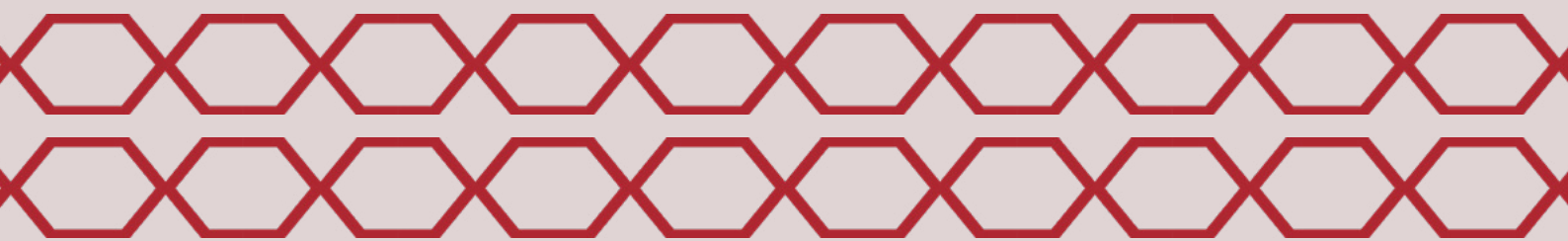


LAND-BASED GEOENGINEERING TOOLKIT





WHAT IS LAND-BASED GEOENGINEERING?

Land-based geoengineering is expanding as an industry-driven response to the failure to achieve the deep and urgent emissions reductions needed to prevent the worst impacts of the climate crisis. Its main purpose is to offset emissions from fossil fuels and land use change, and to compensate for exceeding global carbon budgets through so-called “removals”, now embedded in international mitigation strategies. Some techniques also aim to make the Earth’s surface more reflective, in order to send solar radiation back into space.

*These schemes aim to manipulate soils and terrestrial ecosystems at massive scales and fall into two broad categories: 1) **Carbon Dioxide removal (CDR)**, where plant biomass, rocks and minerals, and direct mechanical or chemical methods are used to capture carbon from the atmosphere and store it long-term, and 2) **Solar Radiation Modification (SRM)**, where land and ecosystems are changed in order to increase their albedo (reflectivity), which traps less solar radiation at the surface and in the atmosphere.*

These approaches range from technologies already being commercialised for large-scale emissions offsets to experimental techniques still in early research. All require substantial land and energy, posing serious risks to biodiversity, food production, human rights, and local livelihoods. They also reinforce colonial power dynamics by shifting the responsibility for carbon removal to the Global South, where emissions from the Global North are often “offset”. Many land-based geoengineering approaches—particularly

those labelled as “removals” or “negative emissions”—are combined with Carbon Capture and Storage (CCS), which introduces further risks, including leakage, contamination, accidents, and reliance on high energy use and toxic chemicals.

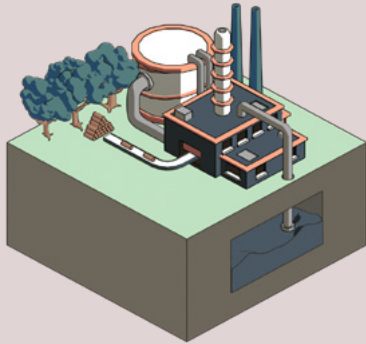


Screenshot from A technofix for the climate? Land-based geoengineering (BECCS) from YouTube (<https://www.youtube.com/watch?v=qLsH84dIV1Y&t=8s>)

Read more in Geoengineering Monitor for an overview of each technology, the actors involved, and their impacts at <https://www.geoengineeringmonitor.org/briefings>

Learn more about other forms of geoengineering at <https://handsoffmotherearth.org/resources/geoengineeringtoolkits/>

MAIN TECHNOLOGIES



BIOENERGY WITH CARBON CAPTURE AND STORAGE (BECCS)

Read more at <https://www.geoengineeringmonitor.org/technologies/beccs>

BECCS aims to capture carbon dioxide from bioenergy processes, such as burning biomass for electricity or producing ethanol, and store it underground or use it in products. It is often described as “carbon negative” due to the fact that carbon emissions from combustion are ignored, based on the flawed and widely criticised assumption that regrowth of trees and plants reabsorbs the emitted carbon.

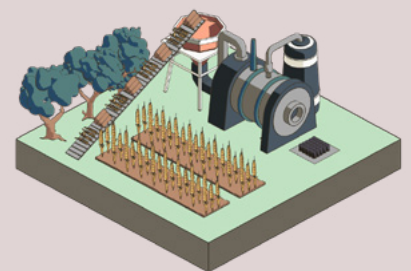
BECCS requires burning massive amounts of crops, trees, and other biomass, or converting them into ethanol. Carbon capture is achieved through energy-intensive post-combustion filtration, which increases biomass demand further.

Capturing carbon from burning trees and other biomass is still unproven at scale due to technical barriers and the huge energy penalty involved. On top of this, ecological sequestration of carbon captured through BECCS has still not been proven at scale either, and large-scale efforts to capture and store carbon underground, such as the Summit Carbon Solutions pipeline network linking ethanol plants in the US Midwest, or [Stockholm Exergie's BECCS plant in Sweden¹](#), are still under development. However, this hasn't stopped huge deals being signed for future carbon credit sales based on BECCS, which have made it the leading carbon credit removal technology on the voluntary carbon markets.

BIOCHAR AND BIO-OIL SEQUESTRATION

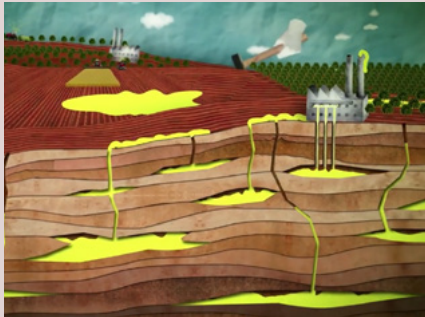
Read more at <https://www.geoengineeringmonitor.org/technologies/biochar>

Biochar is essentially a new name for charcoal, and is made by pyrolyzing biomass at high temperatures in low-oxygen conditions, producing a carbon-rich solid that can be mixed into soil or used elsewhere, where proponents claim that it will remain stored for many years. However, there is little conclusive evidence to support this and, similarly, some studies show that rather than benefiting soil health, adding biochar can introduce toxic and harmful substances. On top of this, carbon dioxide emissions from pyrolysis are ignored due to flawed carbon accounting methodologies which assume that biomass is renewable — as is the case with BECCS. Utilising or sequestering bio-oil, a by-product of the process, is also being commercialised as carbon removal.



Although more sophisticated technologies exist, most biochar is produced in rudimentary kilns or pits, making it by far the most “delivered” carbon removal credit to date, due to its relatively low cost. Scaling biochar industrially would require vast land for biomass and substantial energy, competing with food production and affecting Indigenous and peasant territories. More complex methods also demand additional renewable energy, impacting the fossil fuel transition.

1. <https://map.geoengineeringmonitor.org/ggr/stockholm-exergi-beccs-project>



Screenshot from *A technofix for the climate?*
Land-based geoengineering (BECCS) from
Youtube

BIOMASS BURIAL AND GEOLOGICAL STORAGE

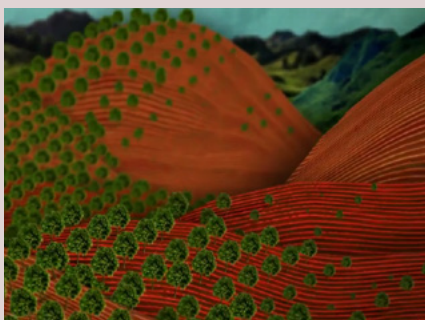
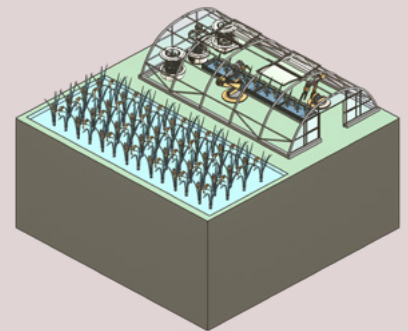
Learn more from <https://www.wri.org/insights/biomass-carbon-removal-storage-companies-fight-climate-change>

Biomass burial, or “wood vaults”, involves storing organic matter like wood, agricultural waste, or seaweed in low-oxygen environments to slow decomposition. Variants include burial in mounds, quarries, mines, underwater, or frozen conditions. Biomass geological storage injects bioslurries—e.g., sewage or paper sludge—deeper underground, often using high-pressure techniques like fracking, as practiced by companies such as Vaulted Deep.

GENETICALLY ENGINEERED (GE) TREES AND PLANTS

Read more about genetically engineered (GE) trees and a campaign to stop them at <https://globaljusticeecology.org/stop-ge-trees/>

Some proposals aim to engineer trees and crops for faster growth, herbicide tolerance, or delayed decomposition to absorb more CO₂. Companies like Living Carbon market GE eucalyptus and poplar as carbon removal tools. However, these approaches carry risks of ecological disruption, contamination, long-term unknown effects, and corporate control; potentially harming forests, soils, water systems, biodiversity, and Indigenous Peoples.



Screenshot from *A technofix for the climate?*
Land-based geoengineering (BECCS) from
Youtube

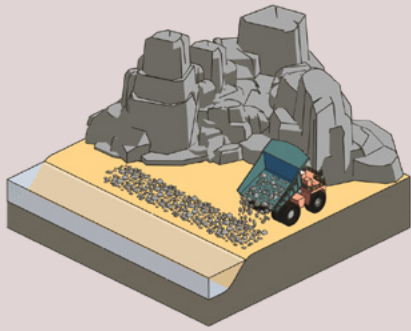
INDUSTRIAL AFFORESTATION AND MONOCULTURE PLANTATIONS

While not strictly geoengineering, industrial plantations dominate current carbon removal efforts. **Afforestation/reforestation with plantations²** would also be required to supply sufficient feedstock for BECCS, biochar, and biomass burial at scale, with the added incentive of selling carbon credits based on the plantations themselves. This practice often rebrands industrial plantations as “carbon sinks”, misleadingly framing them as climate solutions. Large-scale monocultures of non-native species (e.g., eucalyptus or pine) replace biodiverse ecosystems, deplete water resources, increase fire risk, and perpetuate social inequities.

Read more about the impacts of industrial monoculture tree plantations here:

- ▶ *Statement: Monoculture Tree Plantations Are Not Forests!*
(<https://globalforestcoalition.org/statement-monoculture-tree-plantations-are-not-forests/>)
- ▶ *What are the main types of tree plantation projects in the carbon business?*
(<https://www.wrm.org.uy/bulletin-articles/what-are-the-main-types-of-tree-plantation-projects-in-the-carbon-business>)
- ▶ *The impacts of tree plantations on women & women-led resistance to monocultures*
(<https://globalforestcoalition.org/forest-cover-62/>)

2. <https://www.geoengineeringmonitor.org/carbon-dioxide-removal-narrative-is-greenwashing-monoculture-tree-plantations>



ENHANCED WEATHERING (EW)

Read more about genetically engineered (GE) trees and a campaign to stop them at <https://globaljusticeecology.org/stop-ge-trees/>

Enhanced Weathering (EW) techniques aim to remove carbon dioxide by spreading large quantities of finely ground rock minerals across extensive land areas, beaches, or the sea surface, mimicking and accelerating the natural weathering processes of silicate and carbonate rocks which chemically react with and absorb carbon dioxide from the atmosphere.

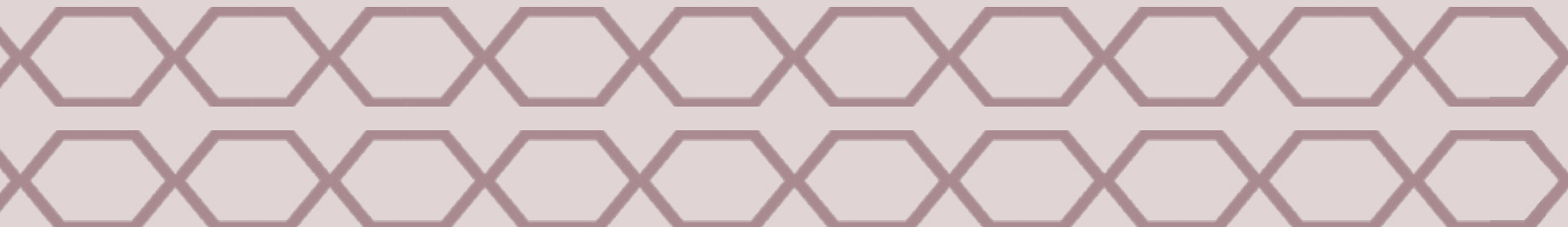
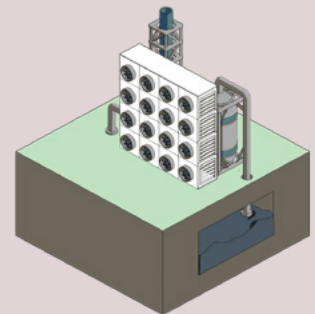
As an example of scale, it is estimated that to remove one gigatonne of carbon from the atmosphere—which the IPCC claims will be necessary—three gigatonnes of basalt would need to be mined and crushed each year, equivalent to the total annual global production of iron ore.

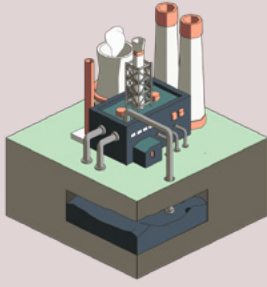
This process would be extremely expensive, and the environmental harm, impacts on communities, and energy and water consumption rates would also be huge. Suitable rocks, particularly silicate and carbonate minerals rich in calcium and magnesium, such as olivine-rich ultramafic and mafic rocks or basaltic rocks, would need to be mined, crushed, transported, and dispersed. In recognition of the scale of industry that would be required, recent EW proposals have focused on using waste from existing mining operations, which would also have significant impacts, for example through heavy metal contamination.

DIRECT AIR CAPTURE (DAC)

Read more at <https://www.geoengineeringmonitor.org/technologies/direct-air-capture>

DAC aims to extract CO₂ using chemical sorbents and large fans, or electrochemical/battery-like devices, and to store the captured carbon dioxide underground or use it for products, fuels, or Enhanced Oil Recovery (EOR). Due to low atmospheric CO₂ concentrations, the process is energy, water, and land intensive, requiring high temperatures (80–800°C) for sorbent regeneration, large volumes of water in the capture process, and large areas of land for infrastructure. Although DAC is often cited by proponents as one of the most promising carbon removal approaches, after years of research and development it remains hugely expensive, energy intensive and unproven at scale.





CARBON CAPTURE AND STORAGE/UTILIZATION (CCS/CCUS)

Although CCS and CCUS aren't generally considered to be geoengineering, many geoengineering technologies rely on them. CCS aims to permanently store carbon in geological formations such as old oil and gas fields, which brings significant risks of leakage, contamination, accidents, and reliance on high energy use and toxic chemicals. CCUS aims to use carbon captured from industrial processes for alternative purposes, such as a feedstock in manufacturing, where the carbon is "stored" in products for varying amounts of time.

There are a number of different CCUS pathways, including Enhanced Oil Recovery (EOR), chemicals and fuels, microalgae-based fuels and products, plastics, construction materials, food, and animal feed. CCUS aims to make CCS more profitable by selling products made from the captured carbon, rather than incurring the costs of geological storage. Although many CCUS pathways are still theoretical, many technologies are already being commercialized.

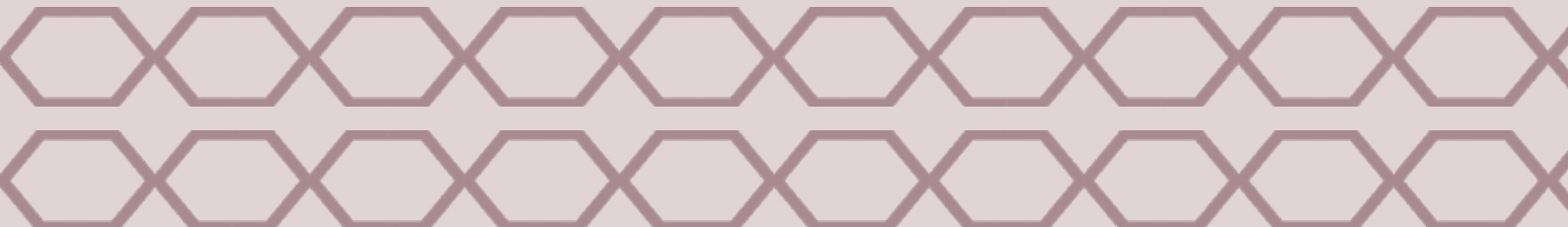
Read more about CCS at <https://www.geoengineeringmonitor.org/technologies/carbon-capture-and-storage>

Read more about CCUS at <https://www.geoengineeringmonitor.org/technologies/carbon-capture-use-and-storage>

MAKING THE EARTH'S SURFACE MORE REFLECTIVE (ALBEDO ENHANCEMENT)

For more information on SRM technologies please see our solar geoengineering toolkit here <https://handsoffmotherearth.org/wp-content/uploads/2025/09/English-Solar-Geoengineering-Toolkit.pdf>

There are numerous proposals and technologies being developed to increase the albedo of the Earth's surface, making it more reflective to the sun's light, such that less heat remains trapped. These approaches range from the experimental, such as ice enhancement schemes, particularly over glaciers, and genetically engineering plants and trees to have a higher albedo, to low-tech approaches, such as or cutting down boreal forests. Whereas many CDR technologies are already been commercialised, land-based SRM techniques tend to be at an earlier stage of development; meaning that some companies are actively pursuing outdoor trials, such as covering glaciers with tiny glass beads, or highly controversial gene-editing experiments in the laboratory.



REASONS TO REJECT LAND-BASED GEOENGINEERING

1. LAND GRABS AND DISPLACEMENT

Land and coastal areas in the Global South and Arctic are already under intense pressure. Carbon dioxide removal (CDR), particularly land-based methods like afforestation, reforestation, and **Bioenergy with Carbon Capture and Storage (BECCS)**, **at the scale needed to impact climate change would worsen land grabs and human rights abuses³**, with the most marginalized communities and under-represented groups such as women and youth bearing the greatest burden. Geoengineering proposals, particularly land-based CDR, would amplify these threats to people and biodiversity.

2. DRIVE BIODIVERSITY LOSS

Land-based geoengineering **risks severe biodiversity loss⁴** by driving habitat destruction, water scarcity, and ecosystem degradation. Large-scale BECCS alone could require land twice the size of current croplands, replacing diverse ecosystems with monoculture plantations. The use of fast-growing species like genetically engineered eucalyptus further harms biodiversity, relying heavily on water and herbicides and creating uniform landscapes.

3. ENABLE AND REINFORCE CORPORATE CONTROL AND CARBON MARKETS

Carbon markets fuel the expansion of land-based geoengineering⁵, allowing companies to profit from speculative carbon offsets. These schemes act as a “permit to pollute”, misleadingly suggesting that market mechanisms can solve the climate crisis. Fossil fuel and other polluting industries can exploit geoengineering, including land-based geoengineering, to monetize offsets while avoiding real emissions reductions.

Read this letter of concern⁶ by Demand Climate Justice members

4. DISTRACT FROM FOSSIL FUEL PHASE-OUT

The belief that geoengineering can “fix” climate change **gives governments and industries an excuse to delay urgent action⁷**. Focusing resources on experimental technologies risks diverting funding, research, and attention from genuine, rights-based mitigation and adaptation measures that tackle the root causes of the crisis.

3. https://www.foei.org/wp-content/uploads/2021/01/Friends-of-the-Earth-International_BECCS_English.pdf

4. <https://www.ciel.org/geoengineering-biodiversity-risks/#:~:text=They%20risk%20physical%20harms%20caused,marine%20ecosystems%20for%20their%20livelihoods.>

5. <https://www.geoengineeringmonitor.org/whats-at-stake-sb60>

6. <https://demandclimatejustice.org/2023/07/07/civil-society-groups-raise-concerns-over-increasing-push-for-carbon-markets-offsets-and-false-solutions-like-geoengineering-and-land-based-removals-during-climate-negotiations/>

7. <https://www.ciel.org/why-geoengineering-is-a-false-solution-to-the-climate-crisis/#:~:text=It's a dangerous distraction that,lock in catastrophic climate change.>

MANY NAMES, MANY FACES



CARBON DIOXIDE REMOVAL (CDR)



CDR is increasingly framed as essential for meeting climate targets, but its emphasis on future large-scale removal allows governments and corporations to justify continued fossil fuel use today, delaying the necessary energy transition. Many CDR strategies, including DAC and BECCS, are technologically immature, energy-intensive, costly, and of uncertain scalability. This creates a dangerous gap between optimistic climate models and real-world feasibility, with many promised removals unlikely to materialize at climate relevant scales, while large scale deployment also brings a range of ecological and social risks and harms.

NATURE-BASED SOLUTIONS (NBS)

Check out this fact sheet by DCJ with external resources: <https://demandclimatejustice.org/wp-content/uploads/2023/06/6.-DCJ-False-Solutions-NATURE-BASED-SOLUTIONS-1.pdf>

NbS is an umbrella term often used to legitimize “false solutions.”⁸ Some land-based geoengineering approaches, such as large-scale afforestation/reforestation or BECCS-linked biomass production, are framed as NbS despite massive ecosystem manipulation. Rather than restoring biodiversity or addressing environmental drivers, NbS has been co-opted by vested interests to rebrand questionable practices as “green”.



NET ZERO AND NEGATIVE EMISSIONS

“Net zero” and “negative emissions” are widely used in policies and pledges but are misleading frameworks. They prioritize future carbon removal over immediate emission reductions, allowing continued fossil fuel use.⁹ Many net-zero pathways rely on land-intensive interventions such as plantations, soil carbon schemes, or BECCS, giving the illusion of climate neutrality. What is needed is Real Zero, not Net Zero, to achieve genuine emission cuts.

CLIMATE INTERVENTION & CLIMATE RESTORATION

The term “climate intervention” is increasingly used to rebrand geoengineering, normalizing risky technologies and reducing public resistance. By framing speculative and uncertain interventions as pragmatic solutions, this discourse dangerously present high-risk technological fixes as responsible climate action; rather than acknowledging their experimental nature and the increasing evidence of their harmful and potentially irreversible impacts.



8. <https://www.ienearth.org/nature-based-solutions/>

9. <https://corporateaccountability.org/resources/the-big-con-net-zero/>

RESISTANCE AGAINST LAND-BASED GEOENGINEERING PROJECTS

RESISTANCE TO DRAX BECCS

Civil society groups, notably Biofuelwatch, have **strongly opposed**¹⁰ the large-scale deployment of Bioenergy with Carbon Capture and Storage (BECCS), particularly by companies like Drax Group. Biofuelwatch tried to **challenge the UK government in the High Court**¹¹ over its approval of carbon capture installation at Drax Power Station, arguing that environmental impacts were not lawfully assessed and that treating biomass combustion as zero-emissions was misleading. They warned that Drax's BECCS project could drive further forest destruction, highlighting concerns over unproven carbon-capture technology and reliance on imported wood pellets. Broader civil society coalitions also **issued a joint statement**¹² cautioning against funding BECCS at Drax, citing serious land-use and biodiversity risks and the likelihood that the project would fail to deliver genuine negative emissions.

CAMPAIGN TO STOP GE TREES

Silicon Valley startup Living Carbon is experimenting with enhanced photosynthesis in poplar trees. A **2022 study**¹³ claimed these genetically engineered (GE) trees grew up to 53% faster than non-engineered counterparts in controlled greenhouse settings, though many geneticists criticised **the study as premature**¹⁴. Field trial results from 2023 remain unpublished. Living Carbon is also engineering rot-resistant trees to achieve "more permanent carbon storage," a plan met with skepticism at a 2024 tree biotechnology conference, as decomposition is critical for forest ecosystem health.

The company has received investments from Toyota and Microsoft to develop future carbon offsets from these unproven GE trees. Living Carbon **envisions vast plantations**¹⁵ on "degraded land," aiming to mimic Carboniferous-era

carbon storage by slowing biomass decomposition over millennia. Similarly, Suzano Pulp in Brazil has government approval to cultivate GE eucalyptus trees that are herbicide-tolerant, insect-resistant, and easier to process. Microsoft and Apple plan to **use these plantations, including potential GE trees, as carbon offsets**¹⁶ for electricity demand from data centers. Despite claims of using "degraded land," the plantations often occupy former Amazon rainforest, Mata Atlantica, or Cerrado lands, with carbon emissions from this deforestation excluded from offsets, illustrating a clear false solution to climate change.

APERAM BIOENERGIA'S BIOCHAR PRODUCTION

Aperam South America, a major Brazilian steelmaker, produces charcoal from extensive eucalyptus plantations to fuel its blast furnaces. Capitalizing on carbon removal credits, Aperam has rebranded some of this charcoal as biochar, spreading it on plantation sites rather than burning it. It is currently one of the largest CDR project globally in terms of "tonnes of removals delivered" and **recently received a \$250 million USD loan with support from the International Finance Corporation** to¹⁷ expand thousands of hectares of new eucalyptus plantations.

Aperam's more than 100,000 hectares of plantations are concentrated in the Jequitinhonha Valley in the Brazilian state of Minas Gerais, and many communities are literally surrounded by eucalyptus plantations, which has dried up water sources and fundamentally changed how traditional peoples live their lives. A **podcast on the issue**¹⁸ was published on International Day of Action Against Big Biomass based on an investigation into the company being led by the Global Forest Coalition.

10. <https://www.biofuelwatch.org.uk/2023/biofuelwatches-objections-to-draxs-beccs-application/>

11. <https://www.biofuelwatch.org.uk/2024/biofuelwatch-issues-legal-challenge-to-decision-to-allow-carbon-capture-installation-at-drax-power-plant/>

12. <https://www.biofuelwatch.org.uk/2021/uk-beccs-ngo-statement/>

13. <https://www.livingcarbon.com/post/photosynthesis-enhanced-trees-grow-faster-and-capture-more-carbon>

14. <https://www.nytimes.com/2023/02/16/science/genetically-modified-trees-living-carbon.html>

15. <https://www.livingcarbon.com/post/how-the-first-trees-nearly-froze-the-earth>

16. <https://www.geoengineeringmonitor.org/brazils-ge-eucalyptus-boom>

17. <https://bankinformationcenter.org/en-us/project/aperam-brazil/>

18. <https://www.youtube.com/watch?v=vOilAMAJV0g&t=5s>

ADVOCACY IN POLICY SPACES

THE UN'S CLIMATE CONVENTION

Civil society campaigns have struggled to prevent the inclusion of false climate solutions in the UN's climate convention (UNFCCC). Geoengineering and fossil fuel lobbyists, among others, have sought to influence these talks, which should focus on real, rights-based solutions that address root causes of climate change rather than masking emissions. **CDR technologies are increasingly referenced in countries' Nationally Determined Contributions (NDCs)¹⁹**, the Global Stocktake, and Paris Agreement's Articles 6.2 and 6.4 on carbon trading.

Following years of negotiations, carbon markets under Article 6.4 of the Paris Agreement were operationalized at COP29, potentially normalizing large-scale CDR. Unsurprisingly, **in 2025, more than 1,600 fossil fuel lobbyists²⁰** were granted access to the UNFCCC COP30 in Belém, along with **531 Carbon Capture and Storage lobbyists²¹**. There were also **at least 20 events in pavilions²²** and side events dealing with or promoting different types of geoengineering, including an entire pavilion dedicated to CDR.

Despite this, civil society continues to resist carbon markets as false solutions, highlighting the risks of relying on speculative carbon removal.

HOLDING THE IPCC ACCOUNTABLE

Geoengineering has been referenced in IPCC reports since the Second Assessment Report (1995), and its coverage has grown alongside the scientific literature. The **IPCC's 5th Assessment Report (AR5)²⁴** relied heavily on CDR in its mitigation scenarios, particularly BECCS, **whereas the 6th Assessment Report (AR6)²⁵** did caution against reliance on large-scale CDR and overshoot pathways.

Assuming massive deployment of CDR later in the century to compensate for continued emissions is highly problematic. This speculative modelling creates a false sense of flexibility in carbon budgets and delays emissions reductions. The impacts of these interventions on land use, rights and ecosystems are frequently under-represented, favouring technocratic solutions over systemic change. Analysis by CIEL and the Heinrich Böll Foundation in **Beyond the Limits²⁶**, **IPCC Unsummarized²⁷**, and **Lost in Translation²⁸** provides critical insights into the IPCC's scenarios.

Read more about CDR, carbon markets and NbS at COP30 at: <https://www.geoengineeringmonitor.org/cdr-at-cop30>

CARBON MARKETS AND LAND-BASED GEOENGINEERING

Carbon markets and geoengineering offset projects are often promoted as climate solutions but rarely deliver real benefits. **A 2023 investigation into Verra, the world's largest carbon credit certifier, found that over 90% of rainforest carbon credits²³** likely did not represent real emission reductions, exposing fundamental flaws in the carbon market system and reinforcing concerns that offsets delay genuine emissions reductions.

19. <https://www.wri.org/insights/carbon-removal-countries-climate-goals>

20. <https://www.theguardian.com/environment/2025/nov/14/fossil-fuel-lobbyists-cop30>

21. <https://www.ciel.org/news/531-carbon-capture-and-storage-lobbyists-gained-access-to-cop30-climate-talks/>

22. <https://handsoffmotherearth.org/resources/press-release-home-alliance-slams-cop30-captured-by-carbon-markets-and-illusionary-fixes-like-geoengineering/>

23. <https://www.theguardian.com/environment/2023/jan/18/revealed-forest-carbon-offsets-biggest-provider-worthless-verra-aoe>

24. <https://www.ipcc.ch/assessment-report/ar5/>

25. <https://www.ipcc.ch/assessment-report/ar6/>

26. <https://za.boell.org/en/2022/03/01/ciel-hbf-beyond-limits>

27. <https://www.ciel.org/reports/ipcc-wg3-briefing/>

28. <https://www.ciel.org/reports/lost-in-translation-lessons-from-the-ipcc-sixth-assessment/>

TRACKING LAND-BASED GEOENGINEERING DEVELOPMENTS

SUMMIT CARBON SOLUTIONS, USA

In 2023, Absolute Energy partnered with Summit Carbon Solutions on a major BECCS project linked to Iowa ethanol plants. The proposed “Midwest Carbon Express” would transport captured CO₂ via a 2,000-mile pipeline network from dozens of plants to North Dakota for underground storage.

(<https://map.geoengineeringmonitor.org/ggr/summit-carbon-solutions-absolute-energy's-saint-ansgar-plant>)

STOCKHOLM EXERGI, SWEDEN

This Swedish energy company has commissioned a BECCS project at an existing biomass power station that involves transporting the captured CO₂ by ship for underground injection into geological formations beneath the North Sea.

(<https://map.geoengineeringmonitor.org/ggr/stockholm-exergi-beccs-project>)

EXOMAD GREEN, BOLIVIA

Exomad SRL is a leading Bolivian exporter of tropical hardwood sawn timber and veneers. The company established Exomad Green, a subsidiary that has grown to become a leading seller of biochar-based carbon credits and now operates three biochar plants.

(<https://map.geoengineeringmonitor.org/ggr/exomad-green>)

APERAM BIOENERGIA, BRAZIL

Aperam South America is a major “green” steel producer and one of the world’s largest charcoal producers, using extensive eucalyptus plantations. As biochar has gained prominence as a CDR technology it has also started selling carbon removal credits.

(<https://map.geoengineeringmonitor.org/ggr/aperam-bioenergia-ltd>)

FS LUCAS DO RIO VERDE, BRAZIL

FS has announced plans to implement a BECCS project at its Lucas do Rio Verde corn-to-ethanol refinery in the Brazilian state of Mato Grosso. The plant is fuelled mainly by biomass from eucalyptus plantations, and the company plans to expand BECCS to its other refineries.

(<https://map.geoengineeringmonitor.org/ggr/fs-lucas-do-rio-verde-beccs-project>)

Land-based geoengineering developments and screenshot from Geoengineering Map, an interactive world map on geoengineering, prepared by ETC Group and the Heinrich Boell Foundation. Explore the map at: map.geoengineeringmonitor.org

CARBFIX, ICELAND

Carbfix's direct air capture technology, developed in Iceland by four partners, captures CO₂ by dissolving it in water and injecting it into basalt formations at depths of 400 to 800m with the aim of storing the gases in mineral form in the rock.

(<https://map.geoengineeringmonitor.org/other/carbfix-carbfix-2-projects>)

DRAX, UK

Drax Group proposed a BECCS project at its Drax power station, the world's largest biomass plant. As Biofuelwatch had warned, this appears to have been a ruse to get further subsidies. As soon as the government approved huge new subsidies into the 2030s, Drax announced that it would suspend BECCS investments.

(<https://map.geoengineeringmonitor.org/ggr/drax-power-station>)

ALT CARBON, INDIA

In 2024, the company initiated an enhanced weathering project, applying basalt to tea farms and other fields and, one year later, inaugurated its first biochar plant, in Nobojagoron, West Bengal.

(<https://map.geoengineeringmonitor.org/ggr/alt-carbon-tech-ltd>)

VARAHA, INDIA

This Indian company sells carbon credits generated in various ways, including biochar and enhanced weathering projects, and plans to massively scale up its operations.

(<https://map.geoengineeringmonitor.org/ggr/varaha-climate-ag-pvt-ltd>)

PYROCCS BIOCHAR, NAMIBIA

PyroCCS GmbH, which is headquartered in Germany, commissions biochar projects in the Global South with the aim of selling biochar and carbon credits. PyroCCS Namibia was established in 2022 to lease land from farmers and build and operate pyrolysis plants.

(<https://map.geoengineeringmonitor.org/ggr/pyroccs-gmbh>)

HOME MANIFESTO AGAINST GEOENGINEERING

The Hands Off Mother Earth (HOME) Alliance is a diverse alliance of civil society groups, including Indigenous Peoples' organizations, frontline communities, and organizations focused on human rights, climate justice, gender justice, and Indigenous Peoples' rights, working together to reject all forms of geoengineering.

In light of new political and in-the-field developments and the worsening of the climate crisis and its impacts, we've revisited and revised the 2018 Manifesto and our demands to reflect these changing and urgent realities, and we are sending a clear message: we will not allow geoengineering to hijack our future!

The revised HOME Manifesto is a renewed collective statement rejecting false solutions, opposing the dangerous distraction of geoengineering to the climate crisis and reaffirming our commitment to real, transformative, rights-based, and gender-just solutions to the climate crisis.

Our home, lands, oceans, and sky are not a laboratory for risky and manipulative planetary-scale technologies. We will not allow geoengineers, corporations, and governments to gamble with the planet.



Stand with us and endorse the manifesto against geoengineering!

Learn more at

<https://handsoffmotherearth.org/manifesto/>

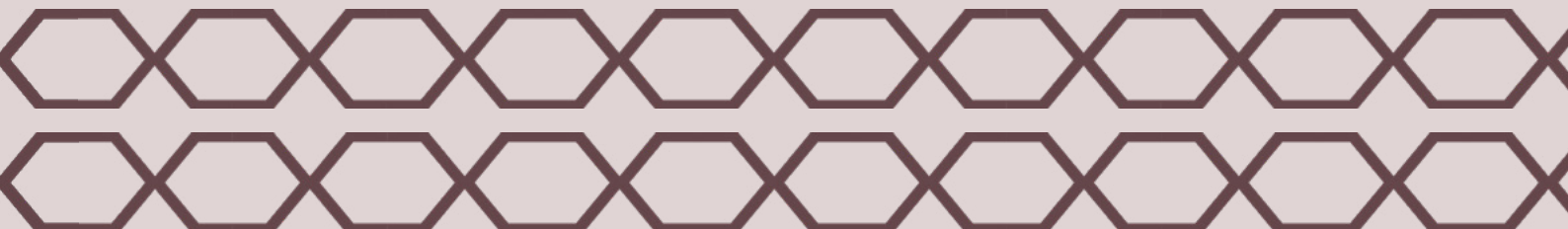


USEFUL RESOURCES

- ▶ **A Leap in the Dark: The Dangers of Bioenergy with Carbon Capture and Storage (BECCS)** (https://www.foei.org/wp-content/uploads/2021/01/Friends-of-the-Earth-International_BECCS_English.pdf)
- ▶ **Forest Cover 61: Our Nature is Not Your Solution** (<https://globalforestcoalition.org/wp-content/uploads/2020/05/forestcover-61-EN.pdf>)
- ▶ **The Big Con: How Big Polluters are advancing a “net zero” climate agenda to delay, deceive, and deny** (<https://corporateaccountability.org/resources/the-big-con-net-zero/>)
- ▶ **Hoodwinked in the hothouse. Resist false solutions to climate change** (<https://climatefalsesolutions.org/#pdf>)
- ▶ **Technology briefings in Geoengineering Monitor** provide an overview of each technology, the actors involved, and its impacts (<https://www.geoengineeringmonitor.org/briefings>)
- ▶ **This interactive Geoengineering Map** (map.geoengineeringmonitor.org) reveals the alarming expansion of geoengineering research and experimentation.
- ▶ **Read more on carbon markets and net zero** (<https://www.foei.org/publication/chasing-unicorns-carbon-markets-net-zero/>)

WHAT CAN YOU DO TO SUPPORT?

- ▶ **Keep learning more about geoengineering and following its developments to build a critical view.**
- ▶ **Include the rejection of geoengineering and resistance work in your campaigns.**
- ▶ **Share this toolkit in your networks! Geoengineers often erase and trivialise critical civil society perspectives.**
- ▶ **Follow-up on social media (LinkedIn, Bluesky, YouTube and Facebook) to stay up-to-date and support us!**
- ▶ **Endorse the HOME Alliance Manifesto against geoengineering** (<https://handsoffmotherearth.org/manifesto/>)







CONNECT WITH US


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FOLLOW US

 [handsoffmotherearth.org](https://twitter.com/handsoffmotherearth.org)

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 [@HomeAlliance_](https://twitter.com/HomeAlliance_)

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