ENERGY TECHNOLOGY PERSPECTIVES 2006

Scenarios & Strategies to 2050

Energy Technology Perspectives:
Scenarios and Strategies to 2050

IEA Deputy Executive Director
Ambassador William C. Ramsay

OECD Tokyo Center – Press Conference - 14 July 2006

G8 - Gleneagles Communiqué July 2005

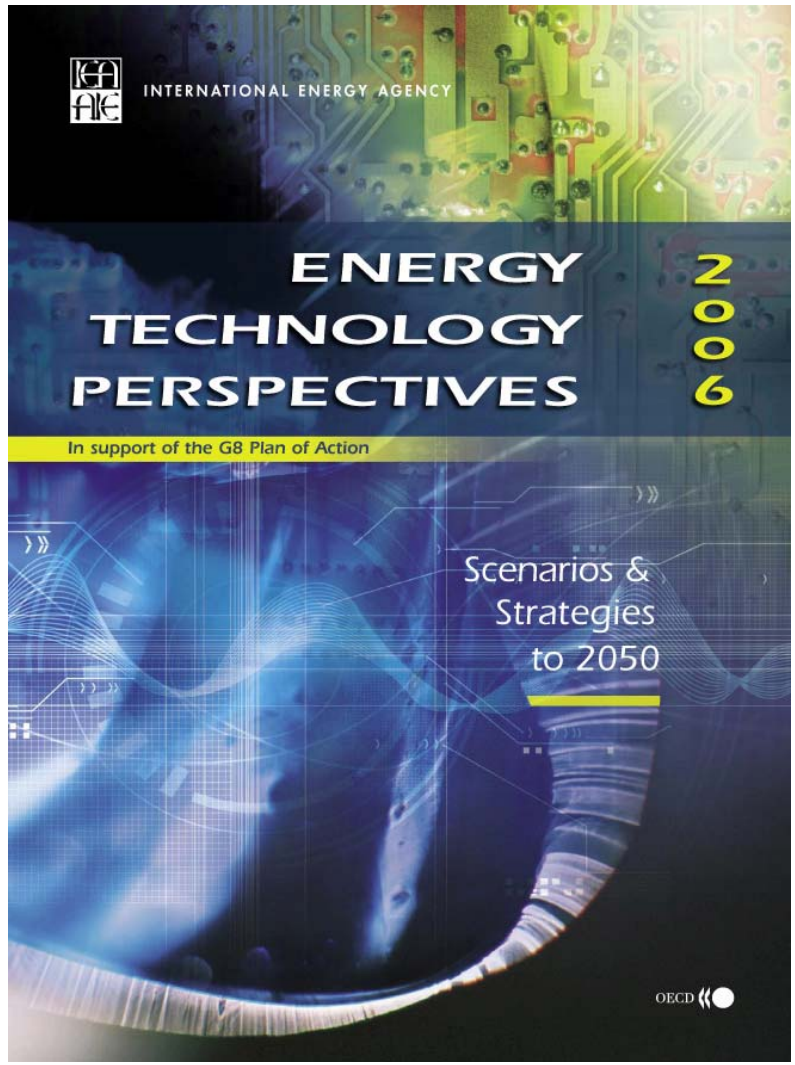
"We will act with resolve and urgency to meet our shared multiple objectives of reducing greenhouse gas emissions, improving the global environment, enhancing energy security and cutting air pollution in conjunction with our vigorous efforts to reduce poverty"

"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 G8 Summit in St. Petersburg

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



Scenario Analysis
Key Findings

- CO_2 emissions can be returned towards today's level by 2050
- Most energy still comes from fossil fuels in 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

Scenario Analysis

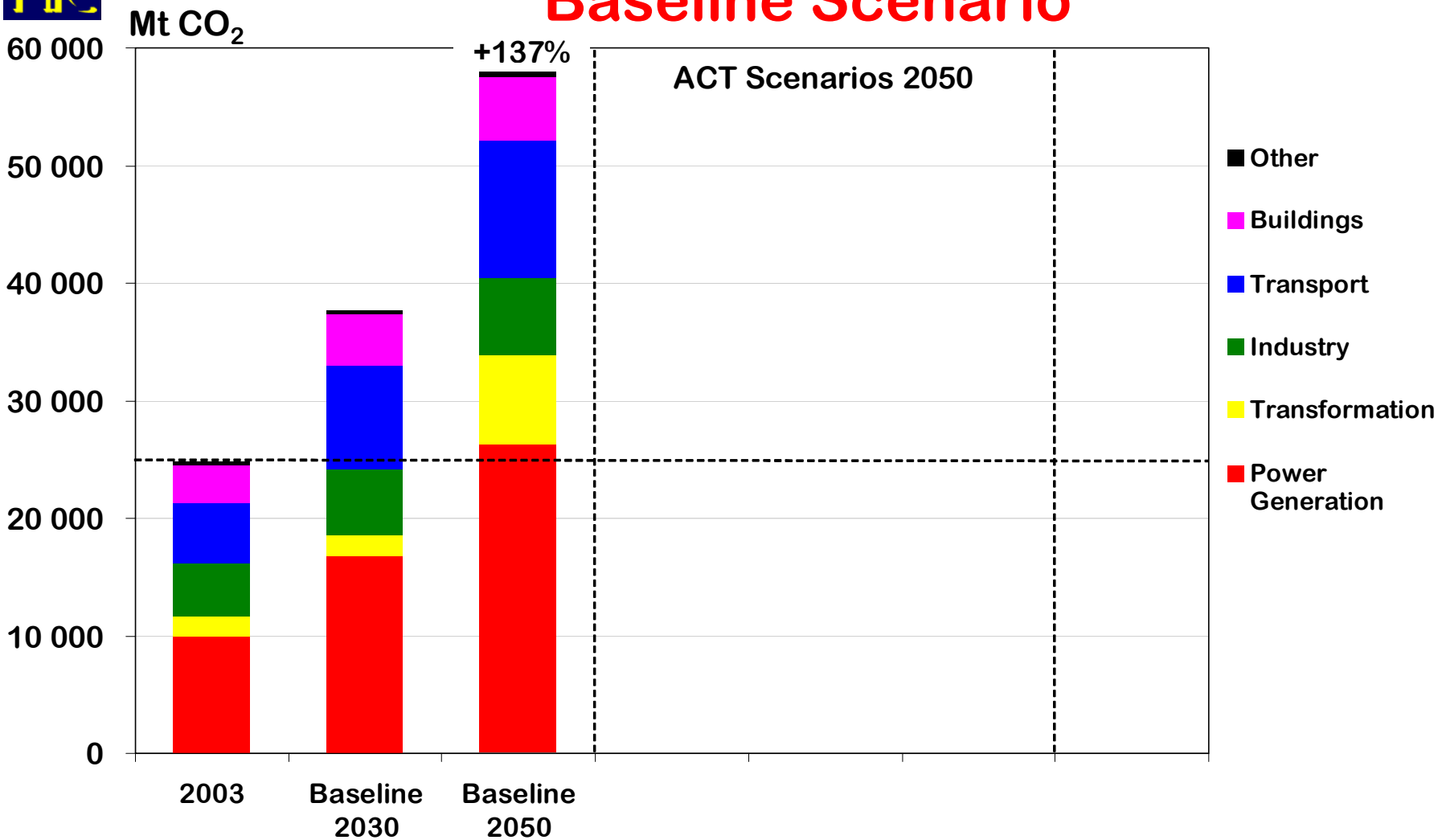
- Scenarios analysed:
  - Baseline Scenario
  - Accelerated Technology Scenarios (ACT)
  - TECH Plus scenario
- ACT and TECH Plus scenarios:
  - Analyse the impact from R&D, Demonstration and Deployment measures
  - Incentives equivalent to 25 $/tonne CO_2 for low-carbon technologies implemented world-wide from 2030 and on
  - Individual scenarios differ in terms of assumptions for key technology areas

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	

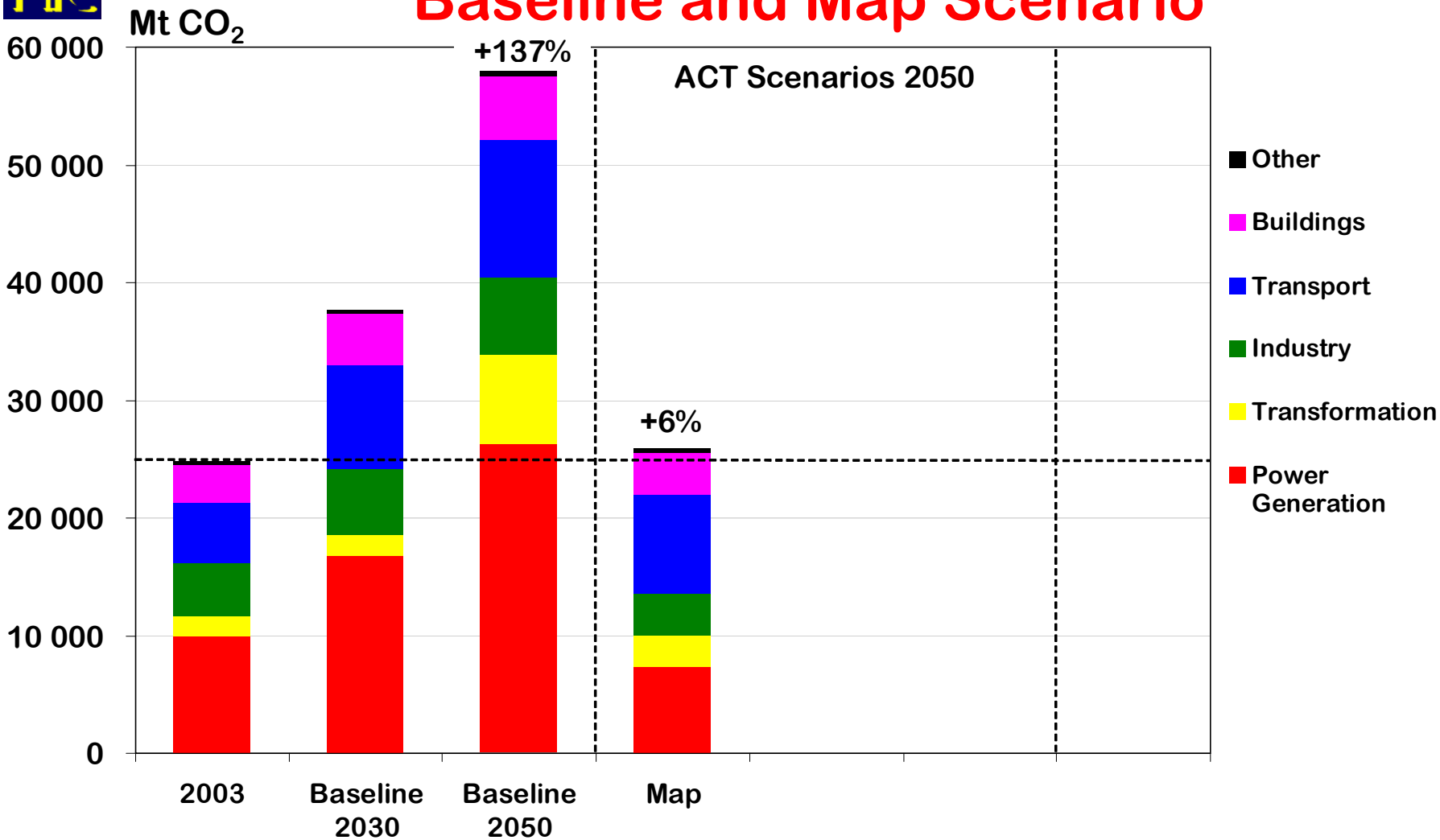
Global CO_2 Emissions 2003-2050

Baseline Scenario



Emissions increase 137% from today's level

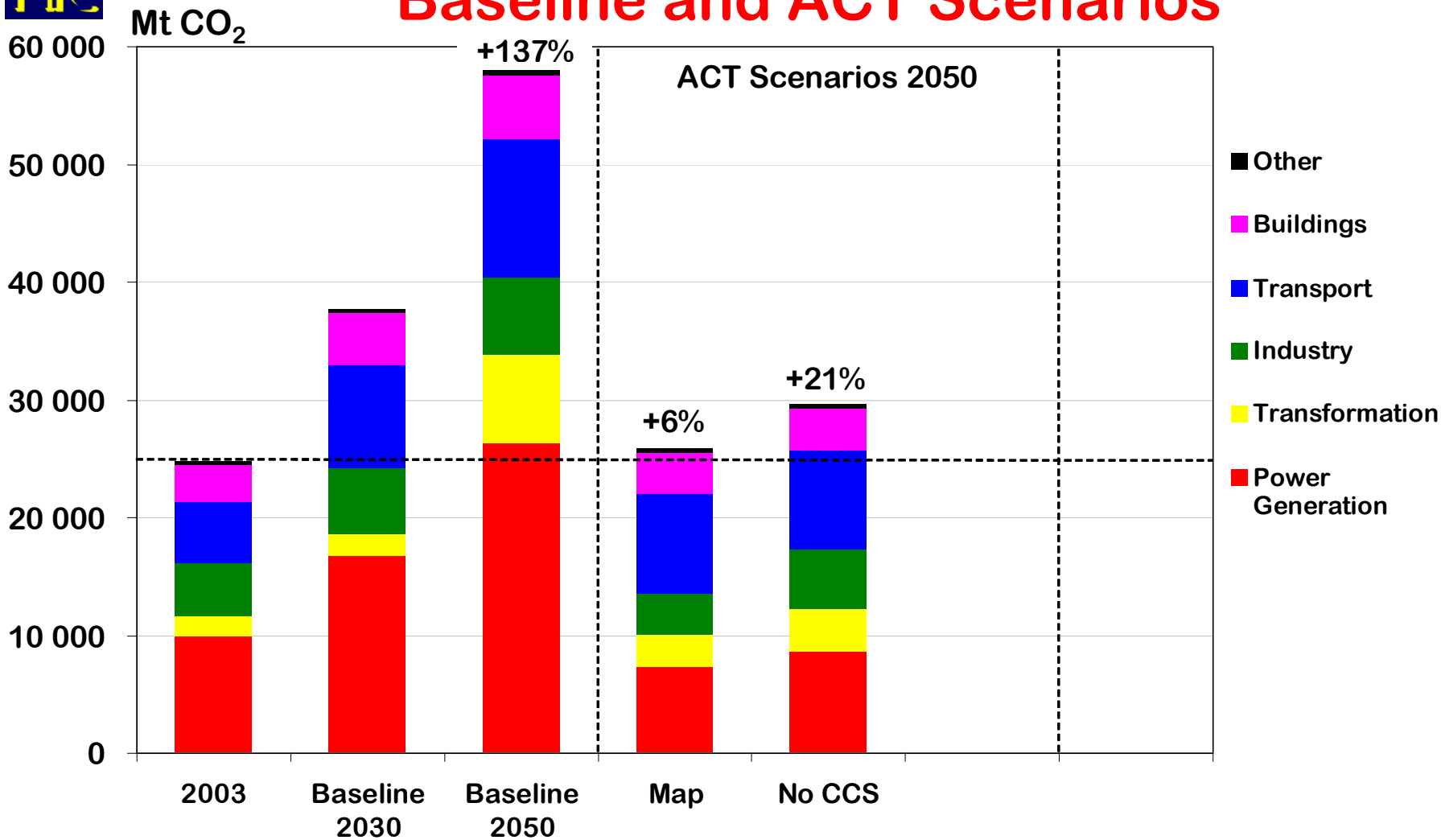
Global CO_2 Emissions 2003-2050
Baseline and Map Scenario



Map Scenario (Relatively optimistic across all technology areas) : Emissions returned towards today's level

Global CO_2 Emissions 2003-2050

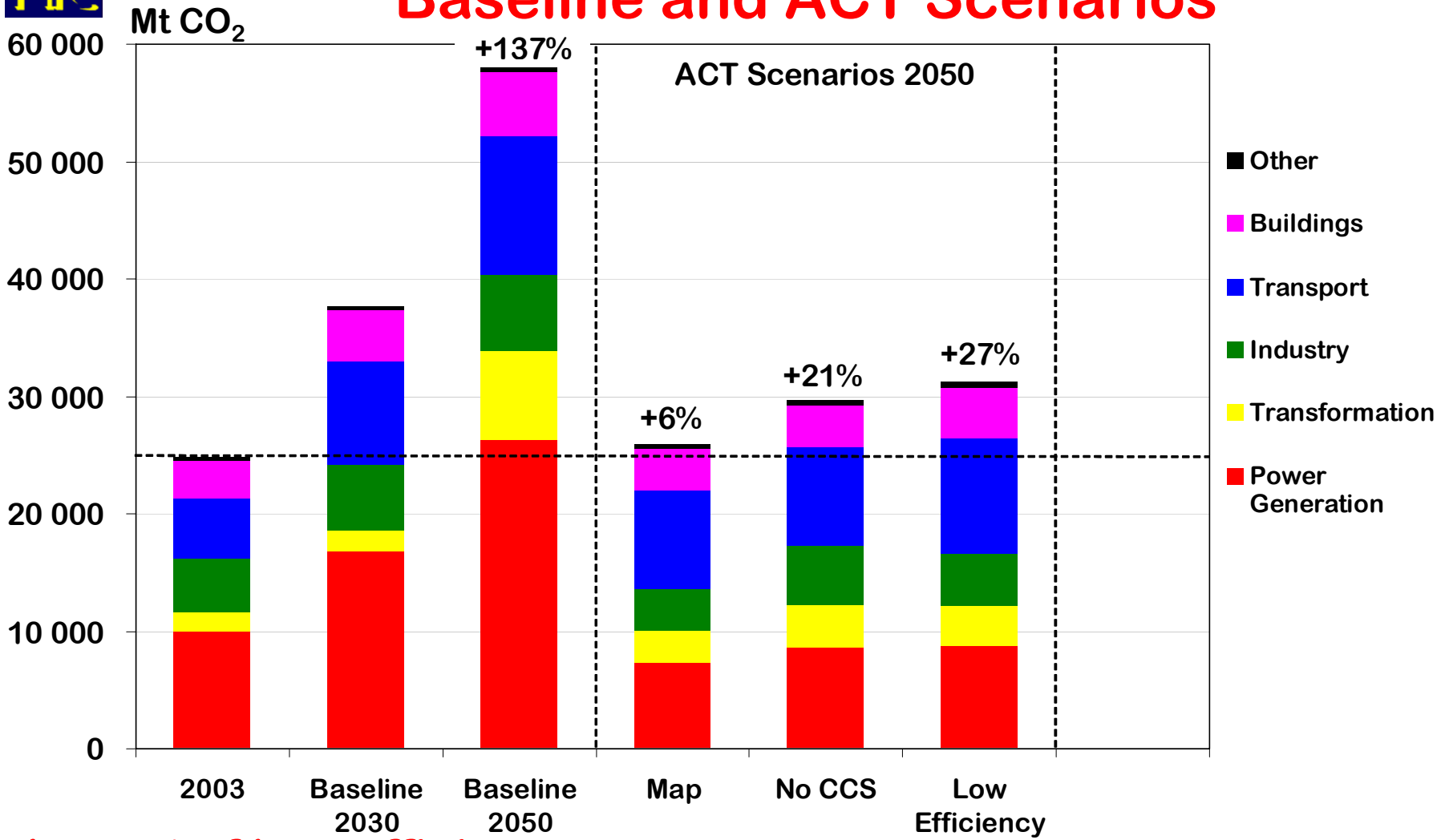
Baseline and ACT Scenarios



Impact of not having CCS available

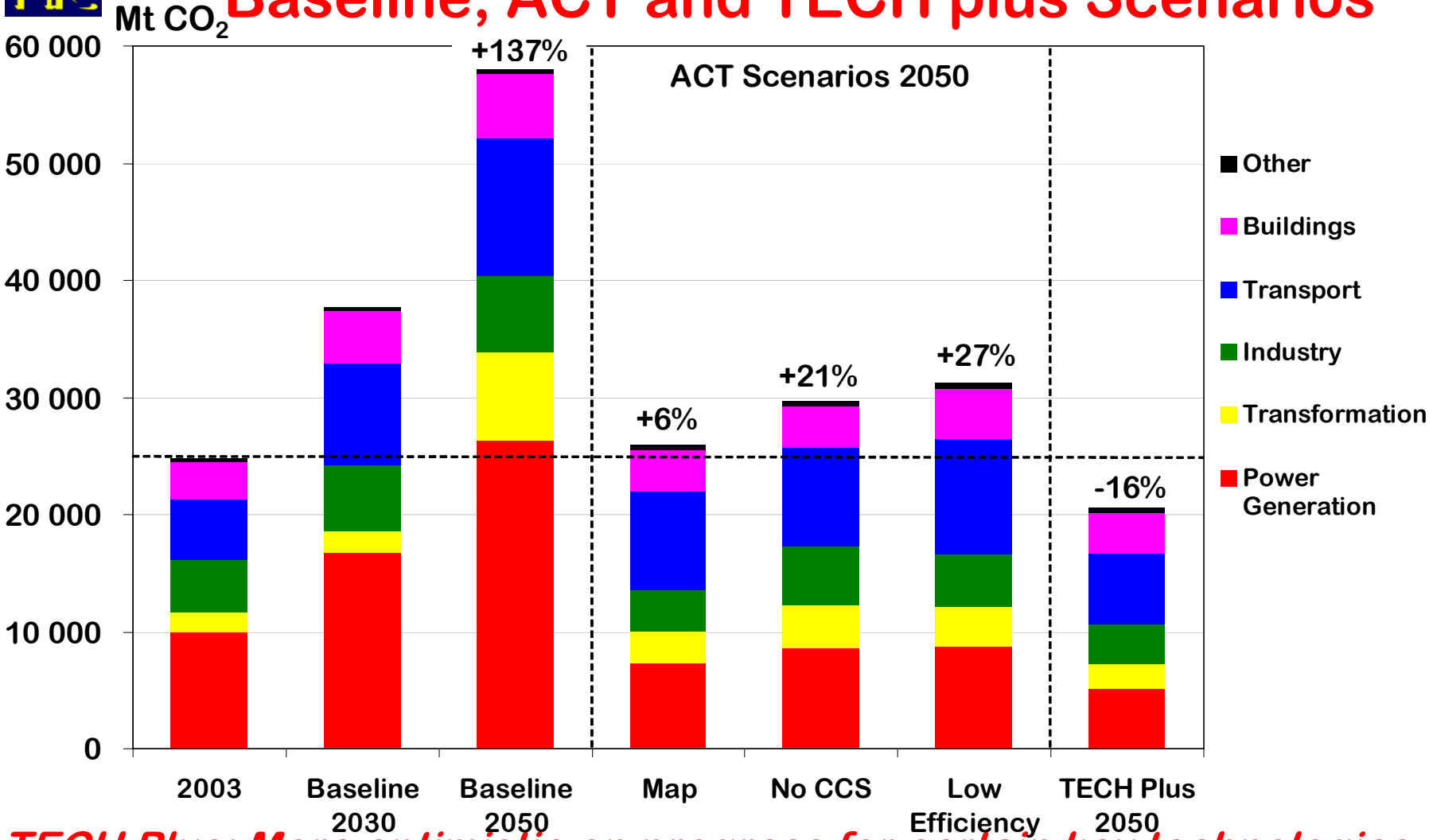
Global CO_2 Emissions 2003-2050

Baseline and ACT Scenarios



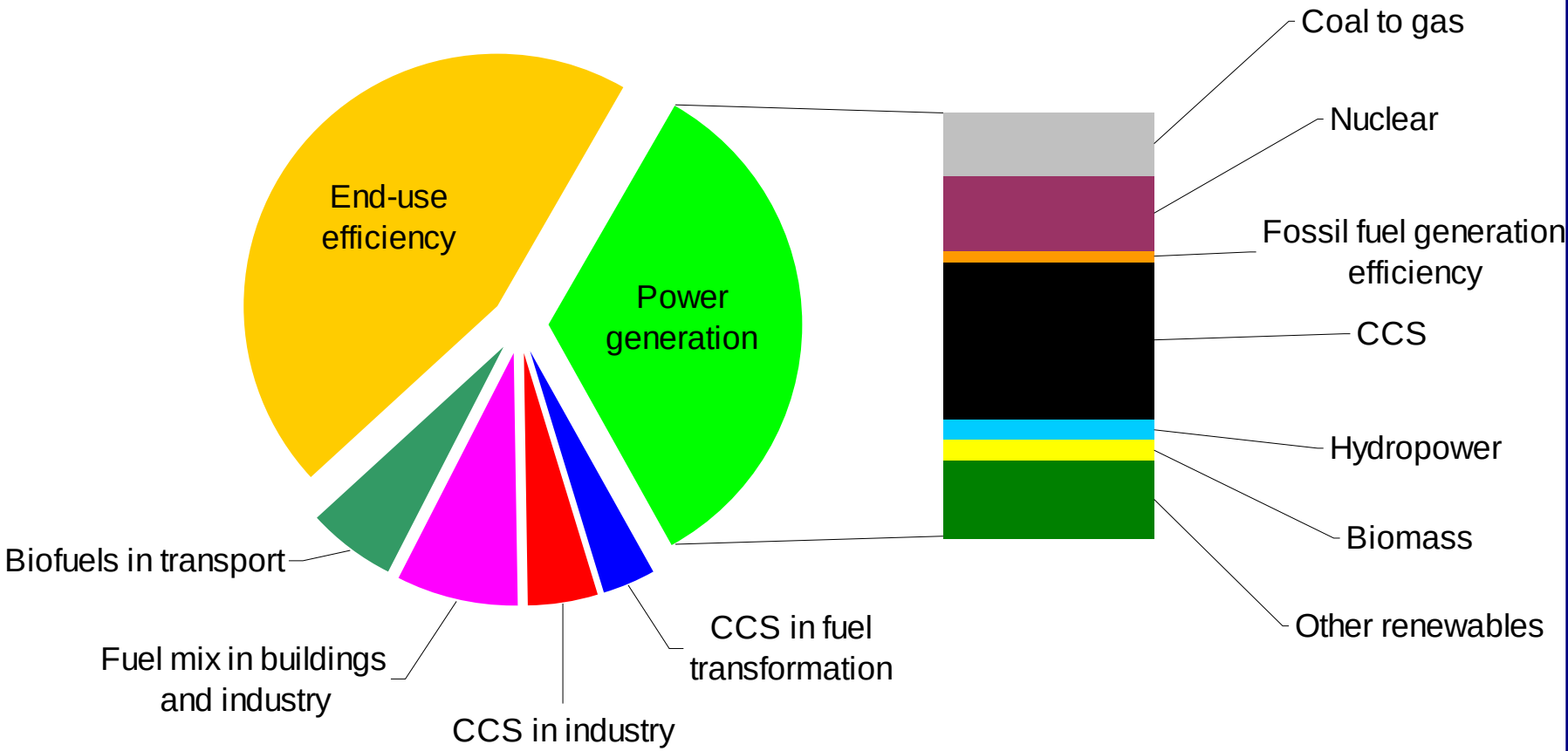
Impact of less efficiency progress

Global CO_2 Emissions 2003-2050
Baseline, ACT and TECH plus Scenarios



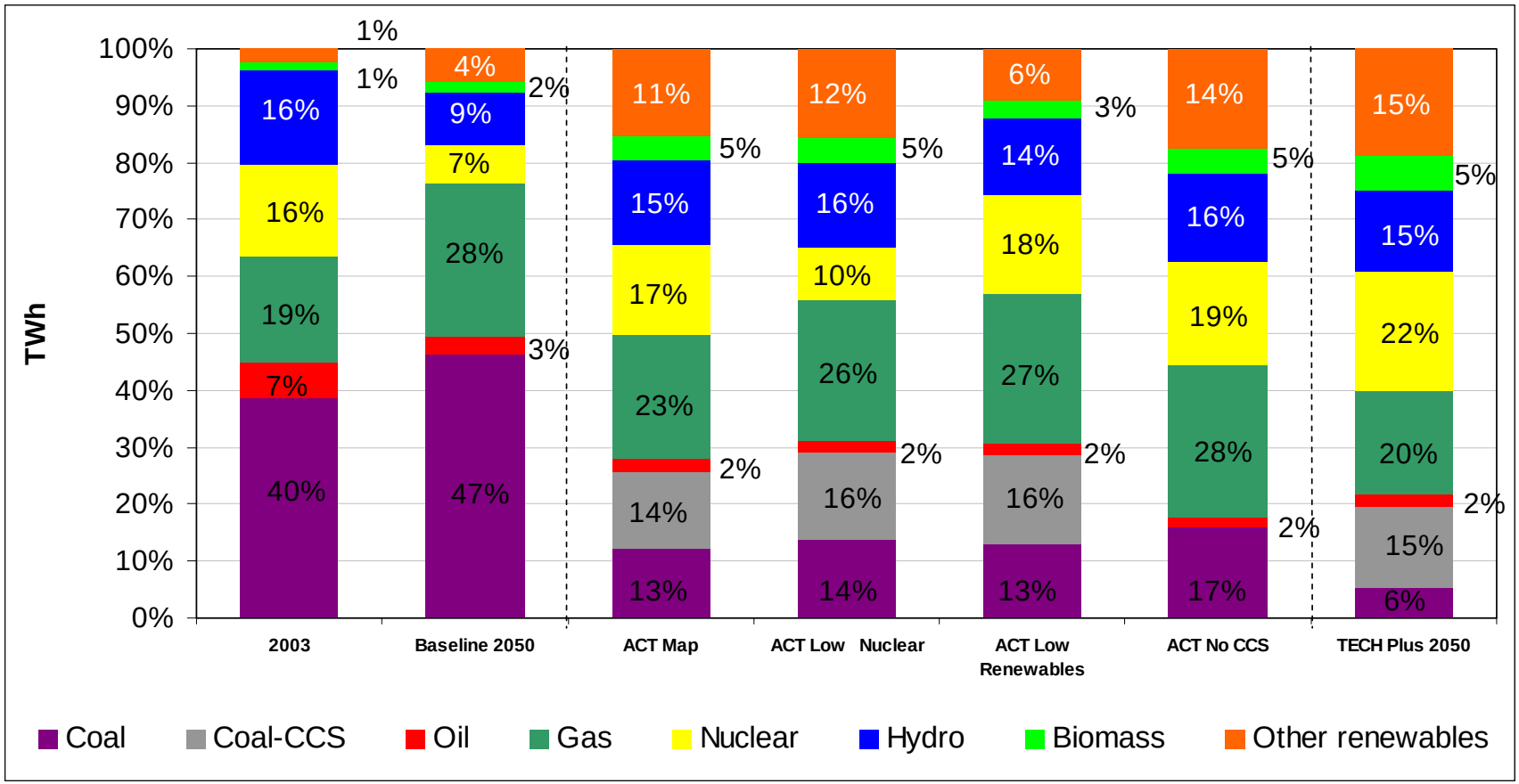
TECH Plus: More optimistic on progress for certain key technologies

Emission Reduction by Technology Area
ACT Map Scenario



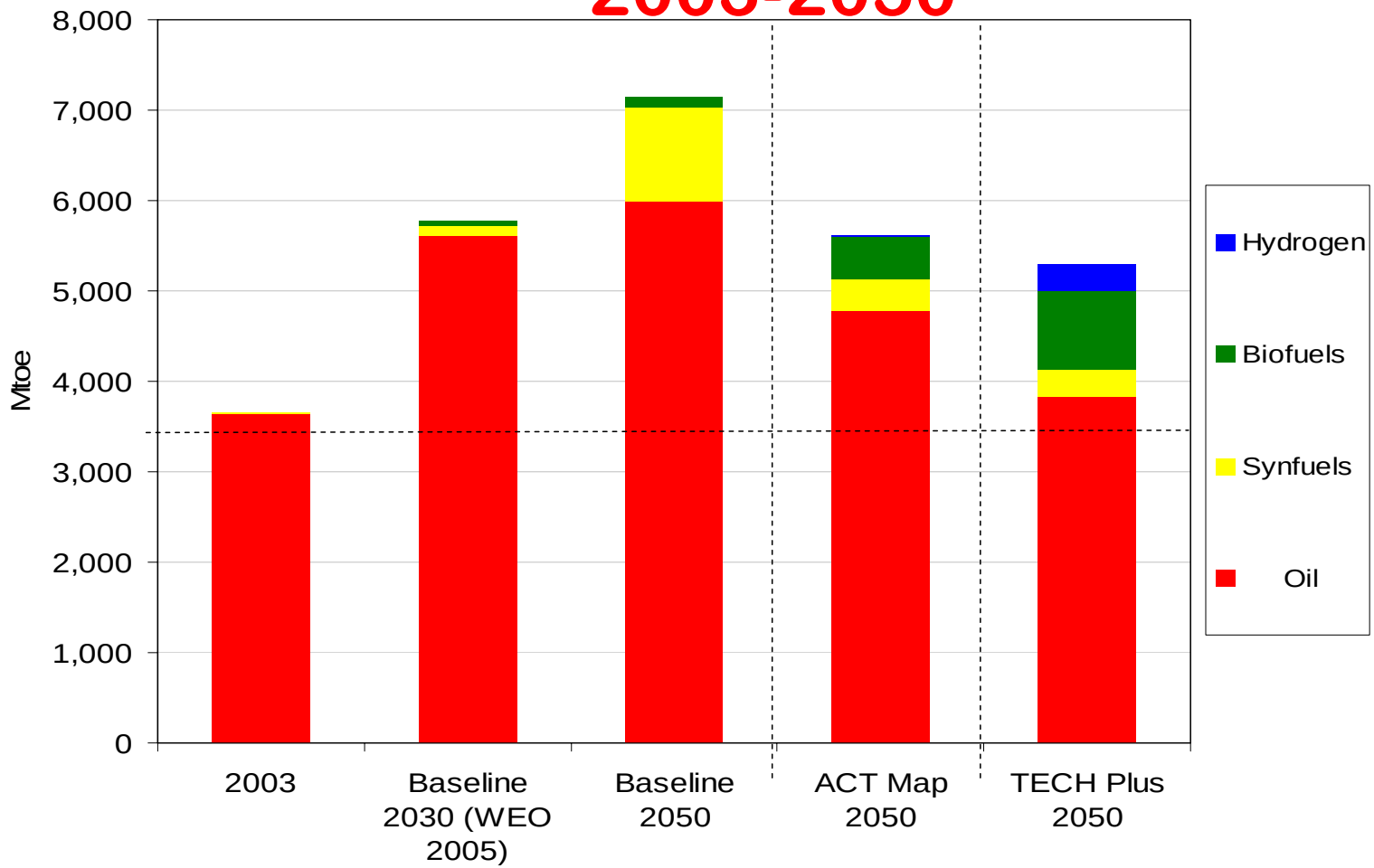
Improved energy efficiency most important contributor to reduced emissions

Global Electricity Generation by Fuel



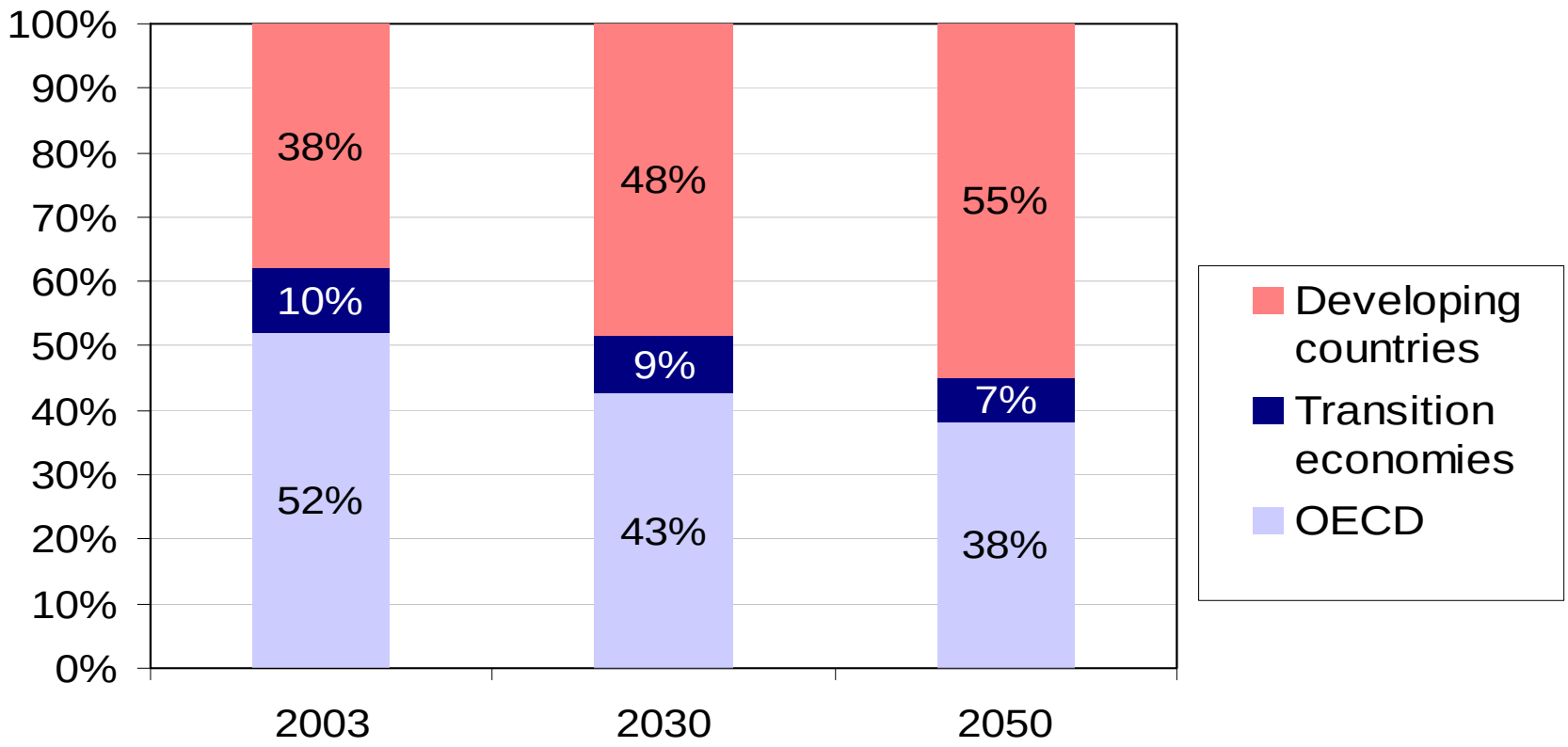
ACT Scenarios: Important role for CCS and strong growth in the shares for renewables and nuclear

World Liquid Fuel Supply by Scenario 2003-2050



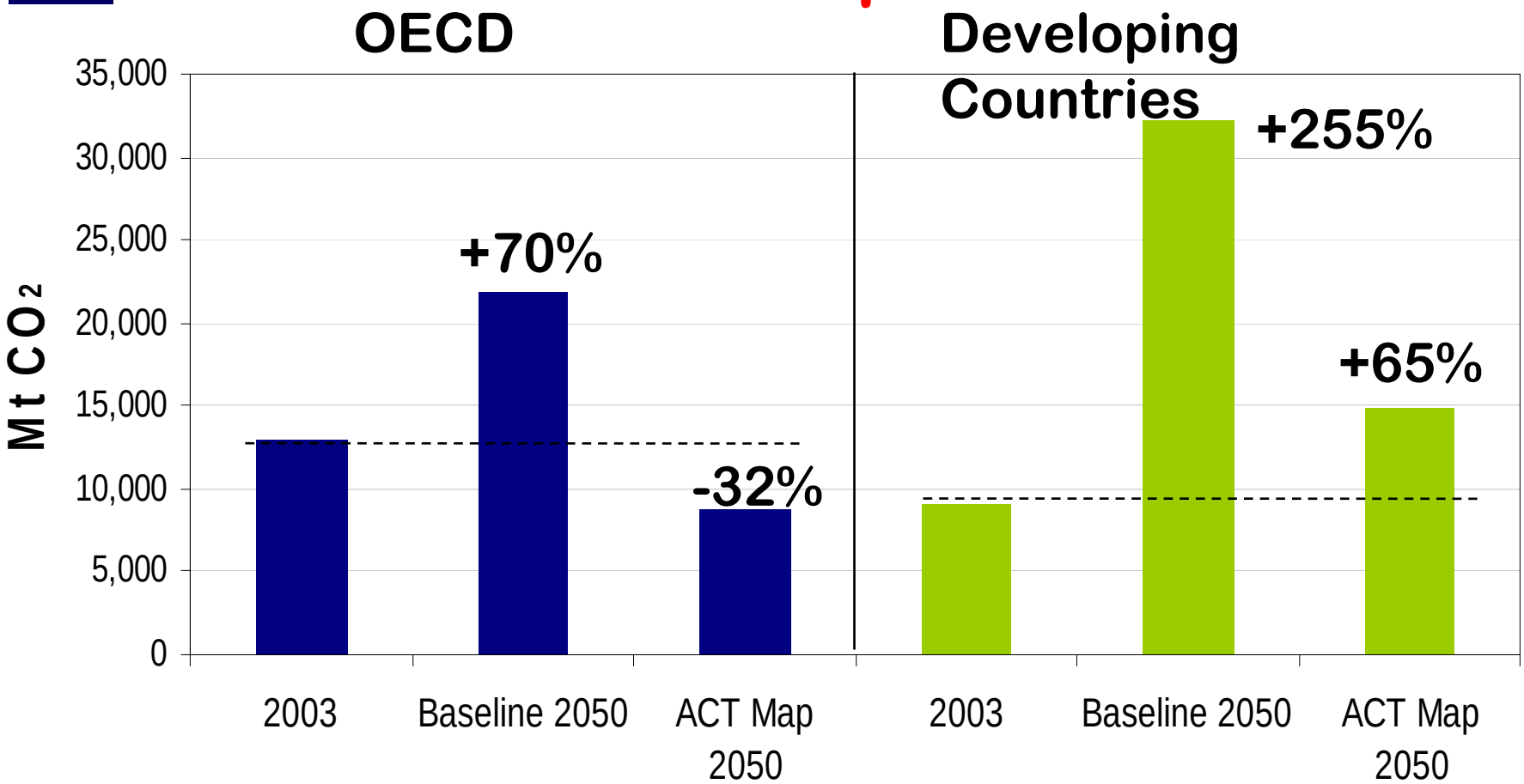
Primary oil demand is below 2030 baseline level, and is returned to about today's level in TECH Plus

Primary Energy Demand by Region
Baseline Scenario



By 2050 developing countries account for 55% of global energy demand

CO_2 Emissions
Baseline and Map Scenarios



Map: OECD Emissions one-third below 2003 level, while emissions in Developing Countries are two-thirds higher

Insights from the Scenario Analysis

Energy Efficiency - A top Priority

- Improved energy efficiency saves about 15 000 Mt CO_2 by 2050 - equivalent to 60% of current emissions
- Improved efficiency halves expected growth in electricity demand and reduces the need for generation capacity by a third
- In a scenario with less progress in efficiency, CO_2 emissions increase more than 20%
- Lower efficiency progress increases supply-side investments and costs of reducing CO_2 emissions

Electricity Generation

- CCS is crucial for the role coal can play in a CO_2 constrained world – without CCS coal-fired generation in 2050 drops below today's level
- By 2050 more than 5 000 TWh electricity globally can be produced by coal-plants equipped with CCS
- There is an urgent need for more R&D and for full-scale CCS demonstration plants
- Generation from renewables can quadruple by 2050
- Nuclear can gain a much more important role in countries where it is acceptable

Transport
Key to Reduce Growth in Oil Demand

- Share of biofuels by 2050 is 13% and average 2050 vehicle is almost 50% more efficient than today
  - Reduce expected growth in transport oil demand by almost 50%
- Transport accounts for 62% of the 42 mb/d total oil savings by 2050, which more than halves the expected growth in total oil demand
- Hydrogen and Fuel Cells can reduce transport oil demand and CO_2 emissions even further and can be crucial for long-term sustainability

Key Technologies

- A technology portfolio will be needed
- Improving energy efficiency is top priority
- CCS is key for a sustainable energy future
- Other important technologies:
  - Renewables, including biofuels
  - Nuclear
  - Efficient use of natural gas
  - In time and with effort, hydrogen and fuel cells

Costs

- 25 $/tonne CO_2 incentive is upper limit for the incremental costs of technologies included
- Significant transitional costs for RD&D and deployment programs
- Progress in efficiency and CCS key to keep mitigation costs down

Policy Implications

- A more sustainable energy future is possible with known technology
- The costs are not out of reach
- But urgent action is needed in public and private sectors:
  - Overcome barriers for adoption of energy efficient technologies
  - Enhance R&D
  - Accelerate demonstration and deployment
  - Provide clear and predictable incentives
- Collaboration between developed and developing countries essential

International Energy Agency

for more information:

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