

SCOPING PAPER

IPCC SPECIAL REPORT ON CARBON DIOXIDE CAPTURE AND STORAGE

1. Introduction

At the 19th IPCC plenary meeting in Geneva, April 2002, it was decided¹ to hold a workshop in the fourth quarter of 2002 to consider the issues associated with geological and oceanic carbon separation, capture and storage. The outcome of the workshop should be an expert advice to the Panel whether to develop a Special Report on this topic or to incorporate the issue in the Fourth Assessment Report. In case the experts would recommend a Special Report, the workshop should deliver a scoping paper, timetable and detailed outline for a Special Report and a proposed list of authors for decision by the Panel at its next Session (18-21 February 2003). This scoping paper is the result of the workshop.

2. Workshop on Carbon Capture and Storage

From 18-21 November 2002, the IPCC workshop on carbon capture and storage was held in Regina, Canada under the auspices of Working Group III. About 200 experts indicated their interest in participation, but the maximum was set at 70 participants. The participants originated from 24 different countries. Thirteen presentations were given and discussions were held covering the area of sources, capture, transport, geological storage and ocean storage. The presentations addressed a wide range of issues including long term energy system implications, technical, environmental, safety, economic and legal aspects, and consequences for emission inventories². Eight breakout groups prepared the input to a Drafting group that agreed on a structure and contents of an IPCC Special Report (see section 4.2).

During the workshop, a field trip was organised to visit the Weyburn Monitoring Project. In this project, CO₂ transported from a Coal Gasification facility in Beulah, North Dakota, USA, is injected in oil wells, resulting in enhanced oil recovery. The oil revenue forms the basis for commercial viability and the CO₂ used in the project will remain stored in the reservoirs.

3. Why a Special Report?

The mandate of the Workshop was to support a decision by the IPCC Plenary meeting on a Special Report on Carbon dioxide Capture and Storage by 2005 or inclusion of this subject in the Fourth Assessment Report (AR4) by 2007. The participants discussed this issue and concluded that a Special Report would be the appropriate choice for the following reasons:

- Carbon dioxide capture and storage is an emerging technological option with a very high mitigation potential. It has been suggested that about half the world cumulative emission to 2050 may be stored at costs comparable to other mitigation options.
- The keen interest in this subject is demonstrated by plans considered by several leading industrial countries to invest in this emerging technology in the coming years.
- In the Marrakech Accords (2001), UNFCCC expressed its interest in the subject by inviting IPCC to prepare a Technical Paper on geological carbon storage technologies, covering current information, and report on it for the consideration of the 2nd COP/MOP³. However, a Technical Paper would be repetitious with the very limited material covered in the IPCC TAR of WG III. Conversely, a Special Report would recognise the range of new literature that could provide a basis for a comprehensive and up-to-date IPCC assessment.

¹ See www.ipcc.ch, Draft Report of the Nineteenth Session of IPCC, Geneva 17-20 April 2002, Appendix C decision 7, p.45-46

² The proceedings of this meeting are expected to be published on the web by February 2003.

³ See <http://unfccc.int>, Report of COP 7, document FCCC/CP/2001/13/Add.1, Decision 9/CP.7 (Art. 3.14 of the Kyoto Protocol), Draft decision -/CMP.1, para 7, page 50: "Invites the Intergovernmental Panel on Climate Change, in cooperation with other relevant organisations, to prepare a technical paper on geological carbon storage technologies, covering current information, and report on it for the consideration of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol at its second session".

- There is a growing interest in the scientific and technical community in the subject of carbon dioxide capture and storage, demonstrated by the growing availability of literature.
- Policymakers have a growing need for a reliable synthesis of the available scientific literature in order to facilitate the decision making process on the plans for carbon dioxide capture and storage as a climate change mitigation option.
- A first survey of available scientific and technical literature indicates that there generally is sufficient to ample material (including the output of the IEA Greenhouse Gas R&D Program) to cover the relevant areas for an Assessment Report.
- Inclusion of this subject as a chapter in the AR4 would necessarily mean that only a limited assessment of the new literature would be possible. In that case, IPCC could not ensure the provision of a complete and balanced picture of carbon dioxide capture and storage. Conversely, a Special Report would be able to cover all relevant issues.
- Preparation of a Special Report on carbon dioxide capture and storage would not interfere with preparation of AR4 and other activities given the specific nature of the topic and its timing.

4. Proposed Content of a Special report

4.1 Title

The 19th session of IPCC gave a mandate to hold a workshop on *carbon capture and storage*. As a matter of fact, it is not “carbon” but “carbon dioxide“ that is stored. Therefore, it is proposed to the IPCC 20th session to decide to change the title into “*carbon dioxide capture and storage*”.

4.2 Contents

The following structure was felt to ensure the best possible treatment of the Carbon Dioxide Capture and Storage issues:

1. Introduction (CO₂ emissions and projections; stabilisation options of GHG concentrations; possible role of carbon dioxide capture and storage for deep CO₂ emission reductions; CO₂ storage in relation to other mitigation options; general explanation and guidance with system diagrams; the importance of carbon dioxide retention time-scales)
2. Sources (characterisation of emission sources; geographical distribution of emission sources; matching of sources and sinks; climate neutral energy carriers and system transitions and the implications for CO₂ sources from direct fuel use)
3. Capture (capture systems; technological options for separation; system integration; optimisation of capture; advances in capture systems and enabling technologies; hydrogen; distributed applications; monitoring, risk, and legal aspects for capture systems; capture costs)
4. Transport (Pipelines (regional, national); ships; monitoring, risk and legal aspects for transport systems; transport costs)
5. Geological storage
 - 5.1. Introduction
 - 5.2. Storage formations and capacity (depleted gas fields, oil fields, unminable coal seams, and saline aquifers)
 - 5.3. Site selection and performance assessment
 - 5.4. Injection technology and well field operations
 - 5.5. Monitoring technologies
 - 5.6. Verification
 - 5.7. Environmental impacts and risks (e.g. leakage)
 - 5.8. Legal issues and public acceptance
 - 5.9. Costs
6. Ocean storage

- 6.1. Introduction
 - 6.2. Storage formations and capacity (mid-ocean injection, sea floor options, and carbonate neutralisation)
 - 6.3. Site selection and performance assessment
 - 6.4. Injection technology and well field operations
 - 6.5. Monitoring technologies
 - 6.6. Verification
 - 6.7. Environmental impacts and risks (e.g. leakage)
 - 6.8. Legal issues and public acceptance
 - 6.9. Costs
7. Re-use and other storage options (re-use technologies and other storage technologies such as mineralisation; potential in terms of avoided CO₂ emissions; energy use, life cycle analysis and practical feasibility)
 8. Total costs and market potential (model approaches and assumptions; building up the full cost chain; potential for cost reduction; economic potential and implications)
 9. Implications for emission inventories and accounting (greenhouse gas emission inventories; accounting issues)
 10. Critical Gaps in knowledge

5. Time schedule and provisional budget estimate

If the Plenary decides to approve of a Special Report, delivery would be planned in the first half of 2005. In contrary to the request by the COP-7, it is not likely that the report will be ready by the 2nd COP/MOP. It will be presented at COP-11. 2 Lead Author meetings in 2003 and 2 Lead Author meetings in 2004 are foreseen. The planning would be made to properly synchronise with the preparation of the AR4 and a possible Special Report on Fluorinated gases.

Budget 2003: assuming 2 Lead Author meetings, assuming 25 journeys of DC and EIT lead authors per meeting at 5.740 CHF per journey, and assuming that local meeting costs will be met by in-kind contributions, *315.700 CHF* will be needed from the IPCC Trust fund.

Budget 2004; 2 * 25 journeys of DC and EIT Lead Authors = approx. 315.700 CHF. In addition, 4 review editors from DC and EIT will be invited at the LA-meetings, which corresponds to another 50.512 CHF. The total budget for 2004 will then amount up to *366.212 CHF*.

Budget 2005: Plenary WG III meeting (likely combined with approval of Special Report on Fluorinated Gases); assuming 3 days for the Summary for Policy Makers on this subject will cost approx. 845.000 CHF. An additional 63.140 CHF are reserved for the LA meeting in advance of the WGIII Plenary. Costs for translation and purchasing of the Special Report, shipping costs and outreach are estimated at *200.000 CHF*. The total budget for 2005 then amounts to *1.107.940 CHF*.

6. Lead author selection process

Nominations were called for in a letter to governments, dated June 17, 2002. Based on the nominations, the IPCC Bureau will select the Co-ordinating Lead Authors, Lead Authors, and Review Editors.