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Why you need to get involved in the geoengineering debate - now

By Rob Bellamy

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The prospect of engineering the world's climate system to tackle global warming is becoming more and more likely. This may seem like a crazy idea but I, and over 250 other scientists, policy makers and stakeholders from around the globe recently descended on Berlin to debate the promises and perils of geoengineering.

There are many touted methods of engineering the climate. Early, outlandish ideas included installing a ‘space sunshade": a massive mirror orbiting the Earth to reflect sunlight. The ideas most in discussion now may not seem much more realistic – spraying particles into the stratosphere to reflect sunlight, or fertilising the oceans with iron to encourage algal growth and carbon dioxide sequestration through photosynthesis.

But the prospect of geoengineering has become a lot more real since the Paris Agreement. The 2015 Paris Agreement set out near universal, legally binding commitments to keep the increase in global temperature to well below 2°C above pre-industrial levels and even to aim for limiting the rise to 1.5°C. The Intergovernmental Panel on Climate Change (IPCC) has concluded that meeting these targets is possible – but nearly all of their scenarios rely on the extensive deployment of some form of geoengineering by the end of the century.

Some geoengineers take their inspiration from supervolcanic eruptions, which can lower global temperatures. Image source: www.pexels.com

How to engineer the climate

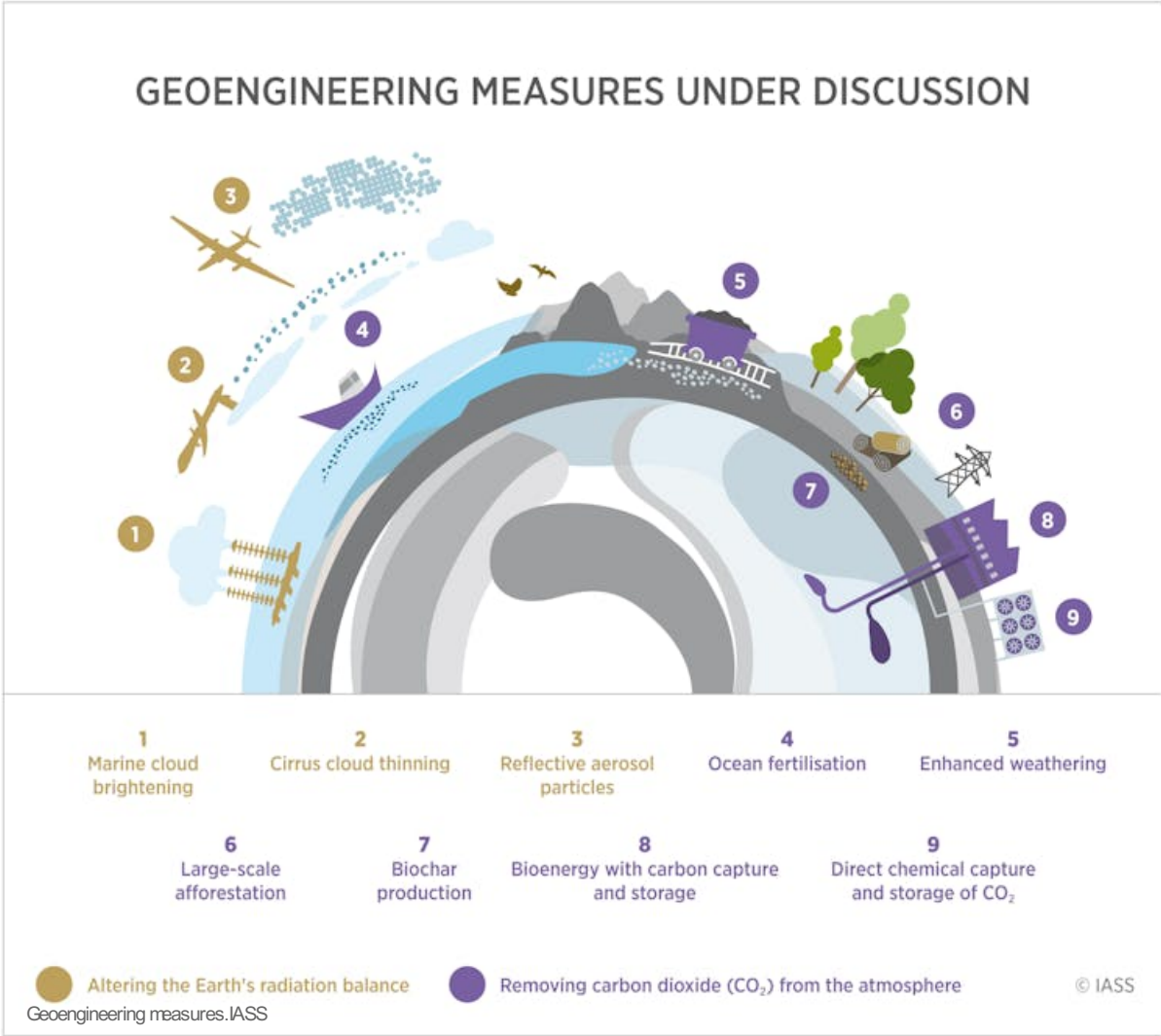
Geoengineering comes in two distinct flavours. The first is greenhouse gas removal: those ideas that would seek to remove and store carbon dioxide and other greenhouse gases from the atmosphere. The second is solar radiation management: the ideas that would seek to reflect a level of sunlight away from the Earth.

Solar radiation management is the more controversial of the two, doing nothing to address the root cause of climate change – greenhouse gas emissions – and raising a whole load of concerns about undesirable side effects, such as changes to regional weather patterns.

And then there is the so-called “termination problem”. If we ever stopped engineering the climate in this way then global temperature would abruptly bounce back to where it would have been without it. And if we had not been reducing or removing emissions at the same time, this could be a very sharp and sudden rise indeed.

Most climate models that see the ambitions of the Paris Agreement achieved assume the use of greenhouse gas removal, particularly bio-energy coupled with carbon capture and storage technology. But, as the recent conference revealed, although research in the field is steadily gaining ground, there is also a dangerous gap between its current state of the art and the achievability of the Paris Agreement on climate change.

The Paris Agreement – and its implicit dependence on greenhouse gas removal – has undoubtedly been one of the most significant developments to impact on the field of geoengineering since the last conference of its kind back in 2014. This shifted the emphasis of the conference away from the more controversial and attention-grabbing solar radiation management and towards the more mundane but policy relevant greenhouse gas removal.



Geoengineering measures.IASS

Controversial experiments

But there were moments when sunlight reflecting methods still stole the show. A centrepiece of the conference was the solar radiation management experiments campfire, where David Keith and his colleagues from the Harvard University Solar Geoengineering Research Programme laid out their experimental plans. They aim to lift an instrument package to a height of 20km using a high-altitude balloon and release a small amount of reflective particles into the atmosphere.

This would not be the first geoengineering experiment. Scientists, engineers and entrepreneurs have already begun experimenting with various ideas, several of which have attracted a great degree of public interest and controversy. A particularly notable case was one UK project, in which plans to release a small amount of water into the atmosphere at a height of 1km using a pipe tethered to a balloon were cancelled in 2013 owing to concerns over intellectual property.

Such experiments will be essential if geoengineering ideas are to ever become technically viable contributors to achieving the goals of the Paris Agreement. But it is the governance of experiments, not their technical credentials, that has always been and still remains the most contentious area of the geoengineering debate.

Critics warned that the Harvard experiment could be the first step on a “slippery slope” towards an undesirable deployment and therefore must be restrained. But advocates argued that the technology needs to be developed before we can know what it is that we are trying to govern.

The challenge for governance is not to back either one of these extremes, but rather to navigate a responsible path between them.

How to govern?

The key to defining a responsible way to govern geoengineering experiments is accounting for public interests and concerns. Would-be geoengineering experimenters, including those at Harvard, routinely try to account for these concerns by appealing to their experiments being of a small scale and a limited extent. But, as I argued in the conference, in public discussions on the scale and extent of geoengineering experiments their meaning has been subjective and always qualified by other concerns.

My colleagues and I have found that the public have at least four principal concerns about geoengineering experiments: their level of containment; uncertainty around what the outcomes would be; the reversibility of any impacts, and the intent behind them. A small scale experiment unfolding indoors might therefore be deemed unacceptable if it raised concerns about private interests, for example. On the other hand, a large scale experiment conducted outdoors could be deemed acceptable if it did not release materials into the open environment.

Under certain conditions the four dimensions could be aligned. The challenge for governance is to account for these – and likely other – dimensions of perceived controllability. This means that public involvement in the design of governance itself needs to be front and centre in the development of geoengineering experiments.

A whole range of two-way dialogue methods are available – focus groups, citizens juries, deliberative workshops and many others. And to those outside of formal involvement in such processes – read about geoengineering, talk about geoengineering. We need to start a society-wide conversation on how to govern such controversial technologies.

Public interests and concerns need to be drawn out well in advance of an experiment and the results used to meaningfully shape how we govern it. This will not only make the the experiment more legitimate, but also make it substantively better.

Make no mistake, experiments will be needed if we are to learn the worth of geoengineering ideas. But they must be done with public values at their core.

ABOUT THE AUTHOR

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