



Energy Technology Perspectives Scenarios and Strategies to 2050

NIES Workshop
Developing Visions for a Low Carbon Society
through Sustainable Development

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G8 - Gleneagles Communiqué July 2005

“IEA will advise on alternative energy scenarios and strategies aimed at a clean, clever and competitive energy future”.

Take part in dialogue, including developing countries

14 international programmes focussed on energy efficiency (buildings, appliances, industry, transport), clean coal, renewables and R&D collaboration

Reports to Japanese G8 Presidency in 2008



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**WORLD
ENERGY
OUTLOOK
2004**

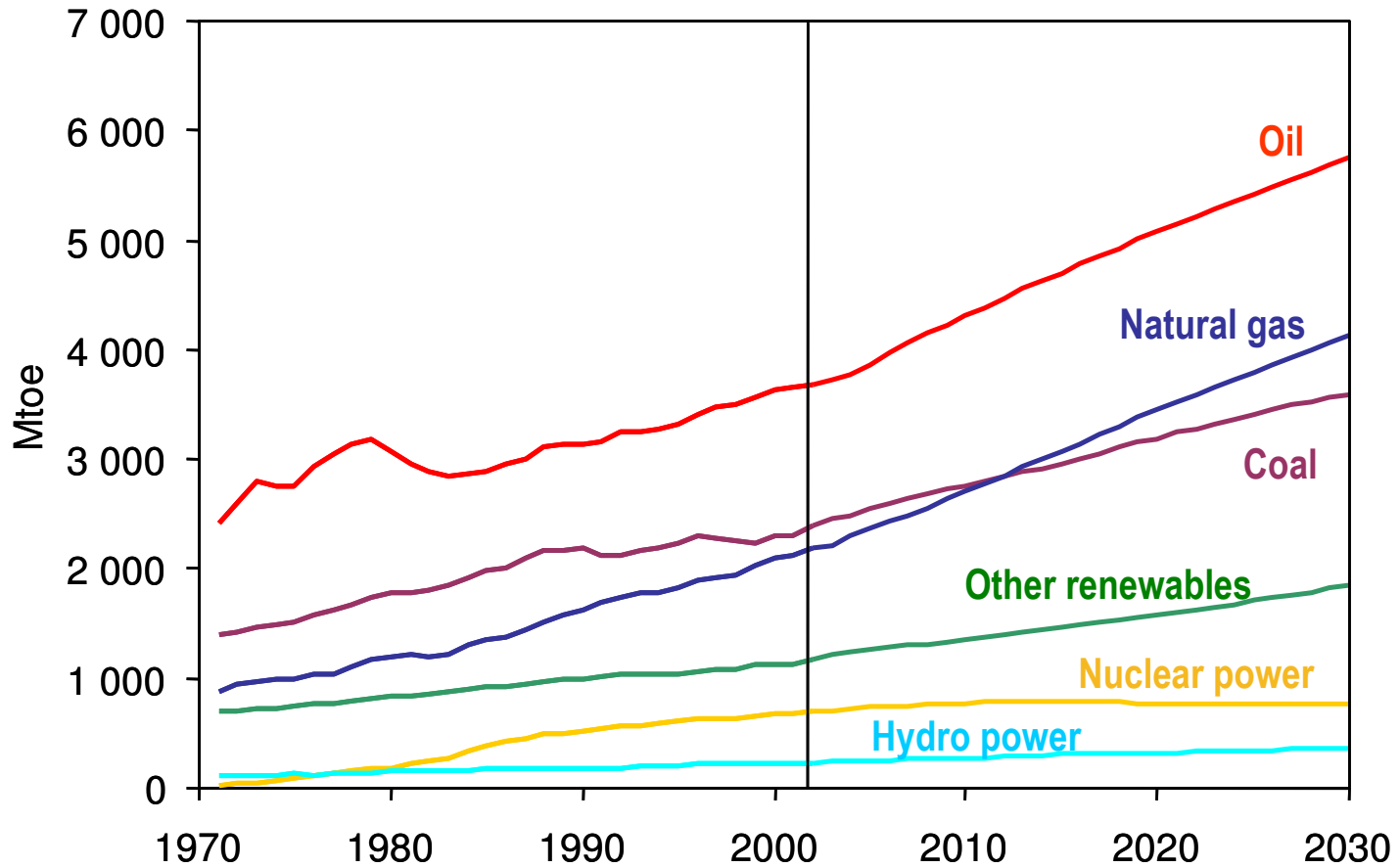
World Energy Outlook



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2004

World Primary Energy Demand



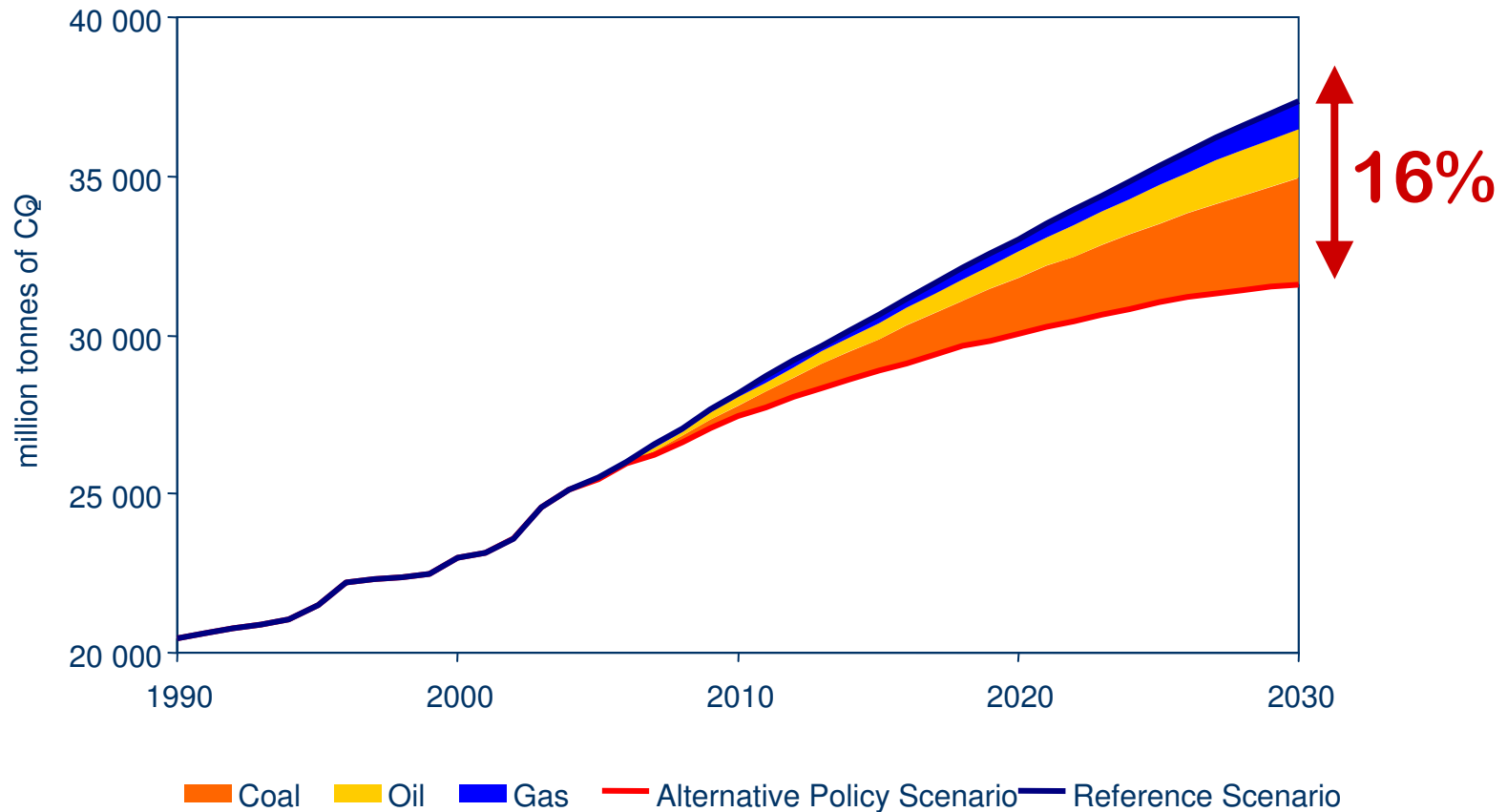
Fossil fuels account for almost 90% of the 60% growth in energy demand between now and 2030



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2004

Global CO₂ Emissions in the Reference & Alternative Scenarios



CO₂ emissions are 16% less in the Alternative scenario in 2030.

Improved energy efficiency contributes more than half to this gap.



But this is not enough...



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Energy Technology Perspectives 2006

- **Contributes to the IEA response to the G8 Plan of Action (“Advising on scenario strategies aimed at a clean, clever and competitive energy future”)**
- **This innovative work demonstrates how energy technologies can make a difference in a series of global scenarios to 2050.**





What ETP builds on

- IEAs multi-year ETP project, supported via Voluntary Contributions from Australia, Canada, Italy, Japan, Norway, Sweden, the UK and the US
- Past work on the WEO Alternative Policy Scenarios
- Extensive information base from previous ETO analyses and from IEA's Technology Network
- Substantial input from across the IEA and from a long list of external experts



ETP 2006 Focus

- Status and perspectives for key energy technologies in different sectors
- Global scenario analysis to illustrate how technologies can make a difference
 - ◆ Individual scenarios differ in terms of assumptions for nuclear, CCS, renewables, advanced biofuels, hydrogen fuel cells and energy efficiency progress
- Technology Strategies:
 - ◆ How much can different technologies deliver?
 - ◆ By when can they deliver?
 - ◆ What barriers have to be overcome to make them deliver both in the short term and over the next 3-5 decades?
 - ◆ Pathways to overcome barriers



Accelerated Technology Scenarios (ACT)

- A family of scenarios to demonstrate how technologies that are already commercial or under development can help towards a sustainable energy future
- All scenarios analyse the impact from measures to accelerated R&D, demonstration and deployment efforts as well as measures aimed at giving incentives for low-carbon technologies



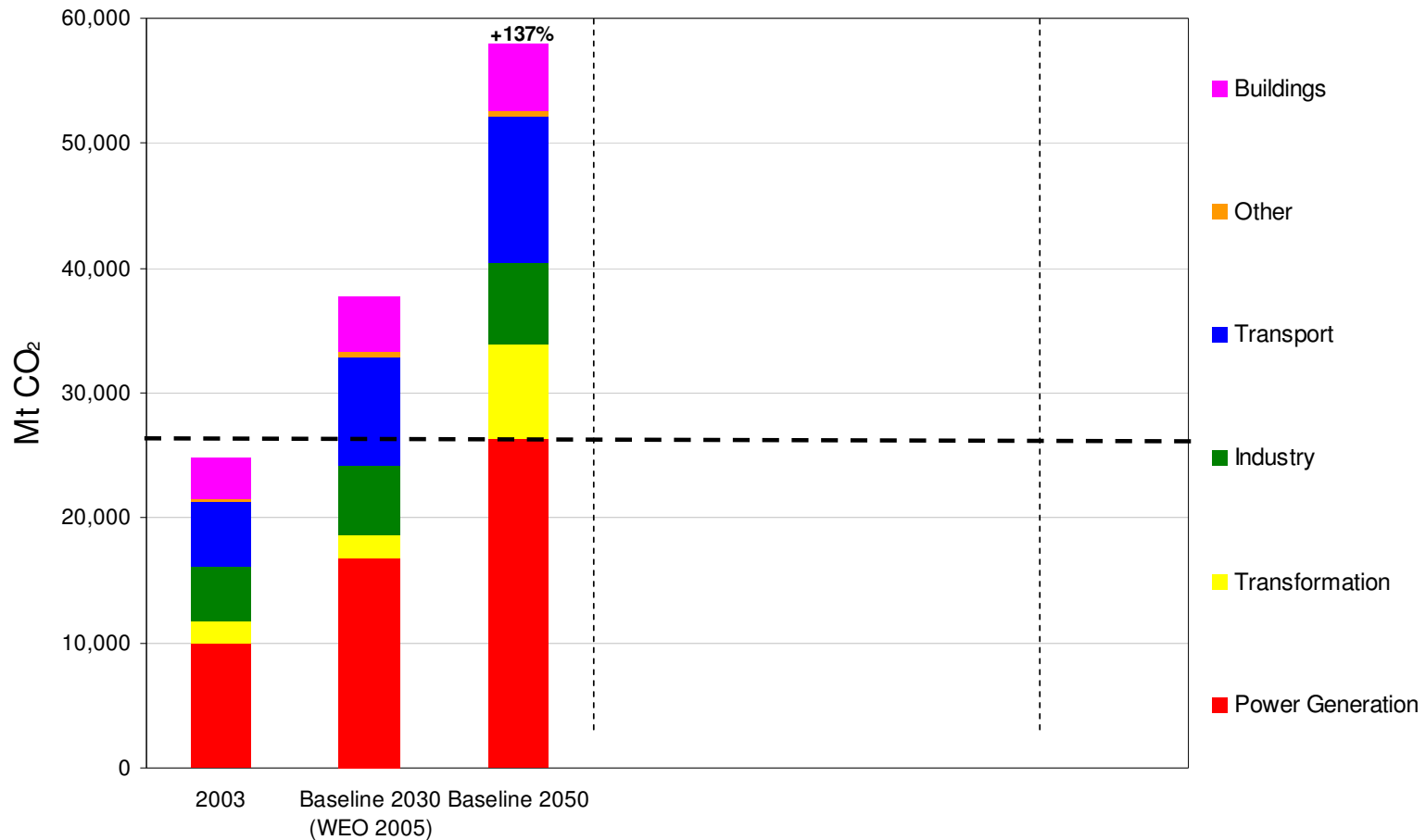
Technology Assumptions (relative to Map Scenario)

Scenario	Renewables	Nuclear	CCS	H ₂ fuel cells	Advanced biofuels	End-use efficiency
Low Renewables	Slower cost reductions					
Low Nuclear		Lower public acceptance				
No CCS			No CCS			
Low Efficiency						0.3% p.a. less improvement
TECH Plus	Stronger cost reductions	Stronger cost reductions & technology improvements		Breakthrough for FC	Stronger cost reductions & improved feedstock availability	

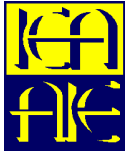


Global CO₂ Emissions 2003-2050

Baseline Scenario

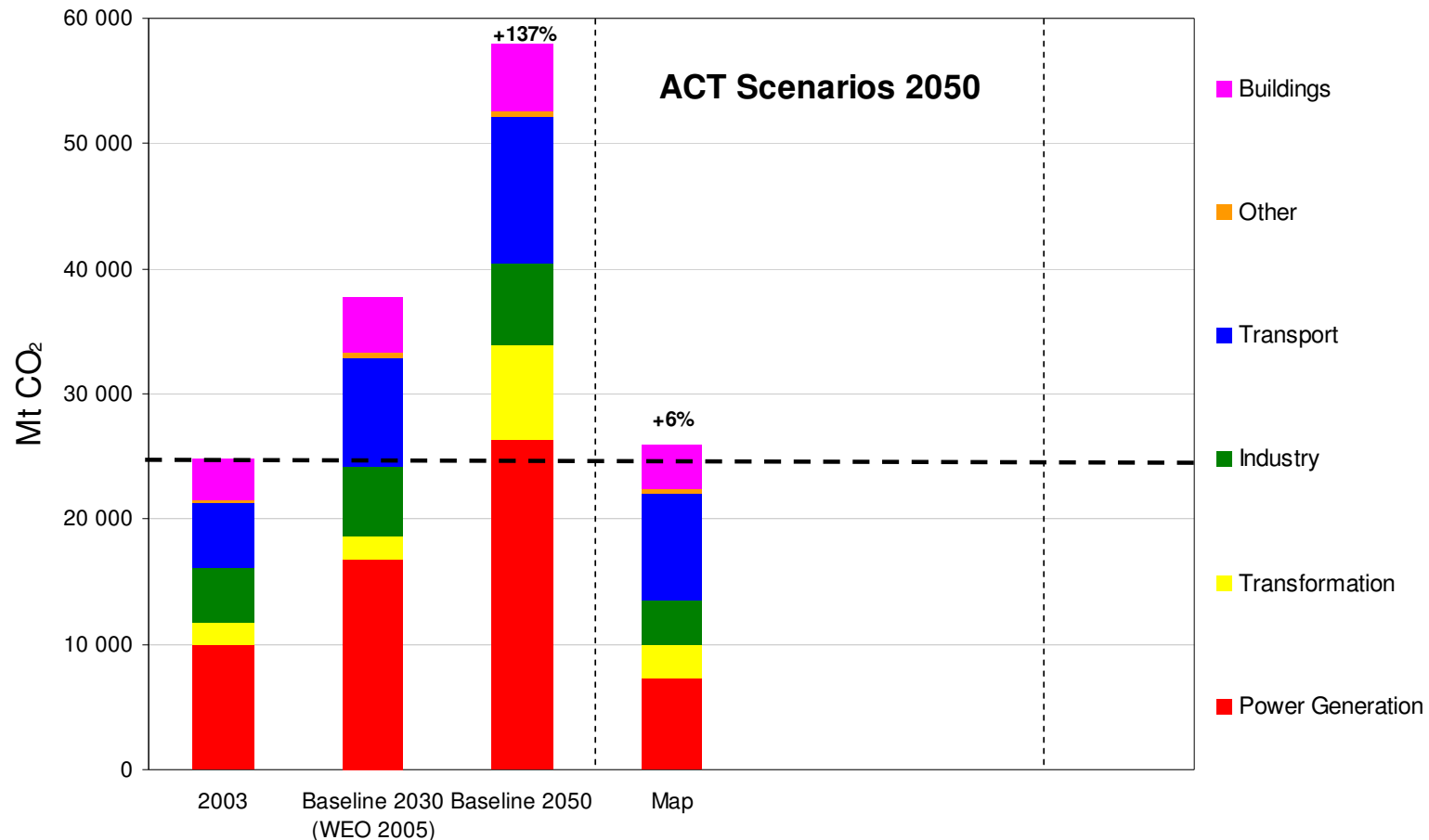


Emissions increase dramatically by 2050



Global CO₂ Emissions 2003-2050

Baseline and Map Scenario

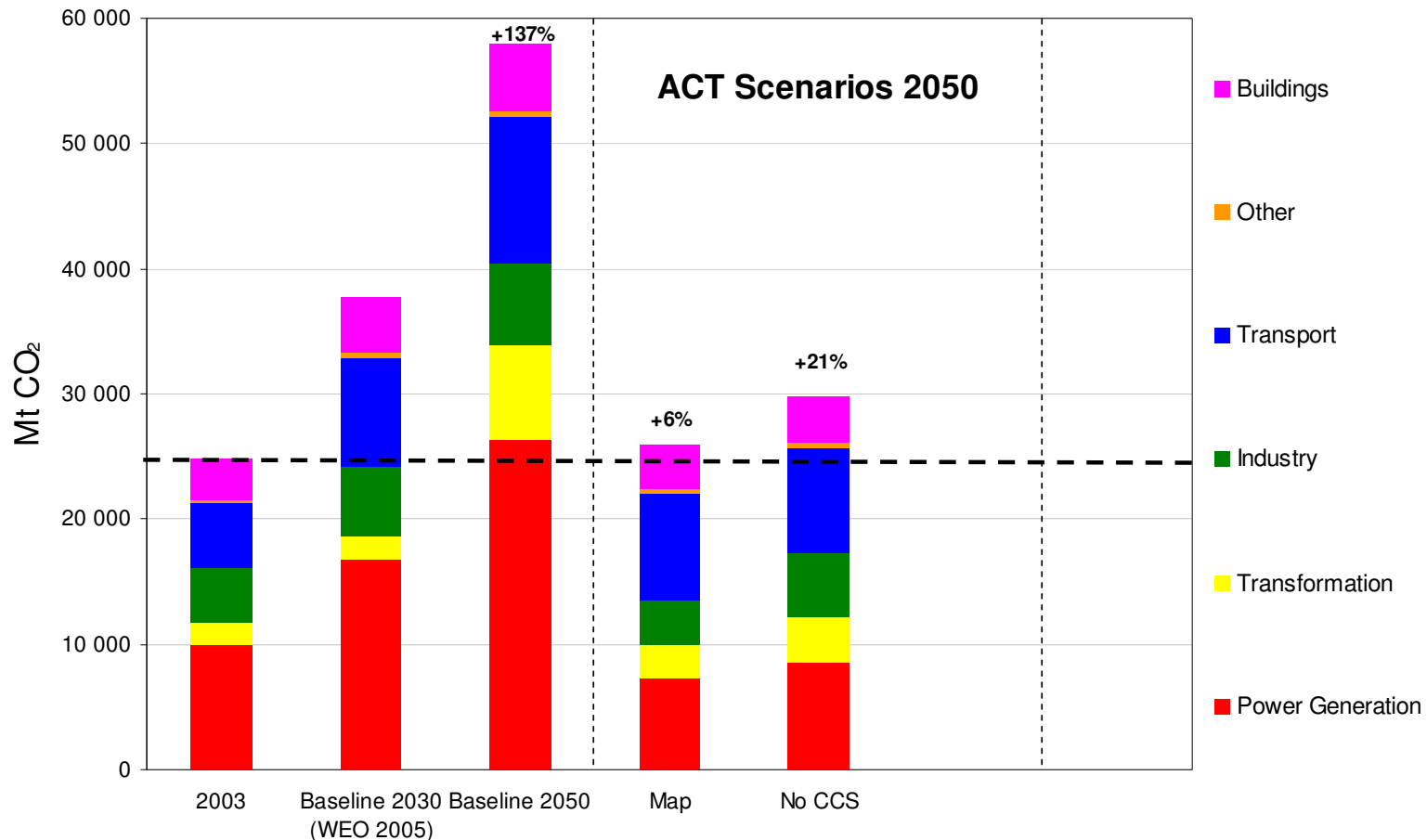


Map Scenario: Emissions returned towards today's level



Global CO₂ Emissions 2003-2050

Baseline and ACT Scenarios

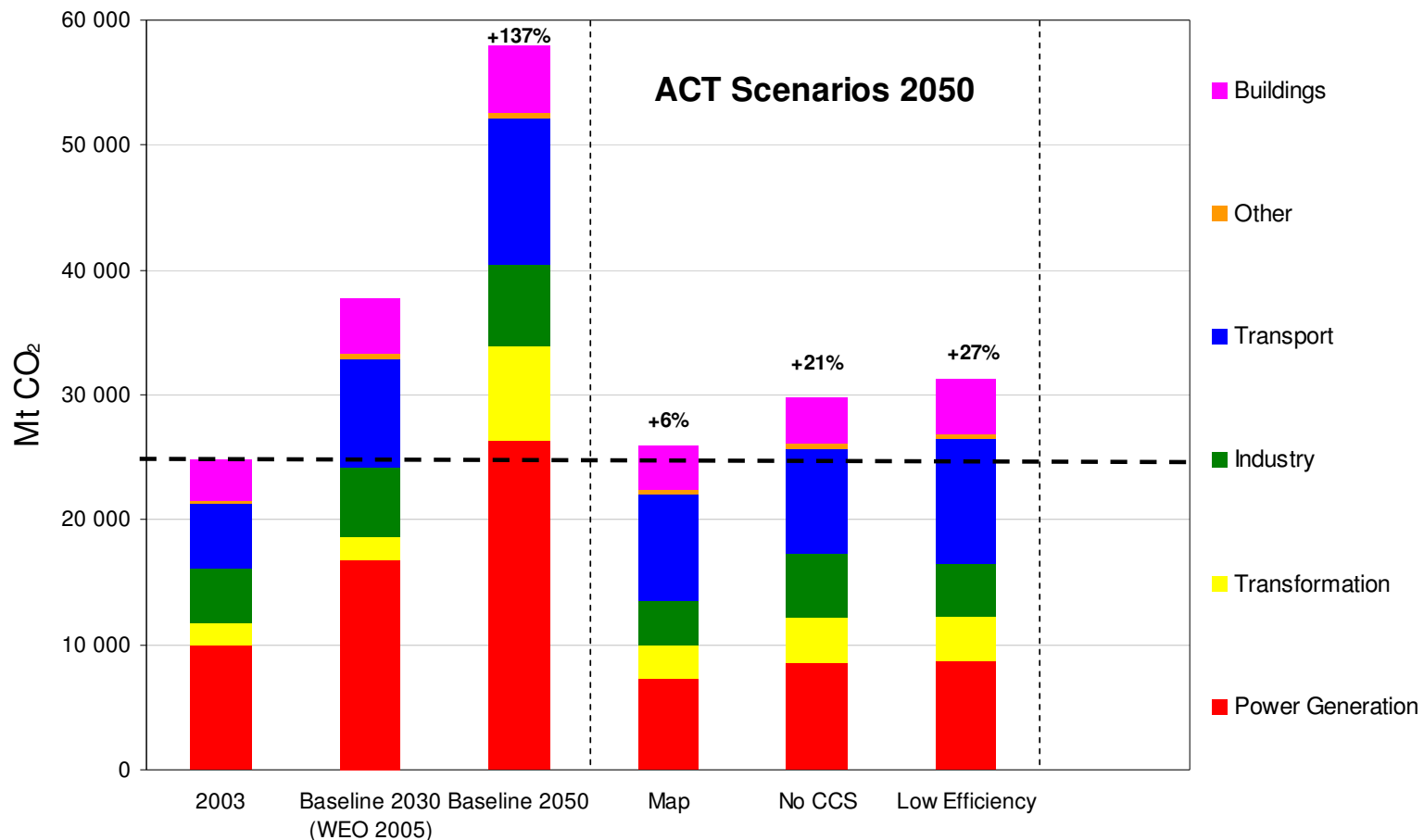


Impact of not having CCS available



Global CO₂ Emissions 2003-2050

Baseline and ACT Scenarios

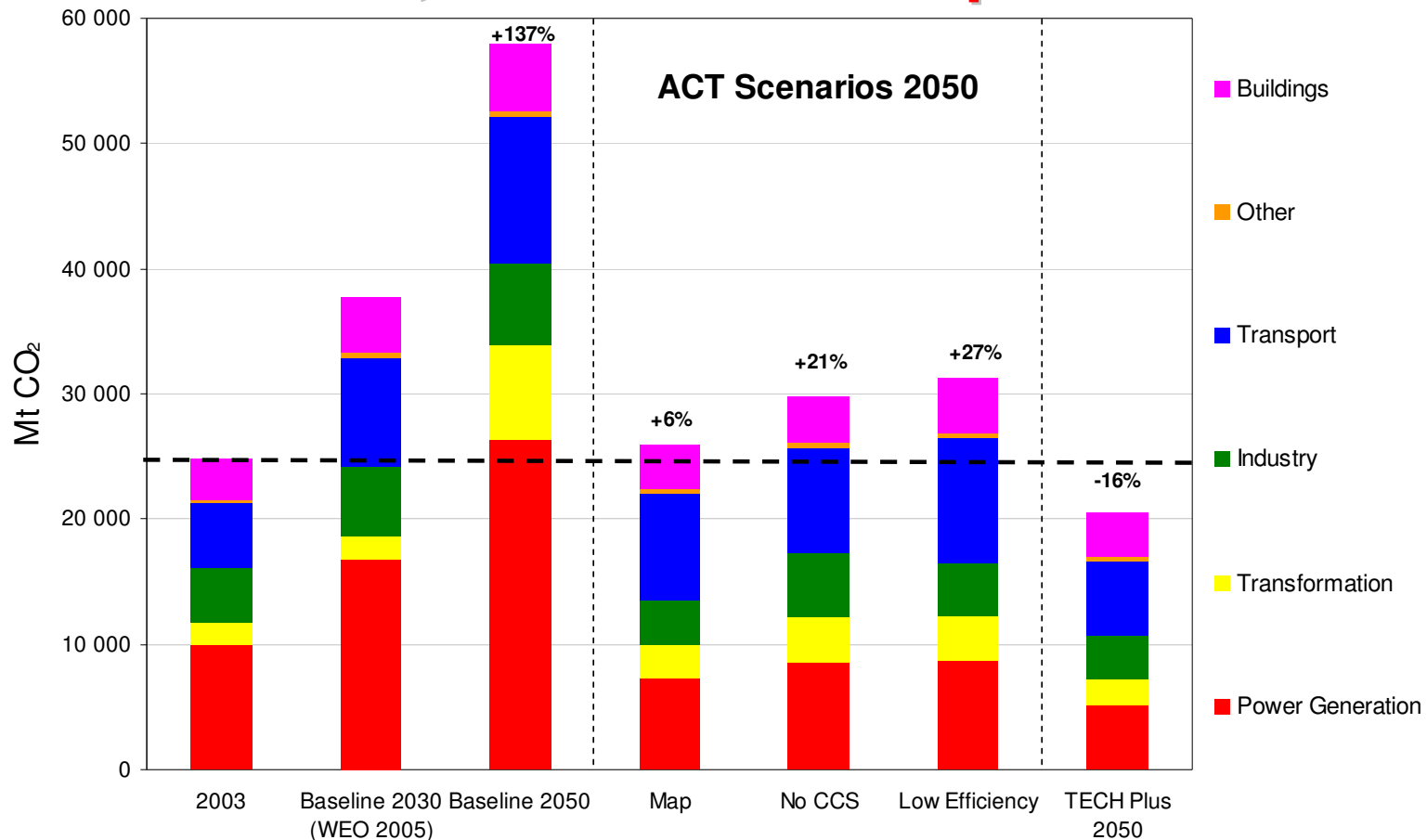


Impact of less efficiency progress



Global CO₂ Emissions 2003-2050

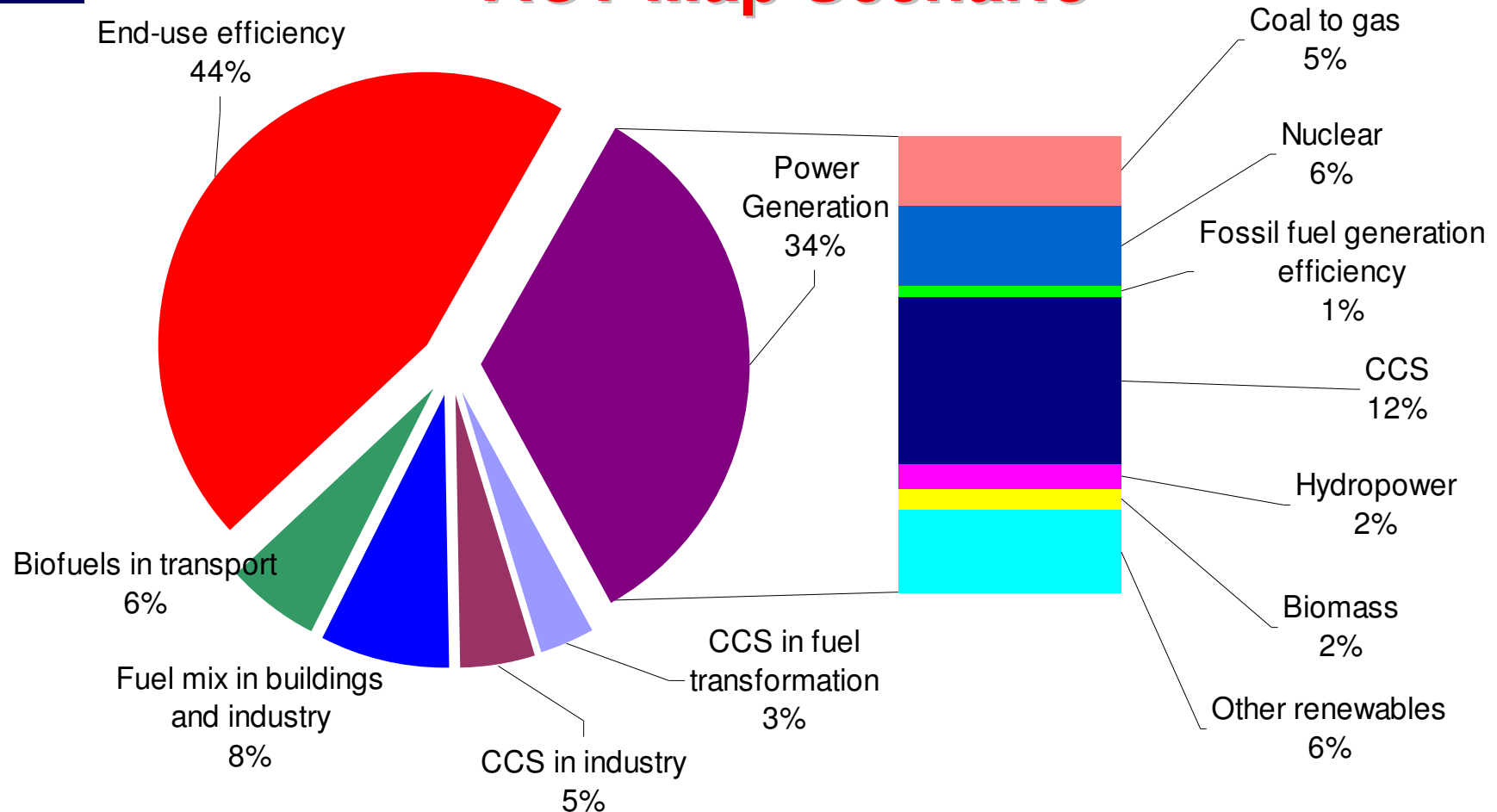
Baseline, ACT and TECH plus Scenarios



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



Key Messages

- **A more sustainable energy future is possible with known technology**
- **The costs are not disproportional**
- **But it will require sustained effort and investment by both the public and private sector in developed and developing countries**



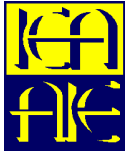
Key Messages

- We can return carbon emissions to their current level by 2050
- We can halve the growth of oil demand
- We can move onto a pathway that will stabilise CO₂ in the atmosphere at “sustainable levels”
- And this is consistent with continued rapid growth of energy demand in the developing World



Key Messages

- **Most energy still comes from fossil fuels in 2050**
- **We can substantially decarbonise the power sector by 2050**
- **Decarbonising transport will take longer but must be achieved in the second half of the century**



Key Messages

- Energy efficiency is paramount
- Also very important:
 - ◆ Carbon Capture and Storage
 - ◆ Renewables
 - ◆ Nuclear – where acceptable
- Urgent action is required in public and private sectors:
 - ◆ Enhanced R & D
 - ◆ Demonstration and deployment
 - ◆ Clear and predictable incentives



Implementing the ACT Scenarios Policy Implications

- **Energy efficiency is top priority**
- **Well focused R&D programs are essential**
- **Transition from R&D to deployment is critical**
- **Need for predictable long-term incentives for low-carbon technologies**
- **Non-economic barriers need attention**
- **A huge and coordinated international effort**
- **The task is urgent**