Search

Projects

Print this page

Core Concepts of Risk and Risk Governance
Risk Governance Deficits
Emerging risks
Critical Infrastructures
Influenza Pandemic
Nanotechnology
Nanotechnology in Food and Cosmetics
Carbon Capture and Storage
Governance of Bioenergy
Synthetic Biology
Review of Energy Technology Scenarios
Energy Security
Geoengineering
Pollination Services
Maritime Global Critical Infrastructure
Power Plant CO2 Capture Technologies

Geoengineering

Geoengineering – a term which is increasingly used to describe a number of techniques which have the potential to offset the global warming caused by greenhouse gases – raises many risk governance issues.

Some of these issues concern the techniques themselves, and their impacts. Given the early stage of research, there is also an ongoing debate about the term geoengineering itself and which set of techniques it refers to. The main categories are:

• Solar radiation management (SRM) includes techniques that reflect sunlight back into space, and thus have a cooling effect on Earth. This could be achieved by, for example, adding aerosol particles to the upper atmosphere or improving the reflectivity or longevity of clouds. These methods work quickly and can help mitigate global warming. However, they do not address the broader effects of rising CO2 levels (e.g., ocean acidification) and may create additional problems.

• Carbon dioxide removal (CDR) techniques remove CO2 from the Earth's atmosphere, and thus target the root cause of climate change, i.e. rising CO2 concentration. Available techniques include ocean iron fertilisation and atmospheric CO2 scrubbers. In comparison to SRM techniques, CDR techniques would not work to cool the climate as rapidly, although, unlike SRM, they would address the root problem of rising CO2 concentrations.

Each technique, in either category, would work differently, and have different potential impacts on systems such as the hydrological and carbon cycles.

Another set of issues derives from limited knowledge. Climate modelling is itself hugely complex and imprecise, and it is currently not possible to adequately model the effects of geoengineering techniques on not only the Earth's climate but also other parts of the biosphere (such as hydrological, carbon and nitrogen cycles, Ocean Flux and ecosystems). To better understand each technique's impacts, modelling will need to be complemented by physical experiments which, to be useful, themselves require considerable and costly enhancements to current climate monitoring systems.

The need for such research raises issues of how (under what norms) the research should be conducted, by whom and under whose oversight. A number of international treaties include texts which have relevance to some of the techniques. However, no existing treaty is applicable to SRM, which is arguably the category of techniques most urgently in need of international governance. It may be premature to introduce new legal frameworks for techniques that have yet to be tested, but there may well be a need to develop a transparent approach to ensuring the legitimacy and purpose of the necessary research.

Research is an essential prerequisite to a decision to actually deploy one or more geoengineering techniques. Both research and deployment raise a risk of moral hazard. Whilst genuine progress has been made through the United Nations Framework Convention on Climate Change and its Kyoto Protocol, the scientific evidence (as in the IPCC's Fourth Assessment Report) indicates that far more rigorous measures are needed to reduce GHG emissions and their impact. These measures are known to be hugely expensive and their effect on global warming will be slow. Geoengineering could be seen by some as a potentially cheaper policy alternative. The moral hazard is that a decision to support geoengineering techniques could lessen efforts to reduce global emissions of CO2 and other greenhouse gases. Even the proponents of geoengineering believe that to this outcome must be avoided.

To help progress discussion of these issues, an expert workshop on this issue was held at the Calouste Gulbenkian Foundation in Lisbon, Portugal on 20 and 21 April 2009, and IRGC published an opinion piece in October 2010.

For more information about this project, please contact Diane Boulay.

Further information

Expert workshop

Opinion piece