

THEME 02

Will climate engineering save the planet?

CLIMATE
ENGINEERING

TECHNOLOGY

CLIMATE CHANGE

For thousands of years, man has dreamt of intervening in the Earth's climate. Now climate engineering is trying to make this reality. Scientists and governments are taking the idea more seriously as climate change accelerates. But it is not just a desperate measure for desperate times. The rise of climate engineering is the result of systemic change across culture, technology and geopolitics.

Our observations

- The global scientific community is taking [more seriously](#) the idea of climate engineering (or geo-engineering): active intervention to change the climate through technological measures. For instance, [Harvard](#) scientists are preparing to launch a balloon capable of spraying reflective particles into the atmosphere to mitigate the effects of global warming.
- Governments across the world are increasingly experimenting with climate engineering. Especially [cloud seeding](#), a technique to change the amount or type of rainfall, is gaining traction. It is now employed in more than [50 countries](#), particularly in those that face severe droughts (e.g. the [UAE](#), [India](#), [Indonesia](#), [Thailand](#)). China is developing the world's [most ambitious project](#) across the Tibetan plateau and Saudi Arabia's \$500 billion [Neom city](#) will artificially produce rain.
- One of the largest projects to date illustrates the changing debate over climate engineering. In 2012, American entrepreneur [Russ George](#) dumped 100 tons of iron sulphate in the Pacific Ocean to absorb carbon dioxide. His efforts triggered a widespread backlash. Environmentalists worried that experiments like these could trigger ecological catastrophes. However, more recently, researchers have begun to explore George's technique of "ocean fertilization", as this idea has graduated from a fringe proposal to one seriously contemplated by the [Intergovernmental Panel of Climate Change](#) (IPCC).
- The use of climate engineering technology is already considered a [geopolitical risk](#). For example, [what if](#) China suffers from severe droughts as the result of U.S. climate engineering?
- The Council of Councils has argued that the United Nations (UN) should play a [central role](#) in the governance of geo-engineering. In March 2019, [UN negotiations](#) on geo-engineering technologies abruptly ended when opponents (e.g. the U.S., Saudi Arabia, Brazil) argued that these technologies pose huge potential risks to people and nature.



Connecting the dots

The idea of intervening in the climate is ancient. It traces back to [myths](#) of the climate as a form of moral retribution that manifested themselves in traditional society in the custom of praying to gods of weather. However, as man came to understand himself as the center of the cosmos, modern man has become the subject facing the climate as a malleable object. Nineteenth century scientists already argued that technological weather intervention would become possible. Climate prayer became climate engineering: instead of praying to the clouds, we are now blasting [hail cannons](#) into the clouds to prevent storms. Moreover, the manipulation of the climate through technology is actually all around us already. Air-conditioning, the planting of trees and [supercharged plants](#) are basic forms of climate engineering. Much more ambitious types of climate engineering are now emerging, such as solar radiation management (reflecting sunlight to reduce global warming) and stratospheric aerosol injection (spraying particles into the stratosphere to block sunlight).

To be sure, many experts are skeptical about these types of climate engineering and some warn against unforeseen consequences of using them. Scientists also worry that publicity for climate engineering will lend legitimacy to the idea that we can simply turn back the clock on climate change. It is still useful, though, to wonder why climate engineering is now emerging as a serious [response](#) to climate change. It is not just a desperate measure for desperate times. In fact, climate engineering is the product of sociocultural, technological and geopolitical change.

First, climate engineering befits the zeitgeist of [climate fatalism](#). As the critical threshold of 2°C of global warming comes closer, governments must adapt to the changing climate besides hoping to reach global consensus. Indeed, local experimentation with different types of climate engineering is a practical alternative. Looking ahead, successful experiments will improve the cultural perception of climate engineering. Ideas like those of Russ George and Oliver Morton, author of *The Planet Remade: How Geengineering Could Change the World*, could gain prominence: Morton argues that climate engineering is not an antidote

to climate change, but an additional form of climate change, one that has effects that oppose those brought on by greenhouse warming. Similarly, viewing climate engineering as a supplement to, and not a substitution for reducing emissions, has given rise to its comparison to [airbags](#) and [medicine](#). Furthermore, some argue that radical types of climate engineering are actually fairly “natural”. For instance, supporters of stratospheric aerosol injection argue that it simply mimics volcanic eruptions: in 1815, a volcano in Indonesia ejected huge amounts of aerosols into the upper atmosphere, deflecting so much sunlight that the following year was known as ‘[The Year Without a Summer](#)’.

Second, in recent years, technological innovation has created many more possibilities. State-led weather modification programs have been around for decades (a notorious example is Operation Popeye, an American cloud seeding operation during the Vietnam War to increase rainfall). But innovation in [solar tech](#), [satellite imagery](#), [AI](#) and [chemical manufacturing](#) has provided the opportunity for new types of climate engineering, which have already found their way into state-led programs (e.g. China, Neom city) and scientific research. Furthermore, as the scientific legitimacy of climate engineering grows, it is likely that innovation will gain momentum too.

Thirdly, as more and more countries have started to experiment with climate engineering, it is becoming a geopolitical weapon. Since climate change increasingly also threatens powerful countries, instead of only [poor countries](#), more and more countries will experiment with climate engineering. As the risk of the unilateral use of climate engineering grows, countries will have to invest even more to protect themselves. A certain type of “[mutual assured destruction](#)” of climate engineering could be the future.

All in all, the rise of climate engineering has not simply been born out of desperation. It is the product of systemic change across culture, technology and geopolitics, which could significantly boost the momentum for climate engineering in the coming years. It is even possible that this could trigger a [climate change Manhattan Project](#).

Implications

- Countries with high capabilities (i.e. those that are wealthy and powerful), vulnerable geography (e.g. those affected by desertification), and urgency (e.g. those suffering from growing severity of droughts) are most likely to invest in ambitious climate engineering projects in the coming years (e.g. China, India, Gulf countries).
- China could become the leader of climate engineering by supporting its [legitimization](#) with its currently running projects.
- The unilateral use of climate engineering technology will become an increasingly important geopolitical risk.