International Energy Agency

World Energy Outlook

World Energy Outlook 2009
Climate Change Analysis

Dr Fatih Birol
Chief Economist

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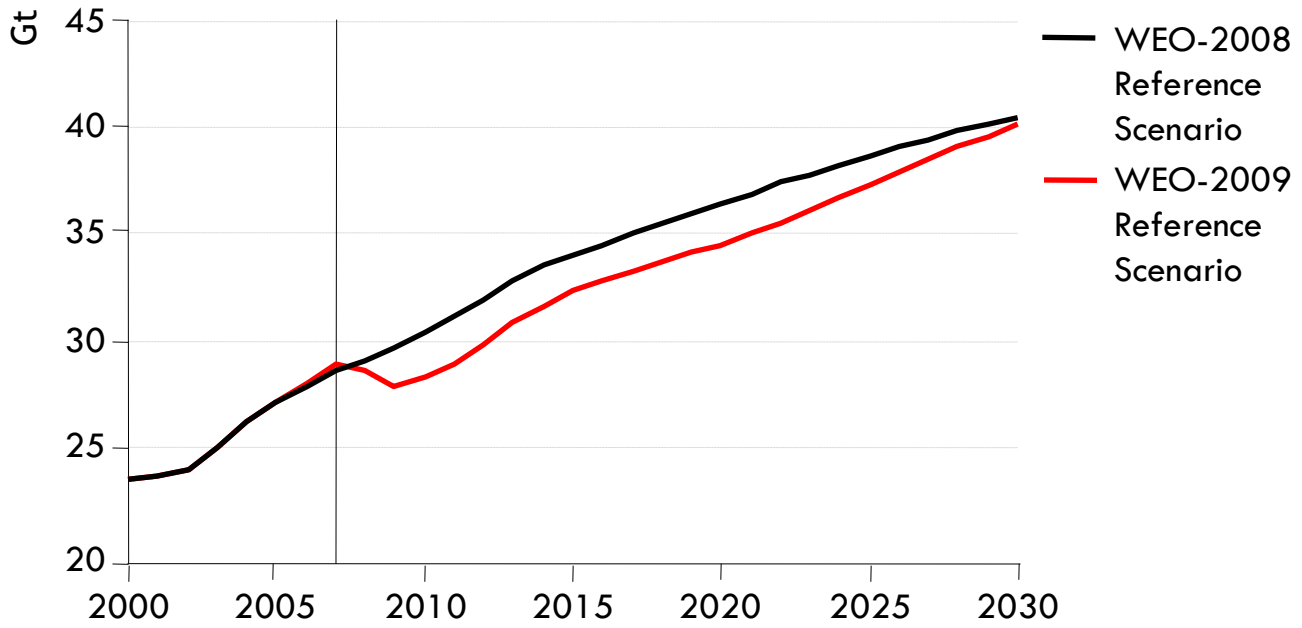
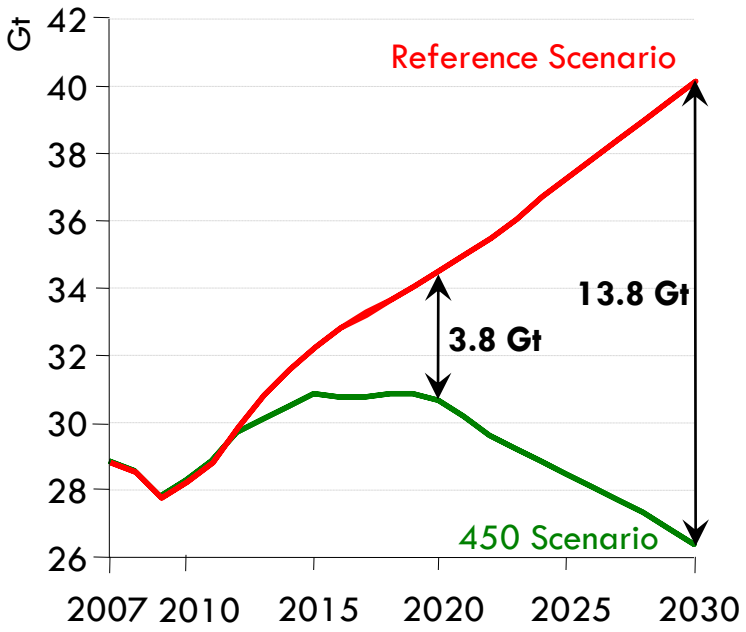
World energy-related CO_2 emissions in the Reference Scenario in *WEO-2009* and *WEO-2008*



In cumulative terms between today and 2030, emissions are 35 Gt lower than in* WEO-2008. *75% of this reduction is due to the impact of the financial crisis and 25% to new policies

The 450 Scenario: energy-related CO2 emissions compared to the Reference Scenario

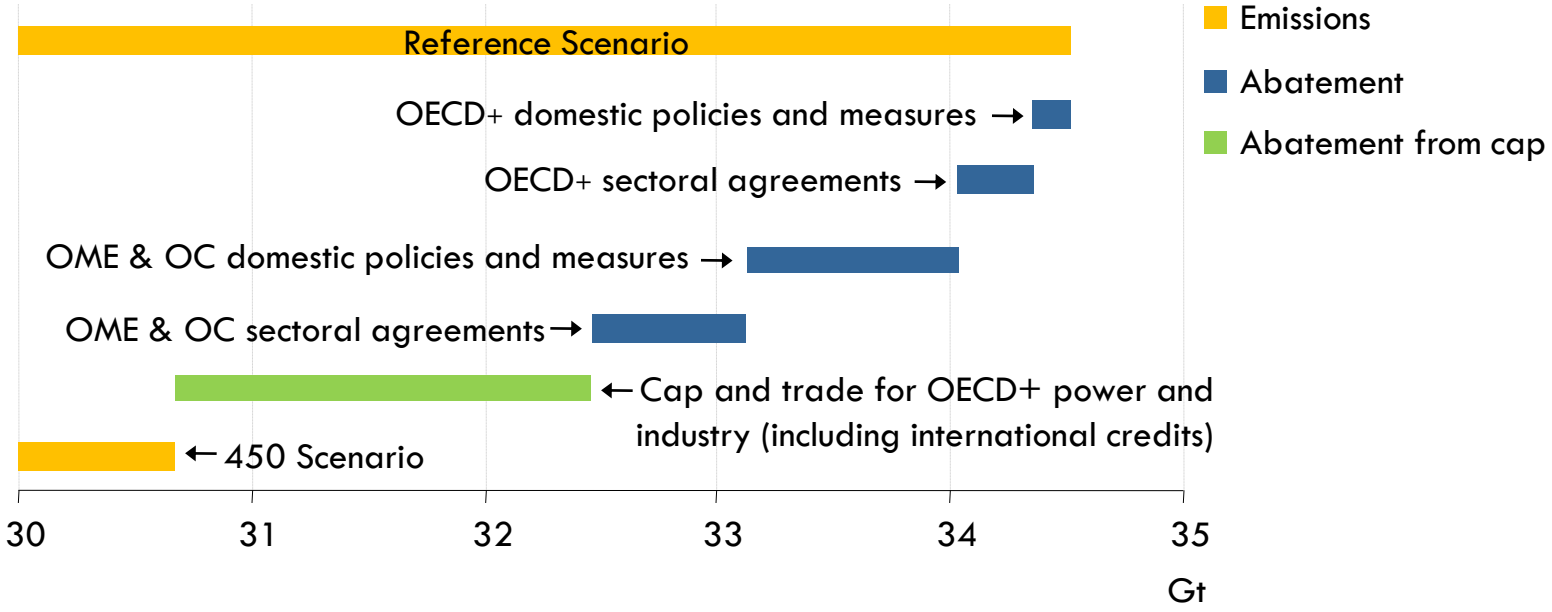


In the 450 Scenario, emissions peak before 2020 at 30.9 Gt, falling to 26.4 Gt by 2030

The policy mechanisms in the 450 Scenario

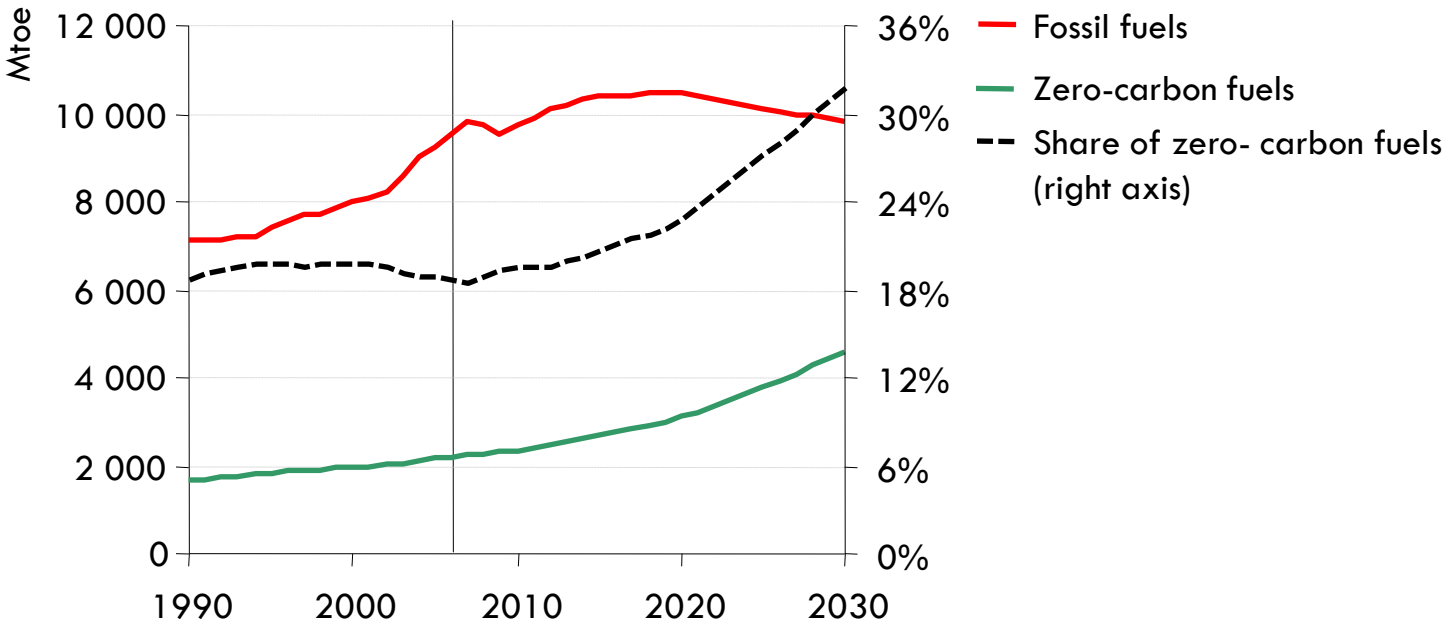
- A combination of policy mechanisms, which best reflects nations' varied circumstances & negotiating positions
- We differentiate on the basis of three country groupings
  - *OECD+: OECD and other non-OECD EU countries*
  - *Other Major Economies (OME): China, Russia, Brazil, South Africa and Middle East*
  - *Other Countries (OC): all other countries, including India*
- Three types of policy mechanism
  - *National policies & measures*
  - *Sectoral agreements for iron & steel, cement, passenger vehicles, aviation & shipping*
  - *Cap-and-trade for some countries in power generation & industry*
- A graduated approach
  - *Up to 2020, only OECD+ have national emissions caps*
  - *After 2020, Other Major Economies are also assumed to adopt emissions caps*

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



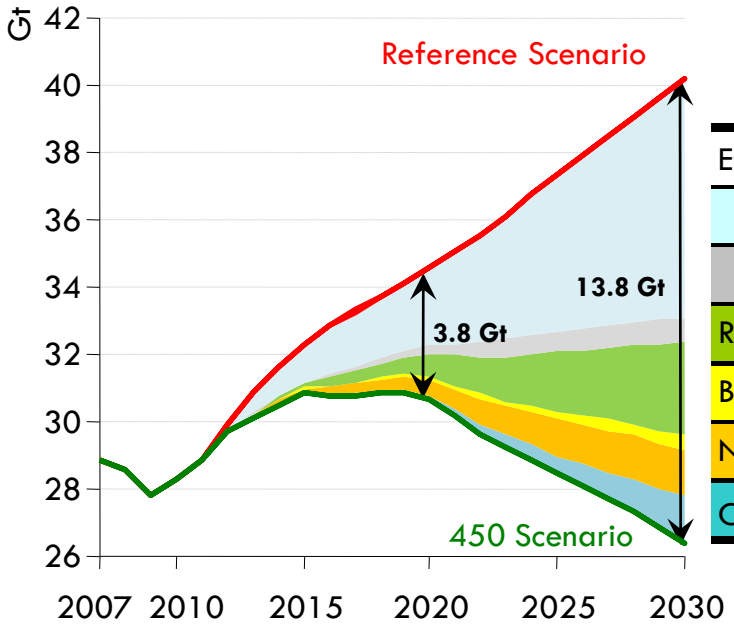
After realising the abatement potential of policies & measures and sectoral approaches, including 1 Gt in China, cap-and-trade in OECD+ yields a further 1.8 Gt

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 abatement of energy-related CO_2 emissions in the 450 Scenario

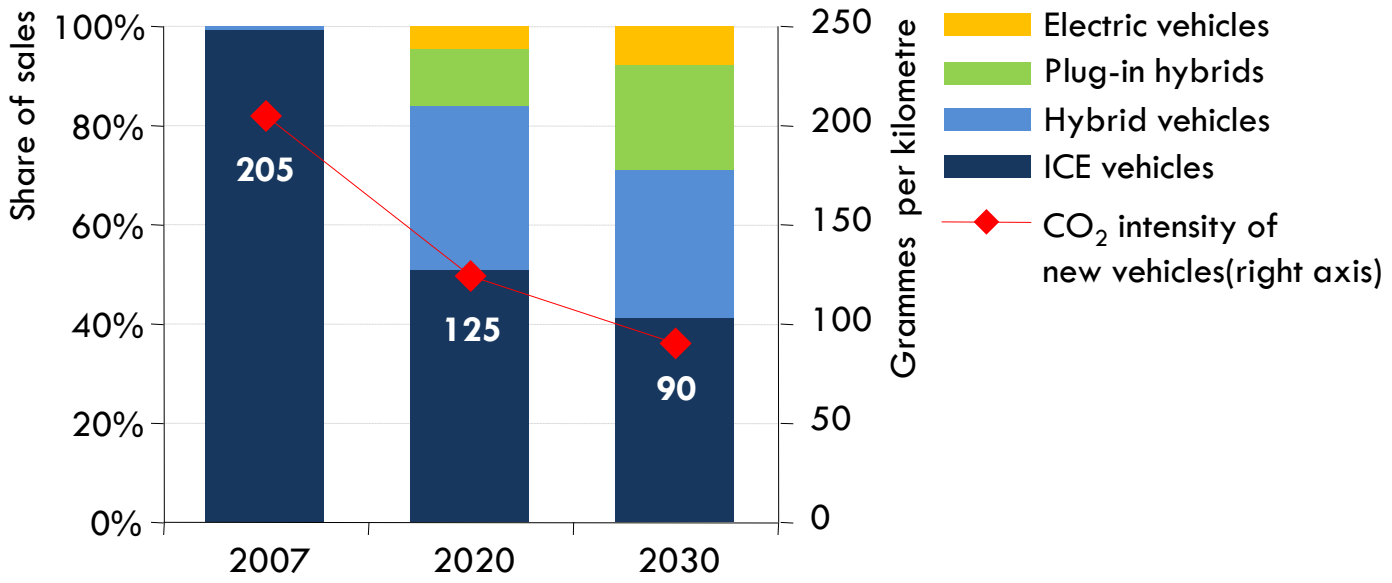


Share of abatement (%)

	2020	2030
Efficiency	65	57
End-use	*59*	*52*
Power plants	*6*	*5*
Renewables	18	20
Biofuels	1	3
Nuclear	13	10
CCS	3	10

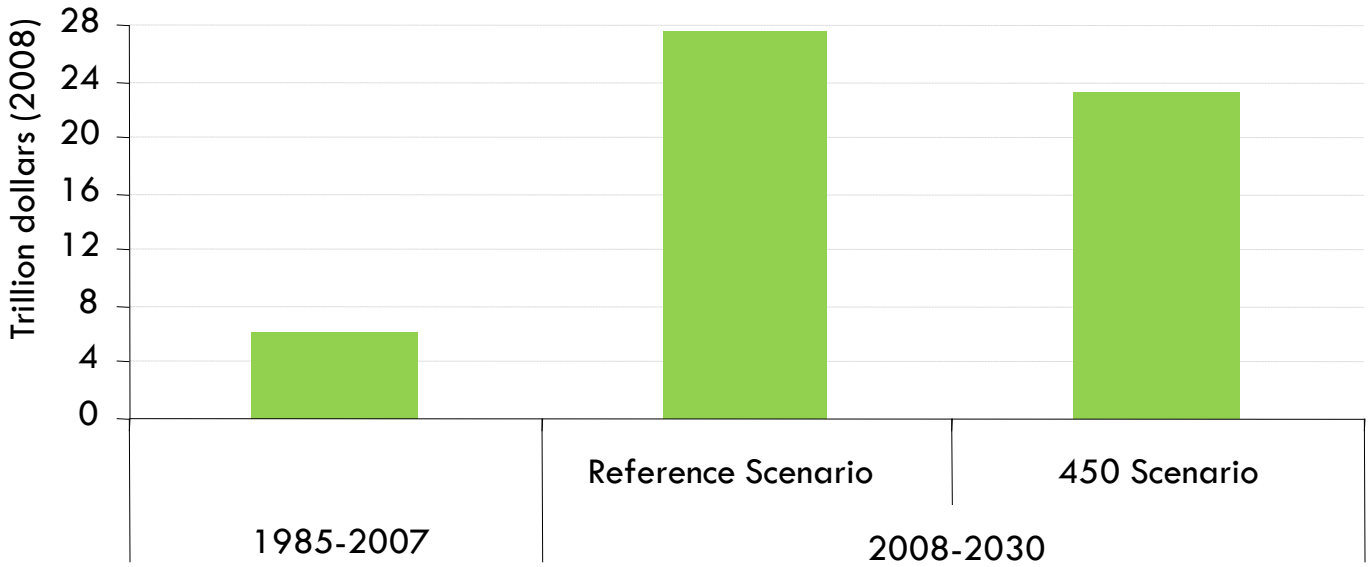
Efficiency measures account for two-thirds of the 3.8 Gt of abatement in 2020, with renewables contributing close to one-fifth

World passenger vehicle sales by technology and average new vehicle on-road CO_2 intensity in the 450 Scenario



Improvements to the internal combustion engine and the uptake of biofuels and next-generation vehicles lead to an 80 g/km reduction in new-car emissions by 2020

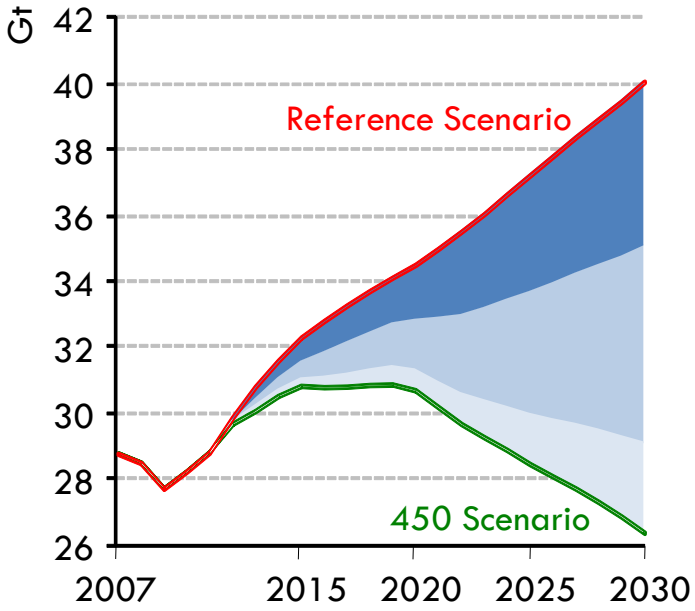
Cumulative OPEC oil export revenues by scenario



OPEC production in 2030 in the 450 Scenario is 11 mb/d higher than in 2008

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

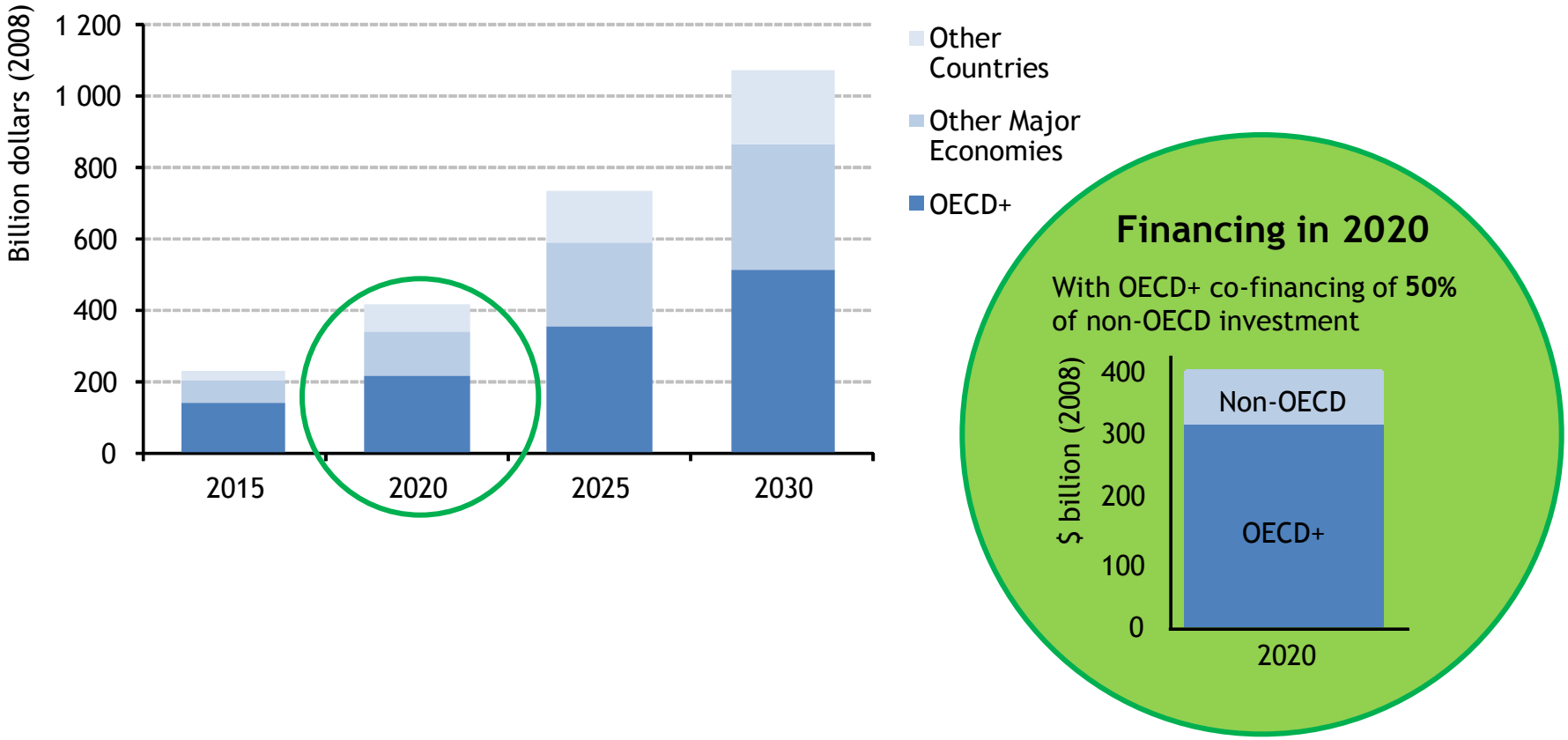
Geographical location of abatement in the 450 Scenario



	Abatement	
	2020	2030
Total (Mt CO_2)	3 850	13 840
OECD+	43%	36%
Other Major Economies	40%	43%
Other Countries	16%	19%

With substantial abatement potential outside the OECD+ region, financing will hold the key to the energy sector meeting a 450 ppm trajectory

Additional investment in the 450 Scenario relative to the Reference Scenario, by region



The 450 Scenario sees $10 trillion of additional investment to the Reference Scenario, costing 0.5% of GDP in 2020 and 1.1% of GDP in 2030

The benefits of the 450 Scenario

- Avoiding the worst impacts of climate change
- Lower energy bills for consumers: in industry, transport & buildings fuel costs are reduced by a total of $8.6 trillion between 2010 and 2030, compared to additional investment of $8.3 trillion
  - *Savings in transport alone account for $6.2 trillion*
- Energy-security benefits and reduced oil & gas imports
  - *For OECD countries, oil imports are 7 mb/d lower in 2030 than in 2008*
  - *In China & India, oil imports by volume are around 10% lower than in the Reference Scenario; China's gas imports are 23% lower*
- Sharp reduction in air pollution relative to the Reference Scenario
  - *In 2030, SO_2 emissions are 29% lower than in the Reference Scenario; NO_x emissions are 19% lower & emissions of particulate matter 9% lower*

Conclusions

- The Reference Scenario puts us on course for 1 000 ppm – a 6°C temperature rise - but the financial crisis has created a unique window of opportunity
- Meeting a 450 Scenario is within reach but requires a wholesale transformation of industry and the way we produce & use energy
- The investment needs are substantial, but there will be major benefits in terms of fuel cost savings, enhanced energy security & reduced air pollution
- Financial support holds the key, as many of the abatement options are in non-OECD countries
- A deal in Copenhagen is crucial – every year of delay adds $500 bn to the energy sector's mitigation costs between today & 2030
- The energy sector can lead the way and must be at the heart of a Copenhagen agreement