CO_2 Capture and Sequestration in Future International R&D Programmes: Summary Note

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Goals of the workshop

- **Presentation of the state-of-the-art about latest European and International CCS technologies in order**
  - **to give orientation and guidance to international priority RTD topics**
  - **identify and assess future RTD potentials**
- **Overview about the opportunities and barriers of CCS RTD activities as possible technological option for future mitigation technology**
- **To support the decison makers of industrial and public sectors, scientific bodies and NGOs in their future positions and decision making**

1st Session: International R&D Programmes and Activities - I

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- **IEA: CCS technologies are a serious, future CO_2 mitigation option - among others – having a significant potential for reducing GHG**
  - **Major challenges include RD&D gaps, public awareness and acceptance, the legal and regulatory framework, long-term policy framework and incentives**
- **EU vision of energy sustainability include**
  - **The need for the security of energy supply (incl. the full range of available fuels (incl. FF and CCS)!)**
  - **The need to ensure EU industrial competitiveness (global competition for the European Industry mentioned)**
  - **Post-Kyoto strategies to be developed incl. the full range of technological options (CCS technologies)**
- **EU RTD policy issues involve cost-effective FF usage in combination with zero emission technologies (incl. the whole RTD chain), a serious of FP 6 projects were presented (f. ex. Decrease of CO2 capture costs from 50-to 60 €/t to 20-30 €/t), CCS is also a priority topic in the next FP6 Call)**
- **EU: Clear recognition for an international approach on the issue of global environment challenges and technology development (participation in CSLF, IEA,**

1st Session: International R&D Programmes and Activities - II

- **COORETEC – R&D for Zero-Emission Fossil-Fuelled Power Plants, 2-phase programme (incl. CCS in the 2nd phase)**
  - **Replacement capacity in Germany till 2020: 40 GW Potential of increasing power plant efficiency: + 15 – 20 %**
  - **Clear roadmap shown and key technologies to be developed**
- **IEA GHG Program**
  - **Confirmation of portfolio approach in order to decrease GHG emissions (with CCS as priority topic)**
  - **Major studies on covering the whole portfolio of CCS technologies, latest results were mentioned that indicate a clear cost decrease in CO_2 capture technologies**
  - **CCS is priority topic in the greenhouse gas programme**
  - **New R&D networks will be set up covering risk assessment and monitoring of CO_2 storage**
  - **Role of international collaboration for future RTD developments outlined (participation of Austria?)**

2nd Session: CCS Projects and Activities: Key Messages - I

- **CO_2 Sinks in oil/gas fields and aquifers (Prof. Heinemann)**
  - Overview of world-wide CO2 storage activities and programs (presently over 70 projects)
  - Since 1950 EOR is an established technology
  - Austria: theoretical CO_2 storage volume in 11 oil/13 gas fields ~ 465 MM t (final: 510 MM t)
    - Vienna Basin (OMV): 430 MM t; Molasse (RAG): 35 MM t
    - Cost estimation (incl. 30 km pipeline): 11 – 12,5 €/t
    - Suggestion for a national CCS research project involving all major stake holders!
- **GESTCO Project – Geological "detailed" storage surveys incl. 8 European countries (f. ex. storage capacity in hydrocarbon fields = 37 Gt)**
  - Development of a CO_2 storage GIS (matching sources and sinks) and Decision Support System (DSS) to evaluate the economics of CSS
- **Schlumberger: Identification of challenges and risks of CO_2 subsurface storage, options concerning state-of-the-art technological and simulation models for monitoring procedures (conc. risk assessment, risk prevention for gradual or sudden release of CO_2 from a particular formation), virtual reality centers for improved "on-time" visualisation of stored CO_2**

3rd Session: CCS Projects and Activities Key Messages - II

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- **OPEC (Ms. Laura Atkins)**
  - CO_2 storage in depleting oil gas fields can significantly contribute to an increase of oil reserves (EOR = win/win situation)
  - Description of geological storage potentials in general and with specific examples in particular (Sleipner, In-Salah, West Texas Permian Basin, Weyburn, etc.)
  - Analysing the financing and policy issues (CDM could facilitate early implementation of CCS in developing countries) incl. gas flaring reduction initiatives
- **CO_2 Capture Project Update (Ms. Helen Kerr, BP)**
  - Joint industrial partnership in order to reduce costs of CCS technologies (several projects - over 100 contracts! - involving key technologies performed by key industries)
  - Perform successful demonstration projects (incl. proof of concept, risk assessment studies, etc.), but still unsolved questions (f. ex. cap rock stability, storage stability in saline aquifers, etc.)
  - Demonstration to external stakeholders that CCS is safe, measurable, and verifiable (f. ex. develop industry guidelines, etc.)

3rd Session: CCS Projects and Activities Key Messages - III

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- **CASTOR Project – RAG**
  - Reduce the costs of post-combustion capture technologies (in coal-fired power plants, f. ex. Elsam in Denmark (cost goals: 20 to 30 €/t)
  - So far, field evaluations of Atzbach-Schwanenstadt field in Upper Austria (depth: 1600 m, reservoir pressure: 11 – 30 bar) achieve positive results, however present CO_2 prices do not justify CCS investments at this stage.
- **OMV: CCS an emerging business opportunity?**
  - Consideration/analysis of the CCS market in Austria (SWOT analysis, competing technologies to CSS, ...)
  - Core competency is in the storage (not in capture and transportation technologies)
  - Major remaining questions: CO2 a waste? CO2 stored or disposed? Long-term ownership of CO2 and liability issues? Long-term Monitoring and verification issues?
  - Major business barriers exist (costs, legislation, image, uncertainties, etc.)

Summary

- CCS is a priority topic within the present and future(!) European and International RTD programmes and industrial activities
- Analysis by leading energy experts show a huge storage potential for CO_2
- A number of demonstration projects are presently carried-out to gain experience in practicability and other issues (f. ex. cap rock stability, CO_2 leakage, etc.)
- International collaborations (beside of national and industrial activities) may be characterised as essential to spur the development and implementation process (development of Post-Kyoto technologies necessary)
- Major uncertainties still exist in the policy and legal frameworks (liability, etc.)
- Major barriers were shown concerning the development/-implementation of CCS as business opportunity for companies (f. ex. absence of commercial incentives)