Geoengineering Our Climate?

Ethics, Politics and Governance

Opinion Article 3
14 May, 2013
www.geoengineeringourclimate.com

A Commentary on the Oxford Principles

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Citation Information

Kruger, Tim. 2013. "A Commentary on the Oxford Principles." Opinion Article, Geoengineering Our Climate Working Paper and Opinion Article Series. Available at: http://wp.me/p2zsRk-76

Origins of the Oxford Principles

The context in which the Oxford Principles (OPs)[1] were drafted was shortly after the Royal Society published its report *Geoengineering the Climate*, just prior to the UNFCCC COP in 2009 at Copenhagen.[2] With tremendous expectations heaped upon the COP, some commentators were openly hostile to even discussing geoengineering. It was perceived that even raising the hypothetical possibility of such techniques might detract from efforts to cut emissions – the so-called 'moral hazard' effect.

The germ of the idea that would become the OPs was a conversation between Steve Rayner and me in November 2009. The UK House of Commons Science and Technology Committee (HoC S&T) had just issued a call for evidence for their enquiry into "The Regulation of Geoengineering"[3], and we thought it would be useful to submit some draft guidelines for research in this field.

We recognised that the guidelines would be greatly strengthened if experts in a range of fields participated in their drafting. To that effect we invited the involvement of Catherine Redgwell, Julian Savulescu and Nick Pidgeon – and between us there was expertise in social science, international law, ethics, psychology and the technical aspects relating to geoengineering. Over November and December 2009, the authors prepared a set of "Draft Principles for the Conduct of Geoengineering Research"[4], which were submitted to the HoC S&T Committee as evidence for their enquiry.

The cross-party committee of MPs would proceed to use the framework of the OPs in their questioning of those who gave oral evidence to the enquiry in early 2010. Their report of March 2010 would state: "While some aspects of the suggested five key principles need further development, they provide a sound foundation for developing future regulation. *We endorse the five key principles to guide geoengineering research*".[5] The UK Government, in their response to the HoC S&T Committee's report of September 2010, welcomed "the contribution of the Committee and academics in framing the outline of a set of principles to guide geoengineering research" and encouraged their further development.[6]

The HoC S&T Committee's report was published the week prior to the Asilomar Conference on Climate Intervention Technologies (March 2010) that had been organised by the Climate Institute to discuss how to promote the responsible conduct of research on climate engineering. During the conference, Steve Rayner presented the "Draft Principles for the Conduct of Geoengineering Research" to the conference, coining the name "The Oxford Principles".[7]

They subsequently formed the basis of discussions there and the Asilomar Principles

[1] A thorough and detailed analysis of the Oxford Principles (OPs) has been published elsewhere (Rayner et al, 2013). This piece is a personal reflection on the origins of the OPs, the motivation behind each of the principles, their role in the SPICE project and how they might be developed in the future.
[2] Shepherd et al 2009
[3] HoC S&T 2010
[4] Rayner et al 2009
[5] House of Commons 2010, 35
[6] UK Government 2010
[7] The OPs were named for the location of the meeting at which they were initially drafted, rather than because of the affiliation of the authors – Catherine Redgwell was at University College London and Nick Pidgeon was at Cardiff University.

for Responsible Conduct of Climate Engineering Research, which emerged from that meeting, acknowledged that they drew from the OPs.[8]

The Motivation behind the Principles

The five Oxford Principles are:

1. Geoengineering to be regulated as a public good.
2. Public participation in geoengineering decision-making.
3. Disclosure of geoengineering research and open publication of results.
4. Independent assessment of impacts.
5. Governance before deployment.

Principle 1: Geoengineering to be regulated as a public good. While the involvement of the private sector in the delivery of a geoengineering technique should not be prohibited, and may indeed be encouraged to ensure that deployment of a suitable technique can be effected in a timely and efficient manner, regulation of such techniques should be undertaken in the public interest by the appropriate bodies at the state and/or international levels.

Commentary:
The UNFCCC's Preamble acknowledges "that changes in the Earth's climate and its adverse effects are a common concern of humankind".[9] As such there is a desire that activities that might play such a role are not dominated by a small group, be they a subset of the world's governments or powerful business interests. Rather, such activities should be governed in such a way that benefits everyone.

Regulation of geoengineering as a public good should not be read as a rejection of private sector involvement in the development of potential geoengineering techniques - there is an important role that the private sector can play in ensuring that any suitable technique could be deployed in a "timely and efficient manner". A line of discussion in the oral evidence to the HoC S&T Committee raised the concern that this principle was about excluding the private sector- in response, the authors of the OPs submitted a supplementary submission specifically addressing this concern.[10]

That response made clear that private sector involvement should be encouraged, albeit with a regulatory framework that would help to stymie the creation of vested interests in this space, and particularly with respect to the issues of patents and other intellectual property rights. It also recognised that with regard to intellectual property issues the heterogeneity of proposed geoengineering techniques meant that a one-size-fits-all approach would not be appropriate. For example, the development of some techniques (biochar) might benefit from normal patent regulations, while for others (stratospheric particles) it may be better to restrict, or even exclude, intellectual property rights.

Principle 2: Public participation in geoengineering decision-making. Wherever possible, those conducting geoengineering research should be required to notify, consult, and ideally obtain the prior informed consent of, those affected by the research activities. The identity of affected parties will be dependent on the specific technique which is

[8] Asilomar Scientific Organizing Committee 2010, 8
[9] UNFCCC 1992
[10] Kruger et al 2010

being researched-for example, a technique which captures carbon dioxide from the air and geologically sequesters it within the territory of a single state will likely require consultation and agreement only at the national or local level, while a technique which involves changing the albedo of the planet by injecting aerosols into the stratosphere will likely require global agreement.

Commentary:

In general, two reasons are advanced in favour of public participation. Firstly, a *normative* view- that it is the right thing to do and that a decision can be legitimate only when it has been consented to by those affected. Secondly, a *substantive* view- that it leads to better decision-making because all information and perspectives can be brought to attention.[11] This Principle, along with Principles 3 and 4, recognizes the importance of both views.

The use of the words 'prior informed consent' is a deliberate echo of the language used in medical ethics, where respecting the views of the patient is fundamental. But just as in medical situations, while desirable, it may not always be possible, to obtain the patient's consent; hence the explanatory text starts with the words 'wherever possible'. It is obviously important to define in what circumstances such an exclusion might apply.

The extent of public participation in geoengineering decision-making will be determined by both necessity and feasibility. As the explanatory text makes clear, the heterogeneity of geoengineering techniques will result in different requirements for consultation and agreement –techniques without transboundary effects could reasonably be determined by involving people in the particular state, while techniques with global effects would require global agreements.

It is also important to note that "public participation" will differ substantially depending on which public is being referred to. As stated in the Climatic Change piece: "Differences in political and legal cultures will shape the mode and extent of public participation around the world. Different ideas about democracy and the relationship between individuals and society will engender different understandings of consent".[12] A requirement for "global agreement" as stated in Principle 2 does not mean that universal democracy is a pre-requisite to deployment of stratospheric aerosols – what it does mean is that engagement with representatives of countries which may be affected by a technique should be sincere, thorough and transparent. It may be questioned why such adjectives are needed – after all who would argue for an insincere, slipshod and opaque dialogue with society? Yet, that is how engagement about new technologies is conducted all too often.

P**rinciple 3: Disclosure of geoengineering research and open publication of results.** There should be complete disclosure of research plans and open publication of results in order to facilitate better understanding of the risks and to reassure the public as to the integrity of the process. It is essential that the results of all research, including negative results, be made publicly available.

[11] The analysis of the normative, substantive and instrumental motivations for public participation detailed here and on subsequent pages draws on the Andy Stirling's work on the social appraisal of technology (Stirling 2008)

[12] Rayner et al 2013

Commentary:

As previously stated, this Principle, like Principles 2 and 4, is motivated both by normative and substantive perspectives – that transparency is both the right thing to do and is likely to lead to better decision-making. The counterfactual here is that research plans are not disclosed and the results of such research are not published openly. A lack of transparency would undermine trust, as has been seen with other controversial new technologies, such as genetically modified organisms (GMOs) and the nuclear industry.

The motivations for secrecy may be different – for the nuclear industry there are security concerns, while for biotech companies there are commercial reasons – but in both cases secrecy can be used to obscure inconvenient findings and sweep incompetence under the carpet. Indeed, the pharmaceutical industry has been rocked by a series of scandals involving concealment of negative trial results.[13] Were something similar to happen in the field of geoengineering research, it could devastate public trust and could lead to a backlash against geoengineering researchers and their research.

Moreover, it would be important to know whether any other geoengineering experiments were taking place at the same time – if you wanted to conduct an experiment to test the safety of stratospheric particles as a means to alter the planet's albedo, you would probably want to apply a very low dosage of particles over a long time period (low dosage to minimise any side-effects, long duration to allow the signal from the experiment to be discernible from the noise). Were other, unregistered, experiments taking place at the same time the results would not be reliable.

It is thus necessary for research plans to be published –it is hard to see how Principle 2 (public participation in decision-making) could be meaningfully undertaken otherwise. And without open publication of results Principle 4 (independent assessment of impacts) would be severely hampered.

As the authors of the OPs observed in the supplementary memorandum to the HoC S&T Committee about the risks associated with the concealment of negative results: "The highly regarded House of Lords Science and Technology Committee "Science and Society Report" of 2000 concluded that openness and transparency are a fundamental precondition for maintaining public trust and confidence in areas which may raise controversial ethical or risk issues".[14]

The pharmaceutical industry scandals led to the setting up of a national trials registry in the US, as well as similar initiatives elsewhere. It is hoped that a similar register, international in scope, could be set up for geoengineering research pre-emptively– without being impelled by a scandal to do so.

Principle 4: Independent assessment of impacts. An assessment of the impacts of geoengineering research should be conducted by a body independent of those undertaking the research; where techniques are likely to have transboundary impact, such assessment should be carried out through the appropriate regional and/or international bodies. Assessments should address

[13] For an exemplary case, see Wadman 2004.

[14] Kruger et al 2010

both the environmental and socio-economic impacts of research, including mitigating the risks of lock-in to particular technologies or vested interests.

Commentary:

This Principle, like Principles 2 and 3, is based on both the normative and substantive advantages of transparency. The validity of any 'prior informed consent' hinges crucially on the validity of the information that is used to arrive at a conclusion, and independence of assessment is essential.

A cynic might also identify a more *instrumental* perspective - that engagement processes are carried out because they serve particular interests. It is fair to say that the authors of the OPs support the undertaking of geoengineering research because they believe that research needs to be undertaken – but that they do not support the undertaking of geoengineering deployment, which can only be assessed once some research has been undertaken.

As is stated in the preamble of the Principles:

> "*Recognising* the fundamental importance of mitigation and adaptation in combating climate change and its adverse effects;
>
> *Acknowledging* nonetheless that if, in the near future, the international community has failed to reduce greenhouse gas emissions and urgent action is needed to prevent catastrophic climate change then it may be necessary to resort to techniques involving deliberate large-scale intervention in the Earth's climate system ("geoengineering");
>
> *Ensuring* that, in the event such resort is necessary, potential geoengineering techniques have been thoroughly investigated to determine, which, if any, techniques will be effective in addressing the issue of climate change without producing unacceptable environmental and socio-economic impacts;
>
> *Stressing* that research into geoengineering techniques does not lead inevitably to deployment, and that principles to govern research may need to be adapted to guide decisions regarding deployment, if any…"

Transparency is thus a necessary– though not sufficient- requirement to obtain the 'social licence to operate' that other novel technologies such as nuclear power and GMOs have to a significant extent struggled to obtain. But public participation is not just a 'box-ticking exercise', or a means to the end of obtaining the necessary social licence. I reject such a rationale as cynical, though I do not doubt that there will be some who might embrace transparency for that purpose. But for me (and those I choose to associate with) transparency is not a mere 'hygiene factor', but has both moral and practical value.

Principle 5: Governance before deployment. Any decisions with respect to deployment should only be taken with robust governance structures already in place, using existing rules and institutions wherever possible.

Commentary:

This Principle reflects the view that governance should precede deployment. The question this raises is: should governance precede experimentation? At what point does experimentation raise the same, or sufficiently similar issues, as full-scale deployment? It is not clear where the dividing line is between small-scale experiments- which would have no material impact on the environment- and large-scale experimentation verging on small-scale deployment. Yet, it is important that we

establish the location of this Rubicon before we inadvertently cross it.

The Role of the Oxford Principles in the SPICE Project

A practical use of the OPs was in the decision to institute a stage-gate into the funding of one part of the SPICE Project. SPICE (Stratospheric Particle Injection for Climate Engineering) is a project that received funding in March 2010 from two UK research councils – EPSRC and NERC - through the 'Geoengineering Sandpit' (a funding mechanism designed to stimulate cross-disciplinary research in emerging fields). The project comprises three elements, of which the first two were relatively uncontroversial and involved computer modeling and laboratory-based research. The third element, the so-called 'test-bed', intended to deploy a 1km hose suspended from a balloon in order to test a transportation mechanism for materials capable of enhancing the planet's albedo in the stratosphere.

That the proposed test-bed experiment would have been environmentally benign is self-evident – it involved transporting a bathtub load of water to an altitude well below that of the stratosphere. But the recognition that this would be the first such experiment in the UK to research a geoengineering technique in the open environment created the need to engage in a dialogue with stakeholders – the experiment may have had all the necessary legal licences to operate, but did it have a social licence?

As one of the Mentors (decision-makers) at the Sandpit, I made the suggestion that the decision as to whether to fund the test-bed element of the SPICE project should be stage-gated – that the funding be ring-fenced for the use of the project, but released only on the satisfactory completion of the stage-gate. The suggestion was adopted by the other Mentors and integrated into the proposal – funding was agreed unconditionally for the first two elements of the project and agreed conditional on the successful completion of the stage-gate for the test-bed element. The exact design of the stage-gate was not agreed during the Sandpit, but later determined by a separate body with the expertise required. Yet, following a rocky process, the test-bed experiment was first delayed, then eventually cancelled.

The reasons for this cancellation are the subject of some debate. However, two key reasons have been given: the engagement process with stakeholders with an interest in this field was not completed satisfactorily, and a dispute about insufficient disclosure of intellectual property held by a participant and a Mentor at the Sandpit. My contention is that the former matter was resolvable – the engagement process could have been extended and improved, while the latter matter was fundamentally irresolvable. Some people have characterised the intellectual property issue as the straw that broke the camel's back – my view is that it was more of a steel girder than a straw – it was sufficient to break the camel's back all on its own.

It is fair to say that when the decision to stage-gate the funding of the test-bed was made, it was not popular with either of the two projects that were impacted by it – the SPICE project itself saw it as a bureaucratic burden, and the IAGP (Integrated Assessment of Geoengineering Proposals) project believed that an accelerated public engage-

ment process had been pushed upon them. However, people involved in both projects recognise the value that such a stage-gating process has had in making researchers reflect more deeply on the consequences of their research and the need to obtain a social licence to operate for controversial research. It suffices to say, at this point, that the principle of engagement with those affected by geoengineering research has been established, and we are learning lessons as to the complexity of such a process.

Future Developments

So what next for the governance of geoengineering research? There are many opinions as to how such research should be governed, including opinions that no research should currently be undertaken outside of a laboratory setting.[15] Nevertheless, the authors of the OPs believe that that there is value in seeking to operationalise the OPs – transforming the broad principles into detailed guidelines that are implementable.

There has been much discussion about producing a research register, which draws specifically from Principle 3 on the disclosure of geoengineering research and open publication of results. It could also incorporate the dissemination of the independent assessment of impacts detailed in Principle 4 and could inform Principle 2 on public participation in decision-making, as it is hard to see how meaningful consent can be obtained without the information required to make such decisions. Work is ongoing on designing a research register, with debate centring specifically on forms of research that should and should not be included in such a register.

Work on Principle 5 (Governance before deployment) is proceeding slowly. Proposals have been put forward to use the framework developed by the London Convention/London Protocol for the governance of ocean fertilisation research as the basis for governance of other geoengineering research. [16] Work is ongoing in assessing whether text incorporated in other existing treaties governing the management of commons (for example the Antarctic Treaty) could be adapted for use in governing geoengineering research.

It is important to distinguish both between the potential impacts of the wide range of proposed techniques and also between the scale at which research may be undertaken. There is not going to be a one-size-fits-all approach that is valid for all proposed techniques or for all scales of experimentation or deployment. To this end the recent paper in Climatic Change on the Oxford Principles recommends the "development of research protocols for each stage of development of the technology … to be interrogated by a competent third party as part of a stage-gate process".[17] As described earlier, such a stage-gate process was used in the SPICE project. In that instance it was a novel approach and thus was implemented in an *ad hoc* manner. My hope is that such a stage-gate process could become the norm and technology-specific research protocols and public engagement procedures could be developed appropriate for the different technologies and scales of implementation.

[15] Robock 2012

[16] Markus and Ginzky 2011

[17] Rayner et al 2013

The authors of the Principles have reiterated that the OPs are draft principles and the commentary attached to them in the submission specifically invites others to develop them further.[18] It would be strange indeed if we did not invite a broader involvement in the development of such guidelines – the recognition that the subject of geoengineering deserves and requires broad engagement is the motivation that lies behind all the of the Oxford Principles.

***Acknowledgements**: This work was supported by the Oxford Geoengineering Programme, Oxford Martin School, University of Oxford. I would like to thank Steve Rayner and Clare Heyward for their comments and advice relating to earlier versions of this piece.*

[18] Ibid.

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