The UK government's view on geo-engineering

What is geo-engineering?

Geo-engineering (sometimes called "climate engineering") proposals to counter climate change are attracting growing attention, yet the scientific evidence base to inform a rational debate on their potential merits or risks is currently limited.

Geo-engineering is the deliberate large-scale intervention in the Earth's natural systems to counteract human-caused climate change. A range of different geoengineering techniques has been proposed, in two broad categories:

- those to remove greenhouse gases directly from the atmosphere (greenhouse gas removal technologies, or GGRs, such as afforestation, bioenergy with carbon capture and storage, direct air capture and storage, marine fertilisation);
- those to reflect some of the Sun's energy that reaches Earth back into space (solar radiation management, or SRM, such as brightening of marine clouds, injection of aerosols into the stratosphere). While these would be likely to reduce the Earth's temperature, they would not reverse ocean acidification (unlike GGRs).

The priority is, and must be, to tackle the root cause of climate change by reducing emissions of greenhouse gases from human activities and adapting to those impacts that are unavoidable. Mitigation of climate change, by reducing emissions and protecting natural carbon sinks, remains the main focus of our efforts to increase our chances of avoiding dangerous climate change.

Research, development and deployment

The Climate Change Act 2008 requires the UK to reduce greenhouse gas emissions by at least 80 per cent on 1990 levels by 2050. As the UK approaches 2050, its remaining emissions will likely be in the sectors where it is the most difficult to cut them.

<u>Greenhouse Gas Removal</u>

GGR technologies are likely to have an important role to play in offsetting these emissions. Further, the Paris Agreement includes an aim of achieving net zero global greenhouse gas emissions in the second half of the century. As indicated in the

Clean Growth Strategy[1], the Government believes the UK will need to legislate for a net zero emissions target at an appropriate point in the future. The CCC has made it clear that GGRs globally and in the UK will be central to realising this aim under the Paris Agreement[2]. We will seek the Committee on Climate Change's (CCC) advice on the implications of the Paris Agreement for the UK's long-term targets after the release, in October 2018, of the Special Report on Global Warming of 1.5°C by the Intergovernmental Panel on Climate Change (IPCC)[3]

The Government has no current policies to deploy specific GGR technologies beyond existing commitments to plant 11 million trees in England[4], to increase the amount of UK timber used in construction, and to restore peatland[567].

Any further deployment must be informed by thorough understanding of the costs, feasibility, environmental and societal impacts. Such understanding is currently limited so we are taking active steps to strengthen our understanding of these technologies and, where appropriate, move forward with deployment; for example we have been working with the Research Councils, who launched a new £8.6 million GGR research programme in April 2017[8]. As indicated in the Clean Growth Strategy, we will develop our strategic approach to GGR technologies in light of this work.

Solar Radiation Management

The government is not deploying SRM, and has no plans to do so.

The UK Government has commissioned research into the effects of SRM on climate, which showed that SRM deployment would produce changes in rainfall patterns and amounts. This would be likely to lead to "winners" and "losers", with some regions suffering detrimental impacts[91011].

The UK Government is not commissioning further research into SRM, but the World Climate Research Programme's (WCRP's) Geoengineering Model Intercomparison

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1 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/651916/BEIS_The_Clean_Growth_online_12.10.17.pdf

2 https://www.theccc.org.uk/wp-content/uploads/2016/10/UK-climate-action-following-the-Paris-Agreement-Committee-on-Climate-Change-October-2016.pdf

3 http://www.ipcc.ch/report/sr15/

4 The UK Government also has a longer term aspiration to increase woodland cover to 12% by 2060, as set out in the 25 Year Plan for the Environment. There are no current plans to further deploy GGRs.

5 https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/651916/BEIS_The_Clean_Growth_online_12.10.17.pdf

6 https://www.gov.uk/government/news/new-10-million-fund-to-restore-peatland

7 There is a longer term aspiration to increase woodland cover to 12% by 2060, as set out in the 25 Year Plan for the Environment.

8 http://www.nerc.ac.uk/press/releases/2017/09-greenhousegas/

9 http://onlinelibrary.wiley.com/doi/10.1029/2008JD011450/abstract

10 http://www.atmos-chem-phys.net/10/5999/2010/acp-10-5999-2010.pdf

11 http://onlinelibrary.wiley.com/doi/10.1002/jgrd.50856/abstract

Project (GeoMIP), is investigating the effects which SRM would have on the climate[12].

Regulation

We would expect any deployment of GGRs to comply with local, national and international regulation and guidance. Some forms of geo-engineering are already regulated. For instance, in England, large-scale afforestation is covered by Environmental Impact Assessment Regulations. In addition, work has been undertaken to examine how existing instruments could apply:

- The Government has supported the Convention on Biological Diversity (CBD) in their review of existing regulatory instruments. Following consideration of this review, the Conference of the Parties (COP) to the CBD adopted a decision in 2016 noting that more research is needed. The COP also recalled their previous decision in 2010 which invites Parties to take a precautionary approach on any geo-engineering activities that may affect biodiversity until there is an adequate scientific basis to justify such activities, with the exception of small-scale, controlled scientific research studies.

- The Government has also contributed to work under the London Protocol on the prevention of marine pollution by dumping of wastes and other matter, to adapt the instrument to meet this new challenge. This has resulted in adoption by Parties to the London Protocol, in October 2013, of an amendment to regulate ocean fertilisation activities and, potentially, other forms of marine geo-engineering. The UK was the first country to ratify the amendment, in 2016.

Further reading:
The Royal Society (2009): Geoengineering the climate: science, governance and uncertainty
https://royalsociety.org/~/media/Royal_Society_Content/policy/publications/2009/8693.pdf

Update on climate geoengineering in relation to the Convention on Biological Diversity: Potential impacts and regulatory framework
https://www.cbd.int/doc/publications/cbd-ts-84-en.pdf

Carbon Dioxide Removal and Reliable Sequestration (2015)
https://www.nap.edu/read/18805/chapter/1

Climate Intervention Reflecting Sunlight to Cool Earth (2015)
https://www.nap.edu/read/18988/chapter/1

[12] http://climate.envsci.rutgers.edu/GeoMIP/

NAS Programme “Developing a Research Agenda for Carbon Dioxide Removal and Reliable Sequestration”
http://nas-sites.org/dels/studies/cdr/