



A Call to Action on CO₂ Capture and Storage

CO₂ CAPTURE
AND
STORAGE

*A key carbon
abatement
option*

Tom Kerr

**Sustainable Energy Technology and
Policy Office**

International Energy Agency

IEA Day, UN FCCC COP

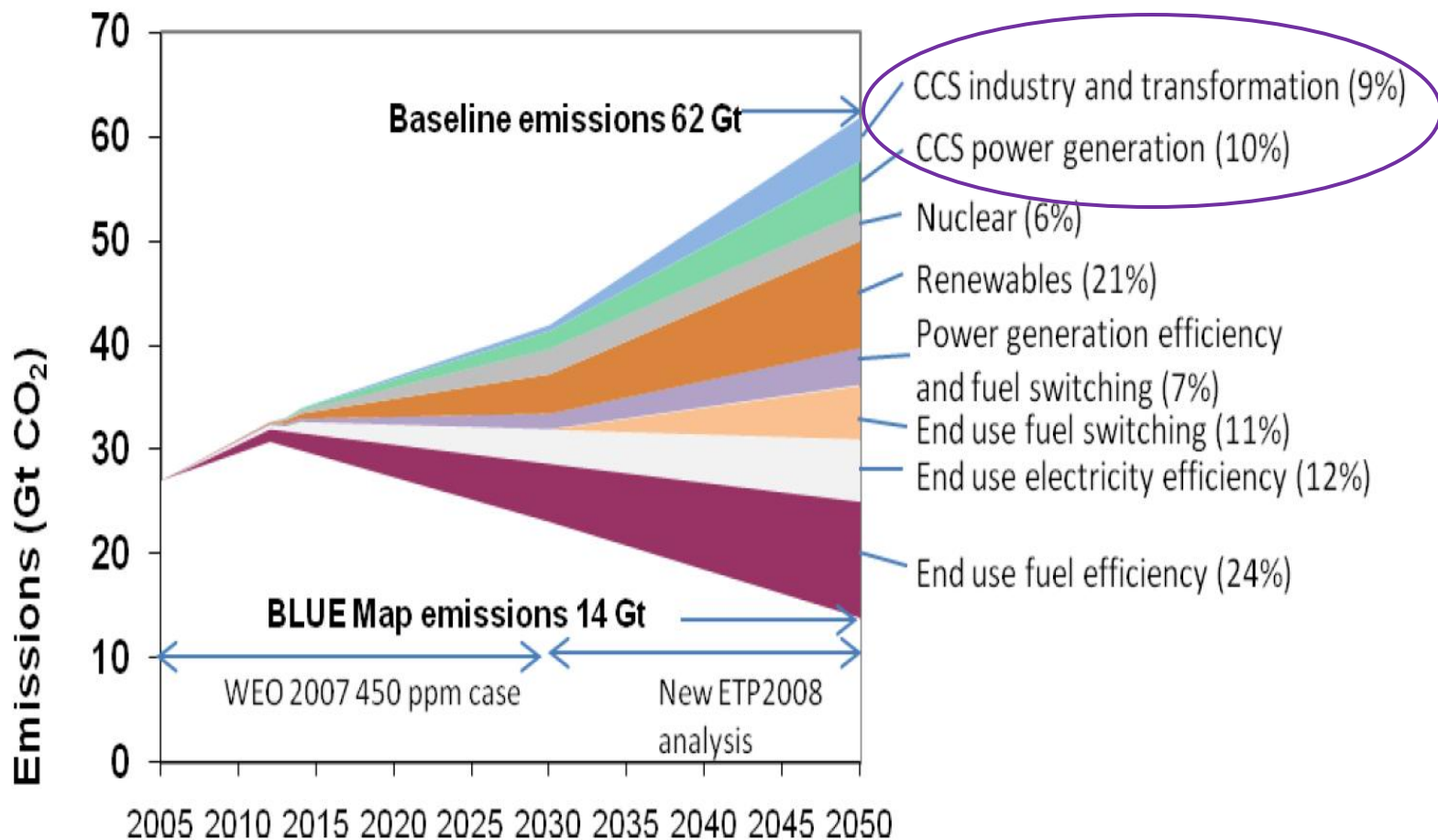
Poznan, 9 December 2008



Overview

- **The Role of CCS in GHG Mitigation**
- **Status of CCS today**
- **CCS in the future: what are the important challenges?**
- **The IEA's CCS activities**

ETP: How to Get There from Here



Source: IEA, *Energy Technology Perspectives* (2008).



The Role of CCS

- Without new policies, global emissions increase 130% by 2050, corresponding to a $>4^{\circ}\text{C}$ temperature rise
- CCS provides 19% of the needed CO_2 reductions in 2050
- Without CCS, cost of stabilisation rises by 70%
- CCS the *only* low-carbon solution for coal, cement, and iron & steel sectors

CO₂ Capture

- **The largest share of the costs (2/3)**
 - ◆ **Currently USD 40-55/tonne for CO₂ capture at coal-fired plants**
 - ◆ **Chemical absorption costs and efficiency penalties have been reduced**
 - ◆ **Much work being done here; still need to ramp up process improvements and demonstrations**
- **Cement, iron & steel, other industrial sectors need to step up CCS efforts**
- **IEA GHG is leading a global network**

CO₂ Transport & Storage

- **Need to build regional CO₂ pipeline transport infrastructure**
- **There is enough CO₂ storage capacity in the world for 100s of years...**
- **...but governments must improve CO₂ storage potential estimates**
- **EOR CO₂ storage potential of 70-100 Gt**
 - ◆ **Near-term EOR can jump-start CO₂ pipeline infrastructures**
- **Saline formations the most likely long-term solution**



CCS Demonstration

- Currently only 4 full-scale CCS demo plants operating worldwide; none with a coal-fired power plant
- The number of major CCS efforts is expanding...
 - ◆ Alberta, Canada: \$2B funding
 - ◆ Australia AUD\$3-400 million, new Global CCS Institute
 - ◆ Norway's Gassnova, UK CCS competition
 - ◆ EU ZEP
 - ◆ US FutureGen
- ...but many efforts lack sufficient funding or have slowed down

The next 10 years are critical --

G8 Goal of 20 large-scale project announcements by 2010



CCS Legal & Regulatory Issues

- **Important progress being made on principles**
 - ◆ London Protocol, OSPAR amendments allow offshore CO₂ storage
 - ◆ EU CCS Directive
- **Need to go to the next level of detail**
 - ◆ Site selection/risk mitigation
 - ◆ M&V to assure CO₂ retention
 - ◆ Property rights issues for transport and storage
 - ◆ Pipeline access, construction
 - ◆ Long-term liability
 - ◆ Interaction with GHG regulatory schemes
- **Jurisdiction, lack of resources are barriers**

CCS Financing

- Different needs for near-term demonstration and medium-term commercialisation
- For demonstration projects, USD 20B incremental funding needed
- Many proposals for special treatment for CCS in GHG emissions schemes
 - ◆ Bonus allowances
 - ◆ Use of allowance revenues to create special CCS funds
 - ◆ Trust funds capitalised via other fees
- CO₂ pipeline transport presents unique challenges in financing, access rules

Public Acceptance

- **Need to move beyond opinion surveys**
- **Pioneering public consultation work being done at local level**
 - ◆ **US Regional Sequestration Partnerships**
 - ◆ **EU ACCSEPT**
 - ◆ **Australia**
- **Need to synthesise lessons learned from these efforts and share internationally**
- **Governments need to increase outreach efforts**

CCS in Emerging Economies

- **China, India, Brazil, Russia and S. Africa must be key partners in CCS**
 - ◆ **IEA sees their coal use rising dramatically in the next two decades**
- **Technology transfer ideas urgently needed**
 - ◆ **Must be accompanied by policy development**
- **Testing CCS in the CDM a key first step**

The Way Forward

- **The window of opportunity is closing for CCS to deliver the necessary emissions reductions in time to stabilize the climate**
- **Announce 20 demonstration projects by 2010**
- **Develop harmonized, comprehensive CCS legal frameworks**
- **Ensure public education and acceptance**
- **Expand international collaboration**
 - ◆ **Develop global CCS Roadmap**
 - ◆ **Coordinate early demonstrations to leverage funding**
 - ◆ **Engage emerging economies more urgently**

The IEA Is Playing a Key Role

- **IEA CCS Roadmap effort launched 6 November**
 - ◆ Includes all major economies
 - ◆ Document baseline of CCS technology demonstration, track progress towards 20 projects worldwide
 - ◆ Set concrete technology, demonstration and policy milestones
 - ◆ Document for G8 CCS Summit in June 2009
- **IEA CCS Regulators' Network**
 - ◆ Sharing of experiences, harmonization of efforts
 - ◆ Forums on CO₂ pipeline regulation, regulation for early demo projects, long-term liability
 - ◆ Working with University College London
 - Carbon Capture Legal Programme offers updates on national/sub-national CCS laws and regulation: www.ucl.ac.uk/cclp

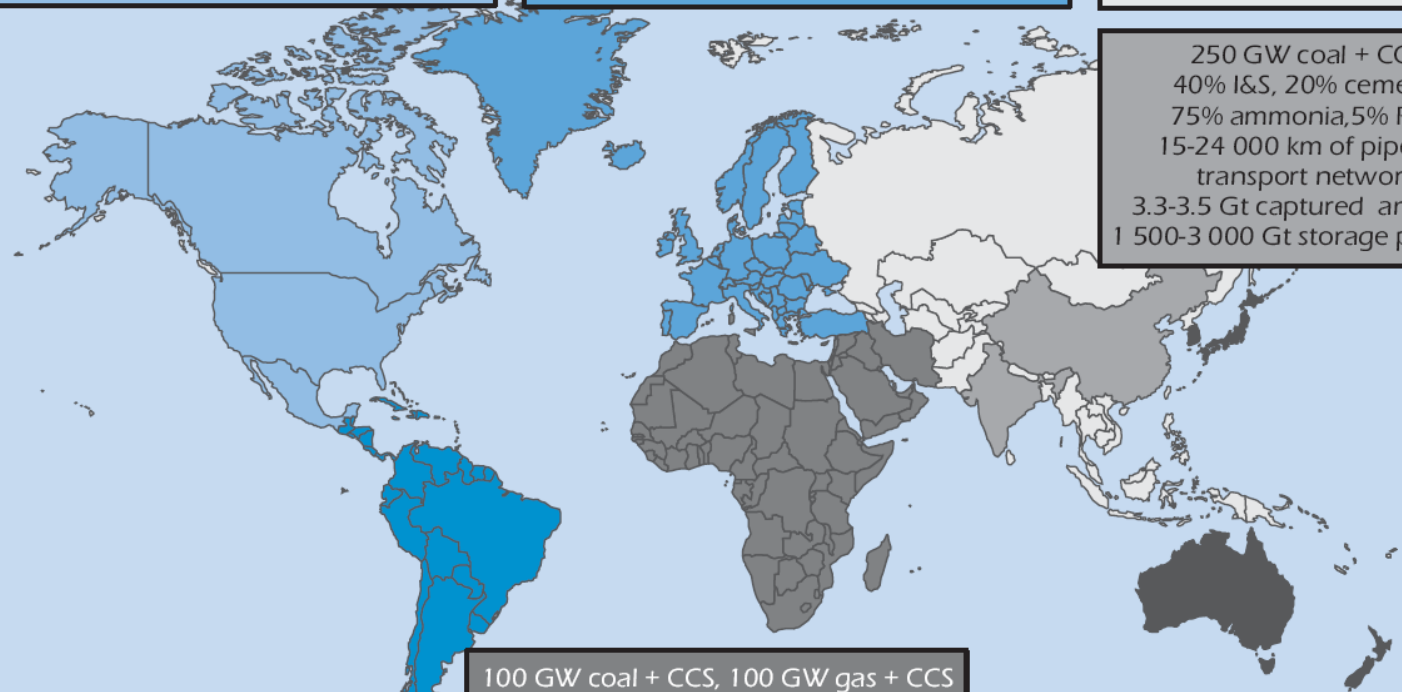


A 2050 CCS Vision

90 GW coal + CCS, 60 GW gas + CCS
 75% I&S, 50% cement, 100% ammonia,
 30% P&P
 18-24 000 km of pipeline transport network
 2.2-2.5 Gt captured annually
 1 500-6 000 Gt storage potential

15 GW coal + CCS, 90 GW gas + CCS
 75% I&S, 50% cement, 100% ammonia,
 30% P&P
 6-9 000 km of pipeline transport network
 0.8-0.9 Gt captured annually
 30-300 Gt storage potential

50 GW coal + CCS, 120 GW gas + CCS
 5-8 000 km of pipeline transport network
 1.1-1.3 Gt captured annually
 110-1 200 Gt storage potential



250 GW coal + CCS
 40% I&S, 20% cement,
 75% ammonia, 5% P&P
 15-24 000 km of pipeline transport network
 3.3-3.5 Gt captured annually
 1 500-3 000 Gt storage potential

25 GW gas + CCS, 10 GW coal + CCS
 4-6 000 km of pipeline transport network
 0.5-0.6 Gt captured annually
 2 000-5 000 Gt storage potential

100 GW coal + CCS, 100 GW gas + CCS
 7-12 000 km of pipeline transport network
 1.2-1.4 Gt captured annually
 300-3 000 Gt storage potential

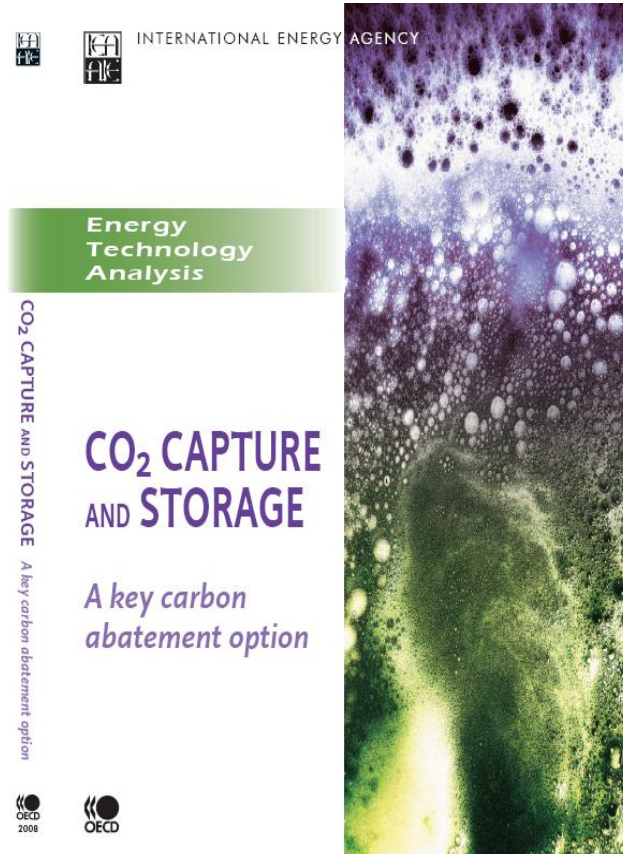
20 GW coal + CCS, 10 GW gas + CCS
 75% I&S, 50% cement, 15% P&P
 6-9 000 km of pipeline transport network
 0.4-0.5 Gt captured annually
 700-1 600 Gt storage potential

The boundaries and names shown and the designations used on maps included in this publication do not imply official endorsement or acceptance by the IEA.

Source: IEA, *CO₂ Capture and Storage: A Key Carbon Abatement Option (2008)*.



CO₂ Capture and Storage: A Key Carbon Abatement Option



- Role of CCS in global energy and emission scenarios
- CO₂ Capture: options and costs
- CO₂ transport and storage: Options and costs
- Legal & regulatory issues
- Financial mechanisms
- Comprehensive national and regional CCS status updates
- Roadmaps for CCS demonstration and deployment



Thank You
Tom.kerr@iea.org

www.iea.org/Textbase/subjectqueries/cdcs.asp

