GREEN
EUROPEAN
JOURNAL

A Feminist Approach to Solar Geoengineering

Article by Anni Pokela
June 24, 2026

Solar geoengineering is no silver bullet against the climate crisis, but rejecting it categorically in the name of preserving the planet overlooks our entanglement with the atmosphere. Drawing on feminist neo-materialism, Anni Pokela proposes a different approach: purposeful, accountable participation in atmospheric becoming from within the relationship.

“It surrounds us, penetrates us, and we are barely aware of it.” As philosopher Emanuele Coccia writes in *The Life of Plants* (2018), the atmosphere is our first world – “the sphere of breath, the medium in which everything that lives is wholly immersed.” And it is changing at an accelerating pace.

The latest assessment by climate scientist James Hansen and colleagues shows that the pace of global warming has accelerated from 0.18 to 0.27 degrees Celsius per decade – over 50 per cent faster than the average between 1970 and 2010. The researchers estimate that we will cross the 2-degree threshold by 2045.

In this context, it makes sense that a growing number of actors have begun considering emergency measures such as solar radiation geoengineering: the idea of deliberately injecting reflective particles into the stratosphere to cool the planet by deflecting some of the Sun’s radiation back into space.

For many environmentalists and ecofeminists, the very concept is an affront: a masculinist, technocratic fantasy that treats the Earth as a machine to be tuned rather than a living system to be respected. The instinct is often to reject it categorically.

I understand that instinct, because I have felt it myself. But I have come to believe that categorical rejection is neither the most responsible nor the most fruitful position available to us.

The debate as it stands

Solar radiation modification (SRM), most commonly discussed in the form of stratospheric aerosol injection (SAI), has been modelled and theorised for over 50 years. The idea is inspired by what volcanoes do naturally: when Mount Tambora, on the island of Sumbawa in present-day Indonesia, erupted in 1815, the massive cloud of particles it released cooled the global climate by roughly one degree Celsius for years. SAI would attempt something similar by design – aircraft or high-altitude balloons releasing reflective particles into the stratosphere to create a partial sunshade – only with less sulfur, or even potentially a less toxic, more bio-based particle.

SRM does not remove carbon dioxide from the atmosphere, and it does not address the root cause of climate change. It is, at best, a temporary response that could buy time while the deeper, structural work of decarbonisation continues. Yet, the attention it receives is growing, driven by an uncomfortable reality: we are running out of that very time.

In ecofeminist circles, geoengineering has been met

with powerful and, in many ways, justified resistance.

Despite this growing interest, there is currently no international framework governing SRM research or deployment. No large-scale field experiments are underway, and the research remains dominated by climate modelling in Global North institutions. Additionally, private actors such as the startup Stardust Solutions are taking the lead, raising questions about public oversight and accountability. And this is precisely the problem: the conversation about whether and how to investigate these technologies is happening without most of the world at the table. As the UN Environment Programme's Expert Panel has stressed, there needs to be significantly more research into the potential impacts of SRM on communities already on the frontlines of climate change.

The feminist refusal

Within environmental thought, and particularly in ecofeminist circles, geoengineering has been met with powerful and, in many ways, justified resistance. Although SRM would be, at best, a complementary solution to decarbonisation, environmentalists have raised significant concerns about it being used as an argument to delay the more systemic transition away from fossil fuels and overconsumption.

Meanwhile, feminist scholars have exposed the masculinist, techno-scientific culture that permeates the field: the dominance of male-led research teams from the Global North, the privileging of quantitative methods over qualitative or community-based knowledge, and the deployment of fatalistic narratives that frame SRM as an inevitable necessity or a "neutral" silver bullet.

The Hands Off Mother Earth Alliance, a coalition of civil society groups and feminist advocates, has articulated perhaps the most forceful collective opposition to geoengineering, calling it a perpetuation of the unjust industrial model that caused the climate crisis in the first place. Ecofeminist voices often invoke the Mother Earth metaphor to insist on the planet's intrinsic worth and resist its instrumentalisation. These critiques rightly expose that geoengineering is not a neutral technical question but is fundamentally about values, power, and whose knowledge counts.

Yet, these critiques have three recurring limitations.

First, they tend to conflate the problematic ideologies behind geoengineering discourse with the technological mechanics themselves. The fact that current research culture is steeped in masculinist assumptions does not mean that the physics of SAI's aerosol-radiation interactions are inherently patriarchal. The essentialist language that portrays SRM mechanics themselves as a hubristic, sometimes even phallistic, penetration into the natural system misses this important distinction. If the background assumptions were different – if the researchers, the questions, the governance, the values were different – would the critique remain the same?

Second, some critiques contain an inconsistency. They call for recognising our deep interconnection with the natural world while simultaneously treating atmospheric technology as something categorically external to it – as if restoring a local wetland were a relational act but reflecting sunlight were an alien violation. Some of the imagery used in anti-geoengineering advocacy conveys the idea that these technologies are comparable to a planet-sized wrench threatening to tinker with nature. This implicitly reinstates the nature-culture binary that feminist theory has spent decades trying to dismantle. If we truly are interconnectedly one with Mother Earth, how can we sustainably position technology as an inherent outsider to this configuration?

Third, there is a problem of scale. Feminist environmental thought has long prioritised local, situated, community-based knowledge and action – and rightly so. But when it comes to planetary atmospheric physics, localism alone cannot resolve the challenge. The atmosphere does not respect these boundaries. A farmer's methane emissions in Finland and a monsoon system in South Asia are entangled in the same global climate. The exclusive emphasis on small-scale solutions, while morally appealing, risks proving inadequate at the planetary scale, where some of the most urgent decisions must be made.

A different way in

This is where feminist new materialism opens a different door – not to uncritical endorsement of geoengineering, but to a more honest and fruitful engagement with it.

The work of physicist and philosopher Karen River Barad, whose theory of agential realism is foundational to new materialist thought, offers tools for rethinking the relationship between humans, technology, and the atmosphere. Barad's central concept is intra-action: the idea that distinct entities do not exist prior to their relations but emerge through them. Where conventional thinking assumes that separate entities – a particle, an atmosphere, and a research team, for example – come together and interact, Barad argues that they only come into being through their entanglement.

The question is not whether we participate in shaping the atmosphere but how.

Applied to SAI, this reframing is profound. The atmosphere is not a passive container waiting to receive aerosol particles or not, nor are those particles inert tools wielded by human controllers. What SAI would constitute, from a Baradian perspective, is a phenomenon – an ongoing material-discursive entanglement in which human decision-making, particle chemistry, stratospheric wind patterns, solar radiation, and surface ecosystems all participate agentially. The cooling effect does not simply happen to the atmosphere; it emerges through the specific configuration of all these entangled agencies.

This reframing does two critical things. First, it dissolves the comfortable binary between a "natural" atmosphere and an "engineered" one. Second, it dismantles the hubristic mindset that we could ever have complete control over the atmosphere. Both stances – protecting a pure system and seizing control of it – are revealed to be ontologically unsustainable.

Industrial emissions, shipping pollution and agricultural practices, to name a few, have been modifying the atmosphere for centuries. Climate scientist James Hansen himself has noted that the reduction of sulphur in shipping fuel – a clean air policy – inadvertently removed a cooling effect equivalent to what SAI proposes to create. In a real, material sense, we are not standing outside the atmosphere wondering whether to intervene. We are already geoengineering the planet. The question, therefore, is not *whether* we participate in shaping the atmosphere but *how*.

From intervention to intra-vention

Based on these considerations, I propose to replace the concept of "climate intervention", which is conventionally used to describe geoengineering techniques, with the idea of climate intra-vention. Where intervention signals a procedure performed from the outside (an actor imposing change on a passive system) intra-vention designates something different: purposeful, accountable participation in

atmospheric becoming from within the relationship.

This is not a semantic trick. The shift in framing would carry real consequences for how research is designed and governed. If SAI is understood as intra-action rather than intervention, then the models, metrics, and governance structures used in research are not neutral instruments of observation, but actively shape what the atmosphere becomes and what counts as relevant knowledge about it. Current SAI modelling, for instance, tends to prioritise global mean temperature as its primary metric. This makes temperature change visible and determinate while rendering other effects – regional precipitation shifts, monsoon stability, agricultural impacts – less prominent.

Different research practices would literally produce different phenomena. A modelling apparatus that centred, say, monsoon system stability or the lived experiences of communities in the Sahel, would not simply see SAI differently; it would literally bring a different version of SAI into being, with different boundaries, different risks, and different possibilities. This is what Barad means when they say that apparatuses are not static setups but are perpetually open to rearrangement. A patriarchal, technocratic configuration of SAI research is not the only possible one.

This is where feminist engagement with geoengineering becomes not just possible but urgently necessary. If how we set up SAI research actively produces what SAI is, then the values, perspectives, and power relations embedded in that setup matter enormously. Feminist principles of justice, care, transparency, and participatory knowledge production are not peripheral add-ons to the “real science”. They are constitutive of the science itself.

Care, not control

As climate impacts accelerate, interest in SRM technologies will only grow – whether feminists are at the table or not. If the field is abandoned to technocratic elites and private actors, the very outcomes that feminist critics most fear become more likely: unilateral deployment driven by profit, governance captured by powerful states, communities – particularly in the Global South – excluded from decisions that will reshape their climate.

The concerned scientists who launched the Solar Geoengineering Non-Use Agreement in 2022 called for immediate political action to prevent the “normalisation” of solar geoengineering as a climate policy option, arguing that it is neither necessary, desirable, nor governable in the current context. But as others have pointed out, if publicly funded, transparent research is banned, the field does not disappear. It simply moves into clandestine, unmonitored, private hands.

Feminist engagement with SAI can be understood as an act of care rather than an endorsement of control. Care, in the sense that feminist philosopher María Puig de la Bellacasa articulates it, is not about fixing or mastering but about attending to neglected realities, staying with troubling situations, and taking responsibility for the entanglements we are already part of. This means approaching SRM deliberation as a form of responsibility toward the communities already experiencing unbearable heat, failing harvests, and collapsing ecosystems; insisting that research is designed with justice at its centre, and that Indigenous communities, researchers in the Global South, and grassroots actors are not consulted after the fact but participate in shaping what research is prioritised, what SRM is understood to be and how that research looks like in practice.

Staying with the trouble

This framework does not solve all tensions. Most SRM research is still funded and governed by powerful institutions in the Global North, and profit motives, geopolitical competition, and blind techno-optimism are real forces in this space. There is a risk that the language of “intra-vention” and “care” could be co-opted to entrench business as usual.

Categorical rejection is not abstention. It is an act that excludes certain possibilities while enabling others.

There is also a temporal dilemma. Climate urgency is used to justify accelerating SRM research now, within existing structures, before the systemic transformation that justice demands has been achieved. But if we rush ahead, we risk consolidating the very systems that caused the crisis. On the other hand, if we wait for post-growth institutions and decolonial governance to emerge fully before investigating SRM, we may face tipping points that foreclose the possibility of such transformations.

There is no neat resolution to these contradictions. But holding these perspectives simultaneously is more honest and more productive than pretending they do not exist. Donna Haraway calls this “staying with the trouble”: refusing both the seductions of despair and the false comforts of easy answers.

What Barad’s philosophy adds is the insight that inaction is not a neutral zero position. In a world where the atmosphere is already being reshaped by human activity, choosing not to investigate how it might be reshaped more deliberately is itself a form of participation in atmospheric becoming, with its own consequences and its own accountabilities. Categorical rejection is not abstention. It is an act that excludes certain possibilities while enabling others – and we are responsible for those exclusions.

Historically, feminist thought has been at its most powerful when it has refused purity. When it has held contradictions, and when it has insisted on staying engaged with messy, compromised realities rather than retreating to the moral high ground. The atmosphere – this all-encompassing fluid that we breathe, that we are reshaping, that is reshaping us – demands nothing less.

Anni Pokela is a gender studies graduate from the University of Helsinki and a strategist at Operaatio Arktis, a climate strategy agency based in Finland. Her master’s thesis, “Atmospheric Intra-vention: Reimagining Solar Geoengineering Through Feminist New Materialism”, was completed in January 2026 and is available online via open access.

Published June 24, 2026
Article in English
Published in the *Green European Journal*
Downloaded from https://www.greeneuropeanjournal.eu/a-feminist-approach-to-solar-geoengineering/