



Carbon Capture and Storage Outlook

**Business Perspectives on CCS:
Enabling Widespread Application
COP 13 - Bali, 10 December**

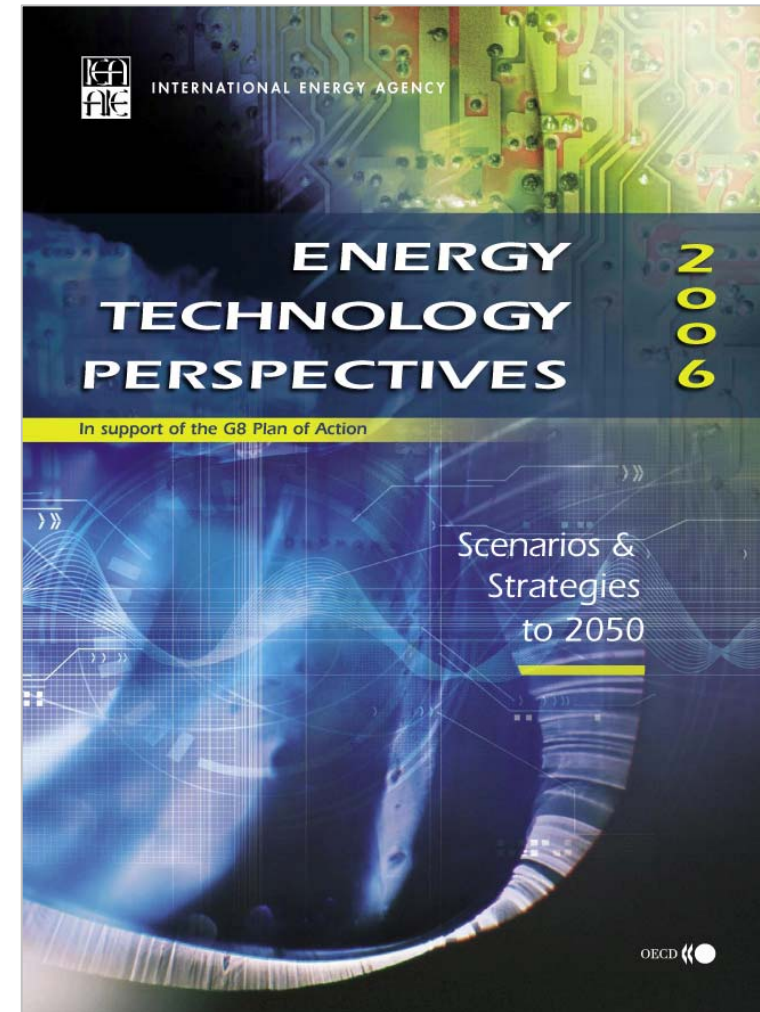
**Debra Justus
Energy Technology and R&D
International Energy Agency**



Energy Technology Perspectives

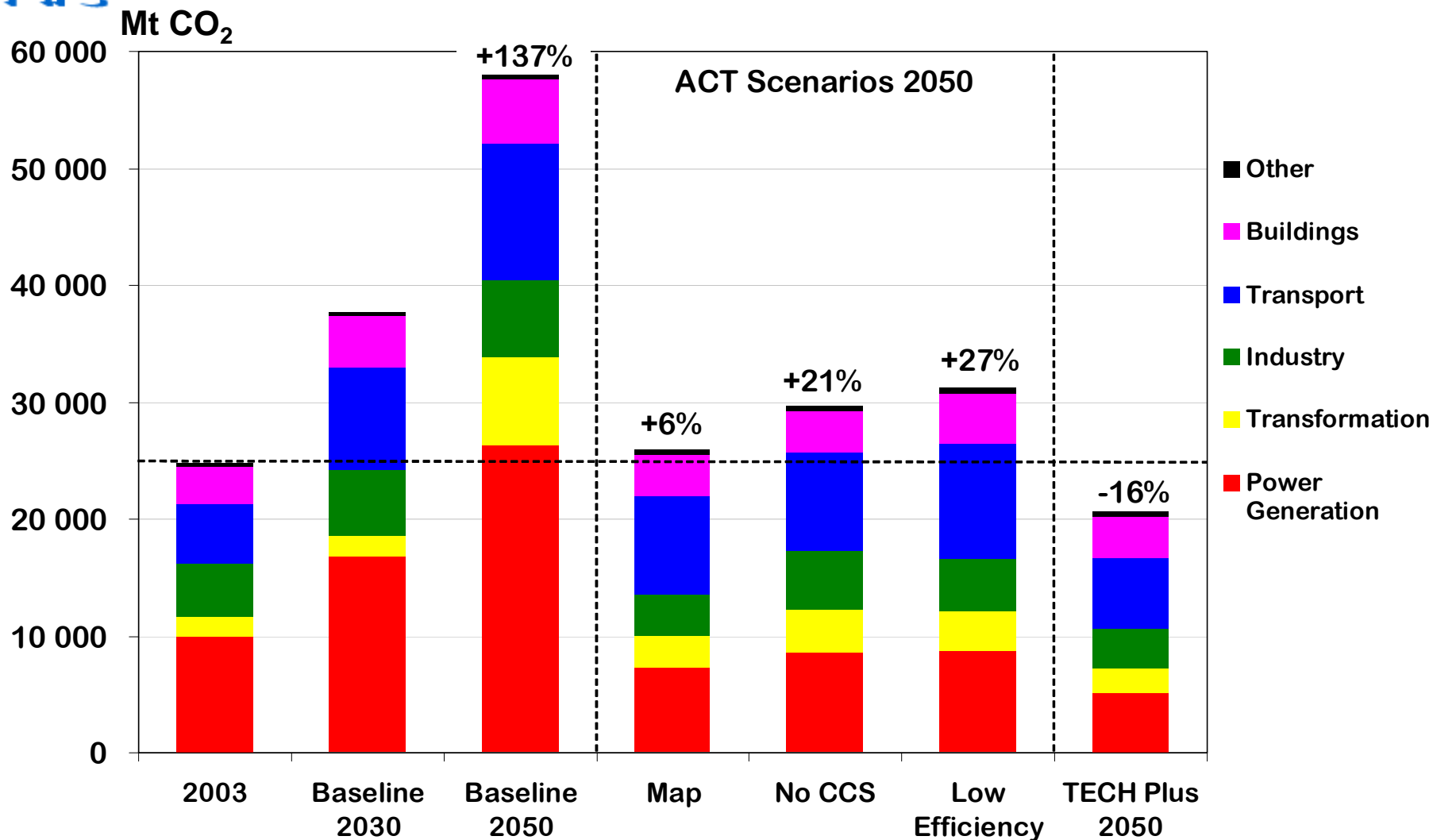
ETP 2006 provides part of IEA's "advice on scenarios and strategies" to G8 leaders.

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



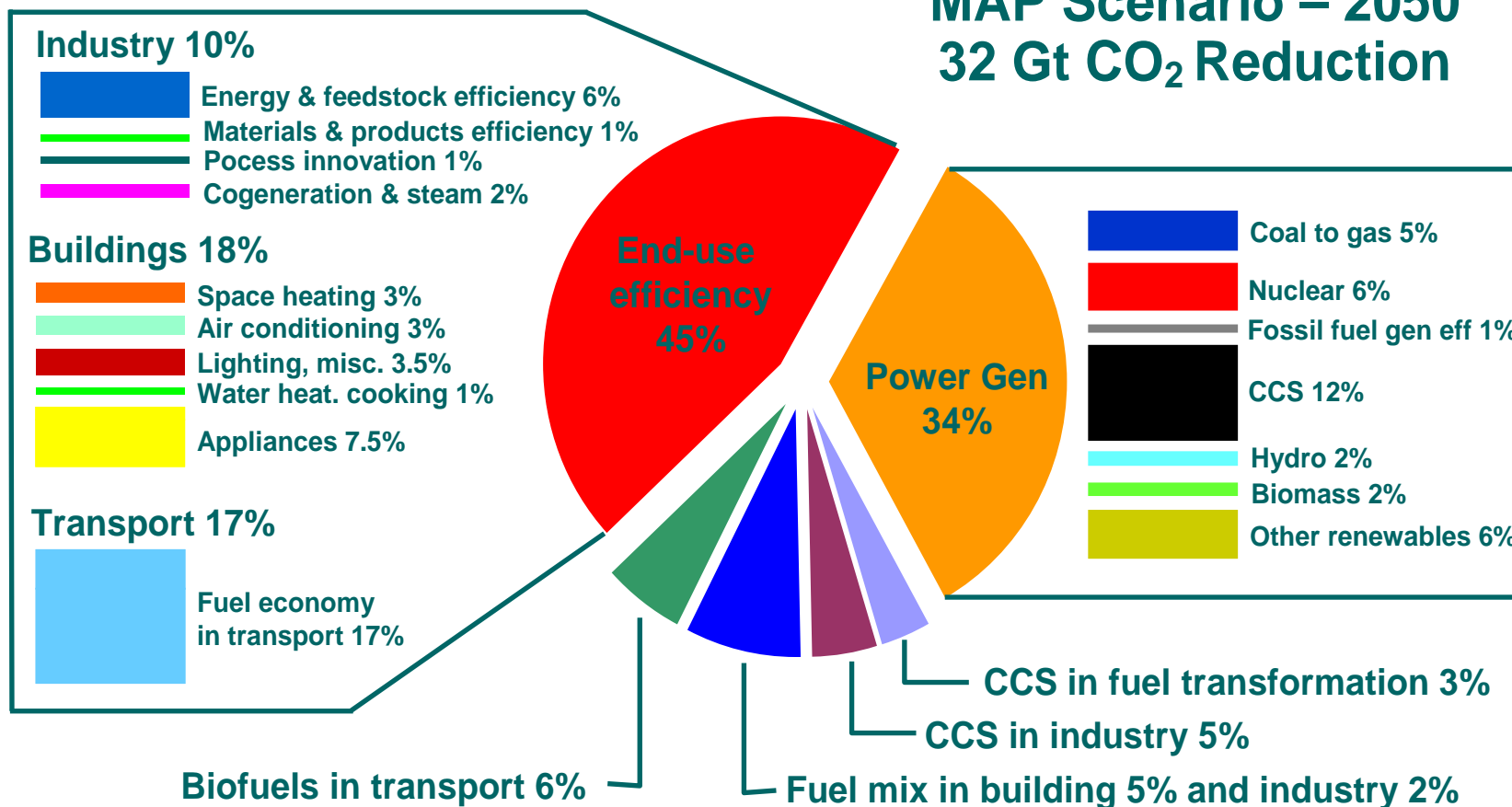
Global CO₂ Emissions 2003-2050

Baseline, ACT and TECH plus Scenarios



Emissions Reduction by Technology Area

MAP Scenario – 2050
32 Gt CO₂ Reduction





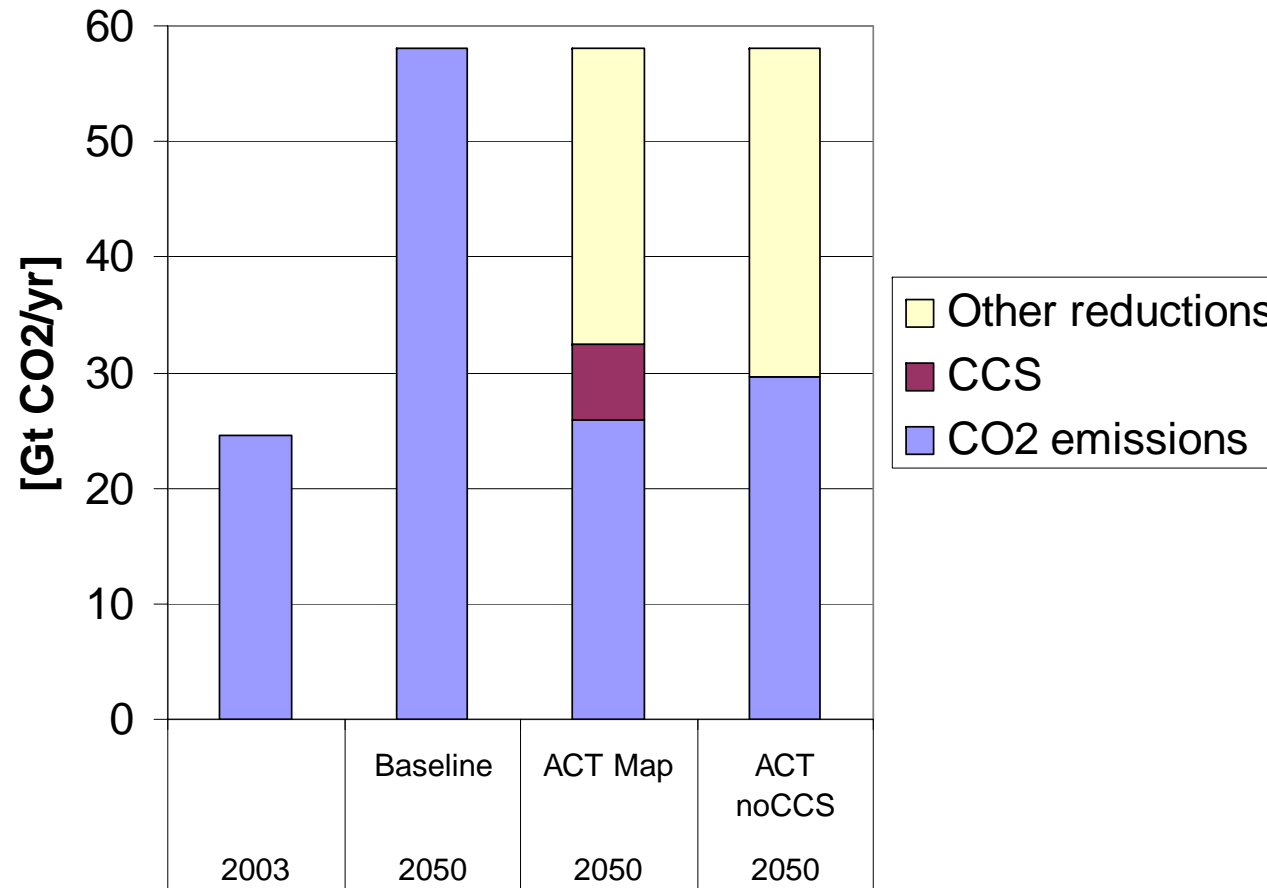
Key Findings and Technology Implications

- Most energy still comes from fossil fuels in 2050.
- CO₂ emissions can be returned towards today's level by 2050.
- Power generation can be substantially de-carbonised by 2050.
- A technology portfolio will be needed.
- Improving energy efficiency is a 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

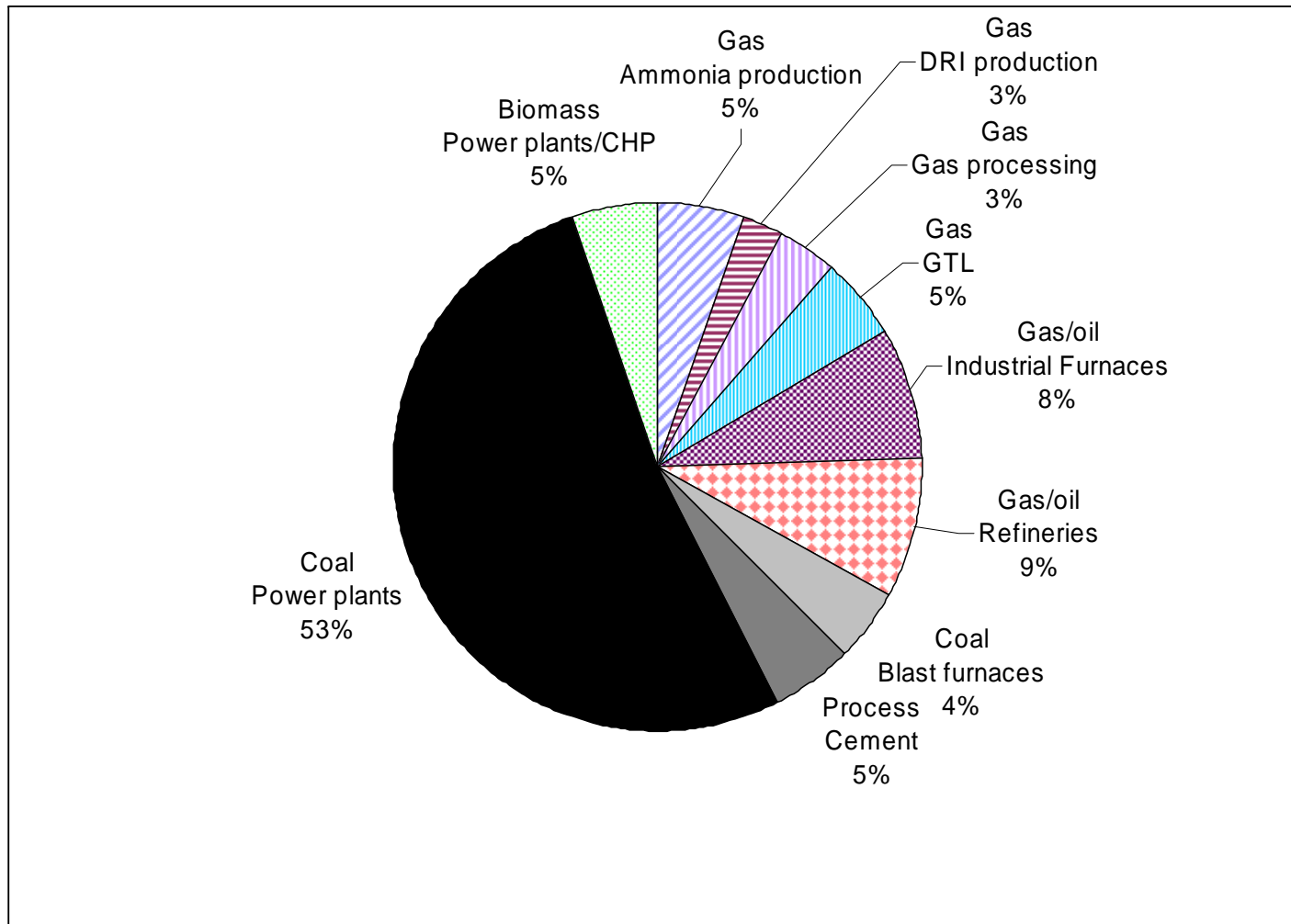
Policy Implications

- A more sustainable energy future is possible with known technology.
- The costs are not out of reach.
- But urgent action is needed in both, 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 & developing countries is essential.

CCS Accounts for 20% of Total ACT Map Emissions Reduction

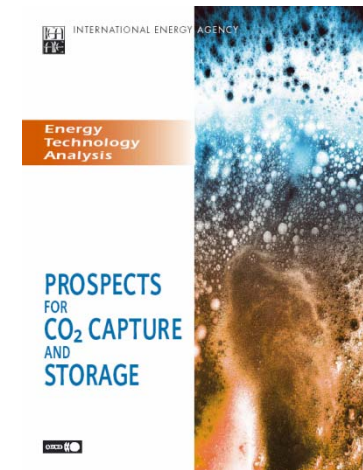


6.5 Gt CO₂ Capture ACT Map 2050





Prospects for CO₂ Capture and Storage



- CCS is a key option for emissions reduction (25-50% of total emissions reduction in 2050).
- Especially important for future coal use.
- A power sector option, but also in industry and for fuel supply processes.
- The average policy cost are 30% higher without CCS.



Thank you!

Debra.Justus@iea.org

www.iea.org



Back up slides

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 US\$ 25/tonne CO₂ for low-carbon technologies implemented world-wide from 2030 and onwards.**
 - ◆ **Individual scenarios differ in terms of assumptions for key technology areas.**



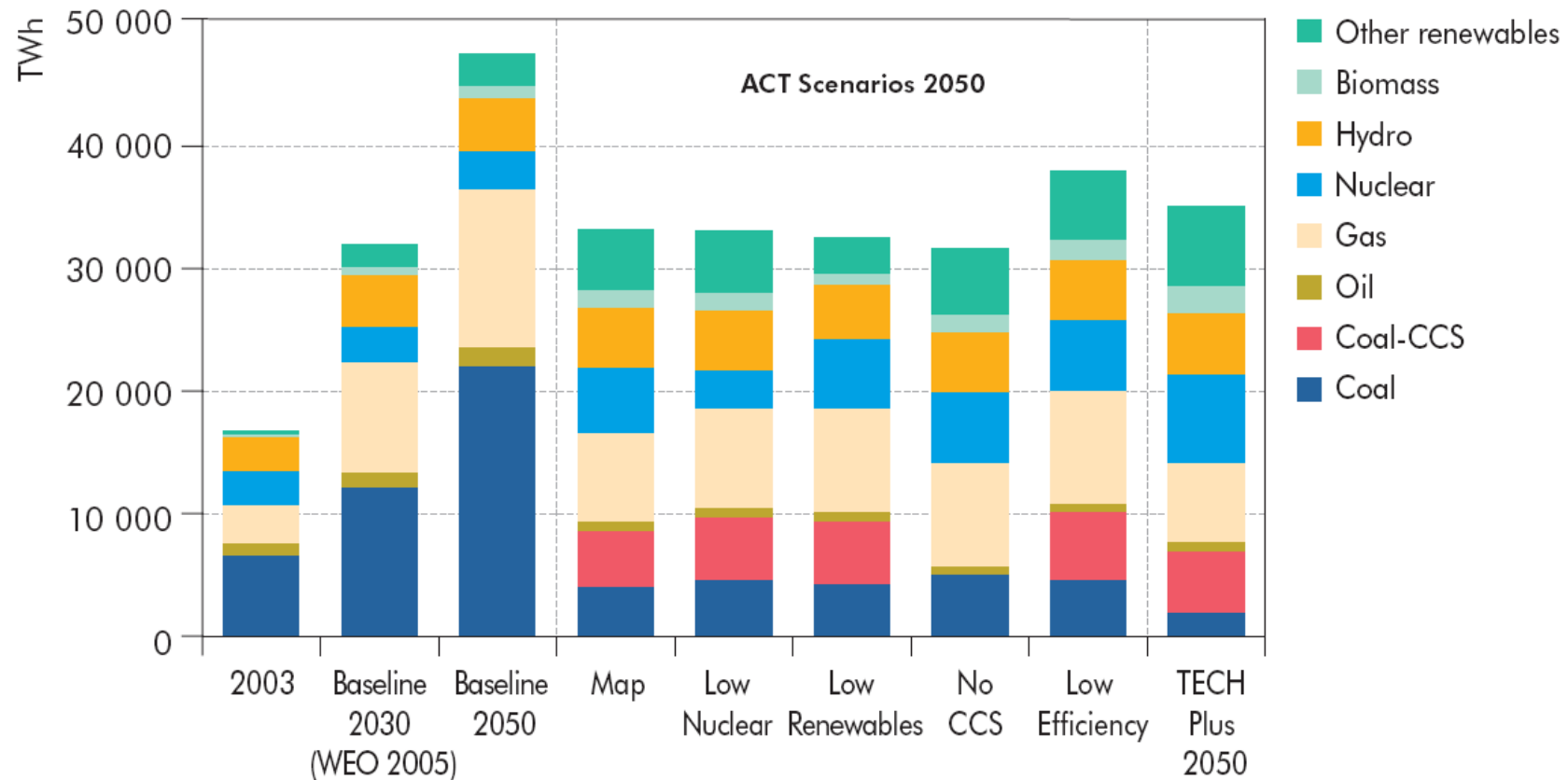
Technology Assumptions

| 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 | |

Costs

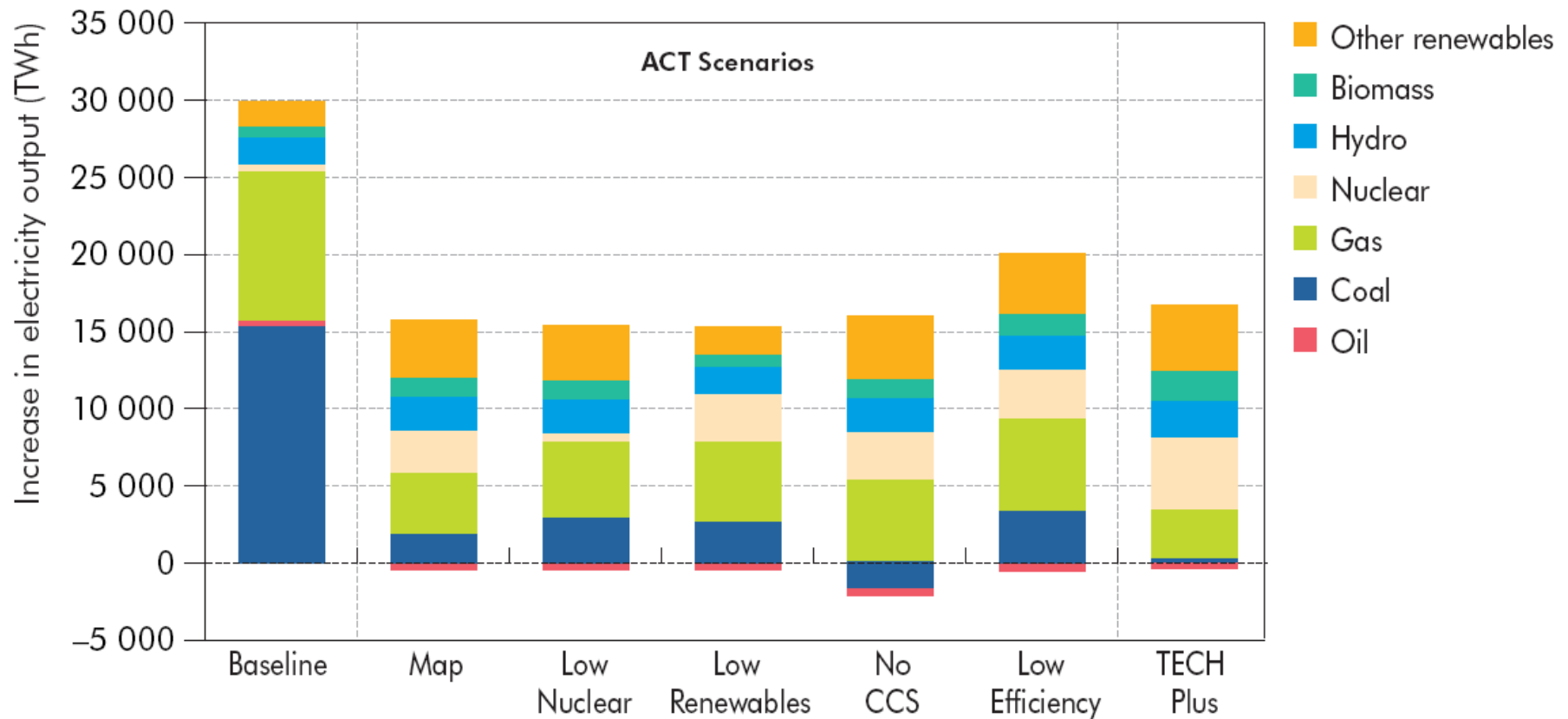
- 25 USD/tonne CO₂ incentive is upper limit for the incremental costs of technologies included in ETP 2006.
- Significant transitional costs for RD&D and deployment programs.
- Improved energy efficiency substantially reduces need for supply side investments and fuel imports.
- Progress in efficiency and CCS key to keep mitigation costs down.

Electricity Generation in the ACT Map



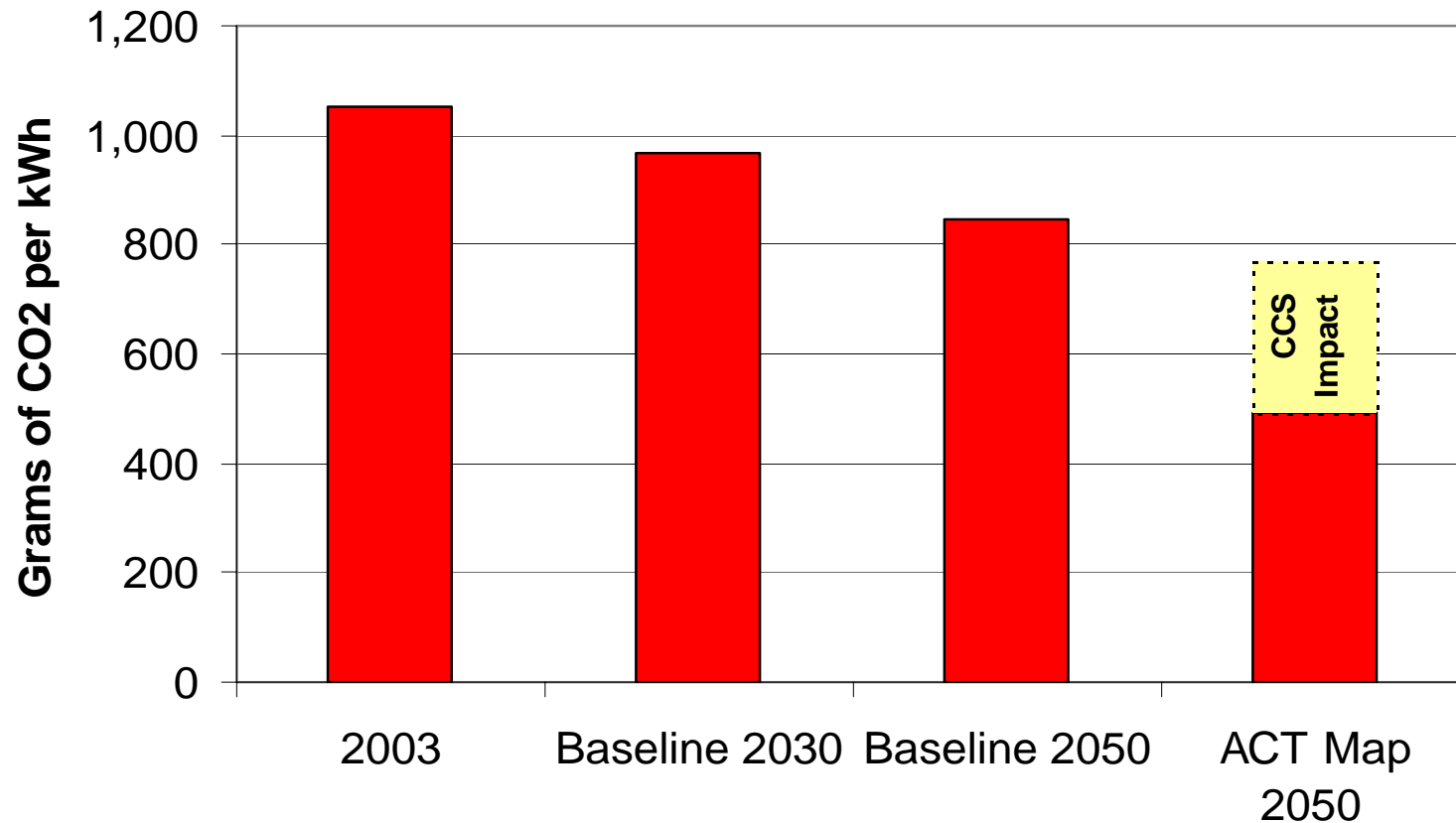
Significant increase in renewables, nuclear, coal with CCS

Growth in Electricity Generation by Fuel and Scenario, 2003-2050





CO₂ Intensity Coal Fired Power Generation China 2003 - 2050



More than 50% reduction in CO₂ intensity due to improved generation efficiency and CCS