Carbon Capture and Storage: A critical technology to combat climate change

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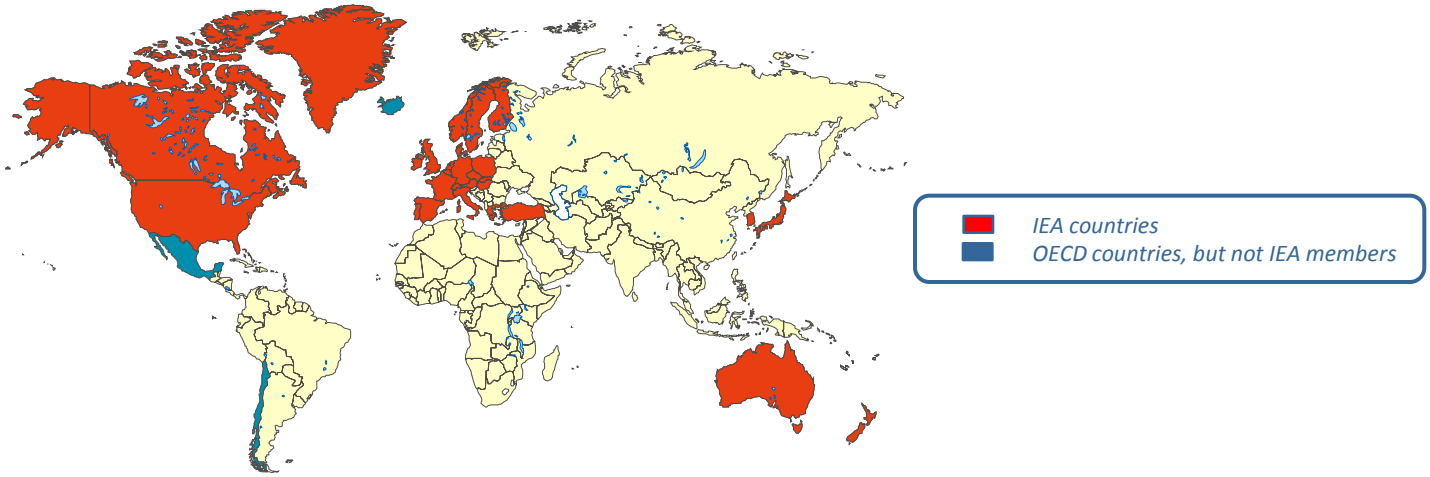
MOST – IEA CCUS Workshop:
Joint Activities and Opportunities
18-19 September 2011
Beijing, PRC

International Energy Agency

- Energy Security
- Environmental Protection
- Economic Growth
- Engagement Worldwide



- Inter-governmental body founded in 1973, currently 28 Member Countries
- Policy advice and energy security coordination
- Whole energy policy spectrum and all energy technologies
- Key publications: World Energy Outlook and Energy Technology Perspectives
- Host to more than 40 technology-specific networks ("Implementing Agreements")
  - Operated independently with their own membership and financing
  - Includes IEAGHG, IEA Clean Coal Centre etc.
- Active in CCS since 2000; dedicated CCS unit created in 2010
  - Provides policy advice
  - Supports broader IEA cross-technology analysis

CONTENTS

1. Past and present of energy supply
2. Our alternative futures
3. What can CCS do?

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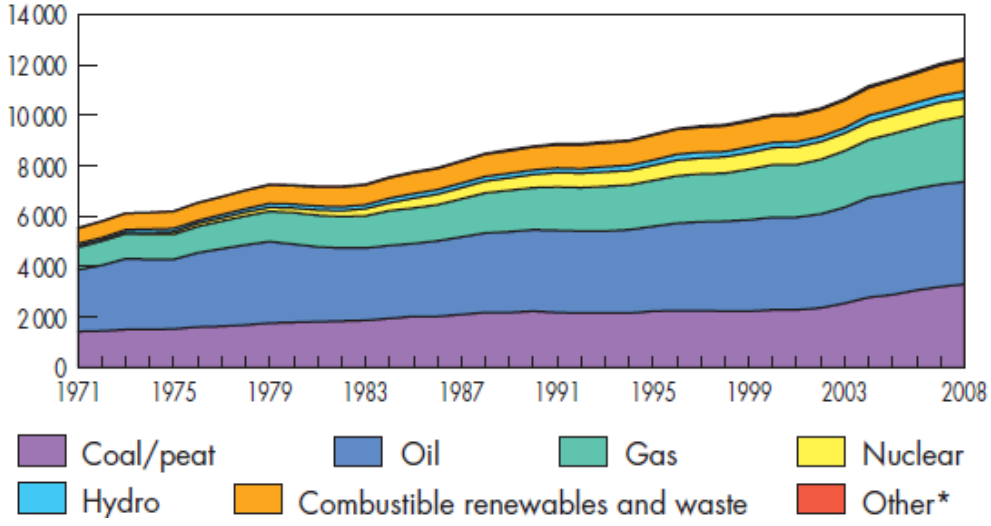
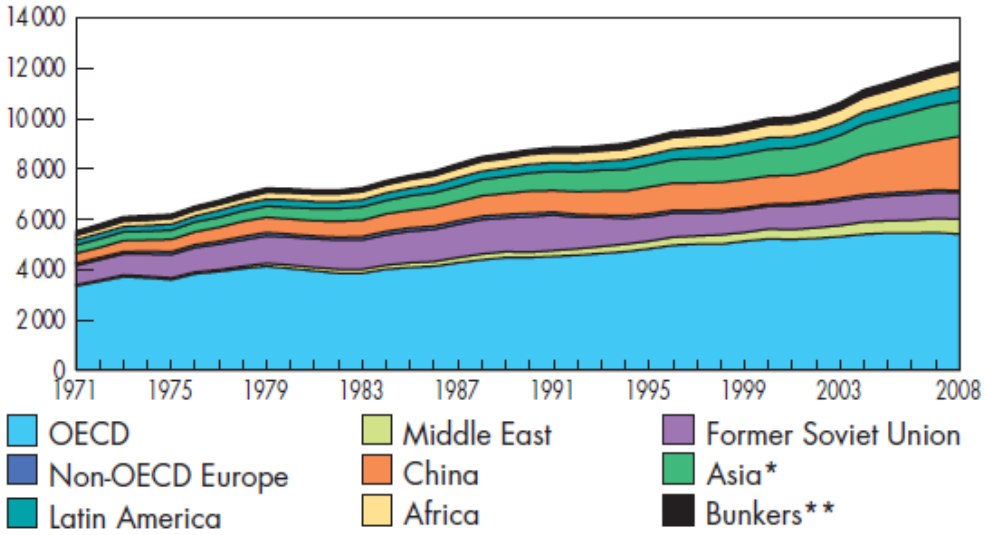
GLOBAL DEMAND x2 IN 40 YEARS





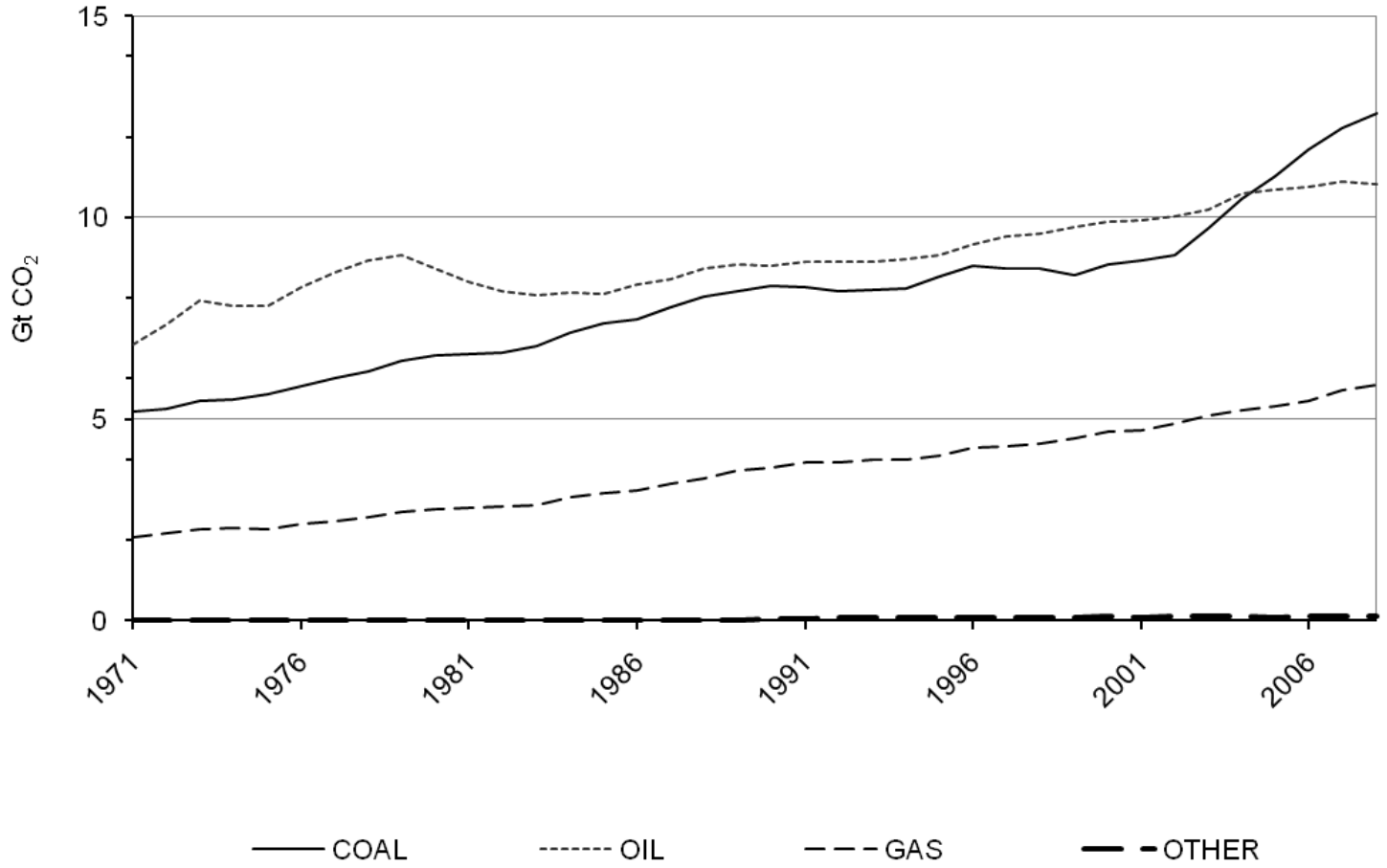
- From 6115 Mtoe to 12 267 Mtoe
- 75% of the increase is from fossil fuels

- Moderate increase in OECD world
- Rapid demand growth outside OECD

Source: IEA statistics

CO_2 EMISSIONS BY FUEL

- Oil-related CO_2 emissions used to dominate…
- …since 2004, coal is leading source of global emissions at ~13Gt pa, up 135% from 1971
- Gas-related emissions have tripled from 2Gt in 1971 to 6Gt in 2008



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The CO_2 content of electricity is still increasing globally

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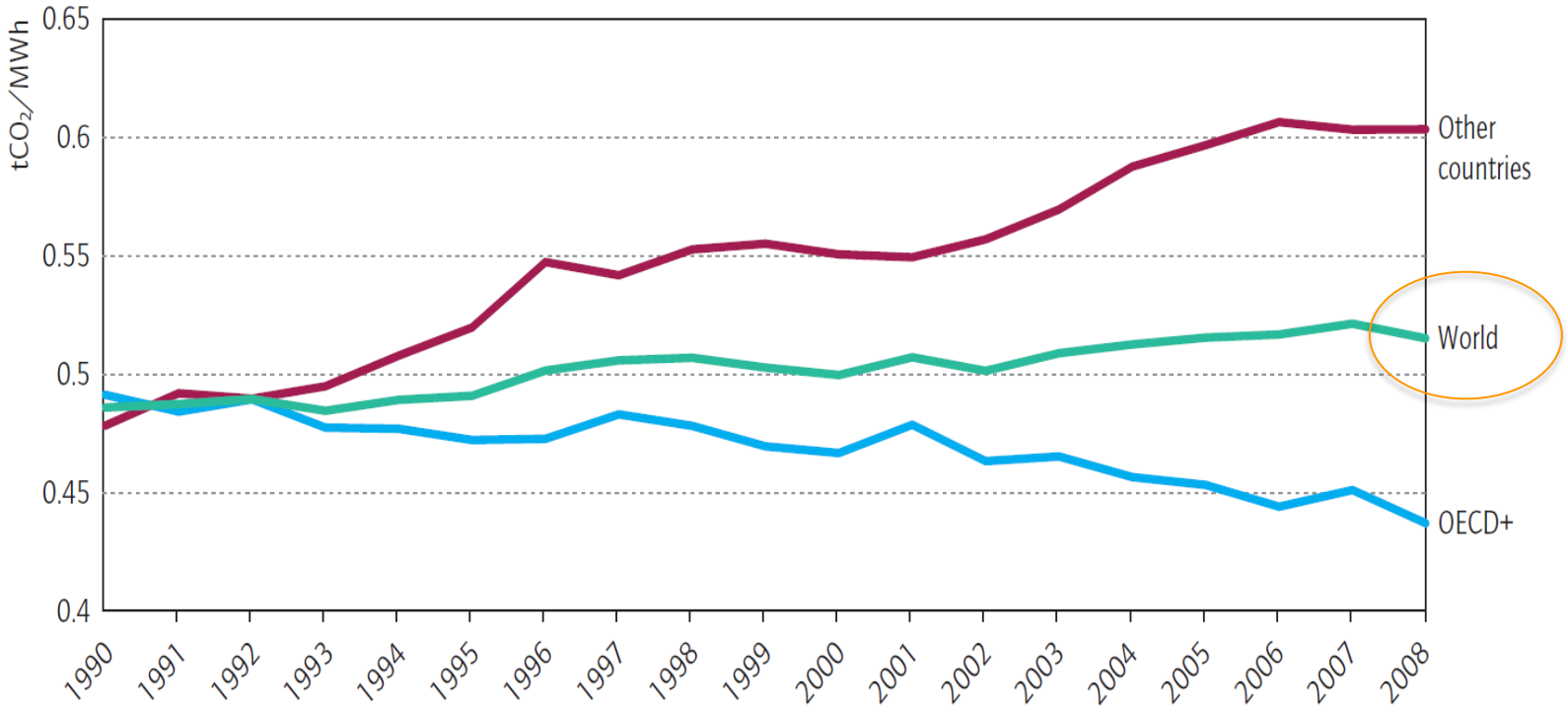
Global evolution of the CO_2 intensity of power generation (1990-2008)

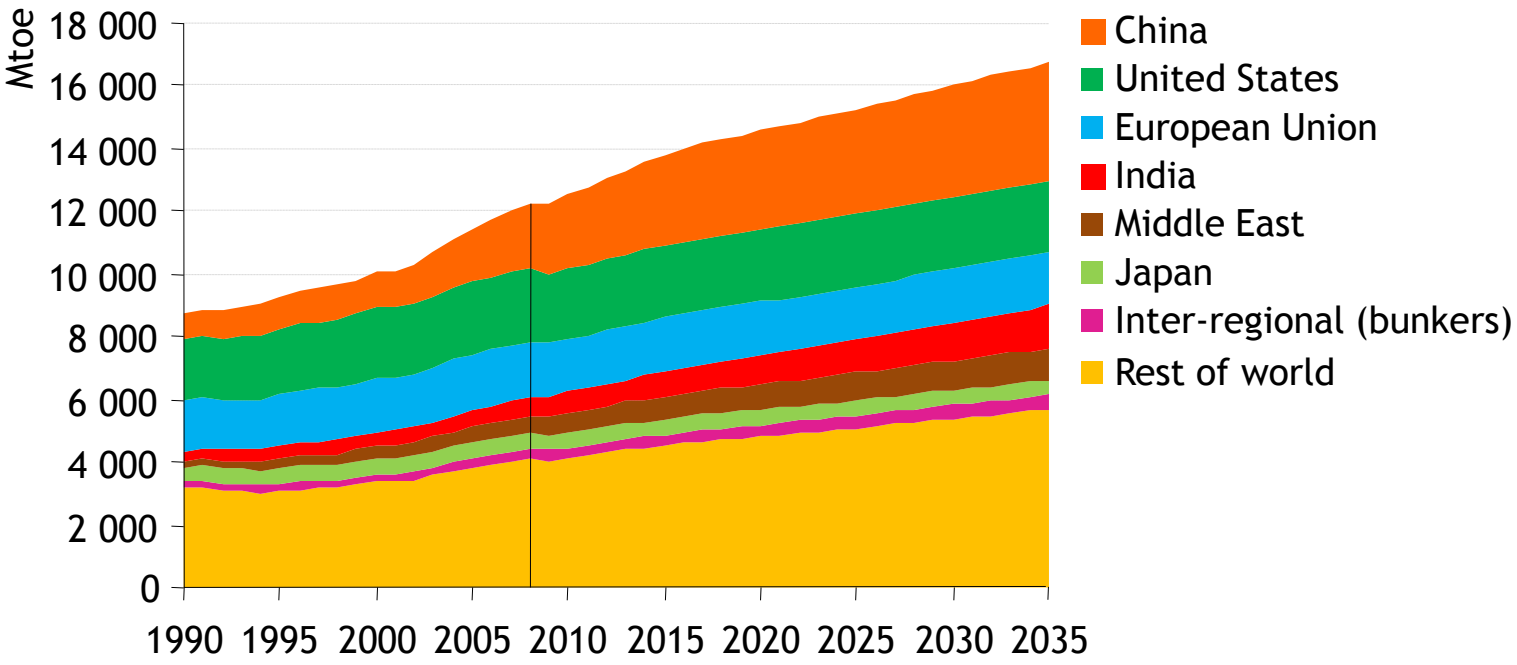


Note: OECD+ includes all OECD member countries as of 2009 and non-OECD European countries (see section on geographical coverage).

Source: IEA statistics, 2011.

ENERGY DEMAND CONTINUES TO GROW

- Energy demand +35%
- China: 35% of global incremental demand
- OECD demand stagnates



"New Policies Scenario", IEA World Energy Outlook 2010

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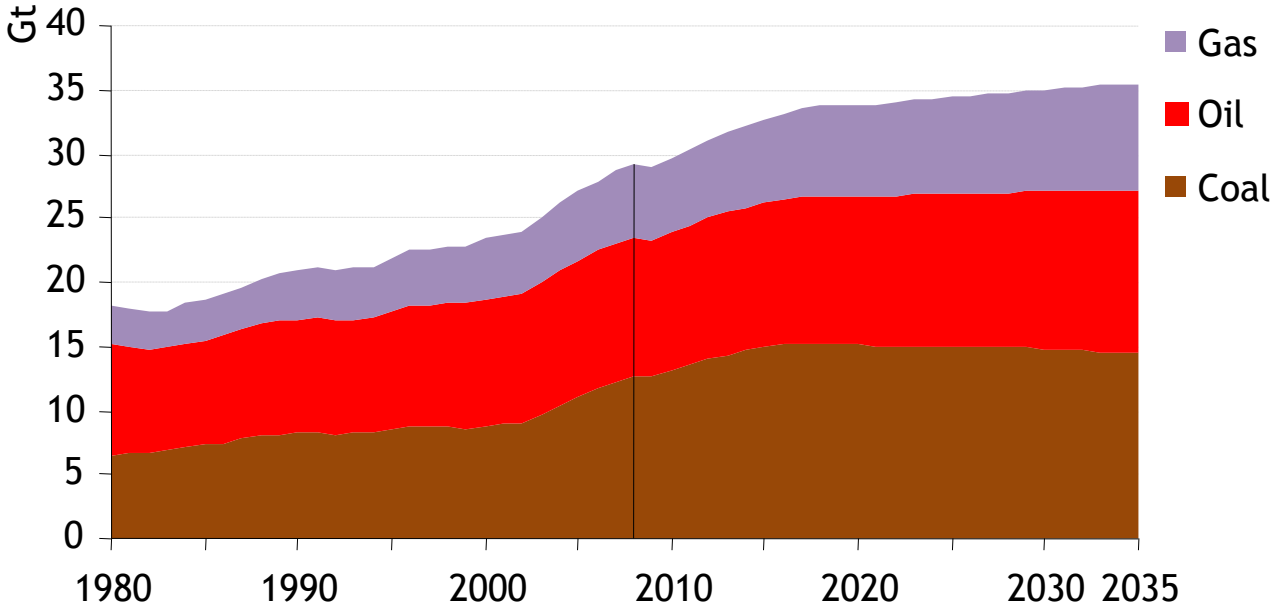
Engagement Worldwide

CO_2 EMISSIONS CONTINUE TO GROW

- Energy-related CO_2 emissions 35 Gt by 2035
- Growth from non-OECD countries
- Gas-related CO_2 emissions grow fastest (1,3%pa), followed by coal (0,5%pa)
- 650ppm CO_2-eq pathway

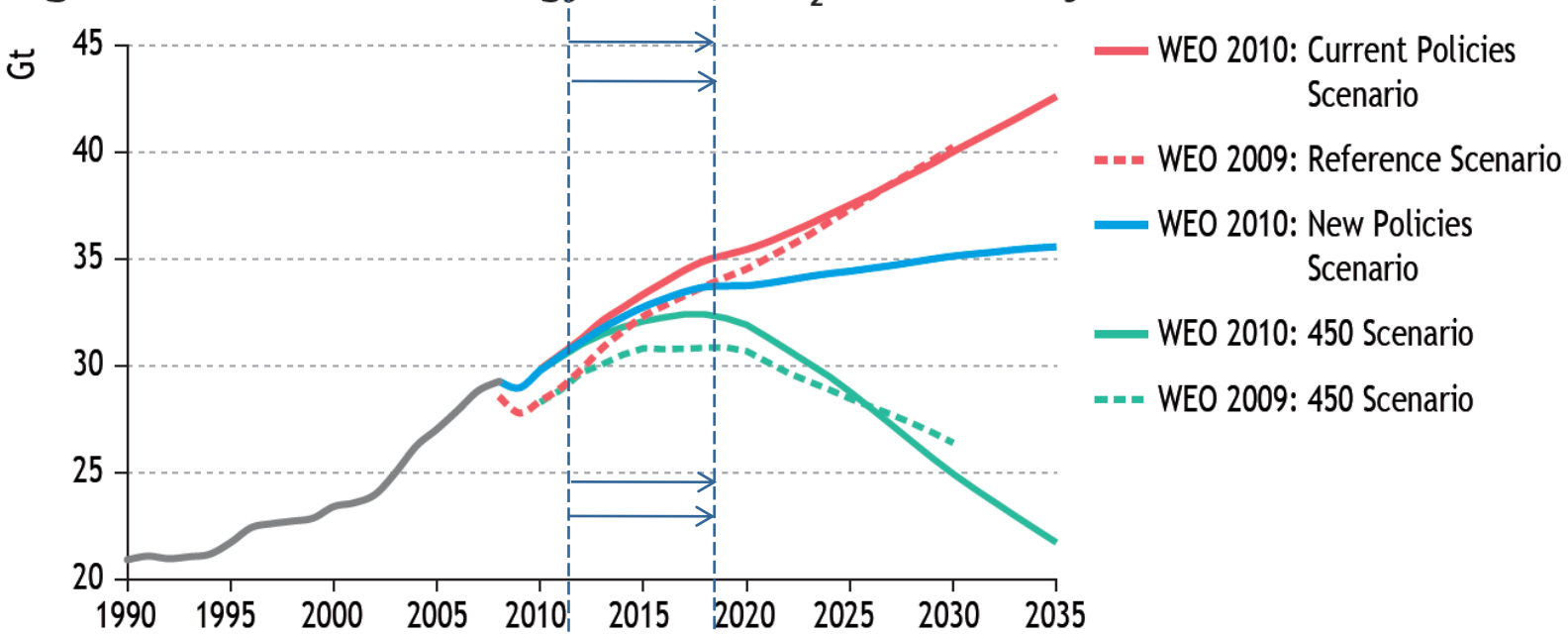


"New Policies Scenario", IEA World Energy Outlook 2010

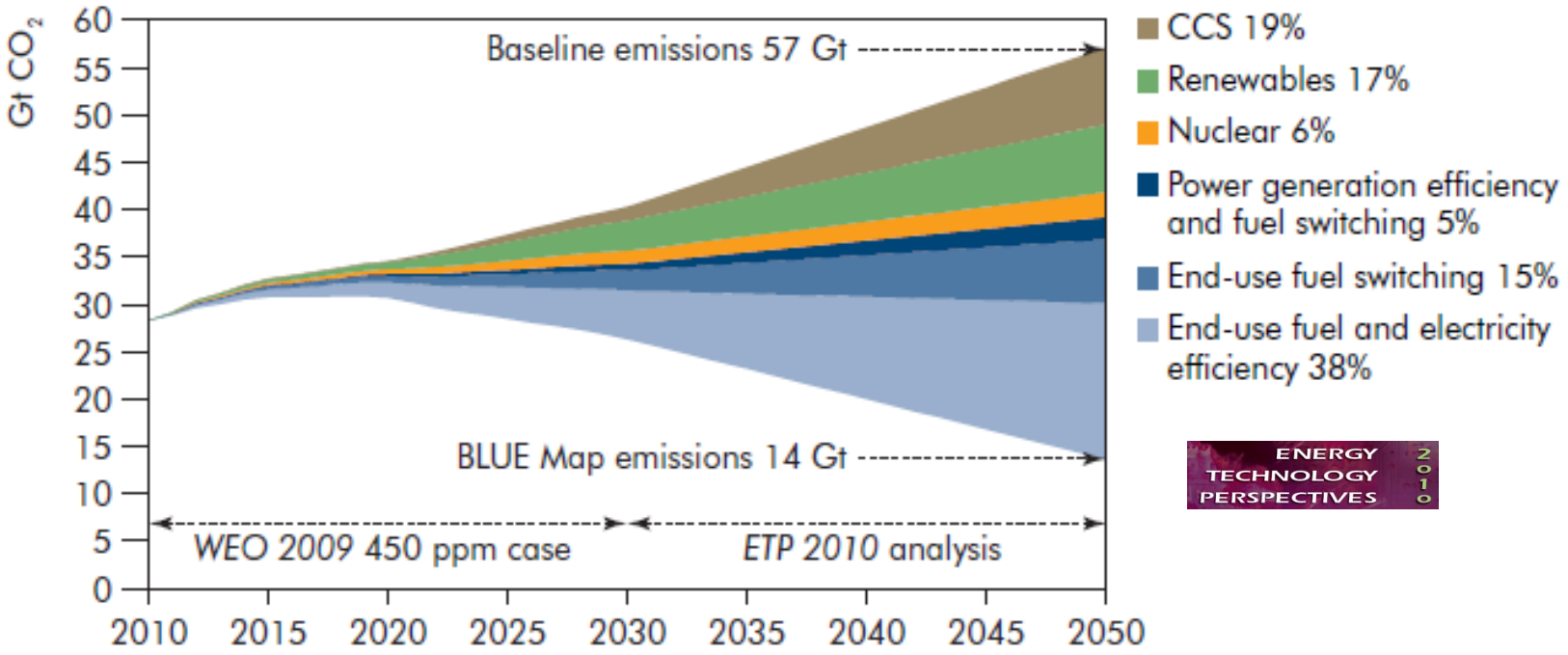
A SUSTAINABLE FUTURE

- Current policies or “reference scenarios” unsustainable
- Scientific evidence and policy ambitions now often target “450ppm scenarios” (50-50 chance to keep temperature increase at ≤2°C)
- Time window for reaching 450ppm is rapidly closing!

Figure 13.2 • *World energy-related CO_2 emissions by scenario*

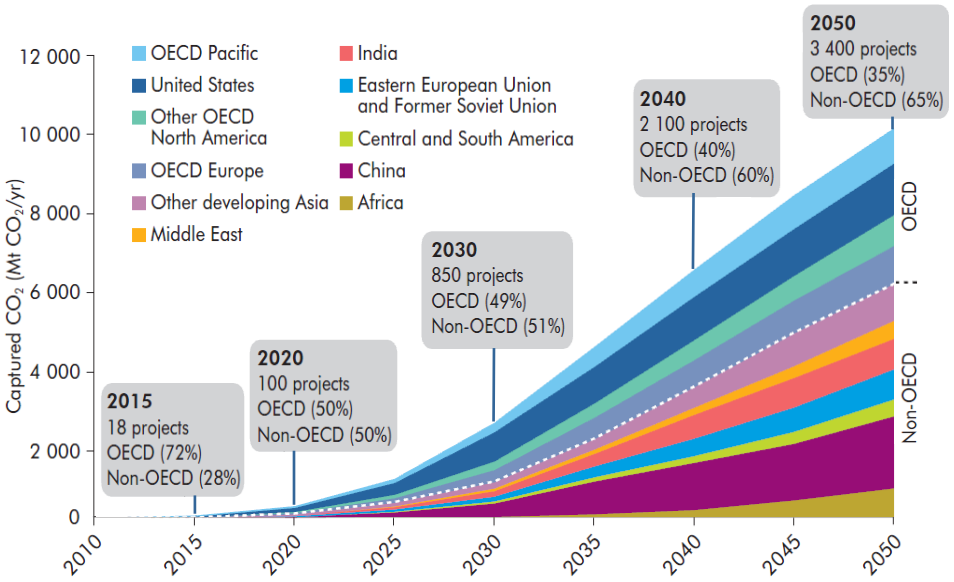


CRITICAL ROLE FOR CCS IN "450" SCENARIOS



- Role of CCS increases after 2030 → contributes 1/6 of total needed reductions against baseline 2010-2050
- 450ppm achievable without CCS, but at higher cost
- Stronger reliance globally on gas replacing coal is alone not enough to stabilise emissions

CAN THE POTENTIAL OF CCS BE EXPLOITED?



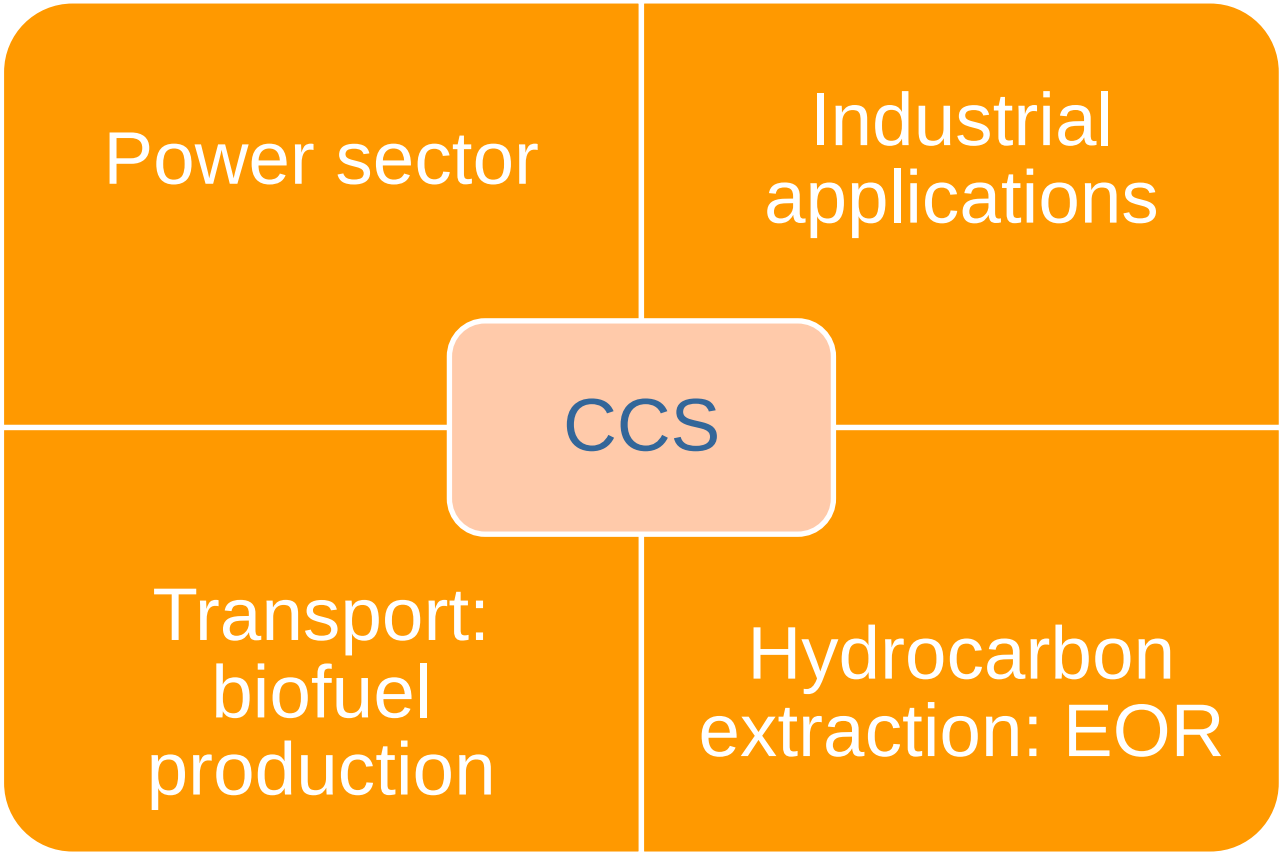
- 3000+ projects across the globe
- 3000+ across industries: CCS is not only about coal-fired power!
- 150Gt CO_2 captured and stored

Year	2015	2020	2030
Number of Projects	18	100	850
OECD	72%	50%	49%
Non-OECD	28%	50%	51%

Technology Roadmap
Carbon capture and storage

ENERGY TECHNOLOGY PERSPECTIVES 2010

CCS CUTS ACROSS VARIOUS SECTORS



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CHALLENGES REMAIN FOR CCS

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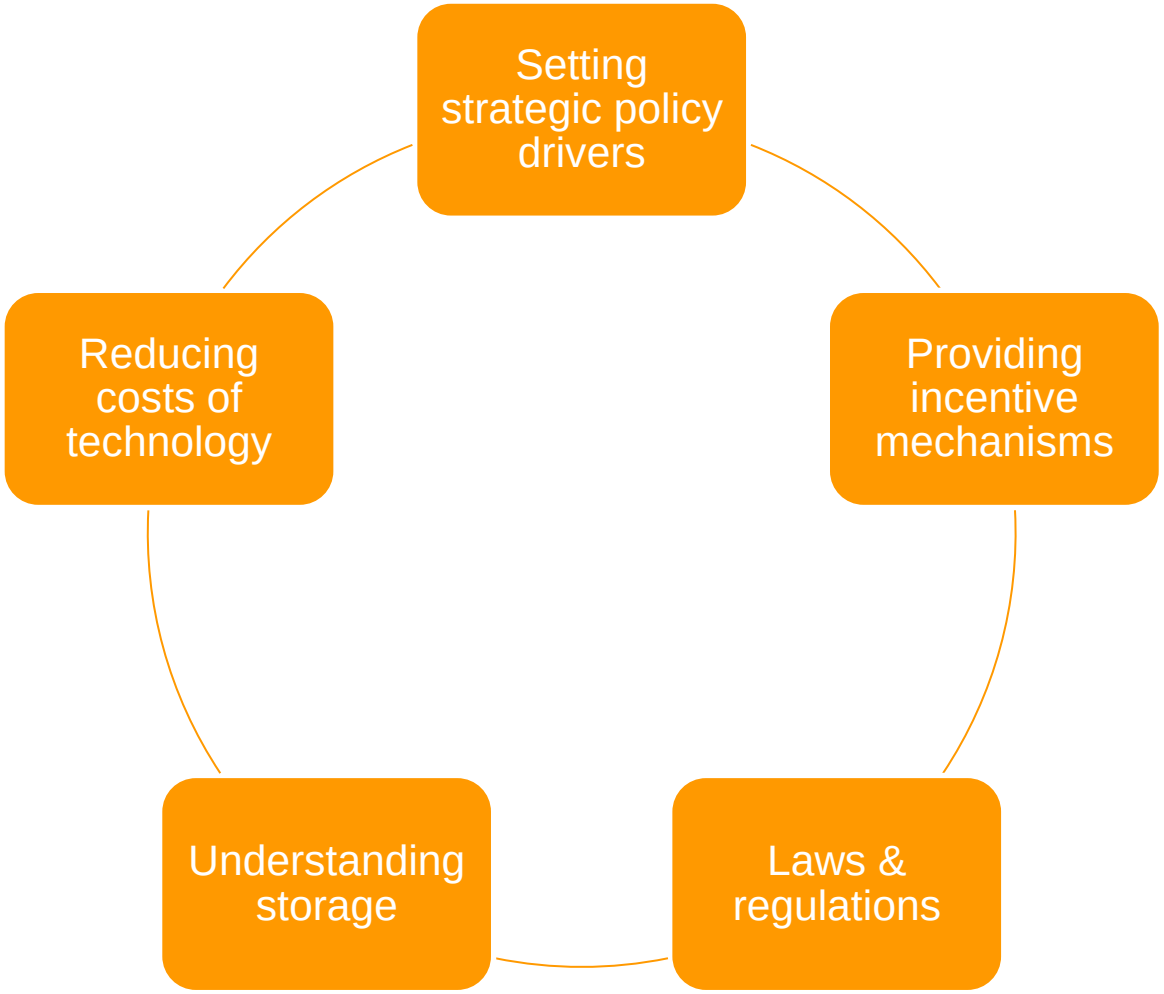

A long-term signal to investors?

The case for clean-tech support:

2011

- Most low-CO2 technologies are not cost-competitive
- But should account for vast majority of supply by 2050 (renewables, CCS, nuclear) to cut CO2

Bridge

- Today's CO2 price –where it applies- is too low
- Necessary step: targeted support for cost reductions in key technologies

2030→

- Rising CO2 cost + lower unit cost of low-CO2 technology ensure full competitiveness

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CONCLUSIONS

- Energy demand and emissions have doubled in past 40 years
- Energy demand and emissions continue to grow
- The world faces a tightening window to reach 450ppm scenario, requiring rapid policy action
- CCS has potential to play a very significant role in cutting emissions from many industries
- CCS deployment requires ambitious climate policy and solutions to various challenges

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Thank you!

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