



International  
Energy Agency

*World Energy Outlook*

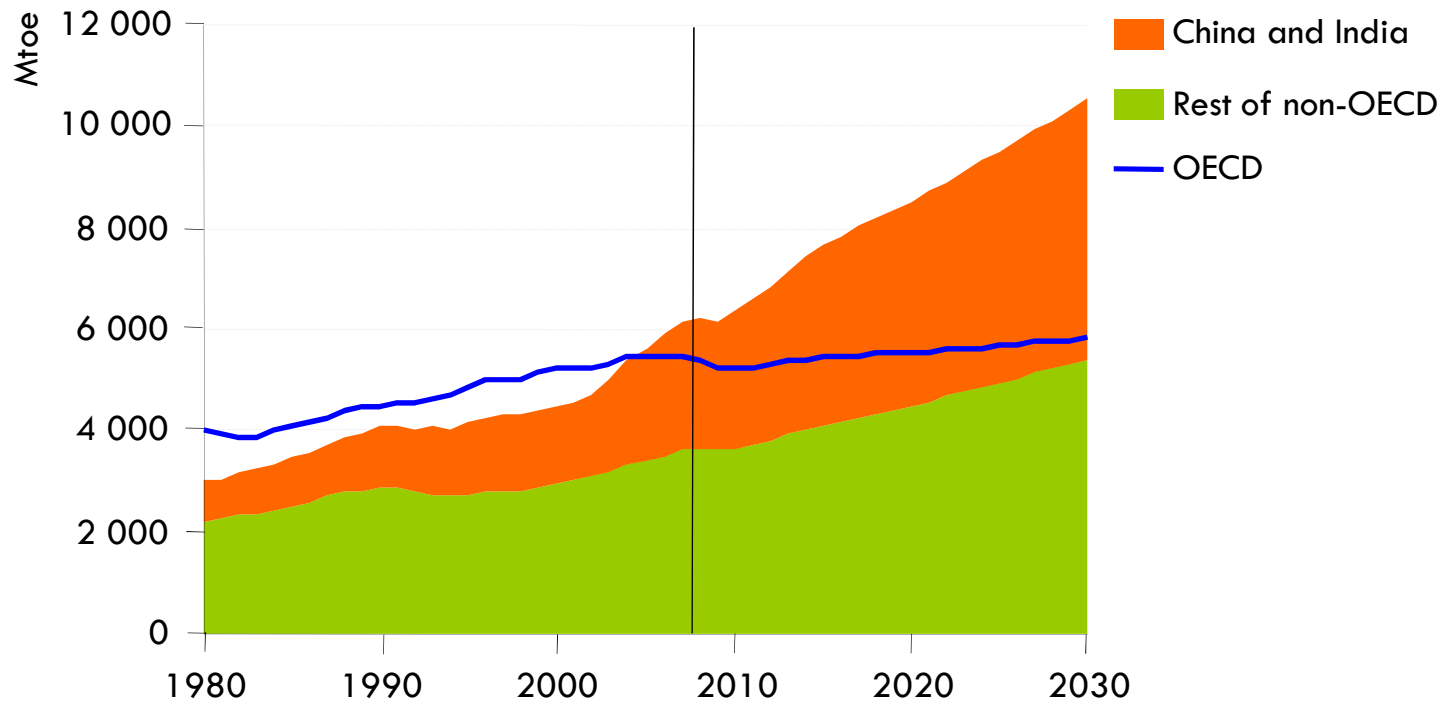
# *World Energy Outlook 2009*

Presentation to the Press  
London, 10 November 2009

## The context

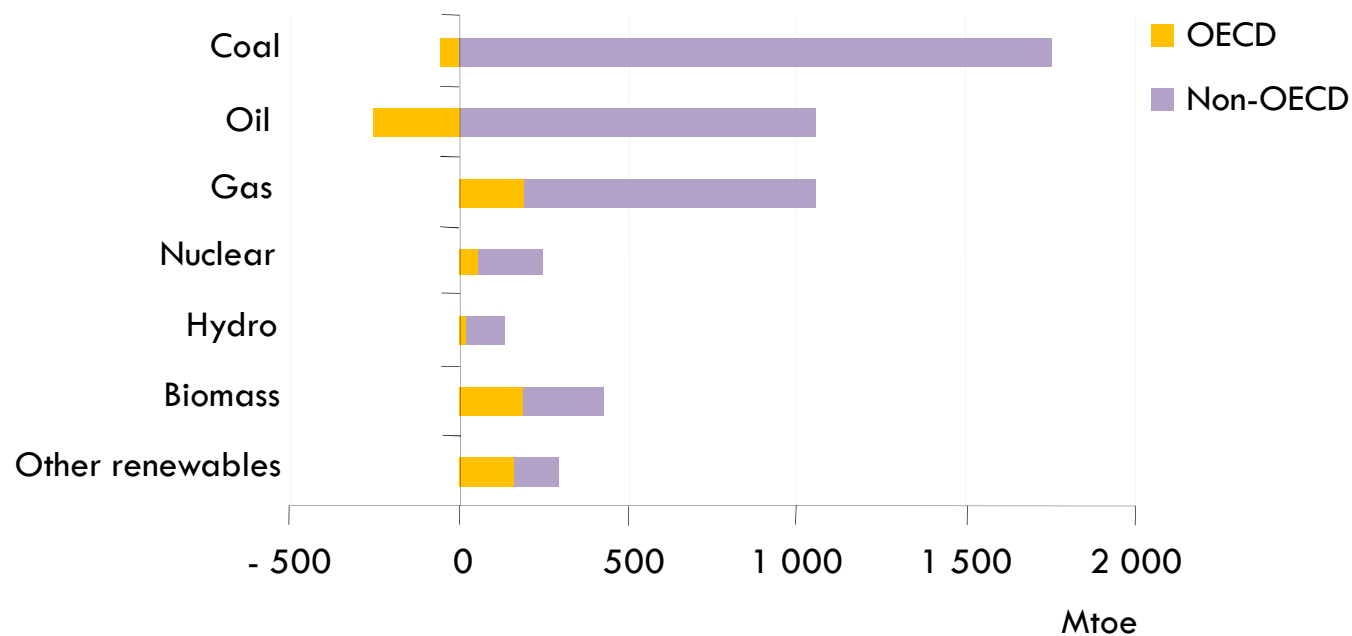
- The worst economic slump since the 2<sup>nd</sup> World War & signs of recovery – *but how fast?*
- An oil price collapse & then a rebound – *rising marginal costs point to higher prices in the longer term, but are current levels sustainable?*
- A slump in energy investment due to the financial & economic crisis – *will it bounce back quickly enough to avert a supply squeeze later?*
- Difficult negotiations on a post-2012 climate deal leading up to Copenhagen – *what is needed to avert catastrophic climate change?*

# World primary energy demand in the Reference Scenario



***Non-OECD countries account for 93% of the increase in global demand between 2007 & 2030, driven largely by China & India***

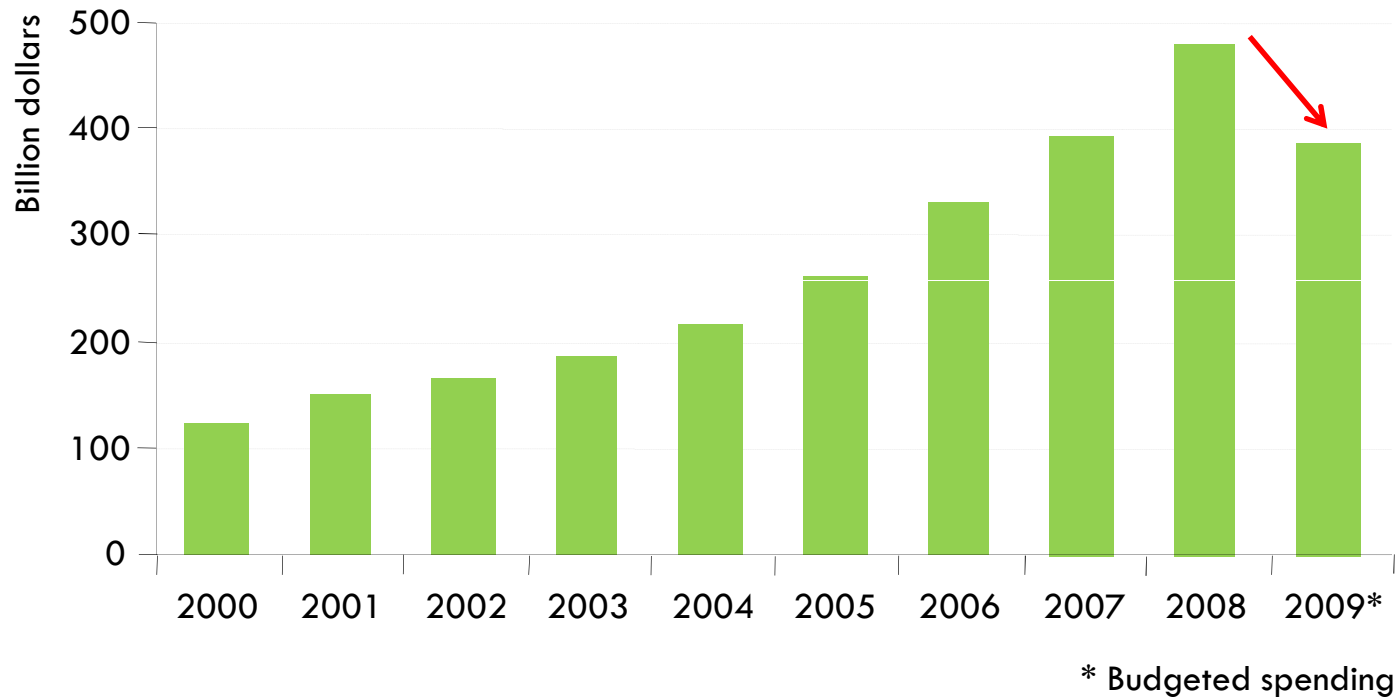
# Change in primary energy demand in the Reference Scenario, 2007-2030



***Fossil fuels account for 77% of the increase in world primary energy demand in 2007-2030, with oil demand rising from 85 mb/d in 2008 to 88 mb/d in 2015 & 105 mb/d in 2030***

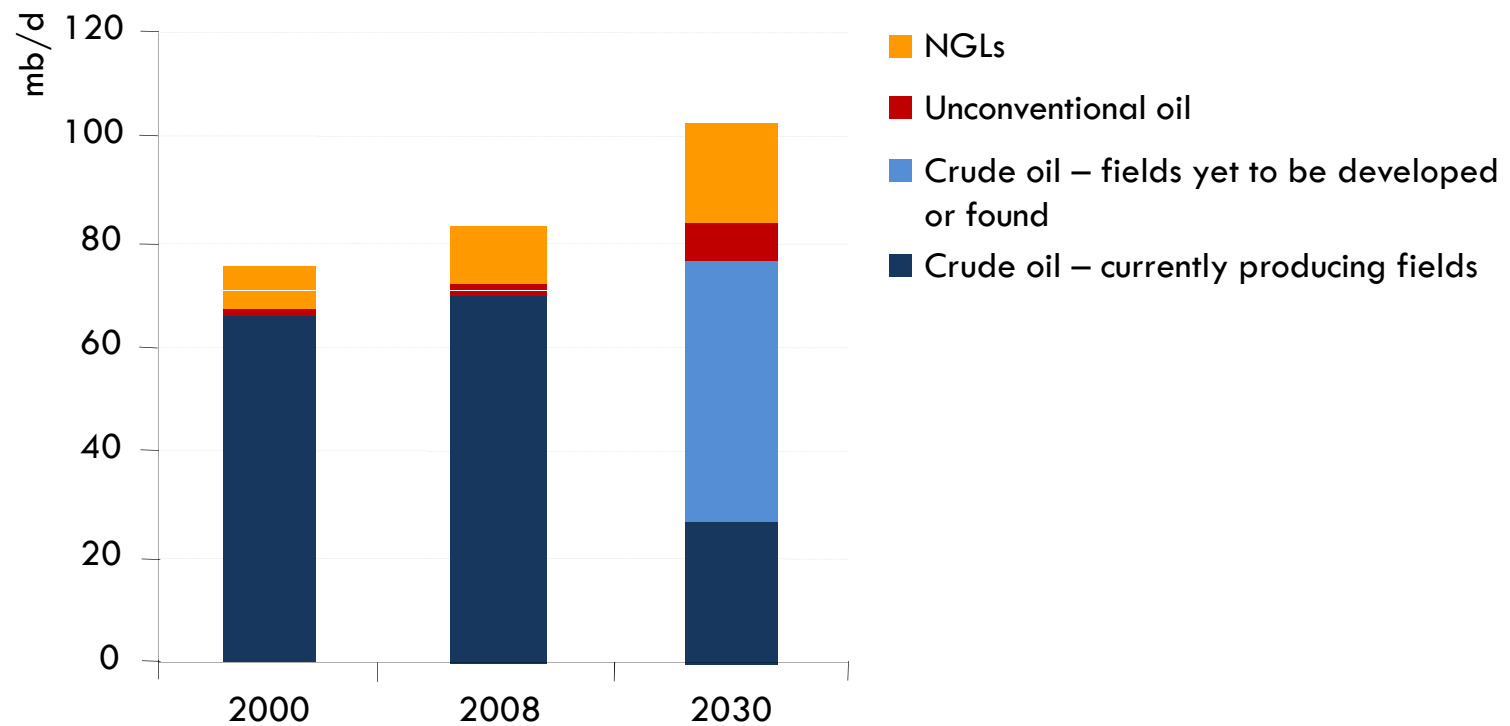


# Worldwide upstream oil & gas capital expenditures



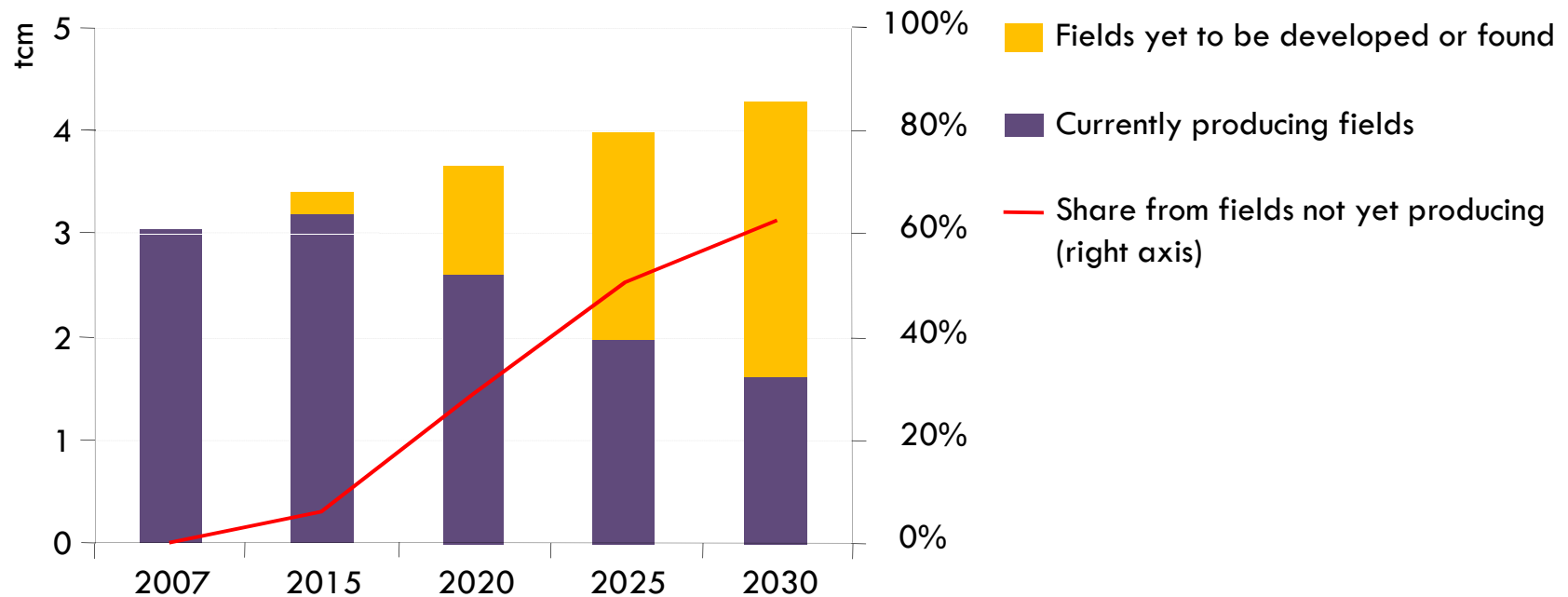
**Global upstream spending (excluding acquisitions) is budgeted to fall by over \$90 billion, or 19%, in 2009 – the first fall in a decade**

# Oil production in the Reference Scenario



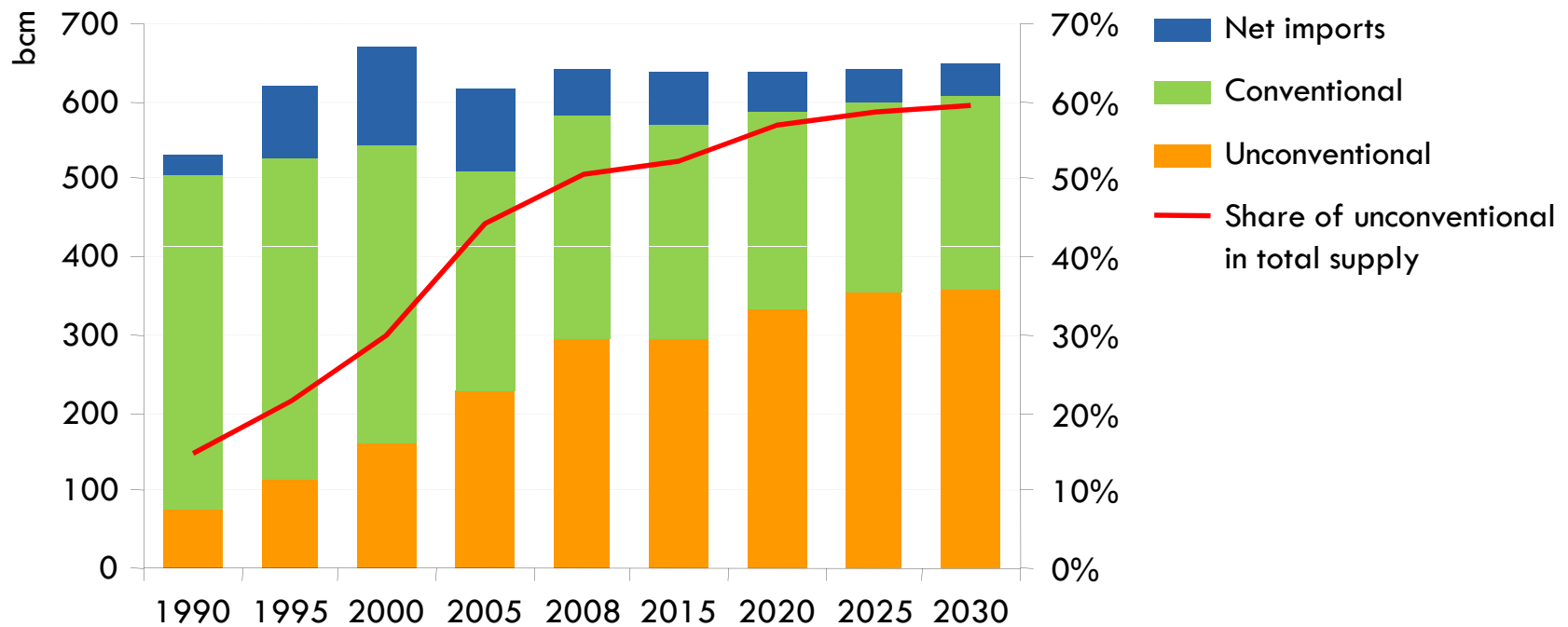
***Sustained investment is needed mainly to combat the decline in output at existing fields, which will drop by almost two-thirds by 2030***

# Impact of decline on world natural gas production in the Reference Scenario



**Additional capacity of around 2 700 bcm, or 4 times current Russian capacity, is needed by 2030 – half to offset decline at existing fields & half to meet the increase in demand**

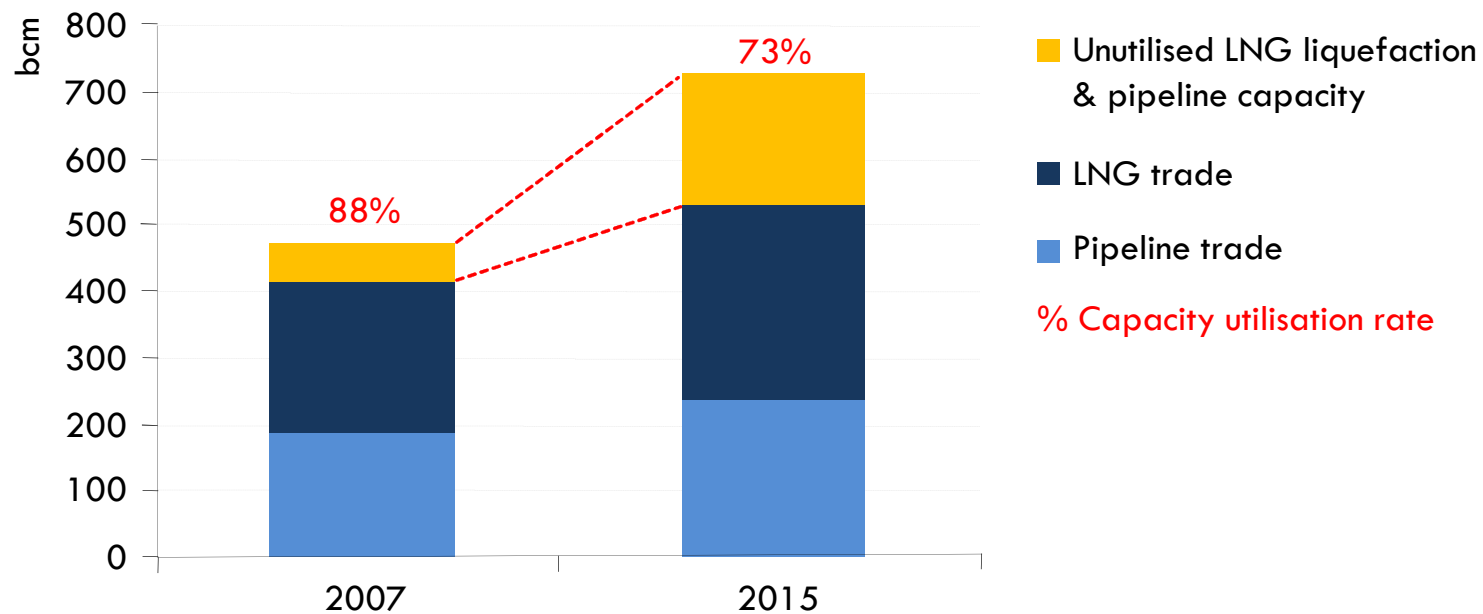
# US natural gas supply in the Reference Scenario



*Thanks mainly to shale gas, US gas output grows gradually through to 2030, outstripping demand & squeezing imports*

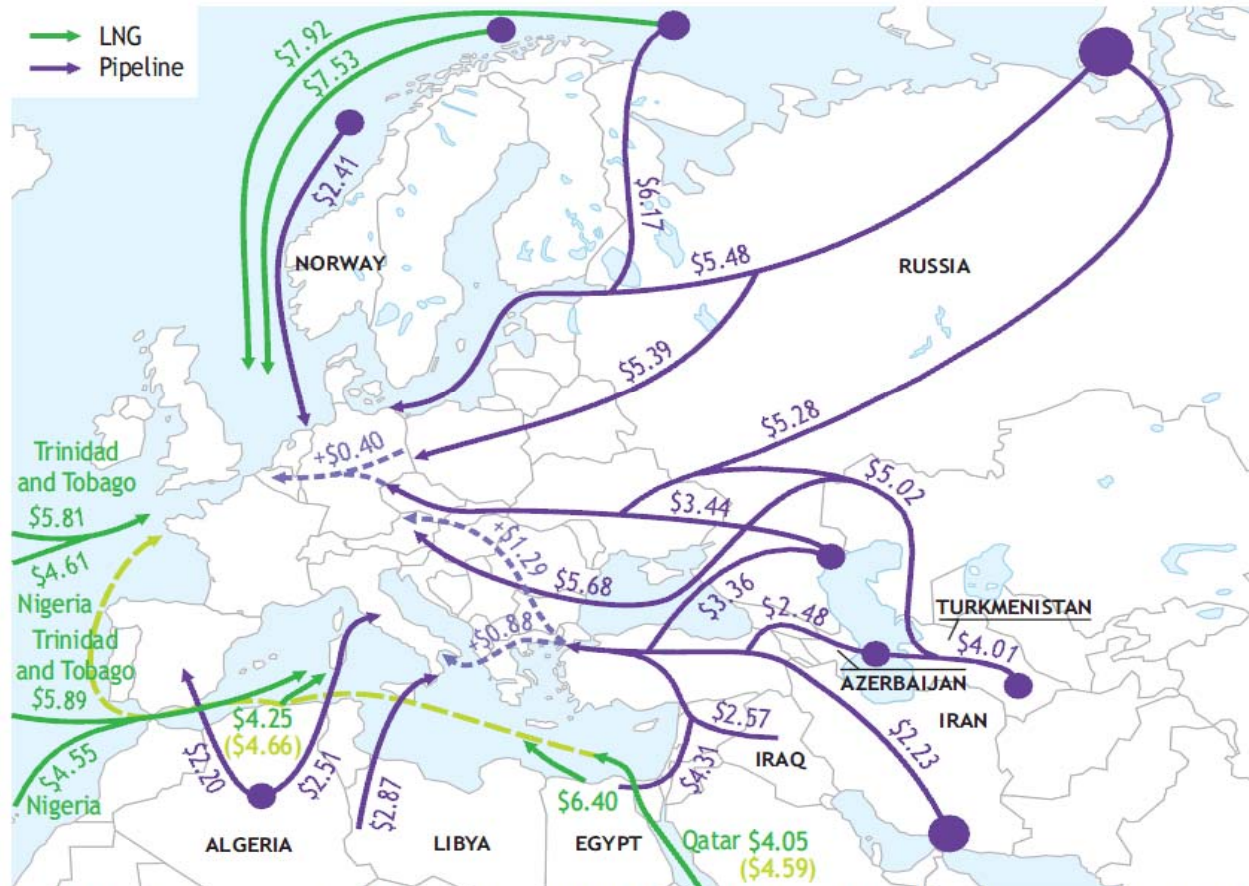


# Natural gas transportation capacity



*A glut of gas is developing – reaching 200 bcm by 2015 – due to weaker than expected demand & plentiful US unconventional supply, with far-reaching implications for gas pricing*

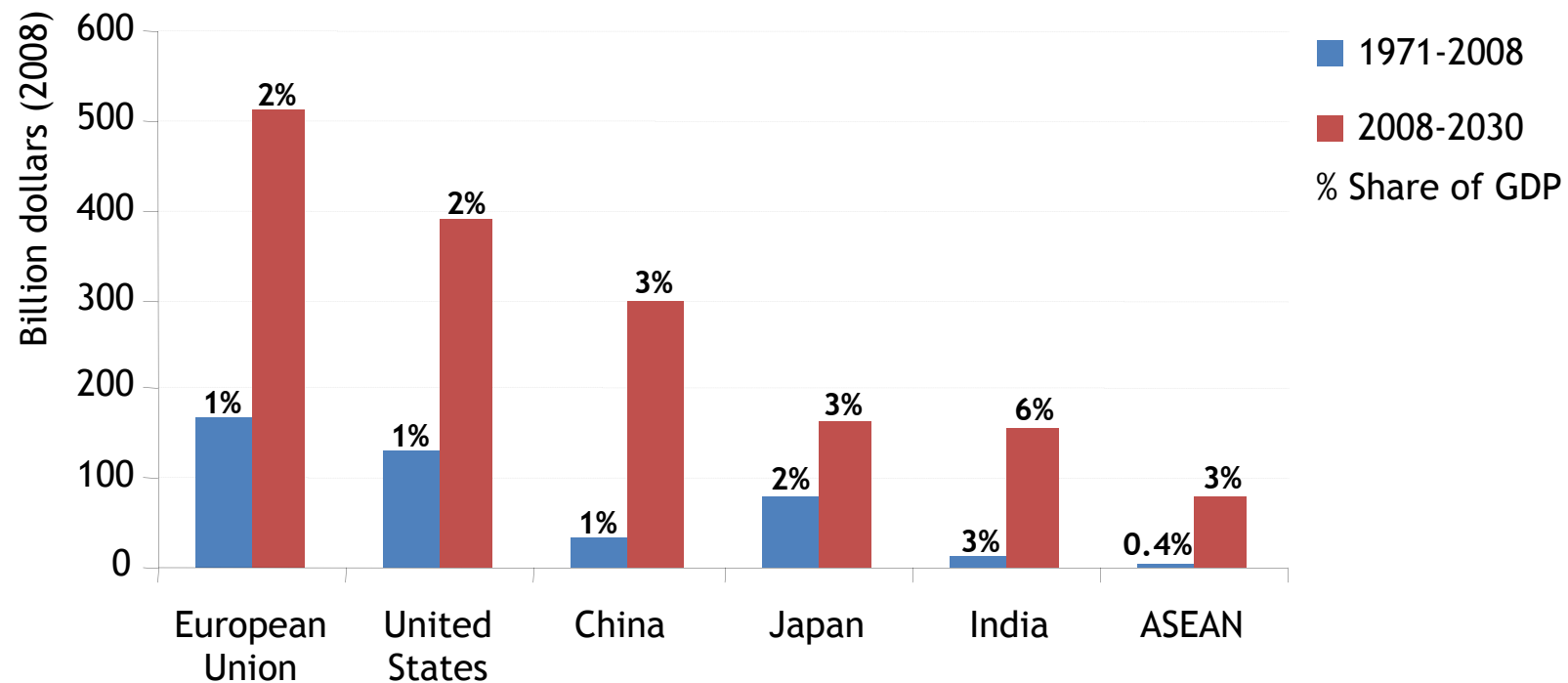
# Indicative costs for potential new sources of gas delivered to Europe, 2020 (\$/MBtu)



The boundaries and names shown and the designations used on maps included in this publication do not imply official endorsement or acceptance by the IEA.

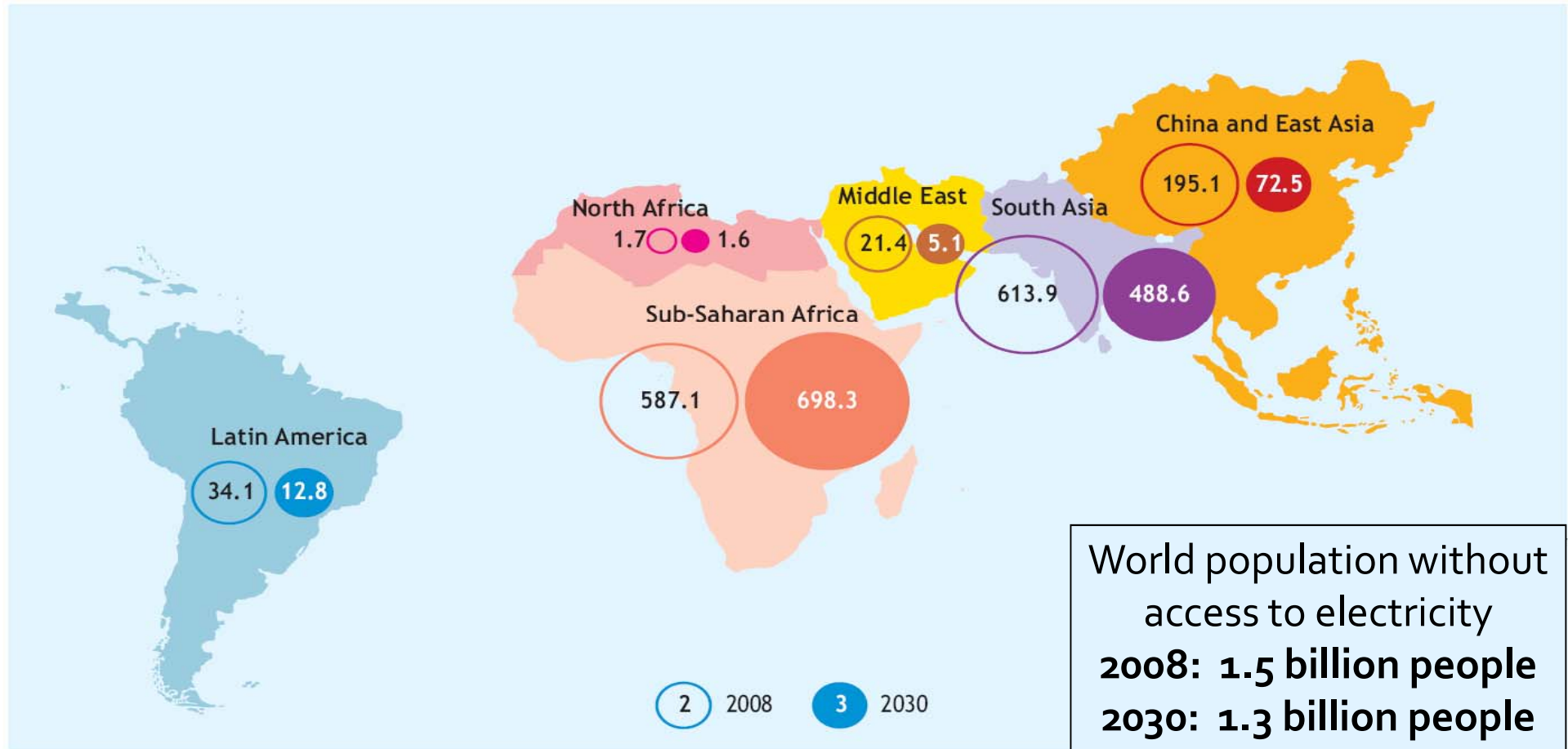
**Although indigenous resources are limited & output is declining, Europe is geographically well placed to secure gas supplies from a variety of external sources**

# Average annual expenditure on net imports of oil & gas in the Reference Scenario



*The Reference Scenario implies persistently high spending on oil & gas imports, with China overtaking the United States by around 2025 to become the world's biggest spender*

# Number of people without access to electricity in the Reference Scenario (millions)



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***\$35 billion per year more investment than in the Reference Scenario would be needed to 2030 – equivalent to just 5% of global power-sector investment – to ensure universal access***

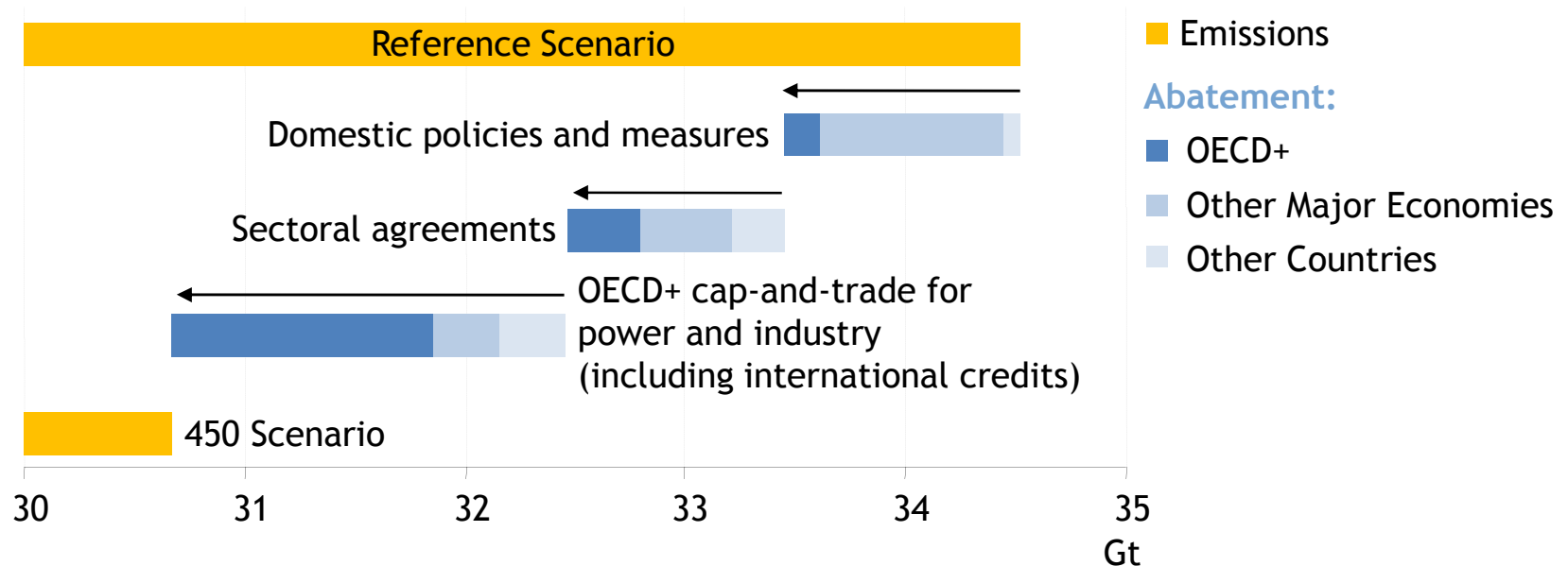


# The policy mechanisms in the 450 Scenario

- A combination of policy mechanisms, which best reflects nations' varied circumstances & negotiating positions
- We differentiate on the basis of three country groupings
  - > *OECD+:* OECD & other non-OECD EU countries
  - > *Other Major Economies (OME):* Brazil, China, Middle East, Russia & South Africa
  - > *Other Countries (OC):* all other countries, including India & ASEAN
- A graduated approach
  - > *Up to 2020, only OECD+ have national emissions caps*
  - > *After 2020, Other Major Economies are also assumed to adopt emissions caps*
  - > *Through to 2030, Other Countries continue to focus on national measures*
- Emissions peaking by 2020 will require
  - > *A CO<sub>2</sub> price of \$50 per tonne for power generation & industry in OECD+*
  - > *Investment needs in non-OECD countries of \$200 billion in 2020, supported by OECD+ through carbon markets & co-financing*

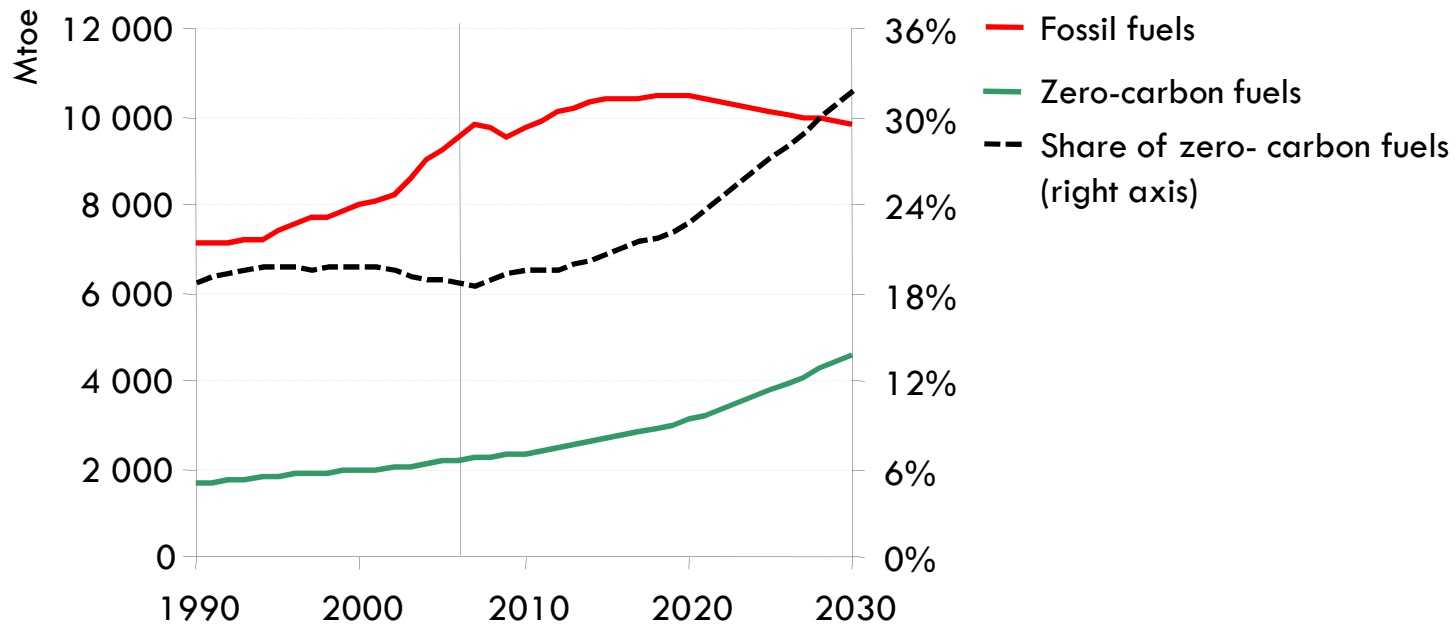


# Abatement by policy type in the 450 Scenario relative to the Reference Scenario, 2020



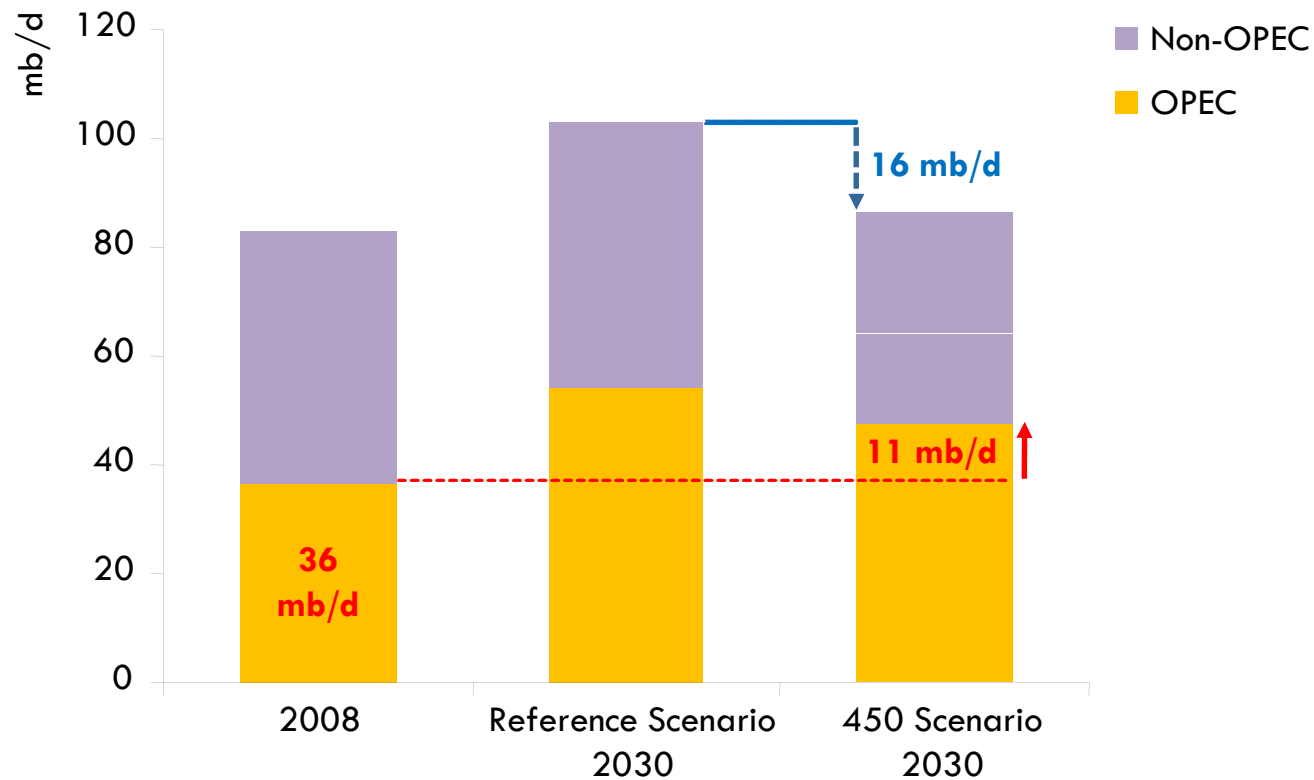
*After realising the abatement potential of policies & measures and sectoral approaches, cap-and-trade in OECD+ yields a further 1.8 Gt*

# World primary energy demand by fuel in the 450 Scenario



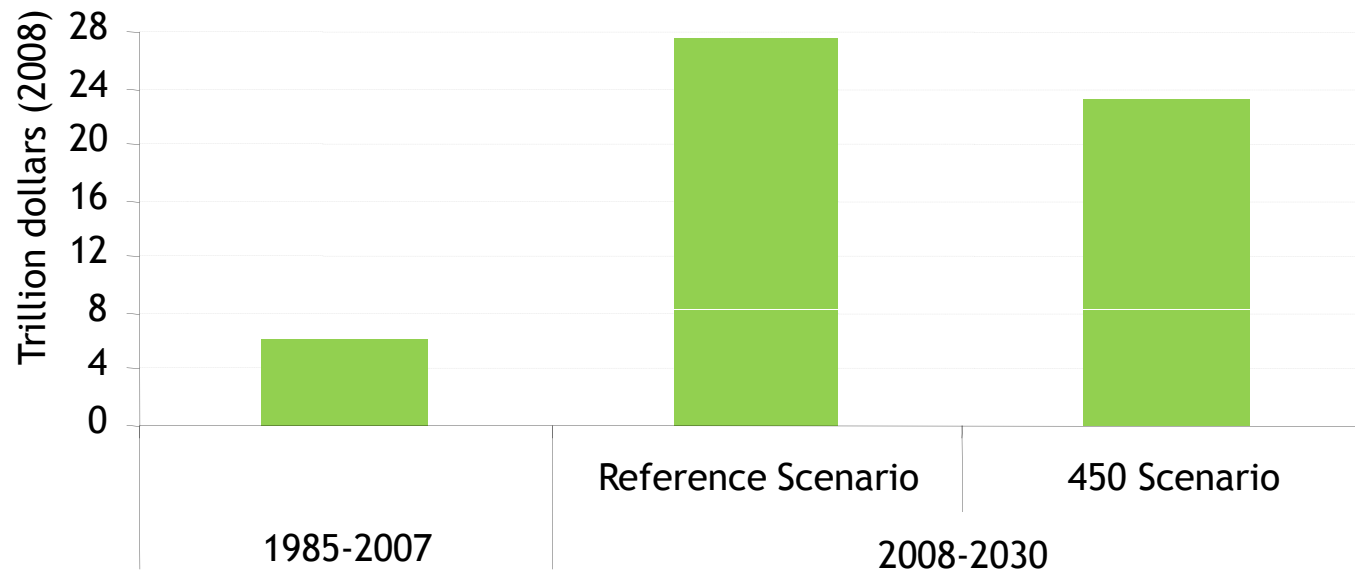
*In the 450 Scenario, demand for fossil fuels peaks by 2020, and by 2030 zero-carbon fuels make up a third of the world's primary sources of energy demand*

# World oil production by scenario



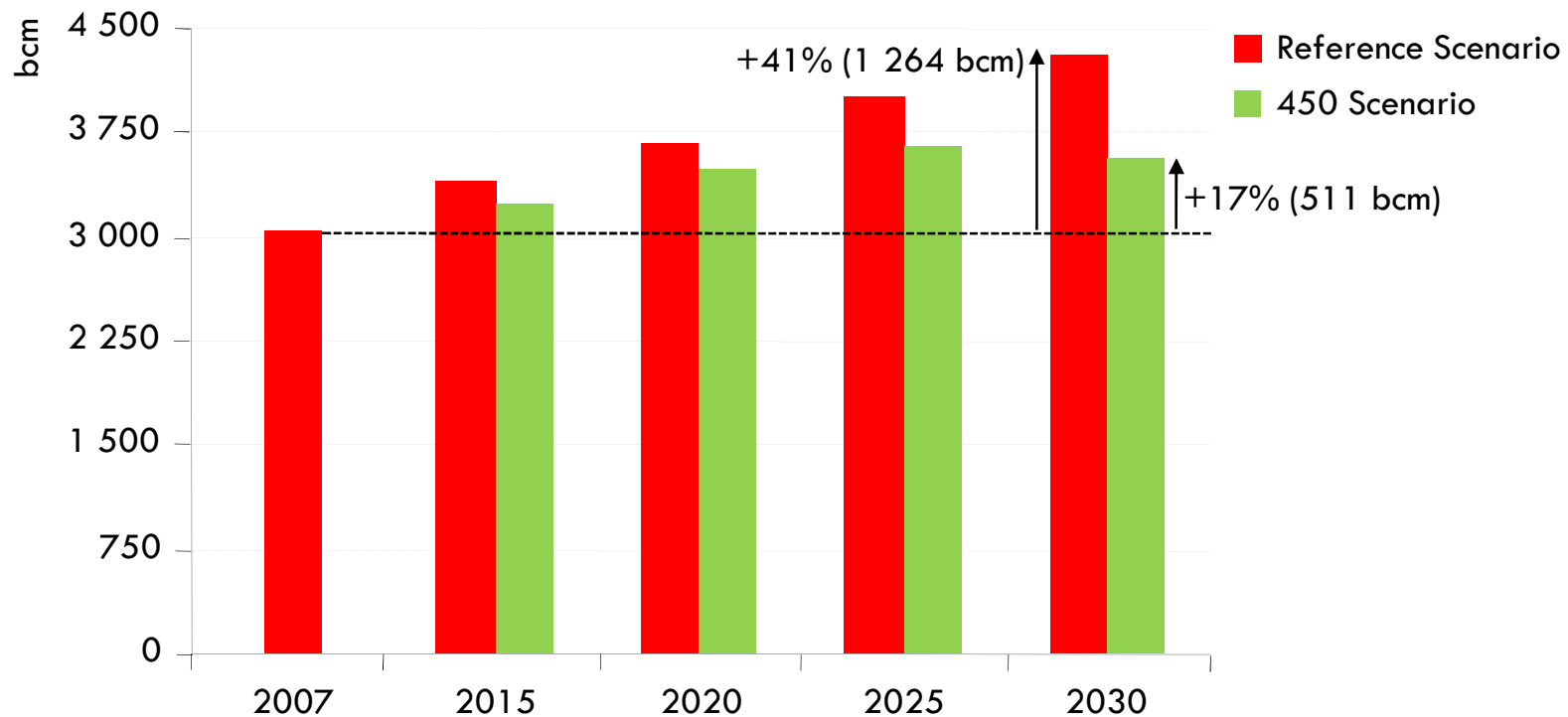
*Curbing CO<sub>2</sub> emissions would also improve energy security by cutting oil demand, but even in the 450 Scenario, OPEC production increases by 11 mb/d between now and 2030*

# Cumulative OPEC oil export revenues by scenario



*Though slightly lower than in the Reference Scenario, OPEC revenues in the 450 Scenario are over four times as high as in the last 20 years*

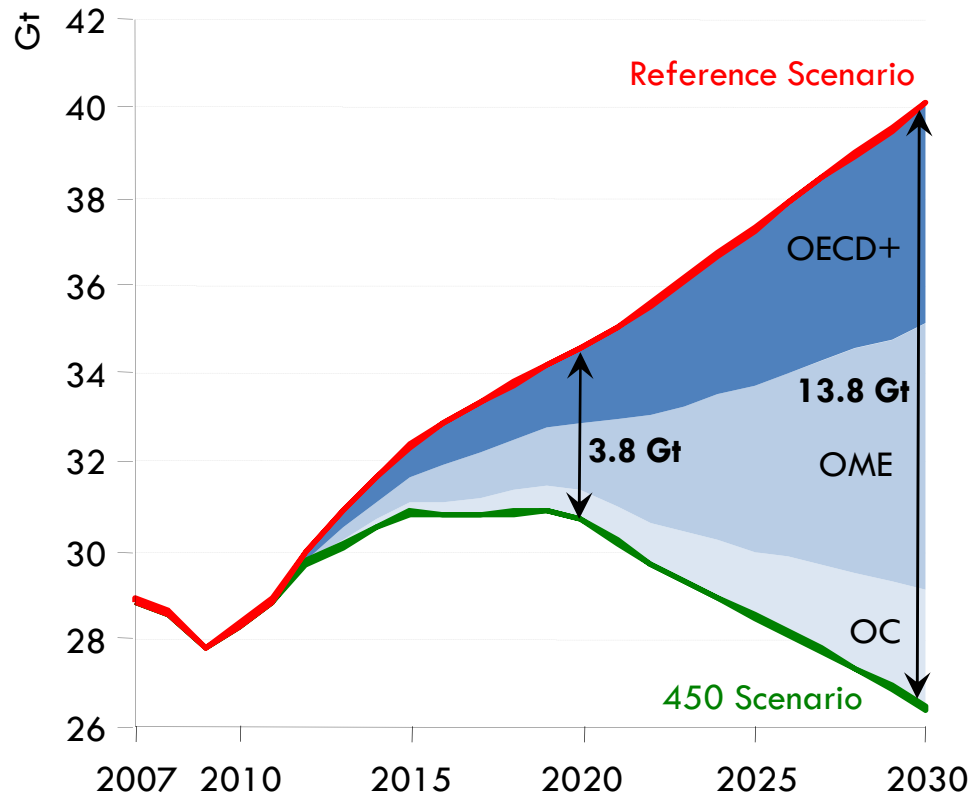
# World primary natural gas demand by scenario



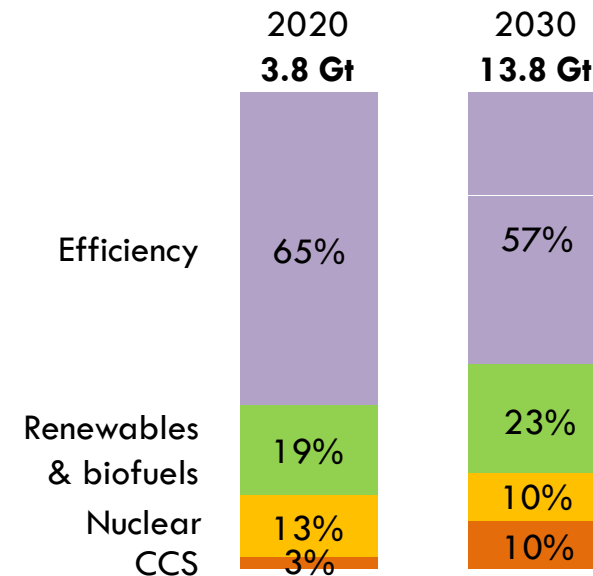
*Gas demand continues to grow in both scenarios, peaking by around 2025 in the 450 Scenario & highlighting the potential role of gas as a transition fuel to a clean energy future*



# World abatement of energy-related CO<sub>2</sub> emissions in the 450 Scenario

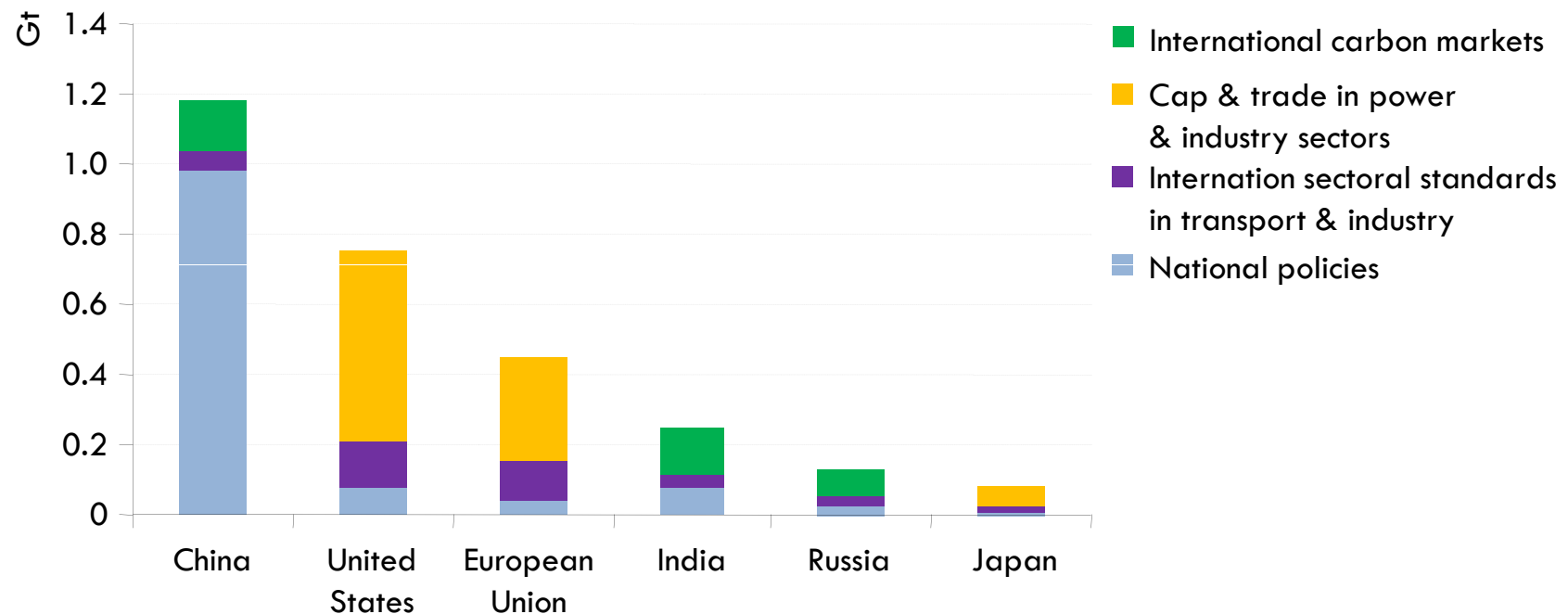


World abatement by technology



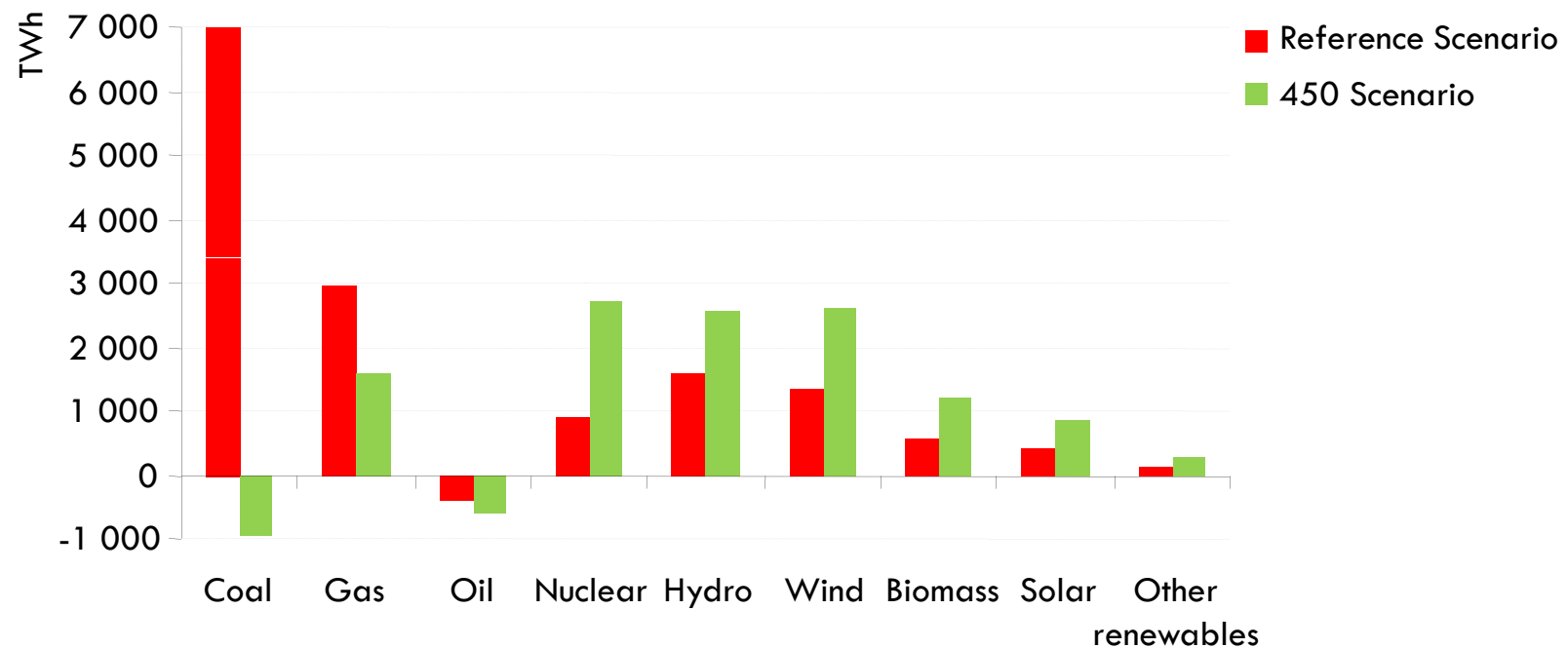
*An additional \$10.5 trillion of investment is needed in total in the 450 Scenario, with measures to boost energy efficiency accounting for most of the abatement through to 2030*

# Abatement in the 450 Scenario by key emitters, 2020



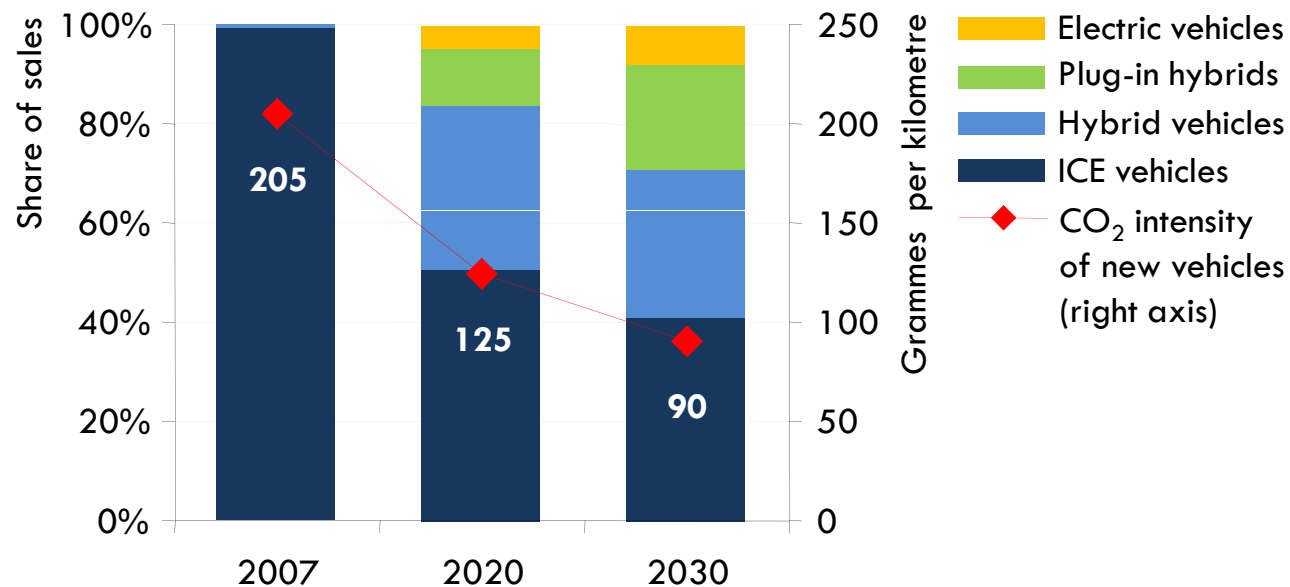
***China, the United States, the European Union, India, Russia & Japan account for almost three-quarters of the 3.8 Gt reduction in the 450 Scenario***

# Incremental world electricity production in the Reference and 450 Scenarios, 2007-2030



***Renewables, nuclear and plants fitted with CCS account for around 60% of electricity generation globally in 2030 in the 450 Scenario, up from less than one-third today***

# World passenger vehicle sales & average new vehicle CO<sub>2</sub> intensity in the 450 Scenario



**Improvements to the internal combustion engine & the uptake of next-generation vehicles & biofuels lead to a 56% reduction in new-car emission intensity by 2030**

## Summary & conclusions

- The financial crisis has halted the rise in global fossil-energy use, but its long-term upward path will resume soon *on current policies*
- Tackling climate change & enhancing energy security require a massive decarbonisation of the energy system
  - > We are now on course for a 6°C temperature rise & rising energy costs
  - > Limiting temperature rise to 2°C will require big emission reductions in all regions
- A 450 path towards 'Green Growth' would bring substantial benefits
  - > Avoiding the worst effects & costs of climate change
  - > Energy-security benefits, lower oil & gas imports & reduced energy bills
  - > Much less air pollution & huge health benefits
- Natural gas can play a key role as a bridge to a cleaner energy future
- The challenge is enormous – but it can and must be met
  - > Improved energy efficiency & technology deployment are critical
  - > Each year of delay adds \$500 bn to mitigation costs between today & 2030