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Executive Coordinator Sally Klimp  
SCoPEX Advisory Committee  
20 University Road  
Cambridge, MA 02138-5756

**Re: Comment on the Proposed Governance Framework for Harvard University's  
Stratospheric Controlled Perturbation Experiment ("SCoPEX") by the SCoPEX Advisory  
Committee**

Dear Ms. Klimp and members of the Advisory Committee:

We thank the Advisory Committee for the invitation to comment on the proposed governance framework for the Stratospheric Controlled Perturbation Experiment ("SCoPEX") at Harvard University. We submit these comments in our personal capacities, drawing on our expertise in solar geoengineering governance, U.S. and international environmental law, and climate change policy.

We commend the Advisory Committee for its thoughtful and well-conceived proposal. The proposal appropriately addresses the major requirements for effective governance of solar radiation modification ("SRM") research.<sup>1</sup> The specific components and processes for scientific and technical review, financial disclosure, and legal and regulatory compliance review are thorough, well crafted, and appropriate. These elements of the framework will provide valuable guidance for governance of SCoPEX and other potential SRM-related research projects.

We focus our comments principally on societal engagement and review, an essential element of governance and likely the most challenging of the identified elements. Research on SRM technologies requires broad public engagement. That task would best be done by a dedicated body with a mandate to consider the broad range of environmental, societal, and political concerns that have been raised about SRM research. By contrast, a single SRM experiment with vanishingly small environmental impact is an inapt site to address such broad societal concerns.

We thus recommend that the Advisory Committee clearly distinguish its societal engagement activities between those that pertain to the SCoPEX experiment specifically and those that pertain to the broad societal implications of any SRM-related research. Not making this distinction would risk setting a precedent that all SRM-related research projects must undertake similarly comprehensive engagement and review processes for both the specific proposed research and the broad societal implications of SRM research. Applying such expansive requirements individually to every proposed SRM-related research project would risk obstructing even high-value and minimal-impact research, without effectively addressing the serious broader concerns raised about SRM and SRM research.

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<sup>1</sup> See SCoPEX Advisory Committee, <https://scopexac.com/framework-deliverables-and-timeline/> (last visited Jul. 31, 2020).

## Background

Good governance of SRM research requires appropriate and meaningful public participation.<sup>2</sup> The public engagement process is a chance for decisionmaking organizations to inform and educate people on projects that may affect them.<sup>3</sup> These people are *stakeholders*—“those that have an interest or stake in an issue, such as individuals, interest groups, [or] communities,” as defined by the U.S. Environmental Protection Agency (“EPA”).<sup>4</sup> Public engagement also allows stakeholders to comment on and potentially influence project decisions.<sup>5</sup> In addition to building legitimacy and aligning with democratic values, the process can also improve project outcomes.

Different projects will implicate different kinds of interests, requiring varying levels of public engagement. For example, a construction project could cause noise pollution, dust, traffic congestion, and other environmental impacts. It could also raise concerns about longer-term or broader impacts if, for example, the project were to change how the parcel of land or neighboring areas are used. An appropriate public engagement process would include affected communities and deliberate on mitigation options to address identified concerns.

Compared to a construction project, the effects of SCoPEX on public interests are less concrete and immediate. The experiment would have no effect on weather or climate, nor would it cause any lasting physical impacts.<sup>6</sup> Its lack of physical impacts means no stakeholder would “be *directly* affected by [the] proposed outdoor experiment[.]”<sup>7</sup> Moreover, SCoPEX is not part of a program to develop, scale up, or deploy SRM, nor is it part of a longer-term or strategically guided program of continuing research.<sup>8</sup> Rather, the primary concerns expressed about SCoPEX are more abstract and indirect, and pertain to SRM research in general rather than to SCoPEX in particular.<sup>9</sup>

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<sup>2</sup> See Shuchi Talati & Peter C. Frumhoff, Union of Concerned Scientists, *Issue Brief: Strengthening Public Input on Solar Geoengineering Research* 3–4 (2020); Michael B. Gerrard, “Introduction and Overview,” 1, 25 in *Climate Engineering and the Law* (Michael B. Gerrard & Tracy Hester eds., 2018).

<sup>3</sup> See EPA, *Public Participation Guide* 3, available at <https://www.epa.gov/international-cooperation/public-participation-guide-view-and-print-versions> (last visited Jul. 31, 2020).

<sup>4</sup> See *id.*; see also Talati & Frumhoff at 2, fig. 1 (charting different configurations of stakeholders and publics).

<sup>5</sup> See EPA, *Public Participation Guide* at 3.

<sup>6</sup> See John A. Dykema et al., *Stratospheric Controlled Perturbation Experiment: A Small-Scale Experiment to Improve Understanding of the Risks of Solar Geoengineering*, 372 *Phil. Trans. Roy. Soc. A* no. 20140059 14–16 (2014).

<sup>7</sup> See Steve Rayner et al., *The Oxford Principles*, 121 *Climatic Change* 499, 506 (2013) (emphasis added) (discussing the governance obligation to meaningfully include the public); see also EPA, *Public Participation Guide* at 3, 19–20 (defining “stakeholder”).

<sup>8</sup> See Harvard Solar Geoengineering Research Program, <https://geoengineering.environment.harvard.edu/frank-keutsch-Heterogeneous-chemistry-ageing-designer-aerosol-particles> (last visited Jul. 31, 2020); see also Harvard Solar Geoengineering Research Program <https://geoengineering.environment.harvard.edu/robert-stavins-governance-solar-geoengineering-advancing-understanding-action> (last visited Jul. 31, 2020).

<sup>9</sup> See, e.g., Open letter from Abibiman Foundation, Ghana, et al. to SCoPEX Advisory Committee in opposition to solar geoengineering technology, *Geoengineering Monitor* (Aug. 21, 2019), <http://www.geoengineeringmonitor.org/2019/08/open-letter-scopex/>.

These concerns about SRM are of utmost importance and require effective engagement processes.<sup>10</sup> But they are far removed from the experiment's physical impacts and therefore cannot be addressed by changes to its design, implementation, or governance. Such high-level concerns call for the development of new processes with broader mandates and participation. Public engagement for specific experiments, on the other hand, should be more circumscribed.<sup>11</sup>

## Comments

### 1. The Advisory Committee, Harvard University, and the SCoPEX research team can effectively address SCoPEX's specific governance challenges.

We begin by observing that the Advisory Committee, Harvard University, the SCoPEX team, and existing U.S. and state law can effectively govern this experiment. Though it will take place in part outdoors, the experiment does not risk any substantial or lasting physical effects.<sup>12</sup> In terms of legal obligations, the experiment appears to require only standard aviation permitting. It is not subject to any legal requirements specific to SRM technologies.<sup>13</sup>

These characteristics suggest that the specific governance tasks presented by SCoPEX are quite straightforward. It must undergo rigorous peer review regarding the scientific questions to be addressed and the appropriateness of the methods and materials to be used. Potential environmental impacts and risks must be identified, assessed, and acceptably managed. Sources of finance, intellectual-property claims, and related material interests must be appropriately disclosed, to avoid conflicts of interest that might cast doubt on the integrity of reported results. The project must be verified to be in compliance with all applicable legal and regulatory requirements and university guidelines. Finally, an appropriate public engagement process should be implemented.

Effective implementation and oversight of these governance processes are within the capability of the people and institutions associated with the SCoPEX project. The Advisory Committee's proposed governance framework presents an effective and prudent approach to doing so.<sup>14</sup> The Advisory Committee includes environmental scientists, policy experts, legal experts, risk analysts, and civil-society representatives who collectively bring a wide range of views on SRM, depths of expertise, and

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<sup>10</sup> Cf. *id.* (“[A] technology with implications for all should not be developed without consultation with all.”).

<sup>11</sup> EPA describes five levels of public participation, with each level building on those below it: *Inform*, *Consult*, *Involve*, *Collaborate*, and *Empower*. See EPA, *Public Participation Guide* at 12–16 (citing IAP2's Spectrum of Public Participation). *Inform*: the public is given the information “they need to fully understand the project and decision,” but no opportunity to comment. *Id.* at 14. *Consult*: the public is asked for comment and the decisionmaker responds to those comments. *Id.* at 14. *Involve*: the public works directly with the decisionmaker, with public input considered “throughout the decision-making process.” *Id.* at 14–15. *Collaborate*: members of the public are “directly engaged in decisionmaking,” often with an emphasis on consensus. *Id.* at 15. *Empower*: the public is the final decisionmaker on the project. EPA, *Public Participation Guide* at 15.

<sup>12</sup> See Dykema et al. at 14–16.

<sup>13</sup> See Jesse L. Reynolds & Edward A. Parson, *Nonstate Governance of Solar Geoengineering Research*, 160 *Climatic Change* 323, 324–26 (2020).

<sup>14</sup> SCoPEX Advisory Committee, <https://scopexac.com/framework-deliverables-and-timeline/> (last visited Jul. 31, 2020).

many decades of relevant experience.<sup>15</sup> Harvard University has deep expertise in managing and governing research on controversial topics and strong reputational interests in governing this project carefully – and has committed significant resources to doing so.<sup>16</sup> SCoPEX researchers have long indicated that they take the experiment’s governance challenges seriously, and they have demonstrated willingness to comply in good faith with the Advisory Committee’s and University’s recommendations.<sup>17</sup> All the elements for effective nonstate research governance are thus in place.<sup>18</sup>

2. New strategies and processes are needed to address broad societal concerns about SRM research.

While many concerns raised about SCoPEX pertain specifically to this project and are effectively addressed by the governance elements discussed above, these do not adequately address all relevant societal concerns. We strongly agree with what has been stated elsewhere by Advisory Committee members, SCoPEX researchers, and others: SRM technologies have long-term, global implications that require broad public engagement.<sup>19</sup> The most prominent and challenging of these concerns arise not from the specifics of the proposed research activity or its direct effects, but from potential indirect effects on policy, politics, and society. These concerns include, for example, the prospect of an unconsidered slide into larger-scale experiments with more significant impacts, or even to full deployment, without adequate and legitimate public control; potential weakening of mitigation efforts or other essential elements of climate-change policy; potential threats to global stability, development, or justice; and a sense of intrinsic wrongness.

Such larger-scale and longer-term concerns often arise around the development of disruptive technologies with substantial societal implications, and they are rarely adequately addressed.<sup>20</sup> Addressing these concerns more effectively presents serious challenges to conventionally designed assessment processes. It calls for innovative, ongoing processes with the mandate and resources to do meaningfully broad public engagement, to draw on diverse forms of expertise, and to integrate functions of education, deliberation, analysis, and assessment. These broader engagement processes should not, however, be linked to any particular proposed experiment or research project. Nor should conducting them be the responsibility of the researchers proposing to conduct such projects. Rather,

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<sup>15</sup> SCoPEX Advisory Committee, <https://scopexac.com/advisory-committee-members/> (last visited Jul. 31, 2020).

<sup>16</sup> See Harvard University Solar Geoengineering Research Program, <https://geoengineering.environment.harvard.edu/people-0> (last visited Jul. 31, 2020) (listing membership of the program’s advisory committee and management staff); See also Harvard University, Faculty of Arts and Sciences Administration Services, <https://research.fas.harvard.edu/guidance-for-fas-researchers> (last visited Jul. 31, 2020) (directory listing policies and staff related to the university’s research governance).

<sup>17</sup> See Jeff Tollefson, *The Sun Dimmers*, 563 *Nature* 613, 614 (2018) (describing efforts of SCoPEX to build meaningful governance).

<sup>18</sup> Cf. Simon Nicholson et al., *Solar Radiation Management: A Proposal for Immediate Polycentric Governance*, 18 *Climate Policy* 322, 324–25 (2018) (describing the required functions of effective near-term SRM governance).

<sup>19</sup> See, e.g., Talati & Frumhoff at 3–4; Gerrard at 25.

<sup>20</sup> See generally, e.g., Paul Berg & Maxine F. Singer, *The Recombinant DNA Controversy: Twenty Years Later*, 92 *Proc Nat’l Acad. Sci.* 9011 (1995); see also Stefan Schäfer & Sean Lowe, *Asilomar Moments: Formative Framings of Recombinant DNA and Solar Climate Engineering Research*, 372 *Phil. Trans. R. Soc. A.* no. 20140064(2014).

these processes should be situated, authorized, and managed at the level of broader research programs, or at the nexus between strategic research direction and related policy and political decisions.

We appreciate the predicament in which this advice may put the Advisory Committee, Harvard University, and the SCoPEX research team. The need for such broadly legitimate engagement processes is acute, and no presently existing body or process is well equipped to meet the need. Yet the Committee is tasked to address the governance implications of a single research project. Moreover, public engagement efforts linked to individual prior SRM field experiments have been criticized as inadequate or biased, potentially damaging the legitimacy and public acceptability of such research.<sup>21</sup> It is thus understandable that the Advisory Committee might seek to combine these two distinct governance needs and make a single engagement process serve both: the specific concerns attending SCoPEX's design, implementation, and governance; and the broader concerns about societal implications of SRM and SRM research in general.

Nevertheless, we advise that conflating these processes would be a potentially serious error, and we urge the Advisory Committee to maintain a clear distinction between these two scales of concern and processes to address them. The responsibility to conduct and manage public engagement on the broad societal implications of SRM research should *not* be linked to individual research projects or fall upon individual research teams. Individual research teams and their associated governance structures are likely to lack the expertise, scope of authority, and connection to larger-scale policymaking needed for such processes to be effective. Indeed, no decisions or resources that lie within the control of a single research team can effectively address or inform these broader concerns. With a broader engagement process in place, however, individual research teams could support and participate in the high-level public engagement work done there and take guidance from its results.

We recognize that the Advisory Committee is in a unique situation, which may make them more able to jointly advance the specific and the broad engagement needs through a single integrated process than would be feasible for any other research project. The research team and Harvard University have demonstrated their willingness for this project to be a test case that explores the development of needed broader engagement processes. They have invested substantial resources, convening power, and time to this end. Yet no other single research project is likely to enjoy similar levels of resources or time. We thus urge the Advisory Committee to be mindful of the unique circumstances of this project and, on that basis, to clearly articulate the distinction between the specific and the broader needs for engagement and maintain that distinction in the activities undertaken.

Absent such a clearly articulated and consistently maintained separation, the Advisory Committee's governance proposals are likely to be taken as a precedent, establishing a norm that any other SRM-related research project is expected to follow – including projects with far less access to governance

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<sup>21</sup> See, e.g., Stuart McDill, 'Cloud Brightening' Experiment May Help Cool Great Barrier Reef, Reuters (Apr. 22, 2020); see also Michael Burger & Justin Gundlach, "Research Governance," 269, 288–89 in *Climate Engineering and the Law* (Michael B. Gerrard & Tracy Hester eds., 2018).

expertise and resources, and less ability to delay, than SCoPEX.<sup>22</sup> Such an expectation would present potentially serious and disproportionate barriers to high-value research, without effectively advancing the need for broad consultation and deliberation about the profound societal effects of SRM. It is even possible that putting this obligation on individual research projects may actively hinder development of needed governance capabilities. This could occur if the resultant burdens and uncertainties discourage research that would advance knowledge of SRM methods, potential contributions, and associated limitations and risks – when that knowledge is needed to understand the particularities of SRM governance needs and to guide development of capabilities to address them.

Maintaining the distinction between SCoPEX-specific concerns and SRM’s more general consultation needs could enable the Advisory Committee to significantly advance understanding on how to conduct the broad engagement processes needed on SRM and SRM research, and design bodies to support these. In contrast to the aspirational generalities common in debates on public engagement, the Advisory Committee has the opportunity to dig in and consider concrete matters of institutional design, such as mandate, process, participation, outputs, and resource needs. In developing guidelines for these broad engagement processes, the Advisory Committee might draw on analogies to other bodies that pursued similar aims. Possible models might include the National Citizens’ Technology Forum, launched to facilitate “informed citizen input” on the development of nanotechnology and human enhancement,<sup>23</sup> or the extensive international consultations conducted in conjunction with the U.N. World Commission on Environment and Development.<sup>24</sup> In addition to recommending guidelines for engagement, the Advisory Committee could actively explore the implications of alternative institutional forms, by integrating experiments in alternative forms of public engagement into its governance work. These “prototypes” could serve as test beds for development of continuing institutions to support needed engagement processes.

3. Public engagement on SCoPEX-specific issues should be limited to “consultation” and “involvement.”

In contrast to our recommendation that the Advisory Committee develop and test institutional models for public engagement on the broader societal implications of SRM research, we recommend that the engagement process specifically linked to the SCoPEX project be more circumscribed. The primary target group to participate in this engagement process should be communities “who might be directly affected” by SCoPEX activities.<sup>25</sup> In the typology of participation models used by EPA, the societal

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<sup>22</sup> See SCoPEX Advisory Committee, <https://scopexac.com/framework-deliverables-and-timeline/> (last visited Jul. 31, 2020) (“The Committee’s recommended approach for societal engagement and review will be developed in the specific context of the SCoPEX project, but with the desire to establish norms and approaches that can be adapted and applied to other solar geoengineering and related research efforts.”)

<sup>23</sup> See Patrick Hamlett et al., The Center for Nanotechnology in Society, Arizona State University, *National Citizen’s Technology Forum: Nanotechnologies and Human Enhancement* 1–2 (2008).

<sup>24</sup> See generally World Commission on Environment and Development, *Our Common Future* (1987).

<sup>25</sup> Steve Rayner et al., *The Oxford Principles* at 506; see also Asilomar Scientific Organizing Committee, Climate Institute, *Conference Report: The Asilomar Conference Recommendations on Principles for Research into Climate Engineering Techniques* 18–19, 23 (2010).

engagement element of SCoPEX-specific governance should be situated in the range from “consultation” to “involvement.”<sup>26</sup> The responsibilities of the SCoPEX project team in this consultation should include informing the interested public on the context, purpose, nature, and results of the experiment; inviting public comment; participating seriously in associated deliberations; and providing thoughtful responses to concerns raised, including identifying whether and how the deliberations influenced any decisions.<sup>27</sup> The project team should also participate in and support the governance pilot projects that the Advisory Committee develops to meet the broader public engagement needs of SRM research. But these broader consultation processes, and the role of the SCoPEX research team in them, should be clearly distinguished from the more circumscribed engagement processes that pertain to the SCoPEX experiment itself.

We thank the Advisory Committee for your consideration of these comments.

Respectfully submitted,

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<sup>26</sup> See discussion on page 3 n.11, *above* (describing levels of public engagement).

<sup>27</sup> See EPA, *Public Participation Guide* at 14.