



Sector Report
Climate Risk Management

October 2026



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Summary

Why did we decide to focus on climate risk management?

Climate risk—elevated damage under high-temperature scenarios—matters because damage scales nonlinearly with warming and the worst-case outcomes carry outsized consequences. We examined this sector because of the scale of potential downside risks.

There are multiple ways to address climate risk, and our report assesses three strategies:

1. Advancing solar radiation modification (SRM) governance and research.
2. Influencing natural feedback systems.
3. Abating short-lived climate pollutants (SLCPs).

Our work on climate risk complements, rather than replaces, Giving Green's core focus on deep decarbonization.

How have we prioritized opportunities in climate risk management?

We assessed each strategy on scale, feasibility, and funding need. All three rated similarly on the first two dimensions—each is a high-scale opportunity with real but potentially manageable feasibility challenges.

On funding need, [advancing SRM governance and research](#) ranked first, with annual funding of roughly \$44 million USD on average from 2021-2025, compared with a global need potentially in the hundreds of millions. While we are uncertain whether the field could productively absorb funding at that global scale, funding to date has been highly geographically imbalanced. Namely, low- and middle-income countries (LMICs) received only 3% of total SRM funding through 2025.

Natural feedback systems ranked second, as philanthropic support is sparse, though absorptive capacity may be relatively low given limited evidence, organizations, and intervention readiness. SLCPs ranked third, almost entirely because the space is comparatively well-resourced for its size. For example, foundation spending reached \$180 million in 2024, and the Global Methane Hub has raised over \$500 million in pooled philanthropic funds since its 2021 launch.

We therefore prioritize advancing SRM governance and research, but remain open to funding promising philanthropic opportunities under the other two strategies. We know that our prioritized strategy is riskier than the other two strategies. Advancing SRM governance and research may never lead to responsible deployment, or any deployment at all, while progress on natural feedback systems and SLCPs carries less downside risk.

What do we recommend funding in climate risk management?

Our recommendations in [advancing SRM research and governance](#) focus on the quality of decision-making rather than on any particular decision. We do not advocate for deployment since the risks of it going badly are real and impossible to eliminate, and the evidence base is far too thin. However, we do not want to see the field foreclosed by a

premature ban that would prevent the research needed to make good long-term judgments.

Since SRM remains largely controversial and poorly understood, we think philanthropy's clearest comparative advantage is opening political pathways by engaging key stakeholders, including the institutions, funders, and individuals best positioned to legitimize the research field. Those inroads create the conditions for building the research governance infrastructure SRM lacks. We also support strengthening LMIC capacity to shape SRM research and governance to reflect diverse geographic perspectives and the reality that LMICs are likely to shape future governance and deployment decisions.

Why Do We Focus on Climate Risk Management?

Defining Climate Risk

Giving Green's mission is to improve human and ecological wellbeing. We aim to increase funding for high-impact strategies that reduce climate change's negative effects on people and the planet.

Here, we focus on managing climate risk, which we define as elevated climate damage under high-temperature conditions. This framing captures two features that are easy to miss when climate change is discussed only in terms of the most likely average warming:

1. **Climate damage scales non-linearly with temperature:** A given increment of warming causes disproportionately more harm at higher temperatures than at lower ones. One recent estimate finds that global economic losses reach roughly 10% of gross domestic product (GDP) at 3°C of warming—up to 17% in poorer, lower-latitude countries—compared to about 3% at 1.5°C of warming.¹ Potential tipping points, such as coral reef die-off and ice sheet collapse, also contribute to non-linearity. Once a threshold is crossed, a tipping point can push a system into self-perpetuating change that causes an abrupt jump in damage.² Peer-reviewed economic modeling estimates that tipping points raise the social cost of carbon by

¹ 1.5° and 3°: "Global GDP is estimated to be 3.2% lower (lower/upper decile: 1.2–5.4%) at +1.5 °C of global warming, compared to a world with no further climate change beyond recent levels. At +3 °C, global GDP decreases by 10.0% (5.1–14.9%)." [Waidelich et al., 2024](#)

Poorer countries: "...we show that at +3 °C global average losses reach 10% of gross domestic product, with worst effects (up to 17%) in poorer, low-latitude countries." [Waidelich et al., 2024](#)

² "Here we define a tipping point as occurring when change in part of a system becomes self-perpetuating beyond a threshold, leading to substantial, widespread, frequently abrupt and often irreversible impact (inspired by Armstrong McKay et al., 2022 and Milkoreit et al., 2018). This definition includes the possibilities of non-abrupt and reversible tipping points." [Global Tipping Points Report, 2023](#)

approximately 25% relative to a no-tipping-point baseline, with a roughly 10% chance that tipping points more than double it.³

2. **Climate risk includes tail risk:** Low-probability but high-impact outcomes that fall outside the “most likely” warming range have outsized consequences given their severity.⁴ Even at a relatively moderate 1.5°C of warming, nearly the entire global population lives in a country facing a non-negligible chance of GDP damage of 5% or higher once climate variability and extremes are taken into account.⁵ The Intergovernmental Panel on Climate Change’s own estimates of climate sensitivity reflect this same asymmetry. Its best estimate for warming from doubled CO₂ is 3°C, but the odds skew toward much higher warming than much lower warming.⁶ Tipping points illustrate this: uncertainty about whether and where their thresholds will be crossed makes them the kind of severe, low-probability outcome this sector targets.⁷

These dynamics—damages that worsen disproportionately at higher temperatures, and the outsized risk of severe, low-probability outcomes—are major reasons we focus on high-temperature outcomes. In addition, philanthropic interest in this sector has grown markedly in recent years, drawn to a cluster of strategies that aim to reduce climate risk and steer the planet away from tipping points.⁸ Because parts of this sector are speculative and lack established frameworks for philanthropic guidance, we see an opportunity for Giving Green to act as a thought leader by making our reasoning transparent as our views develop.

This work is a small part of Giving Green’s broader portfolio, which centers on deep decarbonization. Our primary approach delivers value across the full range of temperature scenarios, from moderate to severe. Some of the strategies within the

³ “Collectively, climate tipping points increase the social cost of carbon (SCC) by 25% in our main specification. The distribution is positively skewed, however. We estimate an ~10% chance of climate tipping points more than doubling the SCC.” [Dietz et al., 2021](#)

⁴ For more information on the likelihood of future emissions and temperatures, we recommend [Venmans and Carr, 2024](#)

⁵ “Even at +1.5 °C, tail risks are substantial, with 99% of the global population living in countries with a non-negligible risk of suffering GDP damage of 5% or higher if all climate indicators are included. Notably, including variability and extremes increases tail risks considerably...” [Waidelich et al., 2024](#)

⁶ “According to the IPCC, our best estimate for ECS is a 3°C temperature rise per doubling of CO₂, with a “likely” range of (66 to 100% likelihood) of 2.5 °C to 4°C. While an ECS below 1.5 °C was essentially ruled out, there remains an 18% probability that ECS could be greater than 4.5 °C (14). The distribution of ECS is “heavy tailed,” with a higher probability of very high values of ECS than of very low values.” [Kemp et al., 2022](#)

⁷ See Figure 2a for tipping point temperature thresholds. [Armstrong McKay et al., 2022](#)

⁸ Climate risk: For example, San Francisco Climate Week 2026 included an event called “Stabilize Earth,” which included speakers working on “methane reduction, directly cooling the arctic, massive scale CDR, cloud seeding, pulling energy out of hurricanes, and more.” Our understanding is that the event was partly geared towards philanthropists. [Stabilize Earth, 2026](#)
Stabilization: There has been a growing effort within philanthropy to categorize this cluster as “climate stabilization.” We choose the phrase “climate risk” because we believe it is most legible to our readers. For more information on the downsides of describing this work as climate stabilization, we recommend the following resource: [African Tech Futures Lab, 2026](#).

climate risk sector, by contrast, are useful primarily in more extreme, high-temperature scenarios.⁹ We therefore treat this sector as a complementary area of work, not a substitute for our core decarbonization focus. For more on the sectors, strategies, and sub-strategies Giving Green prioritizes, see [our research dashboard](#).

Three Strategies for Addressing Climate Risk

This report focuses on three strategies that approach climate risk from different angles (**Table 1**). As we define it, climate risk can be addressed in many ways beyond the three we examine below. We discuss why other approaches fall outside this report's focus in the "Scope and Exclusions" subsection below.

Table 1: Strategies for addressing climate risk

Strategy	Approach to Climate Risk
Advancing solar radiation modification (SRM) governance and research	Aims to produce research and governance structures that can potentially constrain issues of deterred mitigation and work toward more just, transparent (non-)deployment decisions. <i>SRM itself would aim to mask warming by reflecting sunlight rather than reducing greenhouse gas (GHG) emissions. It remains unclear whether SRM should ever be deployed, and we treat this question as unresolved rather than presupposing an answer in our own work.</i>
Influencing natural feedback systems	Aims to intervene in physical systems and reduce warming-induced emissions (e.g., methane emissions from permafrost thaw or tropical wetlands)
Abating short-lived climate pollutants	Aims to abate short-lived climate pollutants (SLCPs) (e.g., methane) that drive near-term warming and buy time before the Earth reaches a tipping point. Because SLCPs have short atmospheric lifetimes, abating them can also help bring temperatures back down faster if the world overshoots a given warming target.

These strategies differ substantially in mechanism, timescale, reversibility, and maturity. The next section explains how we weighed these strategies against one another and where we ultimately chose to focus our work.

⁹ For example, we think solar radiation modification would most likely only be deployed under especially high-temperature scenarios.

Scope and Exclusions

We exclude accelerated decarbonization and social tipping points (such as efforts to induce rapid dietary shifts) from our climate risk lens because we already evaluate those opportunities as part of our core portfolio. We further exclude climate change adaptation, research into tipping points, and early warning systems because we do not believe our mitigation-focused research process and expertise are as transferable to those areas. SRM sits somewhat outside our usual framework, but we continued to track it in 2026 after first evaluating it in 2024.

Some elements commonly grouped under climate risk and tipping points—such as Atlantic Meridional Overturning Circulation (AMOC) collapse and coral reef loss—do not map cleanly onto our approach for evaluating the three strategies above, so we have not investigated them closely. For example, we understand that AMOC interventions would likely involve early warning systems and adaptation, which fall outside our scope. We excluded coral reef loss because we view it as an *impact* of anthropogenic climate change, not a natural feedback that causes greater warming.

Our Prioritization Approach

We evaluated strategies in this space along three dimensions: [scale, feasibility, and funding need](#). Applying this framework across our three strategies, we find that advancing SRM governance and research, influencing natural feedback systems, and abating SLCPs rate similarly in scale and feasibility (**Table 2**). Each represents a high-scale opportunity with real but potentially manageable, although distinctive, feasibility challenges. The three sharply diverged on funding needs. This divergence is the primary reason we have sequenced SRM research and governance and natural feedback systems first for deeper investigation, while treating SLCPs as a lower priority.

Table 2: Scale, feasibility, and funding need of strategies to manage climate risk

Sub-strategy	Scale	Feasibility	Funding Need
Advancing SRM governance and research	High	Medium	High
Influencing natural feedback systems	High	Medium	Medium
Abating short-lived climate pollutants	High	Medium	Low

We prioritized strategies with no low ratings and expand on our reasoning in the following section. More information is available in our [Advancing Solar Radiation Modification Governance and Research](#) strategy report.

Priority #1: Advancing SRM Governance and Research

Scale ●●● High

Feasibility ●●● Medium

Funding need ●●● High

SRM would theoretically cool the Earth by increasing the amount of sunlight that the atmosphere reflects back to space or reducing the trapping of outgoing thermal radiation. Critically, SRM would mask warming rather than address its root cause of GHG emissions. SRM would not be a reliable tool for addressing tipping points, given the large uncertainties in the effects of SRM on the drivers of different Earth system tipping elements.¹⁰ Therefore, we still need to drive down underlying GHG emissions regardless of any hypothetical SRM deployment.

We considered four potential SRM approaches in our strategy report: space-based, stratospheric, cloud-based, and surface-based. We ruled out space-based and surface-based approaches on feasibility and scale grounds, respectively.¹¹ We therefore prioritized stratospheric and cloud-based approaches. **Giving Green does not advocate deploying these approaches.** Instead, our focus is on advancing SRM governance and research so that, if deployment is ever considered, the decision-making process is well-informed and just.

We also believe that philanthropic and public portfolios should focus overwhelmingly on mitigation and adaptation. To align our actions with this belief, we (1) focus our grantmaking portfolio on mitigation, with SRM composing a small fraction of grants, and (2) require grantees applying for funding under this strategy to describe how they minimize moral hazard risks.

Scale: High. Interest in SRM is growing largely because of the widening gap between the pace of mitigation and the pace of warming. Compared to emission cuts, SRM looks fast-acting and cheap. Modeling suggests stratospheric aerosol injection (SAI)—the most studied SRM approach—could in principle lower global mean temperatures by 2–5°C and that cooling effects could happen within a year of deployment.¹² Smith (2020) estimated that a hypothetical SAI program lowering global mean temperature by 1°C would have

¹⁰ See Table 1 in [Futerman et al., 2025](#)

¹¹ Space-based approaches: "Due to the magnitude of space-based deployment required for such an undertaking, and the enormous cost of putting objects into orbit, these options appear impractical for addressing threats posed by climate change this century." [National Academies of Sciences, Engineering, and Medicine \(NASEM\), 2021](#)

Surface-based interventions: "To date, studies indicate limited potential for such approaches, and the efficacy and environmental consequences of these approaches have yet to be carefully studied." [NASEM, 2010](#)

¹² "An operational SAI deployment could be scaled up to produce global cooling of 2–5°C, albeit with diminishing returns at higher rates of injections." [United Nations Environment Programme \(UNEP\), 2023](#)

"In contrast to the longer timescales of mitigation, an SRM deployment could produce a substantial reduction in radiative forcing in as little as one year." [UNEP, 2023](#)

annual costs of approximately \$18 billion.¹³ This cost would cover deployment hardware and operations only, and exclude the potentially high damages, side effects, and governance burdens SRM would carry.¹⁴ For comparison, the International Energy Agency estimated that in 2025, roughly \$2.2 trillion flowed into clean energy, meaning such a program would have an annual cost under 1% of what the world already spends on the energy transition each year.¹⁵ Speed and low direct cost could make deployment tempting to governments facing severe climate impacts, and they also open the door to geopolitical competition.¹⁶ Advancing SRM governance and research is important to both create norms and decision-making processes that make a hasty or unilateral response to temptation less likely, and to improve our understanding of SRM's risks.

We ran an internal cost-effectiveness analysis (CEA) to stress-test our decision to prioritize advancing SRM governance and research. We modeled a hypothetical scenario in which SRM is deployed at a scale sufficient to reduce global temperatures by 1°C. Because SRM's impact is usually reported in climate damages, we converted expected damages into metric tons of CO₂-equivalent (tCO₂e) terms so we could compare it to our other strategies.

Although our strategy focuses on governance and research rather than deployment, we think the case for that work depends on deployment being a credible option worth preserving: if SRM would not be worth deploying even in a worst-case scenario, there would be little reason to direct further resources toward it. Ultimately, we found the expected reduction in climate damages of SRM at this scale to be much larger than corresponding mitigation impacts of other prioritized decarbonization strategies, which helped justify our decision to explore SRM. However, the CEA had several significant assumptions that likely caused it to overstate SRM's expected value, so we treat its results as directional only.¹⁷ We think the stronger case for the scale of SRM work came from

¹³ "What remains remarkably constant however is the annual cost to suppress 1 °C of warming, which remains within 10% of \$18 billion irrespective of the scenario chosen." [Smith, 2020](#)

¹⁴ "Moreover, this analysis also excludes any indirect costs for damages that might accrue either from SAI or from climate change itself. Those could be orders of magnitude larger than the aggregate program budget." [Smith, 2020](#)

"However, SRM comes with at least four political and social challenges that are not accounted for in such calculations. First, best estimates from Irvine et al. indicate that SAI will harm 0% to 7% of the world's population as a side-effect, such that those people would demand compensation from the technology's winners. Using existing (and conservative) metrics to calculate the amount of side-effect harm for SAI, we estimate that such harms would fall between \$0 and \$809 billion annually." [Bronsther & Xu, 2025](#)

¹⁵ "Around USD 2.2 trillion is going collectively to renewables, nuclear, grids, storage, low-emissions fuels, efficiency and electrification, twice as much as the USD 1.1 trillion going to oil, natural gas and coal." [International Energy Agency \(IEA\), 2025](#)

¹⁶ "In climate-oriented governance parlance, SRM engenders a 'free-driver' logic because any capable actor could in theory attempt to engineer a preferred climatic state. For security-related actors, drivers of unilateral development (or use) resided much more in distrust towards (and competition with) other countries than climate risks." [Corry, McLaren, Kornbech, 2024](#)

¹⁷ For instance, it assumed a social cost of carbon (SCC)—estimates vary across the literature—and used a fixed emissions trajectory that does not model any feedback between SRM and mitigation ambition. It most likely overstated SRM's expected value, since we think large-scale deployment is only likely in worst-case warming scenarios, which are themselves improbable. It

more qualitative governance considerations. We did not attempt to measure the scale of well-governed SRM research using our typical methods of estimating tons of CO₂ averted, as that framing does not map well onto decisions about SRM.

Our qualitative argument is that well-governed SRM research matters regardless of whether SRM is ever deployed. We think sufficient governance does two things at once:

- First, it guards against moral hazard. By keeping mitigation and SRM discussions institutionally linked, good governance can help ensure that interest in SRM does not translate into reduced pressure for emissions cuts. Governance frameworks that explicitly frame SRM as a temporary, last-resort supplement to mitigation, rather than a substitute, help keep attention and resources on the root problem even as SRM research advances.
- Second, it builds toward more just and transparent decision-making. Currently, SRM research is fragmented and dominated by a small set of well-resourced actors, mostly in high-income countries (HICs).¹⁸ Investing in inclusive, transparent governance work that brings in voices from low- and middle-income countries (LMICs) means that if a decision on SRM research or (non-)deployment is eventually made, it is made deliberately and with broad legitimacy.

We believe choosing whether to advance SRM research carries scale-related risks in both directions, and we do not think it is productive to weigh these as a hypothetical trade-off between two comparably sized harms. In particular, advancing SRM research could create a moral hazard, while neglecting this work carries its own risks. Without adequate research and established governance norms, the field could face a premature ban that forecloses access to a potentially valuable tool before it is fully understood, or it could increase the odds of a hasty and ill-informed decision. Rather than weigh these risks in the abstract, the more useful question is how to reduce both at once. Governance work that explicitly guards against mitigation deterrence, paired with continued pressure to accelerate mitigation itself, addresses both risks simultaneously.

We do not recommend funding technical deployment capacity because it would sit outside our risk-mitigation logic.

Feasibility: Medium. We focused our feasibility assessment on whether further philanthropic investments can make any future SRM (non-)deployment decision more equitable, better governed, and lower risk. We think the answer is yes. Research improves our understanding of SRM's risks and benefits, while appropriate governance frameworks could ensure that (non-)deployment decisions account for the perspectives of the communities SRM would most affect—particularly those in LMICs. We are not yet confident that a fair, rights-respecting, multilaterally agreed deployment of SRM is itself

also excluded the risk of "termination shock," a rapid rebound in warming if deployment were ever halted abruptly. While we found the CEA helpful for our own prioritization decision, we are not sharing this analysis publicly given those uncertainties; we do not want it read as a more authoritative conclusion than we intend, nor do we want it misread as an endorsement of deployment. We modeled deployment only to produce an estimate of scale comparable to that estimated for our mitigation strategies, and the model provided one limited input into our scale assessment.

¹⁸ See Figure 1 in [Biermann & Möller \(2019\)](#)

achievable; if further research and exploration indicates that this goal is not achievable, we would advocate for global consensus on non-deployment and diversion of resources away from SRM. At this relatively early stage, however, we think well-considered and inclusive research both reduces the risks of a poorly designed or governed deployment and provides valuable clarity on the tools at our disposal for minimizing climate damages.

Advancing SRM governance and research still faces major challenges. First, SRM's controversial nature and geopolitically uneven effects, combined with many groups' historical reluctance to engage on the issue, may make it especially difficult for countries to build adequate consensus around governance structures. Second, significant scientific uncertainty complicates governance design. For example, how SRM would affect different populations, how its risks and benefits would fall across different regions, and how deployment would actually unfold at the local level all remain open questions.¹⁹ Third, SRM research faces a risk of public backlash, which has already disrupted outdoor experiments.²⁰ Even small-scale field tests have drawn significant local opposition, which has played a role in cancellations. This backlash illustrates how difficult it may be for SRM to build the public trust needed to advance research.

Funding need: High. We think SRM's funding needs differ sharply by type of work and geography, and we want to be more nuanced than any particular rating allows.

Cumulative funding for SRM reached \$267 million through 2025, and annual funding in the 2021–2025 period averaged roughly \$44 million per year, or 11 times higher than the 2011–2015 average.²¹ Between 2005 and 2025, philanthropy contributed roughly \$102 million (38%) of total SRM funding, followed by government funding at \$87.5 million (33%).²² Commercial investment has historically been minimal but is growing (\$77.5 million, 29%). Stardust Solutions has now raised a cumulative \$75 million in venture capital—its 2023 backing from Awz Ventures (\$15 million) followed by a larger 2025 round—to develop a patented SAI system it hopes governments will eventually deploy.²³

¹⁹ For a deep look at the challenges SRM faces, we recommend the National Academies report. [NASEM, 2021](#)

²⁰ Canceled outdoor experiments include SCoPEX in 2021 and the University of Washington's Marine Cloud Brightening project in 2024. [SRM360, 2025](#)

²¹ We calculated annual funding based on data provided by SRM360. "Funding for SRM reached a cumulative total of \$267 million through 2025 and was 11 times larger in the five years from 2021–2025 (\$214 million) compared to ten years earlier in 2011–2015 (\$19.1 million). Adjusting for inflation, that is more than 8 times larger (\$221 million vs. \$26.4 million)." [SRM360, 2026](#)

²² We caution that public SRM funding figures are likely incomplete because some funders have not disclosed full information. "Through 2025, philanthropic funding was the leading source at \$102 million, or about 38% of the total. That is followed by governmental sources in second place (\$87.5 million, 33%) and commercial sources in third (\$77.5 million, 29%)." [SRM360, 2026](#)

²³ Funding: "On the commercial side, Awz Ventures, a Canadian-Israeli-US firm with ties to defence agencies, supported Stardust in 2023 with \$15.0 million. With additional investors from the US, UK, and across Europe, its 2025 fundraising round brought Stardust's total investment to \$75.0 million." [SRM360, 2026](#)

Use of technology: "Stardust Solutions, a company led by a team of Israeli physicists, announced on Friday that it has raised \$60 million in venture capital to develop technological building blocks that it says will make solar geoengineering possible by the beginning of next decade... It is seeking

Many SRM researchers consider Stardust's opaque for-profit research to be inappropriate in this space, in contravention of the governance principles proposed thus far, including the Oxford Principles, Calgary Code, and Asilomar statement.²⁴

We think funding remains short of what the field needs. The National Academies of Sciences, Engineering, and Medicine (NASEM) has called for \$100 million to \$200 million over five years for a national research program in the U.S. alone, suggesting the true global need may be in the hundreds of millions.²⁵ We treat this figure with caution rather than as an independent benchmark, given that researchers with a direct interest in expanding funding for their field produced it; we are unfamiliar with any independent corroboration of this level of need. We are also uncertain whether the existing research community could absorb funding at this scale even if it were available. Our uncertainty rests on (1) how many institutions currently have the staff, infrastructure, and disciplinary breadth to responsibly scale up SRM-related research, and (2) how much time it typically takes a small field to build that level of capacity even when funding is available.

We see the largest funding gaps in LMICs, which received only \$7.8 million, or 3% of overall funding.²⁶ We also think significant disparities likely exist in the types of SRM research that get funded. For example, through 2020, only about 34 papers were published on the social science dimensions of SRM, compared to 221 on atmospheric science and 105 on climate science.²⁷

We do not believe philanthropy should fill the entire funding gap for advancing SRM governance and research. Instead, we think SRM research should function as a public good, with governments playing the leading role in building transparent, cross-disciplinary national research programs. In line with NASEM, we see philanthropy as a complement to, not a replacement for, government funding.²⁸ We also view private, for-profit funding of SRM as problematic without a governance structure that ensures the technology serves the public good. For-profit approaches to SRM, such as "cooling

a patent for aspects of its geoengineering system, including protections for the reflective particles that it hopes governments will eventually disperse in the atmosphere." [Heatmap, 2025](#)

²⁴ Lack of transparency: "Stardust is currently not sharing information about the particles it intends to release into the sky, though it says it plans to do so once it secures a patent, which could happen as soon as next year." [Heatmap, 2025](#)

Contravention to governance principles: All three frameworks converge on public disclosure of methods and data. For more information, see [Rayner et al., 2013](#), [Hubert, 2020](#), and [Asilomar statement, 2010](#).

²⁵ "The committee suggests that a reasonable initial investment in SG research is in the range of \$100–200 million total over 5 years." [NASEM, 2021](#)

²⁶ "The Global North also received 97% of the total. Still, \$7.8 million in funding has flowed to 22 countries in the Global South, in large part from the non-profit Degrees Initiative. This organisation plans to continue funding researchers in the Global South, with \$5.1 million in future funding commitments." [SRM360, 2026](#)

²⁷ See "Figure 2.2." [NASEM, 2021](#)

²⁸ "As a general approach, philanthropic support for SG research and research governance (and related activities such as capacity building and engagement) should complement rather than replace core U.S. federal support for these activities." [NASEM, 2021](#)

credits," could lead to both inadequate mitigation and increasingly risky reliance on geoengineering.²⁹

Please see our strategy report, [Advancing SRM Governance and Research](#), for more information, including potential risks and key uncertainties.

Priority #2: Influencing Natural Feedback Systems

Scale ●●● High

Feasibility ●●○ Medium

Funding need ●●○ Medium

We considered three natural climate feedback pathways that amplify warming:

- Carbon loss from permafrost thaw and boreal wildfire.
- Methane emissions from (sub-)tropical wetlands.
- Reduced reflectivity from melting ice and snow.³⁰

Of these three, we removed *reduced reflectivity from melting ice and snow*. First, non-SRM interventions that directly act on ice sheets may have low feasibility, since they are still in early research stages and face major governance and logistical hurdles.³¹ Second, SRM interventions relevant to preventing ice and snow loss overlap with work we already cover under our [Advancing SRM Governance and Research](#) strategy.³²

Scale: High. Permafrost thaw and boreal wildfire dominate the quantified picture, together adding up to an annualized 4.2 billion to 4.6 billion tCO₂e per year between 2025 and 2050.³³ Notably, 60% of permafrost emissions are expected to occur after 2100, meaning

²⁹ For instance, inadequate mitigation would happen if companies sell "cooling" as a substitute for real emissions cuts, while increased risk would happen if companies race to deploy unproven SRM technologies. "Researching solar geoengineering technologies under these conditions, without more restrictive governance concerning commercial activities and powerful private sector actors, is likely to lead to the advancement of solar geoengineering amidst inadequate mitigation." [Surprise et al., 2025](#)

³⁰ We did not consider "Released emissions from Amazon dieback" because we think most of the direct work there would be forestry-related interventions that we either have not prioritized or more so fall under the traditional Giving Green umbrella.

³¹ For more information on low feasibility, please see [Siegert et al., 2025](#). Arctic summer sea ice is a partial exception, since it responds quickly to temperature change and partially reforms seasonally. However, the promisingness of Arctic summer sea ice was not enough for us to keep the broader pathway in scope.

³² In addition to these considerations, the primary concern with ice sheet loss is sea-level rise, which does not translate cleanly into our standard framework of comparing interventions based on avoided GHG emissions.

³³ We calculated this by dividing mean total emissions by the number of years. "On a shorter timescale (2025–2050), mean total emissions (i.e., under-represented processes combined with gradual thaw) were between 105 ± 49 Gt CO₂e and 116 ± 56 Gt CO₂e, an increase of between 185% and 202% compared to emissions from gradual thaw alone." [Schädel et al., 2026](#)

near-term figures understate the long-run commitment.³⁴ Abrupt thaw also remains poorly captured in large-scale models, which simulate only gradual soil thawing. Despite affecting just 2.5 million square kilometers of the permafrost zone, the climate feedback from abrupt thaw could rival that of gradual thaw across the entire 18 million square kilometer region under high-emissions warming, adding uncertainty to these estimates.³⁵

(Sub-)tropical wetlands also face warming-induced emissions. It is estimated that for every 1°C increase in global mean land surface temperature, wetland methane emissions will increase linearly at an average rate of about 24 million metric tons per year.³⁶ Using a 100-year global warming potential (GWP), a 1°C increase in temperature from today would lead to additional wetland emissions of 0.65 billion tCO₂e.³⁷

These figures for permafrost and wetlands represent a ceiling on the total warming contribution from these feedbacks. They capture *both* the emissions already locked in regardless of intervention and the portion that could still be influenced, rather than isolating what is actually addressable. Our estimates are highly uncertain given the poor capture of abrupt thaw in permafrost models mentioned earlier, as well as challenges in estimating methane emissions from wetlands globally.³⁸ Even if only half of the emissions from natural feedback systems were addressable, we would still rank it as high in scale.

Feasibility: Medium. A 2025 Cascade Institute assessment of permafrost thaw identified 13 potential interventions, three of which are ready for deployment today.³⁹

- **Managing wildfires:** Fire is a major driver of permafrost thaw, so reducing the number and intensity of fires slows down the thaw rate.⁴⁰
- **Increasing large herbivore density:** Adding more caribou or other Arctic rewilding may prevent permafrost thaw by compacting snow, which cools the ground.⁴¹

³⁴ "Any substantial warming results in a committed, long-term carbon release from thawing permafrost with 60% of emissions occurring after 2100, indicating that not accounting for permafrost emissions risks overshooting the 2°C warming target." [Schaefer et al., 2014](#)

³⁵ "The permafrost zone is expected to be a substantial carbon source to the atmosphere, yet large-scale models currently only simulate gradual changes in seasonally thawed soil... Emissions across 2.5 million km² of abrupt thaw could provide a similar climate feedback as gradual thaw emissions from the entire 18 million km² permafrost region under the warming projection of Representative Concentration Pathway 8.5." [Turetsky et al., 2020](#)

³⁶ "Our results suggest that for every 1°C increase in global mean land surface temperature, eCH₄ increases linearly ($R^2 = 0.67$) at an average rate of 24 ± 10 Tg CH₄ yr⁻¹." [Zhang et al., 2026](#)

³⁷ We estimated this using a GWP100. If we used GWP20, it would be closer to 2 GtCO₂e.

³⁸ For information on challenges, see section "4.4 Remaining challenges" in [Forbrich et al., 2024](#).

³⁹ See Table A: Overview of the assessed interventions. [Cascade Institute, 2025](#)

⁴⁰ "Overall, this study shows that wildfire has been a major driver of peat plateau loss due to accelerated thermokarst bog development in boreal western Canada, and thus likely a major cause of permafrost thaw in this region where a majority of the permafrost is found in peatlands." [Gibson et al., 2018](#)

⁴¹ "Winter grazing and movements by the animals compact snow, thereby substantially decreasing the thermal insulation efficiency of snow. This allows much colder freezing of soil in winter, hence colder overall mean annual soil temperature. The hypothesis is that this cooling effect may prevent permafrost from thawing or at least postpone the degradation." [Beer et al., 2020](#)

- **Conserving and restoring peatlands:** Arctic peatlands and wetlands sit on top of permafrost and insulate it from surface heat.⁴² Increasing tundra vegetation is a related but less certain lever; more shrub cover tends to cool permafrost in the summer but warm it in winter.⁴³

A broad challenge across these interventions is the lack of an obvious stakeholder: permafrost thaw spans many millions of square miles, and no single industry is responsible. We think this gap leaves responsibility with governments, who lack political incentives to act without a clear plan. A couple of paths could help close it. First, Indigenous Arctic communities already hold stewardship roles and land rights across much of the permafrost zone and could naturally lead several of these interventions directly. Second, climate advocacy could push for explicit recognition of these interventions in future international agreements. Forest conservation's REDD+ mechanism could be a useful precedent, albeit with lessons from its history of leakage and land tenure issues and subsequent efforts to address them.⁴⁴ Separately, approaching medium-sized companies—for example, forestry companies concerned about wildfires that are seeking to protect their own assets—could be a viable near-term path, though identifying the right stakeholders would require real effort. We are less enthusiastic about increasing large herbivore density specifically, given their potential mixed effects on climate.⁴⁵

For wetlands, reducing upstream warming is currently more effective than any direct intervention. For example, achieving net-zero transportation by 2050 would cut climate-driven wetland methane by 6.8–12.2 million metric tons of CH₄ per year by 2100.⁴⁶ No options yet exist for influencing natural wetland methane at scale. Tools like substrate amendments, vegetation management, and hydrological interventions have only been tested in laboratory settings.⁴⁷ Atmospheric methane removal (AMR) could indirectly

⁴² "On one hand, peat contributes to the positive permafrost-carbon feedback (Masyagina et al., 2019, Schädel et al., 2016, Schuur et al., 2015, Zhang et al., 2020), but it is also an effective insulator that protects permafrost (Sannel et al., 2016, Wisser et al., 2011)." [Du et al., 2020](#)

⁴³ "Increases in vegetation cover and height generally mitigate permafrost thaw in summer, yet, increase annual soil temperatures through snow-related winter soil warming effects." [Heijmans et al., 2022](#)

⁴⁴ For more information on leakage, see [Streck \(2020\)](#). For more information on tenure issues, see Table 5 in [Larson et al. \(2013\)](#).

⁴⁵ "Our results suggest that even moderate densities of reindeer may profoundly affect the functioning of subarctic permafrost peatlands in ways that could amplify climate warming. Those different results could be explained by a difference in the response of uplands and peatlands to high densities of large herbivores, especially in the summer." [Holmgren et al., 2023](#)

⁴⁶ "We estimate that achieving a net-zero transportation sector by 2050 will result in 0.15 °C (95% confidence interval: 0.13–0.22 °C) of warming avoided (relative to SSP2-4.5) by the end of this century (Table 1), assuming that all other emissions remain consistent with the baseline projection. The avoided warming achieved through this effort would reduce climate-driven wetland methane production by 6.8–12.2 Tg CH₄ yr⁻¹ by 2100, which translates to 2.6–5.2% of additional warming avoided (by 2100), beyond the benefits of this intervention alone." [Ury, Zhang, & Buma, 2025](#)

⁴⁷ "Among potential management options for methane emissions from wetlands, substrate amendments, particularly sulfate, are the most well studied, although the majority have only been tested in laboratory settings and without considering potential environmental externalities." [Ury et al., 2024](#)

remove wetland methane emissions, but it remains firmly in the early-research stage.⁴⁸ NASEM concluded that AMR could become cost-competitive with some mitigation approaches if AMR's costs fall and it scales as carbon dioxide removal technologies have. For now, though, conventional methane mitigation remains more cost-effective.⁴⁹

Funding need: Medium. Our impression is that philanthropic funding that touches permafrost thaw is sparse, largely indirect, and mostly one-off. The largest adjacent commitment is in wildfire: the Gordon and Betty Moore Foundation's Wildfire Resilience Initiative committed \$110 million over the first six years of a planned 12-year effort, of which \$57 million has been granted as of early 2025.⁵⁰ Its stated geographic focus is western North America rather than the boreal or permafrost zone, so we treat the permafrost-relevant share as small, while allowing that some interventions it develops could transfer north.⁵¹ Permafrost itself has drawn at least one notable investment. The Woodwell Climate Research Center is leading a six-year, \$41 million project (~\$6.8 million per year on average) to close Arctic GHG monitoring gaps.⁵² It was funded by the Audacious Project, a one-off competition rather than a recurring program, so we do not assume this funding will continue past its current term.⁵³ We also looked into funding for bringing large herbivores to the Arctic and could not find publicly available funding figures; we are only aware of one nonprofit working in this space and expect the amounts involved to be relatively small.

We could not identify any philanthropic funding directed at mitigating methane from (sub-)tropical wetlands. In the adjacent and better-funded case of rice paddies, the Global Methane Hub committed \$30 million in late 2025 to the Rice Methane Innovation

⁴⁸ See Table 4-2. [NASEM, 2024](#)

⁴⁹ "Conclusion 5.10: Atmospheric methane removal technologies could plausibly be cost-competitive with some methane emissions mitigation approaches if the atmospheric methane removal cost levels and growth rates reach those seen by analogous technologies, such as carbon dioxide removal (which are in early stages of commercial-scale demonstration). Importantly, methane emissions mitigation is still the most cost-effective means of addressing the growing concentrations of atmospheric methane." [NASEM, 2024](#)

⁵⁰ "And as we've written previously, perhaps the leading philanthropic funder in the wildfire space is the Gordon and Betty Moore Foundation, whose Wildfire Resilience Initiative is focusing on the problem of extreme fire in the western parts of North America. So far, it has made nearly \$57 million in grants out of an initial budget authorization of \$110 million; up to \$200 million total funding is planned beyond the first six-year phase of the initiative." [Inside Philanthropy, 2025](#)

⁵¹ See "Strategy hierarchy" under "Additional resources and citations." [Gordon and Betty Moore Foundation, 2025](#)

⁵² "Led by the Massachusetts-based Woodwell Climate Research Center, the 6-year \$41 million project will fill in gaps in monitoring across the Arctic of greenhouse gas emissions from thawing permafrost, currently a source of uncertainty in climate models." [New York Times, 2022](#)

⁵³ Funding source: "This April, Woodwell Climate Research Center was awarded 41.2 million dollars through The Audacious Project to not only build such a network, filling gaps in our understanding of how much carbon is released into the atmosphere from thawing permafrost, but also to put research to work shaping policy and helping people." [Woodwell Climate Research Center, 2022](#)
Nature of funding: "The Audacious Project is a collaborative funding initiative catalyzing social impact on a grand scale. Every year we select and nurture a group of big, bold solutions to the world's most urgent challenges, and with the support of an inspiring group of donors and supporters, come together to get them launched." [Audacious Project, n.d.](#)

Accelerator targeting at least \$100 million; its named backers to date are all philanthropic.⁵⁴ We do not think all innovations developed under this accelerator would apply to (sub-)tropical wetlands. For example, intermittently draining rice paddies would be inappropriate for natural wetlands.

Public funding for permafrost thaw and (sub-)tropical wetlands is likely larger in absolute terms, but we cannot track this with confidence. U.S. federal Arctic research across all agencies exceeded \$550 million in FY2023 with no permafrost budget line.⁵⁵ Relevant work sits inside the National Science Foundation (\$142 million), the U.S. Department of Energy (\$27.9 million), and the Denali Commission (\$0.3 million), the last of which documents thaw threats to Alaskan communities rather than seeking to reduce thaw.⁵⁶ For natural wetlands, we are unaware of any public funding directed at methane reduction. The closest development is proposed U.S. legislation introduced in June 2026 that would authorize \$25 million annually through 2030 for a program focused on removing methane from the atmosphere.⁵⁷ However, as of August 2026, it has not passed, so we do not treat it as committed funding. We do not anticipate any private-sector funding for permafrost thaw and (sub-)tropical wetlands because there is no clear business case.

We think the immaturity of the natural feedback systems field shapes what funding can usefully do now. We know of only a couple of nonprofits working specifically on natural feedback systems, suggesting limited near-term absorptive capacity. We do not read this as evidence against a funding need, but as evidence about its composition. The binding constraint appears to be organizations, evidence, and intervention readiness rather than deployment funding. On that basis, we estimate that the tractable near-term need is likely in the low tens of millions per year globally, concentrated in field-building, intervention

⁵⁴ "The Hub announced a \$30 million commitment towards the Rice Methane Innovation Accelerator during Singapore International Agri-Food Week, and the Global Climate-Smart Agriculture Conference in Brasília, Brazil, in two countries where rice plays a significant role in diets. The Accelerator aims to raise at least \$100 million in philanthropic, public and private sector funding, and is already supported by funding from the Gates Foundation, Philanthropy Asia Alliance, Quadrature Climate Foundation, and Temasek Life Sciences Laboratory, among others." [Global Methane Hub, 2025](#)

⁵⁵ No more recent editions of the Arctic Research Crosscut Budget Report appear to have been published. "The federal government spent over \$550 million on Arctic research in fiscal year (FY) 2023." [The Interagency Arctic Research Policy Committee of the National Science and Technology Council, 2024](#)

⁵⁶ See Table 1. [The Interagency Arctic Research Policy Committee of the National Science and Technology Council, 2024](#)

Denali Commission: "The Denali Commission contributes to Arctic research through the Statewide Threat Assessment, an ongoing effort to document erosion, flooding, and thawing permafrost in Alaska." [The Interagency Arctic Research Policy Committee of the National Science and Technology Council, 2024](#)

⁵⁷ Background: "Following UN Secretary-General António Guterres' call for an international reduction in methane emissions, Representatives Kevin Mullin (CA-15), Andrea Salinas (OR-06), and Carol Miller (WV-01) introduced the bipartisan Methane Removal and Innovation Act, legislation to accelerate the development of technologies that capture methane directly from the atmosphere and ensure American leadership in this emerging field."

Amount of funding: "Authorize \$25 million annually through 2030 for the program." [Congressman Kevin Mullin, 2026](#)

research, and coordination, with a much larger requirement emerging only if interventions prove viable. We hold this figure loosely.

Co-benefits and potential risks: When it comes to preventing permafrost thaw, wildfire management can reduce air pollution and its adverse health effects, while conservation could protect biodiversity. Prescribed burns for wildfire management carry a runaway-fire risk if they are executed poorly. We are uncertain whether reducing warming-induced emissions from wetlands has any co-benefits and potential risks.

Key uncertainties: We are unsure of our scale estimates because it is unclear how much of the emissions from permafrost thaw and (sub-)tropical wetlands are already locked in regardless of intervention. Large-scale models also poorly capture emissions from abrupt thaw. Given that this field is relatively new, we are also unsure whether philanthropic funding could outpace the absorptive capacity of the few organizations working in this space.

Priority #3: Abating Short-Lived Climate Pollutants

Scale ●●● High

Feasibility ●●● Medium

Funding need ●●● Low

Short-lived climate pollutants (SLCPs) are warming agents with much shorter atmospheric lifetimes than CO₂. Examples include methane, black carbon, and certain refrigerants, such as hydrofluorocarbons (HFCs). Abating SLCPs can reduce warming quickly for two reasons. First, SLCPs are potent: while airborne, each unit of mass exerts more radiative forcing than the equivalent mass of CO₂. Second, because SLCPs do not persist long, their atmospheric levels reflect what is being emitted right now, not what has accumulated over time. So when emissions are abated, the effects show up—both in atmospheric levels and in temperature—within years, not centuries.

SLCP abatement matters for climate risk in several ways. First, SLCP abatement would reduce peak warming, but the timing matters. Since SLCPs are short-lived, only their concentration at the moment of peak warming affects how high that peak reaches. If peak warming is decades away, abating SLCPs today does little to lower it unless that abatement is sustained through to the peak. Reducing peak warming matters because expected damages rise with the magnitude of peak warming. Second, SLCP abatement matters on two different time scales. Stopping SLCPs now reduces warming now, lowering near-term damages and easing pressure on near-term tipping points. Stopping SLCPs later instead reduces warming at that later point; since damages likely rise faster than warming itself, the same reduction in warming may avoid larger damages later than it would today.⁵⁸ In either case, lower near-term warming also reduces how much the world

⁵⁸ Convex damages means that each additional degree costs more than the last. In comparison, linear damages means each additional degree of warming would cause the same amount of additional harm. “Second, we assume that the damage function linking the increase in global mean temperature with the instantaneous reduction in output is highly convex at some temperature. Consideration of some of the science, for example, on tipping points, leads us in this direction

must rely on carbon dioxide removal (CDR) to bring temperatures back down after the peak. We explain the role of (novel) CDR in climate change mitigation further in our [Scaling Novel Carbon Dioxide Removal](#) strategy report.

We group the philanthropic aims under this strategy into two categories. The first is stopping current SLCP emissions now—for example, capping methane leaks from oil and gas infrastructure or destroying high-GWP refrigerants. The second is preventing future emissions, such as through the architecture that governs them (e.g., a global treaty) or research and development (R&D) into enteric methane mitigation or atmospheric methane removal. We removed R&D from contention because our [Food, Agriculture, and Land](#) sector report already covers enteric methane mitigation, and our work on natural feedback systems covers atmospheric methane removal.

We focus on methane and HFCs rather than black carbon. In particular, the most certain way to reduce near-term climate forcing from black carbon is to mitigate diesel-engine sources.⁵⁹ We think this issue is better covered under our [Reducing Maritime Shipping Emissions](#) strategy report and our [Heavy Industry](#) sector report.

Scale: High. According to ClimateWorks Foundation data, the annual mitigation potential from abating SLCPs will grow over time, from about 1.7 billion tCO₂e in 2030 to 7.2 billion tCO₂e in 2050 and 13.0 billion tCO₂e in 2100.⁶⁰ Much of this growth comes from expected population and economic growth, which would raise emissions under a business-as-usual scenario. For example, greater demand for livestock products would increase methane emissions from agriculture. Methane from oil and gas operations would also rise as production grows, unless operators adopt better practices to reduce leaks or decarbonize entirely. Similarly, growing demand for air conditioning and refrigeration would increase the use of HFCs.

Feasibility: Medium. Feasibility differs across the two pathways we considered—stopping current emissions now and preventing future emissions—which matters for assessing philanthropic funding opportunities.

We think stopping current SLCP emissions now could be the more feasible pathway. For methane specifically, the tools already exist and often pay for themselves. For example, the International Energy Agency (IEA) estimates that around 70% of methane from fossil fuels can be abated with existing technology—and more than a third of that at no net

(Weitzman, 2012). By contrast, most existing IAM studies assume very modest curvature of the damage function. The DICE default is quadratic and it is well known that with the standard values of the functions' coefficients an implausible 18°C or so of warming is required in order to reduce global output by 50%" [Dietz & Stern, 2015](#)

⁵⁹ "Mitigation of diesel-engine sources appears to offer the most confidence in reducing near-term climate forcing. Mitigating emissions from residential solid fuels also may yield a reduction in net positive forcing. The net effect of other sources, such as small industrial coal boilers and ships, depends on the sulfur content, and net climate benefits are possible by mitigating some individual source types." [Bond et al., 2013](#)

⁶⁰ We define mitigation potential as all potential emissions reductions from a given sector or strategy, not exclusively emissions reductions attributable to philanthropic funding. We source the majority of our [mitigation potential estimates](#) from ClimateWorks Foundation. ClimateWorks Foundation used GWP100 to calculate mitigation potential.

cost—because the equipment costs less than the gas it saves.⁶¹ We also see compelling opportunities in HFC abatement. In particular, the Kigali Amendment to the Montreal Protocol phases down production of high-GWP HFCs, but large volumes are still sitting in existing equipment and will be vented unless someone captures them.⁶² Recovering, reclaiming, and reusing those refrigerants, and destroying what cannot be reused, is a separate opportunity from the phase-down itself.⁶³

What limits emissions abatement now is whether governments can enforce the rules they enact. For methane, the IEA points to shortages of verification equipment, staff, and training, as well as outdated systems for collecting data from operators.⁶⁴ For example, countries responded to only 12% of methane leak alerts in 2025. Acting on all alerts would have cut oil and gas methane emissions by about 6 million metric tons.⁶⁵ The IEA has seen no sign of methane emissions from fossil fuels falling.⁶⁶

We think this gap between potential and actual abatement makes the second pathway of preventing future emissions worth considering. If cheap and proven measures are not being adopted, the constraint likely lies in the rules governing whether countries act at all.

⁶¹ We calculated “more than a third” by dividing 35 Mt by 85 Mt. “Around 70% of methane emissions from fossil fuels – nearly 85 Mt – can be abated with existing technology, including three-quarters of emissions from oil and gas and about half of coal emissions. More than 35 Mt could be avoided at no net cost, based on average energy prices in 2025. This is because the required capital and operating costs of abatement are lower than the market value of the gas captured and sold or used.” [IEA, 2026](#)

⁶² “In the United States, the current ODS and HFC bank within existing appliances amounts to approximately 3.6 GtCO₂e – roughly equal to tailpipe emissions from about half of U.S. passenger vehicles each year. By 2050, total volumes of ODSs and HFCs double from today’s level, rising to approximately 9.2 GtCO₂e by 2100. A robust LRM regime would make it possible to prevent the release of a significant portion of the approximately 61 GtCO₂e of ODSs and HFCs in use or expected to be produced by 2050. By 2100, the global total rises to approximately 91 GtCO₂e – nearly equal to three full years of global energy-related carbon dioxide emissions today.” [U.S. Energy Information Administration, Institute for Governance & Sustainable Development, & Natural Resources Defense Council, 2022](#)

⁶³ “In addition to ratifying and implementing the Kigali Amendment, countries can achieve more HFC mitigation through various methods: an accelerated phasedown schedule; collecting and destroying HFCs at the end of product life; reducing HFC refrigerant leaks through better design, manufacturing, and servicing; and replacing older inefficient equipment.” [Sun et al., 2022](#)

⁶⁴ “Yet in practice, implementation can be hampered by limited access to verification technology, insufficient resources and staff, limited training on methane detection, outdated systems for collecting company data, and the need to coordinate with other agencies with competing priorities.” [IEA, 2026](#)

⁶⁵ “Had all countries followed the recommended timelines for mitigating the emissions events detected by MARS in 2025, global oil and gas emissions would have been reduced by around 6 Mt – roughly equivalent to total upstream emissions from the Caspian region...”
“Although prompt responses to MARS notifications have led to successful mitigation in several countries, overall engagement remains low: globally, only around 12% of MARS notifications received a response in 2025.” [IEA, 2026](#)

⁶⁶ “The fossil fuel sector accounts for around 35% of methane emissions from human activity, yet there is still no sign that methane emissions from fossil fuel operations are falling, despite well-known and proven mitigation pathways.” [IEA, 2026](#)

Two solutions look promising. The first is import standards, which use trade to reach emissions in other countries, much as Kigali does. From 2030, EU rules will require imported oil, gas, and coal to meet a methane intensity limit, and the stakes are large: for the EU, U.K., Japan, Korea, and China, methane from imported oil and gas was 15 million metric tons in 2024, against 5 million from their own production.⁶⁷ The second is fixing how countries set and enforce targets. Of the 141 updated national climate pledges submitted by April 2026, only five include a numeric target for methane from fossil fuels.⁶⁸ However, we think this pathway is slow and potentially easy to reverse, as recent delays to methane rules in the U.S. show.⁶⁹

Funding need: Low. Foundation spending on SLCPs averaged \$25 million annually between 2015 and 2020.⁷⁰ In 2024, the average was seven times higher at \$180 million per year.⁷¹ Much of this funding was focused on technology development and measurement systems.⁷² We are unsure how this funding was split across different SLCPs. We think most of it went toward methane, given the Global Methane Hub's success in raising over \$500 million in pooled philanthropic funds to support methane mitigation since its launch in 2021.⁷³

About \$13.7 billion from the public and private sector went toward methane abatement in 2021 and 2022. In contrast, the annual need by 2030 is estimated at \$48 billion, and the annual need by 2050 at \$119 billion.⁷⁴ We do not think philanthropy can or should fill this

⁶⁷ "Starting in 2030, the European Union Methane Regulation will require all imported oil, gas and coal to meet a defined methane-intensity threshold. Japan, Korea and the United Kingdom have also taken steps to better understand and address methane emissions associated with imported fossil fuels. More than 40% of global oil and 25% of natural gas and coal is traded internationally. For many importers, most of the emissions associated with their fossil fuel consumption originate abroad. In the European Union, the United Kingdom, Japan, Korea, and China, the methane tied to imported oil and gas (15 Mt in 2024) dwarfs that from domestic production (5 Mt in 2024)." [IEA, 2026](#)

⁶⁸ "As of April 2026, 141 countries had submitted updates to their Nationally Determined Contributions (NDCs) under the Paris Agreement for the period to 2035. Methane is included in the scope of all of them, but only around 20 set out specific measures to cut emissions from fossil fuel operations, and just five include quantitative targets for these reductions." [IEA, 2026](#)

⁶⁹ See [Federal Register, 2025](#)

⁷⁰ See "Super Pollutants" under "Figure 5: Known Foundation Support to Regions and Sectors, Annual Average, 2015-2020." [ClimateWorks Foundation, 2021](#)

⁷¹ See "Super Pollutants" under "Figure 10. Known Foundation Funding by Geographies and Sectors, 2024, USD Millions." [ClimateWorks Foundation, 2026](#)

⁷² "Carbon Dioxide Removal and Super Pollutant funding was concentrated in technology and innovation, reflecting a focus on technological development and measurement systems." [ClimateWorks Foundation, 2026](#)

⁷³ "We have raised over \$500 million in pooled funds from more than 20 of the largest climate philanthropies to accelerate methane mitigation across the globe." [Global Methane Hub, 2025](#)

⁷⁴ See the figure in section "Overview of Global Targeted Methane Abatement Finance Flows and Needs in 2021/2022." [Climate Policy Institute \(CPI\), 2023](#)

entire gap, though we believe it could play a role in some priority areas for advancing methane abatement finance.⁷⁵

Overall, the philanthropic space is comparatively well-resourced for its size. Foundation funding for SLCPs was the fastest-growing segment of climate mitigation philanthropy in 2022, and a dedicated funder collaborative already operates at scale.⁷⁶ Public channels have grown alongside it. For example, parties to the Montreal Protocol adopted a Multilateral Fund budget of \$965 million for implementation of the Kigali Amendment to reduce high-GWP HFC emissions over the 2024-2026 triennium, the highest nominal level in the Fund's history.⁷⁷

Co-benefits and potential risks: Since methane is a precursor to ground-level ozone, abating methane emissions could bring public health benefits from improved air quality.⁷⁸ Potential risks include safety trade-offs with leading low-GWP alternatives to HFCs. For example, some are mildly flammable while others have toxic combustion products.⁷⁹

Uncertainties: We characterized SLCP philanthropy as comparatively well-resourced given its rapid growth and the scale of the Global Methane Hub's fundraising. However, one could argue that philanthropy for SLCP abatement is not yet saturated and that the total pie is still too small relative to the problem. We do not yet have a clear way to distinguish those two stories. We think we may also be underweighting HFC-specific opportunities that get lost inside the broader SLCP framing.

What Do We Recommend Funding in Climate Risk Management?

All three strategies—advancing SRM governance and research, influencing natural feedback systems, and abating SLCPs—clear a high bar for scale, and each presents real but potentially surmountable feasibility challenges. The deciding factor in our

⁷⁵ See "Table 1: Overview of priority areas to advance methane abatement finance" for examples of activities. Some include supporting research on innovative technologies and providing technical assistance. [CPI, 2023](#)

⁷⁶ "Following the launch of the Global Methane Pledge, foundation funding to reduce emissions from super pollutants jumped to around \$120 million in 2022, making it the fastest-growing sector that year." [ClimateWorks Foundation, 2024](#)

⁷⁷ "Governments also reiterated their recent agreement to the largest ever replenishment of the Montreal Multilateral Fund with \$965 million in funding to support Kigali Amendment implementation and energy efficiency." [Global Methane Pledge, n.d.](#)

⁷⁸ "Methane mitigation reduces surface O₃ everywhere, offering a unique opportunity to improve air quality globally. We estimate that reducing ~20% of current global anthropogenic CH₄ emissions, which can be achieved at a net cost-savings by using identified technologies, will reduce O₃ mixing ratios globally by ~1 ppbv and prevent ~30,000 premature mortalities globally in 2030 and ~370,000 mortalities between 2010 and 2030." [West, et al. 2006](#)

⁷⁹ "The primary impediment to their adoption is that they are flammable and, for halogenated compounds, their combustion products are highly toxic." [Linteris & Sunderland, 2020](#)

prioritization is funding need. We believe advancing SRM governance and research remains especially underfunded.

Based on this assessment, we identified and prioritized high-impact philanthropic opportunities related to advancing SRM governance and research. We do so knowing that this is a lower-odds bet than the other two strategies: funding SRM research and governance may never lead to responsible deployment, or deployment at all, whereas progress on natural feedback systems and SLCPs carries more limited downside risk. We judge the bet worthwhile because the payoff is asymmetric. Our central concern is a scenario in which a decision on SRM development and (non-)deployment is made without the research and governance infrastructure needed to prevent adverse outcomes. Advancing SRM governance and research addresses that risk directly. We remain open to funding promising efforts under the other strategies, such as those reducing emissions from permafrost thaw and HFCs.

Our theory of change for advancing SRM governance and research focuses on the quality of decision-making rather than on any particular decision. We do not advocate for deployment, since the risks of it going badly are real and impossible to eliminate, and the evidence base is far too thin. However, we also do not want to see the field foreclosed by a premature ban that would prevent the research needed to make good judgments later.

Because SRM remains largely controversial and poorly understood, we believe philanthropy's clearest comparative advantage lies in opening political pathways for research and governance by engaging key stakeholders: the institutions, funders, and individuals positioned to legitimize the research field. Those inroads create the conditions to build the research governance infrastructure that SRM currently lacks, so that future decisions are transparent, just, and well-informed. Alongside this, we see a need to strengthen low- and middle-income countries' capacity to shape SRM research and governance, reflecting diverse geographic perspectives and the reality that LMICs are likely to shape future governance and deployment decisions.

We plan to more deeply investigate how to influence natural feedback systems and abate SLCPs in the future.

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Giving Green was founded to help donors cut through the complexity of climate philanthropy and direct their resources for maximum impact.

Our founder, Dan Stein, Ph.D., spent 15 years developing evidence-based strategies in global philanthropy. He saw people eager to fight climate change but paralyzed by its scale. In 2019, with support from IDinsight, he launched Giving Green to rigorously evaluate solutions and share clear guidance.

What began as a side project is now a team directing tens of millions of dollars to high-impact initiatives. Our success is shared—with donors ranging from kids donating allowances to retirees investing in a better future. We believe anyone can start small and still make a huge difference.

Thank you for joining us on the path to net zero.
Together, we keep moving forward.