World Energy Outlook 2008

Seoul, 19 November 2008

The context

- Soaring energy prices to mid-2008, followed by a drop – what will it mean for demand?
- How will the financial crisis & economic slowdown affect energy demand & investment?
- Will economic worries divert attention from strategic energy security & environmental challenges?
- Are we setting ourselves up for a supply crunch once the economy is back on its feet?
- Will negotiators at COP-15 in Copenhagen in 2009 have the political support needed to succeed?

World primary energy demand in the Reference Scenario: an unsustainable path

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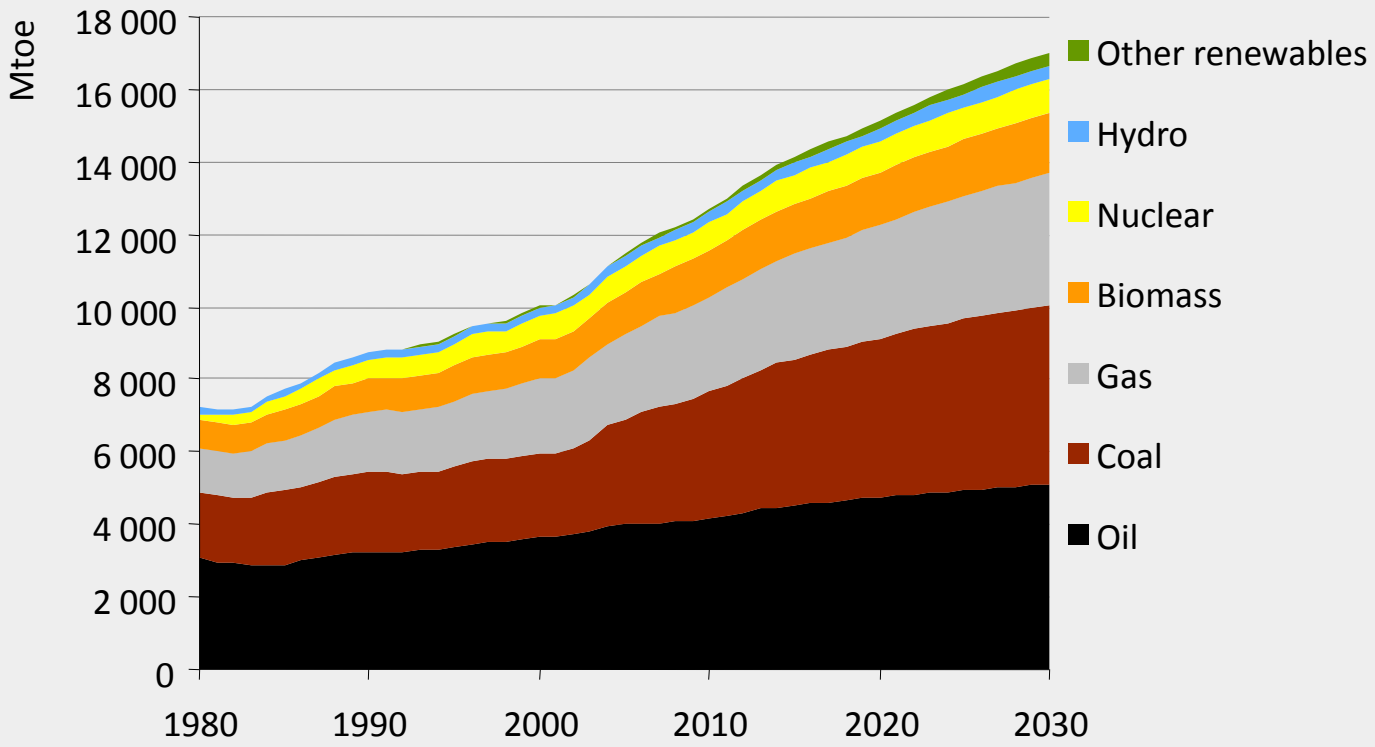

World energy demand expands by 45% between now and 2030 – an average rate of increase of 1.6% per year – with coal accounting for more than a third of the overall rise

The continuing importance of coal in world primary energy demand

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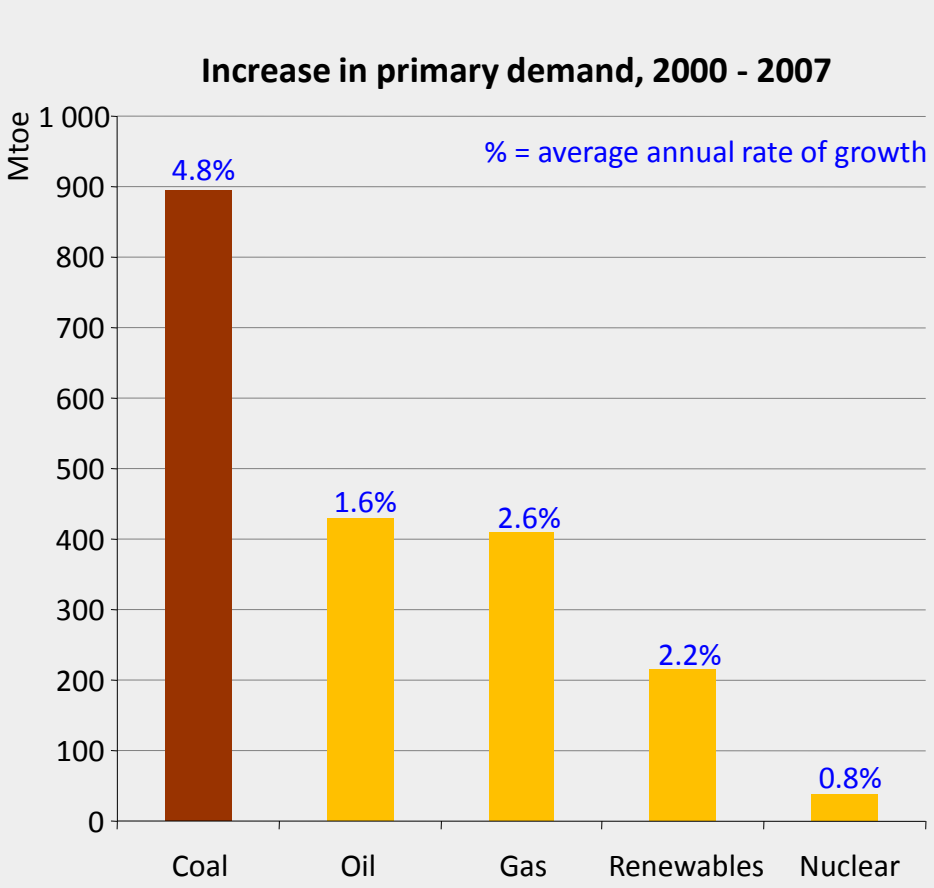

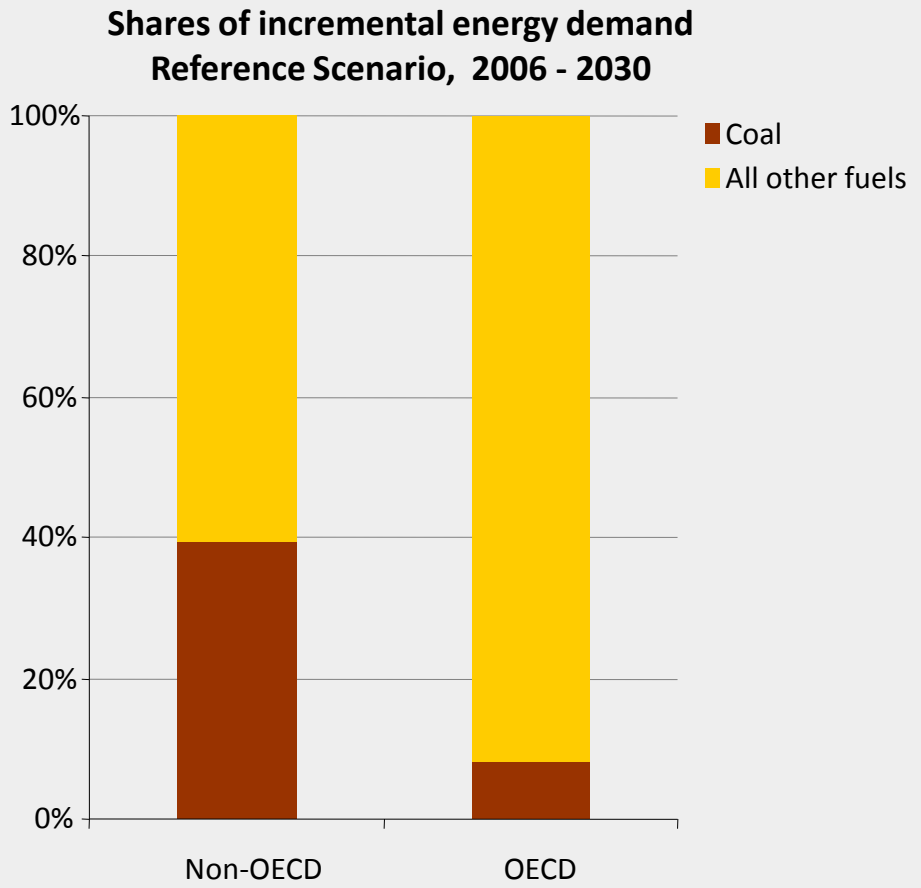

Demand for coal has been growing faster than any other energy source & is projected to account for more than a third of incremental global energy demand to 2030

Change in oil demand by region in the Reference Scenario, 2007-2030

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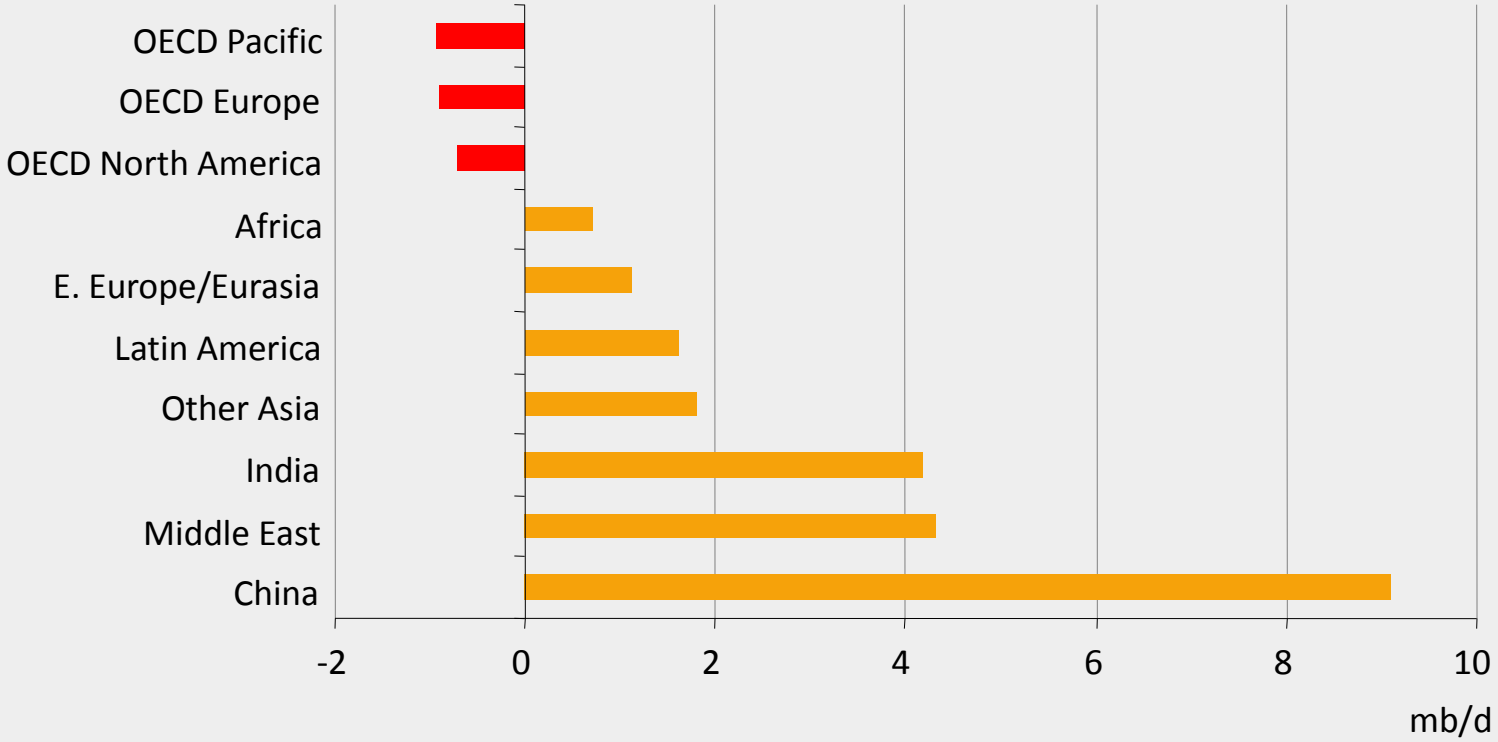

All of the growth in oil demand comes from non-OECD, with China contributing 43%, the Middle East & India each about 20% & other emerging Asian economies most of the rest

Share of renewables in electricity generation in the Reference Scenario

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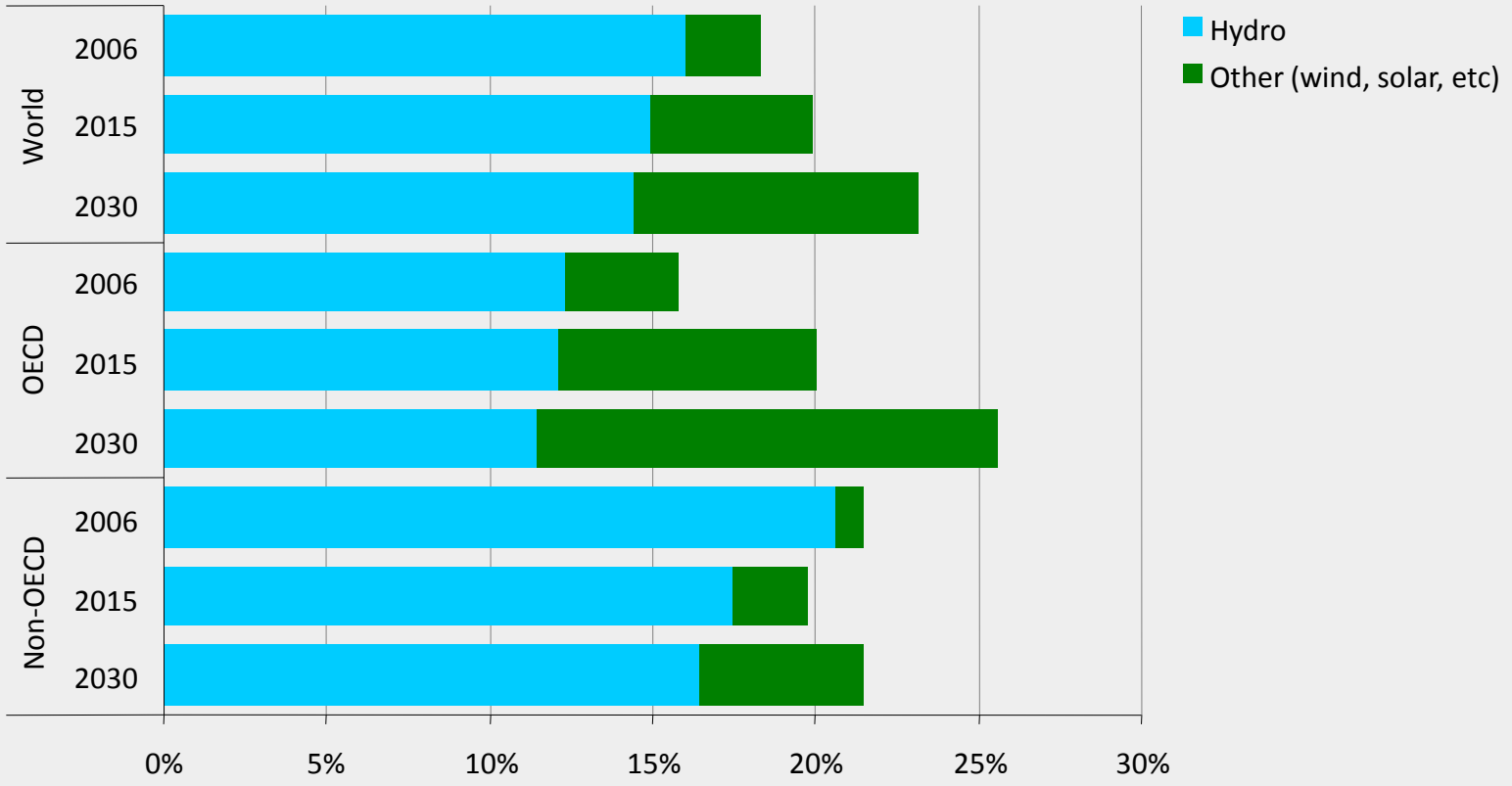

Soon after 2010, renewables become the 2nd-largest source of electricity behind coal, thanks to government support, prospects for higher fossil-fuel prices & declining investment costs

Oil-import dependence in the Reference Scenario

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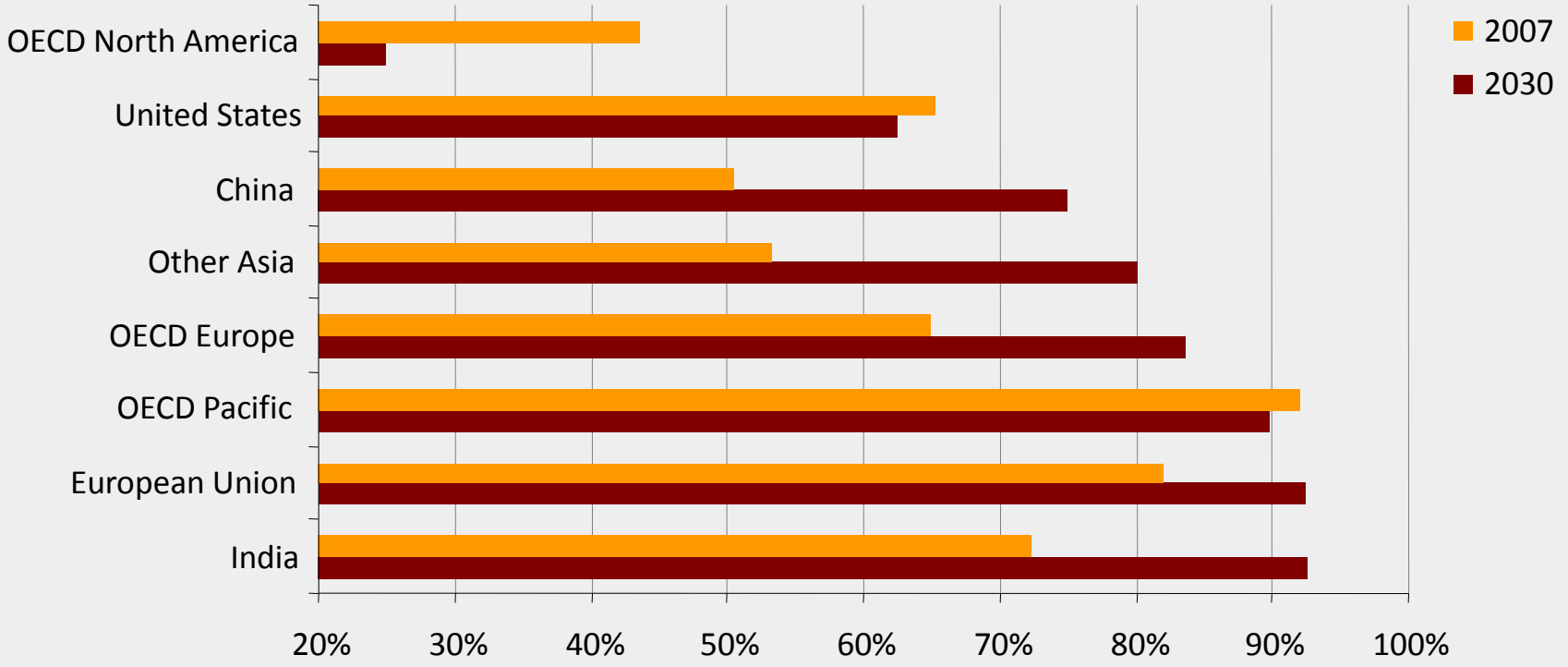

OECD Europe & Asia become even more dependent on oil imports, but import dependence drops in North America & OECD Pacific

Energy subsidies in non-OECD countries, 2007

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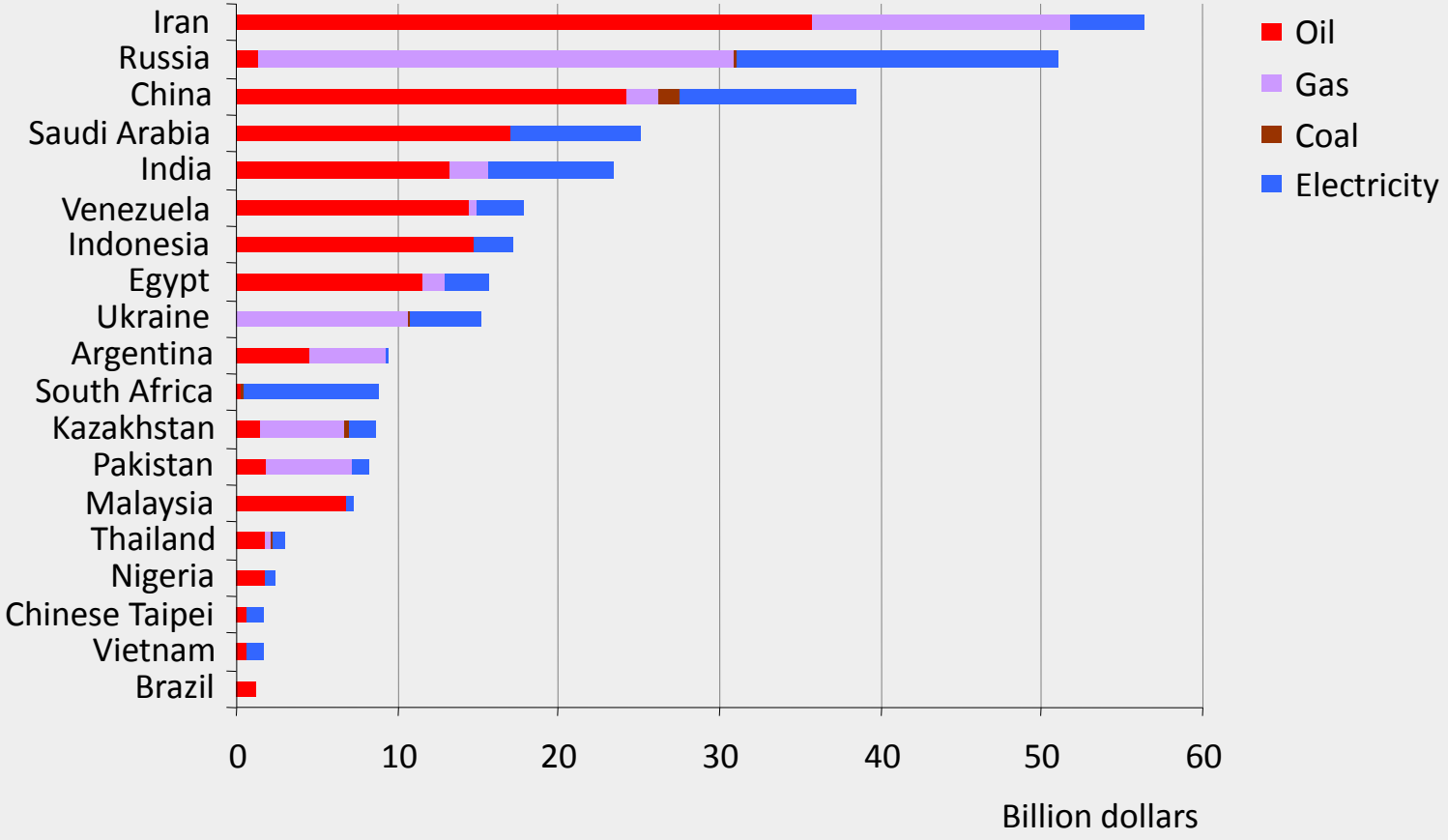

Energy subsidies in the 20 largest non-OECD countries hit $310 billion in 2007 – creating, in many cases, an unsustainable economic burden & exacerbating environmental effects

Cumulative energy supply investment in the Reference Scenario, 2007-2030

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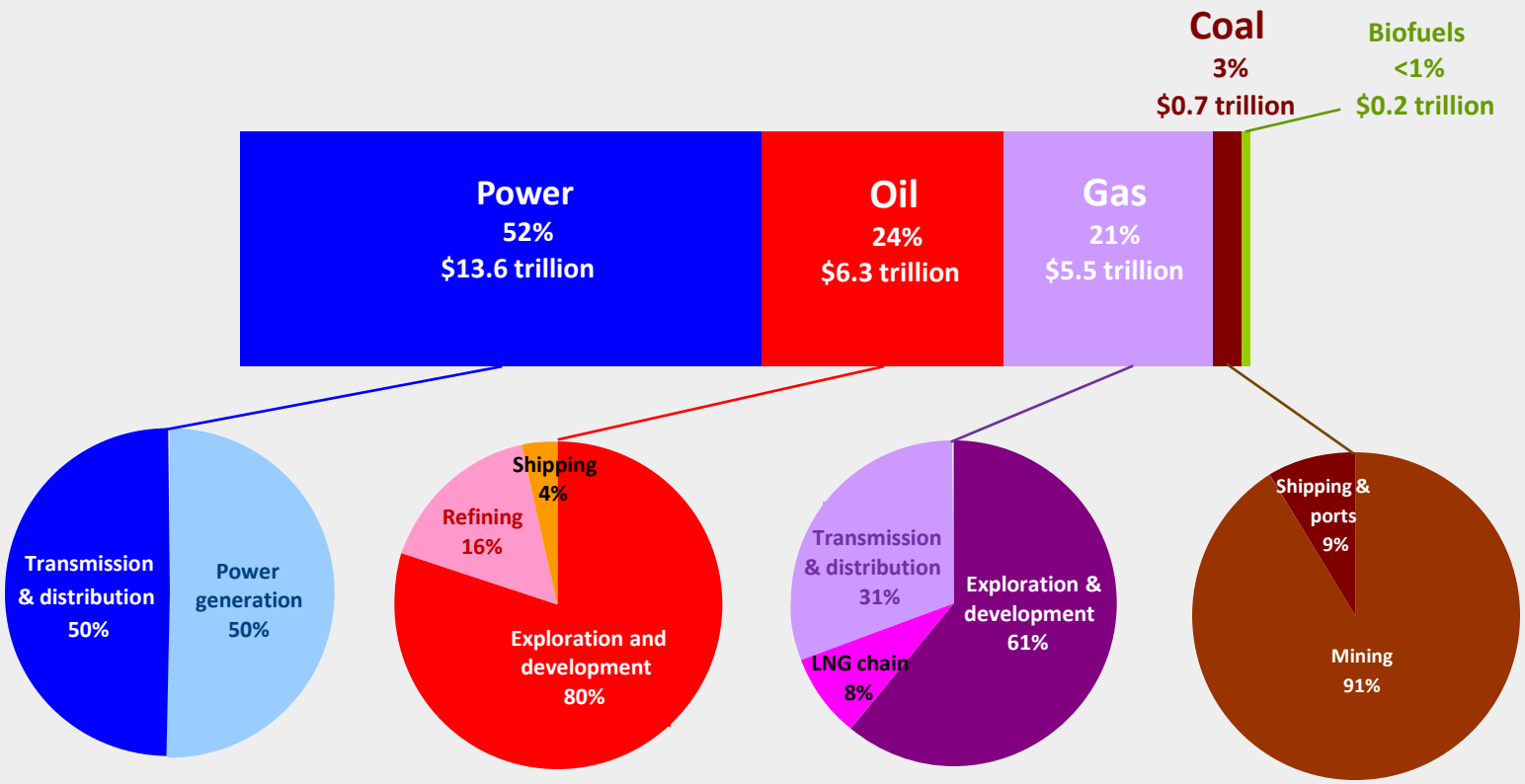

Investment of $26 trillion, or over $1 trillion/year, is needed, but the credit squeeze could delay spending, potentially setting up a supply-crunch once the economy recovers

Oil supply prospects

World oil production by OPEC/non-OPEC in the Reference Scenario

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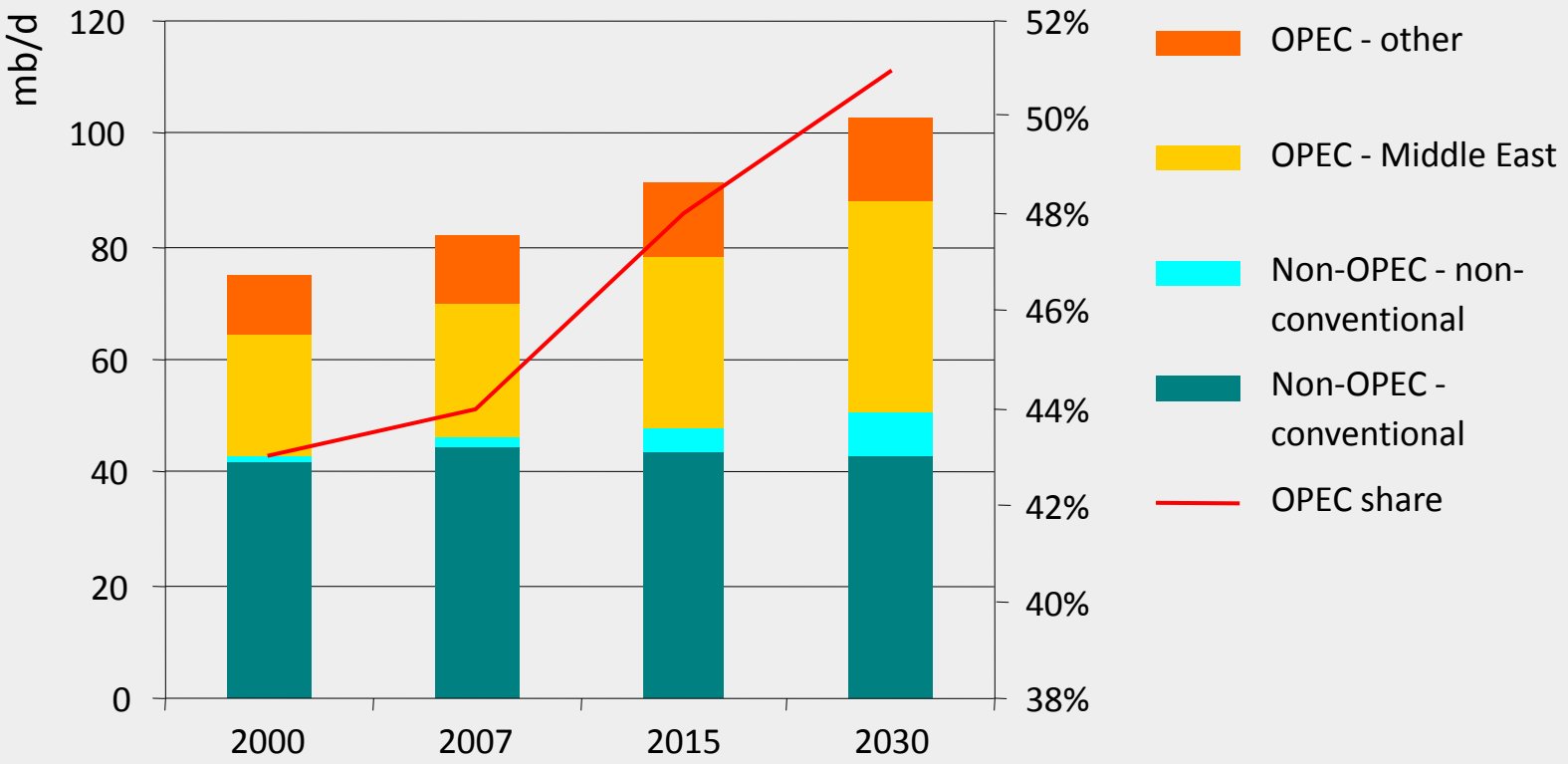

Production rises to 104 mb/d in 2030, with Middle East OPEC taking the lion's share of oil market growth as conventional non-OPEC production declines

World oil production by source in the Reference Scenario

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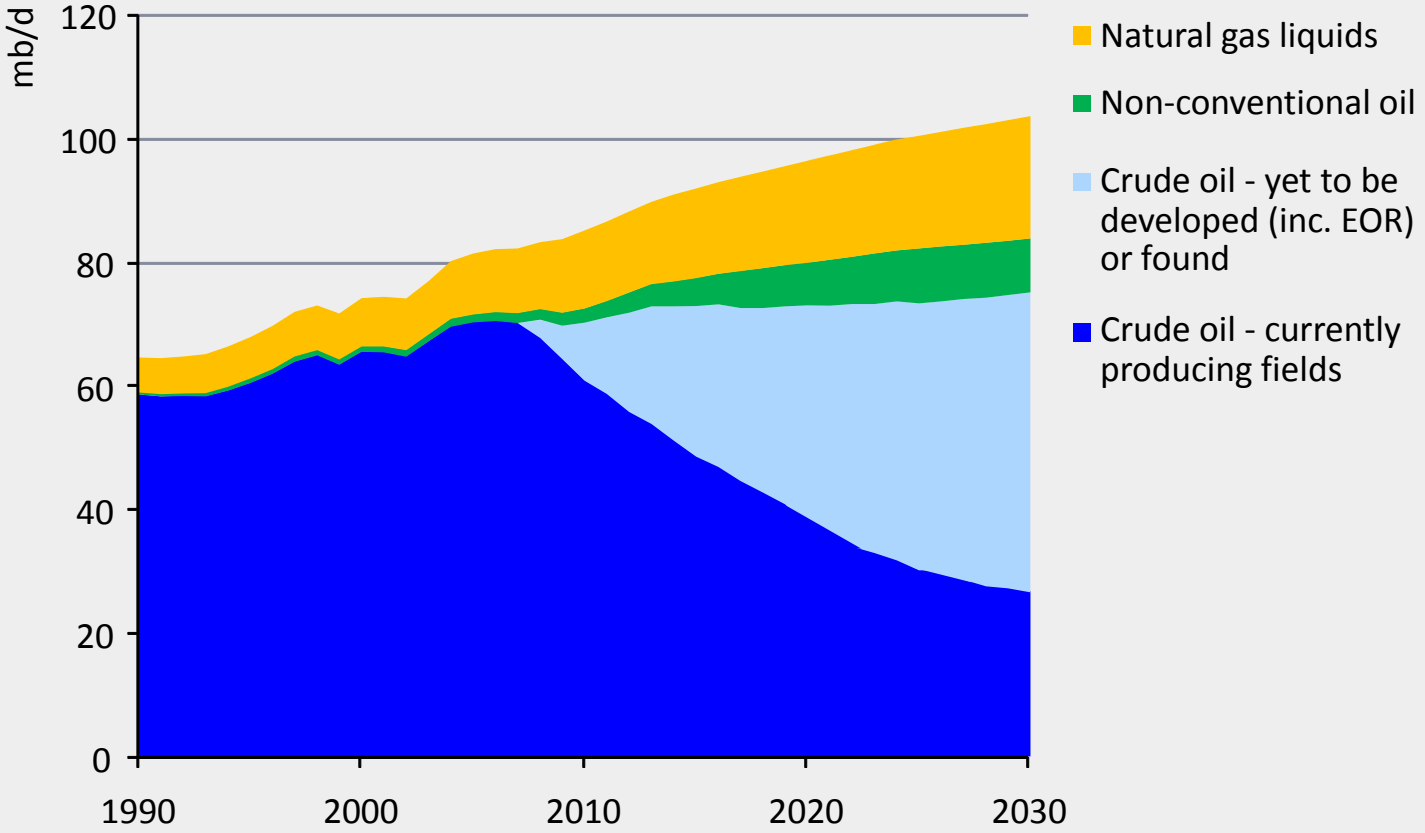

64 mb/d of gross capacity needs to be installed between 2007 & 2030 – six times the current capacity of Saudi Arabia – to meet demand growth & offset decline

Average observed oilfield decline rates

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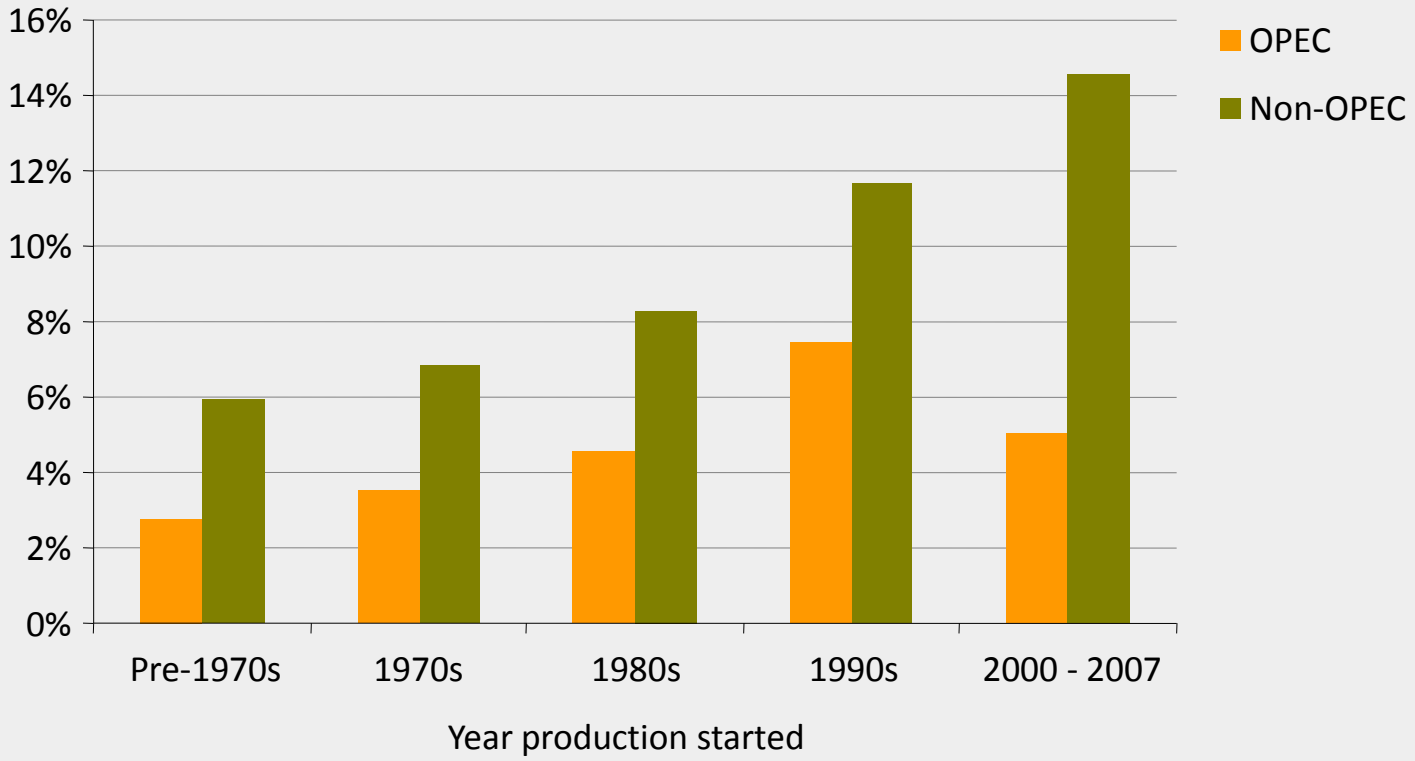

The production-weighted average decline rate worldwide is projected to rise from 6.7% in 2007 to 8.6% in 2030 as productions shifts to smaller oilfields, which tend to decline faster

A sea change: world oil & gas production by company type in the Reference Scenario

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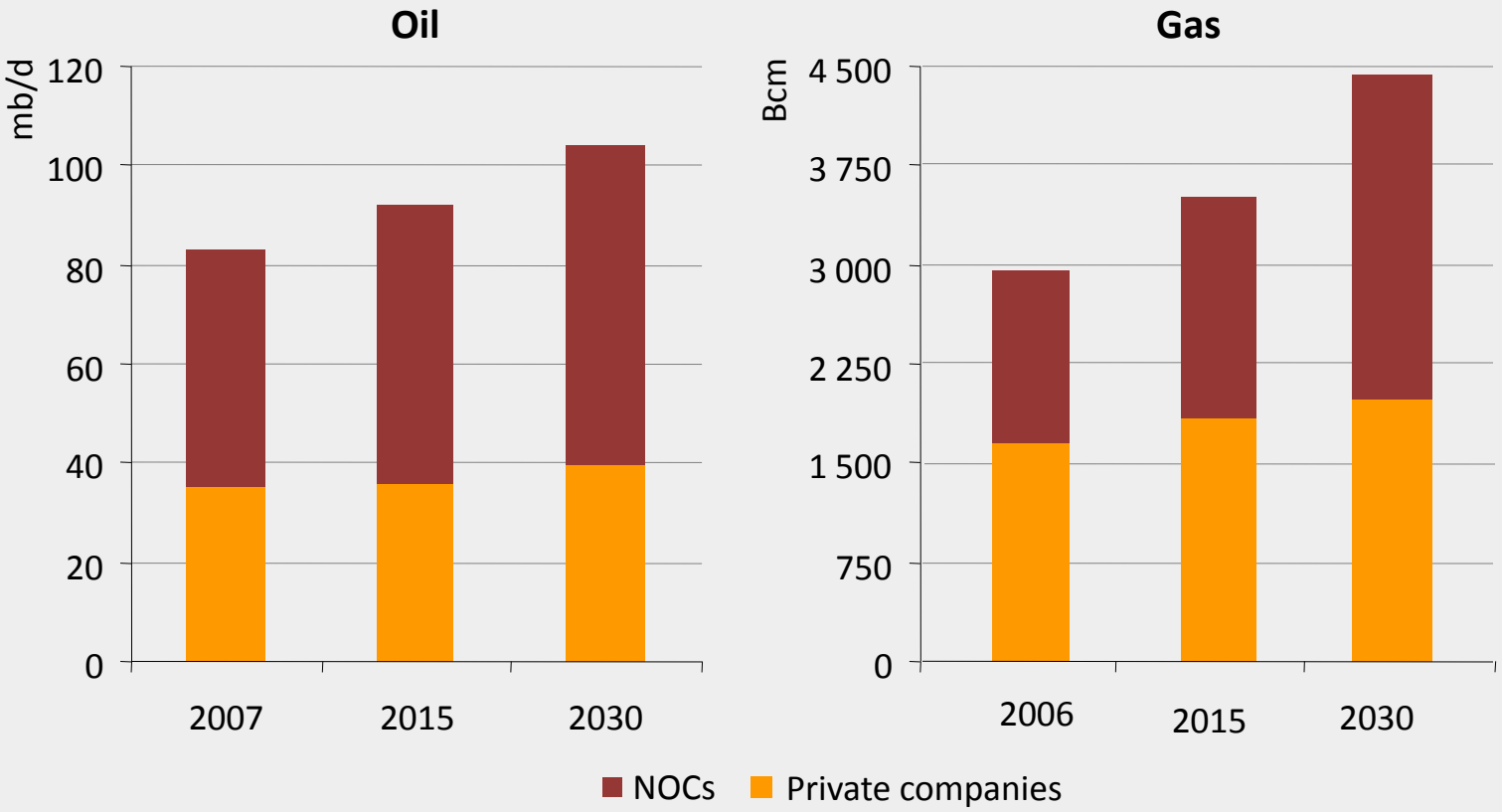

Almost 80% of the projected increase in output of both oil & gas comes from national companies – on the assumption that investment is forthcoming

Long-term oil-supply cost curve

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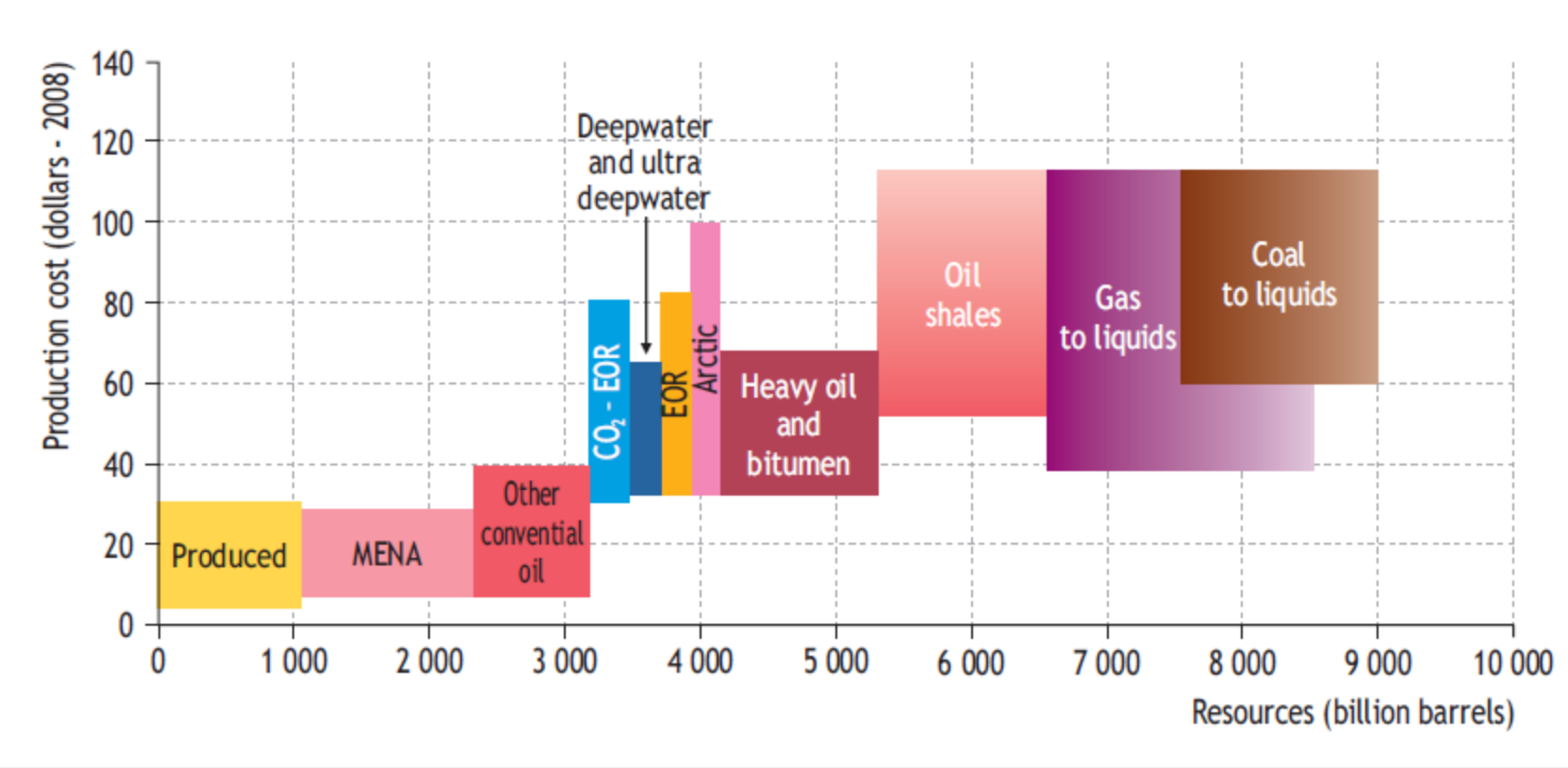

The total recoverable oil-resource base is estimated at 9 trillion barrels (including 2.5 trillion barrel of GTL/CTL) of which we have so far produced 1.1 Tb

Post-2012 climate-policy scenarios

Energy-related CO_2 emissions in the Reference Scenario

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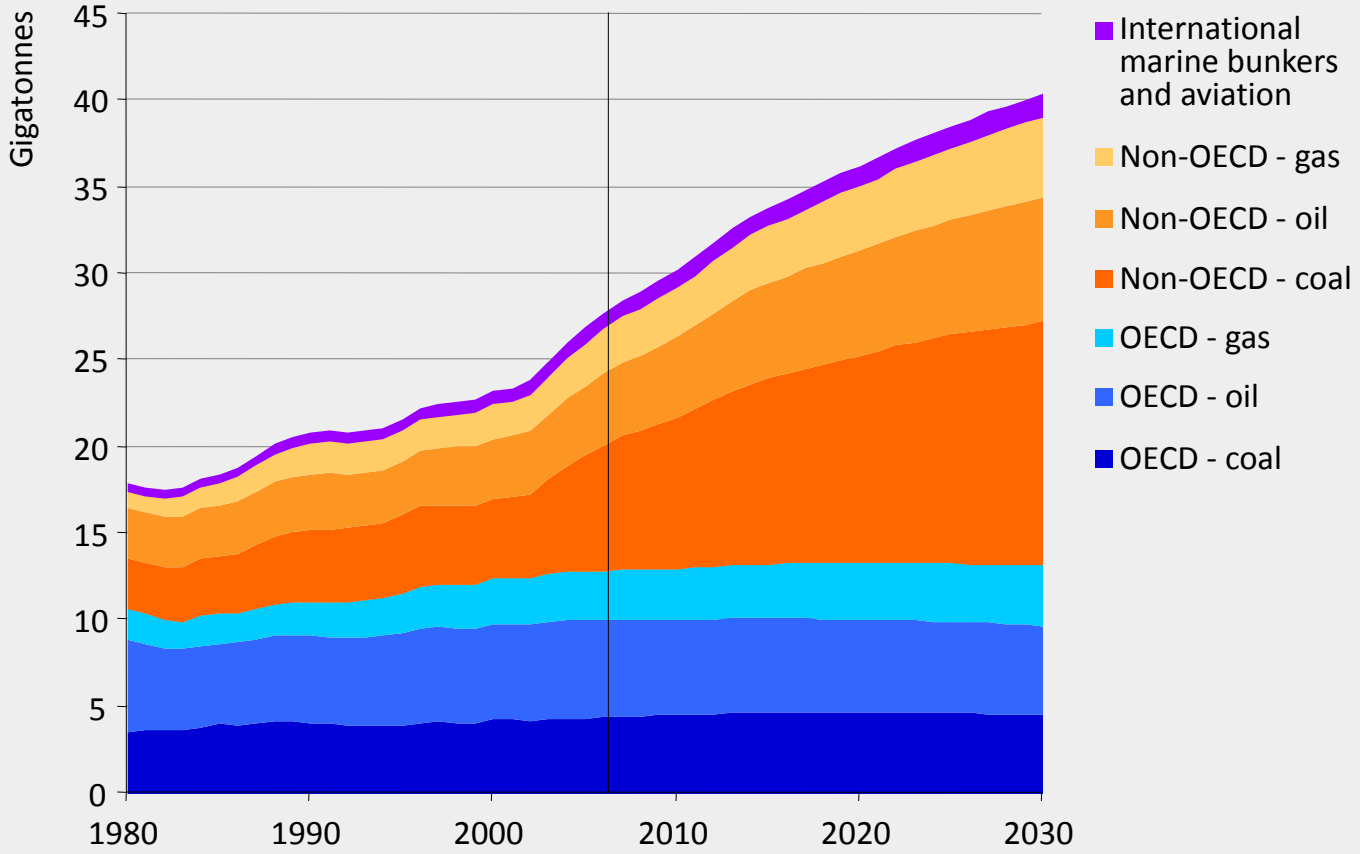

97% of the projected increase in emissions between now & 2030 comes from non-OECD countries – three-quarters from China, India & the Middle East alone

World energy-related CO_2 emissions in 2030 by scenario

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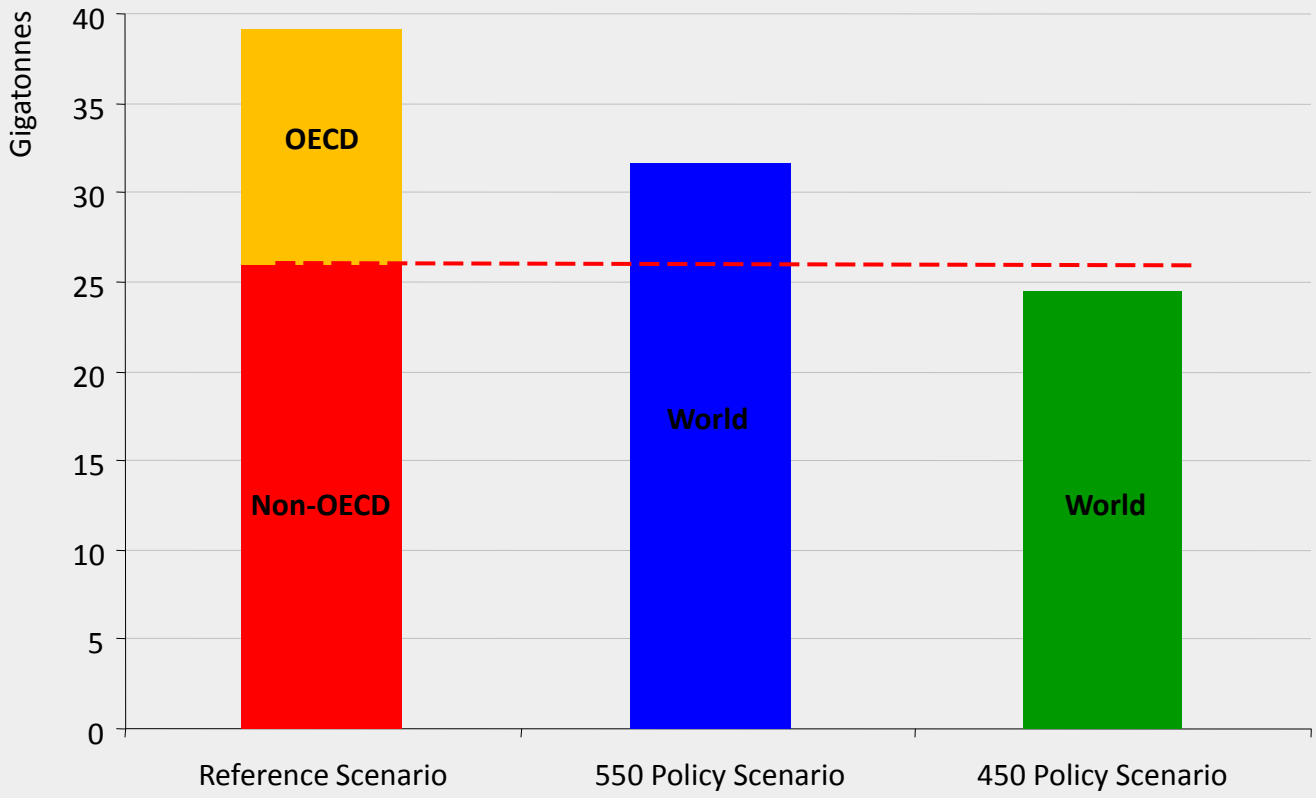

OECD countries alone cannot put the world onto a 450-ppm trajectory, even if they were to reduce their emissions to zero

Copenhagen: a plausible post-2012 global climate-change policy regime

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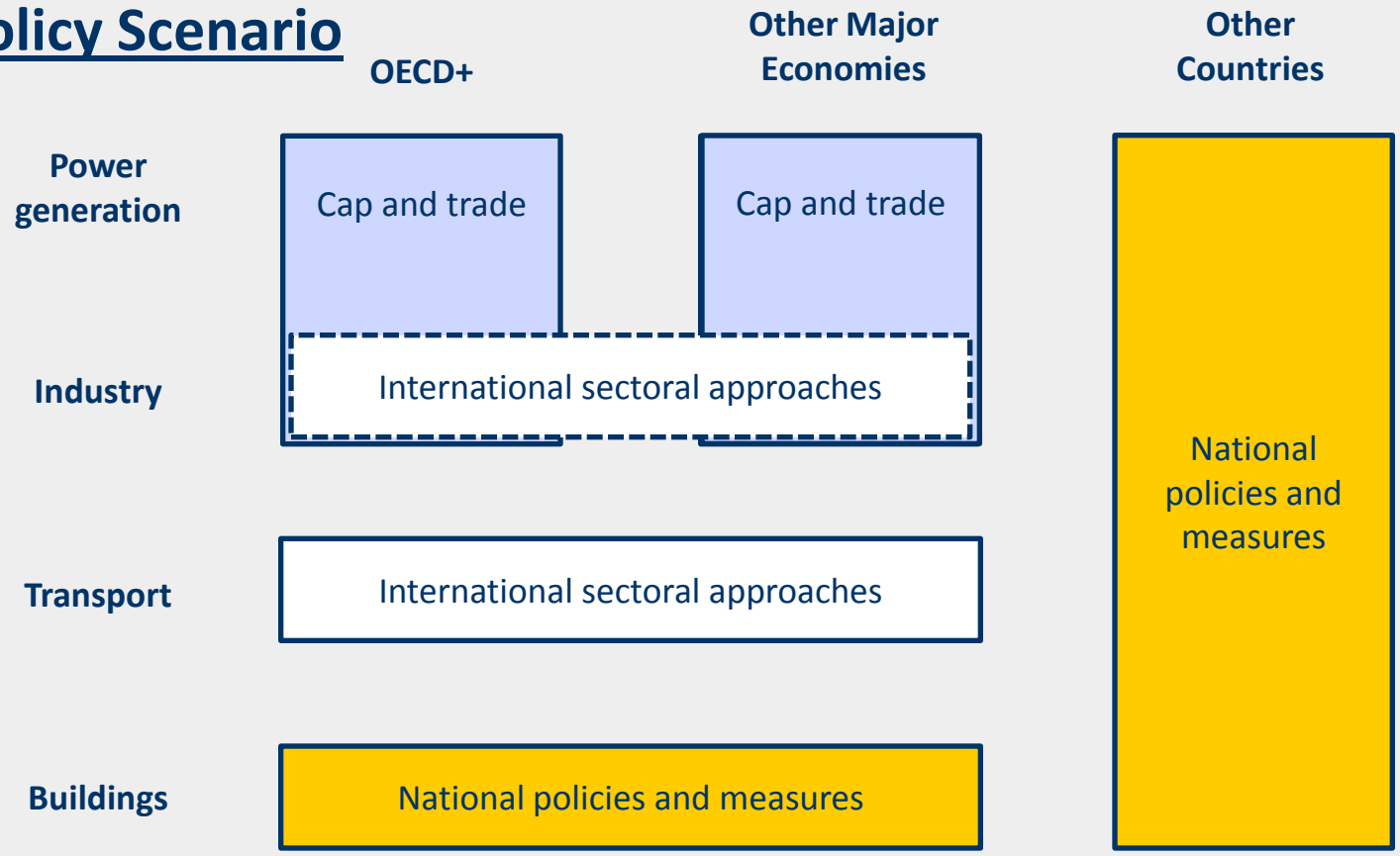
The 450 Policy Scenario



A combination of policy mechanisms – reflecting nations' varied circumstances & current negotiating positions – is a realistic outcome at the Copenhagen COP at end-2009

Reductions in energy-related CO_2 emissions in the climate-policy scenarios

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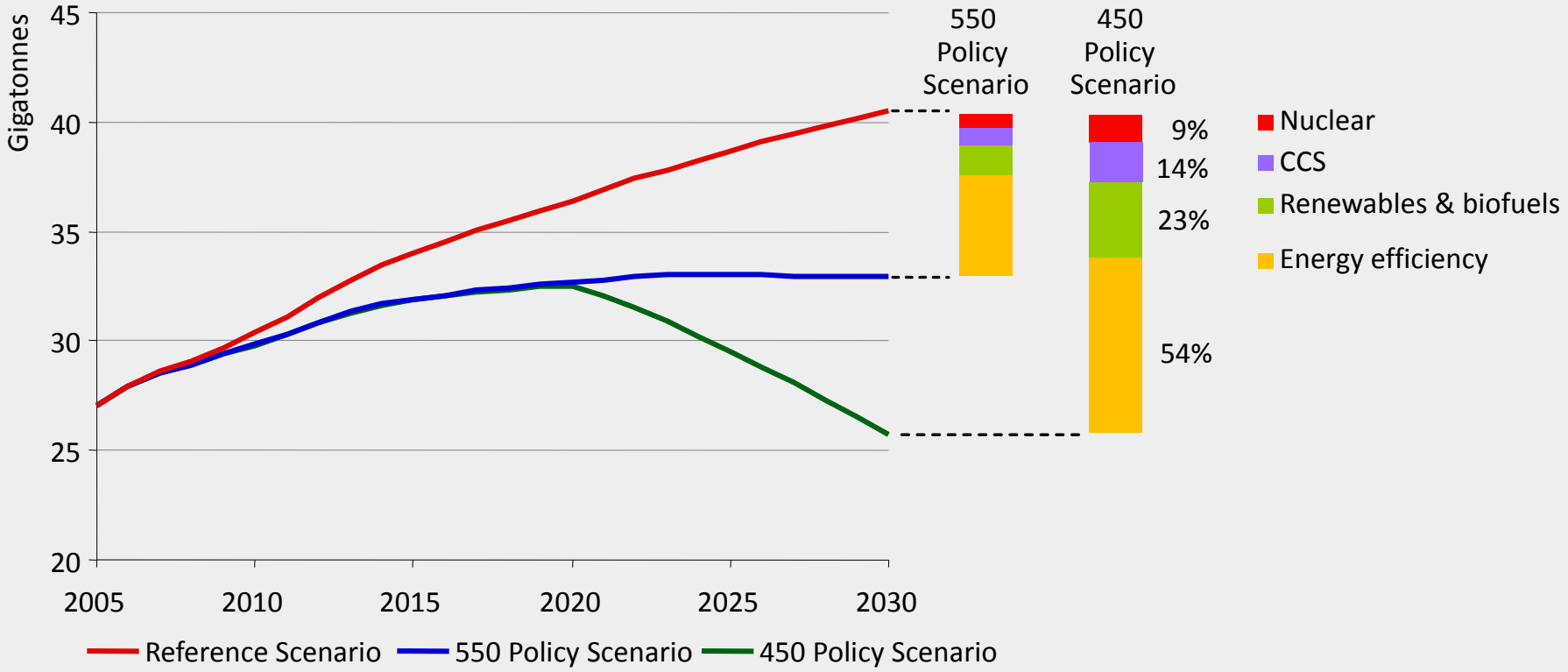

While technological progress is needed to achieve some emissions reductions, efficiency gains and deployment of existing low-carbon energy accounts for most of the savings

Total power generation capacity today and in 2030 by scenario

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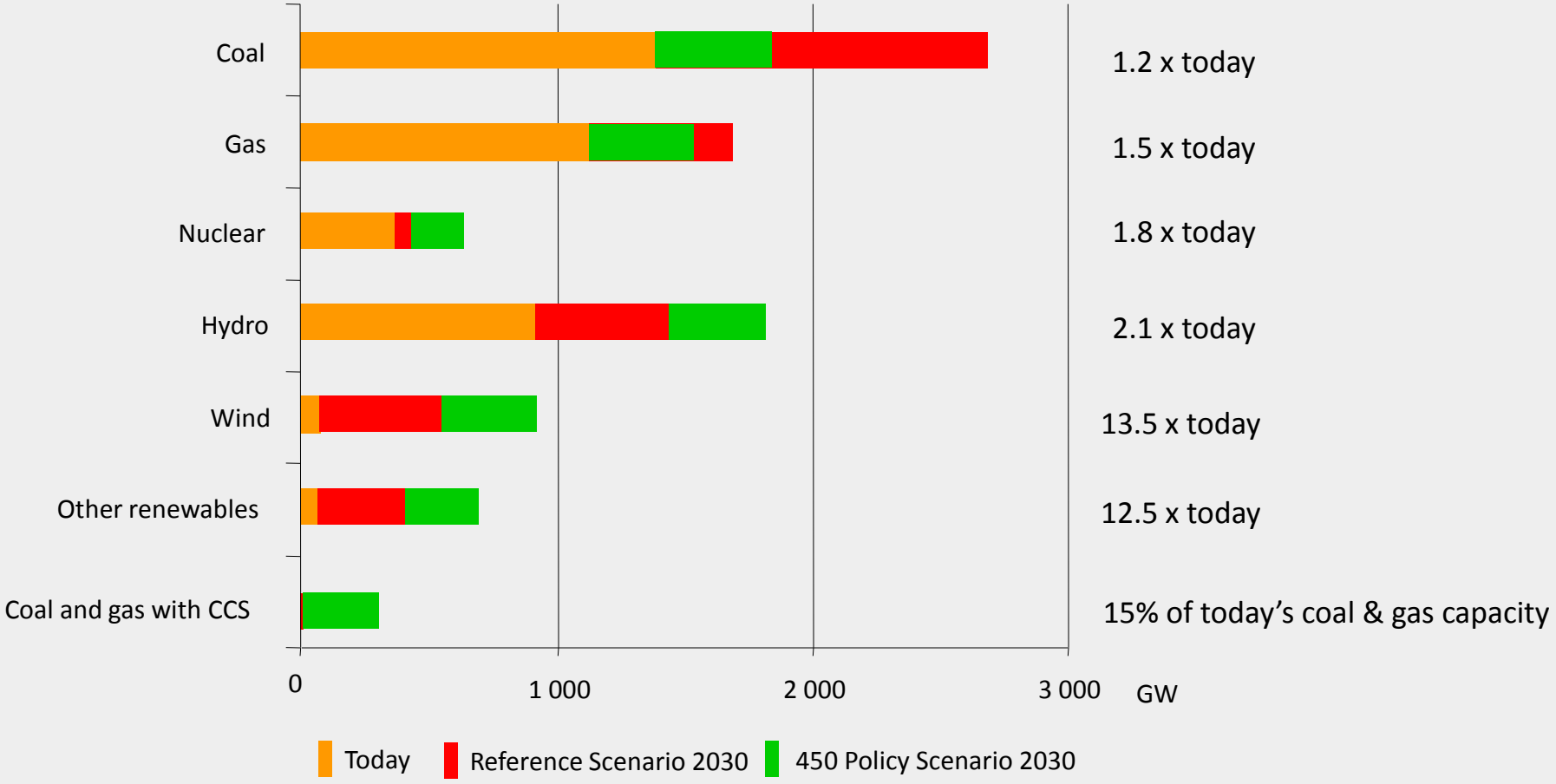

In the 450 Policy Scenario, the power sector undergoes a dramatic change – with CCS, renewables and nuclear each playing a crucial role

Total oil production in 2030 by scenario

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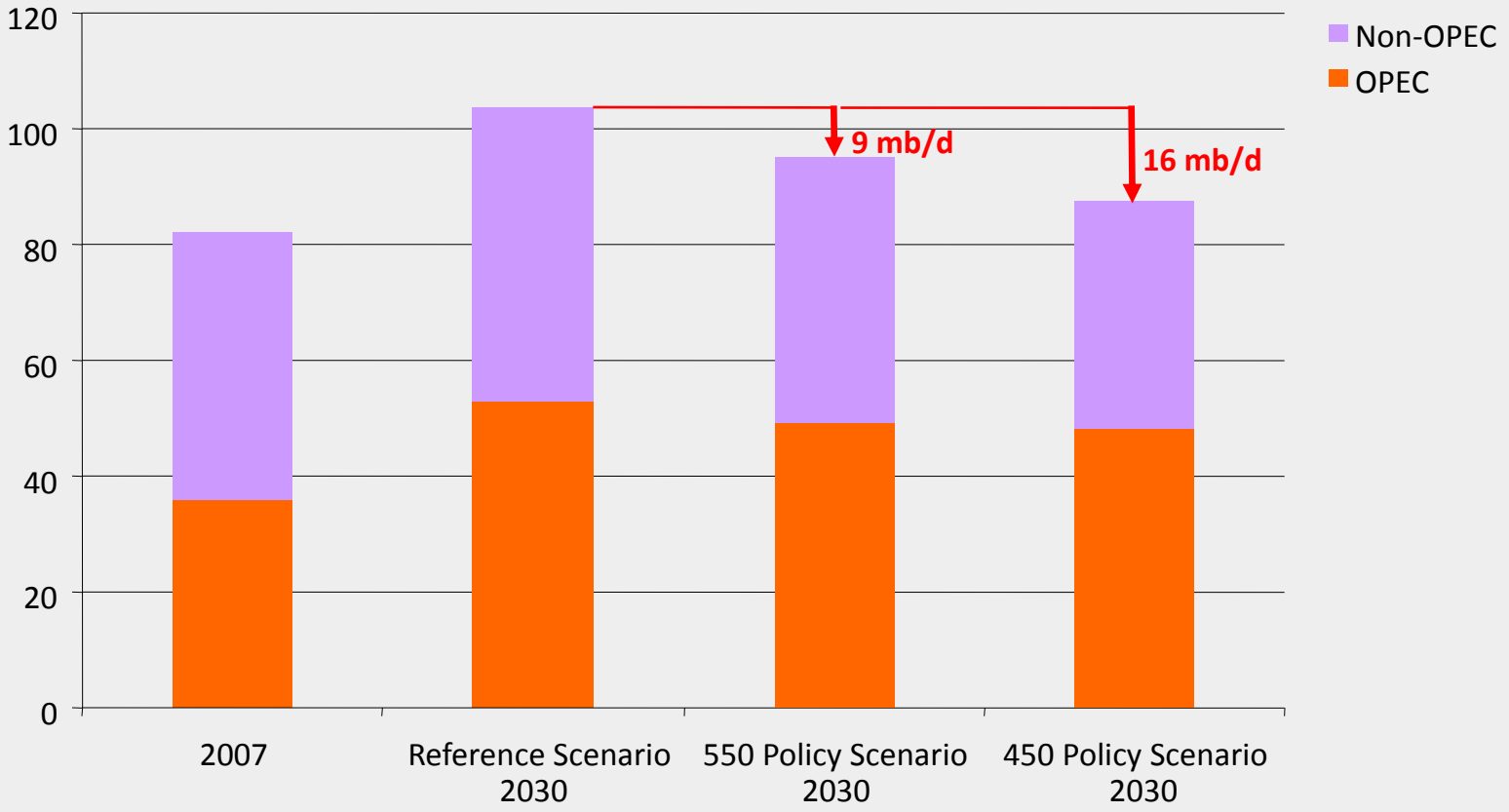

Curbing CO_2 emissions would improve energy security by cutting demand for fossil fuels, but even in the 450 Policy Scenario, OPEC production increases by 12 mb/d from now to 2030

Key results of the post-2012 climate-policy analysis

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550 Policy Scenario

- Corresponds to a c.3°C global temperature rise
- Energy demand continues to expand, but fuel mix is markedly different
- CO_2 price in OECD countries reaches $90/tonne in 2030
- Additional investment equal to 0.25% of GDP

450 Policy Scenario

- Corresponds to a c.2°C global temperature rise
- Energy demand grows, but half as fast as in Reference Scenario
- Rapid deployment of low-carbon technologies – particularly CCS
- Big fall in non-OECD emissions
- CO_2 price in 2030 reaches $180/tonne
- Additional investment equal to 0.6% of GDP

Summary & conclusions

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World Energy Outlook 2008

- Current energy trends are unsustainable — socially, environmentally AND economically
- Oil will remain the leading energy source but...
  - > *The era of cheap oil is over, although price volatility will remain*
  - > *Oilfield decline is the key determinant of investment needs*
  - > *The oil market is undergoing major and lasting structural change, with national companies in the ascendancy*
- To avoid "abrupt and irreversible" climate change we need a major decarbonisation of the world's energy system
  - > *Copenhagen must deliver a credible post-2012 climate regime*
  - > *Limiting temperature rise to 2°C will require significant emission reductions in all regions & technological breakthroughs*
  - > *Mitigating climate change will substantially improve energy security*
- The present economic worries do not excuse back-tracking or delays in taking action to address energy challenges