Convention on Biological Diversity

INTERNATIONAL YEAR OF FORESTS • 2011

I. DEFINITIONS OF CLIMATE-RELATED GEO-ENGINEERING

1. Convention on Biological Diversity – Decision X/33

Technologies that deliberately reduce solar insolation or increase carbon sequestration from the atmosphere on a large scale that may affect biodiversity (excluding carbon capture and storage from fossil fuels when it captures carbon dioxide before it is released into the atmosphere)

http://www.cbd.int/climate/doc/cop-10-dec-33-en.pdf

2. Intergovernmental Panel on Climate Change – Fourth Assessment Report

Technological efforts to stabilize the climate system by direct intervention in the energy balance of the Earth for reducing global warming

http://www.ipcc.ch/pdf/glossary/ar4-wg3.pdf

3. Intergovernmental Panel on Climate Change – Third Assessment Report

Efforts to stabilize the climate system by directly managing the energy balance of the Earth, thereby overcoming the enhanced greenhouse effect

http://www.ipcc.ch/pdf/glossary/tar-ipcc-terms-en.pdf

4. The United Kingdom of Great Britain and Northern Ireland

Activities specifically and deliberately designed to effect a change in the global climate with the aim of minimising or reversing anthropogenic (that is, human made) climate change

http://www.publications.parliament.uk/pa/cm200910/cmselect/cmsctech/221/22102.htm

5. The United Sates House of Representatives Committee on Science and Technology

The deliberate large-scale modification of the Earth's climate systems for the purposes of counteracting [and mitigating anthropogenic[1]] climate change

Hearing on November 5th, 2009 - Geoengineering: Assessing the Implications of Large-Scale Climate Intervention

[1] Added in the Report by the Chairman of the Committee on Science and Technology 'Engineering the Climate: Research Needs and Strategies for International Coordination – October, 2010'.

6. The Royal Society

The deliberate large-scale manipulation of the planetary environment to counteract anthropogenic climate change

Geoengineering the Climate: Science, governance and uncertainty. September, 2009

7. The National Academy of Science

Options that would involve large-scale engineering of our environment in order to combat or counteract the effects of changes in atmospheric chemistry

http://books.nap.edu/openbook.php?record_id=1605&page=433

8. The Australian Academy of Science

A branch of science which is focused on applying technology on a massive scale in order to change the Earth's environment

http://www.science.org.au/nova/123/123key.html

9. The ETC Group (Non-governmental Organization)

Intentional, large-scale manipulation of the environment by humans to bring about environmental change, particularly to counteract the undesired side effects of other human activities

http://www.etcgroup.org/en/materials/issues

10. The Asilomar Conference Report: Recommendations on Principles for Research into Climate Engineering Techniques

Deliberate steps to alter the climate, with the intent of limiting or counterbalancing the unintended changes to the climate resulting from human activities.

http://www.climateresponsefund.org/images/Conference/finalfinalreport.pdf

II. SUBDIVISIONS OF GEO-ENGINEERING

Option 1: Solar Radiation Management (SRM) and Carbon Dioxide Removal (CDR)

Solar Radiation Management

- changing surface albedo (urban, rural, or atmospheric approaches)
- uplifting water vapour (cloud management)
- stratospheric injection of aerosols
- solar reflectors (space based)

Carbon Dioxide Removal

- Air Capture: removal of greenhouse gases from the atmosphere

- ocean fertilization
- afforestation and reforestation
- improved land management
- reducing deforestation
- biochar and other forms of biomass for sequestration
- enhanced weathering
- atmospheric scrubbers
- ocean upwelling / downwelling modification

- Carbon Capture and Storage: capture and storage of greenhouse gasses before they enter the atmosphere

- post combustion capture
- pre-combustion capture
- oxy-fuel combustion
- chemical looping combustion
- calcium looping combustion

- storage in deep geological formations
- storage in deep ocean masses
- storage in the form of mineral carbonates

Options 2: Remediation and Intervention Technologies

Remediation Technologies: reduce the causes of climate change

- afforestation
- ocean fertilization

Intervention Technologies: moderate the results of the altered atmospheric composition

- solar radiation management

III. Comparison of Definitions of Climate-Related Geo-engineering

Definition	Scale	Intended to minimize or counteract[2]:	Activities that manage the Earth's:	Actions that are:
Technologies that deliberately reduce solar insolation or increase carbon sequestration from the atmosphere on a large scale that may affect biodiversity (excluding carbon capture and storage from fossil fuels when it captures carbon dioxide before it is released into the atmosphere)	large	not specified	not specified	deliberate
Technological efforts to stabilize the climate system by direct intervention in the energy balance of the Earth for reducing global warming	not specified	global warming	energy balance	direct
Efforts to stabilize the climate system by directly managing the energy balance of the Earth, thereby overcoming the enhanced greenhouse effect	not specified	enhanced greenhouse effect	energy balance	direct
Activities specifically and deliberately designed to effect a change in the global climate with the aim of minimising or reversing anthropogenic (that is, human made) climate change	not specified	anthropogenic climate change	climate	deliberate
The deliberate large-scale modification of the Earth's climate systems for the purposes of counteracting and mitigating anthropogenic climate change	large	anthropogenic climate change	climate	deliberate

[2] It should be noted that some definitions of geo-enigineering suggest that only activities that aim to reduce historical emissions should be considered geo-engineering whereas those actions that intend to offset present emissions would not be considered as geo-engineering as they don't result in a net change in the atmospheric concentration of greenhouse gasses

The deliberate large-scale manipulation of the planetary environment to counteract anthropogenic climate change	large	anthropogenic climate change	environment	deliberate
Options that would involve large-scale engineering of our environment in order to combat or counteract the effects of changes in atmospheric chemistry	large	changes in atmospheric chemistry	environment	not specified
A branch of science which is focused on applying technology on a massive scale in order to change the Earth's environment	massive	not specified	environment	not specified
Intentional, large-scale manipulation of the environment by humans to bring about environmental change, particularly to counteract the undesired side effects of other human activities	large	other human activities	environment	deliberate
Deliberate steps to alter the climate, with the intent of limiting or counterbalancing the unintended changes to the climate resulting from human activities	not specified	anthropogenic climate change	climate	deliberate