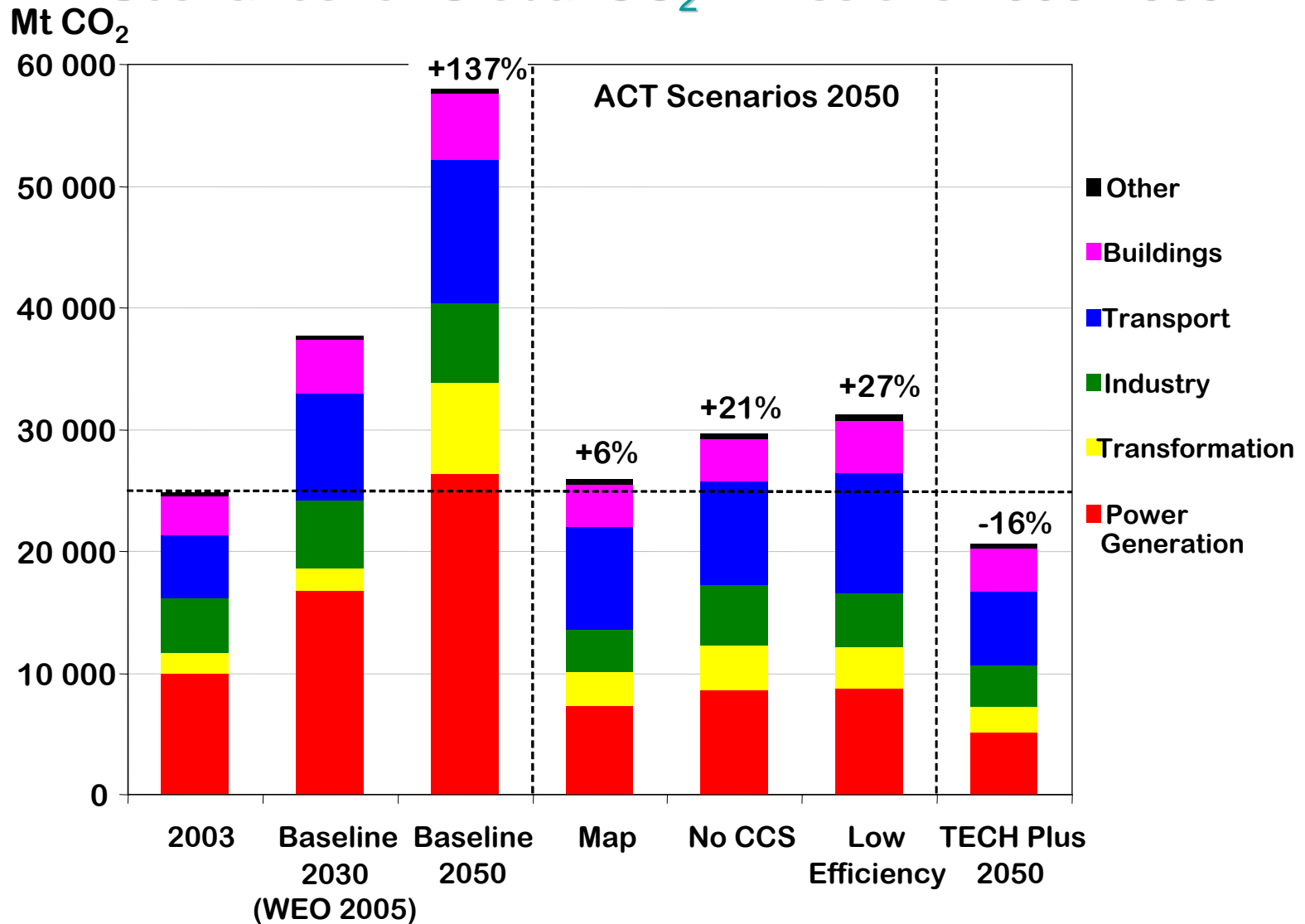
Gas imports in the main consuming regions are significantly lower in the APS compared with the RS

Alternative Policy Scenario: Key Policies for CO₂ Reduction



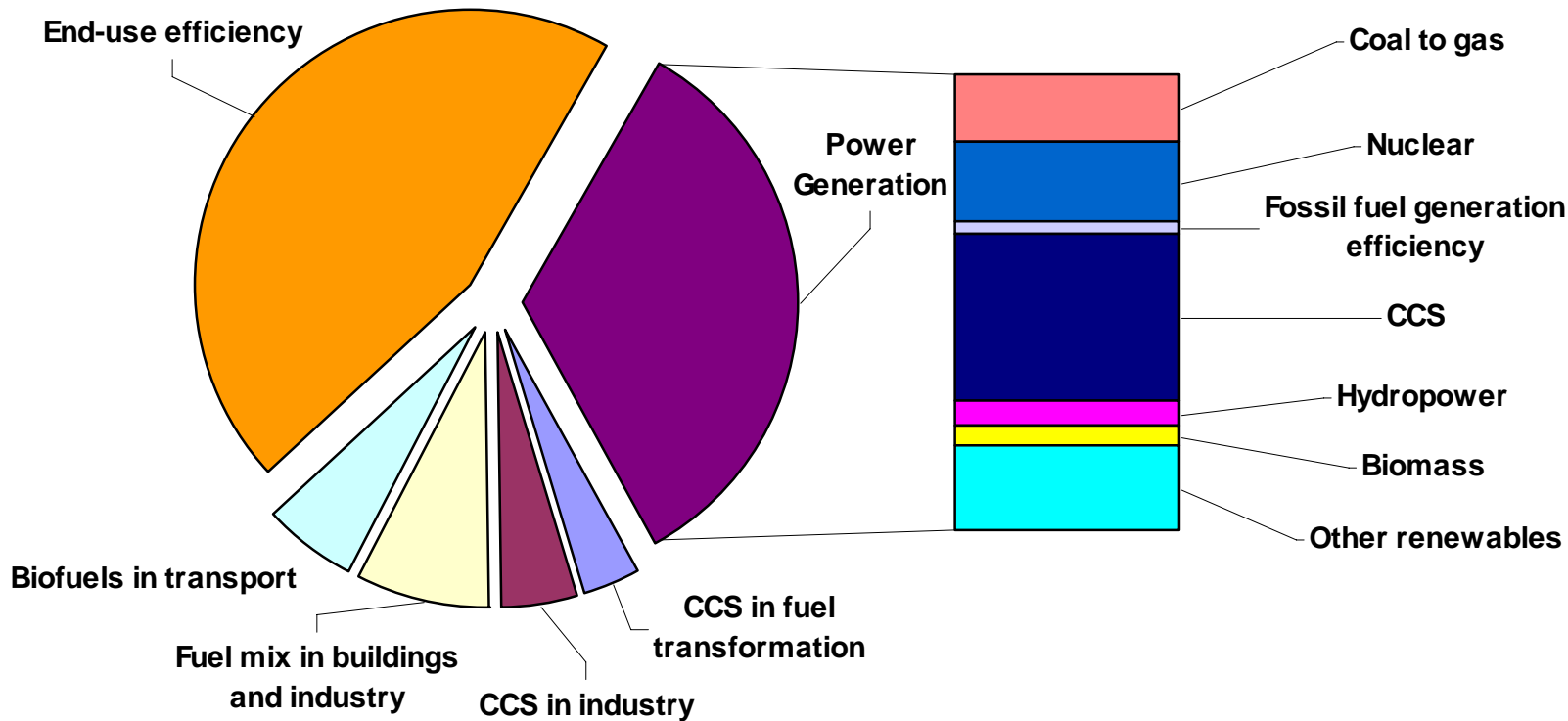
Improved end-use efficiency accounts for over two-thirds of avoided emissions in 2030 in the APS

Scenarios for Global CO₂ Emissions 2003-2050



Technology holds the promise of returning soaring energy-related CO₂ emissions to today's levels by 2050

Emission Reduction by Technology Area ACT Map Scenario



*Improved end-use energy efficiency
is the most important contributor to reduced emissions!*

Alternative Policy Scenario :

Key policies that Make a Global Difference

	<i>Energy efficiency</i>	<i>Power generation</i>
US	<ul style="list-style-type: none"> • Tighter CAFE standards • Improved efficiency in residential & commercial sectors 	<ul style="list-style-type: none"> • Increased use of renewables
EU	<ul style="list-style-type: none"> • Increased vehicle fuel economy • Improved efficiency in electricity use in the commercial sector 	<ul style="list-style-type: none"> • Increased use of renewables • Nuclear plant lifetime extensions
China	<ul style="list-style-type: none"> • Improved efficiency in electricity use in industry • Improved efficiency in electricity use in the residential sector 	<ul style="list-style-type: none"> • Increased efficiency of coal-fired plants • Increased use of renewables • Increased reliance on nuclear

A dozen policies in the US, EU & China account for around 40% of the global emissions reduction in 2030 in the Alternative Policy Scenario

Alternative Policy Scenario: Cost Effectiveness of Policies

- Total energy investment – from production to consumption – is lower than in the RS
- Consumers spend \$2.4 trillion *more* in 2005-2030 in more efficient cars, refrigerators etc
- ..but \$3 trillion *less* investment is required on the supply side
 - *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 equipment (mainly cars) saves \$2.4 in oil imports to 2030*
- The higher initial investment by consumers is more than offset by fuel-cost savings / **THIS IS THE DEMAND-SIDE APPROACH for ENERGY POLICY.**

Energy Efficiency Has A Key Role To Play And Is Available In The Short Term



High performance buildings



Least life-cycle cost appliances



Labelling and certification

Energy efficiency offers

- ***substantial energy and greenhouse gas savings at low or negative cost***
- ***energy security and reliability benefits***
- ***enhanced business competitiveness and social welfare***



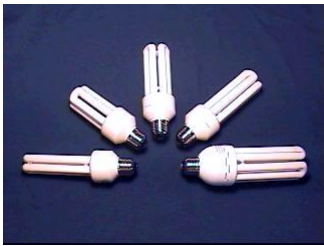
Efficient information and communication technologies



Reducing standby power consumption



Super windows & daylighting



Compact Fluorescent Lamps

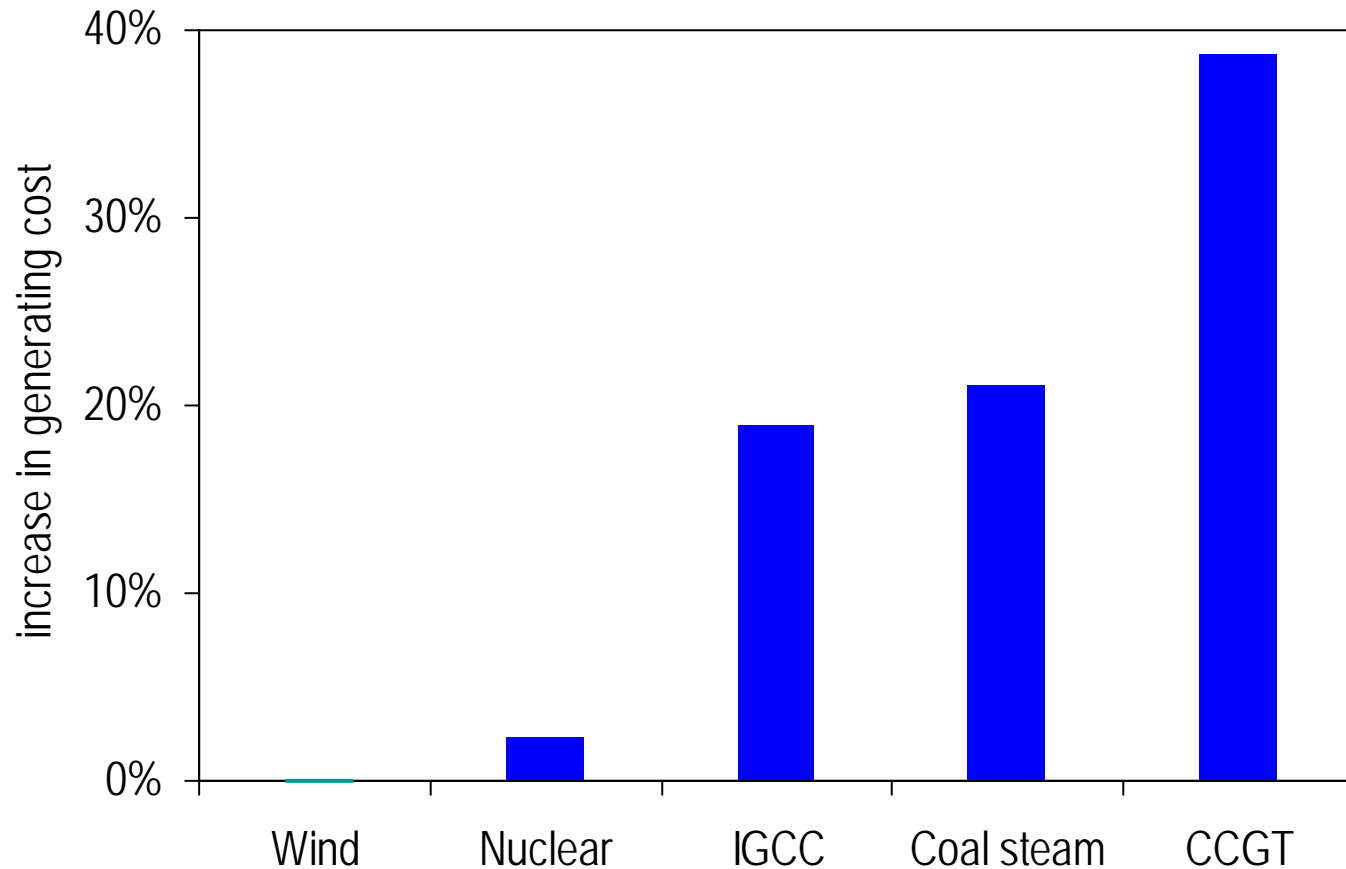


LED traffic lights

Renewed Interest in Nuclear Power

- Growing concerns over energy security, surging fossil-fuel prices & rising carbon emissions
- Positive aspects of nuclear power
 - ❑ *proven technology for large-scale baseload electricity generation*
 - ❑ *reduce dependence on imported gas*
 - ❑ *no emissions of greenhouse gases or local pollutants*
 - ❑ *produces electricity at competitive & stable cost*
 - ❑ *uranium resources abundant & widespread*
- But governments need to play a stronger role in facilitating investment where nuclear is accepted

Impact of a 50% Increase in Fuel Price on Generating Costs

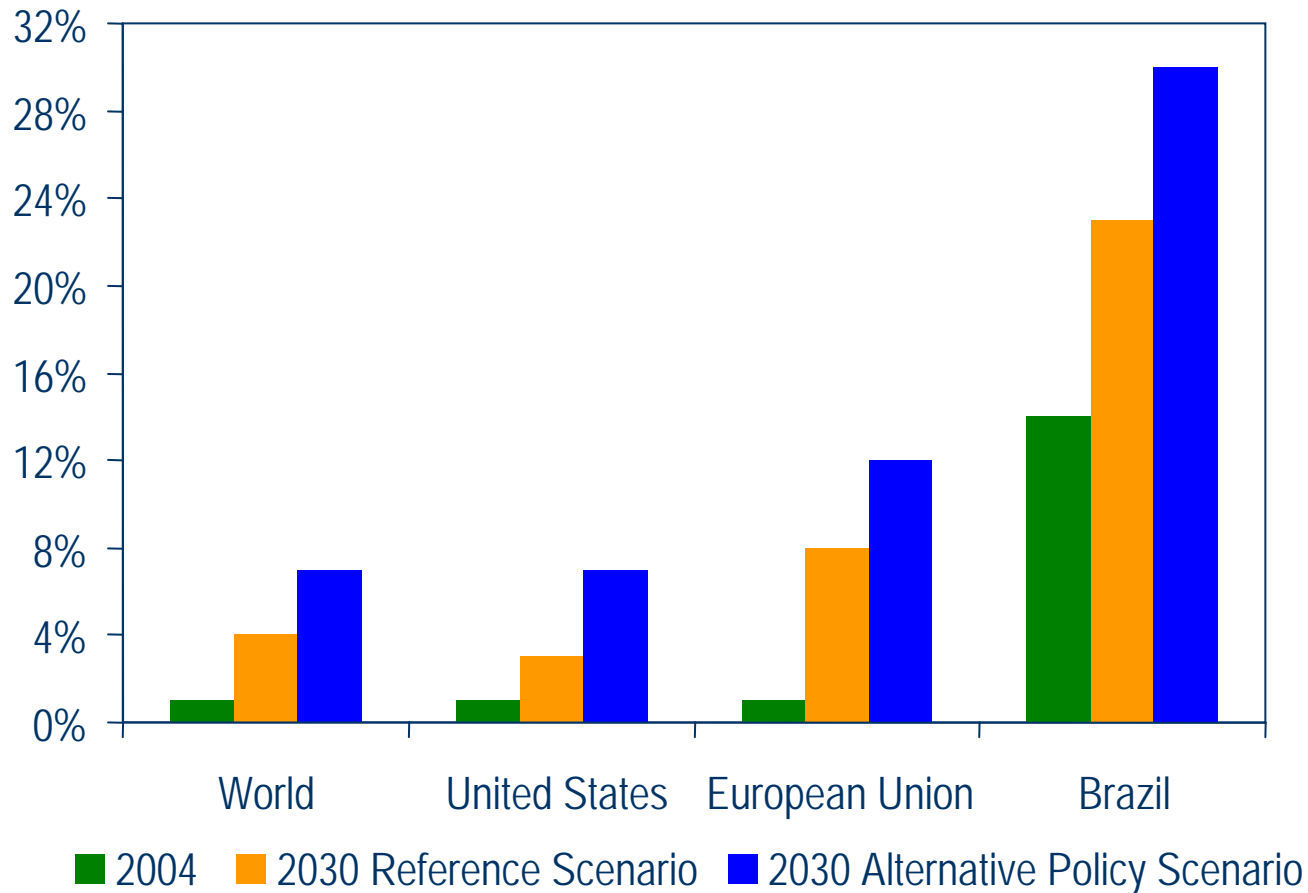


Nuclear generating costs are far less sensitive to fuel price increases than gas or coal plants

Outlook for Biofuels

- Interest in biofuels is soaring
- Biofuels can help address growing energy security & climate change threats by:
 - ❑ *Increasing diversity of geographic & fuel sources*
 - ❑ *Lowering 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 medium term
- Long-term prospects hinge on new technology

Share of Biofuels in Road-Transport Fuel Consumption



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

Summing Up

- On current trends, we are on course for an unstable, dirty & expensive energy future
- In response, urgent government policy action is required in two key areas:
 - Promoting energy investment / **Comprehensive energy security**
 - Promoting energy efficiency / **Demand-side approach**
- In addition to improving energy security and the environment, these policies also make economic sense (**Addressing three E's all together**)
- The *WEO* sets out the essential first steps on a path towards a clean, clever and competitive energy future
- For a truly sustainable energy system, **technological** breakthroughs will also be needed
- Need for **Enhanced International / Cross Disciplinary Cooperation**

IEA and G8 Summit

- In July 2005, the G8 invited the IEA to attend its Summit in Gleneagles. The Gleneagles Plan of Action mandated the IEA to identify pathways for G8 policy makers to realise a “clean, clever and competitive energy future.”
- At St. Petersburg G8 Summit 2006, the IEA recommended four points;
 - Standby power use in appliances and equipment,
 - Program for tyres,
 - Television set top boxes
 - and Energy efficient lighting.