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Energy and CO_2 Emissions Outlook

World Energy Outlook - 2006

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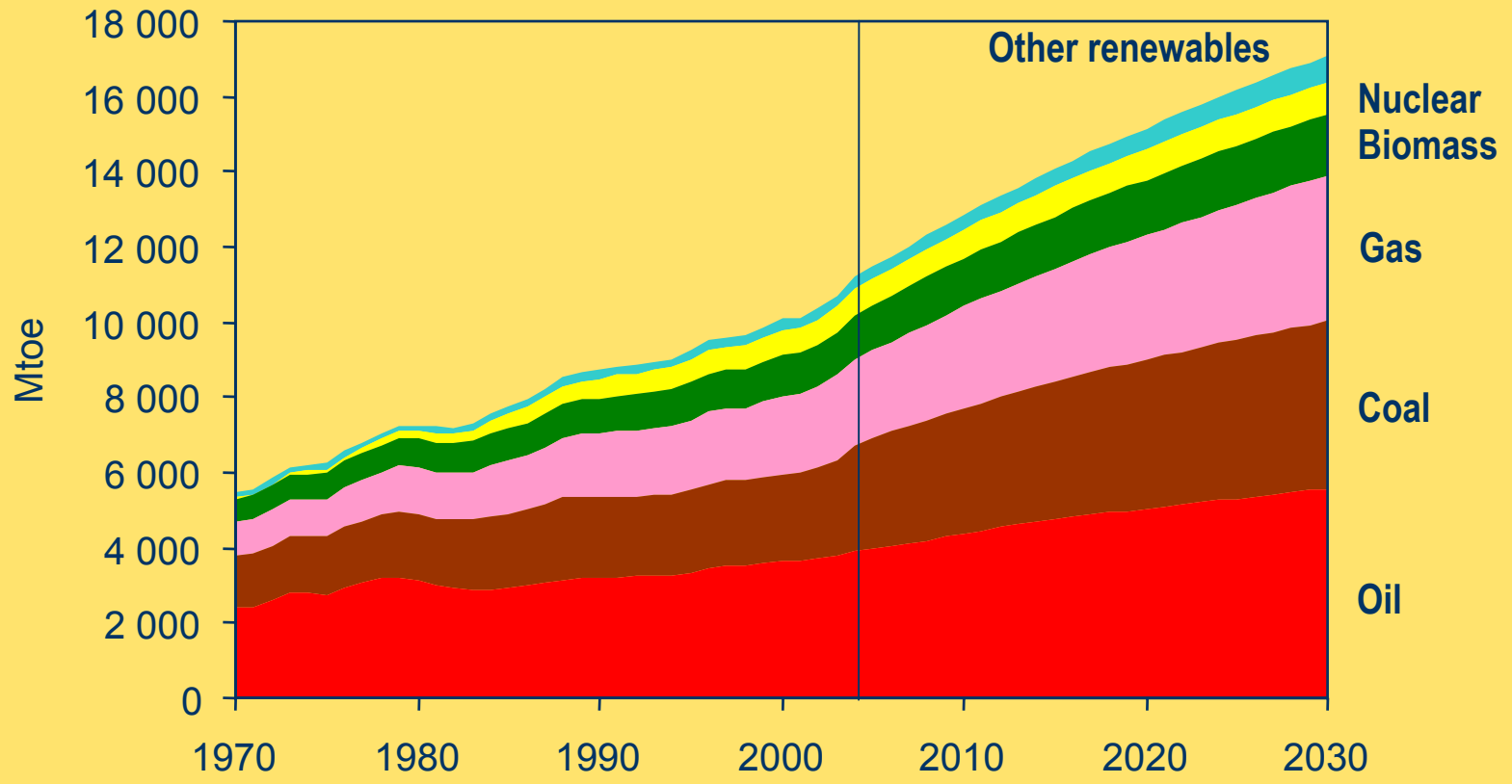
World Energy Outlook 2006

The 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

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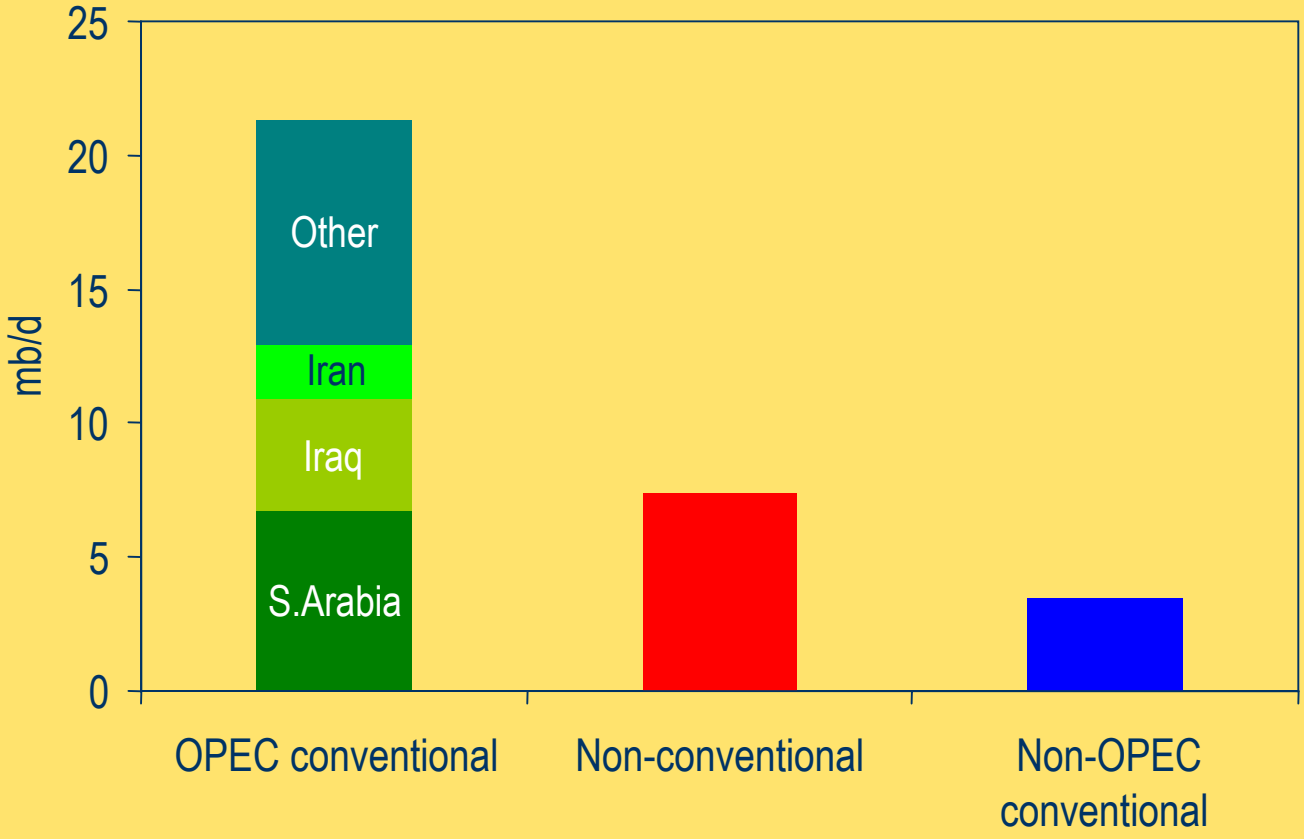
Reference Scenario:
Increase in World Oil Supply, 2004-2030



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

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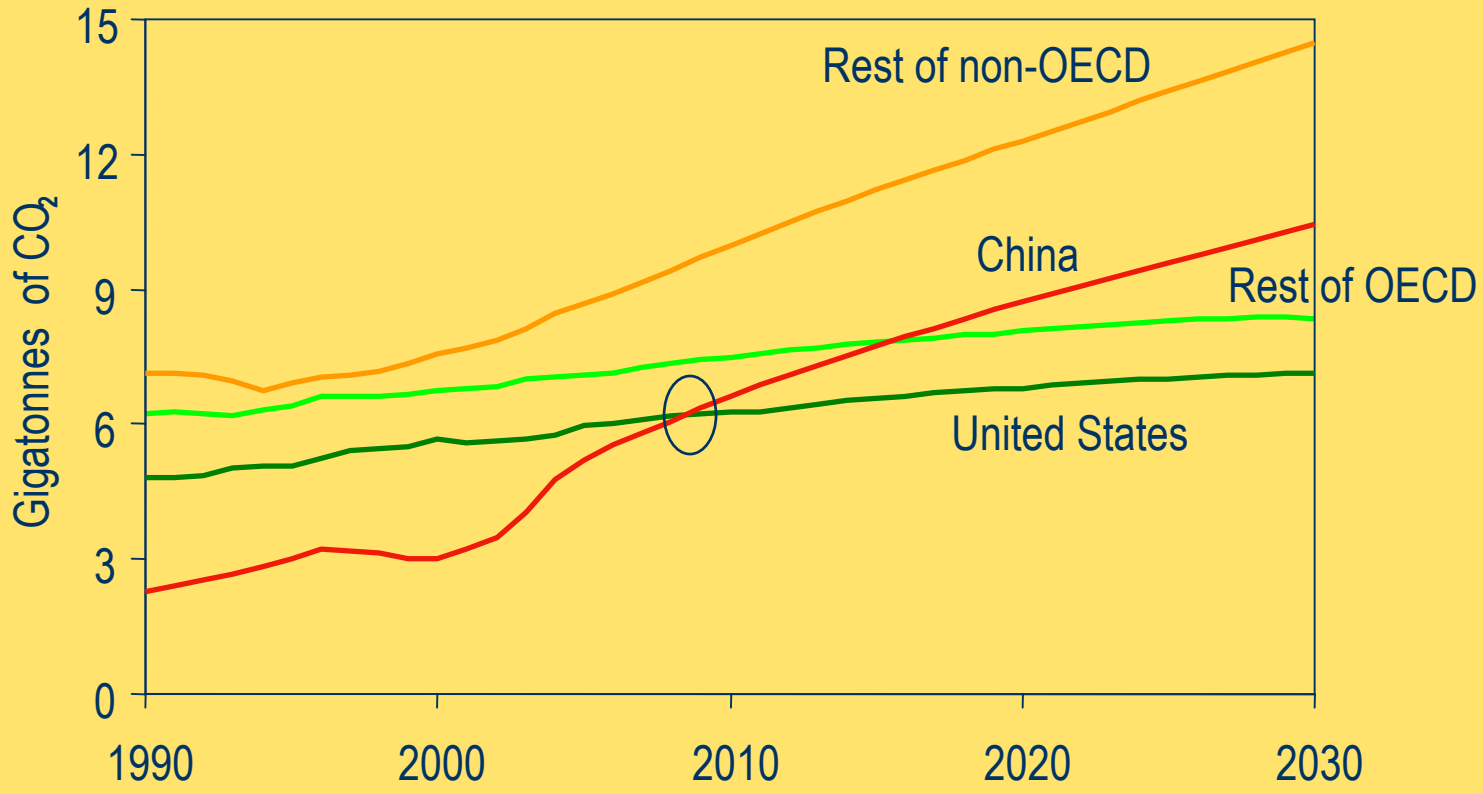
Reference Scenario: Energy-Related CO_2 emissions by Region



China overtakes the US as the world's biggest emitter before 2010, though its per capita emissions reach just 60% of those of the OECD in 2030

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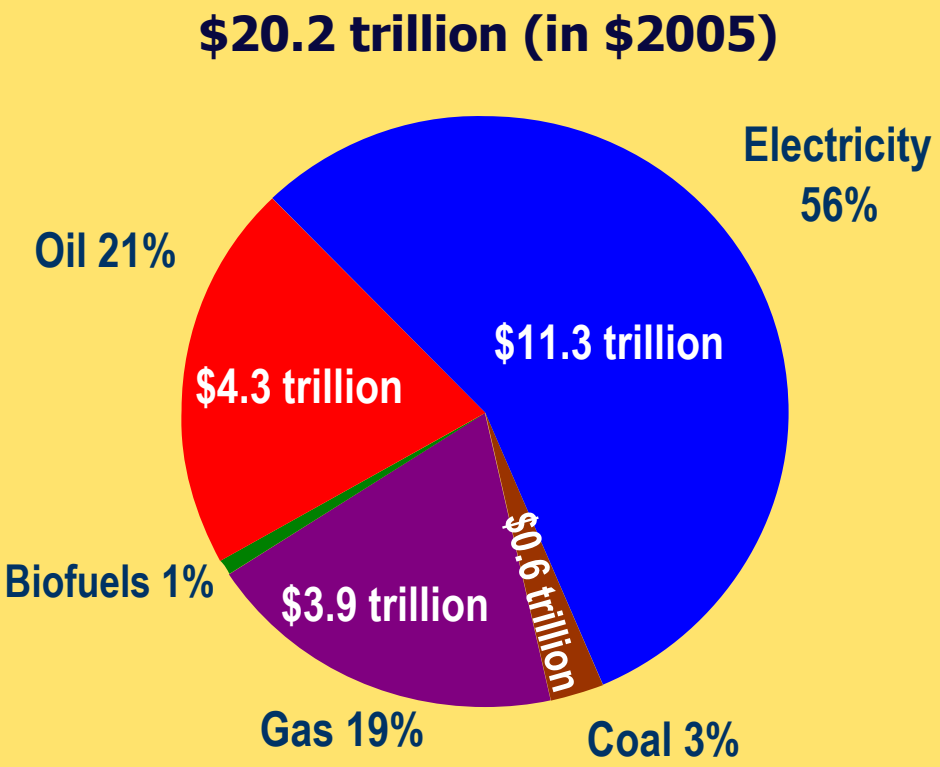
Reference Scenario: Cumulative Investment, 2005-2030



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

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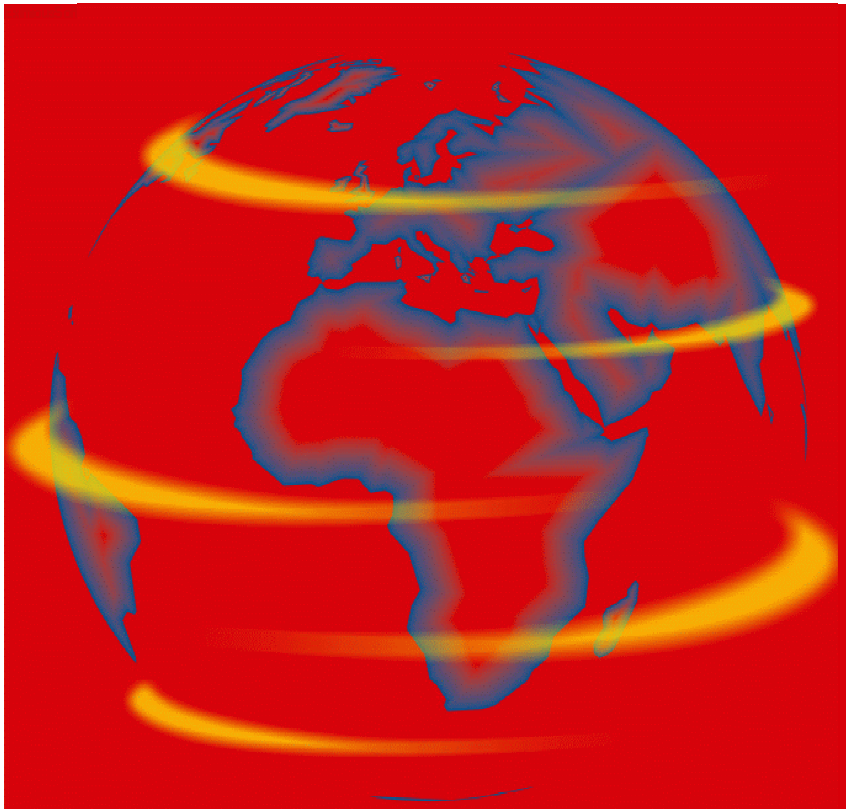
The Next Ten Years Will Determine Our Energy Future

- Investment over the next decade will lock in technology for up to 60 years
  - ***China and India*** *- growing at breakneck speed fueled by energy*
  - ***OECD power plants –*** *significant portion reaching to retirement*
- Security of supply is under threat because the balance of power is shifting
  - ***Oil production*** *in non-OPEC countries is set to peak,*
  - ***Gas production*** *to peak in OECD*



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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
- 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*
- Delaying action by 10 years would reduce the impact on emissions in 2030 by three-quarters

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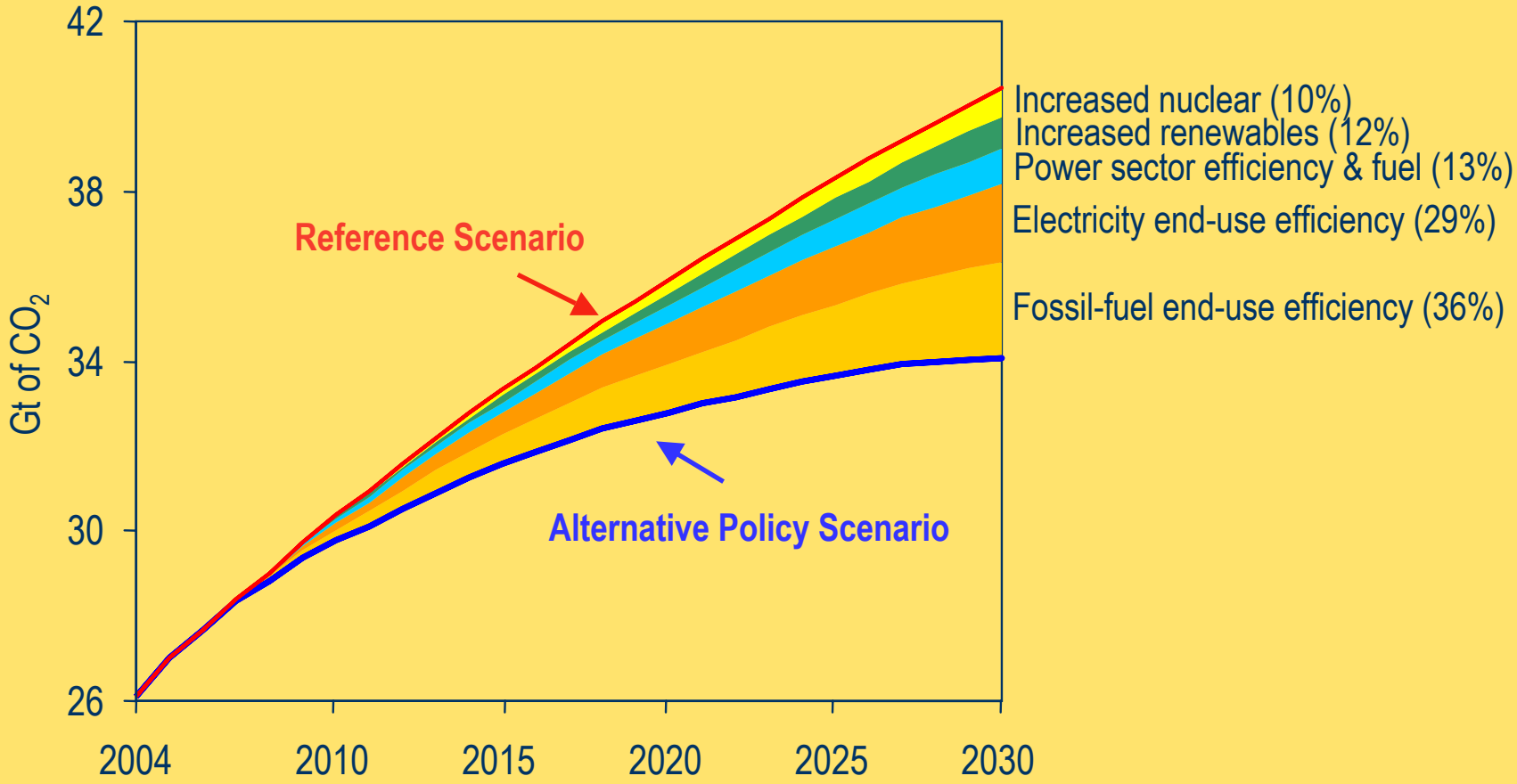
The Alternative Policy Scenario: Key Policies for CO_2 Reduction



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

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The Alternative Policy Scenario : Key policies that Make a Global Difference

	Energy efficiency	*Power generation*
US	• Tighter CAFE standards • Improved efficiency in residential & commercial sectors	• Increased use of renewables
EU	• Increased vehicle fuel economy • Improved efficiency in electricity use in the commercial sector	• Increased use of renewables • Nuclear plant lifetime extensions
China	• Improved efficiency in electricity use in the industrial & residential sectors	• 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

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Alternative Policy Scenario: The economics of energy efficiency measures

- Investment in the energy sector (demand and supply side) are lower in APS than in the RS
- Consumers spend $2.4 trillion *more* in 2005-2030 in more efficient cars, refrigerators etc
- ..but producers need to spend almost $3 trillion *less*
  - *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 equipments (mainly cars) saves $2.4 in oil imports to 2030*
- The higher initial investments by consumers are more than outweighed by fuel-cost savings

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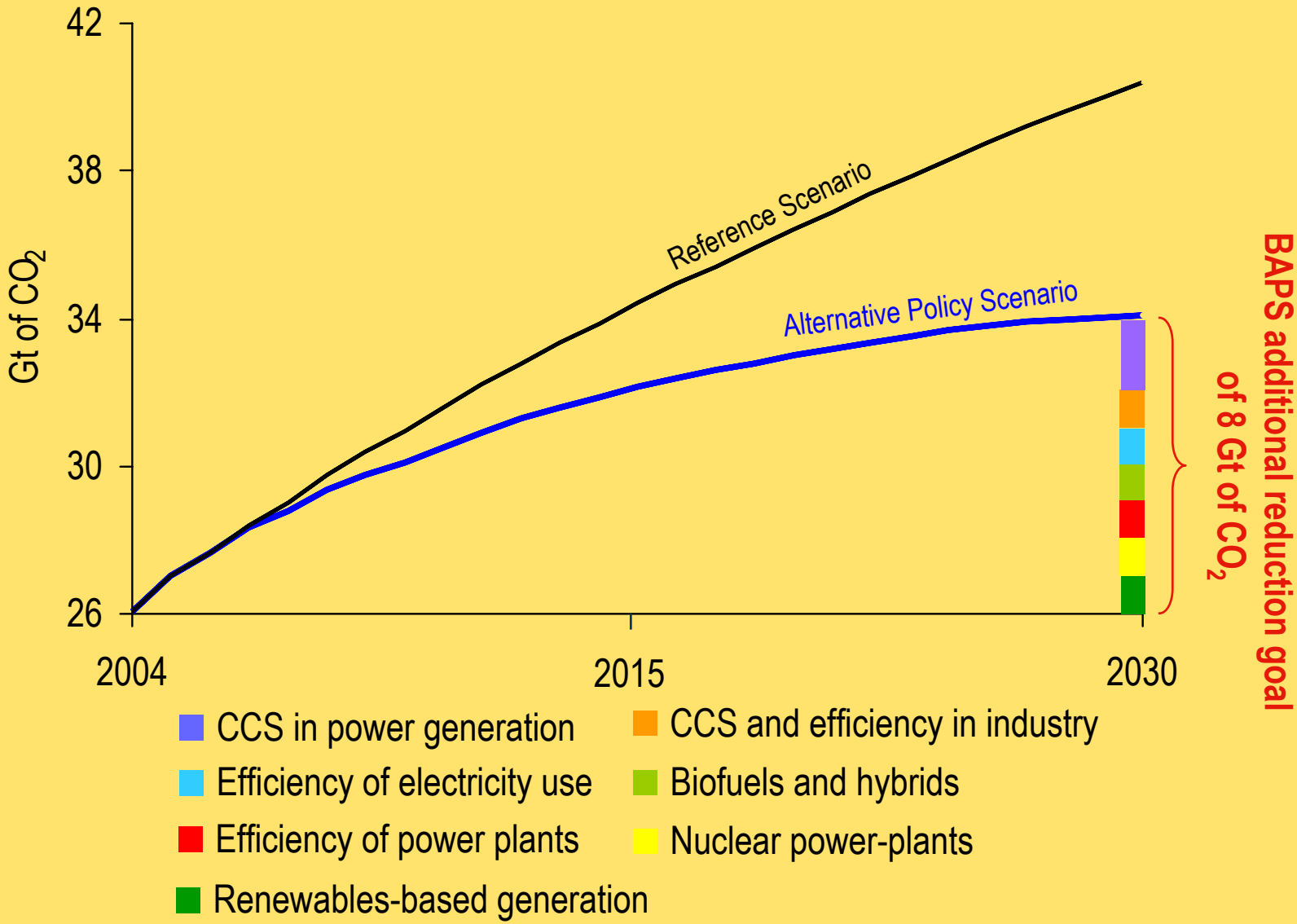
Going Beyond the Alternative Policy Scenario: BAPS CO_2 Emissions Savings



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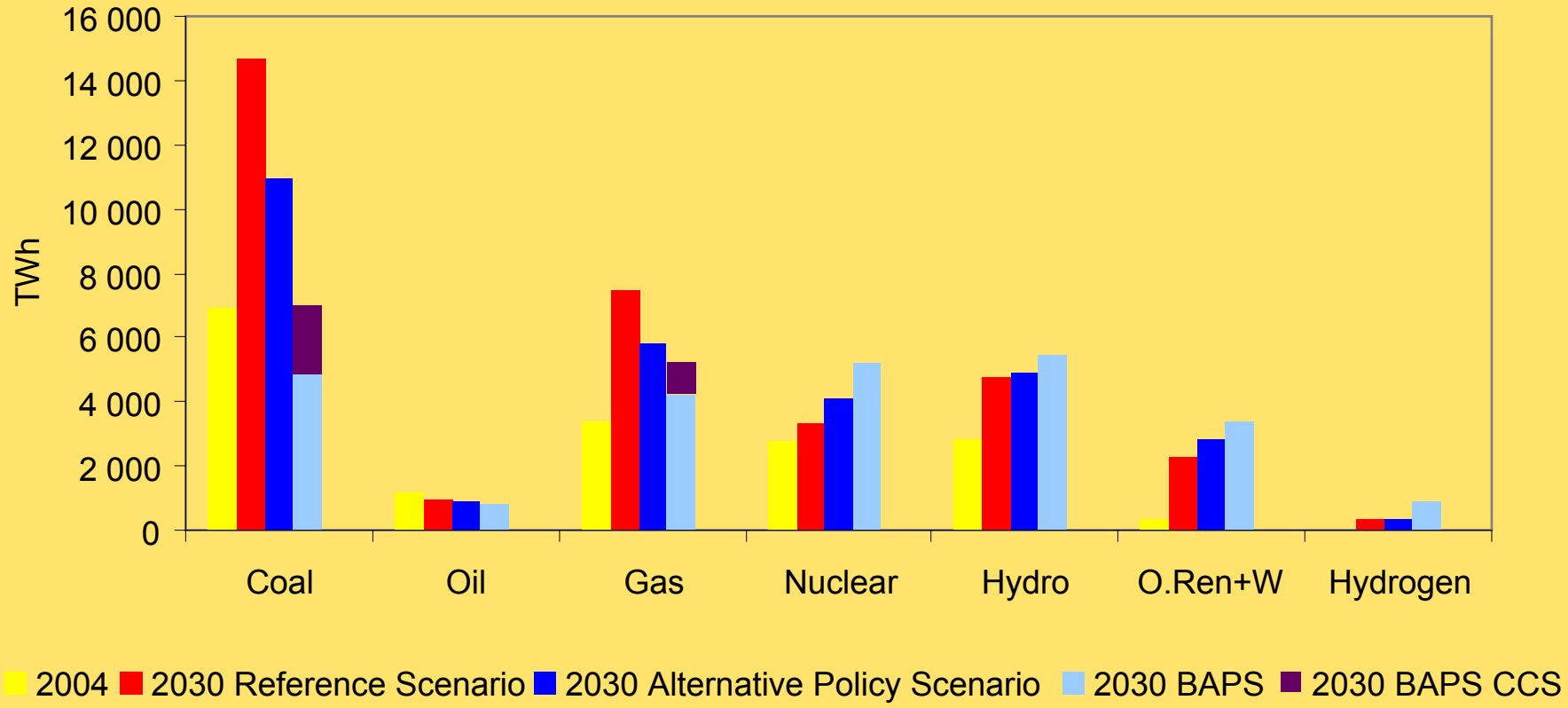
Power Generation by Technology



In BAPS CO2 intensity of electricity generation is 50% the current level, due to increasing reliance on "carbon free" fuels and technology improvements

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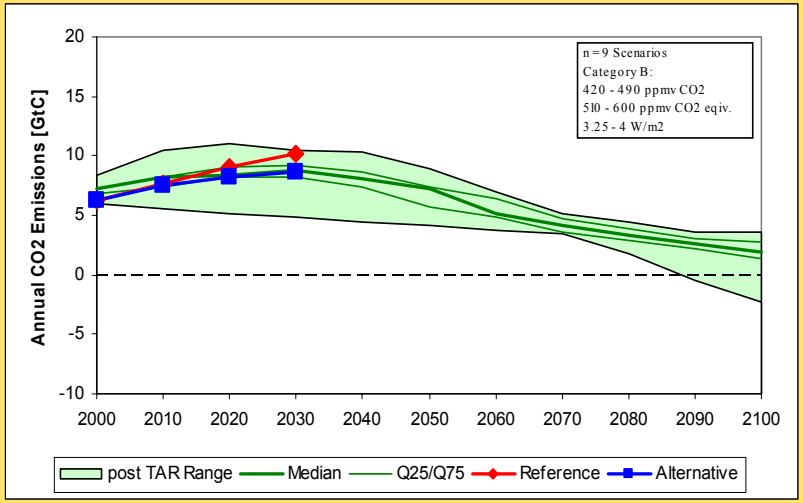
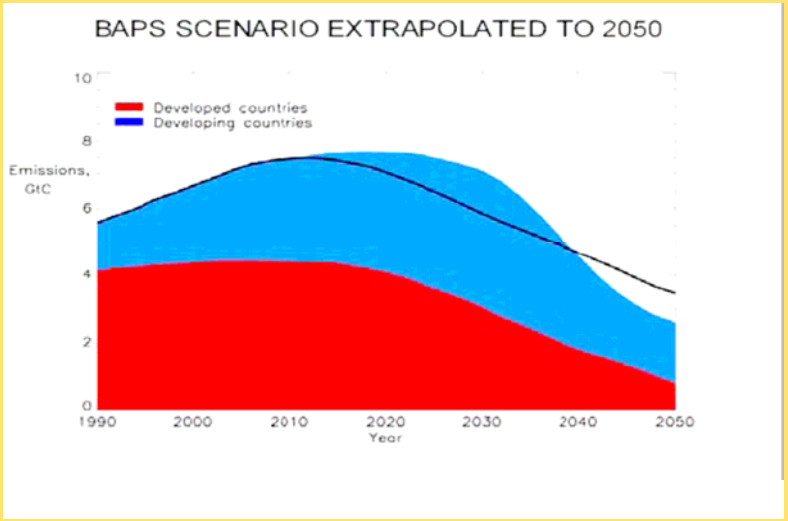
Implications for CO_2 concentration

- The Reference Scenario trends would lead to long term concentration far above 550 ppm CO_2eq (cat C)
- The Alternative Policy Scenario trends are consistent with median values of scenario heading to 550 ppm CO_2eq, provided right policy incentives and technology development dramatically reduce emissions post 2030 (cat B)
- The Beyond Alternative Policy Scenario could head to 510 ppm CO_2eq, but would have to be followed by sharp reduction post 2030 (cat AB)



Source: Nakicenovic, Paper for IEA, 2006



Source: Sir Houghton, Global Warming, Climate Change and Sustainable Energy, 2006

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Summing Up

- The Reference Scenario projects a vulnerable, dirty and expensive global energy system
- The Alternative Policy Scenario maps out a cleaner, cleverer and more competitive energy future based on new policies – mainly on energy efficiency, renewables and nuclear
- Strong political will and urgent government action is needed to change existing investment patterns and move Beyond the Alternative Policy Scenario

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Next steps – WEO 2007 & WEO 2008

- ***WEO-2007*** China and India insights
  - In addition to RS and APS, high growth scenario is also explored
  - Implications for energy markets and global emissions
  - Co-operation with TERI, ERI and indian/chinese authorities
  - Release: 7 November 2007
- ***WEO-2008***
  - in-depth analysis of climate change scenarios – understanding energy implications of different post kyoto international architectures
  - in-depth field by field analysis of top 200 oil producing fields