
# THE GEOENGINEERING GAMBLE: WHEN SKY IS NO LONGER THE LIMIT

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**EPISODE 39 - ft. Hans van der Loo, CEO of the Blue Cooling Initiative**

Every so often, a bold new climate solution emerges - hailed as the answer to humanity's looming environmental crisis. From carbon capture and storage (CCS) technologies to nature-based solutions, these innovations offer hope. But one of the most provocative - and polarizing - is geoengineering.

Unlike traditional mitigation strategies, geoengineering doesn't aim to address the root causes of climate change. Instead, it proposes fixing the climate at a planetary scale, either by cooling the planet through the injection of particles into the stratosphere or fertilizing oceans.

So what happens when humanity decides to directly hack the sky ? Is this a Faustian pact for short-term gains, with long-term climate catastrophe waiting to unfold?

In this episode of 2050 Investors, host Kokou Agbo-Bloua dives deep into the world of geoengineering - what it is, what it isn't, and why it's so controversial. From ancient examples of human attempts to manipulate nature to cutting-edge techniques such as Carbon Dioxide

Removal and Marine Cloud Brightening (MCB), Kokou explores the fine line between innovation and interference. He also examines the profound ethical, environmental and political questions that geoengineering raises, and whether these might encourage individuals and governments to become complacent.

To help unpack these complexities, Kokou is joined by Hans van der Loo, chairman of the Institute for Integrated Economic Research and CEO of the Blue Cooling Initiative, which focuses on MCB. Together, they explore the future of geoengineering in an age of rapid technological advancement - where AI and data science may improve precision but can't eliminate uncertainty. Hans argues that geoengineering may be one of humanity's best remaining options to buy much-needed time - but only if it is done responsibly.


**2050 INVESTORS – EPISODE 39 SCRIPT**

**The Geoengineering Gamble: When Sky Is No Longer the Limit (ft. Hans van der Loo)**

“Breaking news! Unprecedented climate disasters are unfolding worldwide. Massive storms have engulfed coastal cities, and temperatures are plummeting to record lows in the tropics. Emergency services are overwhelmed. Authorities suspect… geoengineering may be to blame…We'll be right back after this short break”

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Kokou: Siri, this is bad. Really bad. We need to keep mooovvviiiing. Watch out!

Kokou (breathless): Siri, what’s happening?!

Siri: Oh, you know… just humanity’s latest bright idea turning the planet into a live-action remake of The Day After Tomorrow.

Kokou: That’s not funny, Siri. The world is literally falling apart. This can’t be real! Geoengineering was supposed to save the climate, not destroy it!

Siri: Yeah, funny how that works. Turns out spraying sulphur into the sky and fiddling with the clouds is less like tuning a thermostat… and more like tossing fuel to a campfire.

Kokou: Was that a satellite falling from the sky?! Holy cow! We’ve triggered a climate cascade! The atmosphere’s spinning out of control!

Siri: Well, I’ll send a thank-you card to the scientists who thought ‘hacking the sky’ was a fun weekend project!

Kokou: Siri, how come you are so calm and sarcastic? We're trapped!

Siri: Relax, Kokou. it's just a dream….

Kokou: Wait.. Wha…? Ow… what the…? That… looked so real!

Siri: Yep. Your subconscious is reminding you that humanity's habit of breaking things and assuming they can fix them later is getting a little out of hand.

Kokou: Alright, let's explore how we can prevent this from becoming our future.
Welcome to 2050 Investors, the podcast that deciphers economic and market mega-trends to meet tomorrow's challenges. I'm Kokou Agbo-Bloua, I head up Economics, Cross-asset, and Quant Research at Societe Generale.

In this episode of "2050 Investors," we explore how humans have shaped and transformed the geosphere, biosphere, atmosphere, and hydrosphere over the course of history. We examine the myths and realities of geoengineering: its feasibility, associated risks, and whether human ingenuity can effectively cool the planet without provoking nature's wrath.

Further in this episode, we will interview Hans van der Loo, Chairman of the Advisory Board at the Institute for Integrated Economic Research. He's also the CEO of the Blue Cooling Initiative, which focuses on Marine Cloud Brightening, aka MCB, to mitigate global warming. Hans will share his take on cloud brightening and explain why geoengineering is not a perfect solution, but rather a crucial step to buy humanity time to tackle climate change.

Let's start our investigation.

Kokou: Okay, Siri, geoengineering in its etymological sense isn't new. In fact, humans have been reshaping the planet for millennia.

Siri: Sure. You've been playing with Earth's systems since the Stone Age.

Kokou: I wouldn't necessarily say "playing", but sure. It began with agriculture, moving soil, redirecting water, and creating canals to grow food. Early civilizations engineered landscapes to meet their needs.

Siri: From earlier feats like the Pyramids, the Great Wall of China to the now massive Skyscrapers in Dubai.

Kokou: Consider Amsterdam, a city that exists only because humans pushed back the sea. Or Dubai's Palm Islands, literally re-sculpting the coastline for luxury villas.

Siri: Right, because nothing says 'We're masters of nature' like shaping the desert into a palm tree visible from space.

Kokou: But this time, it's different. Geoengineering isn't about aesthetics, it may be about survival. I found this article from NASA, entitled "Just 5 questions: Hacking the planet", it's very enlightening. It's an interview with Riley Duren, a systems engineer at NASA's Jet Propulsion Laboratory known for robotic space exploration.

Siri: So what is geoengineering?
Kokou: In a nutshell, Riley explains that: “Geoengineering is an attempt to avoid or reduce the negative consequences of climate change by directly altering parts of the Earth’s natural system. It’s different from “mitigation” efforts, where people try to reduce emissions of [heat-trapping] greenhouse gases or preserve natural carbon-dioxide storage or removal mechanisms like forests. It’s also distinct from “adaptation,” which involves dealing with the impacts of climate change”

Siri: “Yeah, ‘survival.’ Or as I call it… humanity’s favorite excuse for last-minute panic solutions.

Kokou: You have a point because, as Riley adds: “Geoengineering is not a cure. At best, it’s a Band-Aid or tourniquet; at worst, it could be a self-inflicted wound”.

Siri: Ok. We got the answer then. We should end this episode now. Thank you for listening to us, dear listeners!

Kokou: Hold on, Siri. Not so fast.
There is another angle worth considering. Remember this quote by Hungarian physiologist, Albert Szent-Györgyi. “Research is to see what everybody else has seen, and to think what nobody else has thought.“ ?

Siri: Okay okay, I’m listening…

Kokou: While it may not be the solution to climate change, geoengineering could buy us time by slowing the effects of global warming. The latest IPCC report says we are on track to 3 degrees of global warming by the end of the century. Global GHG emissions continue to reach new highs, surpassing 54 gigatonnes of CO2 equivalent each year. To meet net zero by 2050, we’re supposed to halve this amount by 2030… in, hum… 5 years.

Siri: Should we call Tom Cruise? This feels like “Mission Impossible”… pun intended!
Kokou: Funny. We’ve barely scratched the surface, so let’s go a bit further into geoengineering, shall we?
Siri: Sure… after all, duct tape might stop a dam from leaking. For a while.

Kokou: Cynical as always, Siri. There are thousands of quite technical articles on this topic but for our mental sanity’s sake, let me quickly summarise in simple terms the four key geoengineering solutions with their pros and cons.

Siri: I like it. To quote Leonardo da Vinci “Simplicity is the ultimate sophistication”

Kokou: First up, Solar Radiation Management or SRM.
SRM works by injecting reflective particles into the stratosphere to deflect sunlight. The objective is to increase the amount of sunlight that is reflected away from Earth and back to space.
This method is fast-acting and powerful, as it mimics the cooling effect seen after volcanic eruptions.
But doing this, of course, could alter weather patterns, cause droughts, and destabilize entire ecosystems.

Siri: Basically, sunglasses for Earth… except you forgot the ‘returns’ policy if they break.

Kokou: Pretty much. Our second solution is Carbon Dioxide Removal or CDR
Air Capture machines basically extract $CO_2$ directly from the atmosphere.
This allows us to tackle the root cause of climate change – excess carbon dioxide.
But it's quite expensive, slow, and requires massive energy. Imagine vacuuming the whole sky one dust speck at a time. Remember, the concentration of CO2 in the atmosphere is about 400 parts per million or 0.04%.

Siri: So… build thousands of sky vacuums? Sounds exhausting and I don't even have lungs.

Kokou: Poor you. Then we have our third lead, which is ocean fertilization.
To fertilize the ocean, we will need to add iron to the ocean, to trigger plankton blooms, which absorbs CO2.
As a strategy it's simple and effective – at least in theory.
The downside is that it could backfire, by triggering toxic algae blooms and suffocating marine ecosystems.

Siri: Hum… that would be a scary scenario

Kokou: Sure is. This brings us to the Fourth solution scientists are investigating: Cloud Brightening
Cloud Brightening requires spraying saltwater into clouds to make them brighter and more reflective. The advantage here is that it is localized and less risky.
This is, however, temporary and still experimental. Cloud brightening is like hairspray for the sky, great hold, but hardly a long term solution.

Siri: This reminds me of typical drug ads with a short list of benefits but a long list of side effects.

Kokou: Exactly. It's not just about what's technically possible—it's about what's ethically acceptable. Geoengineering may give us incredible power, but are we truly ready to wield it responsibly?
Here's how David Schurman, in his TED Talk entitled "We can control climate, but should we? The ethics of geoengineering", puts it:
"The point of engineering is designing or improving something for human benefit. And so with this climate engineering thing we can cool the planet sure but why not increase rainfall to help grow our crops or make certain regions more temperate and comfortable to live in. But while it may be tempting to turn the entire world into Palm Springs, we need to keep in mind that if we approach geoengineering with this mindset, we're implying that the earth is just another thing that humans have the right to dominate and while we may act like gods, we must remember that our power is bounded by our limitations, our arrogance and the gaps in our understanding."

Kokou: This is the real dilemma. Geoengineering might offer a lifeline—but it could also deepen the very mindset that got us here in the first place. And what if we get it wrong? We're not just talking about tech glitches—we're talking droughts, monsoons, or even geopolitical conflict over who controls the climate.

Siri: This is literally the definition of the butterfly effect…

Kokou: And there's another risk that's less about technology—and more about psychology. It's called 'moral hazard.' If geoengineering becomes a fallback plan, do we risk treating it like a license to keep polluting now, assuming we can clean it up later?
Siri: Like skipping exercise because you think you'll just get liposuction later. Not exactly sustainable.

Kokou: Exactly. Geoengineering might buy time, but it can't replace cutting emissions and restoring ecosystems. If it becomes an excuse to delay hard choices, we risk locking ourselves into a dangerous dependency—patching symptoms instead of curing the disease.

Siri: Back to our duct tape on a leaky dam—eventually, it's going to burst.

Kokou: And that's the real danger—complacency. Like Icarus flying too close to the sun, we might be tempted by the power of these technologies, only to be undone by our overconfidence. This also brings to mind the Faustian bargain, where one sacrifices ethics and morals for short-term benefits resulting in…

Siri: …Short term gains but long term pain and eternal damnation.

Kokou: You read my mind, Siri. Ok. Right now, geoengineering is still in its infancy. But what happens if, in 10 or 20 years, advances in AI and data science could enable us to safely master these technologies? Considering we're on a highway to hell with significant warming of 3 to 4 degree Celsius by the end of the century, we might have limited options. Could we manage the planet's climate with precision—or would we be playing with fire?
And what if humanity's future isn't just Earth? What if we go interstellar? Do you remember the Kardashev Scale?

Siri: Yes, but let's explain it for our audience.

Kokou: Very thoughtful, Siri. The Kardashev Scale is a method of measuring a civilization's level of technological advancement based on its ability to harness and use energy. It was proposed by the Russian astrophysicist Nikolai Kardashev in 1964.
Right now, we are currently a Type I civilization, harnessing energy available on our home planet using fossils, solar, wind, geothermal, nuclear, etc... If we become a Type II civilization, we could harness the total energy output of our star, potentially constructing structures like a Dyson Sphere around the Sun.
A Type III civilization, for example, would be capable of controlling energy on the scale of its entire galaxy, managing the energy output of billions of stars.

Siri: So, space colonies could be our backup plan? I believe you've been watching too many sci-fi movies!

Kokou: Well, it was about being ambitious and thinking big. Remember the saying by author Norman Vincent Peale: "Shoot for the moon. Even if you miss, you'll land among the stars"?

Siri: Yes I remember. But maybe you should first stop setting your primary residence on fire…

Kokou: Touche! I guess the answer to my initial questions is that these are not quick fixes. It's about reducing emissions, restoring ecosystems, and most importantly changing behavior.

Siri: Indeed, because even if you build a Mars colony, you'll just end up wrecking that too.

Kokou: Siri, this is a perfect segway to bring on our guest, Hans van der Loo.
Hans has had a distinguished career in the energy sector and is a prominent advocate for innovative climate solutions. He serves as the Chairman of the Advisory Board at the Institute for Integrated Economic Research and he's also the CEO of the Blue Cooling Initiative, which focuses on Marine Cloud Brightening to mitigate global warming.

Kokou
Hans, thank you so much for joining the show.

Hans
Well, thanks, Kokou, for having me on this show. This is a very important topic, so I'm very glad to have the opportunity to explain something that is not seen by many people yet, but yet is of existential importance to all of us.

Kokou
Let's kick off. To set the scene, can you first elaborate on the Blue Cooling Initiative, approach to Marine Cloud Brightening, which is one of the major solutions for geo-engineering, and also focus on its potential role in climate mitigation?

Hans
Yeah, sure. Happy to do that. I think it's important that we see some context here, and that actually goes back quite a while. In 1992, there was the famous Rio Earth Summit. So we agreed the UNF, CCC, the United Nations Framework Convention on Climate Change. We also agreed the COP process, and above all, we agreed that we would reduce anthropogenic emissions then at 20 gigatons per annum. However, by 2019, we had actually doubled emissions to over 40 gigatons per annum, and so the cumulative overshoot over that 30-period was very significant consequences. Now, what was still possible in 1992, had we done what we agreed to do, but some 29 COPs meetings later, it is no longer possible to treat the challenge in the same way that we could have 30 years ago, and that's where Blue Cooling comes in. Because since the challenge has become much bigger and can no longer be met by measures and actions that would have been sufficient 30 years ago, we now, in addition to mitigation and adaptation, which are still indispensable, but they are no longer enough. So, in a way, in a metaphor, Kokou, if you keep digging and you're now in a deeper pit, then the two letters you had are no longer long enough to get out of the predicament.

Due to the inertia of climate as a complex adaptive system, even if we take the measures we should have taken long ago, if we take them now, this will not bring immediate results, it's like a big container ship. It will run for many, many more miles after you switch off the engines. That's inertia. So, our apathy, our negligence, our lack of actions has now locked in a dangerous overshoot into hothouse Earth conditions. And whilst we still need to reduce emissions and even remove past emissions, days will both react too slow to stay within a safe zone. And that is why, in addition to reduce and remove, we also need "Repair". And so the Blue Cooling Initiative or the Direct Climate Cooling Initiative is action that is needed to actively lower the temperature by managing the incoming solar radiation. And we can do that with a biomimicry forma of albedo enhancement, the reflectivity enhancement called Marine Cloud Brightening. And so, you

specifically ask for the role. So, the role of MCB is to buy time for the structural measures to have effect.

Because of the inertia, as I said, of climate as a complex adapter systems, measures need time to have effect. And MCB gives that time or buys the time. It's a little bit Kokou like stabilising the fever symptom of a patient first before you start operating, tackling the cause. It is the fire extinguisher action to douse the fire before you go into the house to renovate or refurbish it.

Kokou
Brilliant. I love the metaphor, and it does make intuitive sense. What are the primary scientific and technical challenges currently facing the implementation of Marine Cloud brightening?

Hans
Well, these exist, of course, as well. Although what I am always gobsmacked by the fact that the scientists that I talk with now, the basic principles were already discovered in the '70s and the '80s. We're now nearly half a century later. But specifically, to your question, the insight that clouds can be brightened by a biomimicry method of nebulising sea water, because that's basically the mechanism with which we do it, so that the rising salt particles break up the larger droplets in dark clouds into more smaller droplets that actually enhance the reflectivity of the clouds. And so the challenges on a technical point are, of course, first of all, the delivery of the salt particles. I mean, you can do that with high pressure nozzles, you can do vibration tables, you can do it by injecting sea water into the chimney stack of ships. All these need to be tested also in view of the economics, because it's funnily enough, it's buying more time for our lives, but nevertheless, we want this to be done cheaply or at least economically. So, the other question is, do we do this with a dedicated fleet of ships, or do we do it on existing ships who, of course, will not deviate from the route, so it limits you a little bit there, but it would be a more economic way to do it.

At this moment in time, Kokou, laboratory testing is going on in Cambridge, in Delft University, Washington State University, and some small-scale testing is happening at this moment over the Great Barrier Reef, which, as you know, is the largest coral reef system in the world. And by the way, I'm a scuba diver. It's not dead material. It's like a huge living colony. And if we would lose the biggest coral reef system in the world, that will have huge implications for all other living beings on this world.

Kokou
It seems we're making quite a lot of progress. So that leads me to the third question. What governance structures do you believe are necessary to oversee the research and potential deployment, as you discussed, of geoengineering technologies?

Hans
Basically, we have been geo engineering in the wrong warming way for many years, and we are now proposing, and we put ourselves at risk doing that. So what we are proposing is merely to direct a very benign form of cloud engineering in the correct cooling direction instead of the wrong warming direction. To undo some of the uncontrollable geo engineering that we've been perpetrating for the past 200 years with a very controlled countermeasure because with MCB, we can control, one, the rate of cooling, two, the duration of the cooling, and three, the location of the cooling in ways that no other SRM, Solar Radiation Modification, method can do, and we push for this one because it is benign and it is controllable.

There are others, but they're neither benign and they're not controllable in the same way either.

Kokou
Yeah, that makes perfect sense. I think you mentioned that briefly, how do you respond to critics who argue that geo-engineering and some of the technology you mentioned could detract from efforts to reduce greenhouse gas emissions in the first place. You've argued that we're running out of time, so we need to buy ourselves some time. But don't you think that it could create bad incentives and reinforce bad habits?

Hans
The other question I would put there is, do you think that the availability of car insurance makes people drive more recklessly? That's basically a comparison. I think that what will happen... So yes, that instinct will be there. There will be people that say, “Oh, we don't have to do it because we got another solution.” But the nonlinear worsening of the framework conditions for you and mankind will make it increasingly clear we are now in an all hands on deck situation. Ideally, and this is an important point, Kokou, ideally, we would want to have a supranational governance as well for the deployment as well as for the research. But sadly, the very process I just described, the 1992 Rio Earth Summit, where we agreed to reduce emissions and then go on to double them, well, that all happened under this fantastic supranational governance that's called the United Nations.

So the problem is that if we wait too long in sorting out the governance, and I would really want that, but it may get too late for already to save the framework conditions that humans need to thrive. So a likely scenario is that a government under stress that has also the means and the money may simply start doing this, triggering both support and process of others. And it is likely in practice that the governance for this will be built whilst we're on the way. Now, I know this is a little bit like building a plane whilst flying, but I'm afraid that is probably what we'll do because I think it was Churchill who once said about the United States, "The United States can always be relied to do the right thing, but only after having tried all other alternatives first".

Kokou
I love this quote. This is a brilliant transition for the last question. As we look into the future, how do you see the world in 2050 when it comes to climate change? Will we have found a way to buy ourselves some time, thanks to geo-engineering, without blowing things up, or would it be too little, too late, and we'll have to spend a lot more time on adaptation?

Hans
Well, I'm afraid the whole spectrum applies because we already have, for a large extent, found a solution. We're now grappling on refining it, making it economic, and most of all, getting the agreement that we are going to do this. Precisely for your earlier question, the advent of this method, will that not take back the effort that we have to do on adaptation and mitigation. The message is very simple:. We have to reduce, remove, and repair. It doesn't matter which one you don't do. If any one of those three you don't do, we will not make it.
This is perhaps an interesting final point, is that the IPCC forecast scenarios call net zero by 2050, which is what all policymakers work on. So net zero means that you will actually take out as much CO2 as we still release in the atmosphere. If both are equally big, then it's net zero. They say net zero by 2050 is needed for one and a half to two degrees warming, but they call that highly optimistic. Now, that is diplomatic language for will not happen. So in fact, their middle-ground scenario only sees net zero happening next century. That is only the point where it stops getting

worse. After that, we need the inertia time to make it go better. And so that means three and a half degrees climate change. Then we're clearly into hothouse Earth conditions. And that is why direct climate cooling is not an option but a must.

Kokou
I think we can end on this excellent thought. I really like the Reduce, Remove, Repair as a conclusion. Hans, this was brilliant. Thanks for your insight. I also love your quotes. I'm a big fan of quotes as well. This was incredibly insightful. Thank you for your time.

Hans
Thank you. You're welcome!

Siri: Alright, Kokou, shall we end this episode with something inspiring?

Kokou: Of course! Carl Sagan once said and I love this quote, "We are a way for the universe to know itself.'

Siri: Maybe that's the point, not to control nature… but to respect it.

Kokou: I like that.

Thank you for listening to this episode of 2050 Investors and thanks to Hans van der Loo for his invaluable insights. I hope this episode has helped you get a sense of the facts, opportunities and risks of geoengineering. You can find the show on your regular streaming apps. If you enjoyed the show, help us spread the word! Please take a minute to subscribe, review and rate it on Spotify or Apple Podcasts.

See you at the next episode!