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ARTICLE

Regulating the Unthinkable: Climate Interventions as a Test Case for Risk Governance

Alberto Alemanno[1,2] and Masa Sugiyama[3]

[1]Law, HEC Paris, Paris, France, [2]School of Public Policy, The University of Tokyo, Bunkyō, Japan and [3]Institute for Future Initiatives, The University of Tokyo, Bunkyō, Japan
Corresponding author: Alberto Alemanno; Email: alemanno@hec.fr

Abstract

As the risk of climate overshoot grows, attention increasingly turns to climate interventions, that is technologies designed to actively alter the climate system beyond conventional mitigation and adaptation. The article addresses questions of institutional legitimacy and recognition justice, the implications of international legal fragmentation, competing approaches to risk analysis, the application of precautionary and prevention principles, market governance of CDR, the role of intellectual property regimes, and regional perspectives. The most striking tension revolves around the question of how risks should be analysed and compared. Climate intervention governance does not exist in a vacuum but is an emerging field shaped by partial institutional coverage, normative contestation, and private-sector acceleration against a background of limited public salience. This article situates climate intervention governance within broader debates on risk regulation. Building on and critically synthesising the contributions published in the European Journal of Risk Regulation's Special Issue devoted to the governance challenges posed by Solar Radiation Modification (SRM) and Carbon Dioxide Removal (CDR), the article identifies cross-cutting themes that will shape governance debates in the coming years. It concludes that climate intervention governance is ultimately a test case for contemporary risk analysis and regulation and collective self-governance, under conditions of radical uncertainty.

Keywords: carbon dioxide removal (CDR); climate interventions; geoengineering governance; solar radiation modification (SRM)

I. Introduction

Climate interventions present a governance paradox. As the prospect of overshooting the Paris Agreement's temperature targets grows more likely, technologies designed to actively alter the climate system, rather than merely reducing emissions or adapting to impacts,[1] are moving from speculative possibility toward political reality. Yet these technologies arrive without the governance frameworks their deployment would require. Carbon Dioxide Removal (CDR) is now considered "necessary" by the Intergovernmental Panel on Climate Change (IPCC); Solar Radiation Modification (SRM) remains contested but increasingly discussed. Both raise questions that existing institutions can address only partially and that democratic processes have barely begun to consider.

[1] The boundaries are sometimes fuzzy. See DW Keith, G Holmes, D St. Angelo, K Heidel, "A Process for Capturing CO2 from the Atmosphere" (2018) 2 Joule 1573–94.

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The conventional framing presents this as a "governance gap": a regulatory vacuum requiring new international agreements and dedicated institutions. This article enriches that narrative. Drawing on the nine contributions to this Special Issue, it demonstrates that climate intervention governance is neither a vacuum nor a settled field, but rather an evolving space where existing legal frameworks, emerging norms and contested values intersect. The question is not whether governance exists, but whether the fragmented architecture of international law, combined with nascent legitimacy requirements and unresolved justice claims, can support decisions of such magnitude.

II. The governance challenge of climate interventions

The risk of "climate overshoot" that is exceeding 1.5°C of global warming is high and rising.[2] Though substantial progress has been made in some areas, efforts to increase protection from impacts of a disrupted climate remain insufficient. The worsening impacts on human health, food security, water availability, social stability and ecosystems demand urgent attention. In this scenario, cutting carbon dioxide pollution to stabilise the world's climates might no longer suffice. Even drastic emission reductions over the next years will not be sufficient to keep temperature rise under desired levels.

No surprise, then, that additional climate responses – including largely speculative ones – are gaining attention. A growing number of voices asks whether "climate interventions," including those often referred to as geoengineering, can be used in tandem with traditional mitigation and adaptation to address the climate crisis. Climate interventions come in two main categories, though even the definitions remain contested. First, Carbon Dioxide Removal (CDR) – also known as negative emissions, greenhouse gas removal, or simply carbon removal – focuses on absorbing carbon dioxide from the atmosphere and increasing carbon sinks at a scale sufficiently large to alter the climate. CDR is necessary for net-zero CO_2/GHG emissions according to the IPCC,[3] and not optional. In fact, CDR is already deployed. The scale of conventional CDR (primarily afforestation and reforestation) stands at around 2 gigatons of CO_2 per year,[4] though this is less than that of deforestation in magnitude. Second, Solar Radiation Modification (SRM) aims at limiting the amount of absorbed solar energy in the climate system, for example by increasing the reflectivity of the earth's surface or injecting aerosols into the stratosphere. While SRM has not been analyzed by the IPCC in depth, it may be an additional tool beyond traditional mitigation and adaptation. In addition, regional or targeted interventions – such as oceanic curtains to hinder warm currents from melting the bottom of ice sheets – are increasingly discussed.

[2] The Paris Agreement's text regarding temperature goals is "[h]olding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change". See A Reisinger, JS Fuglestvedt, A Pirani, O Geden, CD Jones, S Maharaj, ES Poloczanska, A Morelli., TG Johansen, C Adler, RA Betts, & SI Seneviratne, "Overshoot: A Conceptual Review of Exceeding and Returning to Global Warming of 1.5°C" (2025) 50 Annual Review of Environment and Resources 185–217. https://doi.org/10.1146/annurev-environ-111523-102029

[3] M Babiker, G Berndes, K Blok, B Cohen, A Cowie, O Geden, V Ginzburg, A Leip, P Smith, M Sugiyama, F Yamba, "Cross-Sectoral Perspectives" in PR Shukla, J Skea, R Slade, A Al Khourdajie, R van Diemen, D McCollum, M Pathak, S. Some, P Vyas, R Fradera, M Belkacemi, A Hasija, G Lisboa, S Luz, J Malley (eds), *IPCC, 2022: Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge, UK, New York, NY, USA, Cambridge University Press 2022). https://doi.org/10.1017/9781009157926.005

[4] S Smith, O Geden, M Gidden, WF Lamb, GF Nemet, J Minx, H Buck, J Burke, E Cox, M Edwards, S Fuss, I Johnstone, F Müller-Hansen, J Pongratz, B Probst, S Roe, F Schenuit, I Schulte and N Vaughan, The State of Carbon Dioxide Removal—2nd Edition (2024) https://doi.org/10.17605/OSF.IO/F85QJ

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These technologies raise profound governance questions, reflecting deeper ethical, moral and political issues surrounding their emergence and deployment.[5] Climate-altering technologies are feared to undermine attempts to fix climate change by offering a cheaper alternative than cutting greenhouse emissions, thus disincentivising emission reductions – the so-called "moral hazard" or emissions reduction/mitigation deterrence. Together with other forms of geoengineering, SRM has been under a hotly contested de facto moratorium through the Convention on Biological Diversity since 2010. The United Nations Human Rights Council's Advisory Committee has warned that geoengineering technologies "could seriously interfere with the enjoyment of human rights for millions and perhaps billions of people," pointing to disproportionate impacts on Indigenous Peoples, peasants, fisherfolk and others living in rural areas.

Yet if the world were to exceed 1.5°C, the question of which governance frameworks and democratic processes might be needed to responsibly govern climate interventions could catch policymakers and researchers by surprise. Given the relative low cost of SRM, the risk of unilateral deployment grows by the day – as evidenced by recent private ventures. Some CDR options, especially marine CDR options,[6] present characteristics similar those of SRM, including insufficient governance, the need for modeling for verification,[7] attempts by private actors.[8] The climate-altering technologies debate largely remains confined within a small community of scientists, policymakers, and investors, insulated from broader public attention. This special issue brings together social scientists interested in how to govern future, largely speculative climate interventions across the full cycle of research, development, demonstration and deployment.

III. Thematic architecture of the special issue

The nine contributions to this special issue approach climate intervention governance from different disciplinary perspectives – law, political theory, ethics, risk analysis and social science – and at different scales, from the international to the regional and national. Rather than presenting them in isolation, we organise our discussion around five thematic clusters that reveal both convergences and productive tensions across the contributions.

1. Institutional legitimacy, fragmentation, and the challenge of governance gaps

A recurrent claim in academic scholarship is that SRM governance suffers from gaps in international law as epitomised by the absence of dedicated regulatory mechanisms. Two contributions to this special issue challenge and nuance this characterisation in complementary ways.

Ruddigkeit, Bruggink and Gupta present a more nuanced perspective on the "governance gap" claim. Rather than focusing on a single comprehensive regime to govern SRM, they adopt a "multi-dimensional impact approach" to solar radiation modification technologies and their governance. Their analysis maps the diverse array of adverse impacts that any SRM governance regime would need to contend with – impacts on the ozone layer,

[5] For the introduction of topics, see Smith et al. (2024) for CDR and Jinnah & Dove (2025) for SRM and references therein.

[6] M Boettcher, K Brent, HJ Buck, S Low, D McLaren, and N Mengis, "Navigating Potential Hype and Opportunity in Governing Marine Carbon Removal" (2021) 3 Frontiers in Climate 664456. https://doi.org/10.3389/fclim.2021.664456

[7] See, e.g., DW. Keith, G Holmes, D St. Angelo, K Heidel, "A Process for Capturing CO2 from the Atmosphere" (2018) 2 Joule 1573–94; DW Keith, "Geoengineering the Climate: History and Prospect" (2000) 25 Annual Review of Energy and the Environment 245–84. https://doi.org/10.1146/annurev.energy.25.1.245

[8] On the other hand, some more closed CDR options can be considered as a new mitigation option.

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weather and climate, biodiversity, security and geopolitics and human rights – and demonstrates how many of these impacts fall within the purview of existing international institutions and obligations.

The Vienna Convention for the Protection of the Ozone Layer and its Montreal Protocol, for instance, are directly relevant given that stratospheric aerosol injection could adversely affect ozone. The World Meteorological Organization holds responsibility for assessing weather and climate impacts. The Convention on Biological Diversity, with its 2010 decision X/33 establishing what amounts to a de facto moratorium on geoengineering activities, addresses ecosystem impacts. Security dimensions implicate the UN Security Council and the ENMOD Convention on environmental modification techniques. Human rights law provides foundational normative frameworks through instruments including the ICESCR, ICCPR and regional human rights conventions.

Ruddigkeit and colleagues distinguish importantly between governance "deficits" – shortcomings common to many international environmental regimes such as lack of universal participation or effective enforcement – and governance "gaps" understood as absence of regulations, norms or institutional coverage of key impact areas. Their analysis suggests that while deficits exist, the presumed gap in global governance is not as significant as often alleged. The fragmented yet comprehensive coverage of diverse impacts does not mean global coordination for deployment is already in place. Instead, the fragmented web of institutions and principles provides room largely for restrictive SRM governance to prevent adverse impacts. Any new SRM governance regime would need to build upon, or at least not contravene, existing obligations under the principle of systemic integration in Article 31(3)(c) of the Vienna Convention on the Law of Treaties.

Francis and Lenzi complement this institutional mapping by examining the legitimacy requirements for institutions governing SRM research specifically. Building on the "Metacoordination view" of institutional legitimacy developed by Buchanan and Keohane, they argue that SRM research governance presents special challenges because such institutions serve not merely to coordinate research activities but to coordinate responses to climate change as a global collective action problem. Their central contribution is to demonstrate why legitimacy assessment for SRM research governance must include considerations of "recognition justice," that is the dimension of justice concerned with "status injuries" and the institutional recognition of equality. Drawing on Nancy Fraser's account, they argue that marginalised or oppressed collectivities tend to be simultaneously subject to injustices of distribution and of recognition, and that overcoming injustice requires both redistribution and recognition. In the context of SRM research governance, this means attending to the ways in which indigenous peoples, climate-vulnerable communities, and Global South populations face barriers to equal participation that stem not only from economic inequalities but from lack of respect for alternative ways of viewing climate change as a moral and political problem. *Francis and Lenzi* argue that the institutional context of climate action requires a specific interpretation of legitimacy conditions. Existing international practice – such as the *Escazú Agreement* on access to information, public participation, and access to justice in environmental matters – already embeds recognition norms requiring states to actively identify and support vulnerable parties to eliminate barriers to participation in environmental decision-making. Crucially, they argue that participatory requirements should operate at the programme level rather than merely the project level.[9] The cancellation of the Stratospheric Controlled Perturbation Experiment (SCoPEx) project at

[9] S Jinnah, S Talati, L Bedsworth, M Gerrard, M Kleeman, R Lempert, K Mach, L Nurse, HO Patrick and M Sugiyama, "Do Small Outdoor Geoengineering Experiments Require Governance?" (2024) 385 Science 600–3. https://doi.org/10.1126/science.adn2853

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Harvard[10] illustrates how project-level engagement might provide too narrow a window for meaningful recognition.

2. Risk analysis: competing approaches to governing uncertainty

Two contributions engage directly with methodological questions about how risks should be analyzed and compared in the context of SRM governance, revealing fundamental disagreements about the appropriate tools for decision-making under uncertainty.

Wiener, Felgenhauer and Borsuk advocate for a multi-risk governance framework for SRM. They argue that we live in a world of multiple risks, and that policies to reduce anyone "target risk" may implicate other risks – potentially posing risk–risk tradeoffs. Their multi-risk framework aims to help analysts and decision makers identify, evaluate and compare multiple risks holistically; identify affected groups to overcome problems of disregard and omitted voice; compare policy options and map the array of risks to corresponding governance mechanisms; and seek "risk-superior" policies that would reduce multiple risks in concert. Their analysis identifies the multi-risk profiles of key climate policy response strategies – mitigation, adaptation, and reflection (SRM) – showing how each involves both favourable effects (benefits, co-benefits) and unfavourable effects (harms, countervailing risks) on both climate and non-climate risks. For SRM specifically, they catalogue biophysical risks (ozone depletion, acid deposition, regional climate impacts) alongside sociopolitical risks (unilateral deployment, international conflict, mitigation deterrence, termination shock). They examine governance frameworks along a spectrum from uncoordinated to coordinated to comprehensive, ultimately suggesting two mechanisms that could build toward better multi-risk governance: a series of iterative international assessments of SRM, and a transparent international monitoring system.

McLaren offers a sharply critical perspective on risk–risk analysis as applied to SRM. While acknowledging that "in the abstract, it might appear simple common sense to assess a poorly understood and potentially risky technology in the context of the risks it would be intended to mitigate," he argues that the risk-risk framing forms part of an increasingly polarised solar geoengineering debate and warrants careful interrogation. McLaren's detailed examination of the leading methodological proposal for risk-tradeoff analysis reveals what he characterises as serious practical and ethical shortcomings. These include methodological inconsistencies and asymmetries – such as treating biophysical risks as scientifically well-constrained while presenting sociopolitical risks as manageable through good governance, and presuming idealised SRM implementation while comparing against non-ideal mitigation scenarios. He traces these shortcomings to underlying political and ideological presumptions rooted in modernist technocratic social imaginaries. More fundamentally, McLaren argues that risk–risk analysis as currently proposed creates a false binary between SRM and unmitigated climate change, implying a "lesser evil" choice that excludes consideration of other exceptional responses such as radical transformation of fossil fuel systems or degrowth. The risk–risk framing, he contends, tends to normalise SRM as a climate policy option to be traded off against mitigation, rather than treating it as an exceptional measure justified only by existential risks. Rather than abandoning risk analysis entirely, McLaren calls for a reconstructed, genuinely precautionary risk management repertoire that would help humanity live with uncertainty, support meaningful action to avoid worst-case outcomes, and reflect an ethics of care. We expect this debate to intensify as the proponents of the multi-risk governance framework for SRM may soon respond to the main critiques posed against their approach.

[10] S Jinnah and Z Dove, "Solar Radiation Management: A History of the Governance and Political Milestones" (2025) 5 Environmental Science: Atmospheres 656–73. https://doi.org/10.1039/D5EA00008D

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3. Precaution, prevention and legal principles

Several contributions examine how established principles of international environmental law apply – or fail to apply – to climate interventions, revealing both the potential and the limits of existing legal frameworks.

Davies and Vinders examine the application of the precautionary principle to geoengineering in EU law. The precautionary principle, they note, "has long been seen as a key tool in governing geoengineering" and is increasingly invoked both to restrict and to enable climate intervention research. Their analysis reveals that applying precaution to geoengineering proves more difficult than appears at first glance. Their core argument concerns the principle's procedural operation. The precautionary principle operates as a principle to be applied, as it provides a mechanism for managing uncertainty. Both deployment and non-deployment of SRM represent choices that the precautionary principle can potentially inform, but it cannot determine which choice is appropriate. The precautionary framing of SRM as impermissible risk management must therefore rely on substantive considerations external to the precautionary principle itself, such as deontological commitments against interfering with nature or deep scepticism about technological solutions to environmental problems.

Sulyok offers a complementary analysis through the lens of the prevention principle in customary international law. While the precautionary principle deals with scientific uncertainty, the prevention principle – as embodied in the no-harm rule – addresses known risks of significant transboundary environmental harm. Sulyok examines three scenarios for how prevention obligations might constrain SRM activities: where SRM deployment itself causes transboundary harm; where failure to deploy SRM allows climate change harms to continue; and where SRM research activities generate transboundary effects. Her analysis suggests that the prevention principle provides a more solid legal foundation for SRM governance than the precautionary principle in some respects, precisely because it applies to known rather than uncertain risks. The debate about the precautionary principle vs the prevention principle in the climate interventions governance is set to continue animating scholars, policymakers and the political process.

4. Regional perspectives and market governance

Carabajal, González Acevedo, Salas-Peyret and Ruvalcaba-García provide a highly informative perspective on how SRM governance debates are unfolding in Latin America and the Caribbean, a region often underrepresented in climate intervention scholarship dominated by North American and European voices. Their analysis centres on the "Make Sunsets" case, that is a US startup that in late 2022 conducted unsanctioned stratospheric aerosol injection experiments launching balloons carrying sulphur dioxide from Mexico without government knowledge or approval. The Make Sunsets case crystallises several governance concerns. The Mexican government responded by banning solar geoengineering experimentation, becoming one of the first countries to take explicit regulatory action. *Carabajal and colleagues* document how this incident catalysed regional discussion, including statements from civil society organisations and academic networks calling for precautionary approaches. Their contribution reveals the importance of regional perspectives in what is too often treated as a purely global governance challenge. The case demonstrates that governance deficits at the international level create opportunities for unilateral private action that may provoke uncoordinated national responses. We may expect many more of these episodes to manifest themselves in the near future.

Dörpmund, Schenuit and Geden shift attention from SRM to CDR and from public governance to market dynamics. Their contribution examines how practitioners in the

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emerging voluntary carbon dioxide removal market conceptualise fairness and equity, concepts that have received extensive attention in climate policy but remain underexplored in the specific context of CDR. Through empirical research with CDR market participants, they reveal tensions between different conceptions of fairness: procedural fairness in how markets operate, distributive fairness in how benefits and burdens are allocated, and recognitional fairness in whose knowledge and perspectives are valued. Their findings suggest that market governance of CDR cannot rely solely on price mechanisms and voluntary standards but must engage with deeper questions of justice that market actors themselves recognise as inadequately addressed by current arrangements.

5. Intellectual property and innovation governance

Cheng examines a dimension of SRM governance that has received insufficient attention: the role of intellectual property regimes, and specifically patent law. The TRIPS Agreement establishes technology-neutral standards for patent protection, but Cheng argues this neutrality sits uneasily with the distinctive characteristics of SRM technologies. Several potential grounds exist for excluding SRM technologies from patentability: *ordre public* and morality exceptions that allow exclusion of inventions whose commercial exploitation would be contrary to public order; the "harmful inventions" doctrine; and arguments that SRM technologies should be treated as global public goods inappropriate for private appropriation. *Cheng* proposes consideration of a sui generis regulatory framework that could govern SRM innovation outside standard patent channels, ensuring that knowledge development serves collective interests rather than private profit.

This contribution connects to broader themes in the special issue concerning the public–private interface in climate intervention governance. As private actors, from startups like Make Sunsets to established technology firms, become increasingly active in climate intervention spaces, the frameworks governing their activities require greater scrutiny.

IV. Cross-cutting themes and emerging questions

Reading across the contributions reveals several cross-cutting themes that warrant attention from scholars and policymakers alike.

1. The contest over risk analysis methodologies

The most striking tension in this special issue emerges between the contributions of *Wiener and colleagues* and *McLaren* on the question of how risks should be analyzed and compared. Both accept that SRM involves multiple risks requiring careful assessment. But they diverge fundamentally on whether risk–risk or multi-risk analysis as currently proposed provides an appropriate framework. Wiener and colleagues see multi-risk analysis as essential for comprehensive governance that avoids neglecting important impacts and affected groups. McLaren sees risk–risk analysis as embedded in a technocratic social imaginary that systematically favours technological intervention over transformative social change. This methodological dispute has profound implications for how governance institutions should be designed and what kinds of expertise they should privilege.

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2. The research-deployment continuum

A recurring challenge involves the relationship between research governance and deployment governance. Several contributions note that the distinction between research and deployment, while analytically useful, becomes blurred in practice. Open-air experiments at certain scales may produce detectable climate effects, effectively constituting limited deployment. More fundamentally, as *Francis and Lenzi* argue, research programmes shape deployment possibilities by creating knowledge, building constituencies and generating path dependencies. Governing research and governing deployment are thus not separate enterprises but points on a continuum requiring coordinated approaches.

3. North–South dynamics and recognition

The contributions from *Francis and Lenzi*, *Carabajal and colleagues*, and *Dörpmund and colleagues* all highlight the importance of North–South dynamics. Climate intervention research and development remains concentrated in wealthy countries, while impacts – both of climate change and of potential interventions – fall disproportionately on the Global South. Recognition justice emerges as a framework for addressing not merely distributive inequities but the deeper question of whose voices and perspectives shape governance arrangements. The Make Sunsets case illustrates how governance vacuums enable actors from the Global North to treat the Global South as experimental terrain.

4. Legal fragmentation as feature not bug

Ruddigkeit and colleagues' analysis of the fragmented institutional landscape challenges the assumption that fragmentation represents a governance failure requiring consolidation. Their contribution, combined with the analyses of specific legal principles by *Davies and Vinders* and by *Sulyok*, suggests that the existing web of international obligations may be better suited to restrictive governance than to enabling frameworks. The principle of systemic integration means that any new SRM regime would have to take account of existing treaty obligations, effectively constraining rather than enabling deployment.

5. Private actors and market governance

The contributions reveal a largely underexplored dimension of climate intervention governance: the role of private actors. From venture-backed startups conducting unsanctioned experiments to market participants in voluntary CDR schemes to potential patent holders, private entities shape climate intervention trajectories in ways that public governance frameworks must address. *Cheng*'s analysis of intellectual property, *Dörpmund and colleagues*' examination of CDR markets, and *Carabajal and colleagues*' account of Make Sunsets all highlight this theme.

V. Conclusions: toward responsible governance?

The contributions to this special issue do not provide – and cannot provide – definitive answers to how climate interventions should be governed. Some technologies remain speculative,[11] the science uncertain, and the values at stake deeply contested, albeit in the absence of a fully-fledged public debate. What the contributions do provide is a clearer

[11] The rate of technological readiness level (TRL), a widely used method to measure technological progress, varies considerably across climate interventions, with some CDR options presenting a decent TRL.

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map of the governance terrain: the existing legal frameworks that already constrain (and somehow shape) possibilities, the legitimacy conditions that any governance arrangement must satisfy, the justice dimensions that cannot be reduced to technical risk assessment, and the regional and sectoral variations that make global governance so challenging.

Several conclusions emerge. First, the "governance gap" framing oversimplifies a complex institutional landscape. Existing international law and frameworks already cover several impact areas relevant to climate interventions, and any new governance arrangements must operate within these constraints. Second, legitimacy requires more than procedural correctness and integrity; it demands recognition of historically marginalised communities as genuine participants in governance rather than objects of protection or consultation. Third, the research-deployment distinction, while analytically important, should not obscure the need for governance frameworks that address the full trajectory from basic research through deployment decisions. Fourth, private actors play increasingly significant roles that require (greater) attention to intellectual property, market design, and corporate accountability. Fifth, competing approaches to risk analysis reflect deeper disagreements about the role of expertise, the nature of precaution, and the scope for transformative alternatives to technological intervention.

This special issue appears at a moment when the trajectory of climate intervention governance remains genuinely open. Major scientific institutions have begun supporting SRM research; regulatory agencies are clarifying positions; private actors are pushing boundaries while most political leaders abstain from taking public stances. That abstention cannot last. The pressures of climate overshoot, combined with the low cost and unilateral accessibility of some interventions, will force decisions that democratic societies have not adequately prepared for.

Climate intervention governance is ultimately a test of collective self-governance under conditions of radical uncertainty. The technologies under discussion would, if deployed at scale, represent among the most consequential decisions humans have ever made. The contributions assembled here make clear that responsible governance is possible, but only if scholars, policymakers and publics recognise both the constraints that existing law already imposes and the legitimacy conditions that any new arrangements must satisfy. Ensuring that such decisions are made wisely, justly and with genuine democratic authority is not merely one risk regulation challenge among others. It may be the defining challenge of the coming decades.

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