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The Commission's Holistic View on CCS Development in Europe

Large CCS projects meeting and workshop

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Contents

- The policy drivers
- Opportunities, Barriers and Actions to overcome them
- The instruments to promote CCS
- Concluding remarks

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EU Energy Policy

- ✓ **Reduce GHG emissions**
  - **EU Kyoto Commitment:** 8% reduction in GHG emissions by 2008-12 compared to 1990. Much deeper reductions required for post-2012

- ✓ **Maintain Security of Supply**
  - **Green Paper of March 2006 on a Common Energy Policy for Europe:** A European Strategy for Sustainable, Competitive and Secure Energy

- ✓ **Promote Competitiveness of the EU Industry**
  - **Lisbon process:** aiming to make the EU the most competitive and dynamic knowledge-driven economy by 2010

Opportunities: The example of EOR

A recent Commission (JRC) study of the EOR potential in the North Sea estimated that:

- The maximum technical potential for CO2 storage in active oilfields is up to 10 Gt with the simultaneous recovery of 10,000 million barrels of oil
- The economically feasible potential in the near to medium term could be up to 60 Mt/yr of CO2 avoided with the simultaneous annual production of 180 million barrels of oil.

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Opportunities: ZEPs already announced in the EU

Date Announced	Companies Involved	Technology Options	Plant Capacity	CO2 Avoided per year Million Tonnes	Estimated Cost	Place and Date of start of Operation
May 2005	VATTENFALL	Thermal Oxyfuel Pilot Coal Power Plant with CO2 capture	30 MW		40 million €	Germany 2008
June 2005	BP and Partners	Power Plant with H2 as fuel a) Natural gas conversion to H2 and CO2 b) CO2 capture, transport and use for Enhanced oil recovery c) H2 is used as fuel for power generation	350 MW	1.3	600 million $	Scotland 2009
March 2006	STATOIL and SHELL	Natural Gas Power Plant a) Capture and transport of CO2 for offshore injection b) Enhanced oil recovery	860 MW	2.5	1 - 1.5 billion $	Norway 2010-2011
March 2006	RWE	IGCC Power Plant-, CO2 capture and storage	450 MW		1 billion €	Germany 2014
May 2006	SIEMENS	IGGC (Polygasification process + CCS + polygeneration)	1000 MW		1.7 billion €	Germany 2011
Sept 2006?	GE/ POLISH UTILITY	IGCC Power Plant-, CO2 capture and storage	1000 MW		?	Poland

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Barriers - Actions

- **Technical and techno-economic barriers** (cost of capture, storage capacity, matching of sources with storage sites, storage permanence, …) **are being addressed by EU funded research projects.**

  One objective of FP6 was to take the cost of capture down to about €20/t.

- **Legal and regulatory barriers** (safety of storage, long term integrity, liability, risk assessment methodologies) **are being addressed by FP research projects and the ECCP.**

  To go from nothing to best practice to regulations and standards.

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Barriers - Actions

- **The 'chicken and the egg' barrier** (no large capture projects yet, no infrastructure, no regulation,…) **is addressed by the ZEP TP and R&D projects looking at the complete chain, like DYNAMIS, the pre-feasibility study of a large fossil fuel based zero emission power plant in Europe.**

- **The public acceptance barrier is addressed by a dedicated WG in the ZEP TP and by ECCP. The Commission informs and involves NGOs as much as possible from the start in all its activities.**

Barriers - Actions

The "Dispersed Efforts" Barrier

1. **A coherent EU Research Portfolio**
   This is mainly done by the Platform in its analysis of what has been done so far and what should be done to go forward and complement it.

2. **Coherent EU and MS programmes**
   This is also done by the Platform and by the FENCO (Fossil Fuel Energy Coalition) project of FP6 which is a coordination action of 13 Member States Ministries or organisations in charge of national research, coordinated by the UK and Germany.

3. **Addressing the coherence of international efforts**
   This is done by the Commission's active participation in the IEA, CSLF and via several bilateral agreements on S&T and MoUs with developed and developing economies (e.g. US, China, …)

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Instruments: CCS Activities under FP5 & FP6

- Projects on CCS worth more than 170 M€, including Sleipner (CO2STORE), CASTOR, CO2SINK, ENCAP, …
- Growth Initiative – “Quickstart” Programme : HYPOGEN and the Dynamis Project
- Co-ordination of Member States activities, ERA-NET (FENCO)
- International Cooperation : Member of the CSLF, IEA GHG,… Possibility for funding in last 2 calls for proposals with CSLF partners.
- European Technology Platform on Zero Emission Fossil Fuel Power Plants launched on 1 December 2005. A vision document is available.

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Instruments: Examples of Ongoing Projects

Project Acronym	Type of Action	Title	EU funds (M€)	Coordinator	Duration/ months	Start	No of Partners	No of countries
CO2SINK	IP	In-situ laboratory for capture and sequestration of CO_2	8.7	Postdam Research (DE)	60	1/4/04	14	8
ENCAP	IP	Enhanced capture of CO_2	10.7	Vattenfall (DE)	60	1/3/04	33	9
CASTOR	IP	CO_2 from capture to storage	8.5	IFP (FR)	48	1/2/04	30	12
CO2GEONET	NoE	Network of excellence on geological sequestration of CO2	6	BGS (UK)	60	1/4/04	13	7
CACHET	IP	CO2 capture and hydrogen production from gaseous fuels	7.5	BP (UK)	36	1/4/06	29	18 (3 Third countries)
DYNAMIS	IP	Preparing for large scale H2 production from decarbonised fossil fuels with CO2 geological storage	4	SINTEF (NO)	36	1/3/06	30	14
CO2REMOVE	IP	The monitoring and verification of CO2 geological storage	8	TNO (NL)	60	1/5/06	27	10 (1 Third country)

EC Funding: 55% on capture, 40% on storage and 5% on cross-cutting issues.

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Instruments

- **The 7th Framework Programme** is the EU's main instrument for funding scientific research and technological development over the period 2007 to 2013. CCS is one of the priority topics.

- **The Zero Emissions Fossil Fuel Power Plants Technology Platform** aims at highly efficient power generation plants with near zero emissions based on CO2 capture and storage technologies by 2020.

- **The European Climate Change Programme (ECCP)** has identified the most promising and cheapest routes to reduce GHG emissions. Phase II includes a working group on carbon capture and storage.

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Energy Research in FP7

OBJECTIVE

Transforming the current fossil-fuel based (carbon intensive) energy system into a more sustainable (low carbon) one based on a diverse portfolio of energy sources and carriers combined with enhanced energy efficiency, to address the pressing challenges of security of supply and climate change, whilst increasing the competitiveness of European industries.

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FP7 – Proposed Topics in Energy

- Hydrogen and fuel cells
- Energy savings and energy efficiency
- Renewable electricity generation
- CO2 capture and storage technologies for zero emission power generation
- Renewable fuel production
- Clean coal technologies
- Renewables for heating and cooling
- Smart energy networks
- Knowledge for energy policy making

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ZEP TP

ZEP represents the commitment of the European energy industry, research community, NGOs, Member States and the European Commission to use fossil fuels in a sustainable way. An effective Europe-wide programme will be developed, leading to the successful deployment of Zero Emission Fossil Fuel Power Plants over the next fifteen years.

ZEP will also mark out a roadmap for the strategic deployment of technologies for large-scale implementation of CCS.

This approach allows the EU energy industry to make a pro-active challenge to take advantage of the global market opportunities that will arise from the development of zero emission fossil fuel technologies.

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ZEP TP General Assembly

Brussels, 12-13 September 2006

- Review and validate the Strategic Research Agenda and the Strategic Deployment Document
- Demonstrate motivation and commitment of public & private partners to engage in a strategic partnership to accelerate development and deployment of ZEP-technology
- Help the Technology Platform to monitor its own progress and define the work plan for the next period

The GA will be opened by the president of the European Commission, Manuel Barroso. Speakers will include CEO's from industry, eminent scientists and high level representatives from the European Parliament and Council.

ECCP – Phase II

WG CCS – Consensual Recommendations to the Commission:

The Commission will produce a policy communication in 2007 outlining the major EU policy choices for CCS, accompanied (where necessary and appropriate) by a proposal for an EU CCS regulatory framework. Those policy and regulatory frameworks should be in place as soon as possible (before 2012).

- Permitting of geological storage
- Liability for leakage during operation and post-closure
- Clarification of the role of CCS under EU legislation
- The recognition of CCS projects in the EU ETS
- The need and possible options for incentivising CCS in the short term

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Closing Remarks

The EU is very active on all fronts to overcome the many barriers on the pathway towards zero emission fossil fuel power generation via carbon capture and storage

FP7, ECCP and the ZEP Platform are pivotal in this respect

A global challenge requires a strongly coordinated European approach as well as a coherent global solution.

COHERENCE AND COORDINATION ARE CRUCIAL

THANK YOU

http://ec.europa.eu/research/energy/