

Geoengineering

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The words “climate change” haunt researchers, environmentalists, and citizens on a daily basis. Since the early 1990s, there have been many strong proponents of climate change and clean energy changes around the world. People like Vice President Al Gore, Greta Thunberg, and Prince Harry of England have been outspoken over the past decade on why we should combat the climate change crisis. Though they have created waves of support and brought attention to an important subject, there have been no lasting solutions found for this crisis.

Geoengineering is the direct manipulation of our environment in hopes of lessening the effects of global warming and climate change (Harvard’s Solar Geoengineering Research Program, n.d.). There are new emerging geoengineering technologies that show promise but, at the moment, are just hypothetical solutions. The most promising include Cirrus Cloud Thinning, Carbon Capture Use and Storage (CCUS), and Artificial Upwelling (Geoengineering Monitor, 2024). They each target very different environmental factors, and they all have their pros and cons.

Cirrus Cloud Thinning aims to decrease the mass of cirrus clouds, which capture more sunlight than they reflect. By thinning the clouds, less sunlight will be absorbed, and theoretically, more sunlight will be reflected back into space. To thin the clouds, they would inject ice nuclei, which reduces optical depth and lessens the amount of sunlight absorbed. Though it is a promising solution, it cannot be implemented until scientists are sure that their calculations are correct. If done improperly, thinning the cirrus clouds could have the undesired effect of creating thicker clouds, which would increase the heat trapped in the atmosphere.

Carbon Capture Use and Storage works to capture carbon dioxide from the atmosphere and store it before using it in an effective way. They can use this CO₂ for agriculture, construction materials, or plastics, therefore repurposing the CO₂ in a beneficial way. The

drawback would be that CO₂ would still be in our atmosphere in some form, so it is not a perfect solution.

Lastly, Artificial Upwelling aims to bring deep ocean water to the surface, which could stimulate the growth of phytoplankton, which can absorb atmospheric CO₂. This would definitively decrease CO₂ levels, which is a hard solution to come by. This has not been used yet because the effects on the marine ecosystem are unknown and could potentially be fatal for different sea creatures.

As you can see, there are no clear solutions, but there are positives to each proposed idea. Though activists for climate change have not seen the issue resolved, their work has inspired others to seek workarounds and one day solve the climate change crisis. Geoengineering is the key to ending climate change, but patience is needed because there are no quick fixes when you are dealing with altering the environment. It is important to analyze the pros and cons of each proposed solution so that we can work together to find the best solution with the fewest risk factors. All of the solutions above are band aids at best, but with the continued work of environmentalists, we will one day find a cure for our climate change crisis.

References

Admin. (2024, May 6). *Artificial Upwelling (technology briefing)*. Geoengineering Monitor.
<https://www.geoengineeringmonitor.org/2021/04/artificial-upwelling/>

Geoengineering. (n.d.). Harvard's Solar Geoengineering Research Program.
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