WHAT SHOULD WE EXPECT FROM GEOENGINEERING RESEARCH?

The sixth of a set of seven briefing notes summarising the findings of the Climate Geoengineering Governance Project

GEOENGINEERING
GOVERNANCE RESEARCH

The Climate Geoengineering Governance (CGG) project has brought together a broad range of expertise from the social sciences and humanities to examine the challenges of governance and regulation of climate geoengineering and to suggest ways forward

BRIEFING NOTE 6

What particular challenges are raised by geoengineering research?

The general value of research on new technologies is to assess effectiveness and safety: to pare down uncertainty and reduce risks, so that we can take account of them in appropriate governance strategies and in detailed regulation for deployment. But in the case of geoengineering, the research to assess effectiveness and safety faces such technical and social uncertainties as to require governance itself, beyond the familiar institutional ethical review.

This caution about geoengineering research, and especially research which is open to the environment, is justified because:

- the technologies proposed are immature and underspecified in detail;
- geoengineering needs to be considered in the context of mitigation and adaptation, and any deployment needs to supplement not substitute for them;
- the complexity of earth systems makes it impossible to predict the effectiveness and side effects of interventions or precisely how they will distribute goods and harms, and may even make it impossible to attribute cause and effect after the event;
- and because there is no global consensus as to what constitute goods and harms, with some countries even seeing themselves as potential beneficiaries of climate change.

Experiments in the environment will be necessary before any decision to deploy geoengineering. This is because although laboratory work and computational models will improve our understanding, we cannot expect them to substitute for experimentation in the real world, and indeed laboratory scientists require experimentation to improve their models. We can never be sure we know enough, and decisions to approve research, and arrangements for its governance, need to acknowledge that fundamental uncertainty.

How should geoengineering research be governed?

Governance mechanisms are always needed for geoengineering research which is open to the environment, to ensure that

- experimental design is rigorous and the best aid to learning;
- experimental learning is in balance with safety and in line with public consent;
- the experiment doesn't contribute to a 'slippery slope' by which a particular technology becomes normalised and scrutiny of it is reduced or suspended as a result.

The rationale for the five Oxford Principles for research governance were further elaborated during our research. These are:

- geoengineering should be regulated as a public good and in the public interest:
- there should be participation in decision-making at the appropriate level, depending on the type and location of activity, from computer-based research to outdoor research in a locality, or to experiments on a national or international scale;
- there should be full disclosure and open publication of all research results (in the light of the experience of failure to publish unfavourable clinical trial results);
- there should be independent assessments of the research and particularly of impacts; and
- the governance arrangements need to be clear in advance.

General governance principles and technology specific protocols can be brought together in a stage-gate process of research control. Under this, research is broken down into a series of stages, each of which with defined conditions that need to be met in the view of independent assessors before the research may proceed to the next stage (as successfully demonstrated in the UK SPICE project). Because of the complex character of geoengineering, de minimis provisions - by which small scale proposals escape scrutiny - should be applied very sparingly, and even then should not allow the research to escape the provisions for full disclosure and independent assessment of results.

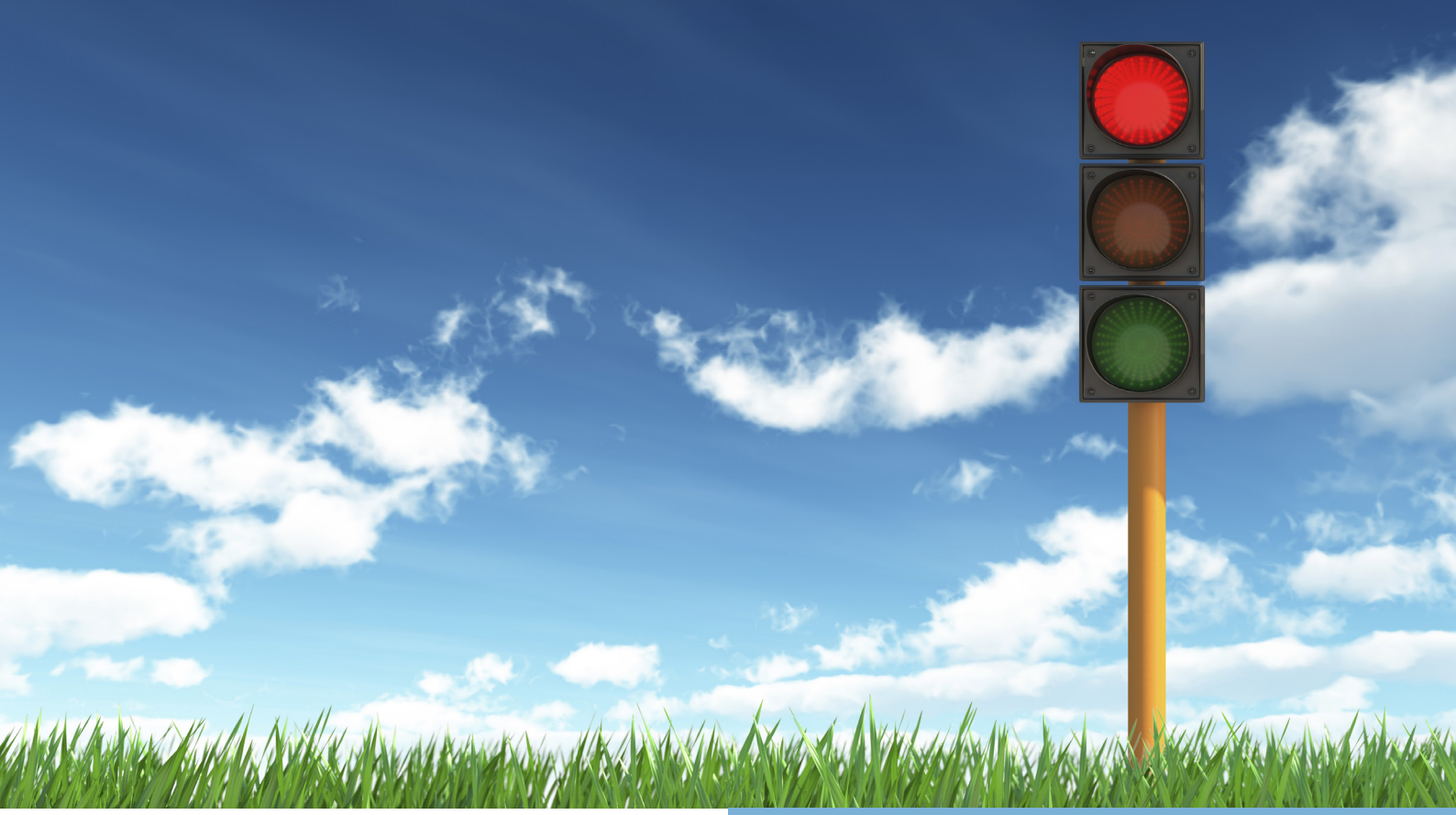
Caution should also be applied to experiments whose stated intentions may be in terms of fundamental work on, for example, cloud physics or developing fish stocks, but whose results may be applied to geoengineering. The general provisions of high-risk research governance should apply in these cases.

What does the CGG project conclude and recommend?

Our work suggests that the governance of research will best proceed through what we call the principles and protocols approach - a combination of:

- general governance principles of the Oxford principles kind;
- technology-specific protocols related to the opportunity and risk profiles of particular technological approaches; and
- specific geopolitical considerations related to the environmental characteristics of the country where the technology is to be applied and the political and cultural values and priorities which may be called into play.

This may contribute to or be bolstered by international agreements but will rely much more on a set of decentralised and gradual arrangements: a world order will emerge rather than being imposed.



Further research on geoengineering governance

Geoengineering, uniquely amongst emerging technologies, is as yet so undefined technically, that so far values have been upmost in discussion about whether and how we should proceed, and the social science contribution has arguably run ahead of the natural science and engineering. It will be difficult to extend the work of assessment, costing, and regulation of potential geoengineering technologies much further until we have some more fully specified systems to assess. In other words, technical research on some areas of geoengineering may need to catch up before specific further research on their governance and regulation becomes useful.

Recommendations and future research:

Whilst detailed work on the governance and regulation of geoengineering research will need to wait for fuller technical specification of geoengineering proposals, there are still a number of useful areas of research to be undertaken, however, most of which are generally applicable to technology governance and regulation:

• Values and attitudes towards new technologies.
Typically, in more mature technologies, claims about what the technology can achieve dominate debate. The relationship between values and attitudes towards new technologies is complex, however. Values informing public attitudes vary through time as publics reframe the issue. Initial negative public response to in vitro fertilisation framed in ethical terms relatively quickly gave way to more pragmatic acceptance of the widening possibilities for human reproduction. Public responses to geoengineering may be subject to such shifts if 'emergency' framings, or framings emphasizing the 'impossibility' of achieving agreed approaches to mitigation, come to dominate discussion. Research is needed to try and learn more about the dynamics of such rapid reframings.

• Local cultural and ethical perspectives.
We also need to understand better the variety of cultural and ethical perspectives across the world that help shape social definitions of individual and collective responsibilities for climate change. What are these variations, and how far do they inform national policies and constrain international agreement?

• The developing applicability of national and international law to the regulation of main geoengineering options, or to the land, sea, air and space environments in which they may be deployed needs to be developed much further.

• The validity of policy assumptions.
Some international and national narratives about possible routes to combat climate change contain contentious assumptions. For example, the IPCC's scenario RCP 2.6 assumes widespread use of Bioenergy with Carbon Capture and Storage (BECCS). Research is needed to establish under what conditions, if any, such assumptions are realistic within the context of wider pressures on natural resources for water and food. Related to this is further exploration of the idea of 'geopolitical wedges' which emerged in the CGG project: national contributions to a global response to climate change which take full account of each country's biological, geological and social and political needs and resources. For example, research could examine whether BECCS-heavy contributions could be achieved for countries with large areas of underutilised land, with incentives to cut atmospheric pollution from coal-fired power stations, and with political systems that allow rapid introduction of radical policies.

Further Resources:

Steve Rayner, Clare Heyward, Tim Kruger, Nick Pidgeon, Catherine Redgwell, & Julian Savulescu (2013). The Oxford Principles. CGG Working Paper 1. Available at: http://geoengineering-governance-research.org/perch/resources/workingpaper1raynere-taltheoxfordprinciples.pdf

Rob Bellamy & Peter Healey (2015) A Report on the CGG Project Scenarios Workshop. Available at: http://geoengineering-governance-research.org/perch/resources/areportontheclimategeoengineeringscenari-osworkshoprbphfinal.pdf

The SPICE (Stratospheric Particle Injection for Climate Engineering) Project: http://www.spice.ac.uk

CGG/IAGP/SPICE Conference at the Royal Society, November 2014. Geoengineering: Where Next? Available at: https://www.youtube.com/watch?v=T81uQyD0RpY&list=PL_KA9gR6zLeEJ-t18oTVe-6fAJIPc2Lki0&index=1

Peter Healey & Steve Rayner (2015) Key Findings from the Climate Geoengineering Governance Project. CGG Working Paper 25. Available at: http://geoengineering-governance-research.org/perch/resources/working-paper25healeyraynerkeyfindings-1.pdf

http://geoengineering-governance-research.org/results-reports-and-publications.php

About us

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