



## What is geoengineering?

Geoengineering is the intentional and large-scale manipulation of the earth's systems, including climate systems.<sup>1</sup>

The abject failure of the global community to tackle climate change means we have reached the point where drastic cuts to greenhouse gas emissions are needed quickly.

Geoengineering is attracting attention and some support because some in industry and government want 'solutions' that don't require a reduction in emissions, consumption, or the unsustainable exploitation of the Earth's resources.

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## What is wrong with geoengineering?

Many geoengineering proposals involve high risks that are poorly understood and their efficacy is uncertain at best. The false promise of such techno-fixes is also likely to make real measures for addressing climate change much harder to achieve.

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Geoengineering proposals typically fall into two categories: solar radiation management and carbon dioxide removal.

### *Solar Radiation Management (SRM)*

SRM generally involves increasing the amount of sunlight reflected back into space.<sup>2</sup> Proposals include putting giant mirrors in space; whitening clouds, housetops or roads so that they are more reflective; and cultivating highly reflective plants.<sup>3</sup>

Currently, the most popular proposal is to deliver sulphate aerosols into the stratosphere to reflect sunlight away from the earth and reduce the earth's temperature.<sup>4</sup> The sulphates could be delivered by weather balloons, high altitude planes or very long tubes connected to a sulphate source.<sup>5</sup> This process would need to continue indefinitely in order to have a long-term effect.<sup>6</sup>

Obviously, this wouldn't change the underlying causes of global warming or address some of the other problems associated with increased carbon dioxide (CO<sup>2</sup>) levels such as ocean acidification.

There are many risks associated with this technology, including changing the global climate in unintended ways. There is evidence that SRM could increase the incidence of droughts and acid rain and inhibit the creation of ozone.<sup>7</sup>

In July 2014 a group of international scientists concluded that injecting particles into the stratosphere would never stop climate change.<sup>8</sup>

### *Carbon Dioxide Removal (CDR)*

CDR involves reducing atmospheric CO<sup>2</sup> levels by 'locking up' carbon. This can include uptake and storage by biological systems, or using engineered systems of capture and storage.<sup>9</sup>

Some of these methods are common practice and low risk such as afforestation (planting trees).

Some proposals, such as carbon capture and storage, are highly risky, highly uncertain, extremely expensive - and so far a complete failure.<sup>10</sup>

Currently the most touted CDR scheme is ocean iron fertilisation. The proposal involves dumping large quantities of iron filings in the ocean to cause algal blooms which absorb CO<sup>2</sup>. The hope is that the algae will sink into deep ocean and remain there for at least 100 years. Unfortunately, modelling suggests that much of the algae wouldn't sink and would stay on the surface to be eaten by other organisms meaning that most of the CO<sup>2</sup> would be emitted once again into the atmosphere.<sup>11</sup>

It has been estimated that a massive fertilisation programme over 100 years would only offset global CO<sup>2</sup> emissions by about 3% - potentially even less.<sup>12</sup>

Risks associated with ocean fertilisation include the creation of low oxygen waters - killing fish - and the creation of other greenhouse gases such as nitrous oxide and dimethylsulfide.<sup>13</sup>



## Who promotes and who controls geoengineering?

A powerful corporate lobby now promotes geoengineering.<sup>14</sup> Emission intensive industries have significant reasons to support a business as usual model. Geoengineering experimentation is also supported by some scientists and science organisations, including the UK Royal Society.

Geoengineering techniques are subject to extensive patents, increasing the pressure on governments for geoengineering and raising concerns that ultimately the control of those technologies will rest in private hands.<sup>15</sup>

## What action is needed?

Because of the global nature of likely impacts associated with geoengineering proposals an international response is clearly needed.

Currently, there are no national or international laws that regulate geoengineering. Although the UN Convention on Biological Diversity has agreed to a *de facto* moratorium on geoengineering, a binding and enforceable agreement is needed, either by international instrument or a convention implemented through domestic laws. Until that happens, a global moratorium on using any geoengineering techniques with potentially global impacts is critical.



- <sup>1</sup> The ETC Group (2010) *Geopiracy: The case against Geoengineering*, p4.  
<http://www.etcgroup.org/content/geopiracy-case-against-geoengineering>
- <sup>2</sup> Royal Society UK (2009) *Geoengineering the climate: Science, governance and uncertainty*
- <sup>3</sup> Reeki, T. and Howard, W. (2012) *Geoengineering*, Occasional Paper Series, Office of the Chief Scientist, issue 1, April 2012
- <sup>4</sup> Spraying sulphate aerosols into the atmosphere,  
<http://emergingtech.foe.org.au/spraying-sulphate-aerosols-into-the-atmosphere/>
- <sup>5</sup> Reeki, T. and Howard, W. (2012)
- <sup>6</sup> *Ibid.*
- <sup>7</sup> *Ibid.*
- <sup>8</sup> Barrett, S. et al. (2014) Climate Engineering Reconsidered, Commentary, *Nature Climate Change*, 4: 527-529
- <sup>9</sup> The Royal Society UK (2009) *Geoengineering the climate: Science, governance and uncertainty*, p1
- <sup>10</sup> Winstock, G. (2013) Carbon Capture and Storage no Easy Task, Australian Financial Review.  
[http://www.afr.com/p/national/carbon\\_capture\\_and\\_storage\\_no\\_easy\\_Qi2ViTwWPWoiKUGoVlw6EN](http://www.afr.com/p/national/carbon_capture_and_storage_no_easy_Qi2ViTwWPWoiKUGoVlw6EN)
- <sup>11</sup> Reeki, T. and Howard, W. (2012)
- <sup>12</sup> *Ibid.*
- <sup>13</sup> Williamson, P. et al. (2012) Ocean Fertilization for Geoengineering: A review of effectiveness, environmental impacts and emerging governance. *Process Safety and Environmental Protection* 90:475-488
- <sup>14</sup> ETC Group (2010) *Geopiracy: The case against Geoengineering*, p14,  
<http://www.etcgroup.org/content/geopiracy-case-against-geoengineering>
- <sup>15</sup> Cited in Rimmer, M. (2014) *Geopiracy: Patent law, climate change and geoengineering*. *Chain Reaction*. May 2014.  
<http://emergingtech.foe.org.au/geopiracy-patent-law-climate-change-and-geoengineering/>

## Find out more

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