ipcc

INTERGOVERNMENTAL PANEL ON climate change

THIRTY-SECOND SESSION OF THE IPCC
Busan, 11-14 October 2010

IPCC-XXXII/Doc. 5
(3.IX.2010)
Agenda Item: 4.2
ENGLISH ONLY

THE IPCC FIFTH ASSESSMENT REPORT (AR5)

Proposal for an IPCC Expert Meeting on Geoengineering

(Submitted by the Co-Chairs of Working Group I, II and III)

IPCC Secretariat

c/o WMO • 7bis, Avenue de la Paix • C.P. 2300 • 1211 Geneva 2 • Switzerland
telephone : +41 (0) 22 730 8208 / 54 / 84 • fax : +41 (0) 22 730 8025 / 13 • email : IPCC-Sec@wmo.int • **www.ipcc.ch**

WMO UNEP

PROPOSAL FOR AN IPCC EXPERT MEETING ON GEOENGINEERING

(Submitted by the Co-Chairs of Working Group I, II and III)

1. Background

Geoengineering, or the deliberate large-scale manipulation of the planetary environment, is increasingly being discussed as a potential strategy to counteract anthropogenic climate change. Prevailing uncertainty in the sensitivity of the climate system to anthropogenic forcing, inertia in both the coupled climate-carbon cycle and social systems, and the potential for irreversibilities and abrupt, nonlinear changes in the Earth system with possible significant impacts on human and natural systems call for research into possible geoengineering options to complement climate change mitigation efforts.

Geoengineering methods can be largely classified into two main groups: Solar Radiation Management (SRM) and Carbon Dioxide Removal (CDR). While both approaches aim to reduce global temperatures, they clearly differ in their modes of action, the timescales over which they are effective, their effects on temperature and other climate variables (e.g., precipitation), and other possible consequences.

SRM techniques attempt to offset the effects of increased greenhouse gas concentrations by reducing the amount of solar radiation absorbed by the Earth. This may be achieved by increasing the surface reflectivity of the planet, for example by brightening human structures, planting crops with a higher albedo, or covering deserts with reflective material. Other techniques aim to enhance marine cloud reflectivity by introducing sea salt aerosols in low clouds, mimic the effects of volcanic eruptions by injecting sulphate aerosols into the lower stratosphere, or place shields or deflectors in space to reduce the amount of incoming solar radiation.

CDR techniques aim to address the cause of climate change by removing greenhouse gases from the atmosphere. This would include advanced land use management strategies to protect or enhance land carbon sinks, and the use of biomass for both carbon sequestration (including biochar) and as a carbon neutral energy source. The removal of carbon dioxide from the atmosphere, either through the enhancement of natural weathering processes or direct capture from ambient air are further examples, as well as the enhancement of oceanic CO_2 uptake through ocean fertilisation with scarce nutrients or the enhancement of upwelling processes.

Major uncertainties exist regarding the effects of these techniques on the physical climate system and on biogeochemical cycles, their possible impacts on human and natural systems, and their effectiveness and costs. SRM, for example, could impact regional precipitation patterns while offering no solution for CO_2 -induced ocean acidification. Unilateral action may have environmental side effects on other countries and regions, and may not appropriately address the global scale of the issue. Thus, geoengineering itself may constitute "dangerous anthropogenic interference with the climate system" (Article 2, UNFCCC), and consideration needs to be given to international governance frameworks.

2. Expert Meeting

Current discussions that suggest geoengineering as an option to support climate mitigation efforts remain rather abstract and lack comprehensive risk assessments that take into account possible adverse impacts over short and longer time frames. The understanding of the physical science basis of geoengineering is still limited and IPCC will, for the first time, assess this in several chapters of the WGI contribution to AR5. Improved scientific understanding of the impacts of geoengineering proposals on human and natural systems will be assessed by WGII. WGIII needs to take into account the possible impacts and side effects and their implications for mitigation cost in order to define the role of geoengineering within the portfolio of response options to anthropogenic climate change. Furthermore, this includes an evaluation by WGIII of options for appropriate governance mechanisms.

2.1 Objectives:

The aim of the proposed expert meeting is to discuss the latest scientific basis of geoengineering, its impacts and response options, and to identify key knowledge gaps. The expert meeting would be organised by Working Group III with a cross-Working-Group focus. The following issues will be discussed in more detail:

- different geoengineering options, their scientific basis and associated uncertainties;
- associated potential risks and related knowledge gaps;
- effect of impacts and side effects on mitigation cost and the role within the portfolio of mitigation options
- suitability of existing governance mechanisms for managing geoengineering, including social, legal and political factors
- key knowledge gaps that could be filled in the shorter and longer terms.

2.2 Expected Outcome:

The expert meeting will provide a platform for exchange and discussion among experts from the different disciplines in order to better address the important cross-cutting issue of geoengineering. This should also encourage the consistent treatment of geoengineering options across the WGs' assessments that will build the basis for the AR5 Synthesis Report.

The Expert Meeting will produce a report that could include summaries of keynote presentations, abstracts of expert contributions, reports from breakout group discussions, and a non-comprehensive bibliography of recent literature related to geoengineering.

3. Organization

A Scientific Steering Committee will be formed with relevant experts in geoengineering from the IPCC Working Groups.

Timing: first half of 2011

Duration: 2 to 3 days

Participants: About 40 invited experts, with broad international representation. It is proposed that 25 journeys for experts from developing countries and economies in transition including Co- and Vice-Chairs from all Working Groups are allocated as part of the line item "expert meetings related to the AR5" in the IPCC Trust Fund budget for 2011. Participants will be needed with expertise in:

- WGI: clouds/aerosols & climate, carbon cycle & climate, coupled climate - carbon cycle projections
- WGII: impacts on human and natural systems
- WGIII: bottom-up modelling experts, risk analysis, integrated assessment modelling groups, governance and international cooperation.