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Geoengineering as a 'Temporary Solution'?

It is either a path towards catastrophe or
an escalation to an even worse crisis

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Geoengineering as a ‘Temporary Solution’? It is either a path towards catastrophe or an escalation to an even worse crisis

Since 1880, global temperatures have increased by about 1.1°C (NASA, 2020). Through the Paris Agreement, countries have agreed to reduce global temperature rise to below 2°C while striving for an increased limit of 1.5°C (UNFCCC, 2022). However, global temperatures are predicted to break the climate threshold of 1.5 °C in 2027 (Harvey, 2023). Mitigating climate change and reducing emissions is often alleged to have failed in pursuing the ambitions of the Paris Agreement. Climate adaptations include every action that needs to be put into practice to ease the impacts of climate change, such as handling climate refugees or building flood protection systems. Mitigation measures, on the other hand, are all actions to prevent the worsening conditions of climate change. The best mitigation method is to directly solve the root causes of climate change: greenhouse gasses. This includes implementing national and international policies to block out fossil fuels, restore nature to absorb more carbon, protect forests and the oceans, and reduce consumption. However, the fossil fuel industries, along with other corporations, keep lobbying to stop policies addressing climate crises. Not to mention, some countries are still heavily dependent on fossil fuel industries. This dilemma of maintaining capital growth and reducing GHG emissions has made geoengineering gain prominence among lawmakers, scholars, and even the International Panel on Climate Change (IPCC) (Walsh, 2023). Instead of focusing on reducing emissions, governments of developed countries such as the United States are considering geoengineering alternatives (Trenberth, 2022). Geoengineering, or climate engineering itself, is a planetary environment manipulation technology used to counteract anthropogenic climate change (Markusson et al., 2014). This technology consists of 2 classifications: Carbon Dioxide Removal (CDR) and

Solar Radiation Management (SRM). The CDR method is intended to store CO₂ gas *in the atmosphere, in the soil or ocean*, while the SRM seeks to increase the albedo or reflectivity of the earth to absorb less sunlight (Schneider, 2019).

This essay is intended to prove the potential for violations of ethics and morals, as well as the ineffectiveness of geoengineering. *How come geoengineering, which potentially violates international laws and harms climate justice, could be considered as an option to prevent climate disasters?* I aim to analyse moral corruption in the geoengineering plan by assessing it through climate justice, referred to as distributive and procedural justice concepts. In addition, the power relations theory will explain how Global North encourages the implementation of geoengineering as an alternative. Even though geoengineering is against international law and threatens human rights, especially in the Global South, I see the potential for modification of international law to create geoengineering justification and legitimacy.

Climate change has dispersed or varied effects; the Global South is the most vulnerable party to the threat of climate immigrants, rising sea levels, and humanitarian crises (Caney, 2016; McAdams, 2012: 15). Nevertheless, developed countries and corporations that benefit from carbon emissions are the ones that can tackle climate change (Caney, 2016). Such unilateral advantages increase the opportunities for geoengineering. Moreover, a complete transition to new and renewable energy takes a long time, and the entire transition must be realised even today (Hickel, 2020). With political resistance in mitigation and an economic system that survives consumerism and increases in Gross Domestic Product (GDP), geoengineering will be a ‘buy-time’ solution by giving one or two decades to achieve zero emissions (Hamilton, 2015). Geoengineering, especially Solar Radiation Management, will likely fail because this option does not address the root cause of climate change, which is the production of greenhouse gasses. The next challenge is the uncertainty about how and who will ensure that each country transitions and reduces its emissions once the geoengineering plan has been implemented. Considering the current mitigation efforts are very ineffective, the same violation will likely occur after implementing this technology.

There has previously been a consensus among experts that geoengineering as an alternative is a bad idea. Geoengineering has the potential as a justification

for delaying climate mitigation and adaptation, including ethical quandaries, encompassing military and commercial controls and sudden rapid rise in temperature after the injection of sulfate aerosols (Robock, 2008). The root cause of climate change is emissions; thus, reducing greenhouse gasses is the ultimate solution. Methods encompassing the transition into renewable energy are insufficient without de-growth implementation, emphasising human needs over capital interests. Developed countries that have benefited from global warming must reduce their production and consumption. Conversely, geoengineering is not a solution to the problem since the idea is about emitting more heat back into the atmosphere. On the contrary, the climate crisis comes from human industrial activities producing emissions. If the production of emissions is not reduced, there is no point in emitting back the sun's heat.

However, in August 2006, climatologist and Nobel laureate Paul Crutzen revived debate on the geoengineering issue. Crutzen exclaimed for supporting the “Arm the Future” Argumentation (AFA), emphasising that geoengineering research is needed to prevent the climate crisis. The rationalisation used by Crutzen is the “lesser-evil argumentation.” This argument recognises that the best approach to tackling climate change is through mitigation efforts (reduction of anthropogenic or human-caused emissions). He acknowledges that geoengineering proposals have moral concerns. Nevertheless, the mitigation progress made so far has been inadequate, leading to geoengineering as an option. If aggressive mitigation continues to be postponed, in an estimated 40 years, the world will only have two choices: be affected by climate disasters or implement geoengineering. The lesser-evil argument contains justification for choosing the best of two bad options, so the choice of geoengineering must be taken when faced with the two possibilities above.

Geoengineering is a proposal by rich countries and business elites to justify defaulting on climate debt through mitigation. The framing of the geoengineering narrative as a ‘lesser evil,’ ‘plan B,’ ‘last resort,’ and ‘insurance policy’ in preventing climate disasters represents a corrupt moral policy. The implementation of geoengineering as an alternative to mitigation failures will destroy the balance of nature and violate human rights, especially in the Global South, thus contradicting the aspect of ‘justice,’ including ensuring representation, inclusion, and protection

of the rights of the most vulnerable populations to the effects of climate change. However, despite the destructive nature of geoengineering and contrary to international law, in line with the approach to climate disaster, this writing argues that international law which contradicts geoengineering will be modified by stakeholders and powers, in this case, Global North with corporations *that benefit from production practices emission*. Because the geoengineering policy violates morals, for it takes a strategy that contains the interests of a group rather than the best strategy against rising global temperatures, this option is likely to fail to prevent a climate disaster.

The formulation of the problem to be investigated includes:

1. Why are climate justice considerations inseparable from discussions of geoengineering?
2. How can geoengineering proponents modify international law to justify this plan?
3. How does geoengineering have a high probability of failing?

Misleading Framing of Geoengineering

Mitigation is recognised as the best way to prevent climate disasters. However, with political inertia and disappointing progress on mitigation, geoengineering proponents call the options they advocate for ‘lesser evil,’ ‘last resort,’ ‘back up plan,’ ‘emergency measure,’ and ‘insurance policy’ (Gardiner, 2010; Svoboda, 2014). This terminology, according to Svoboda (2014), gives the impression and understanding of “Techno-fix”—a planet is a machine—and “Medical-fix”—the planet is like the body of a patient—on Earth. Svoboda reveals the dangers of these framings. For example, fire insurance is not intended to prevent initial loss but to compensate victims financially when the loss has occurred. Using the ‘insurance policy’ framing in geoengineering is misleading, with the implicit suggestion that Stratospheric Sulfate Injection (SSI) is about “making up for” the damage caused by climate change. Svoboda believes that geoengineering has been defined to such a limited extent that it kills rationality and increases the amount of support, one of which is SSI’s association with the cooling effect.

In line with Svoboda, Gardiner (2010) dismantles the defects of geoengineering as a “Lesser-Evil” option. Arguments based on a moral emergency are usually used to exempt projects from moral norms and constraints. Gardiner uncovers several logical irregularities in the lesser-evil argument. Just because an option is considered a lesser evil than another, we should not simply accept that. Instead, questioning them is more crucial regarding *how this emergency occurs so that only evil choices are left. Are there only two alternatives? Is the so-called lesser evil genuinely lesser when considering all the factors?*

There is an opacity in the lesser-evil argument. The question of why geoengineering is categorised as lesser should be the main focus. Lastly, Gardiner questioned whether the alternative to geoengineering is advocated as the last choice due to political inertia to reduce emissions and if geoengineering is lingering inertia. This option is the most convenient method for buck-passing climate debt to future generations. The main challenge now is emission reduction. The international structure is absent from coercion mechanisms on state entities. By choosing geoengineering, how will emission reductions be managed, and by whom? If there are entities that cheat the agreement, what and how they are punished is still the same concern. Therefore, geoengineering as an option makes no sense. If the only way to deal with the climate catastrophe is to reduce emissions, delays without certainty will only buy time to wait for the “termination shock” when global temperatures rise dramatically. Likely, in one or two decades, we will only be able to enjoy the benefits of the groups most responsible for climate change. Geoengineering framing is also problematic when justified due to an emergency. Fundamentally, the effects of geoengineering cannot be predicted with certainty. The ambition to shape the future without sufficient deliberation silences discussion and limits other alternatives in fighting climate change (Markusson et al., 2014). Moral and regulatory considerations should be the main point of the discourse on geoengineering instead of justifying existing mitigation failures.

Climate Justice and Geoengineering

Distributive and Procedural Justice prove that the geoengineering option is a morally corrupt policy. Despite their potential benefits, Distributive Justice recognises that geoengineering applications have disproportionate implications

for different world populations. While some may fare better, others will face a worse situation, especially the people who are already the most vulnerable, such as in Sub-Saharan Africa. The question of who and how to deal with the impacts must be emphasised. Procedural Justice is needed to ensure fairness in research and decision dissemination (Svoboda, in Preston, 2016: 3-15).

The aspect of climate justice cannot be separated from geoengineering. Everyone has the right to exist on earth. Thus, whatever happens on earth, including the climate crisis and the potential disasters that accompany it, must not give up the right to existence. Moreover, it is a public secret that the Global North is responsible for climate change, while the Global South feels more severe impacts (Caney, 2010). The Global North started it all back in the Industrial Revolution with what is called “Black Gold” in the UK, a term that refers to the massive discovery of coal and gas, resulting in the present prosperity of the Global North (Robinson, 2022). Furthermore, 92% of the Greenhouse Gases are accounted for on behalf of the Global North (Bandera, 2022). Due to the initial position of inequality and poverty, the Global South is more susceptible to climate change. They have fewer resources to adapt and mitigate climate change. The Global South is also more vulnerable due to its geographical factors. For example, small island developing states in the Pacific are particularly vulnerable to sea-level rise and lack of adaptation infrastructure. Thus, the different impacts of geoengineering should be emphasised.

There are at least three reasons why the geoengineering plan violates aspects of climate justice:

1. Geoengineering, like stratospheric aerosol injection or solar radiation management, can potentially disrupt weather patterns. At the same time, BECCS (Bioenergy with Carbon Capture Storage) requires tens of millions of hectares of land, thus exacerbating the existing socio-economic crisis and threatening the right to freedom from hunger and the right to water resources (Burns, 2016).
2. The marginalisation of the Global South as the population most vulnerable to the effects of climate change. Research institutions in North America and Europe dominate knowledge production on geoengineering, with 75% of geoengineering-related events occurring in OECD countries (Biermann,

2019). The definitions and questions in question were formed by the Global North, which is the party most responsible for the climate crisis.

3. Interest in maintaining the status quo of economic control.

Most geoengineering research is funded by developed countries and companies that have eroded the benefits of the climate crisis (Schneider, 2019). This plan can potentially hinder mitigation efforts so that, in the end, the geoengineering option can be justified when conditions have crossed the threshold. The neglect and lack of clarity regarding how developed countries and developing countries will be able to adapt to the implementation of geoengineering demonstrates the flaws in the geoengineering proposal.

Geoengineering is a lousy idea and contradicts human rights and international law. However, how might this be justified and legitimised?

Geoengineering's potential negative impacts threaten commitments to the Sustainable Development Goals (SDG) and climate justice (Schneider, 2019). Both types of geoengineering, Carbon Dioxide Removal, and Solar Radiation Management threaten humanity. For example, Bioenergy with Carbon Capture Storage (BECCS), namely a process of cultivating biomass and burning it to capture CO₂ and burying CO₂ gas underground, will seize 7-25% of agricultural land for a moderate level of storage, equivalent to 3 Gt of CO₂ annually (Burns, 2016). Meanwhile, the amount of global carbon produced currently reaches 37.12 billion or 37.12 GtCO₂ (Tiseo, 2023).

If geoengineering is applied in the future over current mitigation reluctances, food prices will increase dramatically. Without geoengineering, even the world hunger rate reaches 810 million people in developing countries. With the implementation of geoengineering, the right to food security will become increasingly exclusive, violating the provisions that states must ensure freedom from hunger “even in times of natural or other disasters” (OHCHR in Burns, 2016). The problem is that the country that initiated geoengineering is the Global North, but the population of the Global South is the victim. The Global North ensures the safety of its population, while the Global South's fate determines their countries' governance in an international system with asymmetrical power relations.

Markusson (2014) explains how geoengineering can be legitimised even though it violates aspects of international law. The legal justification used by proponents of this option is the concept of “necessity.” A concept that allows something that typically violates the provisions of the law due to “emergency and urgency” and “grave and imminent peril.” The international structure contains power relations. Developed countries and corporations can modify international law to justify geoengineering. According to Foucault, the state or ruling class results from the configuration of power relations. In return, this configuration creates a domination superstructure, which then determines the environment of relations between parties and, therefore, modifies or influences other aspects and parties to achieve the objectivity of the ruler (DuBois, 1991). In association with the climate lobby, the Global North and large corporations have the technology and knowledge production capabilities that leave the Global South with no options but to follow the game pattern it created.

A Recipe for a Failure: Arrogance and Ignorance

Suppose the rationality of violations of justice, morals, and human rights is insufficient to stop support for the geoengineering option. In that case, there is an analogy to describe the vulnerability of geoengineering as an alternative to avoiding climate disasters. Asayama and Hulme (2019) explain the similarities between the 2008 Global Financial Crisis and geoengineering. The 2008 Global Financial Crisis began with arrogance and disregard for what was known for sure. Banks in the United States give out too many mortgages and know that this could lead to a financial crisis. However, they insist that Americans are never defaulted on their mortgages. Unexpectedly, those Americans did not pay.

Just as the United States is betting on subprime mortgage bonds, today, the world—Global North in particular—is betting on geoengineering. *Geoengineering plans only fail if countries do not want to reduce their emissions. Who is so stupid as not to cut emissions when they are already on edge? Only time can tell for sure.* However, as a rational human being, seeing history that countries, especially developed countries, have consistently failed in their mitigation, what can guarantee that emission reductions will be successful when geoengineering has been implemented? This plan will only add mitigation resistance and justification

for delaying the energy transition.

This temperature-debt strategy plays “overshoot and peak-shaving.” The world is currently deciding to produce emissions that will drive a temperature rise of more than 1.5 or even 2°C. Therefore, on the curve, the temperature will increase.

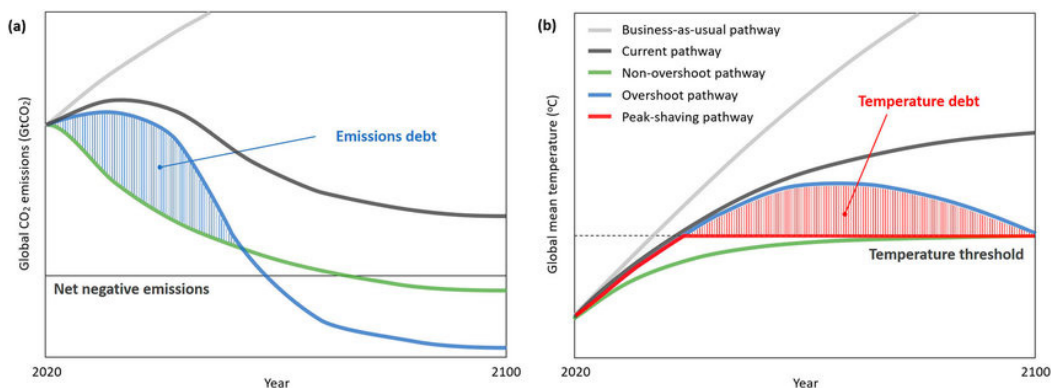


Figure 1. CO₂ Emissions Pathways (Asayama & Hulme, 2018).

Note. The green line represents the safe limit for CO₂ emissions necessary to keep the temperature rise below 2°C. The black line illustrates the current trajectory, which exceeds the green line and is insufficient to remain within the 2°C limit. The blue line, representing the overshoot pathway, indicates that if CO₂ emissions exceed safe levels now, creating an ‘emissions debt,’ it will require more drastic reductions in the future to return to a safe level.

Then, a “peak-shaving” strategy was carried out, namely temporarily using solar geoengineering to prevent the increase due to emissions not exceeding 2°C. “Overshooting” uses “emission debt”; the use of emissions is like someone borrowing money. As an illustration, an employee only has a monthly income of USD 1000. However, she decided to add to her current luxury by buying a bag for USD 800, for which she has a loan debt of USD 800, which she must repay in the future. “Emission debt” is to produce emissions from the amount outside the limit so that the temperature does not exceed 2°C.

Geoengineering creates a “temperature debt”; without geoengineering, the resulting emissions will cross the threshold. Like a loan, the debt must be paid before expiration; otherwise, a crisis will occur. When the climate debt fails to

be paid, a “termination shock” will occur, where the temperature rises suddenly beyond the capabilities of the earth, which will bring about the end of civilisation.

Conclusion

Geoengineering is an alternative to developed countries and large corporations most responsible for climate change. This option is used as a justification for the failure of mitigation and buying more time to erode the benefits of the existing climate crisis, showing why geoengineering is a corrupt policy and violates climate justice and human rights. This option will likely fail for at least three reasons. First, the geoengineering proposal needs to address the root of the problem: emission reduction. Second, the international structure does not have the coercive capability to steer countries to reduce emissions. Considering the current political resistance to reducing emissions, similar conditions do not rule out the possibility of occurring when geoengineering is implemented.

It must be underlined that geoengineering can cause a “termination shock,” if a precise and forced mechanism cannot be carried out, it will cause the earth to experience a more critical drastic temperature increase before the geoengineering pre-condition. Lastly, this plan was initiated and developed exclusively by Global North, thereby providing a rationale for delaying aggressive mitigation. This can further exacerbate the existing power imbalances, reinforcing inequalities in decision-making, interest, and impacts. The geoengineering proposal also does not openly include potential humanitarian crises, repair mechanisms, and guarantees for vulnerable parties. This proposal cannot be accepted as a climate disaster prevention option. The only way to eradicate the problem is to solve the root cause.

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