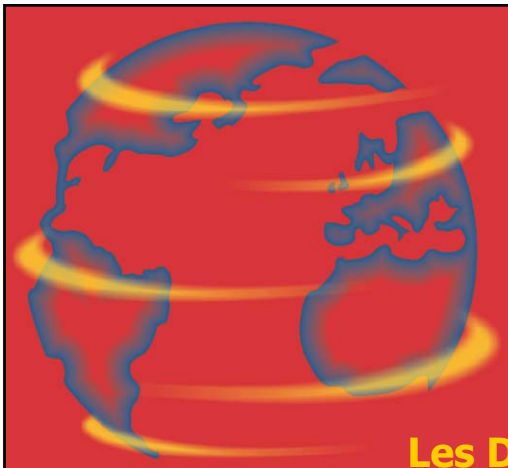

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World Energy Outlook 2006

Les Défis Energétiques

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Club de Nice – Energie et Géopolitique
23 Novembre 2006

World Energy Outlook 2006

The Context

- The world is facing **twin energy threats**
  - *Inadequate and insecure supplies*
  - *Environmental damage, including climate change*
- There is an urgent need to curb the growth in fossil-fuel demand & related emissions
- *WEO-2006* is a direct response to G8 request for advice on alternative energy scenarios
- It confirms that the global energy system is on an unsustainable path…
- …but measures now being considered would curb the growth of fossil-fuel demand & emissions

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Scenario Approach

- Two scenarios depict markedly different energy futures to 2030
  - ***Reference Scenario:*** *No new government policies are adopted*
  - ***Alternative Policy Scenario:*** *Energy-security & climate-change policies now under consideration are adopted*

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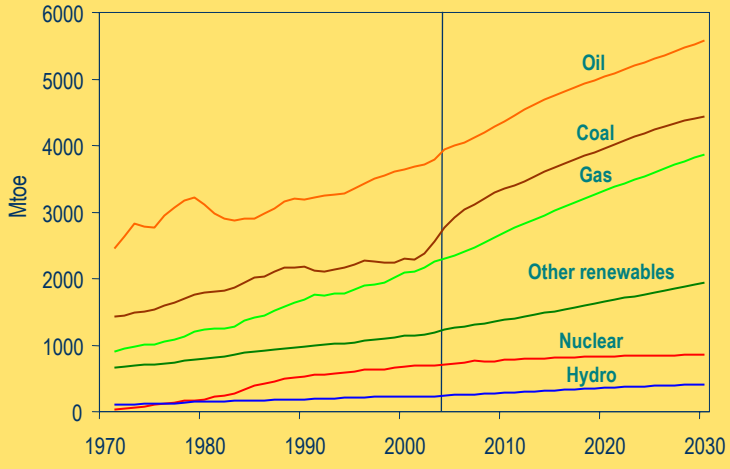
Reference Scenario: World Primary Energy Demand



Global demand for each primary energy source grows inexorably driven by population & economic growth

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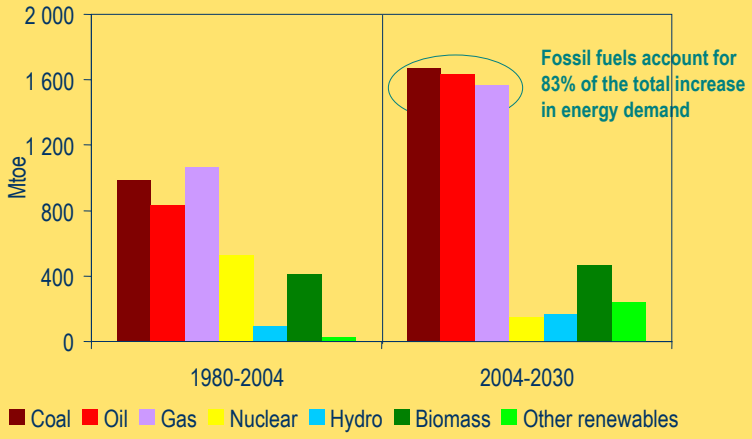
Reference Scenario:
Incremental World Primary Energy Demand



Fossil fuels account for most of the increase in global energy demand between now & 2030, though non-hydro renewables grows fastest

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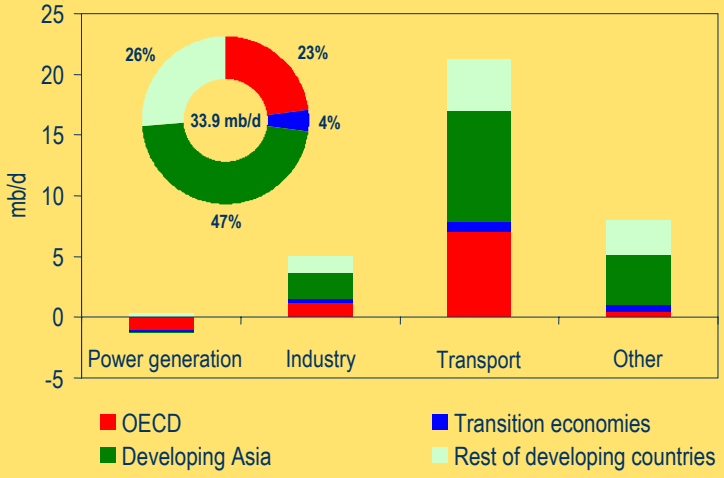
Reference Scenario:
Incremental Oil Demand, 2004-2030



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

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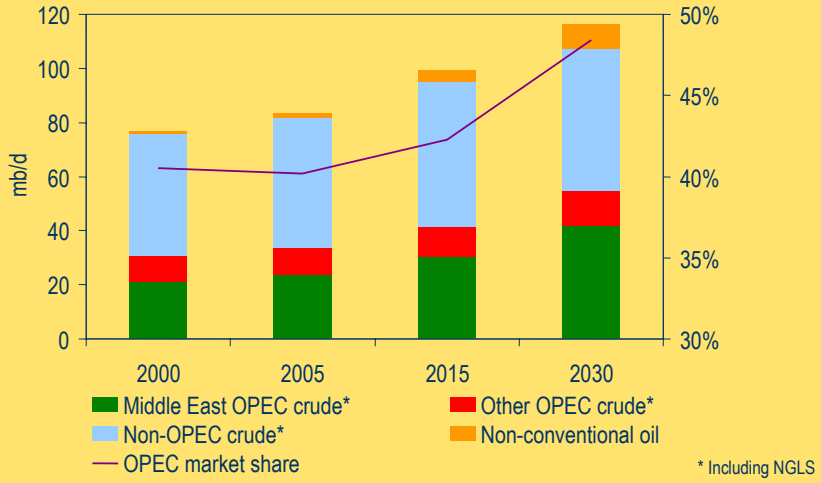
Reference Scenario:
World Primary Oil Supply



OPEC takes the lion's share of oil market growth as conventional non-OPEC production peaks, but non-conventional oil plays a growing role

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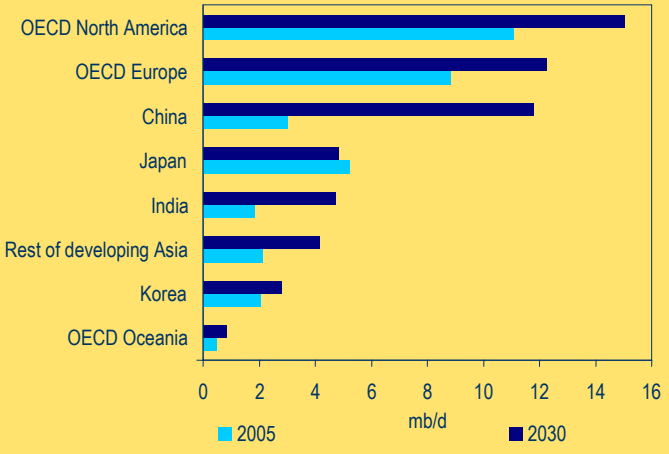
Reference Scenario:
Net Oil Imports



China sees the biggest jump in oil imports in absolute terms, but North America remains the largest importer

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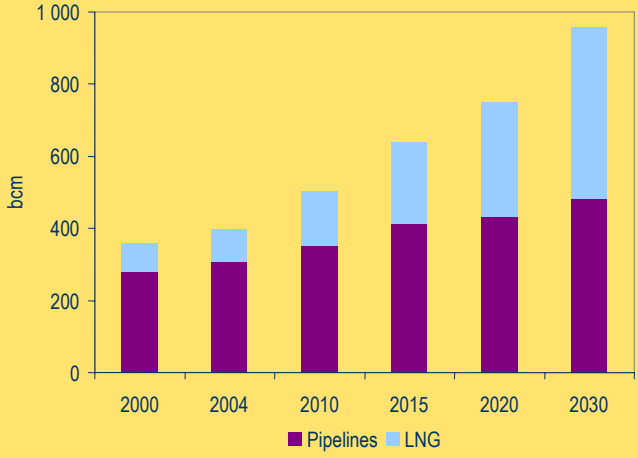
Reference Scenario:
World Inter-regional Natural Gas Trade



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

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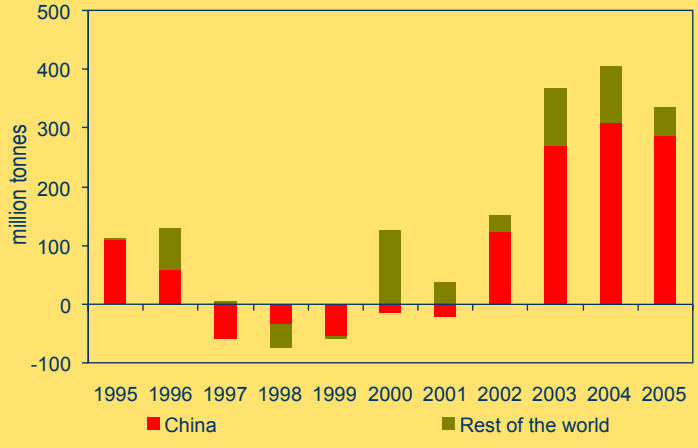
Annual Increase in Coal Demand



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

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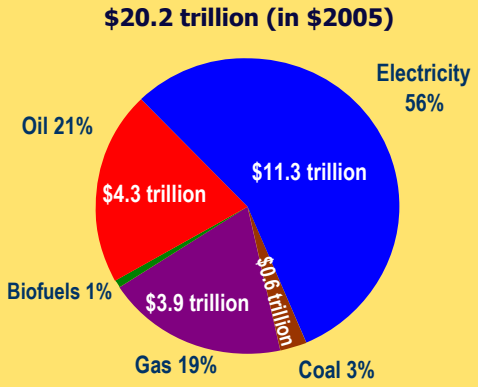
Reference Scenario:
Cumulative Investment, 2005-2030



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

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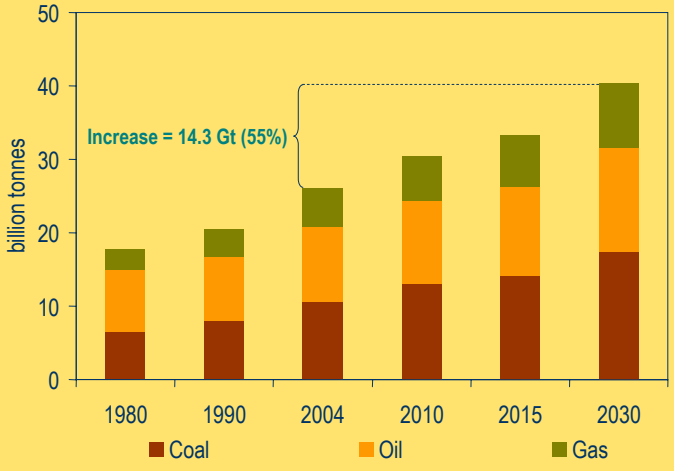
Reference Scenario:
Implications for CO_2 Emissions



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

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Urgent Policy Action is Needed

- Security of oil supply is threatened
  - *Oil production in non-OECD countries is set to peak*
  - *Production will be increasingly concentrated in a small number of countries*
- Gas security is also a growing concern
  - *US gas production will peak by 2015*
  - *Europe's has peaked already*
  - *Import dependence in both regions will grow absent new policies*
- Investment over the next 10 years will lock in technology that will remain in use for up to 60 years
- Delaying action by ten years would reduce impact on emissions in 2030 by three-quarters

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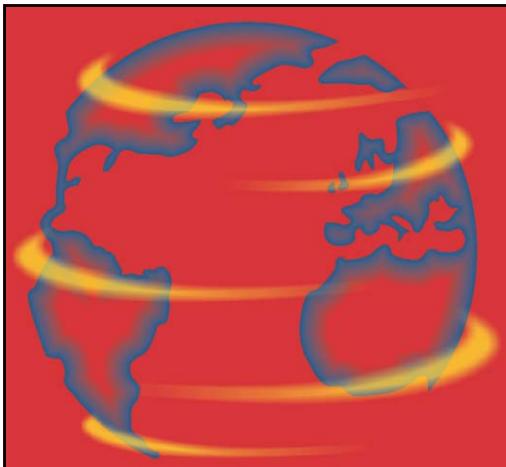

Alternative Policy Scenario

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Alternative Policy Scenario: Mapping a Better Energy Future

- Analyses impact of government policies under consideration to enhance security & curb emissions
  - 1 400+ different policies worldwide analysed to
    - *Improve efficiency in energy production & use*
    - *Increase reliance on non-fossil fuels*
    - *Bolster output of oil & gas in net importing countries*
- 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*
  - *CO_2 emissions are 6.3 Gt (16%) lower in 2030 – equivalent to the current emissions of US and Canada*

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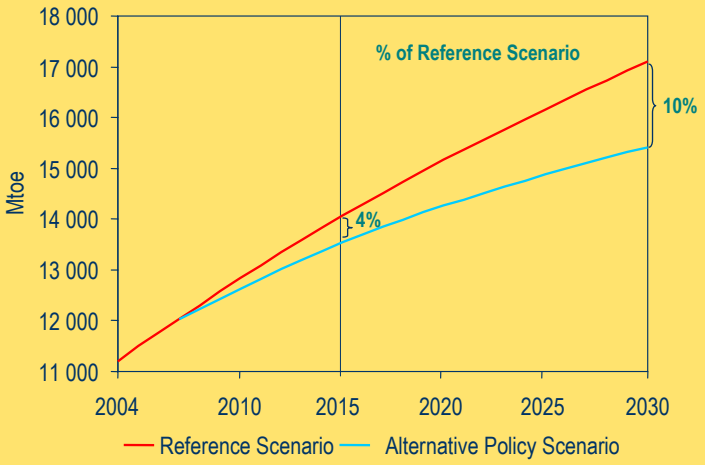
Alternative Policy Scenario: World Primary Energy Demand



The impact of new policies – though far from negligible – is less marked in the period to 2015 because of the slow pace of capital stock turnover

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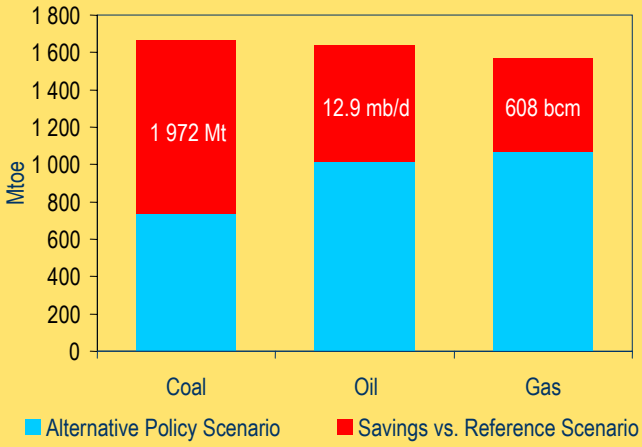
Alternative Policy Scenario:
Incremental World Primary Fuel Demand & Savings, 2004-2030



Coal demand falls most relative to the Reference Scenario, but demand for each fossil fuel still increases between 2004 & 2030

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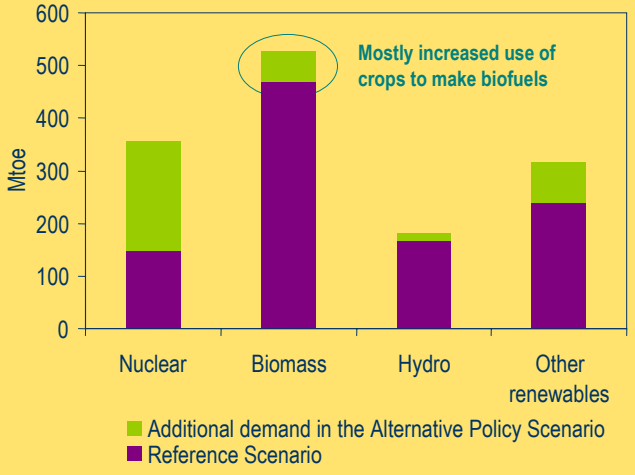
Alternative Policy Scenario:
Incremental World Non-Fossil Primary Energy Demand, 2004-2030



Demand for non-fossil energy – nuclear power & renewables – is 11% higher in 2030 than in the Reference Scenario thanks to stronger policies

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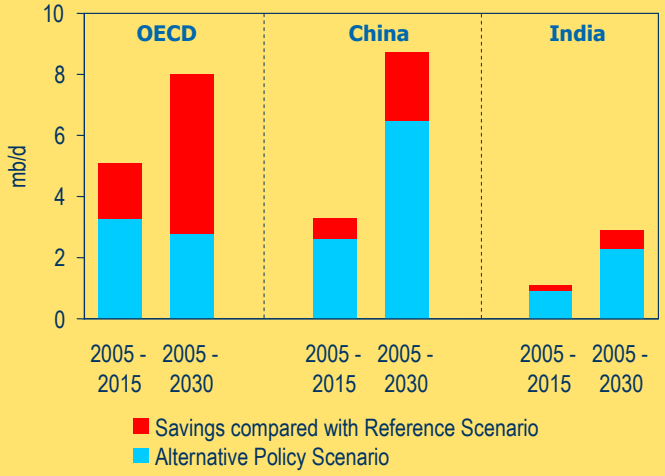
Alternative Policy Scenario: Incremental Net Oil Imports



In contrast to the Reference Scenario, OECD oil imports peak & then decline before 2030

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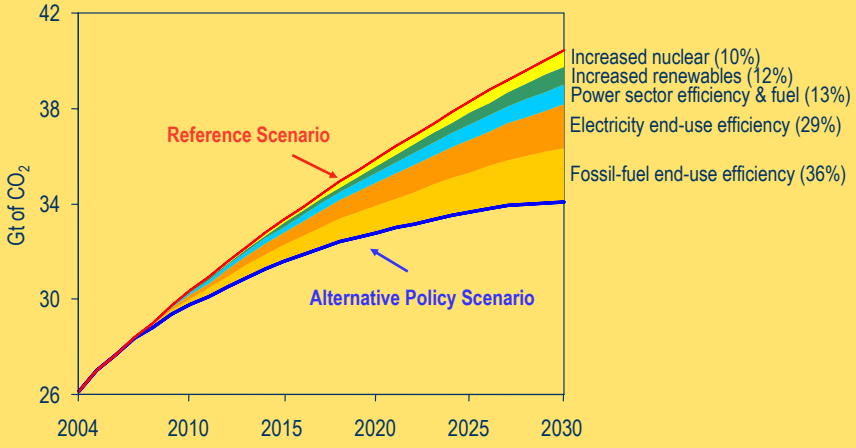
Alternative Policy Scenario: Global Savings in Energy-Related CO_2 Emissions



Improved end-use efficiency of electricity & fossil fuels accounts for two-thirds of avoided emissions in 2030

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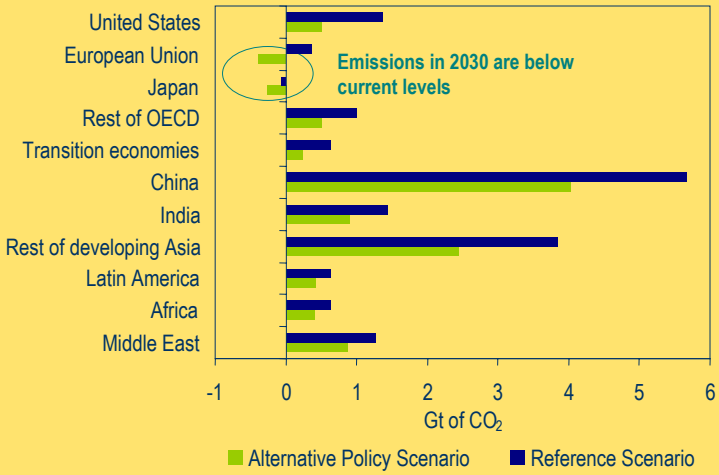
Alternative Policy Scenario:
Change in Energy-Related CO_2 Emissions, 2004-2030



OECD emissions also peak & then decline before 2030, falling below 2004 levels in Europe and Japan

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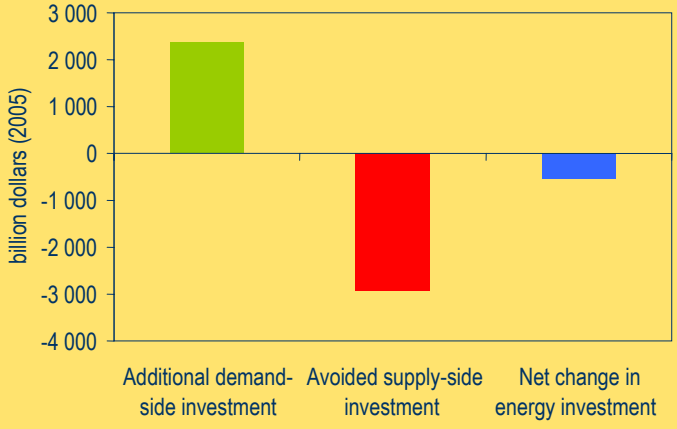
Alternative Policy Scenario:
Energy Investment

Change in Cumulative Energy-Related Investment vs. Reference Scenario, 2005-2030



Avoided supply-side investment more than outweighs the additional investment by consumers in more expensive end-use capital stock

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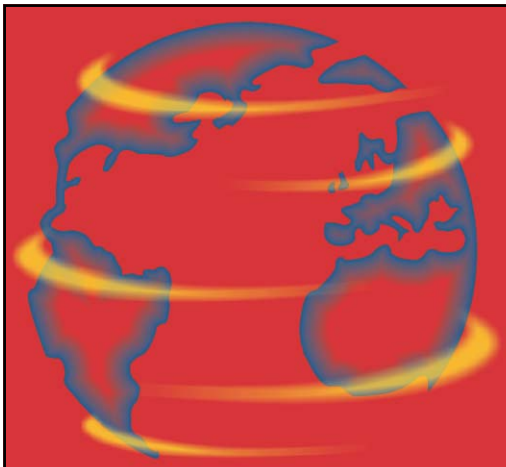
Summing Up

- The need to diversify energy sources & mitigate emissions is more urgent than ever
- Global energy system is on an unsustainable path
- Strong new policies could sharply reduce the rate of increase in demand & emissions
- Economic cost of these policies would be more than outweighed by the economic benefits alone
- In the longer term, technology *development* will be critical to a sustainable energy system
- Governments also need to tackle market barriers to ensure investment is forthcoming
- Rich countries need to help developing countries address energy poverty



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Thank you

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