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Who Funds and Who Pays:

The funding of solar geoengineering, 2020–2025

By Jared Sanborn and J. P. Sapinski

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HEINRICH BÖLL STIFTUNG

Content

Preface

At the Heinrich Böll Foundation, we have been monitoring developments in solar geoengineering since 2010. Although many believe intuitively that deliberate manipulation of the global climate could be catastrophic, solar geoengineering has nonetheless entered mainstream international climate policy discussions. In our view, this shift is driven in no small part by the sharp rise in funding for solar geoengineering research, technology development, outdoor experimentation, and advocacy in recent years. This raises a critical question: who is funding solar geoengineering, and whose interests does it serve?

A groundbreaking paper by Kevin Surprise and JP Sapinski, *"Whose Climate Intervention? Solar Geoengineering, Fractions of Capital, and Hegemonic Strategy"* (2022), analysing the period from 2008 to 2020, shed important light on the origins of this funding. The study found that financial support for solar geoengineering has come predominantly from the technology and finance sectors, alongside a small group of billionaire philanthropists.

The present study, authored by Jared Sanborn and JP Sapinski, builds on and updates this earlier work. Analysing the period from 2020 to 2025, it shows that funding for solar geoengineering has increased dramatically—rising more than tenfold. Most private funders continue to have strong ties to the technology sector, and the overwhelming majority of funding originates in the Global North.

By examining the funding landscape, this study seeks to contribute to a broader debate about the economic and political interests shaping the research and development of geoengineering technologies—and whose interests these technologies ultimately serve. In particular, the rapid growth in private-sector funding raises concerns that democratic deliberation about whether such high-risk technologies should be further researched and developed may be sidelined.

This study focuses specifically on the funding landscape of solar geoengineering, which represents only one branch of geoengineering. However, funding for marine and land-based geoengineering has also increased significantly in recent years. The total volume of funding directed toward geoengineering research, development, and experimentation more broadly is therefore likely several orders of magnitude larger—resources and attention that are being diverted away from real and urgently needed climate solutions.

The Heinrich Böll Foundation has a broad mandate, working at the intersections of democracy, ecology, gender justice, and human rights. We engage in international civil society spaces and support partner organisations across a wide range of issues. Since 2010, we have been actively involved in civil society networks conducting critical work on geoengineering and have supported key organisations, including through financial contributions. Such work is essential to enable the monitoring of policy and

technological developments, the scrutiny of outdoor experiments, public awareness-raising, capacity-building, and the inclusion of diverse and critical perspectives in international debates.

Drawing on our experience in this field, we call on funders to redirect resources toward proven and equitable climate solutions that address the root causes of the climate crisis and benefit people around the world—especially those most affected. Funding for solar geoengineering should be brought to an end. These technologies risk reinforcing existing power structures while carrying potentially catastrophic global consequences.

Linda Schneider
International Environmental Policy Division
Heinrich Böll Foundation

Executive summary

Geoengineering describes a suite of technological strategies that would attempt to address the global climate crisis through large-scale manipulation of the climate system. Solar geoengineering in particular would aim to artificially suppress temperature rise by reflecting a portion of incoming sunlight away from the earth, such as by injecting large quantities of reflective particles into the stratosphere. According to critiques, solar geoengineering targets just one component of climate crisis, the warming, and does nothing to address the root causes of the climate. Moreover, the impacts of any solar geoengineering deployment are largely unknown, and to the extent that the impacts can be controlled, that control affords significant power to whoever wields it. Outdoor experimentation of solar geoengineering research is also incapable of providing complete answers on any scale below complete deployment, and can be used by political actors to try to build support and lock in a technofix trajectory.

Key findings

- **Over the period 2020–2025 total funding of solar geoengineering increased dramatically.**
  Because much of the funding for solar geoengineering comes from philanthropic organizations with minimal regulation on the disclosure of their funding, it is difficult to estimate total spending. Even though less than half of the known payments between organizations collected for this report have monetary values attached to them, over $128 million in constant dollars was spent on solar geoengineering activity over this time period. *The amount spent increased more than tenfold* from under $6 million in 2020 to over $60 million in 2025. The total number of known payments increased from 16 to 100 across that same period. Real amounts are likely at least three to four times higher.

- **During the period 2020–2025 philanthropic giving and government funding were the primary sources of solar geoengineering funding.**
  Philanthropic foundations such as the Quadrature Climate Foundation, Open Philanthropy, and the Simons Foundation have funded solar geoengineering advocacy and research steadily most years, with a dramatic peak in 2024 and 2025. In 2025 the UK Government-funded Advanced Research and Invention Agency (ARIA) funded over $55 million in solar geoengineering research, including five research projects that intend to do outdoor testing. In total, 78 research projects were funded between 2020 and 2025. Thirty-five projects reported the value of the funds awarded, which total over $77 million in research grant funding that went directly to universities and other research bodies.

- **The majority of funding for solar geoengineering comes from the US and UK, and nearly two thirds of recipients of that funding were also based in the US or in Europe.**
  Over 80% of all organizations that funded solar geoengineering were from either the US or UK, while only one was from outside of the US or Europe. Over 30% of all funding recipients were based in the US while just over 30% were in Europe. When it comes to payments for which the value is known, over 96% of the total known funding flows into the US or Europe, for a total amount of $123,872,000.

- **The vast majority of funding is directed to solar geoengineering research.**
  Nine-tenths of all recipients of funding between 2020 and 2025 are universities or governmental research organizations. Government funding is almost entirely directed to research, compared to nearly two thirds of funding from private entities — philanthropic foundations, investment funds and private firms. Two thirds of all research grants uses modelling to assess how different aspects of solar geoengineering would affect the climate and other biogeochemical cycles over time. Government agencies are the only source of funding for a small number of small-scale outdoor experiments, and for research on governance and ethics of solar geoengineering.

- **It is private money that supports solar geoengineering awareness and advocacy groups.**
  Over a quarter of payments from philanthropic foundations, investment funds and private firms supports solar geoengineering awareness and advocacy groups, including groups who explicitly promote outdoor experimentation. More striking, payments received by these groups nearly all come from private entities.

- **Most of the private funders of solar geoengineering have made their money in the tech sector.**
  Of the 33 funders that were either philanthropic foundations or investment firms, more than half stem from some technology-related venture — investments in tech companies, equity in tech startups, and so on. This observation suggests a strategy by the tech billionnaires funders, conscious for some of them, to preserve the basis of their wealth and the continuation of their ventures through promoting further technological investments to buffer the risk of climate policy in support of rapid decarbonization.

Introduction

Solar geoengineering has long been among the most controversial proposed reactions to the climate crisis. Solar geoengineering describes a suite of technological strategies put forth to address the global climate crisis through large-scale manipulation of the climate system. Among such strategies, we find proposals to artificially suppress temperature rise by reflecting a portion of incoming sunlight away from the earth, such as by spreading large quantities of reflective particles into the stratosphere. As critics point out, solar geoengineering targets just one component of climate crisis, the warming, and does nothing to address its root causes.

Solar geoengineering is a techno-fix — a strategy that relies only on complex technology to address a fundamentally social issue — that some hope would kick the can down the road, but carries a significant risk of further disrupting an increasingly destabilized and chaotic climate system. It has now become a favored topic of the ultrarich and the tech elite when discussing climate crisis. This new elite's technological fixation and speculative hope for a process to ease the impacts of global warming is not limited to solar geoengineering, and comprises other highly speculative technologies such as nuclear fusion and carbon dioxide removal (Becker 2025; Calma 2022; Ma 2023). But when it comes to the shorter-term impacts of global warming, solar geoengineering appears to be the techno-fix of choice for these people — who have a lot to lose from the rapid decarbonization and concomitant reductions in global energy demand called for by climate scientists across the globe (Ripple et al. 2020).

Among the first tech billionaires, Bill Gates' support of solar geoengineering dates back to at least 2010, when in a TED talk about climate crisis and energy he discussed his vision of a sustainable energy future. In this talk, he quickly dismisses any approach to emission reductions besides changing the carbon intensity of energy production on the one hand, while on the other hand he extols carbon capture and calls for more renewable and nuclear energy production — all technology intensive strategies to face the crisis. He tells the audience that "An energy breakthrough is the most important thing." But when questioned about what happens if the energy breakthrough fails, Gates puts forth solar geoengineering as "an insurance policy", a means to "buy us 20 or 30 years to get our act together" (Gates 2010).

More recently, billionaire tech investor Chris Sacca expressed concern in 2020 that "de-carbonizing is necessary but going to take 20 years or more." He called for the exploration of solar geoengineering technologies: not doing so would be "surrendering countless lives, species, and ecosystems to heat" (Flavelle 2020). It only took three years for Sacca's concern to intensify. Like Bill Gates before, the man who had made his fortune as one of the best tech-investors in the world could see no path forward without solar geoengineering: "We have no opportunity for survival on this planet unless you reflect back sunlight" Sacca said in a 2023 interview (Neuhauser 2023).

Another main figure of the tech sector's biggest profit sectors, OpenAI CEO Sam Altman envisions a world brimming with AI as technology leads to a brighter future. Altman also knows such a future comes at a steep energy cost. Speaking in an interview at the 2024 World Economic Forum in Davos Switzerland, Altman discussed the future of energy and the climate in his AI-packed future: "We do need way more energy in the world than I think we thought we needed before," later echoing Gates' call for an "energy breakthrough" as the only way to respond to demand. He continued: "I still expect, unfortunately, the world is on a path where we're going to have to do something dramatic with climate, like geoengineering, as a Band-Aid, as a stop gap" (Bloomberg Live 2024).

These are only three examples of billionaires and tech moguls who have been advocating for solar geoengineering for some time now. Today, more and more of them seem unable to imagine a future without it — as the only way they see to buy time for a gradual societal change. Yet, at the same time, nations that stand to lose the most from the ravages of climate change such as Vanuatu and much of Africa have resolved to oppose the use of solar geoengineering (Biermann and Gupta 2024). This contrast in positions raises a simple but crucial question: whose interests are really being served by solar geoengineering? Sam Altman's straightforward explanation quoted above — AI needs more energy, hence the world needs geoengineering — provides a window into what this strategy is fundamentally about: making sure that the industry that made his fortune can keep expanding.

To understand who is propelling this technology beyond words, this report looks into who funds solar geoengineering endeavors, and who receives this funding. The most recent research of this kind covered up to the year 2020 (Surprise and Sapinski 2023). In this report, we continue that research into the present to examine solar geoengineering funding in the period 2020–2025. Analysis of a novel database shows that:

- Known funding has increased tenfold over the period;
- Both funders of solar geoengineering and recipients of funding are concentrated in Europe and North America;
- Most funding supports research into the different solar geoengineering strategies (see Box 1);
- The largest portion of funding indeed comes from the high tech sector, with governmental funding accounting for most of the remainder.

We detail these findings below. The next section summarizes the concerns and critiques that have been raised in discussions of solar geoengineering. Then, after briefly describing how data was collected and the database constructed, we describe trends in funding, discuss the geographical location of funders and recipients of funding, and look at what types of solar geoengineering research is being funded. The following section looks specifically at the funding flows for which we have information on the amounts distributed. The last section provides more detailed information on some of the

ultra-rich individuals who fund solar geoengineering and their foundations and investment vehicles.

What is solar geoengineering?

Solar geoengineering is an umbrella term that covers a range of large-scale technological approaches that attempt to reduce the amount of heat absorbed by the earth or its atmosphere from incoming solar energy. In this way, solar geoengineering is intended to suppress global temperature increases without necessarily lowering the concentration of greenhouse gases in the atmosphere that are predominantly responsible for anthropogenic global warming. Because solar geoengineering primarily affects some element of the greenhouse effect by modifying solar radiation flows, it has become known as solar radiation management (SRM). Solar geoengineering consists of many types of technologies, almost all of which are designed to reflect sunlight out of the atmosphere. So-called "Stratospheric Aerosol Injection" (SAI)[1] is a proposed form of solar geoengineering that would spray particles into the stratosphere to increase the reflectivity (albedo) of the atmosphere, in effect dimming the sun. Marine Cloud Brightening (MCB)[2] is another proposed method of solar geoengineering that aims to increase the reflectivity of marine stratocumulus clouds so that they send back even more sunlight into space than they already do, decreasing the heat energy that is absorbed by the clouds. Other forms of albedo modification can fall under the solar geoengineering umbrella but are rarely considered in the same vein as SAI and MCB, such as glacial re-freezing which aims to slow the melting of highly reflective glaciers and sea ice — a strategy that has been criticized for its limited effectiveness, potential harms to pristine subglacial environments, and high cost (Siegert et al. 2025). Other strategies that have been theorized include placing mirrors in space (National Research Council 2015) or painting mountains white with natural materials though it has received little scientific backing or scrutiny (Collyns 2010). Additionally, the one notable form of solar geoengineering that does not involve increasing albedo is cirrus cloud thinning (CCT)[3] which relies on dissipating the thin icy cirrus clouds that form higher in the troposphere than other clouds. Cirrus clouds reflect solar radiation and absorb heat like all clouds do, however, cirrus clouds absorb more heat than they reflect in solar radiation, so removing or reducing the extent of these clouds would shift the balance towards less energy being absorbed in the earth's atmosphere.

1 For more information on SAI see this technology briefing from Geoengineering Monitor
2 For more information on MCB see this technology briefing from Geoengineering Monitor
3 For more information on CCT see this technology briefing from Geoengineering Monitor

Critiques of solar geoengineering

The impacts of any solar geoengineering deployment are largely unknown. As solar geoengineering aims to change the chemical makeup of the stratosphere, it has the ability to affect earth systems in unexpected ways. While modelling research can help examine broad patterns, the complexity of the systems involved is immense. Despite their complexity, climatological models still pale in comparison to the complexity of the natural earth systems that they attempt to replicate. Even in the idealized worlds of climate models only a fraction of variables are considered as eventually ever more complex models would be unwieldy computing nightmares. Taking into consideration that any actual solar geoengineering deployment would likely vary considerably from the specifications of the model due to human and technological factors, the outcomes are even harder to predict. Additional research can create more robust models that limit variance between predictions and results, but those variances would still compound over time in-model, making the prediction of impacts harder to predict the further into the future they go.

The side effects of solar geoengineering are likely affected by a multitude of factors based on how it is deployed. Recent modeling shows that deployment of SAI at different latitudes may change the extent of disruption to monsoons (Xavier et al. 2024). The extent to which global warming is masked may also affect these and other issues (Irvine et al. 2019). This means that every aspect surrounding the choice to deploy solar geoengineering is a potential fight and a potential for the accumulation of power in the hands of those who control these decisions — who would then have a powerful tool to wield with potentially catastrophic impacts.

The causes of the global climate crisis are well understood. The increase in the concentration of greenhouse gases (GHG) in the atmosphere pushes up the global average temperature. Solar geoengineering makes no attempt to address any root causes of the climate crisis; its only goal is to mask warming, only one component of the crisis. Scientists urge to use indicators beyond global surface temperature to understand climate crisis, and understand how GHG emissions impact climate, the oceans, our environment, and human society (Ripple et al. 2020). Focusing only on mean surface temperature as the metric of climatic change conceals the more significant issue of GHGs and non-warming impacts. Solar geoengineering does not address the underlying causes and by focusing on addressing warming alone it effectively blinds many to the root causes of global climate crisis.

Solar geoengineering is not a one-time deal; it is a process that would need to continue as long as it is intended to have an impact. SAI and MCB techniques only have an effect as long as their aerosols are in the stratosphere, usually assumed to be about one year. Solar Geoengineering does not affect the root causes of warming but only masks them, and hence, as warming forces increase, the amount of particulates required to counteract them also increases. This means that solar geoengineering would need to be applied

regularly and in an ever-increasing quantity if greenhouse gas emissions are not dramatically curbed.

If, at any time, the use of solar geoengineering stops then the resulting situation may be worse than if it had not been used to begin with. The use and sudden stop of solar geoengineering can result in what has been called a termination shock, whereby the full force of the masked warming will be unleased but much quicker. Because warming potential is determined by factors such as greenhouse gas concentrations that are unaffected by solar geoengineering, the warming potential may continue to grow unrealized, masked by the use of solar geoengineering. If the process stops, the warming potential will be reached, but in a much shorter time than if it had done so in the absence of any human alteration. The resulting temperatures may be the same, so the end result may not seem dramatically different. However, for many humans, societies, and ecosystems the speed of warming can be the difference between meaningful adaptation and catastrophe. Imagine the difficulty of the response to decades worth of climatic change happening over the course of only ten years (Trisos et al. 2018).

Many who advocate for the research or deployment of solar geoengineering do so because they claim that addressing climate crisis through other means is failing or already has failed. Some funders of solar geoengineering research and advocacy are putting substantial resources behind finding a potential techno-fix for a problem that they have not tried to solve with any other means. By highlighting the possibility of a speculative fix, solar geoengineering advocates may be reducing the urgency felt by people in positions to push forward other options, such as rapid decarbonization. This effect is known as mitigation deterrence (McLaren 2016). For anyone who benefits from the continuation of the status quo, a speculative technology that allows for a longer period to make societal change may shine brightly in their mind as a source of relief.

In the face of these debates, at the Tenth Conference of the Parties (COP 10) of the United Nations Convention on Biological Diversity (CBD) in 2010, the 193 State Parties passed a de-facto moratorium on geoengineering in decision X/33. This decision prevented any large-scale geoengineering activities that could affect biodiversity unless they met strict criteria. The decision reads that “in the absence of science based, global, transparent and effective control and regulatory mechanisms for geoengineering” and “until there is an adequate scientific basis on which to justify such activities and appropriate consideration of the associated risks for the environment and biodiversity and associated social, economic and cultural impacts” no geoengineering activities can occur unless they are small and controlled (UNEP CBD 2010). The decision has been re-affirmed more than once since its adoption, including just last year at the sixteenth Conference of the Parties (COP 16) of the CBD (UNEP CBD 2024).

The issues with solar geoengineering are not limited to its potential usage but also extend to experiments. Experiments cannot be understood simply as scientific acts purely for the pursuit of knowledge. Controversial experimentation can gain legitimacy once it moves beyond simple computer modelling to live testing. Open-air

experimentation would likely be intended as much as a performance as a test, if not more so, to stimulate political and public interest in solar geoengineering as a policy option.

But even if open-air experiments do occur, the usefulness of their data would be minimal at best. To truly get any sense of the impact of a potential solar geoengineering deployment the actual experiment would need to be massive in scope. Knowing what deploying solar geoengineering from one location only tells you about that deployment under those conditions, if that information can even be extracted from the noise of the weather. In order to get a clear signal out of that noise any experiment would need to be long. Determining the outcome of a future deployment can only be done by replicating the outcome. Any change in location or quantity may affect the impacts in radical ways. Knowing what the impact will be after a certain amount of time would require running the experiment for that amount of time. Any experiment that would produce actual knowledge about a future solar geoengineering deployment would have to mimic that deployment in location, quantity, and length. This means that there is functionally no meaningful solar geoengineering experiment that is not already a solar geoengineering deployment.

Thus, small-scale solar geoengineering experimentation can be seen as a clear slippery slope. A small-scale experiment that is allowed to happen will produce little useful data if any, thus the scientists will push to be allowed to do a larger, more meaningful experiment to be able to establish its efficacy and safety. Most proposed experiments to date have been about answering technical and hardware questions, not so much about gaining useful data about the impacts of a possible solar geoengineering deployment. This makes it hard to see such experiments as much more than advertising for political or commercial investment, largely bypassing societal debate and an international governance framework.

Up to now, civil society has shown its opposition to such outdoor experimentation on several occasions. The highest profile case was the SCoPEx project to release several types of aerosols seen as SRM candidates in the stratosphere above Northern Sweden (Dykema et al. 2014). Soon after the SCoPEx Advisory committee announced the timing and location of the test in December of 2020, the Saami Council[4], along with Swedish environmental groups, raised concerns in an open letter about the governance of the project. They highlighted an alleged lack of dialogue with relevant Swedish parties, and that no member of the advisory committee was actually from Sweden, as well as requesting further discussion in more diverse forums before the project should be allowed (Henriksen et al. 2021). The SCoPEx research team, following the recommendation by its advisory committee to improve public engagement, suspended the experiment within a few weeks of the publication of the letter (Keutsch Group at Harvard 2021); the project was eventually cancelled in March 2024 (Shaw and Stock 2024).

4 The Saami Council represents Saami Indigenous people's organizations in Fennoscandia.

As to international conventions, these open-air experiments would likely violate CBD decision x/33 as they could hardly be said to be conducted in a controlled setting. It is also difficult to claim that aerosols in the atmosphere will not have transboundary impacts, which would break Article 3 of the Convention on Biological Diversity (UNEP Environmental Law and Institutions Programme Activity Centre 1992). Because these experiments are largely about testing hardware it also becomes more difficult to claim that they are "justified by the need to gather specific scientific data" as expressed in decision X/33 (UNEP CBD 2010). All of these hurdles must be cleared, if possible, before any open-air solar geoengineering experiment would be in accordance with the CBD.

Types of solar geoengineering research

There are many types of activities that constitute research into solar geoengineering, and many focuses for researchers. Most solar geoengineering funding appears to go towards modeling solar geoengineering techniques. Modelling is typically done by creating or adjusting climatological models to include new inputs or change existing variables to model how those changes may affect climate outcome. Social science and governance research, for its part, recognizes solar geoengineering as a field of technologies that have the potential to impact the lives of billions on this planet for good and for ill. Social scientific research is broad and can include capturing social sentiments toward solar geoengineering under different conditions, how the impacts of solar geoengineering, intended or not, might affect people and societies, or the political, economic, and social dynamics that shape solar geoengineering research itself. Solar geoengineering governance research recognizes that any anthropogenic intervention into earth systems may be subject to existing international law, but also that governing the use or abolition of any such technology is an extremely complicated matter that would require new forms of regulation to ensure that any decisions are well-reasoned and just. Finally, experimental research into solar geoengineering is by far the most controversial, with several planned small-scale experiments cancelled due to public outcry. These tests are controversial to different people for different specific reasons, but the overall claim is that they aim to gather data on unproven technology in a way that might expose the public to the test and its unknown outcomes. While the possible consequences of any given small-scale experiment may be limited, many feel that allowing this type of research would enable even more experimentation, including at scales that are inherently less controllable.

Methodology

The data collected for this report comes from multiple sources: news media articles, public information from the organizations discussed in this report themselves, and other reliable web sources. First, news media searches were run using the database Nexis Uni, a news, business and law database that includes major global written media in fourteen languages and over any support.

An initial search using the terms "'Solar Geoengineer' AND fund*" returned 824 articles in the database that contain the term "solar geoengineering" as well as a term beginning with "fund" which typically was "fund", "funds", or "funding". The few articles with terms such as "fundamental" but no mention of funding were excluded from this report, for a total of 746 news articles. We supplemented this initial search with two previous publications looking at solar geoengineering funding (Necheles et al. 2018; Surprise and Sapinski 2023). We used these sources to identify an initial set of (a) organizations providing funding to solar geoengineering projects; and (b) organizations receiving funding to conduct solar geoengineering research and/or construct and disseminate advocacy or critical discourse around the issue. From there, we directed further web inquiries into these funders and recipients of funding.

Second, using all the relevant material identified, we constructed a database that includes all organizations we could identify that funded and/or received solar geoengineering funding between January 2020 and September 2025.[5] The database also includes the list of individual funding payments — any known transaction from a funder to a receiving organization (see Appendix A) — including research grants when information was publicly available. Information on funding amounts by grant or by funder was also included when possible. The resulting database[6] contains all funders and recipients of funding found, as well as funding amounts when the information was available, divided by specific research grant if available.[7] Below, we discuss a total of

5 Searches were conducted in English. Hence, our database is not comprehensive, and is biased toward English-speaking countries. Nonetheless, as a lot of global news media outlets publish in English, our coverage extends much beyond Anglo-saxon countries and includes all parts of the world. The search string used did not return the main organizations and campaigns advocating against solar geoengineering, such as the Heinrich Böll Foundation, the ETC Group, and the HOME Alliance. Overall, the data collected does not allow to ascertain the specific stances, beliefs, or intentions of funders. Because data collection ended in September 2025, this report does not include the $60 million in funding to startup Stardust Solutions from a group of Silicon Valley bilionnaires, announced in October 2025. For information on this announcement, see Hiar and Mathiesen (2025) and Meyer (2025).

6 All data was collected by first author JS, who also constructed the database, in consultation with JPS.

7 The website SRM360 (https://srm360.org/) provides a publicly available database with information on solar geoengineering funding since 2007. We did not rely on SRM360's data, as their data collection methodology is unclear, yet different from ours. SRM360 appears to list all funding from and to organizations that currently receive or have received in the past funding for solar geoengineering projects. However, the website reports total funding between organizations when solar geoengineering is only one part of the intended use of the funding. Our data is more conservative: we only report funding relations for actual solar geoengineering projects and organizations whose sole focus is on solar geoengineering. Further, the sources of the monetary values reported by SRM360 are not stated, and part of their data might have been gathered unsystematically from various insider sources. The data we collected all comes from publicly available sources and was gathered in a systematic way that allows to draw rigorous conclusions from it, even though it does not appear as extensive as what is reported by SRM360.

206 organizations, including 43 funders and 166 recipients of funding; three are both funders and recipients. Over the period 2020– 2025, we identified a total of 78 research grants for specific projects, 35 with known funding values, for a total amount of US$77.039 million. We identified 107 non-grant payments between 36 funders and 33 recipient organizations; one organization both provided and received general support funding. Twenty-nine of these 107 payments had known values, totaling just over $52 million. The vast majority of organizations researched here do not report values of payments or individual research grants awarded or received, and the total amount of funding is certainly much higher.

Throughout this report, all monetary values for the years 2020–2025 are reported in constant 2024 US dollars (details of conversions are reported in Appendix A).

Solar geoengineering funding

Trends and patterns of funding

In the period 2020–2025 solar geoengineering funding has continued, and expanded dramatically: the total amount of funds went up more than ten-fold, from a little less than US$6 million in 2020 to over US$60 million in 2025; the number of payments went from 16 to 100 (Figure 1). Funding from sources based in the United States remain prominent over the period. Twenty-nine funding organizations in this report are US-based, while six are based in the United Kingdom (Table 1); several from the UK have made considerable contributions. As well, UK-based funders, including the UK government, have increased greatly the number of payments distributed, as apparent in Figure 2, from none in 2020 to over 85 in 2025.

Figure 1 Total funding and payment count per year

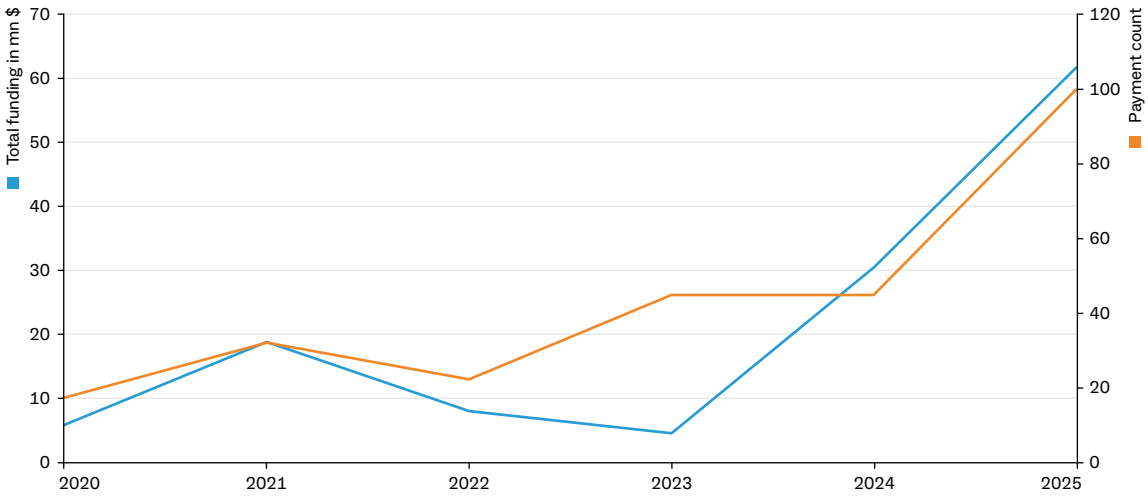
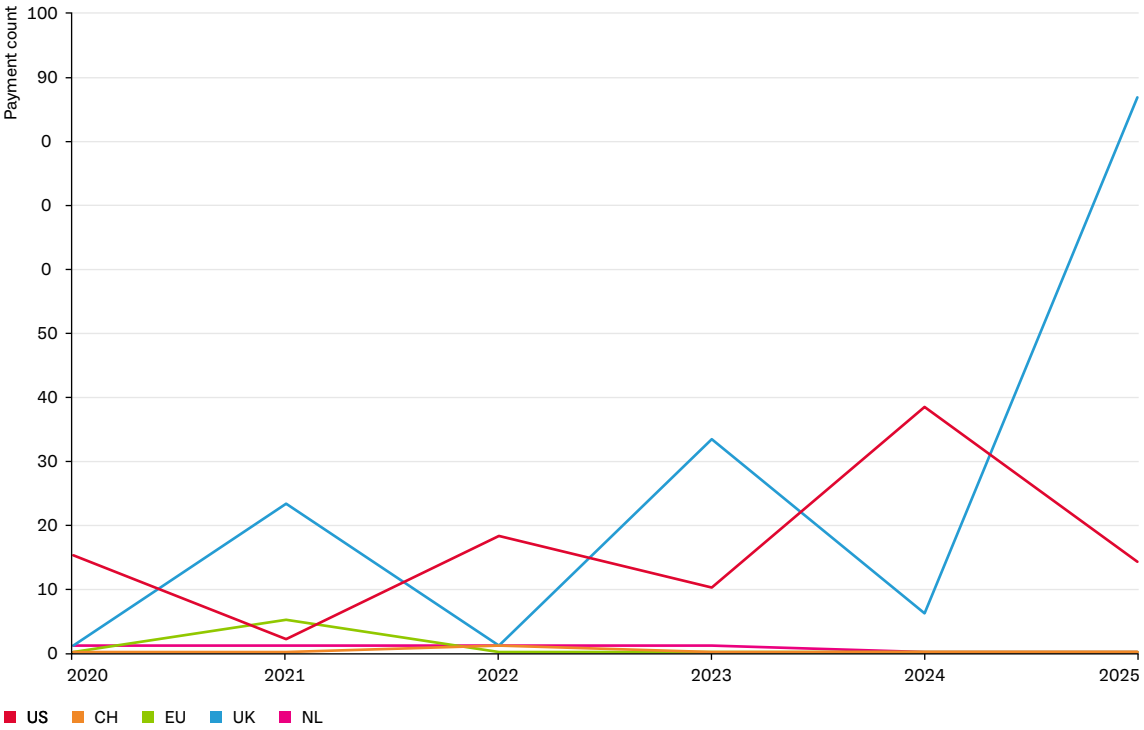


Figure 2 Payment count per year by funder country



As detailed in Table 1, funding recipients are also heavily concentrated in the US and the UK. Of the 166 recipient organizations, 53 are based in the US (46.1%), followed closely by the UK (24). Regionally, North American organizations still lead (57) but are followed closely by European organizations (50) (including UK organizations). Asia (with Oceania) (30), Africa (13), and Latin America (12) also have some significant representation, but much less than North America and Europe.

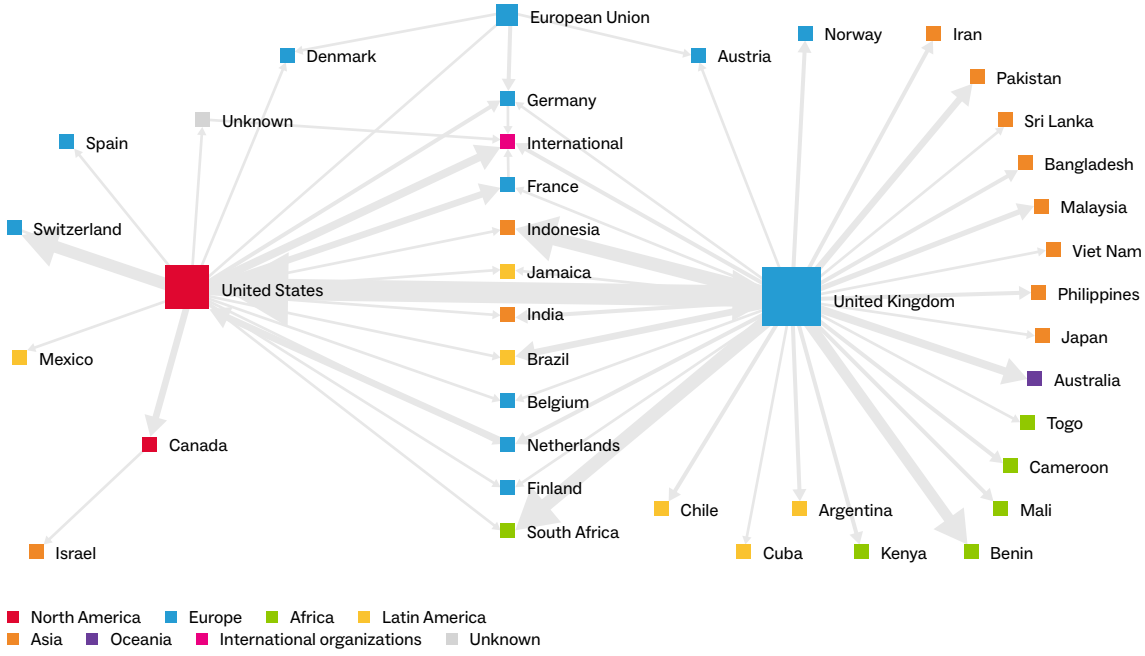
Table 1 Funders and recipients by country

Country	N funders (percent)	Country	N recipients (percent)
United States	29 (69.0)	United States	53 (31.9)
United Kingdom	6 (14.3)	United Kingdom	24 (14.5)
Germany	1 (2.4)	Indonesia	8 (4.8)
Canada	1 (2.4)	Australia	5 (3.0)
European Union	1 (2.4)	Germany	5 (3.0)
France	1 (2.4)	Brazil	5 (3.0)
Israel	1 (2.4)	France	5 (3.0)
Switzerland	1 (2.4)	CH, BJ, CA	4 each (7.2 total)
Netherlands	1 (2.4)	ZA, INT, PK, IN	3 each (7.2 total)
Unknown	1 (2.4)	NL, MY, FI, NO, AR, AT, BD, IR, CM, CL, KE, DK	2 each (14.5 total)
		BE, ML, PH, IL, JM, JP, CU, LK, VN, TG, Unknown, ES, MX	1 each (7.8 total)
Total	**43 (100.0)**	**Total**	**166 (100.0)**

Given the relational nature of the data, it is possible to visualize the international flows of money in the form of a graph where shapes represent countries and lines and arrows represent flows of money between them. Figure 3 illustrates the geographical distribution of global solar geoengineering funding flows among all 206 organizations covered in this report; the size of shapes represents the number of countries receiving funding and line thickness shows the number of payments going from one country to another. The graph makes apparent that the US and UK are at the center of two broad networks of funding.

The US and UK networks do overlap substantially, with ten different countries on four continents receiving funds from both, in addition to a number of international organizations. The European Union acts as a third, less central, provider of funds, directing sums to organizations in four different countries that also receive support from the UK or the US.

Figure 3 Cross-national solar geoengineering funding flows, 2020–2025



The 206 organizations covered in this report, including both funders and recipients of payments, were coded according to their organizational type, as listed in Table 3.

Table 2 Types of organizations

Type of organization	Description	N organizations (percent)
Research	Primarily academic institutions but also includes research institutes and other private organizations that conduct original research.	126 (61.2)
Philanthropic	Organizations that exist for philanthropic purposes, including individuals, personal foundations, and philanthropic arms of larger for-profit organizations.	25 (12.1)
Governmental	Governmental agencies, crown corporations, or similar entities that derive all of or almost all of their funding from a government source, regardless of their degree of independence.	24 (11.7)
Profit-seeking	Commercial companies who aim to make a profit off of their own production, often by the creation of a novel technology or sale of a product.	10 (4.9)
Investment	Non-profit organizations that fund others with the intention of receiving a return on that investment.	9 (4.4)
Solar geoengineering awareness-building and/or advocacy	Non-profit organizations who have some element of solar geoengineering as their chosen cause.	7 (3.4)
Awareness-building and/or advocacy	Organizations that aim to build capacity towards a chosen cause other than solar geoengineering.	2 (1.0)
Startup	Organizations that aim to use solar geoengineering as their product for profit.	2 (1.0)
Unknown	Organization whose type cannot be identified due to lack of information.	1 (0.5)
Total		**206**

Private sources of funding, such as philanthropic foundations and climate-related funds, dominate the solar geoengineering funding field up until 2024, as seen in Figure 4. In 2025, there was a significant infusion of government funding from the Advanced Research and Invention Agency (ARIA), a UK-government funded research agency launched in 2023.

Figure 4 Funding over time by funder type

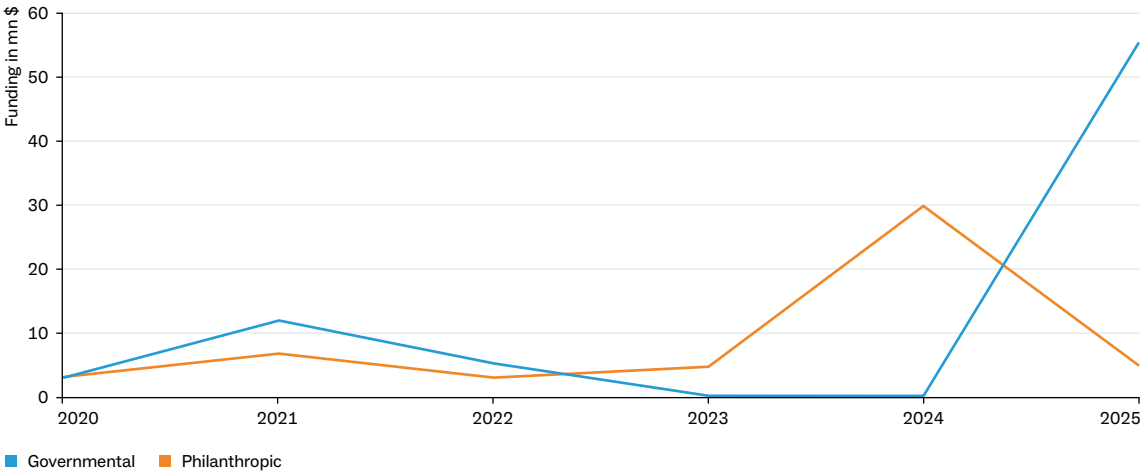


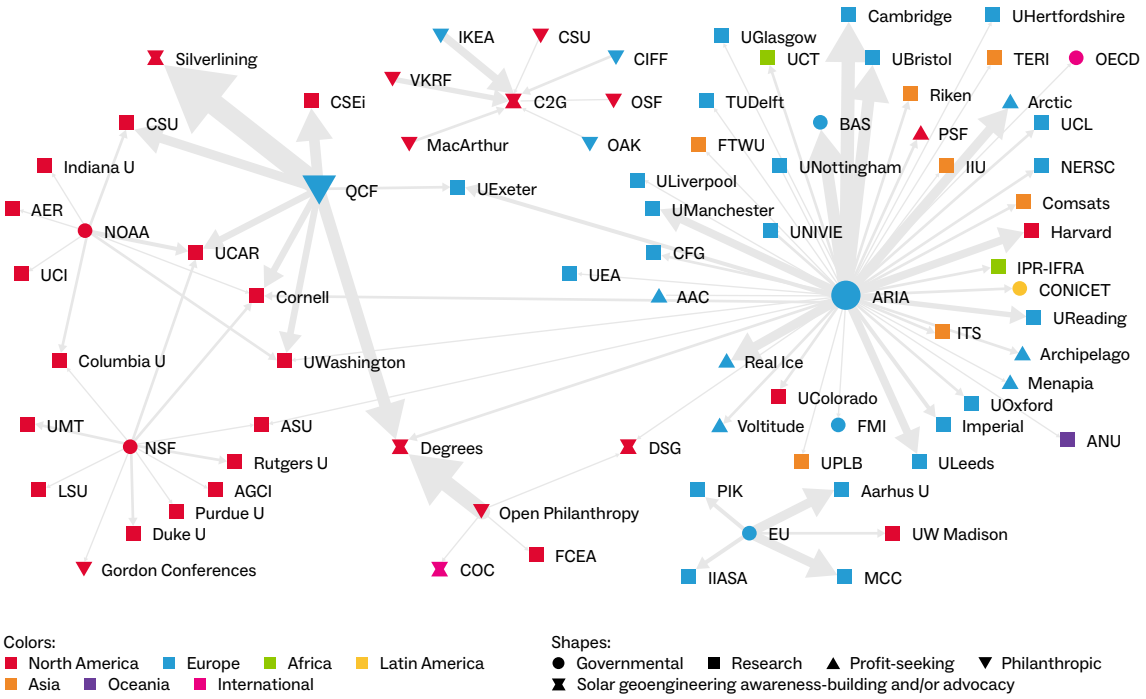
Table 3 Types of solar geoengineering funders and recipients

Type of organization	N funders (percent)	Type of organization	N recipients (percent)
Philanthropic	24 (55.8)	Research	126 (75.9)
Investment	9 (20.9)	Governmental	20 (12.0)
Governmental	5 (11.6)	Profit-seeking	8 (4.8)
Profit-seeking	2 (4.7)	Solar geoengineering awareness-building and/or advocacy	7 (4.2)
Solar geoengineering awareness-building and/or advocacy	2 (4.7)	Startup	2 (1.2)
Unknown	1 (2.3)	Awareness-building and/or advocacy (other than solar geoengineering)	2 (1.2)
		Philanthropic	1 (0.6)
Total	**43 (100.0)**	**Total**	**166 (100.0)**

Looking at funders and recipients separately, Table 3 shows that the philanthropy sector accounts for over half of the 43 total funders, while 20% are investment groups; only five are governmental groups. Most private money comes from people who made their fortunes through high-tech investments or startups: of the 33 funders that are either philanthropic or investment organizations, more than half were started with tech-related fortunes, and another fifth were started with venture capital profits.

Figure 5 presents a graph where the shapes represent individual funder and recipient organizations and the lines and arrows between them represent flows of money. The graph is constructed from a subsample of 13 funders and 69 recipients for which the value of payments attributed and received is known. Line thickness represents the value of the monetary flow between funder and recipient. Within this subset where full funding data is available, it appears that monetary support for solar geoengineering comes mainly from ARIA and the Quadrature Climate Foundation (QCF), and that smaller amounts are distributed by governmental organizations that fund scientific research (NOAA, NSF). A small number of recipients, most of them universities appearing near the center of the graph, receive funding from multiple sources, up to four in the case of Cornell University. Figure 5 highlights the geographical pattern identified above: US-based organizations, in red, are concentrated to the left of the graph around US national funding agencies as well as UK-based QCF; organizations headquartered in the UK and continental Europe, in blue, cluster to the right of the graph, while those from other countries receive their funding from ARIA in all but one case. As a funder, the European Union (EU) supports a distinct group of research organizations, while now-defunct C2G received funding from an entirely separate network of philanthropic foundations.

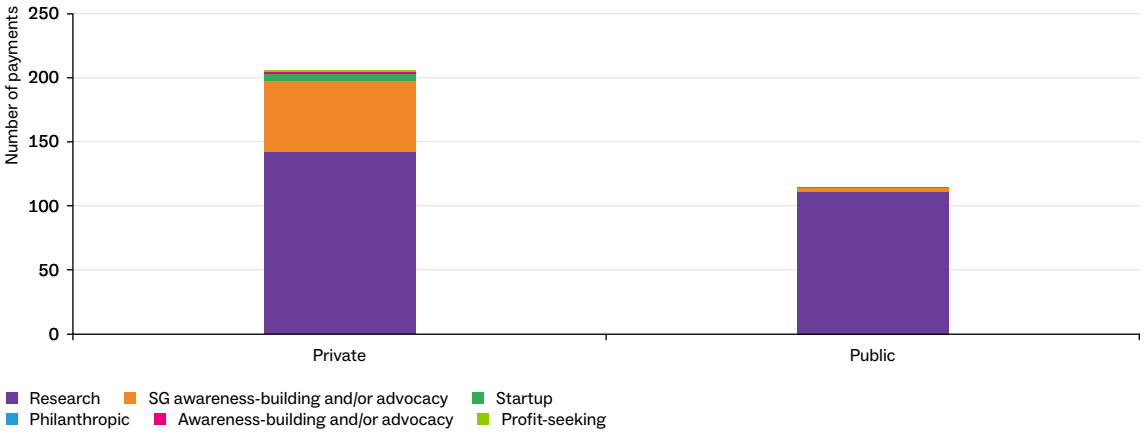
Figure 5 Organization-level solar geoengineering funding flows, known monetary value, 2020–2025



Going back to Table 3, over three quarters of all funding recipients (126) were research organizations while a further twenty are governmental organizations, all of the latter in a research capacity as well.

To go into further details, Figure 6 compares what activities receive payments from public and private sources. It shows that private funders, including philanthropic foundations, investors and private firms, substantially support both research and awareness/advocacy activities (69.3% and 27.3% of private payments, respectively), with a small proportion of payments (2.4%) going to startups. For their part, public sources, i.e. governments, almost exclusively fund research organizations and governmental research (96.5%), with the remainder going to awareness and advocacy, and to philanthropic organizations. Overall, 94.9% of all payments to solar geoengineering awareness-building and advocacy come from private funders, and only 2.6% come from governmental sources.

Figure 6 Number of payments received by different types of recipients of private and public funding



In sum, almost nine-tenths of organizations receiving solar geoengineering funding conduct research. They receive their funding from both private and public sources, though whereas public funding is distributed almost exclusively to support research, private organizations also devote a substantial number of payments to solar geoengineering awareness and/or advocacy groups, a broad category that includes organizations that provide objective information on the issue as well as those who promote controversial outdoor experimentation. Because such a large portion of funding goes to fund research, in what follows we explore in more detail the different types of research supported.

Funding of solar geoengineering research

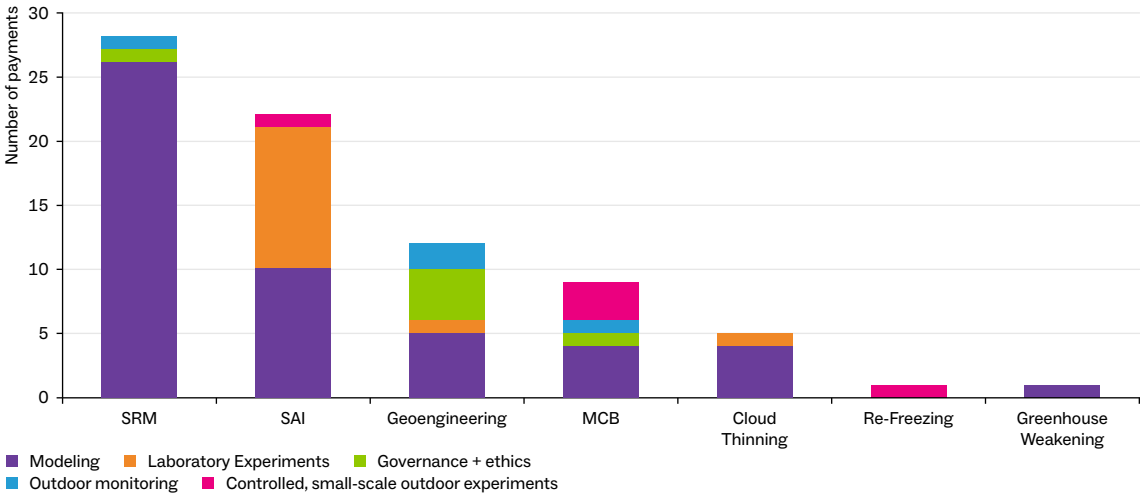
Looking at Table 4, analysis of the materials associated with each research grant shows that modeling projects account for 51 of the 78 projects funded (65.3%). Laboratory experiments are a distant second (16.7%). The UK's Advanced Research and Invention Agency (ARIA) is the only organization currently funding monitoring research, as well as research that explicitly proposes outdoor experimentation, which they call "controlled and small scale." According to publicly available information, there are currently five outdoor experimentation projects being funded.

Table 4 Types of research

Research methodology	Description	N research grants (percent)
Modeling	Any research that does not focus on social or governance questions, does not explicitly state intentions to do laboratory or small scale outdoor testing, nor deploying atmospheric observation equipment.	50 (64.1)
Laboratory Experiments	Experiments that explicitly state intentions to do such research, typically experimentation of some form of aerosol to better determine its properties and then update existing models with that information.	13 (16.7)
Governance + ethics	Projects that interrogate questions of governance and ethics with relation to solar geoengineering.	6 (7.7)
Outdoor experiments	Experiments that explicitly state intentions to conduct outdoor testing in the high atmosphere, typically to collect data on some form of aerosol to better determine its properties.	5 (6.4)
Outdoor monitoring	Research primarily about physical data collection of earth systems.	4 (5.1)
Total		**78 (100.0)**

These different research methods can be used to study different proposed solar geoengineering technologies, many of which are explained in Box 2. As shown in Figure 7, research grants with general focuses on SRM and Geoengineering are largely modeling grants, with some governance and ethics, outdoor monitoring, and laboratory experimentation. SAI received more grants than MCB, more than half of them for lab testing, and one for a controlled outdoor experiment. Re-freezing received one outdoor experiment grant, and the other three grants for outdoor experiments are for MCB testing. Data does includes one grant for outdoor SAI experimentation, titled Natural Materials for Stratospheric Aerosol Injection, at the University of Cambridge. The project aims to launch modified weather balloons carrying natural materials of interest for SAI to stay in the stratosphere for hours to weeks. The samples will then be recovered to test how they react to stratospheric exposure over time (ARIA 2025).

Figure 7 Technology researched by methodology



In sum, we can distinguish several trends and patterns in solar geoengineering funding between 2020 and 2025. First, the quantity of funding flowing through the solar geoengineering space has increased dramatically since 2020. More specifically, 2024 and 2025 have seen an explosion in funding as three organizations alone — UK government agency ARIA, the Quadrature Climate Foundation, and the Simons Foundation — have provided or pledged to provide about $150 million in funding for solar geoengineering projects since 2024. Second, analysis highlights an uneven geography of solar geoengineering funding flows: the main funders are based in the US and the UK, who mainly fund national organizations, but who also direct their support to a network of countries across the world. Third, whereas solar geoengineering activity is majoritarily supported by corporate and individual philanthropic foundations, as well as investment funds and governmental agencies, those receiving the funding are largely research organizations. Funded research covers mostly modeling and lab experiments, but also comprises a small number of outdoor experiments, in addition to governance research and solar geoengineering monitoring.

Going beyond these basic patterns, what follows first looks at funding distributed as research grants, and to payments for general support of the recipient organization. Then, we home in on the funder organizations and the ultra-wealthy individuals and corporations behind them.

Lack of public information on solar geoengineering funding

Many note a lack of publicly available information throughout the solar geoengineering funding space: because the majority of funding comes from private sources which do not have the same requirements of oversight as governments, information on funding recipients or on sources of funds is inadequate (Talati, Buck, and Kravitz 2025). While some grant-making organizations, such as Open Philanthropy and Quadrature Climate Foundation disclose the precise amounts of funding they provide to other organizations, they do not primarily fund direct research.[8] Instead, they fund regranting organizations who make final assessments about what research will be funded. Private organizations that directly fund research through grants, such as the Degrees Initiative and the Simons Foundation provide information about who will receive funding and for what purpose, but not the amount of funding received, or the original source of their funding.

8 For transparency purposes it is noted that Shuchi Talati, lead author on the above paper is the founder and executive director of the Alliance for Just Deliberation on Solar Geoengineering (DSG), Holly Jean Buck, co-author, is on the DSG advisory board, and Ben Kravitz, co-author, advised the creation of the Degrees Modelling Fund from the Degrees initiative, all organizations that appear elsewhere in this report.

There are many issues with this state of affairs, as detailed by Talati, Buck, and Kravitz (2025). For starters, some of the wealthy individuals who fund scientific research have expressed their opinion that solar geoengineering deployment is a necessity, not an open scientific question to be researched. Without full disclosure of funders/funding neither the public nor policymakers, both of whom rely on these research outputs to form their own opinions about solar geoengineering, will be privy to the underlying decisions that produced this research. What is and is not researched or discussed can be kept private, preventing outsiders from knowing what risks may be considered or ignored. If funding for a line of inquiry ceases or its results remain unpublished, this lack of transparency means outsiders to that decision do not know if this is due to a lack of publishable results or progress, or if the funder chose not to publish or to continue funding due to results unfavorable to their preferred outcome.

Additionally, Talati, Buck and Kravitz warn that this state of affairs will allow for relationships with funders to determine funding allocations, "with the risk that expertise gathers in a few elite institutions that happen to be connected to funders" (Talati et al. 2025:2). Especially when there is little to no oversight or transparency associated with the flow of funding, it is difficult to know if funding flows to elite institutions because of networking or because of the value of the work they are conducting.

Changes in the language of solar geoengineering

The language used to describe solar geoengineering is also in flux. Like any field, there are new terms being introduced to describe new theoretical technologies or methodologies, but those are not the changes in language that are pertinent here. Changes in the language used to describe or talk about technologies that already exist in order to reframe discourse are important to track, as changing the names of concepts and technologies can be used to change the nature of discourse without having to address its content. For example, Caldeira and Bala (2017) explain that "[t]he term [solar radiation management] was introduced humorously with the intent of sounding as bureaucratic as possible, and thus allowing the meeting to pass by NASA bureaucrats who were sensitized to possible controversy surrounding the term 'geoengineering'." (11) The euphemism was not created with malicious intent, but it may have had for later effect to reduce the controversial potential of discussions on the topic.

The term "climate intervention" has been around since at least the year 2000, but has been increasingly used in place of geoengineering after the 2015 publication of the National Research Council's Climate Intervention report (2015). This is usually solar geoengineering as other proposed forms of geoengineering not discussed in this report, such as carbon dioxide removal, are more often mentioned by name. Climate intervention or some variation of "solar" or "near-term" climate intervention are used by many groups in place of solar geoengineering or SRM, though they do not eschew those terms entirely, and they use the names of specific technologies when discussing them.

The UK government funded Advanced Research and Invention Agency created a program in 2025 for "actively cooling the Earth", using terms like "climate cooling" to describe the spate of technologies that aim to reduce planetary temperatures through some form of albedo manipulation, that is to say solar geoengineering. ARIA appears to use this terminology to strengthen the association of this research with its highest potential, a counter to global warming, while its actual potential is still unknown. While planetary cooling might accurately reflect the intent of the technologies it sets out to research, it deviates from other terminology in that it no longer describes the technology by its mechanism but by its desired effect. Even more indefinite terms like solar geoengineering, SRM, and climate intervention describe the intended actions (albeit with varying levels of precision) and not their hoped-for results.

Known funding flows

It is rare in the field of solar geoengineering for organizations to publicly report even the most basic financial details of their funding relationships. Of the 43 organizations that are known funders of solar geoengineering activity over the 2020–2025 period, only thirteen reported the monetary value of any contributions. Information on specific research grants awarded is available for seven funders; among these, four have disclosed the amount of each grant (listed in Table 5).

Four governmental organizations published their funding information for the period. Only two of the 24 philanthropic organizations that funded solar geoengineering activities publicly reported the contents of their contributions (Quadrature Climate Foundation and Open Philanthropy). None of the investment or profit-seeking organizations did, and the two solar geoengineering awareness-building and/or advocacy groups that funded solar geoengineering activities, Degrees and SilverLining, did not report specifics of contributions either, despite repeated calls for transparency of solar geoengineering funding (see Box 3 Issues of Transparency).

In what follows, we discuss the actual known flows of money from the thirteen funders for which funding amounts are known, as well as the other 30 where only the number of payments is known. The figures reported below must be read with the understanding that nearly five out of every six organizations and over two out of every three payments do not have any monetary values attached to them. Actual total funding might hence be many times higher than the sum of the amounts reported here. Where general figures are reported, such as a total amount for a round of grants, it will be noted but not included in any tables as the individual payments are not confirmed and the figures are often reported as intended numbers, not actual payments.

Below, we first present funding of direct research grants. We then look at general funding for which we could ascertain specific research projects. Typically, this latter type of funding is directed to universities or solar geoengineering awareness-building and/or advocacy organizations for them to use.

Direct research grants

Table 5 summarizes information about the seven funders for which we have information on specific grants attributed to research solar geoengineering. In the UK, research Grant funding comes from three sources that we examine in turn: ARIA, UKRI-NERC and the Degrees Initiative (Table 6). The Advanced Research and Invention Agency (ARIA), a UK-government funded research agency, was launched in 2023 with ambitions of funding research that is high in both risk and reward. Based off of the US Advanced Research Projects Agency (ARPA) model, in 2024, the agency announced plans to dedicate £57 million towards their climate cooling program (Flavelle and

Gelles 2024). ARIA has since granted over $56 million across twenty-two research grants (Table 5) distributed in all five categories (see Table 6, Grant type).

Table 5 Research grant funders

Funder	Organization Home Country	Organization Type	Number of grants	Total value of grants	Organizations funded by country
ARIA	United Kingdom	Governmental	22	$56,336,436	▪ United Kingdom (21) $39,936,123 ▪ United States (10) $5,258,793 ▪ Australia (5) $188,758 ▪ Pakistan (3) $704,696 ▪ Netherlands (2) $4,348,980 ▪ Thirteen countries (1 each) $376,838 (average)
European Union	European Union	Governmental	1	$11,902,149	▪ Denmark (1) $3,762,636 ▪ Austria (1) $1,588,150 ▪ Germany (2) $5,325,824 ▪ United States (1) $1,225,539
National Oceanic and Atmospheric Administration (NOAA)	United States	Governmental	5	$3,941,071	▪ United States (8) $3,941,071
National Science Foundation (NSF)	United States	Governmental	7	$4,612,741	▪ United States (13) $4,612,741
Degrees Initiative	United Kingdom	Solar geo-engineering awareness-building and/or advocacy	20	--	▪ Indonesia (8) ▪ Benin (4) ▪ Brazil (4) ▪ South Africa (3) ▪ Six countries (2) ▪ Twelve Countries (1)
Simons Foundation	United States	Philanthropic	19	--	▪ United States (20) ▪ Switzerland (4) ▪ Canada (3) ▪ France (3) ▪ Germany (2) ▪ Eight Countries (1)
UKRI-NERC*	United Kingdom	Governmental	4	--	▪ United Kingdom (10) ▪ Norway (1)

* At the time of writing, the UK Research and Innovation Natural Environment Research Council (UKRI-NERC) had not published their funding information for their Modelling environmental responses to solar radiation management grants awarded in 2025.

Table 6 UK Research grants funded by ARIA, UKRI-NERC and the Degrees Initiative

Grant type	N grants	Value	Technology	N grants	Value	Organization type	N recip-ients	Value
ARIA								
Governance and ethics	5	$3,504,604	Geoengineering, broadly	10	$18,055,316	Profit-seeking	7	$10,645,942
Modeling	7	$4,944,197	Marine cloud brightening (MCB)	5	$15,214,723	Solar geoengi-neering aware-ness-building and/or advo-cacy	3	$1,540,264
Laboratory experiments	1	$6,090,586	Re-Freezing	1	$12,520,936	Research	54	$37,690,747
Outdoor monitoring	4	$11,234,866	Stratospheric aero-sol injection (SAI)	3	$7,965,580	Governmental	6	$6,459,293
Controlled, small-scale outdoor experiments	5	$30,561,993	Solar radiation management (SRM), incl. MCB, SAI and others	3	$2,579,690			
Total	22	$56,336,246		22	$56,336,246		70	$56,336,246
UKRI-NERC								
Modeling	4	--	MCB	1	--	Research	11	--
			SAI	1	--			
			SRM	2	--			
Total	4			4			11	
Degrees								
Modeling	20	--	SRM	20	--	Research	35	--
						Governmental	8	--
Total	20			20			43	

Those twenty-two research grants comprise 70 payments to organizations (54 [77%] of which are research organizations, see Table 6). The bulk of ARIA's payments went to the UK, where there were 34 such payments for a total of $39,936,000, while twelve went to the US for $5,259,000 (Table 5). The only other country to receive more than one million in funding was The Netherlands, which received $4,349,000 across two payments. ARIA's 54 payments to research organizations totaled $36,961,000 for just under $700,000 per payment on average, compared to payments to the seven profit-seeking organizations which averaged just over $1,500,000 for a total of $10,646,000 (Table 6).

The other two sources of research grant funding from the UK are UKRI-NERC and the Degrees Initiative, neither of which has reported the specific values of their grants. UKRI-NERC reported that they would be funding four research grants (15 payments to 11 organizations) for a total of £10 million (approximately $12.4 million), one grant focusing on SAI, one on MCB, and two that covered multiple SRM technologies (UK Research and Innovation 2025). All but one of the payments are directed to the UK, the other going to the Center for International Climate and Environmental Research, a research organization in Norway.

The Degrees Initiative, formerly the Solar Radiation Management Governance Initiative, is a UK-based organization with a focus on funding solar geoengineering research based in less-developed countries. This started with the launch of the Degrees Modeling Fund (DMF) after receiving additional funding from Open Philanthropy (The Degrees Initiative 2022).

This allowed the DMF to fund nine research grants to recipients based in the global south. Degrees announced continuation of six research grants in 2021, and three new research grants later in 2021, as well as an additional eleven in 2023. In addition to directly funding research, Degrees has organized 30 workshops and conferences since 2011, including five in the 2020–2025 period (The Degrees Initiative 2024).

Degrees provided 22 research grants comprising 52 payments to 44 recipient organizations in twenty-two countries. Because of Degrees' focus on supporting solar geoengineering activity in countries of the Global South, it is not particularly surprising to see that twenty-one payments are directed to Africa, and twenty to Asia (Table 5). Neither the UK nor the US received any payments from these Degrees grants (see Figure 5).

Degrees and the DMF have received significant funding from Open Philanthropy, starting with $500,000 in 2015, a further $2 million in 2017 (Open Philanthropy 2015, 2017), $5 million in 2021, and $2 million in 2024 (Open Philanthropy 2024). In 2024, the Quadrature Climate Foundation provided Degrees $5,448,443 of funding (Quadrature Climate Foundation 2025) and ARIA granted Degrees £940k ($1,183,000) in funding for their role in developing an "open-access repository of detailed Global South climate data" (ARIA 2025).

Among funders for which we have payment information, we also found three sources of research grant funding based in the US. NOAA has contributed close to $4 million in grant funding for five research grants that comprise nine payments to eight US-based research organizations (one organization receives payments from two grants; see Table 7).

Table 7 US Research grants funded by NOAA, NSF, and the Simons Foundation

Research Type	N grants	Value	Technology	N grants	Value	Organization Type	N organizations	Value
National Oceanic and Atmospheric Administration (NOAA)								
Modeling	5	$3,941,071	MCB	2	$1,580,740	Research	8	$3,941,071
			SAI	3	$2,360,330			
Total	5	$3,941,071		5	$3,941,070		8	$3,941,071
National Science Foundation (NSF)								
Governance + ethics	1	$691,909	Geoengineering	1	$1,234,983	Research	12	$4,561,425
Modeling	6	$3,920,832	MCB	1	$386,297	Philanthropic	1	$51,316
			SAI	3	$1,840,440			
			SRM	2	$1,151,021			
Total	7	$4,612,741		7	$4,612,741		13	$4,612,741

Research Type	N grants	Value	Technology	N grants	Value	Organization Type	N organi-zations	Value
Simons Foundation								
Laboratory Experiments	12	--	Cloud Thinning	5	--	Research	35	--
Modeling	7	--	Greenhouse Weakening	1	--	Govern-mental	5	--
			SAI	12	--			
			SRM	1	--			
Total	19			19			40	

The NSF has contributed $4.6 million for seven research grants (Table 7). Similarly, the seven NSF grants comprised sixteen payments to 13 organizations, all US-based. Fifteen payments went to research organizations and one went to the Gordon Conferences, a philanthropy that supported the 2024 Gordon Research Conference on Climate Engineering.

For its part, the Simons Foundation has awarded nineteen research grants over two years of grant funding. They initially reported that they would be spending $10 million per year for five years, starting with the first round of grants in 2024, but no further information about the payments has been made public. Fourteen research projects were awarded funding in 2024 and an additional five were awarded funding in 2025. The Simons Foundation made 47 payments, 41 to research organizations and six to governmental organizations, for which they did not disclose precise amounts. Unlike NOAA and the NSF, the Simons Foundation made payments to thirteen different countries, though the US still received the plurality at twenty-three payments (Table 5).

The European Union is the only other organization that has made research grant payments with a known monetary value. Its one research grant titled GeoEngineering and NegatIve Emissions pathways in Europe (or GENIE) is split between five different research organizations in Germany, Austria, Denmark and the US (Table 5). The project models multiple geoengineering strategies, including both SRM and greenhouse gas removal. GENIE was funded close to $12 million.

General funding

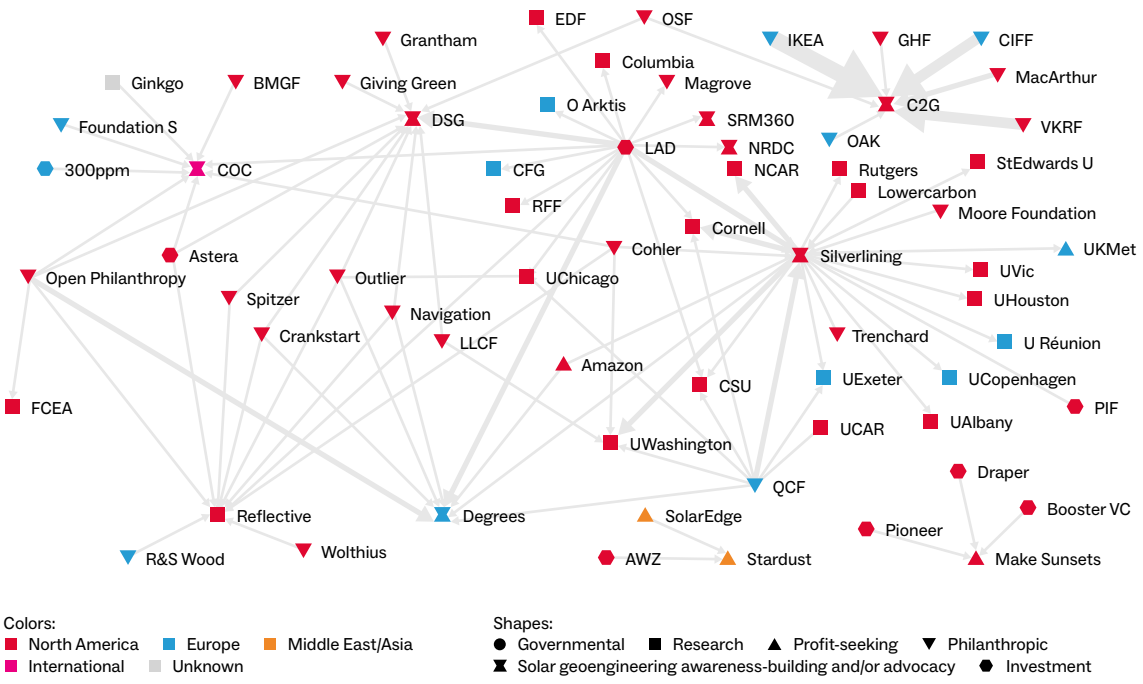
Table 8 presents the information available on the 36 funders who provided general funding for solar geoengineering that we could not tie to a particular research grant. This group funds a total of 33 recipients in eight different countries, plus international recipients. Only three of those did not receive support from the top four funders in this group, highlighting the considerable overlap of funding recipients.

Table 8 General support funders

Funder	Country	Organization type	N recipients	Amount	Country (n recipients)
LAD Climate fund	United States	Investment	16	--	▪ United States (12) ▪ Belgium, United Kingdom, Finland, International (1)
SilverLining	United States	Solar geoengineering awareness-building and/or advocacy	14	--	▪ United States (7) ▪ United Kingdom (3) ▪ France, Denmark, Canada, Unknown (1)
Quadrature Climate Foundation	United Kingdom	Philanthropic	8	$35,827,621	▪ United States (6) $29,375,346 ▪ United Kingdom (2) $6,452,274
Open Philanthropy	United States	Philanthropic	5	$8,066,734	▪ United States (3) ▪ $206,314 ▪ United Kingdom (1) $7,679,399 ▪ International (1) $181,021
Cohler Charitable Fund	United States	Philanthropic	4	--	▪ United States (3) ▪ International (1)
Outlier Projects	United States	Philanthropic	4	--	▪ United States (3) ▪ United Kingdom (1)
Astera Institute	United States	Investment	3	--	▪ United States (2) ▪ International (1)
Crankstart	United States	Philanthropic	3	--	▪ United States (1) ▪ United Kingdom (1) ▪ International (1)
The Navigation Fund		Philanthropic	3	--	▪ United States (2) ▪ United Kingdom (1)
Amazon	United States	Profit-seeking	2	--	▪ United States (1) ▪ United Kingdom (1)
Bernard and Anne Spitzer Charitable Trust	United States	Philanthropic	2	--	▪ United States (2)
Larsen Lam Climate Change Foundation	United States	Philanthropic	2	--	▪ United States (2)
Open Society Foundations	United States	Philanthropic	2	$243,896	▪ United States (2)
Twenty-three other funders	▪ United States (14) ▪ United Kingdom (2) ▪ Germany, Canada, France, Israel, Switzerland, Netherlands, UNK (1)	▪ Philanthropic (14) ▪ Investment (7) ▪ Profit-seeking (1) ▪ Unknown (1)	7 total	--	▪ United States (5) ▪ Israel (1) ▪ International (1)

Figure 8 shows the complex nature of the network of general support funders and recipients. Unlike in Figure 5, here multiple organizations fund several organizations, and several organizations receive general funding from multiple organizations. Solar geoengineering awareness-building and/or advocacy organizations (represented by the hourglass shape) are overwhelmingly receivers of general support funding, with only SilverLining both receiving and providing general support funding. Research organizations (squares) only received general support funding. Some of these research organizations also received research grant funding for specific research projects, but the general support is for unspecified reasons. Philanthropic organizations (downwards triangles) and investment organizations (hexagons) are the only organizations other than SilverLining that provided any general funding. Similar to previous figures, almost all of the organizations that provide or receive general support funding are from North America (red) or Europe (Blue). Only the Carbon Overshoot Commission (COC, international), the Ginko Fund (unknown) and Stardust and SolarEdge (Middle East) are outside of those two regions.

Figure 8 General funding flows



General funding payments by the top funders are summarized in Table 9. The impact of Open Philanthropy starts before the temporal scope of this report: in 2015, it provided $500,000 (unadjusted) for Degrees to start the DMF and begin granting funds. In 2017, Open Philanthropy provided $2,500,000 (unadjusted) to both Degrees and Harvard's solar geoengineering Research Program, as well as a further $1 million (unadjusted) to UCLA's Emmett Institute. These funds represented significant contributions to all solar geoengineering funding at the time. Open Philanthropy's general funding payments are listed in Table 9.

Quadrature Climate Foundation (QCF), an offshoot of Quadrature Capital, is another foundation started by hedge-fund billionaires that has pledged significant funding to solar geoengineering projects. In 2024 QCF told MIT Technology Review that they intended to provide $40 million in solar geoengineering funding over three years (Temple 2024). Based on the funding they have announced on their website, since mid-2023 QCF had provided over $35 million for solar geoengineering projects, primarily as support for re-granting organizations and academic institutions. In addition to this $35 million, QCF has also conferred over $33 million in funding towards Carbon Dioxide Removal (Quadrature Climate Foundation 2025).

QCF has provided $35,828,000 in funding for solar geoengineering activities, primarily in the US, across seven payments totaling $29,375,000, including two payments to SilverLining for $12,171,000 in total. Aside from those payments and one made to Degrees in 2024 for $5,467,000, all of QCFs funding has gone to research organizations. The remaining six payments to research organizations total $18,190,000, none of which provide details about what projects they might be used for beyond general support. Three are labeled for support for SRM, one for MCB, and two for "climate intervention" in general.

SilverLining is an NGO that describes its focus to be near-term earth system safety and security, which it pursues by accelerating research and innovation into earth system modeling and observations in addition to various solar geoengineering technologies. SilverLining is one of the three organizations in this report that is both a recipient of solar geoengineering related funding, and a funder of solar geoengineering activities. SilverLining received about $12,425,500 in funding from QCF in two payments (Quadrature Climate Foundation 2025), as well as funding from LAD climate fund, Chris Sacca's Lowercarbon Capital, the Pritzker Innovation Fund, Amazon, and several other individuals, although the nature and value of these transactions is unknown (LAD 2025; Safe Climate Research Initiative 2020).

SilverLining helped establish the University of Washington's MCB research program and launched an SAI research program as well (Flavelle and Bates 2024). SilverLining has developed extensive roadmaps for research on all fronts of their mission, and their work is not limited to the above. SilverLining has also created the Safe Earth System Research Initiative (SESRI, formerly Safe Climate Research Initiative) to support research into near-term climate risks and solar geoengineering (SilverLining 2024). Through SESRI, SilverLining has funded many research projects, distributing over $7 million in grants and directing an additional $15 million in funding towards solar geoengineering activities (SilverLining 2024). In 2021 SilverLining partnered with Amazon to receive and provide others access to Amazon Web Services cloud resources so that climate models could be accessed on the public could, as well as over $3 million in cloud computing and data services (Peckham 2021; SilverLining 2022).

Table 9 General funding payments of top funders

Year	Recipient organization	Country	Amount	Reason
		Open Philanthropy		
2024	Alliance for Just Deliberation on solar geoengineering	United States	$99,981	General Funding
2024	Degrees Initiative	United Kingdom	$2,001,927	General Funding
2022	Forum for Climate Engineering Assessment	United States	$106,333	General Funding
2022	Climate Overshoot Commission	International	$181,021	General Funding
2021	Degrees Initiative	United Kingdom	$5,677,411	General Funding
--	Reflective	United States	--	General Funding
		Quadrature Climate Foundation		
2025	Climate Systems Engineering Initiative (CSEi)	United States	$4,919,108	Funding U of Chicago's Climate Systems Engineering initiative's (CSEi) to conduct solar radiation management research.
2024	Colorado State University	United States	$4,604,255	Support for research on solar geoengineering to reduce near-term climate risk.
2024	Cornell University	United States	$2,508,464	Support for solar radiation management (SRM) research.
2024	Degrees Initiative	United Kingdom	$5,466,889	Support for capacity building in the Global South to examine solar geoengineering implications.
2024	SilverlLining	United States	$11,768,021	Support for research and advocacy around understanding and equitably considering solar geoengineering to reduce near-term risks.
2024	University Corporation for Atmospheric Research	United States	$2,603,205	Support for Solar Radiation Management research.
2024	University of Exeter	United Kingdom	$985,385	Support for research on solar geoengineering.
2023	University of Washington	United States	$2,569,646	Support for research on marine cloud brightening.
2023	Silverlining	United States	$402,648	Support for research and advocacy around understanding and equitably considering solar geoengineering to reduce near-term risks.
		SilverLining		
2020	Cornell University	United States	--	Safe Climate Research Initiative
2020	Degrees Initiative	United Kingdom	--	Safe Climate Research Initiative
2020	Rutgers, The State University	United States	--	Safe Climate Research Initiative
2020	The National Center for Atmospheric Research	United States	--	Safe Climate Research Initiative
2020	University of Washington	United States	--	Safe Climate Research Initiative
--	Colorado State University	United States	--	General Funding

Year	Recipient organization	Country	Amount	Reason
--	Cornell University	United States	--	General Funding
--	SUNY Albany	United States	--	General Funding
--	The National Center for Atmospheric Research	United States	--	General Funding
--	UK Meteorological Office	United Kingdom	--	General Funding
--	Université de la Réunion	France	--	General Funding
--	University of Copenhagen	Denmark	--	General Funding
--	University of Exeter	United Kingdom	--	General Funding
--	University of Houston	United States	--	General Funding
--	University of St. Edwards	Unknown	--	General Funding
--	University of Victoria	Canada	--	General Funding
--	University of Washington	United States	--	General Funding

Ultra-rich individuals behind funder organizations

Earlier sections of this report have described the funding patterns of many of the organizations detailed below. What follows is a presentation of the individuals behind the organizations and a brief discussion of the individuals' and organizations' overall outlook.

Table 10 Ultra-rich individuals and their organizations

Ultra-rich individual(s)	Net worth	Source of fortune	Fortune organization	Solar geoengineering relevant organizations	Recipients of funding
Greg Skinner & Suneil Setiya	£980 million each*	Investment (general)	Quadrature Capital	Quadrature Climate Foundation	Climate Systems Engineering Initiative, SilverLining, University Corporation for Atmospheric Research, Degrees Initiative, Cornell University, University of Washington, Colorado State University, University of Exeter
Chris Sacca		Investment (Technology)	Lowercase Capital	Lowercarbon Capital	SilverLining
Rachel Pritzker		Inheritance	Hyatt hotels & Marmon	Pritzker Innovation Fund	Harvard's Solar Geoengineering Research Program, SilverLining
Michael Moritz	$7.2 billion†	Investment (Technology)	Sequoia Capital	Crankstart	Alliance for Just Deliberation on Solar Geoengineering
Dustin Moskovitz	$11.7 billion†	Startup (Technology)	Meta (co-founder)	Open Philanthropy	Degrees Initiative, Harvard's Solar Geoengineering Research Program, Alliance for Just Deliberation on Solar Geoengineering
James Simons	$32.5 billion (estate)†	Investment (general)	Renaissance Technologies	Simons Foundation	Direct Grants
Bill Gates	$105.1 billion†	Startup (Technology)	Microsoft	Fund for Innovative Climate and Energy Research, Bill and Melinda Gates Foundation	Harvard's Solar Geoengineering Research Program, Climate Overshoot Commission
George Soros	$7.5 billion†	Investment (general)	Soros Fund Management	Open Society Foundations	Carnegie Climate Governance Initiative, Alliance for the Just Deliberation on Solar Geoengineering
Jeremy Grantham		Investment (general)	GMO LLC	Grantham Foundation	Alliance for Just Deliberation on Solar Geoengineering

Ultra-rich individual(s)	Net worth	Source of fortune	Fortune organization	Solar geoengineering relevant organizations	Recipients of funding
Jed McCaleb	$2.9 billion†	Startup (Crypto)	Ripple	Navigation Fund, Astera Institute	Degrees Initiative, Alliance for Just Deliberation on Solar Geoengineering, Reflective, Climate Overshoot Commission
Chris Larsen	$10.8 billion†	Startup (Crypto)	Ripple	Larsen Lam Climate Change Foundation	Alliance For Just Deliberation on Solar Geoengineering, University of Washington's MCB project
Mike Schroepfer		Startup (Tech)	Meta (CTO 2013–2022)	Outlier Projects, Gigascale Capital	Degrees Initiative, Reflective, Alliance for Just Deliberation on Solar Geoengineering, Climate Systems Engineering Initiative
Larry Birenbaum, Andrew Verhalen, David Schwartz		Startups (Tech)	Various networking startups	LAD Climate fund	Degrees Initiative, Climate Overshoot Commission, SilverLining, Climate Systems Engineering Initiative, Cornell University, Colorado State University, Alliance for Just Deliberation on Solar Geoengineering, Reflective, Columbia University
Matt Cohler		Startup (Tech)	Meta	Cohler Charitable Fund	The University of Washington Marine Cloud Brightening Project, Climate Overshoot Commission, Reflective, SilverLining
Armand Neukermans		Labor (Tech)	Xerox	The University of Washington Marine Cloud Brightening (MCB) Project	Climate Systems Engineering Initiative, Harvard's Solar Geoengineering Research Program
John Wolthius		Startup (Tech)	Twilio	Individual investor	Reflective
Bill Trenchard		Startup (Tech)	LiveOps, Jump Networks	Individual investor	SilverLining

* Source: The Sunday Times (2025) † Source: Forbes (2025b)

Table 10 displays the ultra rich individuals who fund solar geoengineering. As the sources of their wealth make clear, these funders overwhelmingly come from a technology background. Some of them invested in technology, others were founders of successful tech or crypto startups. What follows below are details about the founders or their organizations and their relevant investments, philanthropy, and philosophy. A more complete description of these funders' backgrounds and of their organizations can be found in Appendix B.

Quadrature Climate Foundation

In 2023, while QCF was making significant donations to climate and environmental causes, Quadrature Capital had stakes worth more than $170 million in fossil fuel companies (Stacey 2023). Based on Q2 2025 filings with the US Securities and Exchange Commission, it appears Quadrature Capital now holds less stake in fossil fuels, but maintains a substantial ownership in technology companies, specifically in companies that are boosters of artificial intelligence, which has now become a significant consumer of energy. Of the $5.80 billion in Quadrature Capital's reported stake, $1.19 billion comes from just their eight largest tech holdings. These include giants Apple, Alphabet, Meta, Microsoft, and Oracle as well as hardware manufacturers Micron and Nvidia. While all of these stocks may be great money-making bets, the business models of each of these companies currently requires a rapid expansion in energy consumption for their biggest investments to pay off (Guidi et al. 2024; O'Donnell 2024).

LowerCarbon Capital

LowerCarbon Capital was founded by Chis Sacca who still runs the organization. Sacca's vocal support of not just solar geoengineering research but of its use as well was noted at the beginning of this report : he sees no way for humans to survive on earth without solar geoengineering (Neuhauser 2023).

Pritzker Innovation Fund

Rachel Pritzker, founder of The Pritzker Innovation Fund is also the chair of Third Way and on the board of the Breakthrough Institute, both of which champion climate solutions through technological innovations, including support for high-risk technologies such as solar geoengineering, and other speculative technologies such as direct air capture and advanced nuclear. Prizker is also one of eighteen signatories of An Ecomodernist Manifesto published by the Breakthrough institute. The manifesto questions limits to growth of both human population and economic expansion and expresses a belief that improving current efficiency trends in factors like labor per unit of agricultural output and water use in human diets will continue until human impacts on the earth begin to decline in the aggregate, all through thoughtful deployment of technological improvements (Asafu-Adjaye et al. 2015)[9].

9 A longer discussion of ecomodernism can be found in Appendix B.

Open Philanthropy

While Open Philanthropy has been a big supporter of solar geoengineering and other climate-related issues, the organization's current focus is clearly directed more towards an AI-based future. Open Philanthropy's grants labeled for "potential risks from advanced AI" represents their second most funded area since 2020, and fourth of all-time. The area of global catastrophic risks is less funded and since late 2023 has funded primarily AI safety and alignment research. The last grant they list in their database for solar geoengineering was attributed in 2022, though it increased its funding in October of 2024 (Open Philanthropy 2025).

Fund for Innovative Climate and Energy Research

Starting in 2007 Bill Gates began providing funds totaling $7,765,000 by 2018 in a fund called the Fund for Innovative Climate and Energy Research (FICER) to be directed to geoengineering research at the control of prominent solar geoengineering researchers Keith David and Ken Caldeira (Keith 2010; Necheles et al. 2018). These funds were used both for solar geoengineering and carbon capture research, as well as partially funding three early assessments of geoengineering: the UK Royal Society report on Solar Radiation Management, the US Taskforce on Geoengineering, and a 2009 Novim report (Keith 2010; Vidal 2012). Bill Gates has long taken an engineering-first approach to climate change. As noted above, in 2010 Bill Gates' understanding of climate change was as a wholly technical endeavor, citing technological changes as the only way to reduce emissions, and failing that falling back to solar geoengineering (TED 2010).

The Navigation Fund and Astera

Jed McCaleb began his philanthropic activity after making billions in cryptocurrencies, donating to advanced AI related causes with the Machine Intelligence Research Institute and OpenAI and also founding his own philanthropic ventures. Part of the endowment for the organization he funded, The Navigation Fund, is invested in an AI startup called Voltage Park (The Navigation Fund 2024a). The other organization he funds, Astera, preaches an abundant future through artificial intelligence, automation of science and engineering, and advances in other sciences improving our technological future (Astera Institute 2025a).

Solar geoengineering startups

Two startup companies have been founded since 2022 attempting to monetize SAI technologies (Table 11). Stardust is an Israeli startup backed by Israeli energy company SolarEdge and Canadian-Israeli venture capital firm AWZ Ventures that invests largely in AI and security startups, including AI-powered facial recognition company Corsight.[10]

Make Sunsets was funded by three technology-focused venture capital firms. Those are Draper Associates, founded by tech startup investor Tim Draper, Boost VC, who invest in "Sci-fi" technology and have Tim Draper's son Adam Draper as a partner, and Pioneer Fund, a venture capital fund comprised of over 490 Y Combinator alums that also has Make Sunsets co-founder Luke Iseman as an Investment Partner (Make Sunsets 2025).

Table 11 Solar geoengineering Startups

Startup	People	Funders	Notes
Make Sunsets	Andrew Song, Luke Iseman	Boost VC, Pioneer Fund, Draper associates	Both founders are Y Combinator alumni. One of their major funders is Pioneer Fund, a VC firm made up of former Y Combinator alums. Sam Altman was president of Y Combinator during much of if not all of their time at Y Combinator. Luke Iseman is a Senior venture Partner at Pioneer Fund.
Stardust	Yanai Yedvab	AWZ Ventures, SolarEdge	AWZ Ventures AI, security, and surveillance startups. SolarEdge is an Israel based technology company that makes power inverters and other products for commercial and residential solar photovoltaic installations.

Using public statements from David Keith, Make Sunsets has decided that one gram of aerosol in the stratosphere offsets one ton of CO2 emissions, and is thus one cooling credit, which they sell for $10. It is unclear if they collect any data to test this claim. Recently, Make Sunsets claimed to sell a bit over $10,000 in cooling credits per month (Make Sunsets 2025).

10 The New York Times reported that Corsight's technology has been used by Israeli armed forces during the genocide of Palestinians in the Gaza Strip (Frenkel 2024).

Summary of findings and synthesis

There has been a dramatic uptick in solar geoengineering funding across the time period considered in this report, with total known funding increasing ten-fold from 2020 to 2025. The number of payments and of research grants has also increased dramatically over that time, and at least some granting institutions pledged sustained funding through new research grants for several years beyond 2025. Funding from philanthropic sources was at its highest in 2024, while governmental spending skyrocketed in 2025 when newly launched UK-based ARIA, started distributing grants for solar geoengineering research. Data collection ended in September 2025, and already new announcements are being made. On October 24, Politico reported that private US-Israeli firm Stardust Solutions will receive an additional $60 million from LowerCarbon Capital and other Silicon Valley billionaires and venture capitalists, as well as from a new player in the field, the Agnelli family who made its fortune in Italian carmaking. The new funds are to be used to conduct stratospheric experiments with no release of particles (Hiar and Mathiesen 2025; Meyer 2025). Additional funding will very likely be distributed before the end of the year, or be made public as organizations publish their next annual reports.

Clear patterns emerge from the data presented in this report. **First, funding for solar geoengineering follows an uneven geography:** All funders but one are based in North America or Europe. The only exception is an Israeli utility that has invested in US-Israeli startup Stardust Solutions. In all, over two-thirds of all funders are based out of the US, and over half of those have direct links to Silicon Valley and other high technology firms. Similarly, while some recipient organizations are dedicated to expanding solar geoengineering research or conversations to other nations, nearly 65% of all recipients are based in Europe or North America. The Degrees Initiative is bringing geographical diversity into the picture, as a number of its grants support projects in Asia, Africa, and Latin America. Yet, this persistently biased distribution of overall funding flows toward the Global North runs contrary to the expressed will to include interests from the Global South in solar geoengineering research and governance. Up to now, solar geoengineering gets the most traction with the new tech elite of the Global North, but has been staunchly rejected by countries of the Global South (Biermann and Gupta 2024).

Second, the vast majority of funding is directed to solar geoengineering research: nine-tenths of all recipients of funding are universities or governmental research organizations. ARIA changed the picture in 2025 as it started distributing large grants for work into different aspects of solar geoengineering research. As well, whereas private organizations like philanthropic foundations, investment funds and private firms fund both research and awareness and advocacy activities, ARIA and other government funders support almost exclusively solar geoengineering research. Two thirds of the research funded between 2020 and 2025 uses modelling to assess how different aspects of solar geoengineering strategies would affect the climate over time. Public funders do provide

support through research grants for a small number of outdoor experiments, that they qualify as "controlled, small-scale experiments."

Third, it is almost exclusively private funding that supports solar geoengineering awareness and/or advocacy groups. Some of the groups funded explicitly promote outdoor experimentation, a topic that led to much controversy in the past as advocates shut down planned experiments, including the SCoPEx project that did not have public assent and did not respect Indigenous Saami sovereignty on their land (Keutsch Group at Harvard 2021; Henriksen et al. 2021).

Fourth, the high-tech sector turns out to be a major source of funding: Of the 33 philanthropy or investment capital funders, more than half got their capital from Silicon Valley and other high-tech firms or startups. Our data confirms Surprise and Sapinski's (2023) previous study of funding between 2007 and 2020, and shows that their conclusions hold for the period 2020–2025. This technological focus of the funders of a technological remedy for climate change may not be surprising, as it is the continuation of a same mindset. Beyond Silicon Valley's ideological outlook though, it also poses the question of the economic interests that would be upheld by the use of solar geoengineering strategies: given the recent boom of generative AI and the large increase in electricity demand it has already spurred, it appears that the continued growth of the industry would benefit a lot from solar geoengineering that would delay the greenhouse gas emissions reductions that are urgently needed and allow to stretch further the era of fossil fuels.

Overall, we thus find that tech billionaires from the richest countries are increasing their support of solar geoengineering, and at least the UK government is following suit with new research grants. Most of the funding still supports research, suggesting that actual broad-scale use of solar geoengineering is still not close to taking place. Yet, California-based startup Make Sunsets has been selling credits for spreading sulfur in the stratosphere (Make Sunsets 2025).

Notwithstanding the critiques attacking their credibility, their actions, and the emergence of another private company in the field of for-profit solar geoengineering in early 2025 — Stardust Solutions — exemplify how private actors may grow to prominence in the field under the current market-driven climate governance system (Surprise et al. 2025).

Conclusion: some final considerations

Broadly speaking, viewing solar geoengineering as a way to push back the boundaries for acceptable greenhouse gas emissions is another iteration in a long line of technological fixes to problems with a social origin. When faced with an ecological problem, a technofix is one that attempts to rectify it "through better ingenuity, technological innovations, efficiency, and the operation of the market" (Clark and York 2013:23). This way of understanding ecological problems — typical of the tech billionaires cited in the introduction — is limited and harmful. While many people, including the funders of solar geoengineering activity, understand that there is no technological panacea, they still see no need for any restructuring of the social order. Their technological optimism is nearly boundless as for many who are also betting on speculative technologies like carbon capture or advanced AI. The reason they see for needing more time to decarbonize society is so that there is more time to develop a technological breakthrough that will enable avoiding societal change.

Wealthy investors and philanthropists, as well as governments all have risen to the levels of influence that they have now in a world that looks very much like the one we live in. It is in their best interest to make any transitions as gradual as possible in order to maintain the status quo and the influence they currently have. While some of them maintain in techno-optimist or eco-modernist fashion that technologcal progress will see us through and no change in social relations is necessary, many scientists disagree and call for a move away from the pursuit of affluence (Ripple et al. 2020).

Additionally, the current trend in technology, and investing for that matter, is in artificial intelligence or AI. Recent reports on the energy consumption of AI servers and data centers shows that the total energy used by US data centers more than doubled between 2018 and 2023 in large part due to AI. Estimates say this could nearly triple again, from 4.4% to as high as 12% by 2028, with more than half of that electricity use coming from AI accelerated servers (Shehabi et al. 2024). To meet rising energy demands Microsoft is planning to reopen a shuttered nuclear power plant by 2028, Meta is investing in the expansion of another, and xAI is using fifteen gas turbines to power one data center (Kolodny 2025; Mandler 2024; Ott 2025). With the energy demand growth of AI, decarbonization becomes a significant challenge for the tech industry.

Funders and researchers of solar geoengineering may agree that large-scale high technology strategies are not a solution on their own and could only ever be effective when paired with rapid decarbonization. However, some funders affirm that "'climate overshoot' is now inevitable" (The Navigation Fund 2024b) and that decarbonization and adaptation "might not be enough to safely manage 'temperature overshoot'" (Outlier Projects 2025), indicating they are already preparing for the necessity of that "Band-Aid". It is a strange situation to see such actors supporting research into a technology they might accept may not be an effective solution, while simultaneously

advancing pathways that make more likely the conditions under which they find solar geoengineering necessary.

As this report makes clear, the locus of solar geoengineering funding, research, and other activity is in North America and Europe. While there is some research being conducted in the Global South, even that is funded by organizations in the Global North whose decision makers are also predominantly from the Global North. The US and Europe are responsible for a combined 57% of all historical carbon emissions but there are 92 countries more vulnerable to climate change than any European country or the US (Global Carbon Budget 2024; Notre Dame Global Adaptation Initiative (ND-GAIN) 2025). It is those most responsible for the current state of climatic change that wish to advance solar geoengineering research, governance, and advocacy. In turn, many of those that are leading the push for the non-use of solar geoengineering are in the Global South (Biermann and Gupta 2024). It is those most at risk of losing influence through rapid decarbonization, not those that face the biggest risks from an unchecked climate crisis, who support solar geoengineering.

Solar geoengineering is far from a technological panacea. Its impacts are largely unknown and will remain so unless it is deployed and its effects are discovered in real time. Reacting to detrimental impacts might not be as easy as simply ceasing the deployment due to termination shock and reversal of changed weather patterns. Whoever controlled the decisions surrounding solar geoengineering development or deployment would exercise tremendous authority over those who did not. There is significant risk that solar geoengineering will further disrupt an already turbulent climate system.

Appendix A: Additional methodological details

Standardization of payment currency

Because the known payments included in this report include payments in three different currencies across a five year time period it is necessary to unify these payments into one constant, comparable value. This was done by inflation-adjusting each currency to the most recent date where all three currencies, US dollars, pounds sterling, and euros, had a measure of consumer price indices available. The Harmonized Index of Consumer Prices (HICP) was used for the Euro area (Eurostat 2025) as it is the only measure of consumer prices available for the Euro area with monthly granularity. Because HICP data for the UK ends in December of 2020, adjustments to the value of pounds sterling were made using the UK Consumer price index (Organization for Economic Co-operation and Development 2025a) and inflation for the US dollar was calculated using the same measure (Organization for Economic Co-operation and Development 2025b).This kept the measure for US dollars and pounds sterling calculating change in value over time using the same measure, which was important considering the bulk of transactions occurred in one of the two currencies. After inflation-adjusting each measure to a constant value set equivalent to December of 2024, each currency was converted to USD using the Board of Governors of the Federal Reserve System's spot price for December 2024 (Board of Governors of the Federal Reserve System (US) 2025b, 2025a). This allows for one value to be compared between multiple funding sources by considering the current value of that money to the funder if they had not chosen to fund the projects that they funded, ignoring any considerations of investment returns, etc.

Aggregation of organizations

Some universities were also aggregated to a small extent so that different sub-organizations could be grouped into their larger organization. This occurred where multiple departments might have received funds or where one department has received funds while other funding remains specified only to the university level. For example, funding from three separate sources was directed to Colorado State University, while the Colorado State University Department of Atmospheric Science received funding from one additional source. In this report all of this funding is reported as going to Colorado State University. Additionally, when funding was directed to a researcher who was listed with more than one organization only the first listed organization was counted, both for parsimony and to avoid counting payments more than once.

Definition of payments

In this report the term payment is used to denote any known instance of funds being transferred between organizations. Because most of the known connections between

organizations do not have known monetary values it is necessary to use a different metric to capture all payments, not just the ones that a value can be attached to.

If an organization is known to have funded another organization on two occasions, that would count as two payments. If one organization received funding for three separate grants from one organization that would count as three payments. If a recipient lists a funder as a supporter or vice versa, but no further information is known that is one payment.

Take Cornell University as an example. Cornell received funding for three separate research grants from ARIA, this counts as three payments from ARIA as the research grants are discrete reasons for funding. Cornell is also listed twice as receiving payments from SilverLining for different general payments, so there are two payments from SilverLining to Cornell. In contrast, the LAD Climate fund reports that they have provided funding to Cornell, but no other information is known. This is counted as one payment because that is all that is known, even though it is possible that the support is in the form of multiple payments.

In some cases, it might be possible to make a guess about the quantity of money involved in a transaction based on other known figures involving one of the two parties or a reported total that cannot be further decomposed. However, because known payments vary wildly, from below £10,000 to over $10,000,000 the accuracy of such a guess would be suspect. Still, without knowing the values of each payment, the count of payments is the best way to account for the payments without known values.

Notes on categorization of organization types

Awareness-building and/or advocacy organizations: Awareness-building organizations produce and distribute information about a chosen cause, solar geoengineering or other, and advocacy organizations also aim to build capacity towards that cause. If that chosen cause is research of some type but the organization is not primarily aimed at conducting the research, just funding or advocating for it, then the organization is still classified as awareness-building and/or advocacy.

Research organizations: Primarily academic institutions but also includes research institutes and other private organizations that conduct original research. In cases where an organization is government funded but has research as its primary aim that organization is considered governmental for the purposes of this report.

Investment organizations: In some cases, it is unclear whether or not these organizations intend to make a return on the specific contributions covered in this report, however if it is their typical mode of operation to do so they are included as an investment organization. Some organizations are not clear in their public information whether or not they typically invest or give philanthropically, so organizations that made no mention of philanthropy, or charity or non-profit status, and who had no available paperwork from the relevant tax authorities regarding such status, were considered investment organizations.

For-profit organizations: if a company aims to make a profit through any means other than investment in other organizations it is considered for-profit, with the exception of startups for whom deploying solar geoengineering is the product.

Startups: Startups are any organization that are a for-profit organization for whom solar geoengineering is the product, or produces the produce, i.e. "cooling credits."

Technology researched

The technology researched is listed only as explicitly as the grant materials say. That means that if the grant only mentions geoengineering but not a more precise category of technology then it remains listed as geoengineering. The same is the case for the general term solar radiation management. In the case of "geoengineering" ten of the twelve research grants listed as geoengineering were granted by ARIA; these grants displaying an apparent preference for talking about projects as "earth cooling", "climate cooling", or "climate intervention" instead of as more specific technologies. Of the twenty-eight research grants labeled as SRM, twenty of them were granted by the Degrees Initiative, displaying their apparent preference to talk about their projects in more general terms as well, this time using SRM as their term of choice.

Research grants labeled with the more general geoengineering or SRM account for 40 of the 78 funded projects in this report. Of the remaining technologies SAI dominated the field. Twenty-two research grants were awarded for its study, while marine cloud brightening is next with nine research grants. Five research grants were awarded to study cloud thinning, while one each were awarded to a grant studying greenhouse weakening, and another to study re-freezing of summertime arctic ice melt. Eleven of the thirteen laboratory experiment grants are for SAI related research specifically. Twelve of those grants come from the Simons Foundation.

Appendix B: Further information about companies and their founders

Greg Skinner & Suneil Setiya – Quadrature Climate Foundation

Greg Skinner and Suneil Setiya founded the quantitative hedge fund Quadrature Capital in 2010 in London. Quadrature Capital uses machine learning, artificial intelligence, and other algorithmic trading strategies to execute trades. Quadrature Capital spun off QCF in 2019 as a climate-focused philanthropic arm.

Chris Sacca

Chris Sacca began investing as an individual in 2006 while still corporate council at Google. His first investments were Photobucket and Twitter, both of which were profitable technology investments. In 2010 Sacca founded venture capital firm Lowercase Capital to expand his investment opportunities. Lowercase invested in Uber, Docker, Twilio, Instagram, Twitter, Kickstarter, Medium, and Stripe, among others. This earned Sacca the number two spot on Forbes' 2017 top 100 venture capitalists in the world (Konrad 2017). In 2017 Sacca retired from Lowercase and "regular" startup investing and simultaneously founded Lowercarbon Capital. Lowercarbon has invested in over 90 companies that cover a very broad range of goals and technologies, ranging from simple and pragmatic to highly speculative technologies like nuclear fusion and direct air capture for removing CO2 from the atmosphere.

Rachel Pritzker – Pritzker Innovation Fund

Rachel Pritzker is a member of the Pritzker family, who have earned a combined $41.6 billion dollar fortune through the Hyatt hotel chain and further investment (Forbes 2024). Pritzker is in the fourth generation of the famous family and has targeted issues of climate change, sustainable energy use, and energy accessibility. The Pritzker Innovation fund Describes itself as taking on "wicked" problems, problems that are "so complex they defy easy understanding" (Pritzker Innovation Fund n.d.). The fund claims that promoting ideas and intellectual work will maximize their impact, with Pritzker saying "If you can help fund work that examines underlying assumptions, you can have tremendous leverage" (Callahan 2015).

Dustin Moskovitz – Open Philanthropy

Dustin Moskovitz is one of the co-founders of Meta (then Facebook) and the company's first CTO. He left the company in 2008 to found the multi-billion-dollar tech platform Asana before founding philanthropic organizations Good Ventures in 2011 and Open

Philanthropy in 2017. He and his wife Cari Tuna use their fortune exceeding $11 billion to fund both organizations' philanthropy.

Jed McCaleb – The Navigation Fund, Astera Institute

Jed McCaleb is a cryptocurrency entrepreneur with an estimated net worth of $2.9 billion (Forbes 2025b). He founded a cryptocurrency exchange, followed by two cryptocurrencies as such, Ripple and Stellar (Popper 2018).

The Navigation Fund has four focal areas, but within its focus on climate change the fund has sub-focuses on reducing derailment risks for decarbonization and increasing public understanding of emergency climate interventions. The first focus covers risks that would prevent decarbonization such as disasters, refugee crises, or unrest, but also covers the "risk" of not pursuing all possible technologies to ease decarbonization such as carbon dioxide removal. The second focus covers SRM, glacier stabilization, and other possible interventions (The Navigation Fund 2024b). Part of the Navigation Fund's endowment is invested in an AI startup called Voltage Park (The Navigation Fund 2024a).

Astera Institute is an incubator of sorts that aims to bring in scientists working on high impact open science for a yearlong residency. It also promotes AI research as well as general scientific research. One of Astera's residents is the CEO of Reflective, Dakota Gruener (Astera Institute 2025b).

Chris Larsen – Larsen Lam Climate Change Foundation

Chris Larsen has founded several tech startups in his career, primarily focused on companies with a financial focus. His net worth is currently estimated at $11.4 billion. Larsen was a co-founder of cryptocurrency Ripple alongside Jed McCaleb in 2013 (Forbes 2025a). The LLCCF provides both investment in for-profit organizations and philanthropic support for organizations who are accelerating decarbonization, lowering the cost of CO2 removal or trying to change climate policy. The LLCCF claims that entrepreneurship and innovation are the keys to climate solutions (Larsen Lam Climate Change Foundation 2024).

George Soros – Open Society Foundations

George Soros is a billionaire financier and survivor of the German Nazi regime in Hungary. He made his fortune as an investor and hedge fund founder, starting in the 1970s. In 1979 Soros began philanthropic giving to pro-democracy causes, which continues through today, now through the Open Society Foundations (Open Society Foundations 2025). The Open Society Foundations donated $244,000 to the Carnegie Climate Governance initiative. In 2023 Soros told the crowd at the Munich Security Conference that he believed climate change was an existential threat and expressed

support for an arctic MCB concept (Schwartzkopff and Bochove 2023). Soros was already the target of many unfounded conspiracy theories prior to his speech, and further unfounded conspiracies about weather control technology abounded. Soros provided early funding for DSG, but there is no public record of his involvement in any additional solar geoengineering activities.

Mike Schroepfer – Outlier Projects, Gigascale Capital

Mike Schroepfer was a former CTO of Meta, and is now heading two organizations, Gigascale Capital which invests very early into startups in climate critical fields, and Outlier Projects, a philanthropic endeavor to fund science aimed at preventing climate risks.

Outlier has funded programs in glacier stabilization, super pollutant abatement and removal, carbon dioxide removal, and SRM.

Matt Cohler – Cohler Charitable Fund

Matt Cohler was an early employee at Meta before he left for venture capital firm Benchmark where he backed profitable investments in many tech startups, including Dropbox, Asana, Quora, and Duo Security. Cohler has invested in several solar geoengineering related organizations through his Cohler Charitable Fund (Cooke and Snaith 2024).

Larry Birenbaum, Andrew Verhalen, David Schwartz – LAD Climate Fund

Larry Birenbaum, Andrew Verhalen, David Schwartz are three individuals from the networking and telecom industries who decided to pool their resources and found the LAD Climate Fund (presumably named after the three founder's first initials). They argue solar geoengineering research is necessary because they saw emissions reductions as insufficient (Birenbaum, Verhalen, and Schwartz 2025). LAD Climate Fund has funded many organizations in this report, but because the details of these agreements are not made public it is unclear the extent of their financial contributions.

Armand Neukermans

Armand Neukermans is a former Xerox employee who holds many patents, including those for spraying ink particles. It was this that brought David Keith and Ken Caldeira to him to see if he could develop a nozzle for MCB testing (Flavelle and Bates 2024). Neukermans has been involved with multiple MCB projects including the University of Washington's MCB project (Cooke and Snaith 2024). Neukermans has also donated to the Climate System Engineering initiative at the University of Chicago (CSEi 2025).

John Wolthius

John Wolthius was a co-founder of the tech startup Twilio, one of the companies that Lowercarbon capital backed. Since exiting Twilio, Wolthius has become an investor in tech startups.

Bill Trenchard

Bill Trenchard is a startup founder and venture capitalist who started two tech businesses and has funded far more both as an individual and within VC firms. Trenchard was an early supporter of HSGRP, before the scope of this report, and continues to support solar geoengineering research.

Make Sunsets

In 2022 American startup Make Sunsets was founded by two Y Combinator alumni. Luke Iseman was in Y Combinators incubator program in 2014 before returning as the director of hardware in 2015 (Altman 2015). In winter of 2016 Andrew Song entered the Y Combinator incubator to incubate a different company. Years later, the two reconvened to create Make Sunsets, a venture capital backed startup that injects sulfur into the stratosphere and charges for the “cooling credits” that they claim to create.

Stardust

In 2023 Israeli company Stardust was founded to research and eventually deploy SAI. The company has received at least $15 million in funding from Israeli green energy company SolarEdge, and Canadian-Israeli VC firm AWZ Ventures (Skibba 2025).

Appendix C: A brief discussion of some of the recipients of funding

The Climate Overshoot Commission

The Climate Overshoot Commission is a group of twelve commissioners from twelve different nations brought together to explore response options to exceeding the 1.5°C limit suggested by the Paris Agreement, including further adaptation, carbon dioxyde removal, and solar geoengineering. Most of the commissioners are former government officials, including several former heads of state. The commission contained no practicing scientists and only a few commissioners had any environmental backgrounds. The committee formed in May of 2022 and eventually released its report in September 2023 in advance of the 2023 UN Climate Change Conference. The report calls for rapid expansion of Carbon Dioxide Removal, at one point saying "the increasing likelihood of overshoot makes CDR virtually unavoidable" (Lamy et al. 2023:110). Acknowledging the risks of SRM claiming they are "opposing any use or assumption of use at this stage" (2023:10) the report calls for a moratorium on outdoor testing, but only "large-scale outdoor experiments that would carry risk of significant transboundary harm" (Lamy et al. 2023:86).

The concept of the committee originated in the policy paper of a geoengineering advocate, while several members of the steering committee that developed it were drawn from prominent programs of geoengineering research and advocacy (Geoengineering Monitor 2022). Most of the funders of the Climate Overshoot Commission are also included elsewhere in this report as having funded solar geoengineering activities, or having their core funder also funding solar geoengineering activities.

Carnegie Climate Governance Initiative (C2G)

The Carnegie Climate Governance Initiative was an initiative of the Carnegie Council for Ethics in International Affairs that sought to bring about governance of geoengineering technologies, including carbon dioxide removal and solar geoengineering. Using a problematic risk-vs-risk framework comparing the risk of solar geoengineering to unchecked climate change C2G attempted to bring conversations about solar geoengineering and carbon dioxide removal to governing bodies and decision makers. C2G formally closed down in 2023.

Alliance for Just Deliberation on Solar Geoengineering

The Alliance for Just Deliberation on Solar Geoengineering (DSG) focuses on questions of governance and ethics surrounding solar geoengineering, and claims to elevate the voices of the people who would be most impacted by solar geoengineering deployment. DSG asserts that they approach solar geoengineering questions from a social

perspective, not limiting their approach to be scientific and technical. DSG claims neutrality on questions of solar geoengineering deployment, but do support small scale outdoor experiments with sufficient scientific merit and oversight. DSG limits support of outdoor experiments to be in line with the CBD 2010 decision, not the less strict COC guidelines (Alliance for Just Deliberation on Solar Geoengineering 2025a).

Appendix D: List of organizations' short names and acronyms

Short Name	Organization	Short Name	Organization
300ppm	300ppm	AAC	AAC Clyde Space
Aarhus	Aarhus University	AER	Atmospheric and Environmental Research Inc
AGCI	The Aspen Global Change Institute, Inc.	Amazon	Amazon
ANU	Australian National University	AppState	Appalachian State University
Archipelago	Archipelago Technology	Arctic	Arctic Reflections
ARIA	ARIA	Astera	Astera Institute
ASU	Arizona State University	AWZ	AWZ Ventures
BAS	British Antarctic Survey	BMGF	Bill and Melinda Gates Foundation
Boost VC	Boost VC	C2G	Carnegie Climate Governance Initiative
CFG	Centre For Future Generations	CIFF	Children's Investment Fund Foundation
CIT	California Institute of Technology	COC	Climate Overshoot Comission
Cohler	Cohler Charitable Fund	Columbia	Columbia University
Comsats	Comsats University Islamabad	CONICET	National Scientific and Technical Research Council (Conicet)
Cornell	Cornell University	Crankstart	Crankstart
CSEi	Climate Systems Engineering Initiative	CSU	Colorado State University
Degrees	Degrees Initiative	Draper	Draper Associates
DSG	Alliance for Just Deliberation on Solar Geoengineering	Duke	Duke University
EDF	Environmental Defense Fund	Ethos	Ethos Space
EU	European Union	FCEA	Forum for Climate Engineering Assessment
FMI	Finnish Meteorological Institute	Foundation S	Foundation S
FTWU	Fatima Jinnah Women University	GHF	Green Horizons Fund
Ginkgo	Ginkgo Fund	Giving Green	Giving Green
Gordon Conferences	Gordon Research Conferences	Grantham	Grantham Foundation
Harvard	Harvard University	IIASA	International Institute for Applied Systems Analysis
IIU	International Islamic University	IKEA	IKEA Foundation
Imperial	Imperial College London	Indiana U	Indiana University
IPR-IFRA	Institut polytechnique rural de formation et de recherche appliquée	ITS	Institut Teknologi Sepuluh Nopember

Short Name	Organization	Short Name	Organization
LAD	LAD Climate fund	LLCF	Larsen Lam Climate Change Foundation
Lowercarbon	Lowercarbon Capital	LSU	Louisiana State University
MacArthur	MacArthur Foundation	Make Sunsets	Make Sunsets
Mangrove	Mangrove Media	MCC	Mercator Research Institute for Global Commons and Climate Change
Menapia	Menapia Ltd	Moore Foundation	Gordon and Betty Moore Foundation
Navigation	The Navigation Fund	NCAR	The National Center for Atmospheric Research
NERSC	Nansen Environmental and Remote Sensing Center	NOAA	National Oceanic and Atmospheric Administration
NRDC	Natural Resources Defense Council	NSF	National Science Foundation
O Arktis	Operaatio Arktis	OAK	OAK Foundation
OECD	The Organisation for Economic Co-operation and Development	Open Philanthropy	Open Philanthropy
OSF	Open Society Foundations	Outlier	Outlier Projects
PIF	Pritzker Innovation Fund	PIK	Potsdam Institute for Climate Impact Research
Pioneer	Pioneer Fund	PSF	Planetary Sunshade Foundation
Purdue	Purdue University	QCF	Quadrature Climate Foundation
R&S Wood	Richard and Sabine Wood	Real Ice	Real Ice
Reflective	Reflective	RFF	Resources for the Future
Riken	Riken	Rutgers	Rutgers, The State University
SilverlLining	SilverLining	SolarEdge	SolarEdge
Spitzer	Bernard and Anne Spitzer Charitable Trust	SRM360	SRM360
Stardust	Stardust Solutions	TERI	The Energy and Resources Institute
Trenchard	Bill Trenchard	TUDelft	Delft University of Technology
U Réunion	Université de la Réunion	UAlbany	SUNY Albany
UBristol	University of Bristol	UCambridge	University of Cambridge
UCAR	University Corporation for Atmospheric Research	UChicago	University of Chicago
UCI	University of California Irvine	UCL	University College London
Ucolorado	University of Colorado	UCopenhagen	University of Copenhagen
UCT	University of Cape Town	UEA	University of East Anglia
UExeter	University of Exeter	UGlasgow	University of Glasgow
UHertfordshire	University of Hertfordshire	UHouston	University of Houston
UKMet	UK Meteorological Office	ULeeds	University of Leeds
ULiverpool	University of Liverpool	UManchester	University of Manchester

Short Name	Organization	Short Name	Organization
UMT	University of Montana	UNIVIE	University of Vienna
UNottingham	University of Nottingham	UOxford	University of Oxford
UPLB	University of the Philippines Los Baños	UReading	University of Reading
UStEdwards	University of St. Edwards	UVIC	University of Victoria
UW Madison	University of Wisconsin-Madison	UWashington	University of Washington
VKRF	V. Kann Rasmussen Foundation	Voltitude	Voltitude Ltd
Wolthius	John Wolthius		

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