

World Energy Outlook 2008

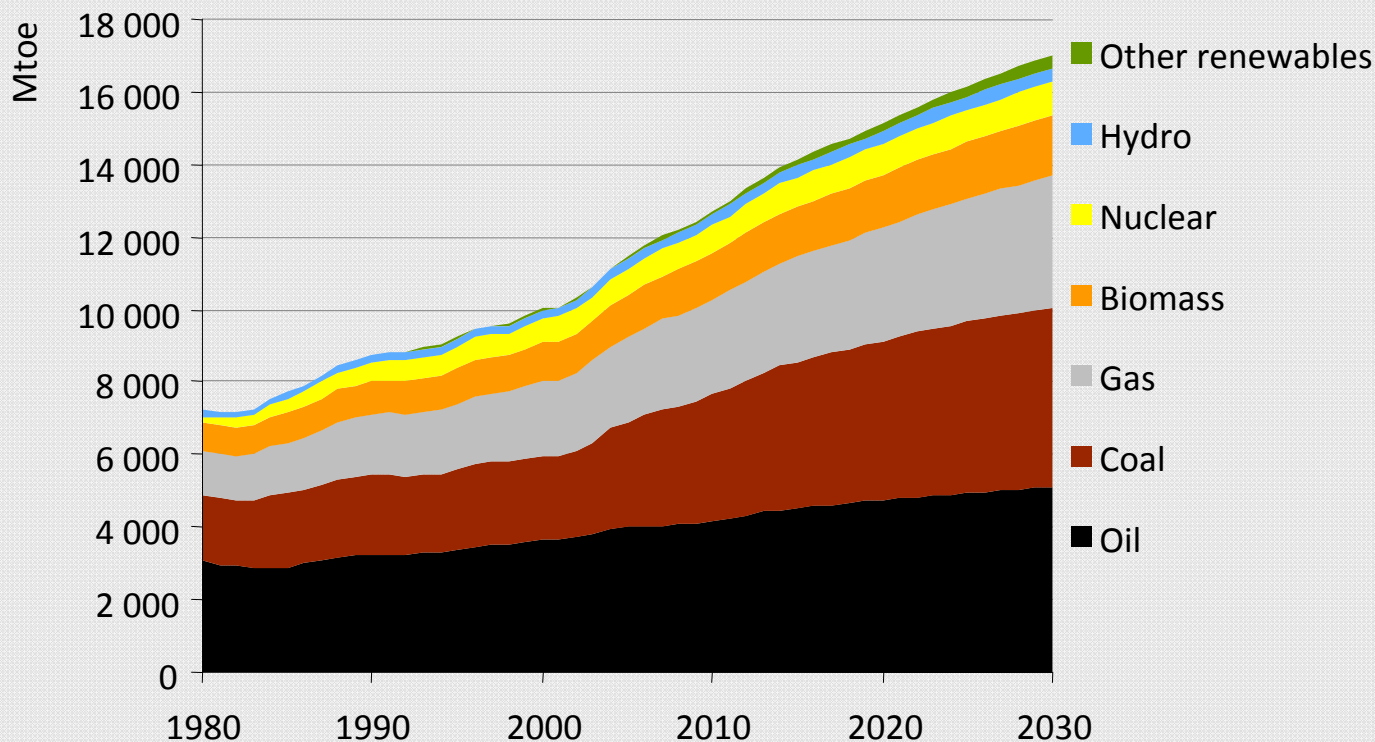
Presentation to the
**G-20 Climate Change
Workshop, 2009**

Sydney, Australia

- Soaring energy prices to mid-2008, followed by a collapse – 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: this is unsustainable!

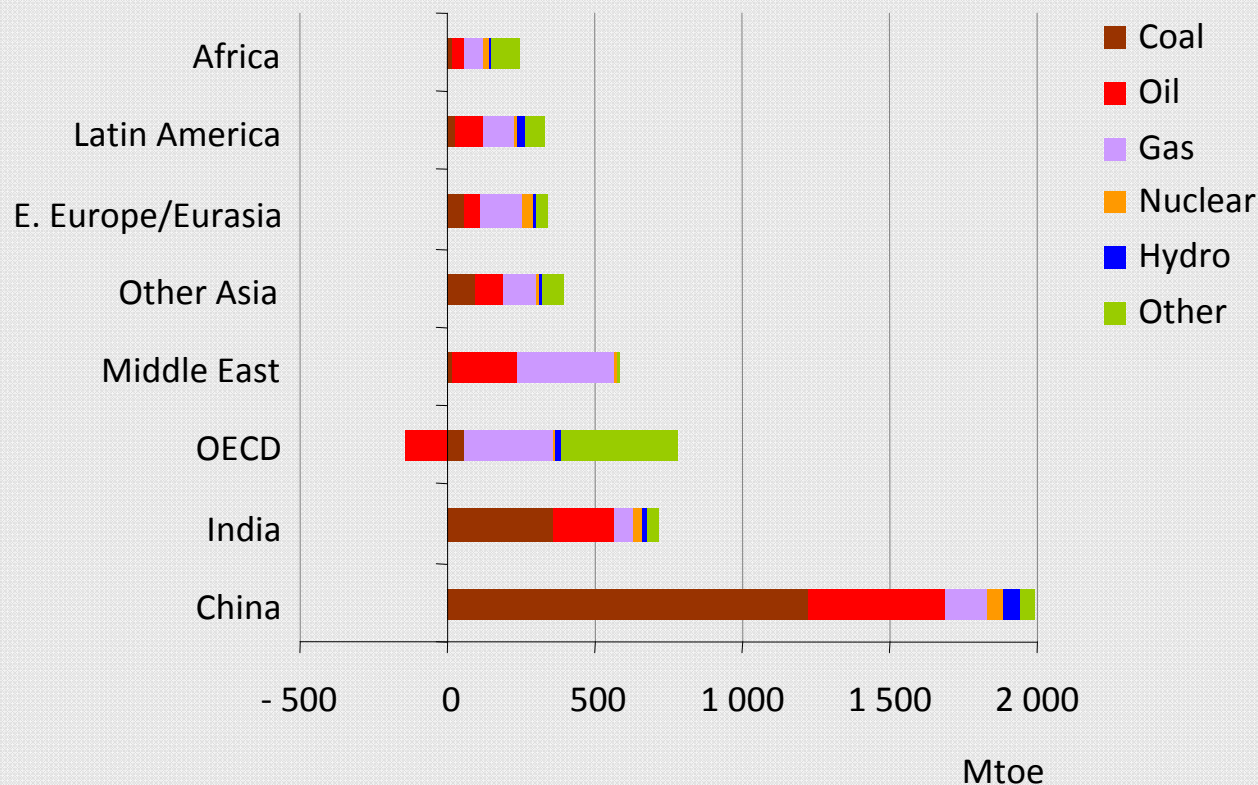
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World energy demand expands by 45% between now and 2030 – an average rate of increase of 1.6% per year – with coal accounting for more than a third of the overall rise

Incremental primary energy demand in the Reference Scenario, 2006-2030

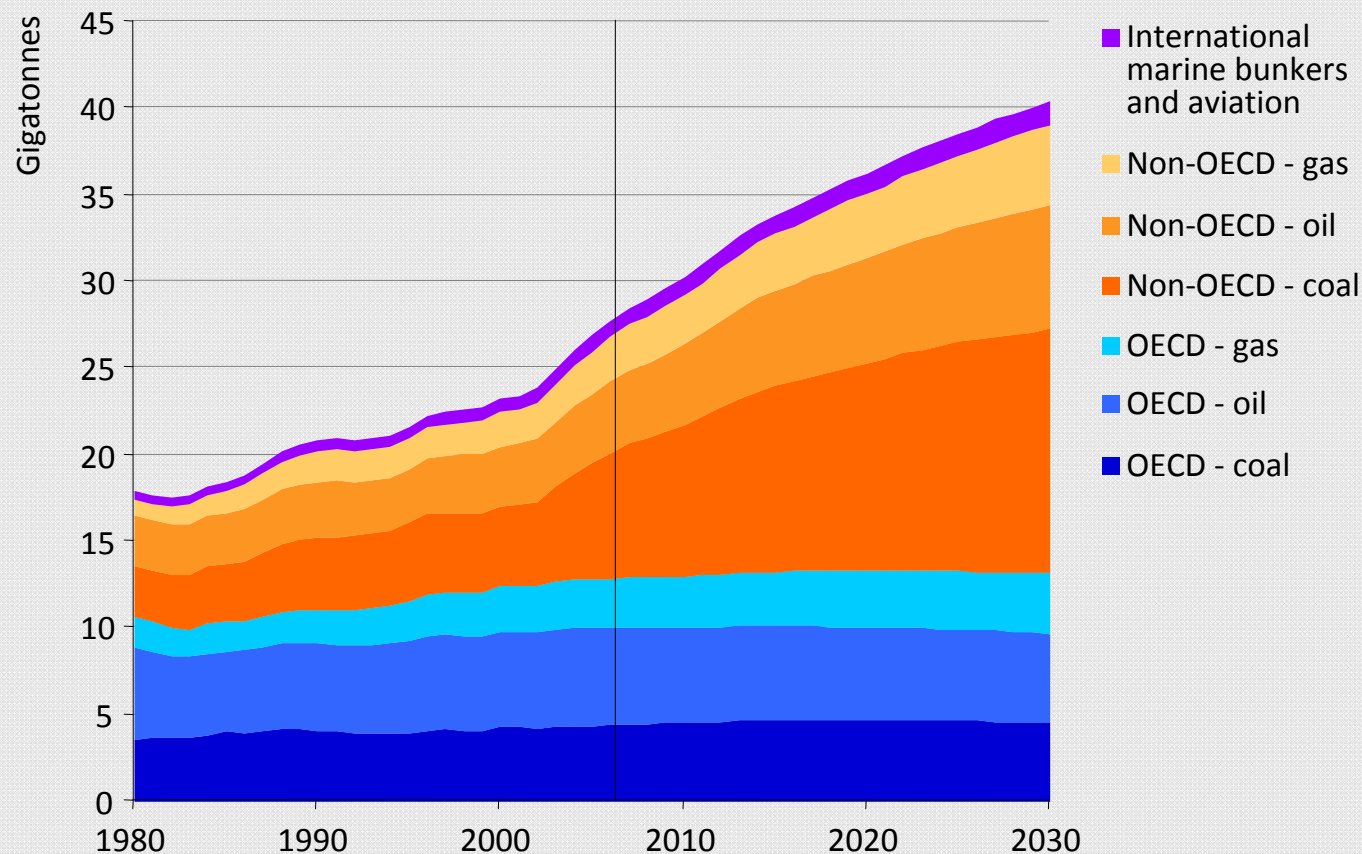
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The increase in China's energy demand to 2030 – the result of its sheer market size & stronger economic growth prospects – dwarfs that of all other countries & regions

Energy-related CO₂ emissions in the Reference Scenario

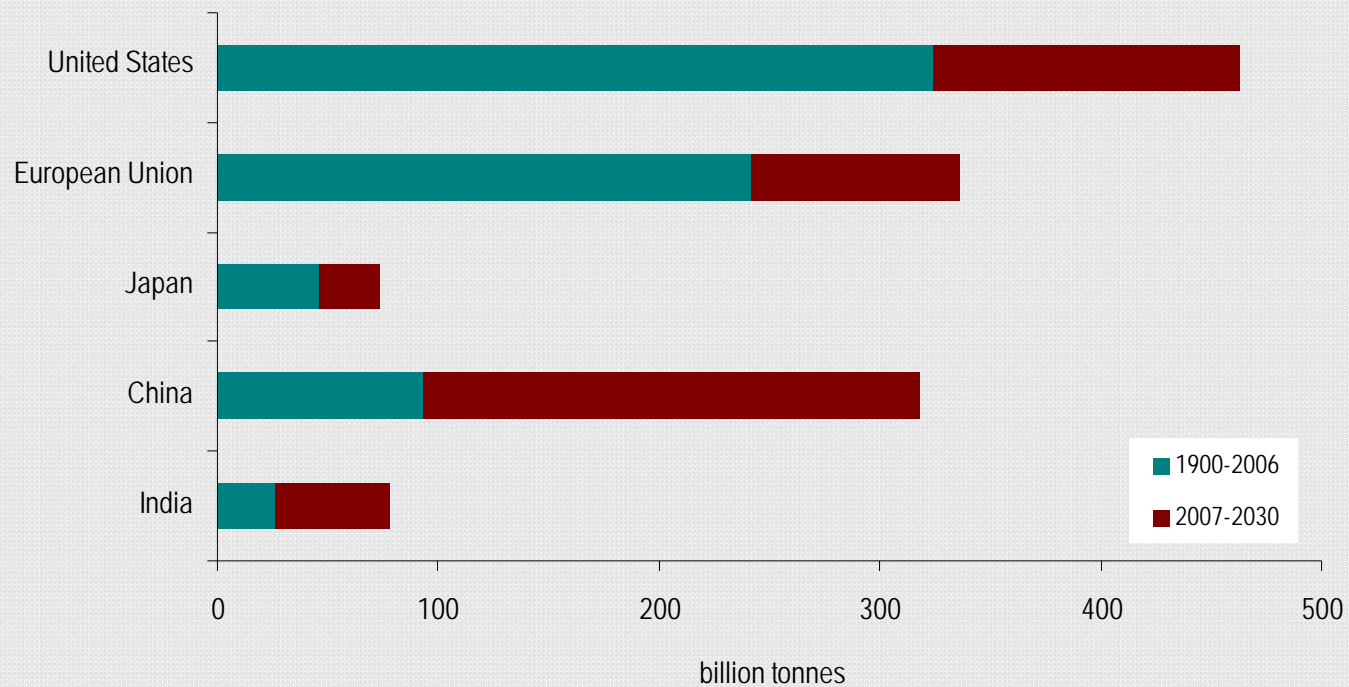
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97% of the projected increase in emissions between now & 2030 comes from non-OECD countries – three-quarters from China, India & the Middle East alone

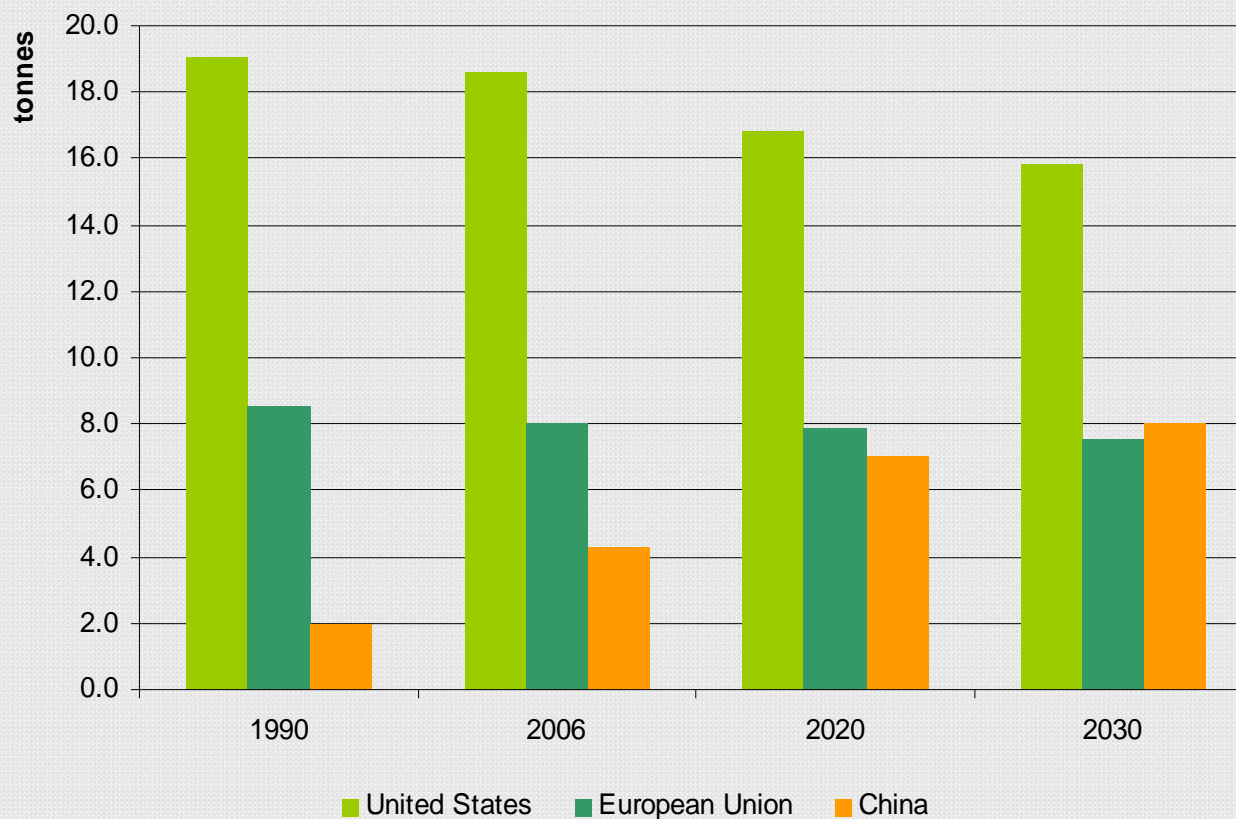
Cumulative Energy-Related CO2 Emissions by Region

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Per capita energy-related CO2 emissions by region in the Reference Scenario

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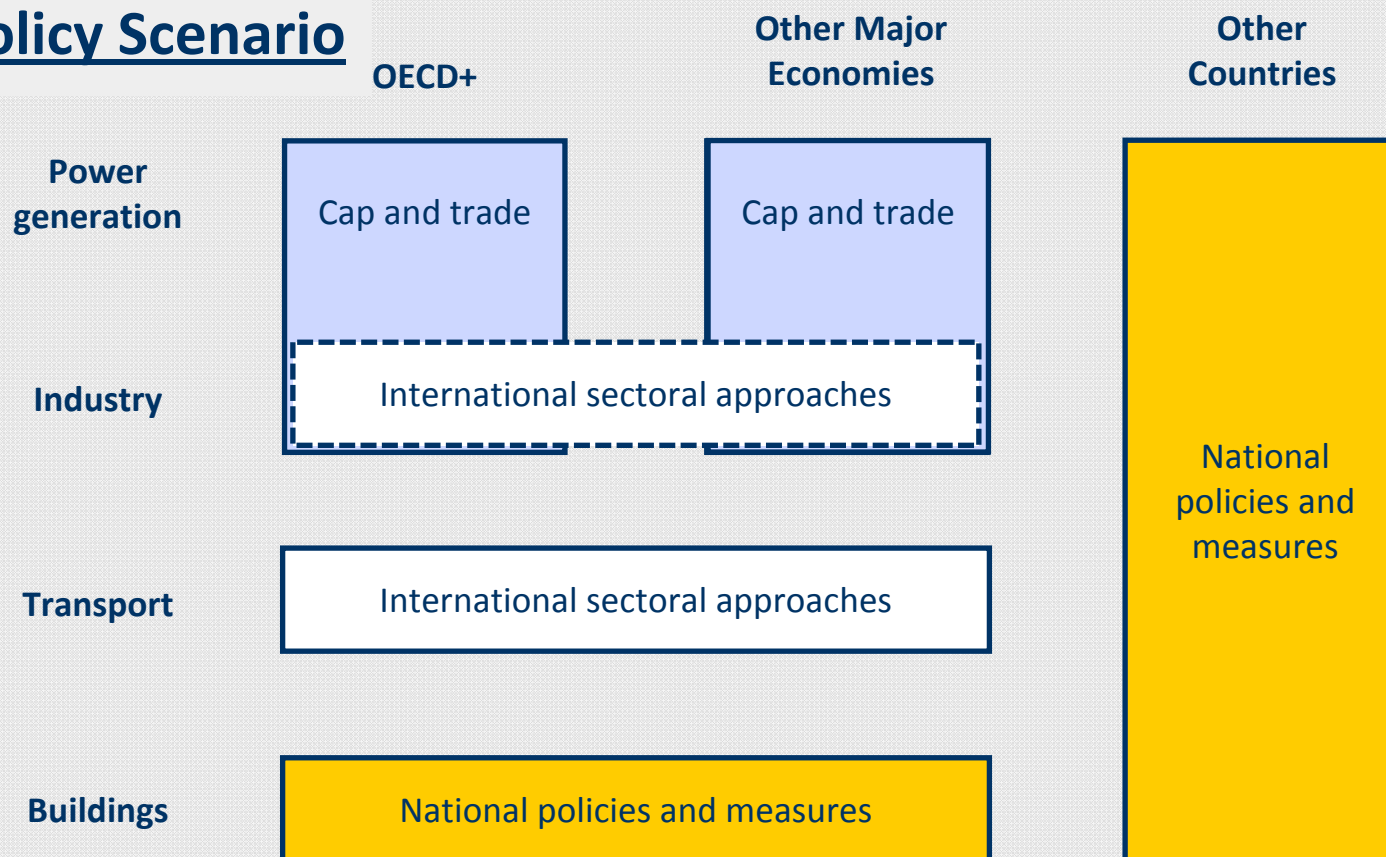
Post-2012 Climate Policy Analysis

- Two climate-policy scenarios are considered:
 - > *The 550 Policy Scenario – GHG stabilised at 550 ppm, a temperature rise of $\sim 3^{\circ}\text{C}$*
 - > *The 450 Policy Scenario with Overshooting – GHG stabilised at 450 ppm, a temperature rise of $\sim 2^{\circ}\text{C}$*
- Both are hybrid options (cap-and-trade, sectoral agreements, national policies & measures)
- Both require a huge increase in new capital stock, a credible regulatory framework, a global carbon market and sustained investment in R&D
- Energy prices differ significantly from baseline

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

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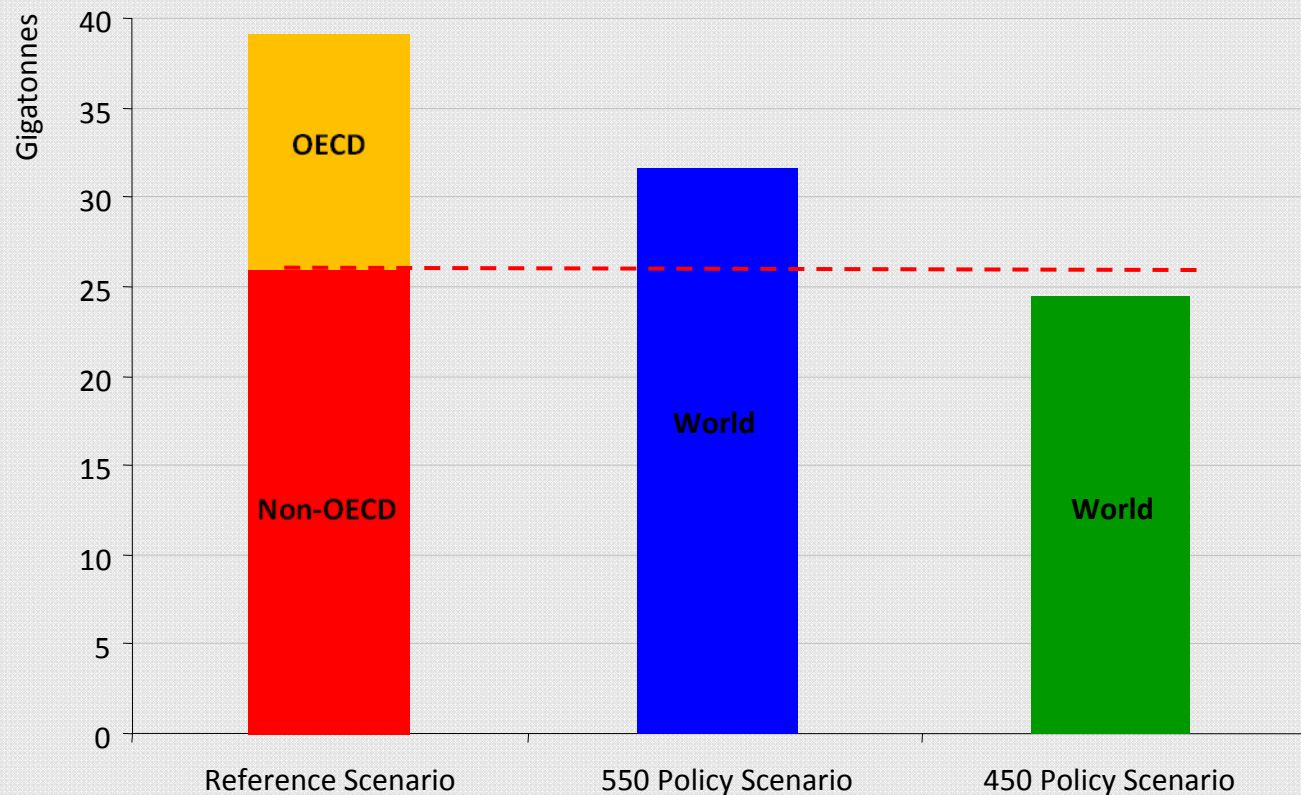
The **450** Policy Scenario



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

World energy-related CO₂ emissions in 2030 by scenario

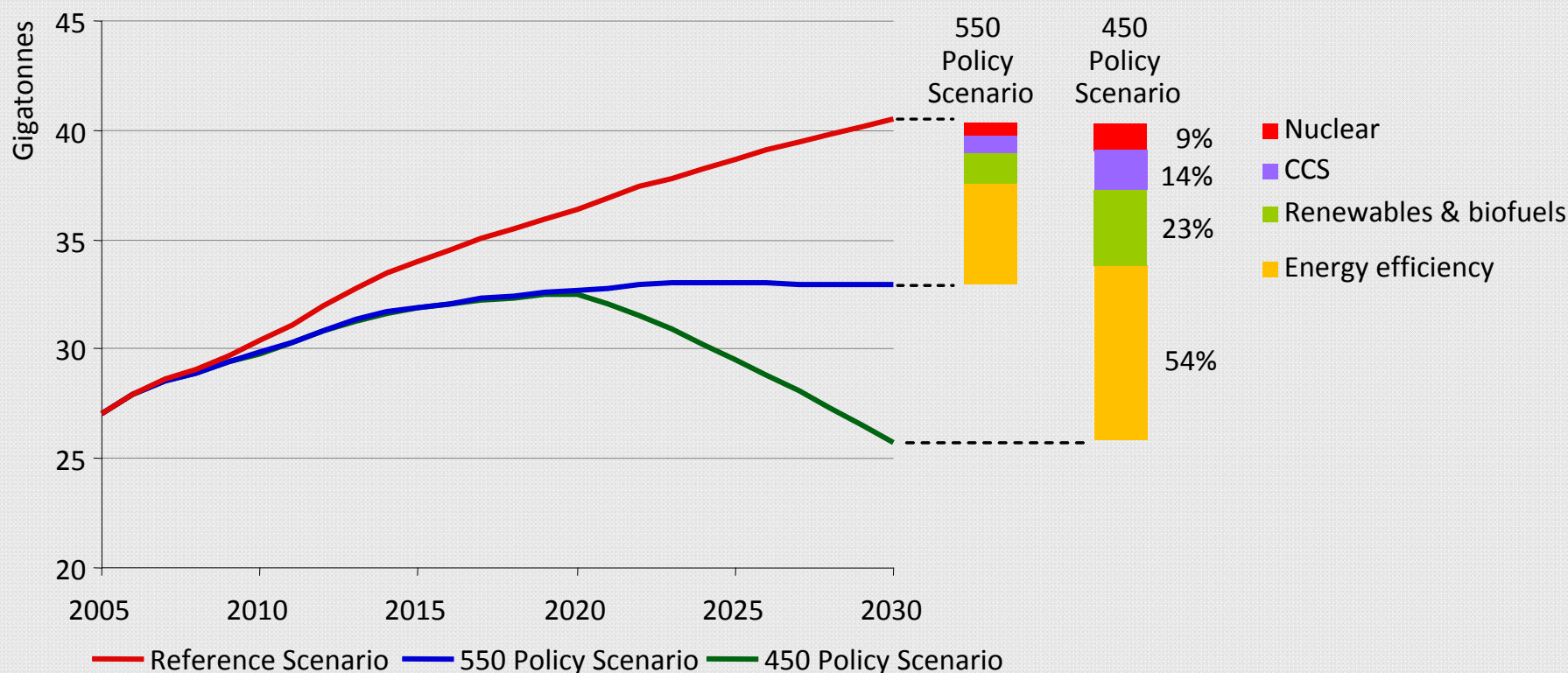
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OECD countries alone cannot put the world onto a 450-ppm trajectory, even if they were to reduce their emissions to zero

Reductions in energy-related CO₂ emissions in the climate-policy scenarios

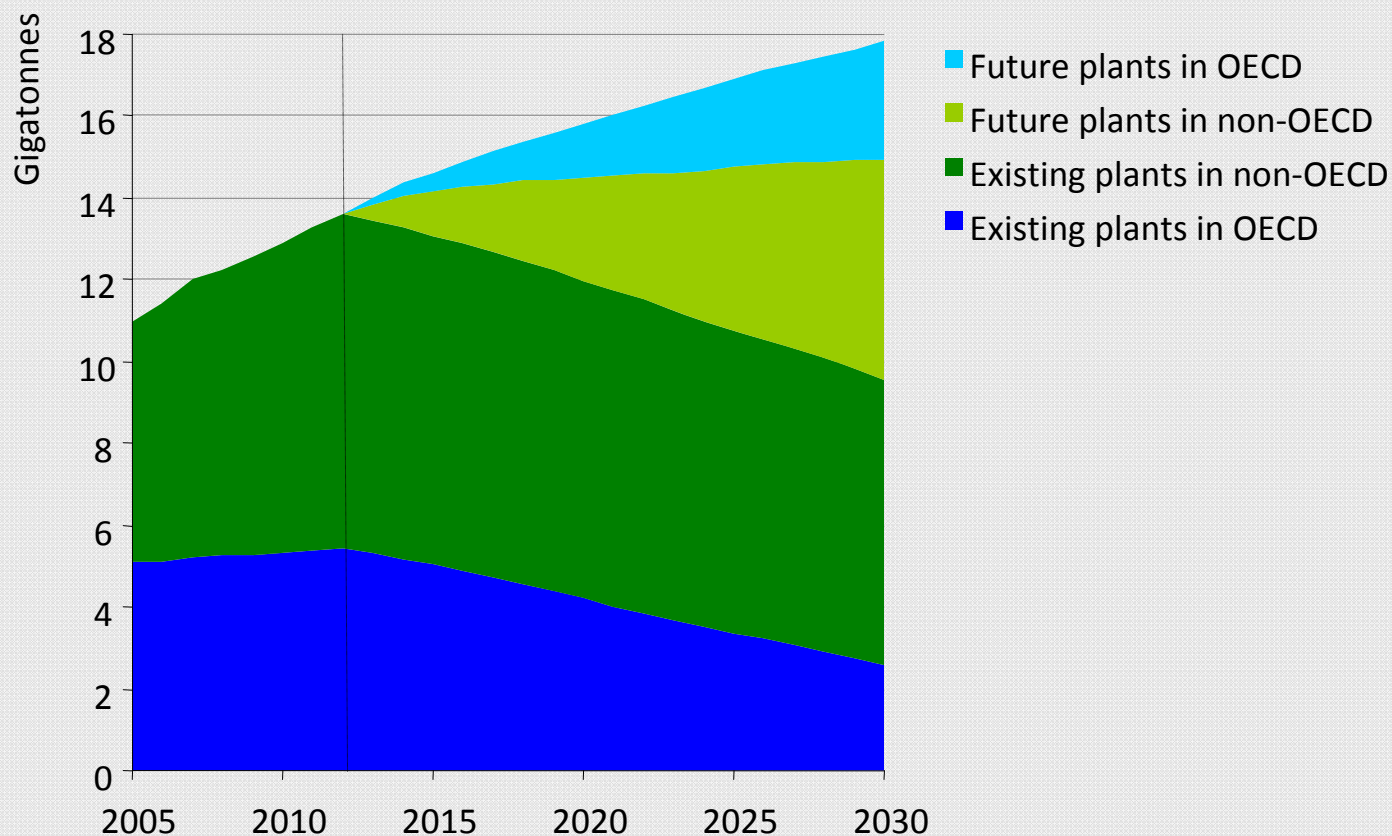
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While technological progress is needed to achieve some emissions reductions, efficiency gains and deployment of existing low-carbon energy accounts for most of the savings

Energy-related CO₂ emissions from existing & future power plants in the Reference Scenario

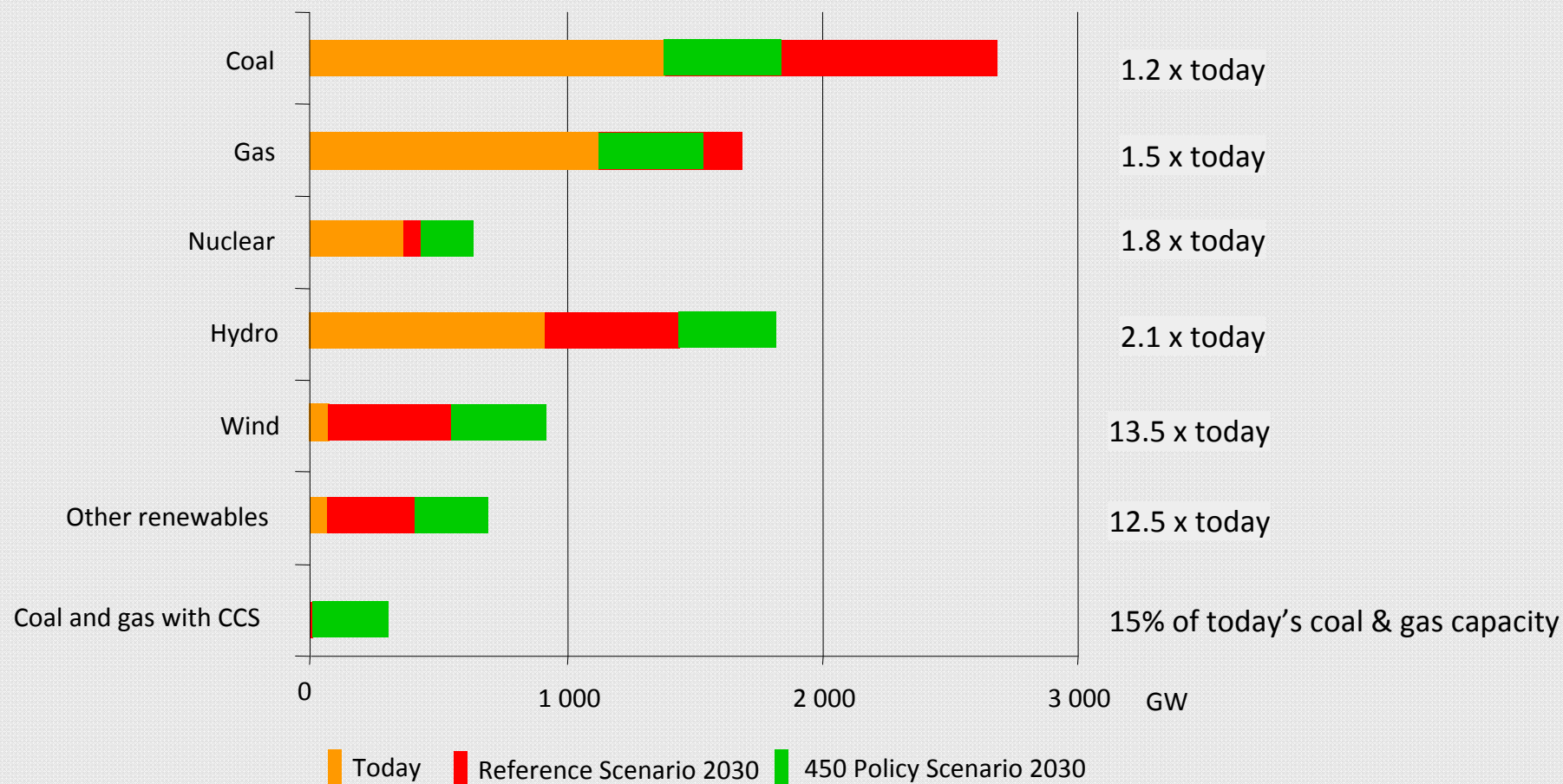
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Although 75% of power sector CO₂ emissions in 2020 are already “locked-in”, investments in the next decade will be critical to a low-carbon future in the longer term

Total power generation capacity today and in 2030 by scenario

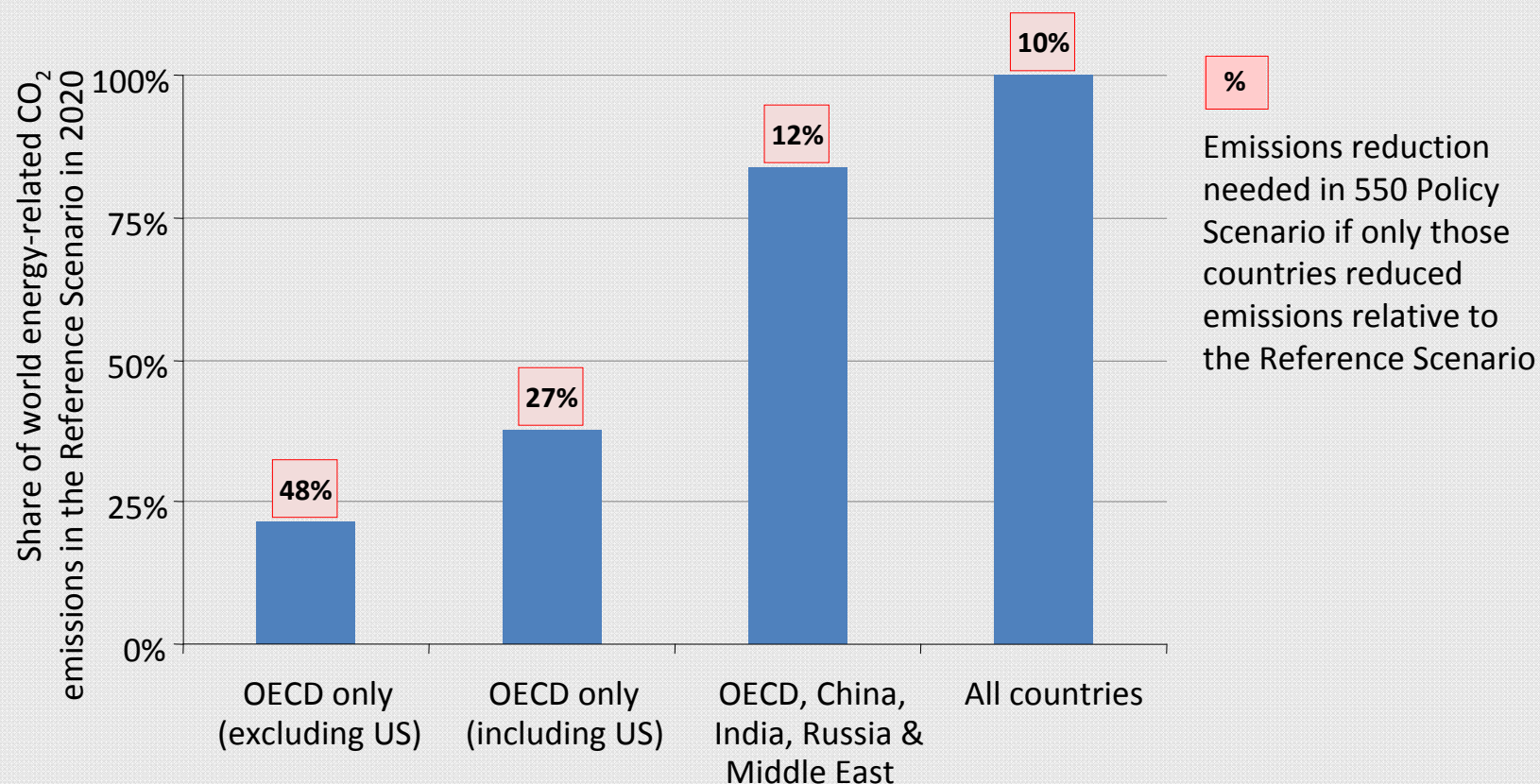
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In the 450 Policy Scenario, the power sector undergoes a dramatic change – with CCS, renewables and nuclear each playing a crucial role

Required emissions reductions according to participation in the 550 Policy Scenario

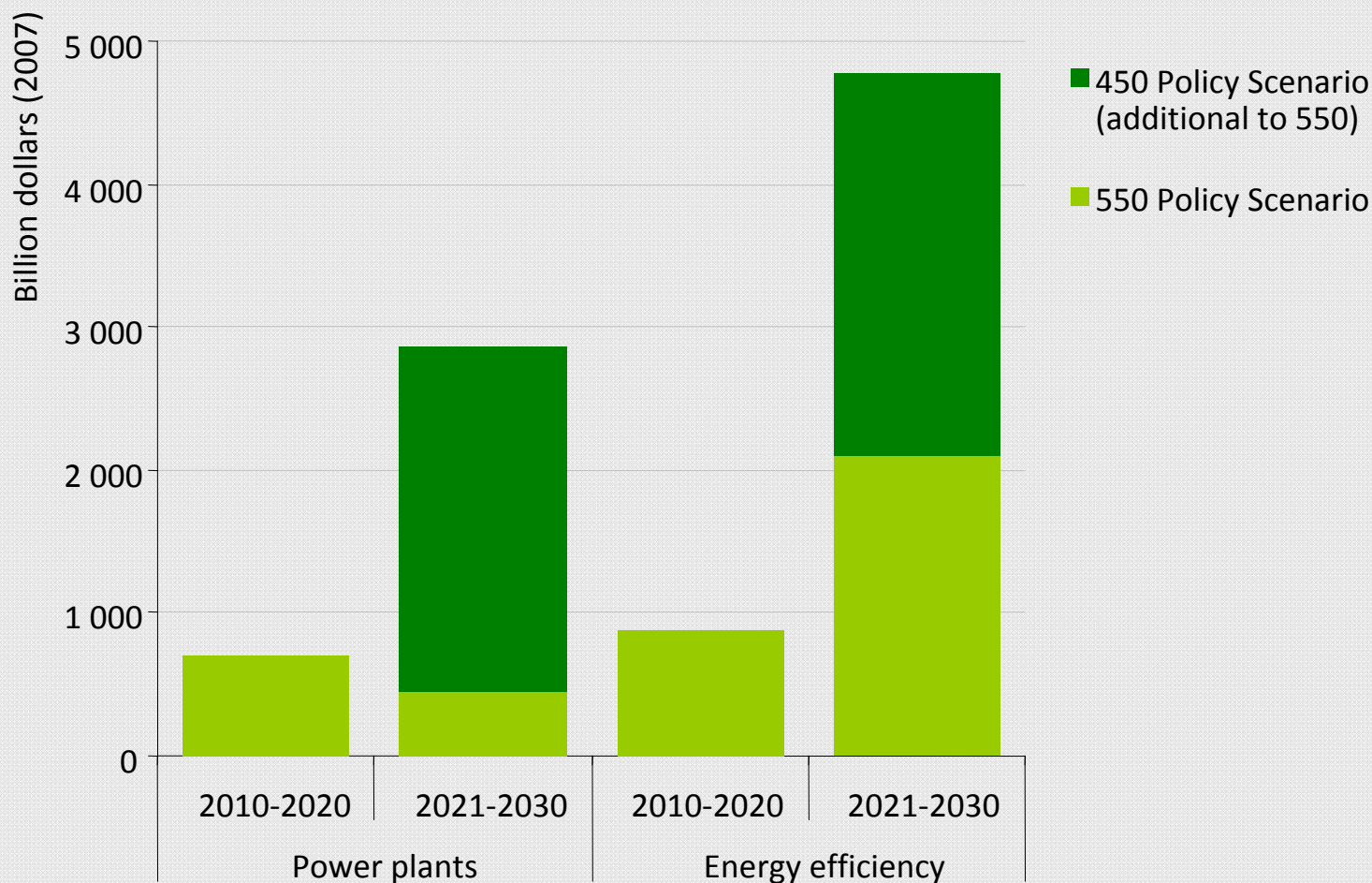
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By 2030, the global emissions reduction in 2030 needed to meet the 550 emissions trajectory is equivalent to 58% of the OECD's Reference Scenario emissions in that year

Additional investments in the Climate Policy Scenarios, relative to the Reference Scenario

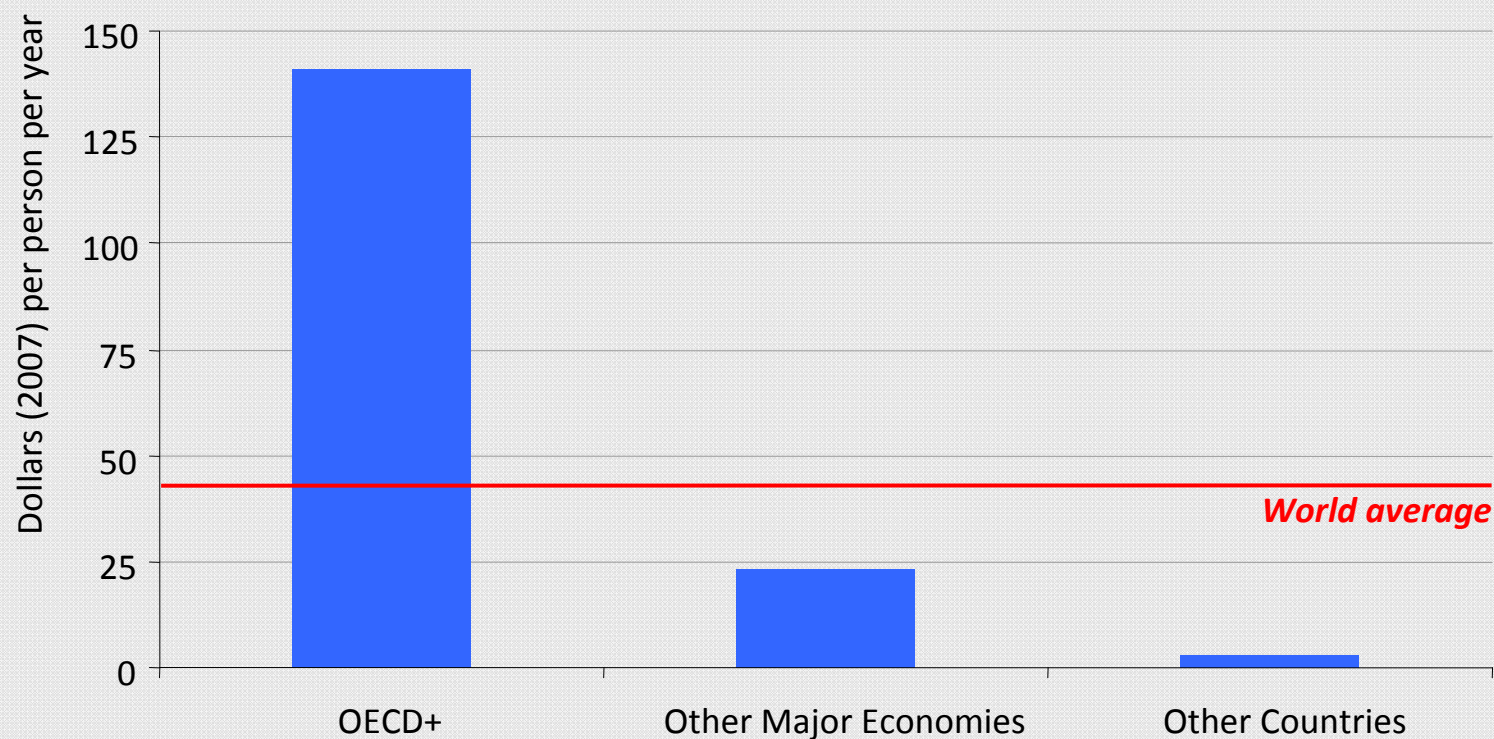
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Post-2020, power sector investment in the 450 Policy Scenario is almost double that in the Reference Scenario

Additional energy investment by private consumers in the 450 Policy versus the Reference Scenario

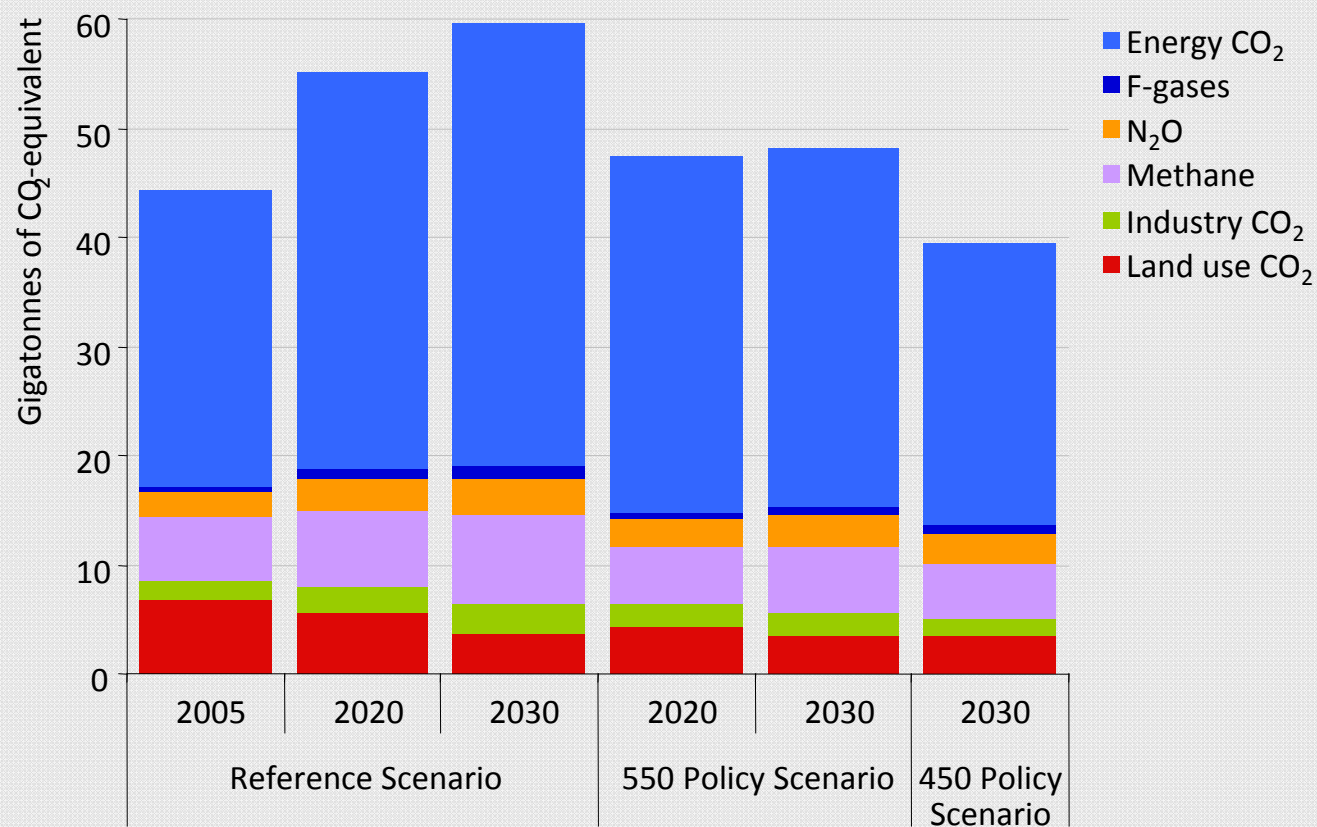
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The transformation of the energy sector depends on the purchasing decisions of hundreds of millions of households worldwide

World greenhouse-gas emissions

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While energy-related CO₂ will continue to dominate, there is strong potential to reduce other emissions through improved efficiency, better farm management & reduced gas flaring

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
- CO₂ 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
- CO₂ price in 2030 reaches \$180/tonne
- Additional investment equal to 0.6% of GDP

Summary & conclusions

Summary & conclusions

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- **Current energy trends are patently unsustainable — socially, environmentally and economically**
- **To avoid "abrupt and irreversible" climate change we need a major decarbonisation of the world's energy system**
 - > *Copenhagen must deliver a post-2012 climate regime that engages all major economies*
 - > *Limiting temperature rise to 2 °C will be impossible without major non-OECD emission reductions & technological breakthroughs*
- **The present economic worries do not excuse back-tracking or delays in taking action to address the energy and environmental challenges**