

Messages from the IPCC Special Report on CO₂ Capture and Storage

Fifth Annual Conference on CCS

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IPCC Process

- Assessment of published scientifically and technically sound information
- No research, no monitoring, no recommendations
- Policy relevant, but NOT policy prescriptive
- Authors are best experts available worldwide covering academic, industrial and NGO experience
- Thoroughly reviewed by Experts/ Governments
- Final approval of summary by governments
- Process took almost 3 years
 - Initial workshop Nov 2002
 - First LA meeting July 2003
 - Acceptance Sept 2005

Coordinating Lead Authors and Crosscut Leaders from US

- Sally Benson (Ch 5)
- Ken Caldeira (Ch 6)
- Richard Doctor (Ch 4)
- James Dooley (Ch 8)
- Howard Herzog (Ch 8)
- Ed Rubin (Ch 3, 7, TS)

Lead Authors from US

- William Moomaw (Ch 1)
- Bob Williams (Ch 2, 3)
- Dale Simbeck (Ch 2, 3)
- David Coleman (Ch 4)
- Jason Anderson (Ch 5)
- Peter Brewer (Ch 6)
- Haroon Khashgi (Ch 6)
- Chris Sabine (Ch 6)
- Klaus Lackner (Ch 7)
- Gregg Marland (Ch 9)

CCS as part of a Mitigation Portfolio

The Third Assessment Report (TAR) indicates that no single technology option will provide all of the emission reductions needed to achieve stabilization, but a portfolio of mitigation measures will be needed.

SPM Paragraph 2

Portfolio Illustration

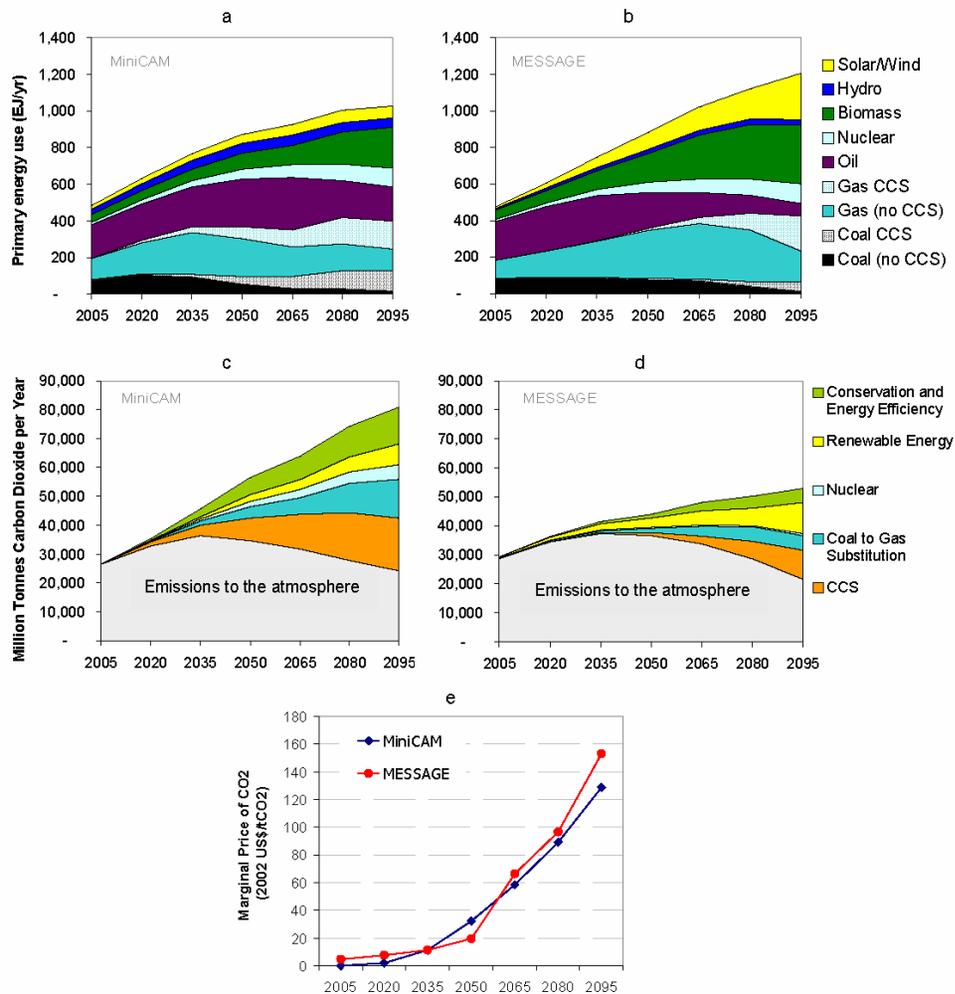


Figure S.7. These figures are an illustrative example of the global potential contribution of CCS as part of a mitigation portfolio. They are based on two alternative integrated assessment models (MESSAGE and MiniCAM) adopting the same assumptions for the main emissions drivers. The results would vary considerably on regional scales. This example is based on a single scenario and, therefore does not convey the full range of uncertainties. Panels a) and b) show global primary energy use, including the deployment of CCS. Panels c) and d) show the global CO₂ emissions in grey and corresponding contributions of main emissions reduction measures in colour. Panel e) shows the calculated marginal price of CO₂ reductions (8.3.3, Box 8.3).

Mitigation Cost

Energy and economic models indicate that the CCS system's major contribution to climate change mitigation would come from deployment in the electricity sector. Most modelling as assessed in this report suggests that CCS systems begin to deploy at a significant level when CO₂ prices begin to reach approximately 25 - 30 US\$/tCO₂.

$\$25\text{-}30/\text{tCO}_2 = \$100/\text{tC}$

SPM Paragraph 17

Economic Potential

*In most scenarios for stabilization of atmospheric greenhouse gas concentrations between 450 and 750 ppmv CO₂ and in a least-cost portfolio of mitigation options, the economic potential of CCS would amount to 220 - 2,200 GtCO₂ (60 - 600 GtC) cumulatively, which would mean that **CCS contributes 15 to 55% to the cumulative mitigation effort worldwide until 2100**, averaged over a range of baseline scenarios. It is likely that the technical potential for geological storage is sufficient to cover the high end of the economic range, but for specific regions, this may not be true.*

Likely = 66-90%

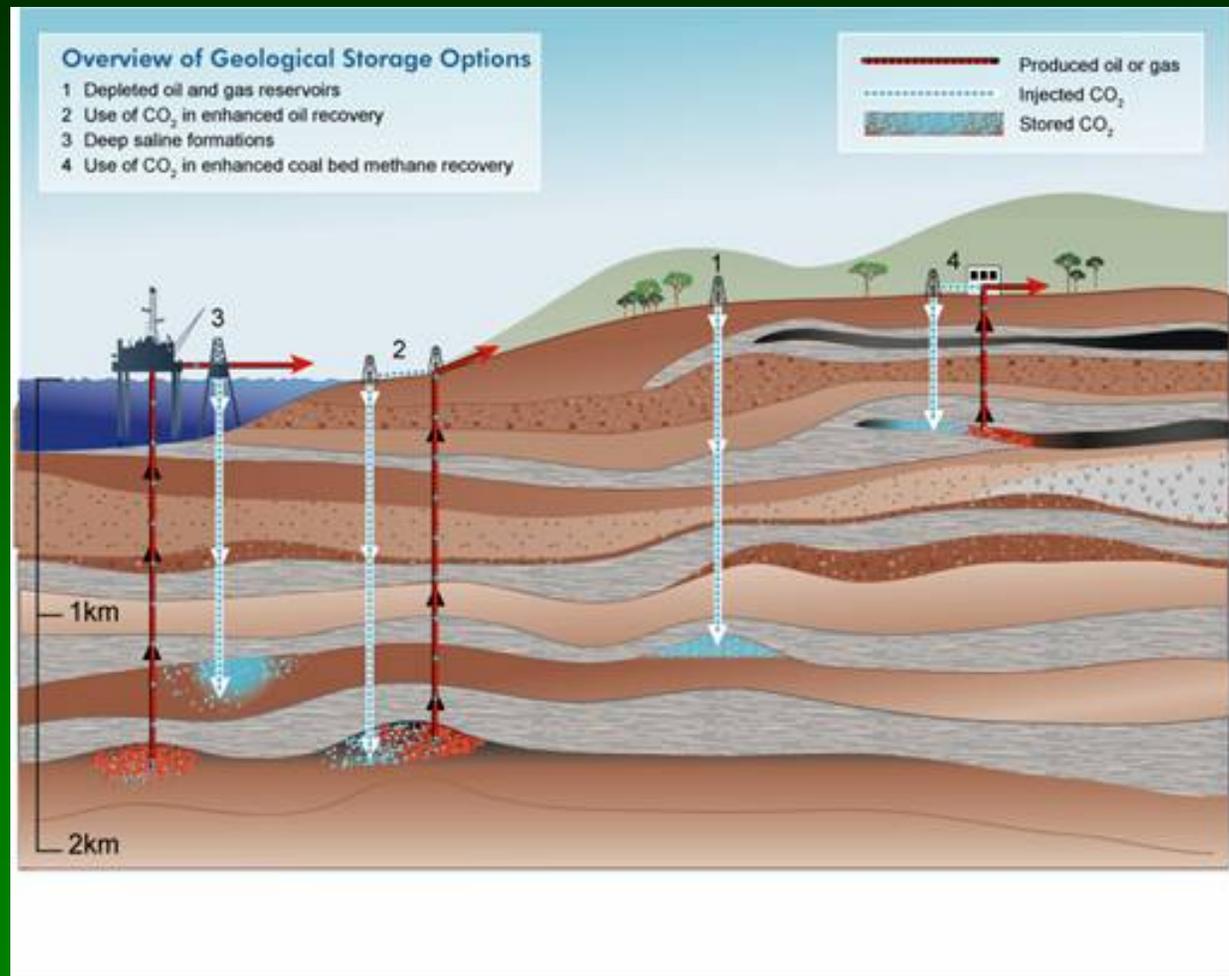
SPM Paragraph 19

Economic Impact

*In most scenario studies, the role of **CCS in mitigation portfolios** increases over the course of the century and including CCS in a mitigation portfolio is found to **reduce the costs of stabilizing CO₂ concentrations by 30% or more.***

SPM Paragraph 20

Overview of Geologic Storage Options



SPM Figure 4

Howard Herzog / MIT Laboratory for Energy and the Environment

Geological Storage Options

Storage of CO₂ in deep, onshore or offshore, geological formations uses many of the same technologies that have been developed by the oil and gas industry and has been proven to be economically feasible under specific conditions for oil and gas fields and saline formations, but not yet for storage in unminable coal beds (see Figure SPM.4).

SPM Paragraph 7

Worldwide Capacity Estimate

Available evidence suggests that worldwide, it is likely that there is a technical potential of at least about 2,000 GtCO₂ (545 GtC) of storage capacity in geological formations.

There could be a much larger potential for geological storage in saline formations, but the upper limit estimates are uncertain due to lack of information and an agreed methodology.

SPM Paragraph 18

Leakage from Geological Reservoirs

*Observations from engineered and natural analogues as well as models suggest that **the fraction retained in appropriately selected and managed geological reservoirs is very likely to exceed 99% over 100 years, and is likely to exceed 99% over 1,000 years.***

For well-selected, designed and managed geological storage sites, the vast majority of the CO₂ will gradually be immobilized by various trapping mechanisms and, in that case, **could be retained for up to millions of years.**

CO₂ Utilization

*Industrial uses of captured CO₂ as a gas or liquid or as a feedstock in chemical processes that produce valuable carbon-containing products are possible, but **are not expected to contribute to significant abatement of CO₂ emissions.***

SPM Paragraph 10

Summary of Key Messages

- CCS part of a mitigation options portfolio
 - Significant deployment starts at \$100/tC
 - Contribute 15-55% of CO₂ reductions
 - Cut mitigation costs by 30% or more
- Geological Storage
 - At least 2,000 Gt CO₂ capacity, potentially much larger
 - Retention times up to millions of years
 - Likely to have less than 1% leakage over 1000 years
- CO₂ Utilization not significant

Moving Forward

- Release of the IPCC Special Report is a beginning, not an end.
 - SBSTA – Subsidiary Body for Scientific and Technological Advice
 - CDM - Clean Development Mechanism
 - 2006 IPCC Guidelines for National Greenhouse Gas Inventories (accepted April 26-28 by IPCC)

SBSTA

- Welcomed Special Report
- Noted it provides a comprehensive assessment
- Acknowledged CCS is an option in the portfolio of mitigation options
- Recognized importance of disseminating the results of the Special Report
- In-session workshop on May 20 at SBSTA 24 in Bonn, Germany
<http://unfccc.int/meetings/sb24/items/3648.php>

CDM

- Invites input on issues relating to project boundary, leakage, and permanence
- Requests proposals for new methodologies
- In-session workshop on May 22 at SBSTA 24 in Bonn, Germany
<http://unfccc.int/meetings/sb24/items/3648.php>

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