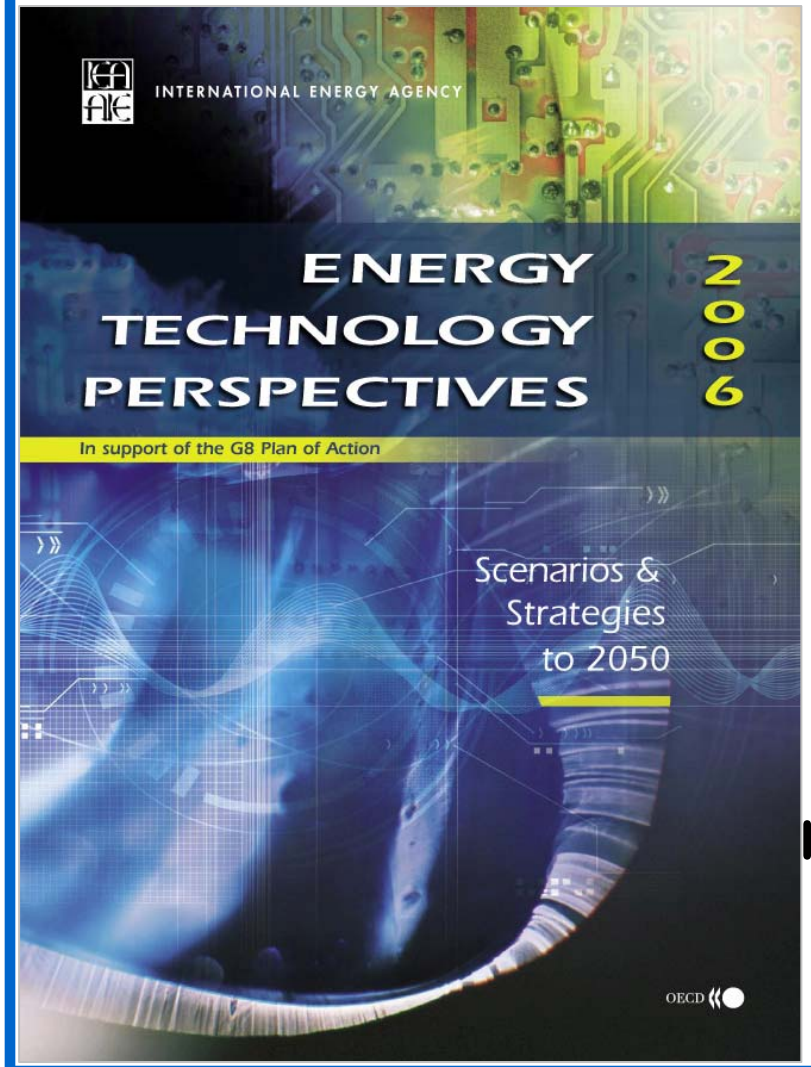
Energy Technology Perspectives
Scenarios & Strategies to 2050



The Future of Energy in Transportation

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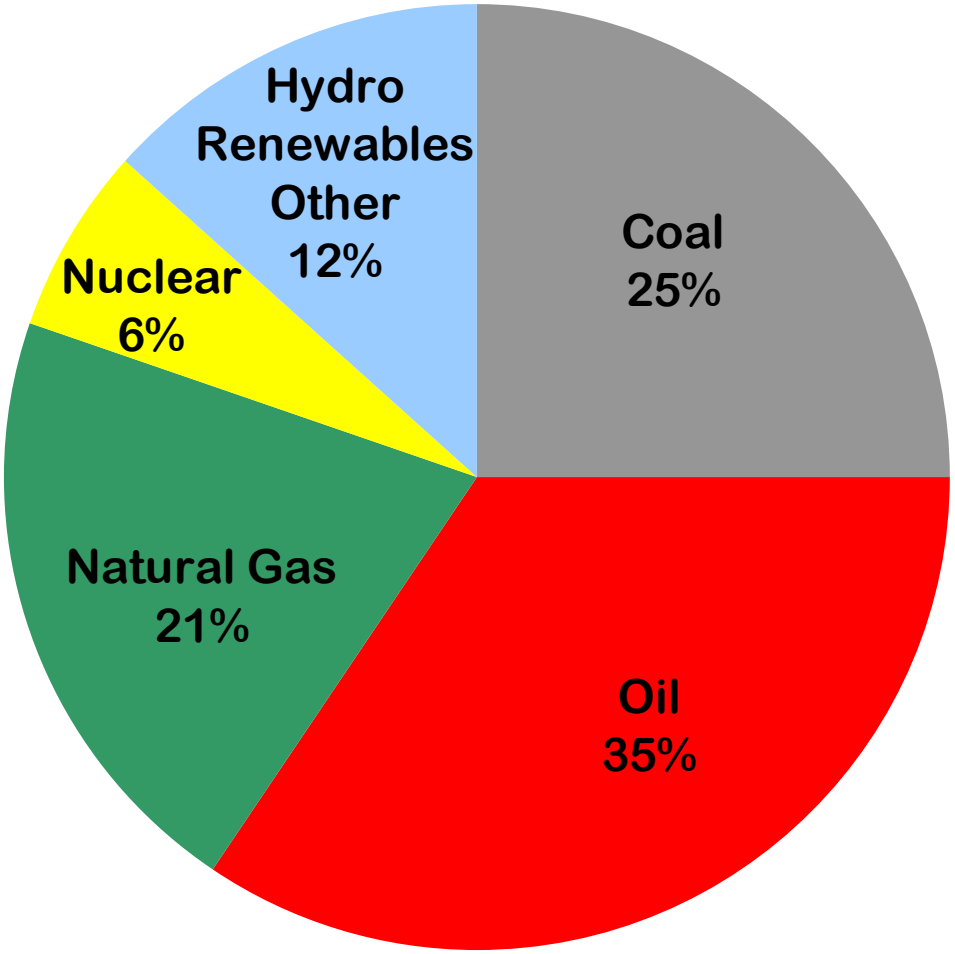
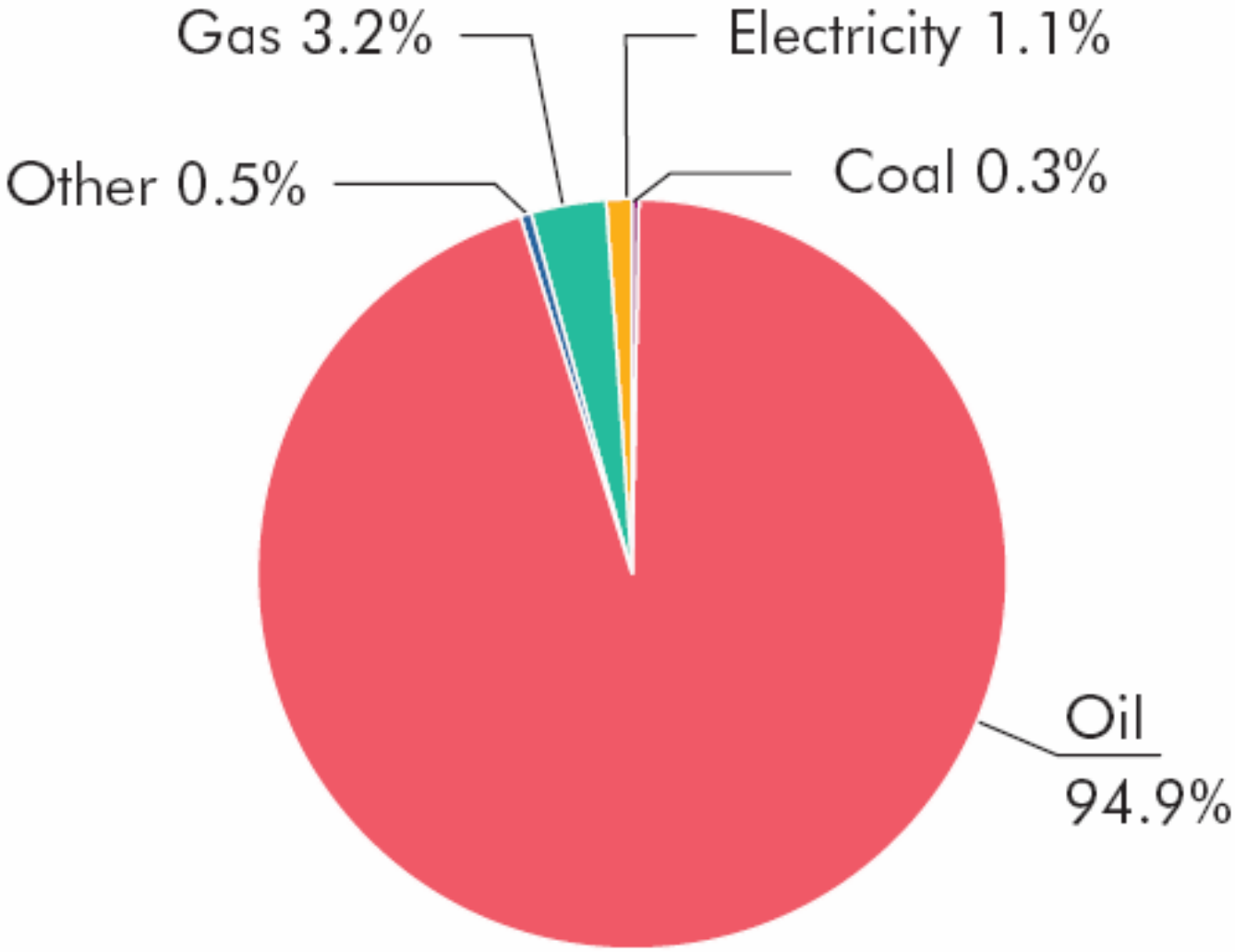
World 2004
Total Primary Energy Supply

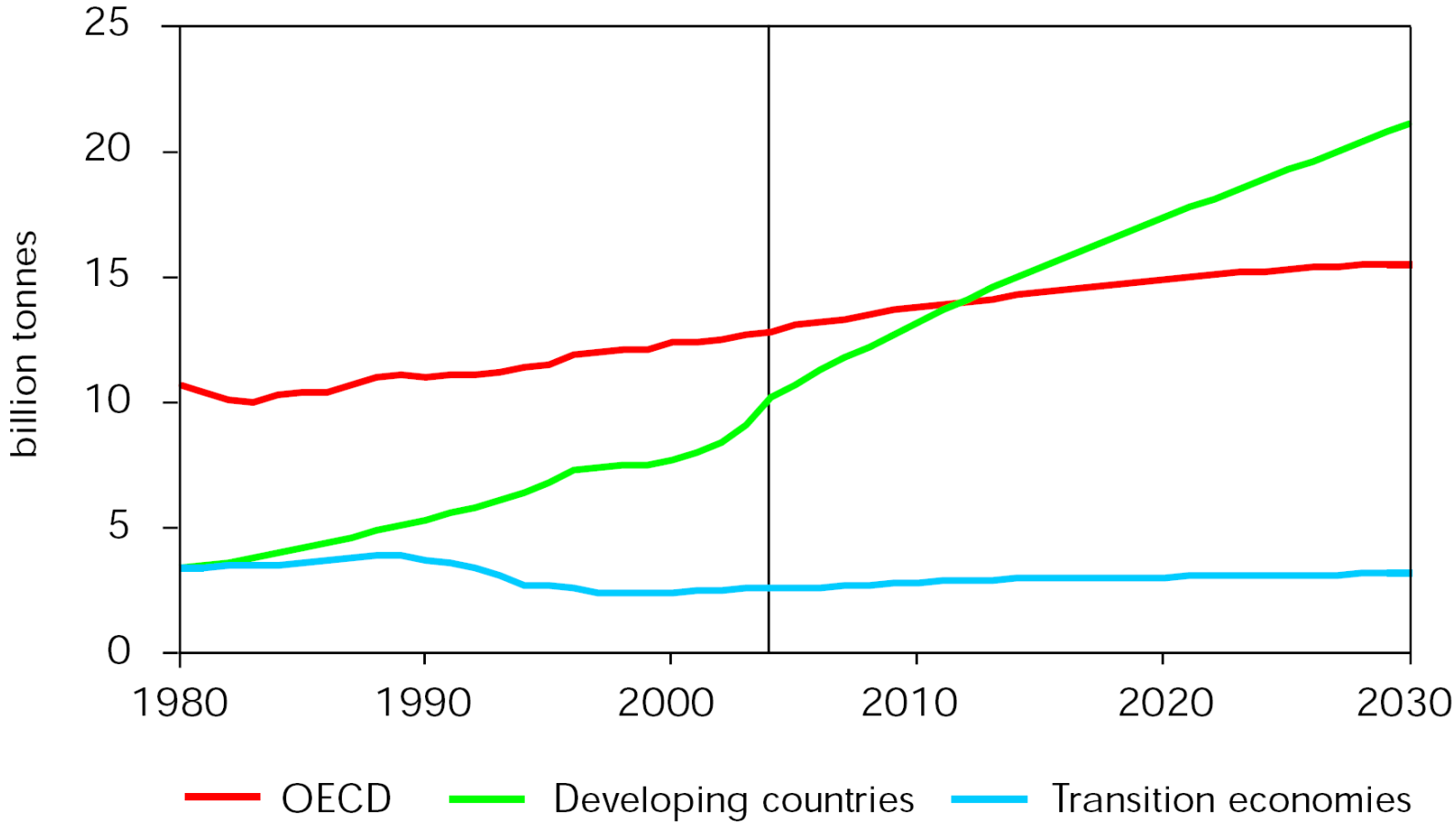


Source: IEA-ESD Energy Balances

Total Final Energy Consumption in Transport Sector 2003



Global CO_2 Emissions Increasing



China will overtake the United States as the world's biggest CO_2 emitter before 2010.

Source: IEA WEO 2006

G8 - Gleneagles Communiqué July 2005

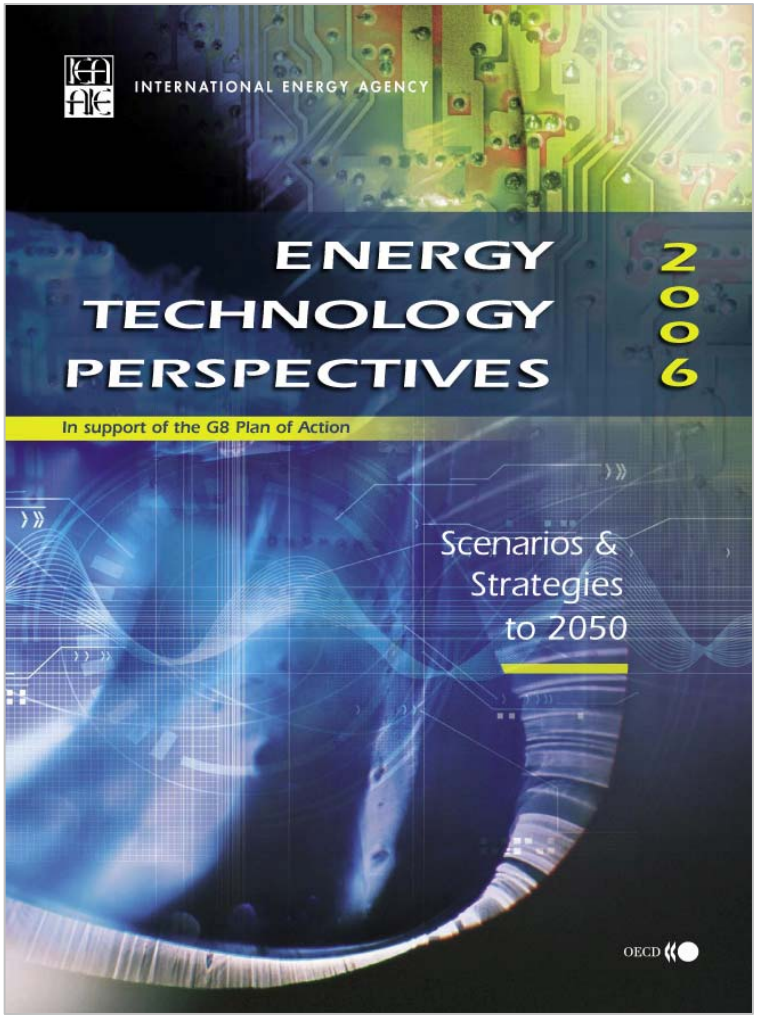
"We will act with resolve and urgency to meet our shared multiple objectives of reducing greenhouse gas emissions, improving the global environment, enhancing energy security and cutting air pollution in conjunction with our vigorous efforts to reduce poverty"

"The IEA will advise on alternative energy scenarios and strategies aimed at a clean, clever and competitive energy future"

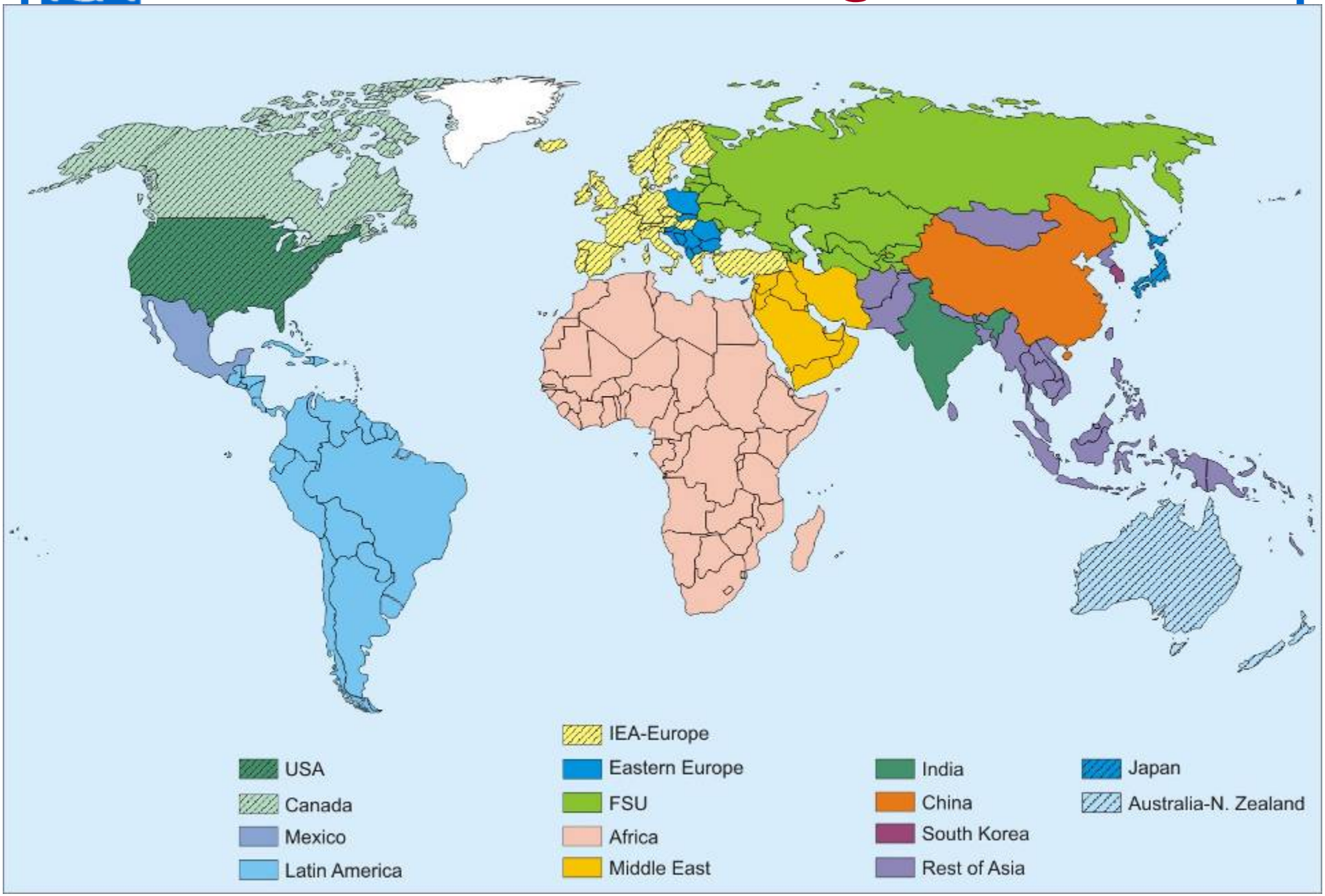
Energy Technology Perspectives 2006

ETP 2006 provides part of IEA's "advice on scenarios and strategies" at St. Petersburg

ETP 2006 presents a groundbreaking review of technologies across all sectors and assess how they together can make a difference



15 ETP model regions

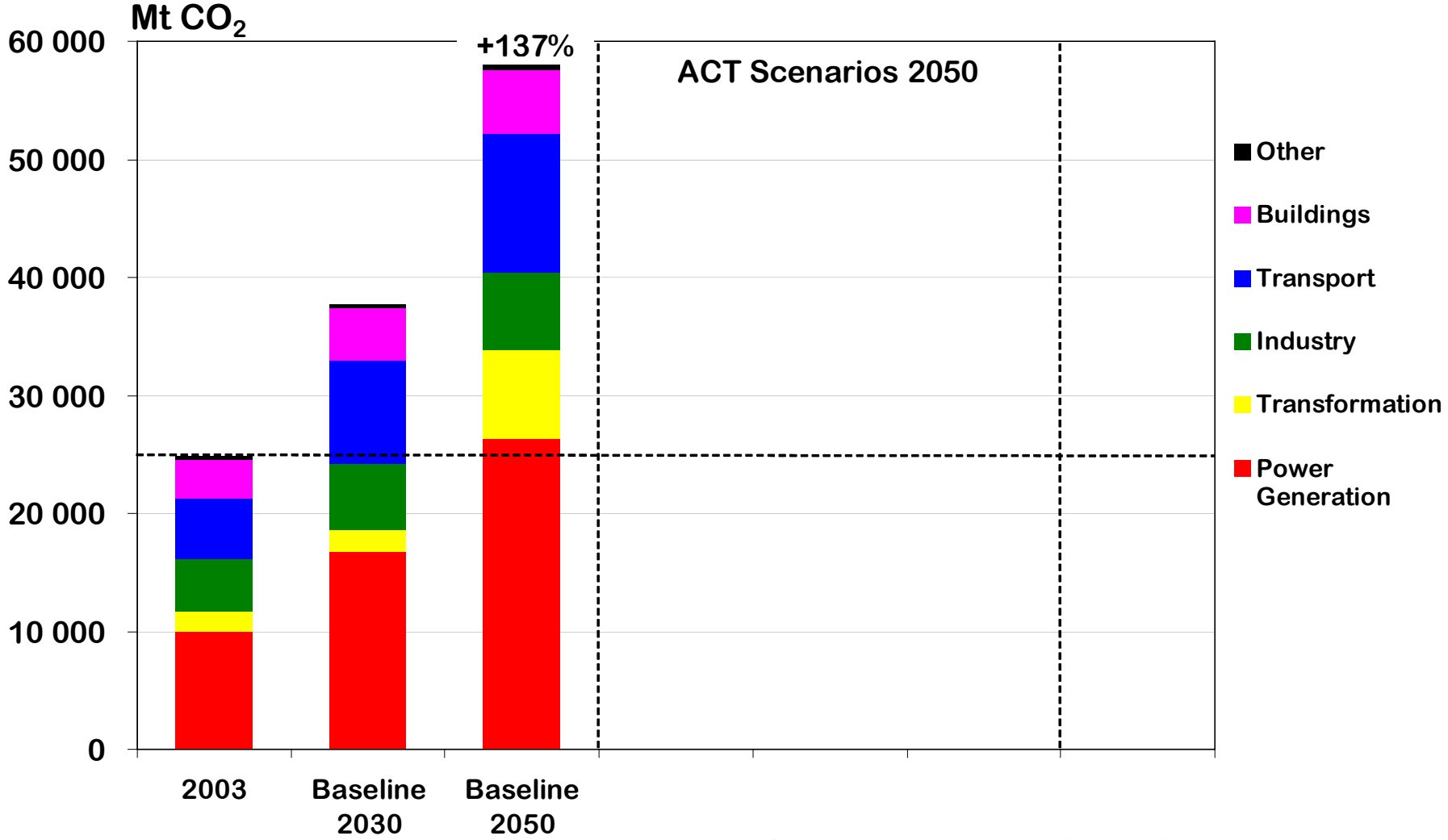


Technology Assumptions

Scenario	Renewables	Nuclear	CCS	H_2 fuel cells	Advanced biofuels	End-use efficiency
ACT Map	Relatively optimistic across all technology areas					2.0 % p.a. global improvement
ACT Low Renewables	Slower cost reductions					
ACT Low Nuclear		Lower public acceptance				
ACT No CCS			No CCS			
ACT Low Efficiency						1.7 % p.a. global improvement
TECH Plus	Stronger cost reductions	Stronger cost reductions & technology improvements		Break-through for FC	Stronger cost reductions & improved feedstock availability	

Global CO_2 Emissions 2003-2050

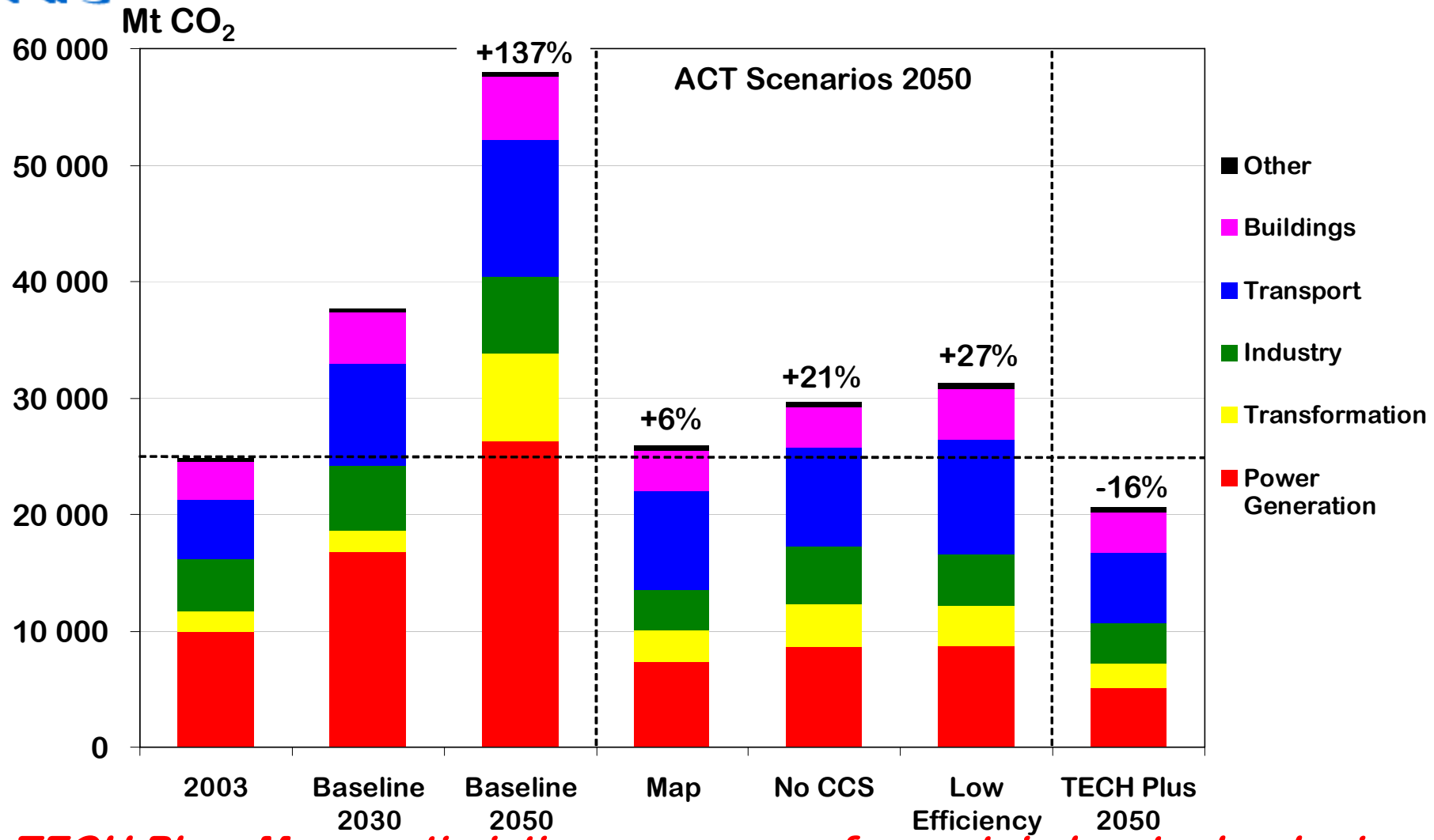
Baseline Scenario



Emissions increase 137% from today's level

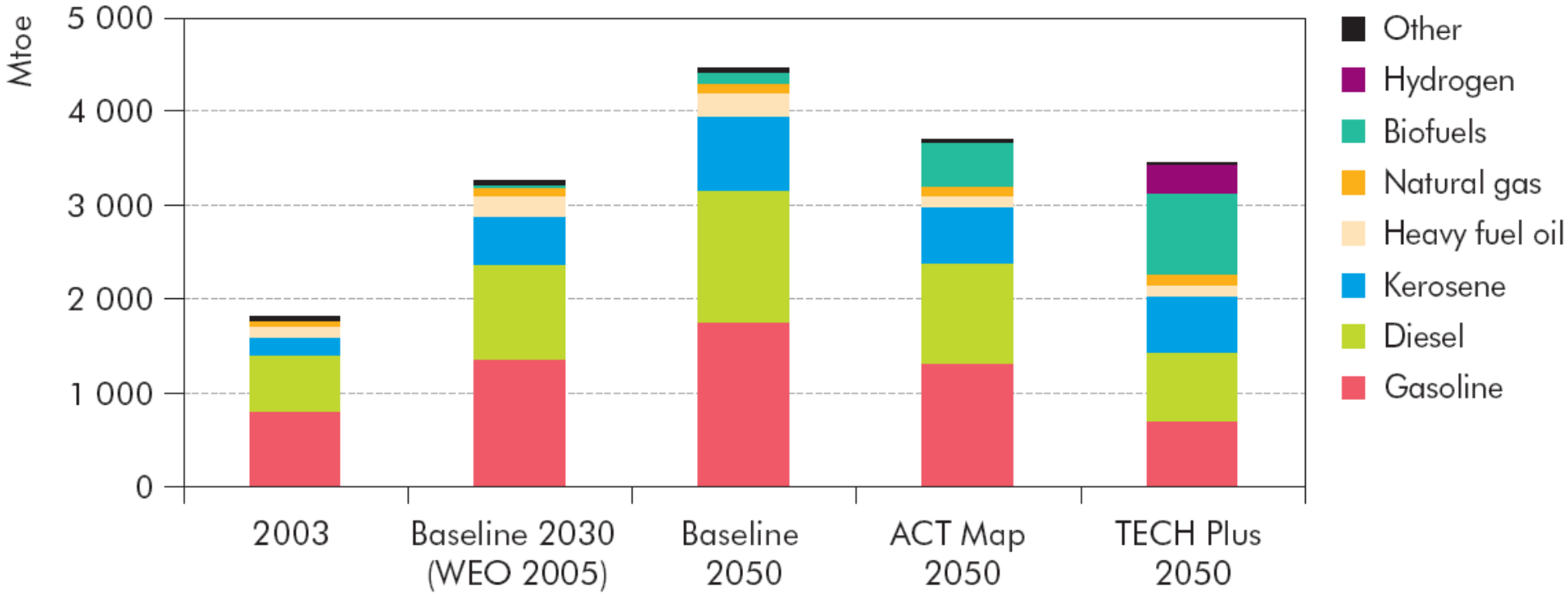
Global CO_2 Emissions 2003-2050

Baseline, ACT and TECH plus Scenarios



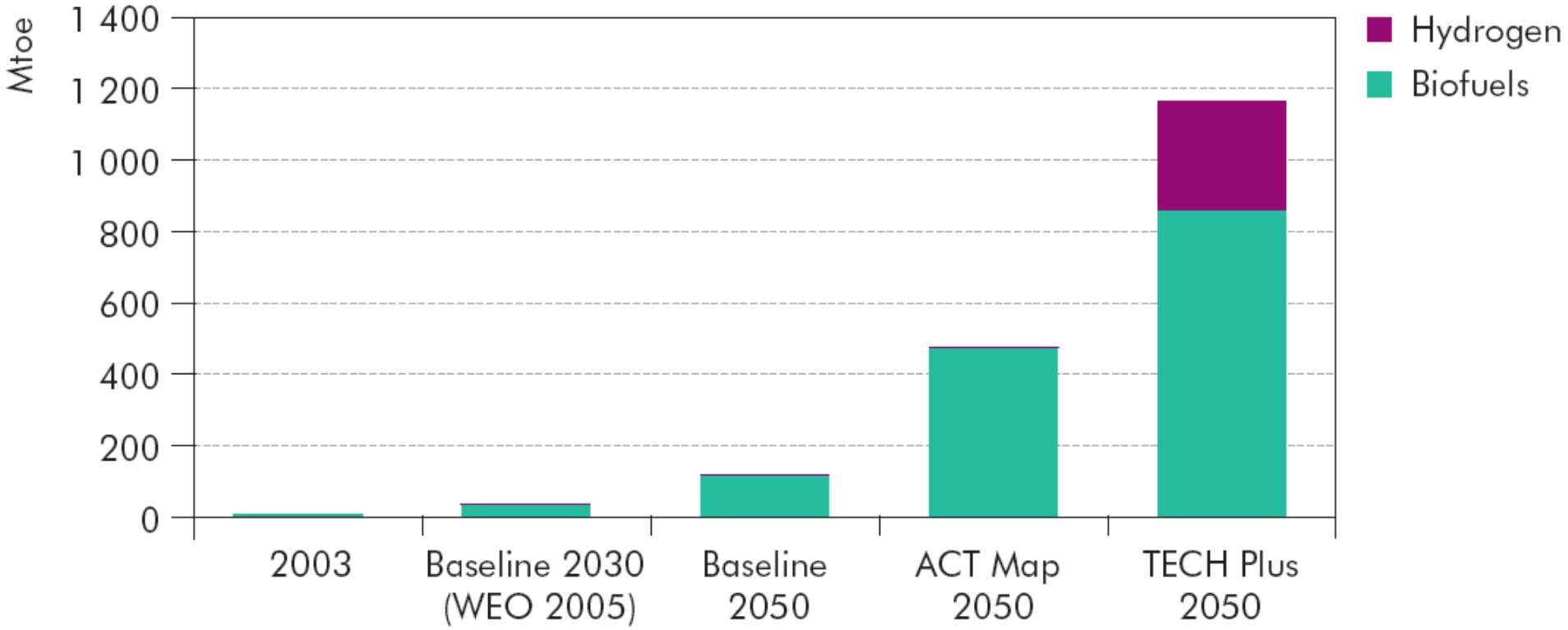
TECH Plus: More optimistic on progress for certain key technologies

Transport Energy Use by scenario 2003-2050



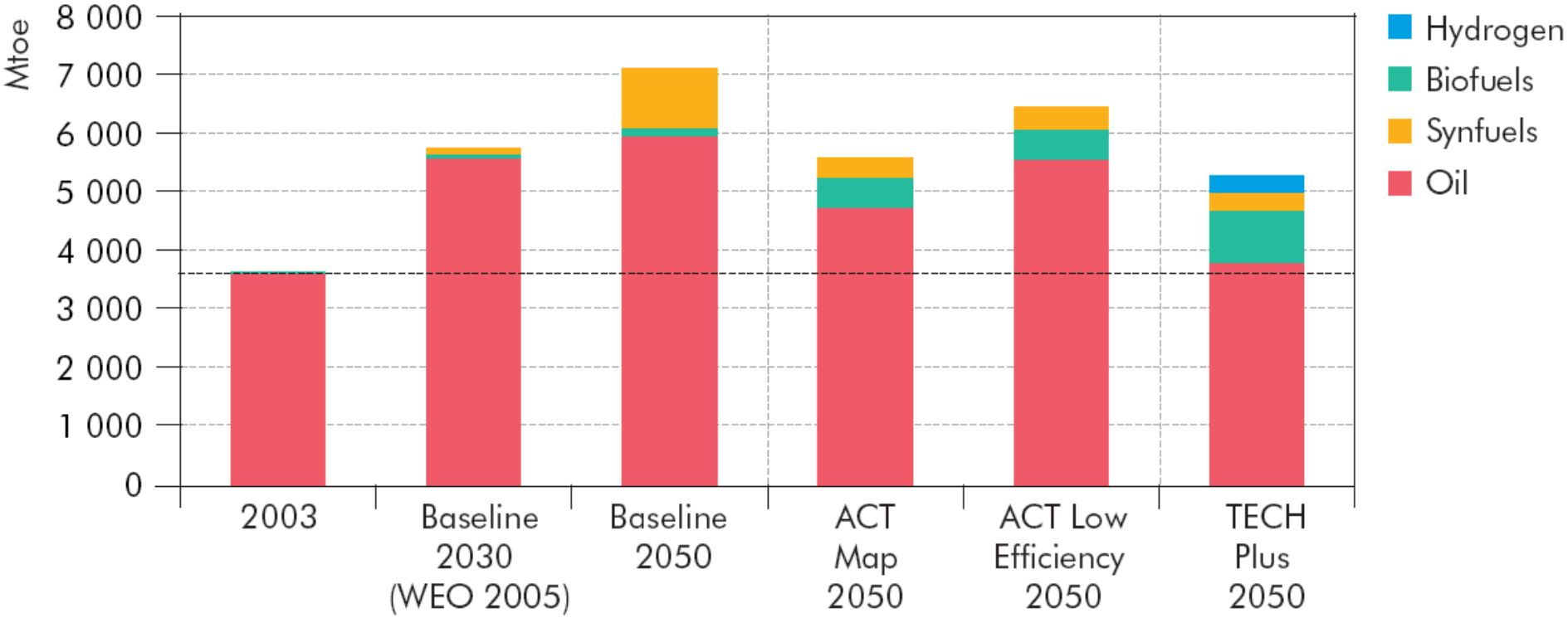
Fuel efficiency and alternative fuels reduce diesel and gasoline demand 24% below the Baseline Scenario in the ACT Map scenario and by 55% in the TECH Plus scenario.

Global use of Hydrogen & Biofuels by scenario, 2003-2050



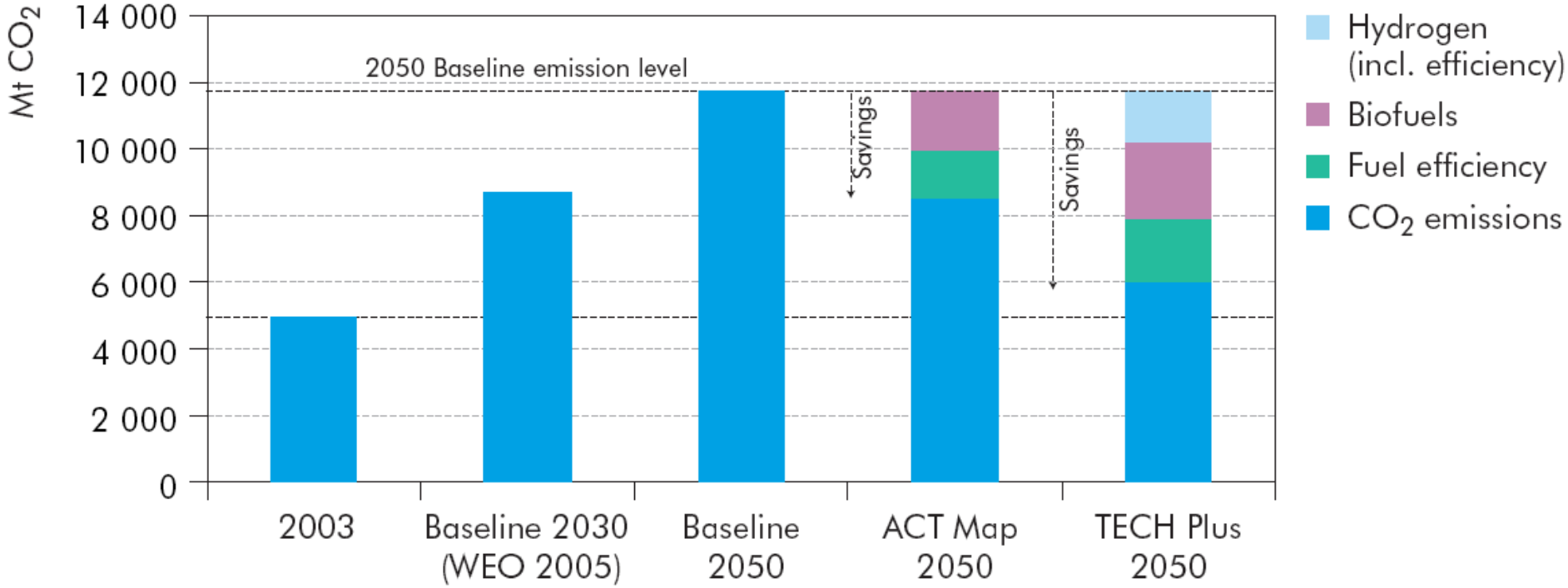
The use of biofuels grows rapidly in the ACT Map and TECH Plus scenarios.

World Liquid Fuel & Hydrogen Supply by scenario, 2003-2050



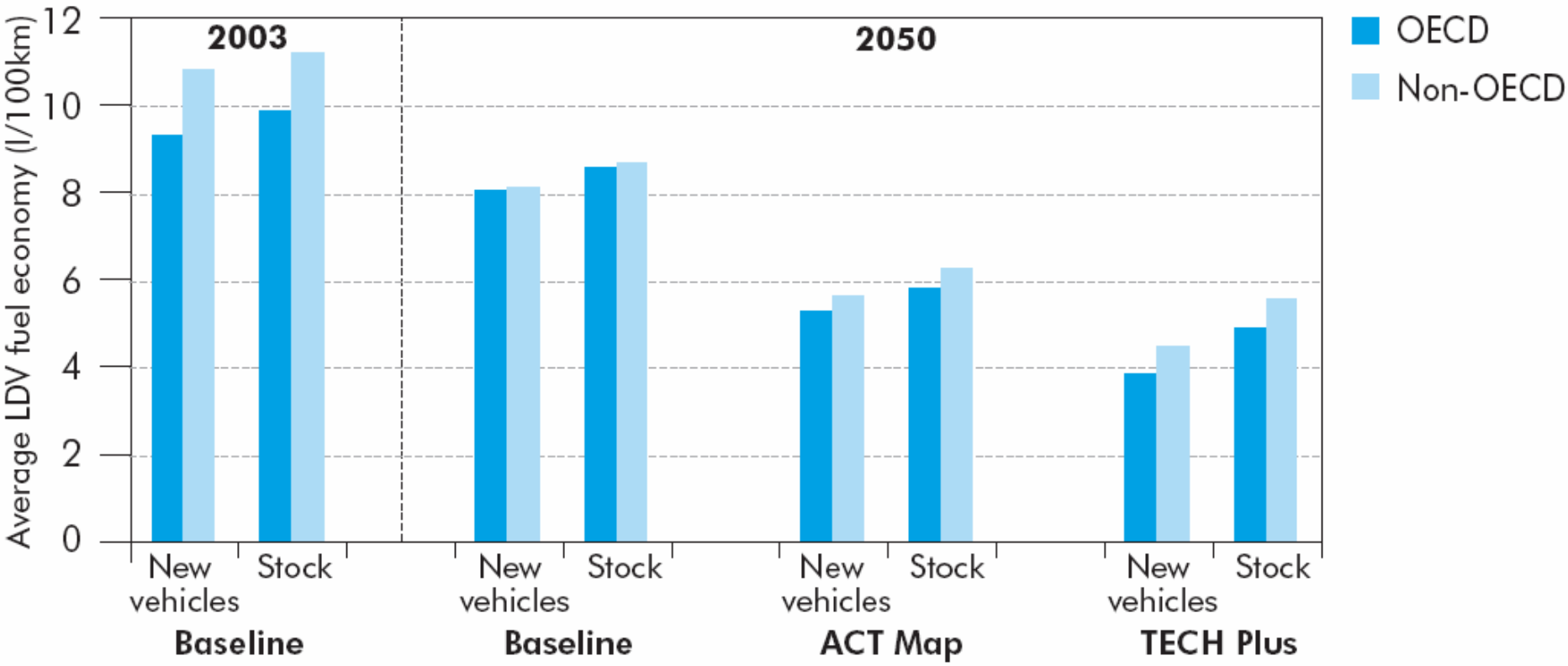
Primary oil demand in 2050 is in all ACT scenarios below the 2030 Baseline level, and is returned to around today's level in the TECH Plus scenario.

CO_2 Emissions in the Transport Sector by scenario, 2003-2050



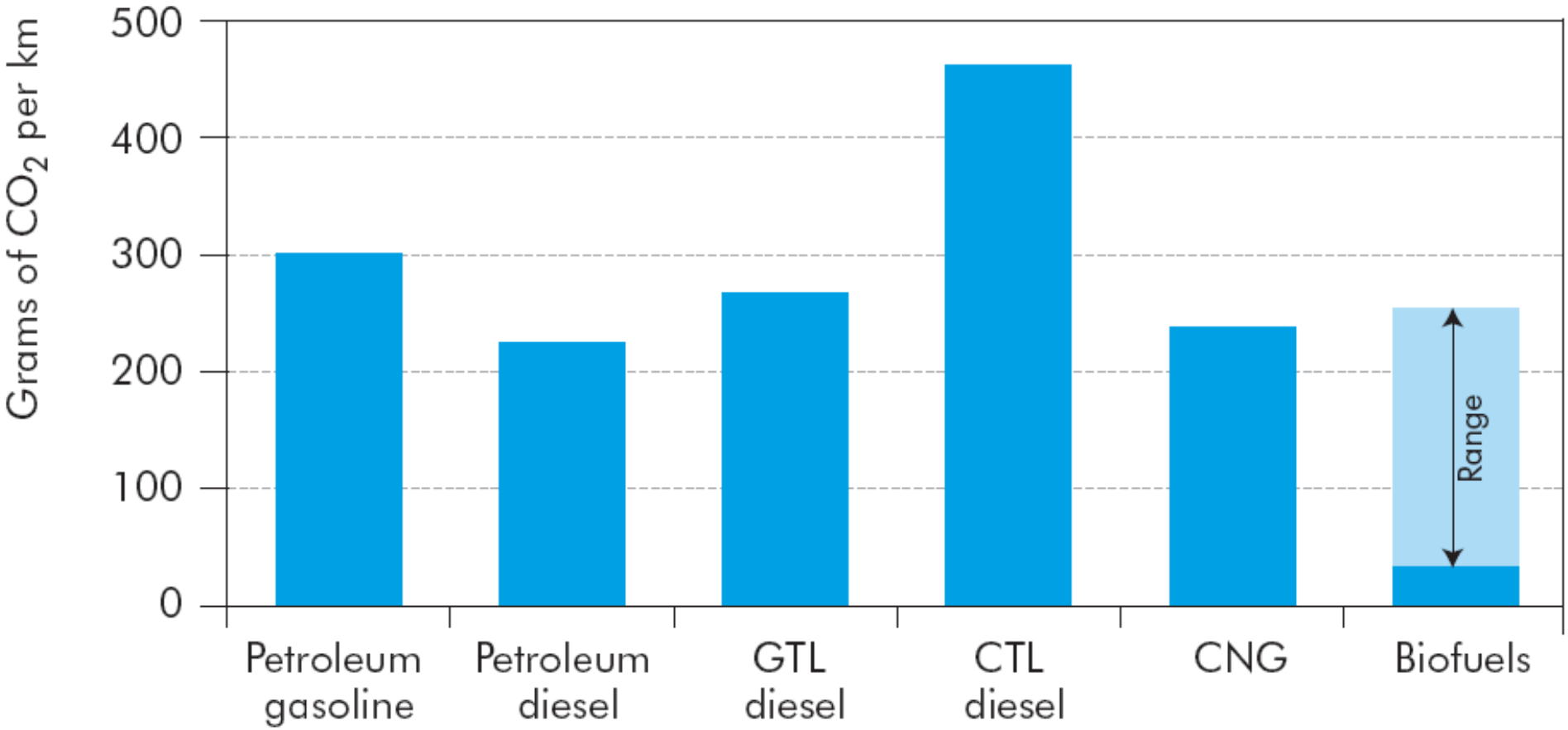
Improved fuel efficiency accounts for two-thirds and biofuels for one-third of the 28% CO_2 emissions reduction in the ACT Map scenario.

Fuel Intensity of Light-Duty Vehicles



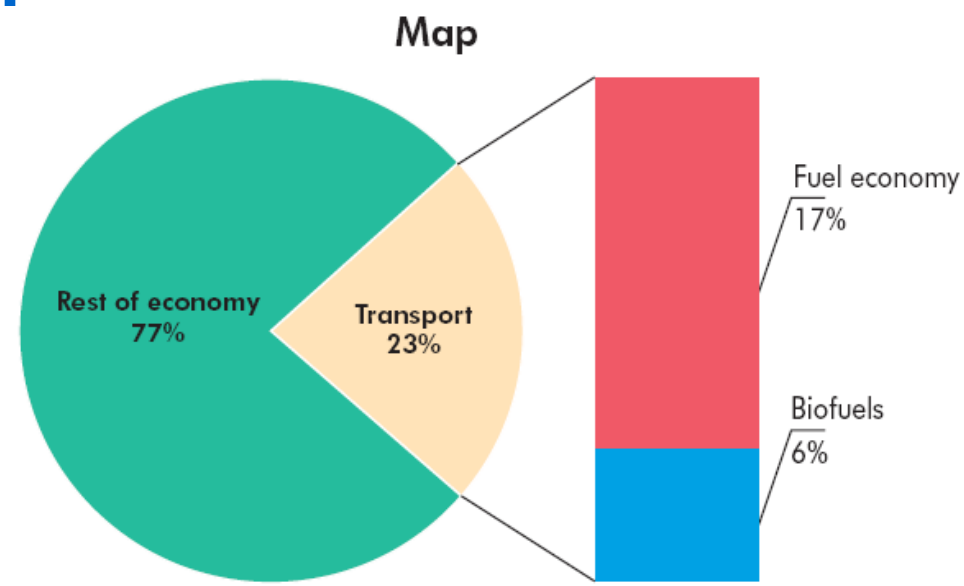
Average fuel intensity of the vehicle stock is 40% lower than the 2003 level in the ACT Map scenario and 50% lower in the TECH Plus scenario.

Well-to-wheel CO_2 Emissions by Fuel Source in the Transport Sector, 2003

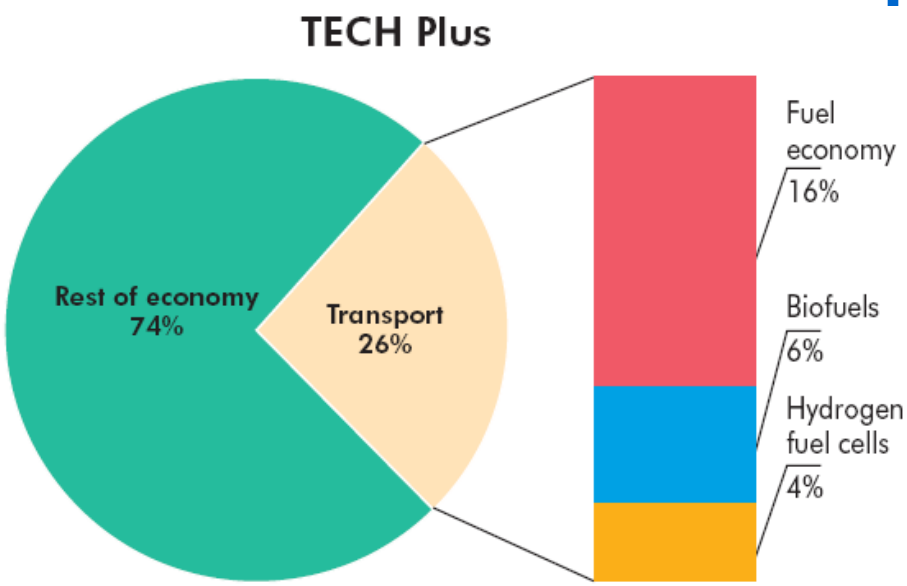


Some biofules offer very large well-to-wheel CO_2 emissions savings, but there is currently a wide range.

Share of Road Transport in the Global CO_2 Emissions Reduction Relative to Baseline scenario in the Map and TECH Plus scenarios 2050

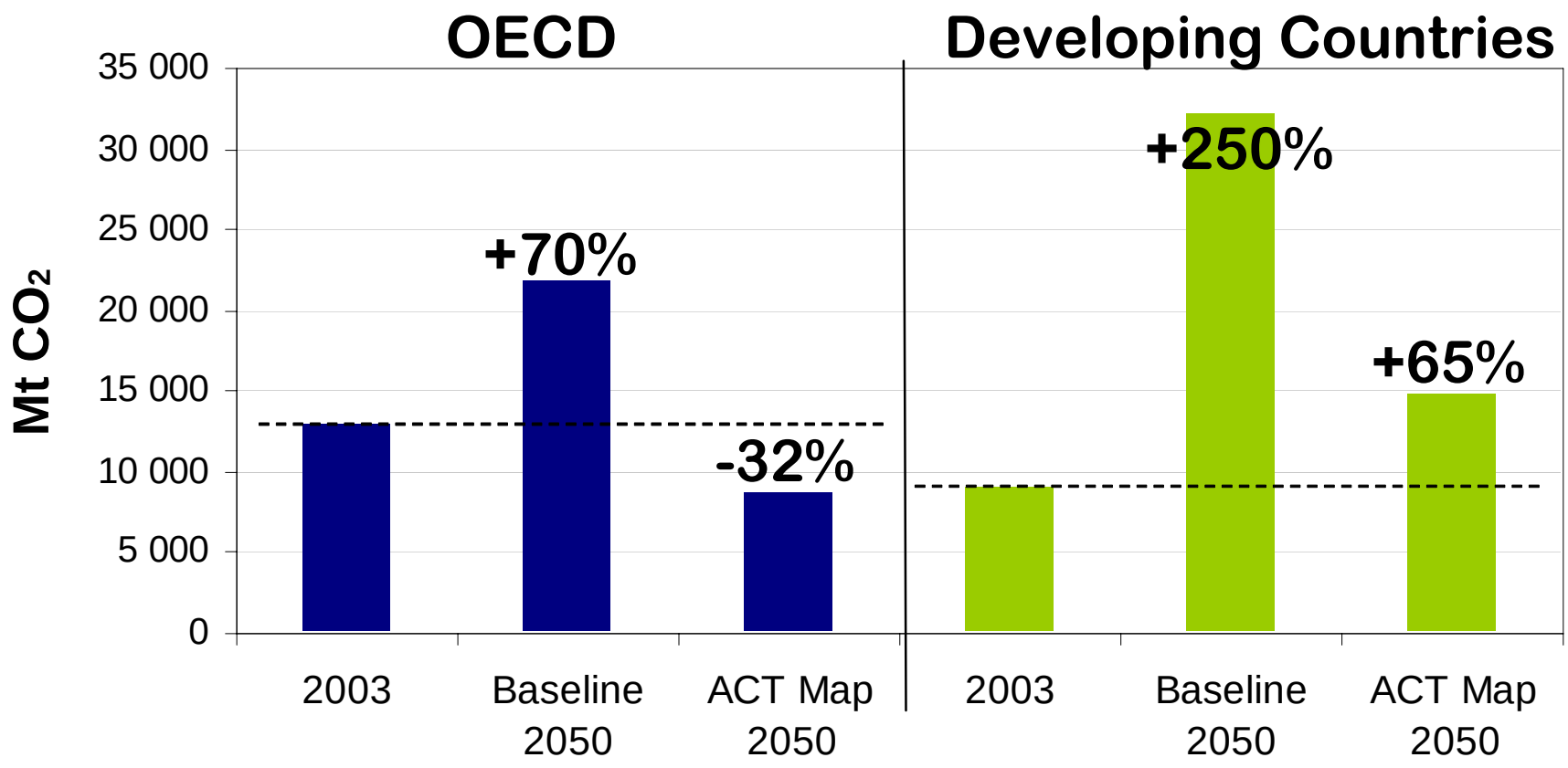


Total CO_2 emissions reduction: 32.1 Gt



Total CO_2 emissions reduction: 37.4 Gt

CO_2 Emissions
Baseline and Map Scenarios



Map: OECD Emissions 32% below 2003 level, while emissions in Developing Countries are 65% higher.

Scenario Analysis
Key Findings

- Most energy still comes from fossil fuels in 2050
- CO_2 emissions can be returned towards today's level by 2050
- Growth in oil and electricity demand can be halved
- Power generation can be substantially de-carbonised by 2050
- De-carbonising transport will take longer but must be achieved in the second half of the century

Technology Implications

- A technology portfolio will be needed
- Improving transport sector energy efficiency is top priority
- Alternative fuels, especially biofules will make contributions to sustainable energy future
- In time and with effort, hydrogen and fuel cells

Thank you!

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