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Brief memorandum to the **House of Commons Science and Technology Committee** enquiry into **The Regulation of Geoengineering**

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SUMMARY

1 In this memorandum, we present a set of draft principles for the conduct of geoengineering research, which we suggest as a framework to act as a starting point for the collaborative development of international regulation.

2 We lay out five key principles by which we believe geoengineering research should be guided:

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

3 We believe that geoengineering needs to be regulated and that there is a need to engage more widely internationally to ensure that any such regulation has broad legitimacy.

ABOUT THE AUTHORS

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- Steve Rayner is Professor of Science and Civilisation and Director of the Institute of Science, Innovation and Society at the Said Business School, University of Oxford. His expertise is in the relationship between science and society and he was a member of the Royal Society's working group on geoengineering.
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- Julian Savulescu is Professor of Practical Ethics and Director of the Uehiro Centre, University of Oxford. His expertise is in the fields of genetic ethics and medical ethics.
- Nick Pidgeon is Professor of Psychology at Cardiff University. His expertise is in the field of risk – its perception, communication and management – and public engagement with science and technology.

- Tim Kruger is Director of the Oxford Geoengineering Institute. His expertise is in the technical aspects of geoengineering, specifically a process that involves reducing atmospheric carbon dioxide by enhancing the capacity of the ocean to act as a carbon sink.

BACKGROUND

5 If the international community fails to reduce greenhouse gas emissions sufficiently to prevent catastrophic climate change it may become necessary to resort to techniques involving deliberate large-scale intervention in the Earth's climate system – geoengineering. Geoengineering techniques may be divided into two categories: Carbon Dioxide Removal techniques which remove CO2 from the atmosphere; and Solar Radiation Management techniques which reflect a small percentage of the sun's light and heat back into space. There are major differences between these two categories in terms of their objectives, impacts, and timescale. Such techniques must be seen not as an alternative to conventional mitigation techniques, but rather as an additional option to which recourse may be had in the event mitigation alone does not avert climate change on a catastrophic scale.

6 Increasingly it is apparent that some geoengineering techniques may be technically possible, though with major uncertainties regarding their effectiveness, cost and socio-economic and environmental impacts. It is imperative that governance structures are in place to guide research in the short term and to ensure that any decisions taken ultimately with respect to deployment occur within an appropriate governance framework. Transparency in decision-making, public participation, and open publication of research results are key elements of such a framework, designed to ensure maximum public engagement with and confidence in the regulation of geoengineering research. Alone or in combination, many of these principles are already applied in the regulation of hazardous substances and activities such as the transboundary movement of hazardous wastes and pesticides, radioactive substances and GMOs.

7 Accordingly, the following principles are suggested as a framework to guide research into geoengineering techniques.

DRAFT PRINCIPLES FOR THE CONDUCT OF GEOENGINEERING RESEARCH

Preamble

8 *Recognising* the fundamental importance of mitigation and adaptation in combating climate change and its adverse effects;

9 *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');

10 *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;

11 *Recognising* that there are a variety of proposed geoengineering techniques which differ both in what they are trying to achieve (Solar Radiation Management or Carbon Dioxide Removal) and how they are trying to achieve it (engineered solutions or interventions in ecosystems) so that each must be assessed on its own terms, rather than applying a one-size fits all governance approach;

12 *Noting* that there is no empirical evidence to suggest researching geoengineering techniques will undermine climate change mitigation efforts;

13 *Emphasizing* the importance of proceeding cautiously with responsible research so as to assess the potential advantages and disadvantages of proposed geoengineering techniques, recognizing that failure to do so will not reduce the probability that such techniques may be resorted to, but will mean that such resort will take place in the absence of a sufficient evidence base on which to determine which techniques carry the least risk;

14 *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;

15 *Recognising* that the regulation of geoengineering research by existing national, regional and international laws and regulations may be sufficient, but that governance gaps may emerge requiring the creation of new rules and institutions;

16 *Propose* the following principles to guide research into geoengineering techniques:

17 **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.

18 **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 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.

19 **Principle 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.

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

21 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.