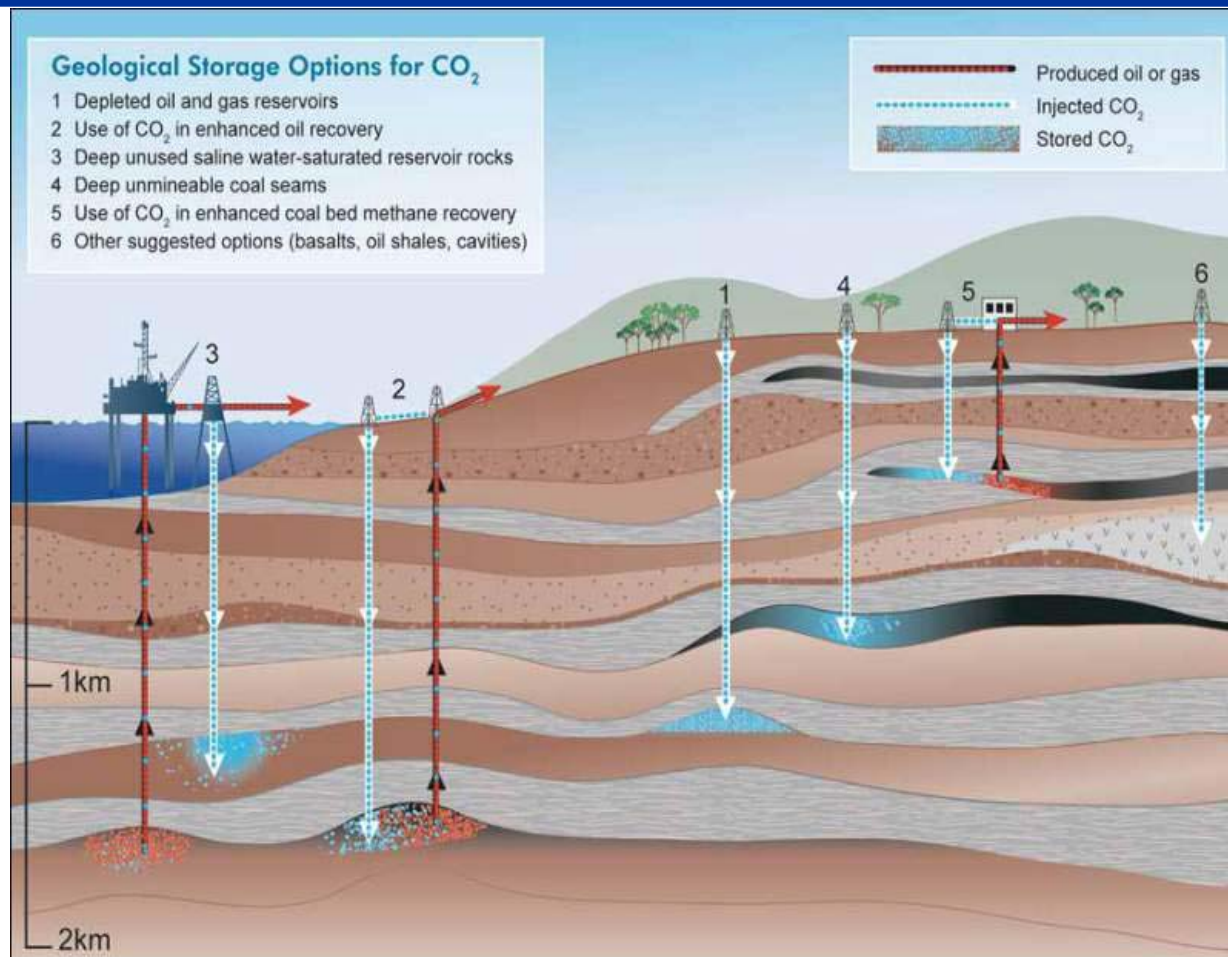




What is CCS?



**ECCP Working Group
on Emissions Trading
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Energy & Environment**



Why do we need CCS?

Climate change context

- Cannot reduce EU or world CO₂ emissions by 50% in 2050 with energy efficiency and renewables alone
- Must also use the possibility to capture and store CO₂
- Major fossil fuel use in the developing world must be addressed.

Potential of CCS

- Could contribute around 14% of all reductions needed by 2030
- by 2050 almost 60% of emissions from the power sector should be captured, compared with none today. More than 90% of all coal-fired electricity generation would be from plants equipped with CCS.
- After initial deployment in developed countries, rapid uptake in developing countries will follow.



How can its potential be achieved?

Requirements

- Manage risks of CCS
- Commercialise the technology – bring costs down substantially

Actions

- Enabling legal framework end 2007
- 10-12 demonstration plants.
- **Widespread deployment by 2020**



Planned power plant demonstrations

Project	Country	Capacity (MWe)	Power plant capture technology ^[1]	Capital	Proposed start	Participants
Lacq	France	50	oxyfuel	?	2006	Total
Schwarze Pumpe	Germany	30	?	?	2008	Vattenfall
Kårstø	Norway	385	NGCC	?	2009	?
Teeside	UK	800	IGCC	\$1.5bn	2009	Progressive Energy
Peterhead Miller	UK	350	NG to H ₂	\$0.6bn	2010	BP, SSE
Ferrybridge	UK	500	SCPC, retrofit	?	2011	SSE
Hatfield	UK	900	IGCC	?	2010	Powerfuel
Killingholme	UK	450	IGCC	?	2011	E.ON
Magnum	Netherlands	1200	IGCC multifuel	1 G€	2011	Nuon
Siemens	Germany	1000	IGCC	€1.7bn	2011	Siemens
Tjeldbergodden	Norway	860	NGCC	?	2011	Shell, Statoil
Mongstad	Norway	820	NGCC		2014	Statoil
RWE, Germany	Germany	450	IGCC	< €1bn	2014	RWE
RWE, Tilbury	UK	1000	SCPC	£0.8bn	2016	RWE



Risks of CCS

Estimates in IPCC Special report:

- Local risks associated with pipeline transport could be similar to or lower than those of current hydrocarbon pipelines
- With appropriate site selection, monitoring and remediation, the local risks of CCS would be comparable to those of natural gas and Enhanced Oil Recovery
- The fraction retained in appropriately selected and managed sites is very likely to exceed 99% over 100 years, and likely to exceed 99% over 1000 years.

Need to balance risks and benefits



Managing the risks

Main issue is geological storage

(Capture and transport fall under existing regulatory systems – outstanding issue is accident hazard risk from compressed CO₂ (SEVESO?))

Risk management framework for storage set out in IPCC Guidelines 2006:

- Model expected behaviour of CO₂, and only use the site if have demonstrated expected permanence of storage
- Monitor to check that CO₂ behaves as expected
- Seal and close when risks of future leakage insignificant.

Leakage

- Sites should be designed for zero leakage, but there must be clear responsibility for damage if leakage does occur.
- Should cover both local damage to the environment, and emissions credited under ETS which subsequently escape.



Removing barriers

Water

- Problem: Article 11.3.j prohibits storage in aquifers, because it bans discharges into groundwater
- Solution: amend article to allow CO₂ storage in aquifers permanently unsuitable for other purposes.

Waste

- CO₂ storage probably counts as waste disposal because the substance won't be used again
- If the Landfill Directive applies, it prohibits CCS, because it bans injection of liquid waste to landfill
- Other issues such as the Waste Shipment Regulation may also arise.
- Classification as waste limits regulatory options at Member State level (waste law has to be used; mining law is ruled out).



Role of Emissions Trading

- ETS is first line of incentivisation for CCS
 - Right now, consider that installation plus capture, transport and storage can be opted in together under Article 24
 - No additional allocation for capture, transport and storage
 - ⑩ Monitoring and reporting guidelines adopted by the Commission (on the basis of a draft prepared by the opting-in state), and verification arrangements made.
 - ⑩ Separate rules could be established for combustion+capture, transport, and storage, and could be generic where variation between projects is unlikely.
 - ⑩ COM must be satisfied with risk management and liability arrangements
 - ⑩ These must be consistent with the developing EU regulatory framework.
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Useful modifications for the future

- Transport and storage elements can't be opted in separately
 - Shared transport and storage networks?
 - Unlikely to pose problem for 2008-2012
 - Post 2012 more flexibility useful
- Commission can choose to opt-in a category of installation, rather than just the individual installation itself
 - But this only applies for the Member State proposing the opt-in
 - Useful to have possibility to opt-in for all Member States



Summary

- CCS is one option among others, but we cannot meet our targets with energy efficiency and renewables alone.
- The risks must be managed, particularly those from storage, and the Commission will propose a framework by end 2007.
- If COM is satisfied that risks are managed, and responsibility for leakage ensured, then CCS can be opted in to ETS as it stands.
- Technical improvements post 2012 could be useful, but the basic requirements are in place.