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Geoengineering: Plan B for the Climate Crisis?

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Most people have never heard of geoengineering and many of those who have don't know quite what it is. Yet geoengineering is all the rage in some scientific and climate policy circles in wealthy countries. Should you be worried? Definitely.

Geoengineers propose an array of speculative techniques with which humans might try to deliberately modify the Earth's climate and weather systems to counteract global warming. Until now, humans have altered the climate by accident. Now some scientists, buoyed by a faith in technological solutions and computer models, believe we know enough about climate systems to actually control them. Some are even advocating experimentation in the relatively short term, and some technologies (such as ocean fertilization) have already been tested on the open seas (unsuccessfully).

What is Geoengineering?

Geoengineering is both a set of technologies and a political strategy. It refers to the intentional, large-scale, technological means of manipulating the Earth's systems, ostensibly as a response to climate change. As political strategy, it is a diversion from getting down to the hard work of decarbonizing the economies of industrialized countries and living more sustainably on the planet.

So what are these technologies? There are, broadly, three types of geoengineering techniques under consideration.

1. The first set of geoengineering proposals is known as **Solar Radiation Management (SRM)**. These aim to reduce the amount of sunlight reaching the planet by reflecting more of it back to space, thereby reducing atmospheric warming. SRM proposals include putting sulfate or aluminum aerosols or engineered nanoparticles into the stratosphere, making clouds whiter by spraying seawater at them, covering deserts with white plastic, or creating a layer of foaming bubbles on the surface of the ocean.

2. The second type, **Carbon Capture and Storage/Sequestration (CCS)**, involves attempts to draw megatons of greenhouse gases out of the atmosphere and lock them up either biologically or mechanically. An example of this is ocean fertilization, which entails dumping iron in the ocean to grow plankton in the hope of eventually sequestering more CO₂ in the bottom of the sea. This category also includes suggestions to change the chemistry of the ocean to improve CO₂ absorption (enhanced weathering), artificial trees (which use chemical processes to take CO₂ out of the atmosphere), and appropriating and burning forest and crop residues into a charcoal that is subsequently buried in land for carbon sequestration (biochar).

3. A third set of geoengineering proposals entails attempts to directly control weather – acting to reduce or redirect hurricanes or seeding clouds for rainfall in drying regions. There are many instances of such interventions (150 incidents in 40 countries according to one report), often connected to military objectives. This category is frequently left out but as James Fleming has shown in *Fixing the Sky: The Checkered History of Weather and Climate Control*,¹ the antecedents of modern climate fixes lie in the history of weather control.

Science Fiction No Longer

Although this all might sound futuristic, it isn't the first time that policymakers have flirted with the concept of geoengineering. As early as 1965, the US President's Science Advisory Committee warned Lyndon B. Johnson that CO₂ emissions were modifying the earth's heat balance. In a report regarded as the first high-level acknowledgment of climate change, the authors recommended not emissions reductions but a suite of geoengineering options. They suggested that reflective particles could be dispersed on tropical seas (at an annual cost of around \$500 million), which might also inhibit hurricane formation. Thankfully, President Johnson ignored their proposal.

Thirty years later, two older military scientists re-ignited interest in the topic by presenting a 1997 paper favoring the sulphate dispersal approach. They were weapons scientist Edward Teller, dubbed the "father of the atom bomb", and his protégé Lowell Wood, the architect of Ronald Reagan's "Star Wars" missile defense system. They gained credibility a few years later when Nobel laureate Paul Crutzen, famous for his work on ozone depletion, threw his support their way in a controversial article in the journal *Nature*. Geoengineering was no longer a taboo topic for respectable scientists.

New geoengineering enthusiasts emerged and have worked assiduously over the past decade to get more funding and political backing for the controversial technologies. As with nuclear testing, proponents contend that we need to test the technology first to know if it is a viable tool for later use. They seek to persuade policymakers that we may need these technologies as a Plan B in the case of catastrophic climate change. Their crowning achievement was the Royal Society's 2009 report, which conferred legitimacy on geoengineering as a field of scientific endeavor and made other scientists and governments pay attention. Particularly in the wake of failed climate negotiations in Copenhagen and Cancun, geoengineering has gained significant momentum. The number of conferences, scientific papers, popular media articles, and books have multiplied.

But it's not just worried climate scientists who have put the geoengineering option back on the table. In something of an unholy alliance, the climate scientists backing such schemes have joined forces with former climate change skeptics who see geoengineering as a preferred Plan A. Fossil fuel-friendly think tanks such as Newt Gingrich's American Enterprise Institute and Bjorn Lomborg's Copenhagen Consensus Centre, previously dismissive of climate science, are now aggressively advocating geoengineering as a cheaper, less disruptive way to address climate change than long and difficult multilateral negotiations. Even the US Department of Defense-funded Rand Corporation has weighed in recently on the question of geoengineering governance.

¹ James Fleming, *Fixing the Sky: The Checkered History of Weather and Climate Control* (New York: Columbia University Press, 2010).

These well-heeled think tanks are attracting private money. Those offering financial support to the search for a hi-tech geo-fix include Shell, Boeing, Virgin Airlines,² and Microsoft founder Bill Gates, who has spent millions on planet-hacking schemes. For these industrial interests, the lure of geoengineering is pretty straightforward. As Sir Richard Branson told the Wall Street Journal: “If we could come up with a geoengineering answer to this problem, then Copenhagen wouldn’t be necessary. We could carry on flying our planes and driving our cars.” Why force industry to live within the planet’s constraints when you can simply jiggle the planet to tolerate the ravages of industry?

Not surprisingly, this way of thinking leaves many environmentalists suspicious and angry. Even when geoengineering is not deployed to the full extent, it can serve as a powerful distraction as a counter in a rhetorical game, sapping the political will to undertake the hard work of decarbonizing our societies and reaching international agreements about other ways of living on this Earth. Many proponents go out of their way to insist that geoengineering research should only supplement, not replace, strong climate change mitigation policies. The trouble with such notions is that once politicians start to see geoengineering as the cheaper option – economically and politically – then emissions reduction will seem even less urgent. We need to increase, not decrease, the sense of urgency among political leaders of wealthy high-emission countries.

Geoengineering technologies and experiments will engender specific negative social and environmental consequences, such as the destruction of livelihoods, reduction of rainfall, acidification of the oceans, even the end of blue skies. But geoengineering is not merely a set of technologies; it is a philosophy and a political strategy. It is a way of seeing the natural world that is shallow and calculating, short-term and reckless, a testament to the hubris of the twenty-first century Western world. Moreover, many proposed geoengineering techniques could seem relatively cheap to deploy, and the technical capacity to do so will be within reach of some individuals, corporations, and states in the coming decade.

Strong, multilateral rules to prevent unilateral attempts at planetary modification are urgently needed. In October 2010 in Nagoya, Japan, the Parties of the Convention on Biological Diversity – with its almost universal ratification (only the US, the Vatican, and Andorra are not members) – unanimously adopted a moratorium on real-world geoengineering experiments. This essentially gives countries a bit of time to examine the potential impacts of geoengineering schemes on their biodiversity – on their precipitation, their food supply, their sources of alternative energy, their people’s livelihoods, their coastal waters – until an appropriate international governance structure is in place with real penalties for violations.

In March 2010, 175 geoengineers met at Asilomar, California, with the purpose of establishing voluntary guidelines for experiments with the planet. The meeting was initiated by commercially-linked geoengineers eager to move their technology out into the field. But with geoengineering, “the field” is the entire planet, and humanity at large would be the unwilling experimental subjects. Civil society groups denounced the meeting on the grounds that the scientists had neither the wisdom, experience, nor the legitimacy to take such risks. The same orientation has now been adopted by the Royal Society’s “Solar Radiation Management Governance Initiative”, which seeks to develop an international conversation around the norms that should govern SRM research, and even deployment.

² Check out www.carbonwarroom.com

But we do not need vague norms designed by the very interests who are engaged in research; we need strong rules developed by those peoples and states who have the most to lose in such a venture.

Many civil society groups and a wide spectrum of social movements and NGOs, including representatives of indigenous peoples, development groups, and environmental and social justice advocates, have recently banded together to oppose geoengineering experiments under the “Hands Off Mother Earth!” (HOME) campaign.³ As a visual display of global opposition, there is an online photo petition with people holding their hands up, protesting the use of Planet Earth as a laboratory. HOME supporters include many high-profile environmentalists and social commentators such as David Suzuki, Vandana Shiva, Clive Hamilton, and Frances Moore Lappe.

What’s wrong with Geoengineering?

For any geoengineering technique to have an impact on the climate, it will have to be deployed on a massive scale. Unintended consequences are also likely to be massive and irreversible, especially in the global South.

Geoengineering interferes with poorly understood, complex systems such as the climate and ocean ecology. Interventions could go awry due to mechanical failure, human error, incomplete knowledge, natural phenomena (like volcanic eruptions), or other unforeseen problems.

Many geoengineering techniques can have military applications and could therefore violate the UN Environmental Modification Convention of 1978, which outlaws hostile use of climate and weather engineering. In addition, treaties protecting our oceans, human rights, and biodiversity, to cite just a few, contain provisions that many geoengineering proposals could also violate.

Some geoengineers, including those promoting ocean fertilization and biochar, have already tried to profit from carbon trading schemes by marketing these unproven technologies as eligible for offsets – once again driving geoengineering deployment for short-term profit.

In a world where the distribution of power, scientific knowledge, and money is not even remotely equitable, geoengineering is particularly dangerous. It will further concentrate power in the hands of the very entities that have caused the climate crisis and been proven singularly incompetent when it comes to solving the problem.

³ www.handsoffmotherearth.org