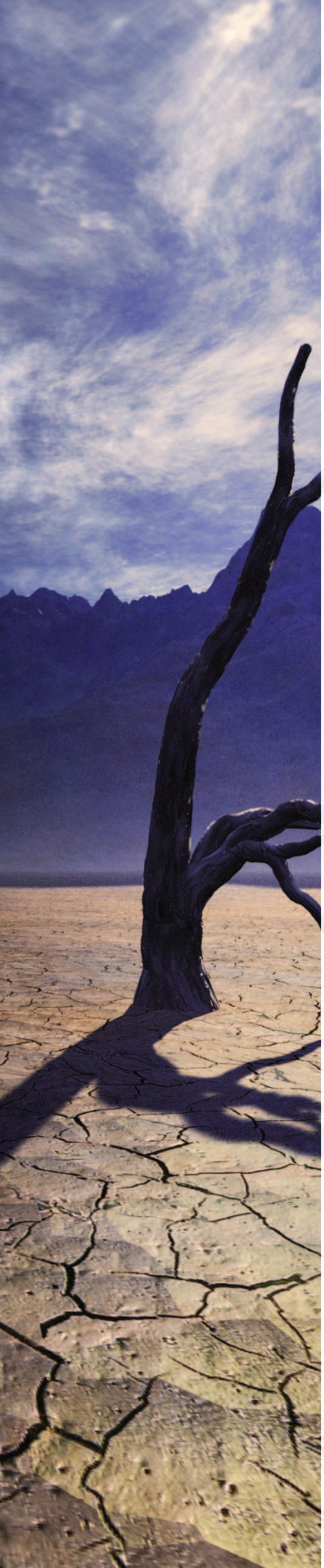

A CIVIL SOCIETY MEETING ON GEOENGINEERING:

SUMMARY AND SYNTHESIS

NOVEMBER 4, 2013
JOHNS HOPKINS UNIVERSITY
WASHINGTON, DC

An event organized by the Washington Geoengineering Consortium

ABOUT THE WASHINGTON GEOENGINEERING CONSORTIUM

The Washington Geoengineering Consortium is a collaboration between a set of academics based in Washington, DC. We are concerned with the social, political, and legal implications of geoengineering technologies. Our public outreach efforts are guided by the observation that, to date, the conversation about geoengineering's development, deployment, and implications has been confined to a relatively narrow set of voices. Our goal is to generate space for perspectives from civil society actors and the wider public, to produce a heightened level of engagement around issues of justice, agency, and inclusion. We will also provide researchers in the field of climate geoengineering with a suite of resources that may prove helpful in their efforts to expand our collective understandings of both the prospects and perils that climate geoengineering may pose to society.

Wil Burns, Ph.D., Johns Hopkins University
Simon Nicholson, Ph.D., American University
Michael Thompson, MA, American University

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Report prepared by:
Simon Nicholson
Michael Thompson
Wil Burns
Kate Goodwin-Reese

With the guidance of meeting rapporteurs:
Carley Chavara
Anne Kantel
Jonathan M. Kittle
Goueun Lee
Abby Lindsay

Special thanks to:
Gawain Kripke, Oxfam America, Session Moderator
Lara Levison, US Climate Action Network, Session Moderator
Joe Romm, American Progress, Panelist
Kate Sheppard, Huffington Post, Panelist
Energy Policy and Climate Program, Johns Hopkins University
Global Environmental Politics Program, School of International Service, American University

This report is not an effort to provide a comprehensive overview or analysis of the state of the conversation around geoengineering in civil society circles. Rather, it should be taken as a concise summation and synthesis of what was said by participants in the Washington Geoengineering Consortium's "Civil Society Meeting on Geoengineering," November 4, 2013, held at the Johns Hopkins University campus in Washington, DC.

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TABLE OF CONTENTS

EXECUTIVE SUMMARY

The Washington Geoengineering Consortium (WGC) is an independent academic group committed to generating a heightened level of engagement around the social, political, and legal implications of geoengineering technologies.

On November 4, 2013, the WGC hosted a closed-door meeting on geoengineering for Washington, DC-based civil society actors. More than 40 individuals registered to attend, from 30 different organizations.

The day was based around an opening panel discussion, followed by two breakout discussion sessions. During the first breakout session, participants were invited to look at the potential benefits and risks for people and the climate of various geoengineering proposals, and began to consider the possible contours of civil society engagement. The second session focused more particularly on questions of ethics, justice, governance, and of framing.

The breakout sessions produced a set of fruitful and revealing conversations. Among the most interesting lines of conversation were the following:

CIVIL SOCIETY RELUCTANCE TO ENGAGE WITH GEOENGINEERING

Three main reasons were advanced by meeting participants for civil society's relative reticence about discussing climate geoengineering as a climate policymaking option:

- **Geoengineering is a dangerous distraction —** it redirects attention away from the main drivers of climate change and away from more important types of response.
- **Geoengineering is important but simply off the radar —** there's no funding for civil society engagement with the subject, as the science races ahead of public attention.
- **Geoengineering is being avoided for strategic reasons —** it's too complex a subject area, and civic society groups are wary about "normalizing the discussion."

RISKS AND BENEFITS OF CIVIL SOCIETY ENGAGEMENT

Many argued that the present reluctance of civil society actors to engage with the geoengineering conversation must be overcome. If the world gets to the point of having to choose between climate disaster or geoengineering, politicians are almost certain, it was suggested, to choose geoengineering. This understanding of the political dynamics driving the world toward deployment of geoengineering technologies suggests a need for urgent and more far-reaching civil society attention.

WHO WINS AND WHO LOSES IN A GEOENGINEERED WORLD?

A recurring theme was that the most vulnerable people and communities should be accorded paramount importance and voice when considering geoengineering. Some suggested that the poor, particularly in the developing world, are unlikely to receive benefits from geoengineering and will be forced to bear any associated costs. Others, though, argued that geoengineering efforts might be a boon for the poor, by helping, potentially, to ameliorate some of the most serious impacts of climate change that are projected to occur during this century and beyond, with likely disproportionate impacts on the global South. Indeed, some argued that rather than see the poor as being victimized by geoengineering efforts, it is in fact the most vulnerable who have the most to gain from geoengineering research and potential deployment.

WHAT ABOUT GOVERNANCE?

In the context of regulation of research, participants discussed whether formal regulation was required. There was a consensus that, at the minimum we need greater transparency, with tracking of private research by a pertinent body at either the domestic or international level.

HOW SHOULD CIVIL SOCIETY ACTORS FRAME GEOENGINEERING?

Some suggested that the dominant framing for geoengineering now is as a "solution" to climate change. Few scientists would make such a claim, but the general public may still construe the promise of geoengineering as "this will make climate change go away and, so, we don't have to change our behaviors." A few suggested that, to shift the conversation in productive ways, geoengineering should be characterized publicly as a "terrible choice." Geoengineering, in other words, can be viewed by civil society organizations as a strategic opening, as a way to bring home the horrors of climate change to policymakers and the public.

A STRATEGIC RESPONSE

In an ideal world, some argued, geoengineering would be a strategic tool. It would be just one among many forms of society-wide response. There would be robust and honest conversations about the tradeoffs of pursuing particular options, taking account of the entire suite of benefits and costs associated with mitigation, adaptation, and geoengineering activities. Yet history teaches that responses to social problems and the assessment of complex technologies seldom proceed in such a reasoned fashion. "Society," one participant noted, "is lousy at strategy."

NEXT STEPS

The Civil Society Meeting on Geoengineering was a useful first step in broadening the array of Washington, DC based voices participating in the geoengineering conversation. The WGC plans to continue to advance its core mission of generating heightened levels of engagement with geongineering's social, political, and legal implications by offering further forums for civil society and public engagement, by growing the availability of educational materials on geoengineering, and by providing a hub for high-quality and policy-relevant legal and social scientific research.

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DEFINING GEOENGINEERING

The definition and use of the term "geoengineering" is not fully agreed upon, and given what is at stake, can be contentious. Any given definition is politically loaded, represents perspectives, and involves choices to include or exclude certain kinds or types of actions, impacting arguments surrounding its potential benefits and risks.[1]

The U.N. I.P.C.C.'s A.R.5 Working Group 1 defines geoengineering as "methods that aim to deliberately alter the climate system to counter climate change."[2]

A U.N. Convention on Biological Diversity document on the definition of geoengineering, titled "Impacts of Climate-related Geoengineering on Biological Diversity," defined geoengineering as "a deliberate intervention in the planetary environment of a nature and scale intended to counteract anthropogenic climate change and its impacts."[3]

The Oxford Geoengineering Programme defines geoengineering as "the deliberate large-scale intervention in the Earth's natural systems to counteract climate change."[4]

Members of a public Google discussion group on geoengineering, which fosters interaction among some of the leading voices in the global geoengineering "conversation," discussed the merits of defining geoengineering as "activities intended to modify climate which have a greater than de minimis effect on an international commons or across international borders and where that greater than de minimis effect occurs through environmental mechanisms that are not a direct consequence of any resulting reduction in anthropogenic aerosol and/or greenhouse gas concentrations."[5]

Those who think and write about geoengineering most often divide proposed schemes into two categories. Carbon Dioxide Removal (CDR) schemes are being designed or imagined to draw carbon dioxide out of the atmosphere, to render it inert and store it in some kind of safe, long-term fashion, or to use it for fuel. At large enough a scale, planting trees, or remediating soil through the integration of a substance like biochar, would qualify. Often discussed CDR schemes include iron ocean seeding (dropping iron into the oceans to encourage carbon-inhaling blooms of plankton), artificial trees (a theoretical system that could draw carbon dioxide directly from the open air), enhanced weathering, and ambient air capture.

Solar Radiation Management (SRM)[6] technologies, by contrast, are those that would reflect some amount of incoming solar radiation back into space, or that would more readily enable heat radiated from the earth's surface to escape, reducing regional or planetary warming. It has been estimated that reflecting around 2% of incoming solar radiation back to space would offset the global temperature increase associated with a doubling of pre-industrial levels of carbon dioxide.[7]

SRM would basically involve making some part of the planet's surface or atmosphere more reflective. Genetically engineered crops with shinier leaves, or massive white plastic sheets deployed over melting glaciers, or micro-bubbles in the earth's oceans have been posited as ground-level options. Moving skyward, some have envisaged ways to brighten cloud layers in the lower atmosphere. The most often discussed potential SRM intervention would be the introduction of sulfate particles or a similar substance into the stratosphere, to mimic the cooling effect of volcanic eruptions. There has also been discussion of space-based options, such as the use of reflective mirrors mounted on satellites. With the exception of the space-based options, solar radiation management technologies currently being discussed are relatively inexpensive (in terms of cash expenditure, as compared to a majority of large scale mitigation technologies and efforts), relatively straightforward in a technical sense, quickly deployable, and fast acting. These traits could make SRM options politically attractive.

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1 Even the term "geoengineering" raises concerns. Some, like Stanford's Ken Caldeira, have argued that "climate engineering" may be a more useful term for nuanced conversation

2 IPCC Climate Change 2013, The Physical Science Basis (Working Group 1) http://www.ipcc.ch/report/ar5/wg1/

3 ADDITIONAL INFORMATION ON OPTIONS FOR DEFINITIONS OF CLIMATE-RELATED GEOENGINEERING http://www.cbd.int/doc/meetings/cop/cop-11/information/cop-11-inf-26-en.pdf

4 http://www.geoengineering.ox.ac.uk/what-is-geoengineering/what-is-geoengineering/?

5 Geoengineering Google group: https://groups.google.com/forum/#!forum/geoengineering

6 The term "solar radiation management" itself is contentious, with some arguing that a more proper wording would be "solar radiation interference."

7 Lenton, T.M., and N.E. Vaughan (2009). "The radiative forcing potential of different climate geoengineering options", Atmospheric Chemistry and Physics Discussions 9, 2559-2608.

INTRODUCTION:
THE CIVIL SOCIETY MEETING ON GEOENGINEERING

On Monday, November 4, 2013, the Washington Geoengineering Consortium convened a meeting for representatives of civil society organizations at the Johns Hopkins University campus in Washington DC (see **Appendix 1** for a list of participating organizations). The primary purpose was to introduce a new set of actors, and to welcome a new set of perspectives, to the fast-evolving conversation on climate geoengineering. The meeting was also joined and shaped in useful ways by a number of seasoned geoengineering researchers and commentators.

The meeting was designed to allow vigorous, unfiltered dialogue. Conversations were off-the-record, in the sense that nothing stated in the meeting's discussion sessions was intended for attribution to particular parties. As such, the following summary of the meeting does not refer to participants by name, beyond identifying those who contributed to the meeting's public opening session.

Geoengineering is an umbrella term used to describe any number of technological interventions that are being imagined or developed to mitigate climate change or to blunt its impacts. Some geoengineering technologies have the potential to slow or stem certain of the negative impacts associated with climate change. Others promise to draw down significant quantities of carbon from the atmosphere and to render it inert. At the same time, such benefits are almost assuredly not free of substantial costs and risks. Participants in the meeting were invited to puzzle through the competing benefits and risks of geoengineering proposals, as well as to consider emerging ideas about geoengineering ethics and governance, and to offer thoughts about appropriate forms of civil society engagement with the subject matter.

The meeting was organized around three main sessions (see **Appendix 2** for the meeting's program). The first session was a panel discussion designed to orient meeting participants.[8] Panelists summarized some of the current strains of geoengineering research, introduced some intellectual categories to help participants parse the possible effects of geoengineering, and offered commentary on geoengineering's social and political implications.[9]

The remainder of the meeting was then given over to moderated discussion sessions. In two separate groups, meeting participants spent the first breakout session looking at the potential benefits and risks for people and the climate of various geoengineering proposals, and began to consider the possible contours of civil society

8 An audio recording of the opening panel is available at www.dcgeoconsortium.org/events.

9 The panelists were Wil Burns (Johns Hopkins University) and Simon Nicholson (American University), two of the meeting's organizers, with Joe Romm (Climate Progress) and Kate Sheppard (Huffington Post).

engagement. The second session focused more particularly on questions of ethics, justice, governance, and of framing.

WHY A CIVIL SOCIETY MEETING ON GEOENGINEERING?

Impetus for the meeting came from the sense of the organizers that the geoengineering conversation has reached a pivotal point. For many years, climate geoengineering proposals were confined to the fringes, viewed as "a freak show in the otherwise serious discussions of climate science and policy."[10] Now, though, geoengineering is edging closer to center stage, for at least three related reasons.

First, there are now a growing number of credible and respected scientists and scientific bodies giving attention to geoengineering. Relevant research programs have been established by individual labs or by groups of scientists at national laboratories and universities in the U.S., Canada, several European countries, Japan, and India. The U.N. I.P.C.C.'s AR5 Working Group 1, in "The Physical Science Basis" report, surprised many in the climate world by including a section on geoengineering approaches. In addition, prominent universities in the U.S. and Europe have established programs focused on geoengineering policy, ethics and governance, and hearings have been held in the United States Congress and in the U.K. parliament.[11] These are recent and quite rapid developments. Tellingly, one recent study notes that there have been more peer reviewed articles on geoengineering in the last three years than were seen in the prior thirty.[12]

Second, the technical work completed to date indicates that, at least in theory, there appear to be some relatively straightforward and cost-effective ways to intervene in the climate system in order to bring about meaningful levels of change. Some strategies, such as the introduction of sulfates into the stratosphere, build from existing technologies and technical knowledge such that they could conceivably be deployed within a handful of years. Other options exist largely as promising lines of inquiry.

Third, and perhaps most important for the civil society actors present at the meeting, the political winds are shifting. Large numbers of concerned observers are suggesting that current international political processes appear insufficient as a response to climate change. The regime developed by the United Nations Framework Convention on Climate Change appears to be limping forward at best. Many important countries also appear to be playing a stalling role, doing little to advance international talks or to tackle the roots of climate change domestically. All of this means that a range of voices is now calling for a "Plan B" on climate change. Geoengineering seems to offer an attractive technological route for those disillusioned with political and social inaction.

Against this backdrop, participants in the meeting were asked to consider two main things:

1. What are the risks and benefits associated with wider ranging civil society engagement with geoengineering?
2. What does effective and productive civil society engagement look like?

It was suggested at the conclusion of the opening session that there is too much at stake to be wholly for or against geoengineering in a knee-jerk fashion. The challenge presented by climate change is too vast, and geoengineering is far too broad a category, for such positions to hold much meaning. It was concluded that it would be far more judicious to engage in a critical and detailed inquiry into the likely benefits, costs, and risks associated with particular geoengineering proposals.

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10 Victor, David G. On the Regulation of Geoengineering, 24, Oxford Rev. Econ. Policy, 322, 323 (2008)
11 For more information, see www.dcgeoconsortium.org/resources.
12 Scott, K.N. (2013) International Law in the Anthropocene: Responding to the Geoengineering Challenge. Michigan Journal of International Law 34(2): 309-358.

PARSING GEOENGINEERING'S COSTS AND RISKS

Commentators have identified many potential benefits or geoengineering technologies. Among them:

- Certain geoengineering interventions could have a large positive impact in ameliorating potential negative impacts of climate change at a relatively low economic cost;
- Geoengineering offers a way to cut through or circumvent the political inaction that has plagued climate policymaking to date because it would not necessitate large-scale changes in lifestyles;
- Geoengineering provides a desperately needed "Plan B" should the climate edge toward critical thresholds;
- A geoengineering pathway could buy time for an increased focus on mitigation and adaptation efforts.

Weighed against these perceived benefits are a variety of potential costs and risks. Participants in the civil society meeting were invited to consider three different categories of risk to help parse geoengineering's potential downsides.[13]

Material Risks
These are the types of risks to which scientists have tended to pay most attention. Most obviously, certain geoengineering schemes could have negative consequences for human and environmental wellbeing. For example, the introduction of sulfates into the stratosphere could substantially alter regional rainfall patterns, produce acid rain, or harm the ozone layer. The meeting's participants were asked to consider, what are the foreseeable tradeoffs when one considers geoengineering pathways? Also, what is the most judicious course of action, knowing that intervening willfully in the climate system is bound to produce a range of unforeseen or unforeseeable consequences?

Political Risks
This category is concerned with questions of control, access, and voice. Some geoengineering technologies promise to consolidate political and other forms of power in ways that some may find troubling, not least because actors that already hold power in domestic and global affairs are those most likely to seize geoengineering's reins. It has also been argued that focusing on geoengineering may sap political will for mitigation and adaptation efforts. Participants were asked, who benefits in a geoengineered world? Who bears the costs? Who decides, and how, which research and deployment paths to take?

Existential Risks
Under this heading are grouped a set of concerns about the kinds of "solutions" to climate change that a greater focus on geoengineering privileges, and the kinds of options that geoengineering might, conceivably, foreclose. Technological responses to climate change fit with current dominant ways of understanding and tackling complex problems. What would it mean, participants were asked, to take seriously the opportunities presented by certain geoengineering approaches, without setting aside other ways of understanding and grappling with climate change?

13 Nicholson, Simon. "The Promises and Perils of Geoengineering." Ed. Erik Assadourian. State of the World 2013: Is Sustainability Still Possible? Island Press, 2013.

BREAKOUT SESSION I:
BENEFITS AND RISKS OF GEOENGINEERING TECHNOLOGIES, AND BENEFITS AND RISKS OF CIVIL SOCIETY ENGAGEMENT

The first breakout session invited participants to consider the potential benefits and threats associated with geoengineering proposals, and to begin to look at the benefits and costs attached to greater levels of civil society engagement with the subject matter of geoengineering.

In each of the two separate breakout groups, participants were presented with the same opening question:

"Why have civil society organizations been reluctant to engage with or speak about geoengineering?"

Participants were quick to acknowledge the validity of the question's premise. Three main reasons were then advanced for civil society's relative reticence about discussing climate geoengineering as a climate policymaking option.

1. GEOENGINEERING IS A DANGEROUS DISTRACTION

A number of participants suggested in different ways that geoengineering has been off the agenda for civil society organizations because it is a distraction, perhaps to a dangerous extent. For organizations that have focused on pushing domestic and international climate change mitigation and, more recently, adaptation efforts, anything that threatens to draw attention away from those efforts is to be greeted with suspicion.

Relatedly, some referenced a "moral hazard" problem, in the sense that offering geoengineering as a viable alternative could take some of the wind out of calls for mitigation and adaptation, or could let actors that should be taking stronger action off the hook.

Another, still stronger argument that some made in a similar vein was that calls for geoengineering look suspiciously like calls for investment in clean coal technologies—as a "redirect;" a way to draw attention away from the real, hard actions that need to be taken to tackle climate change. Discussion of "clean coal" was seen as an important analogy. Politicians, suggested one participant, have talked publicly about the promise of clean coal and carbon capture and sequestration technologies in the United States, and this is perhaps one of the reasons that politicians have avoided backing regulations on emissions.

2. GEOENGINEERING IS IMPORTANT BUT SIMPLY OFF THE RADAR

Another prominent argument was that while geoengineering is fast becoming an important part of the wider climate change conversation, it has not yet found its way into the programmatic agendas of civil society organizations. There are a few different reasons for this. The most obvious, and perhaps most important from an organizational standpoint, is funding. There is some limited money now being directed toward scientific and technical geoengineering work. There is far less money, though, encouraging civil society engagement. Until that changes, the landscape of civil society work on geoengineering is unlikely itself to change.

Others suggested that this is a case of civil society action lagging the work of the scientific community. Scientific work on geoengineering is just beginning to gain steam. It makes sense that civil society, and policymakers, are only now beginning to see the implications.

3. GEOENGINEERING IS BEING AVOIDED FOR STRATEGIC REASONS

A third contention was that the terms of the debate around geoengineering have already largely been set, making it difficult for groups to take a nuanced position. Geoengineering is a polarizing notion. Some actors see it appropriate to avoid the issue entirely, at least at present, rather than being drawn into a conversation that seems to provide little upside for organizations already immersed in other activities.

Geoengineering is also what one of the participants described as a "brain scramble." It is a hard area to talk about, and perhaps, for some civil society groups, it is hard to mobilize action around the idea that certain human activities and technologies could be construed as beneficial. This type of comment pointed to old and deep schisms in the environmental and justice communities that were consistent themes throughout the meeting, with some professing a high level of technological optimism, while others were deeply pessimistic about technology-based climate change responses. Some suggested that a reason to shy away from engagement with geoengineering is that it draws attention to such schisms at a time when the climate movement, in particular, is working desperately to present a united front.

Running through many of these comments was a sense that if more civil society organizations start to pay attention to geoengineering then this could be taken as tacit approval of such technological options—a disturbing idea for many at the table. Some are wary about, as one participant put it, "normalizing the discussion." At the very least, being seen to pay attention to geoengineering could advance and force engagement with a set of technological innovations that some groups are unwilling, at least at this moment, to support.

THE RISKS AND BENEFITS OF CIVIL SOCIETY ENGAGEMENT

The conversations then shifted to consider whether, how, and to what purpose civil society might begin to engage with geoengineering in a more robust fashion. The primary question was, "what would such engagement look like, and what could it expect to produce?"

An important opening remark from one participant was that any decision to develop and deploy geoengineering technologies on a large scale will be a political decision, rather than strictly a scientific one. There is a long-standing assumption in the environmental community that scientific consensus leads to political will, which in turn leads to action. But years of engagement with the challenge of climate change disprove such thinking.

The fact that political decision-making tends to trump the sober pronouncements of scientists has important consequences for civil society engagement. In practice, it could mean that even if scientists conduct research

WHAT IS CIVIL SOCIETY IN THE CONTEXT OF CLIMATE GEOENGINEERING?

What is civil society for the purposes of these conversations? This is a question which both breakout groups grappled with. Invitations to the civil society meeting were extended to people within a number of Washington DC-based civil society organizations, spanning the environmental, legal, human rights, justice, and human development spheres. Some at the meeting, though, suggested that although there was a wide diversity of voices present, the gathering could hardly be taken as representative.

One refrain was, "don't forget to include the scientists." Much of the geoengineering conversation to date has been a scientific one, with the effect that even questions of geoengineering's ethics, justice, governance, and politics have been shaped by the worldviews and understandings of the scientific community. This is crucial, said some, to take into account, and more representatives from the world of science should be present at follow-on events. Others spoke about the need to also include engineers in the conversation, drawing a distinction between scientific curiosity, on the one hand, and engineering problem-solving, on the other.

In addition, it was mentioned by some that the broader public should clearly be considered when one talks of civil society engagement with geoengineering. As yet, conversations about geoengineering have not really penetrated wider public discussions, unless one considers conspiracy theories around so-called "chemtrails."

On that last point, one of the moderators, after conducting a quick Google search on the term "geoengineering" during a pause in the meeting, remarked on reconvening that he was consistently struck by the overwhelming number of "geoengineering" websites devoted to making the case that the contrails left behind by jet aircraft are part of a government effort to control the weather or human behavior. This is a line of thinking, noted one participant, which promises to achieve new prominence if large-scale sulfate aerosol experiments are ever commenced.

that leads nowhere, or even should scientific research suggest that certain geoengineering technologies are far too risky to be utilized, there may still be powerful momentum, propagated by powerful interests, that encourages deployment. Scientists active in geoengineering research are arguing overwhelmingly for geoengineering actions as one part of a wider program devoted to climate stabilization. Mitigation efforts should come first and adaptation next, with geoengineering a distant, and hopefully never used, emergency response. Yet it would be all too easy for political actors to suggest the choice is geoengineering or mitigation.

Said differently, if the world gets to the point of having to choose between climate disaster or geoengineering, politicians are almost certain, suggested one participant, to choose geoengineering. Does this mean that scientists should be given license to try at least small scale geoengineering experiments to test how they work? This understanding of the political dynamics driving the world toward deployment of geoengineering technologies suggests a need for urgent and more far-reaching engagement by civil society actors. Far better, said some, for civil society actors to engage with the geoengineering conversation now, rather

> "I don't think there are scientists out there saying no, let's just do engineering and not mitigation, but when you get into the political realm the question is going to become are we going to do mitigation or are we going to do geoengineering? And that's a political question, it's not a technocratic question. So when people say, "well scientists aren't saying that (let's just do geoengineering and skip mitigation)," I say, "so what," because at the end of the day it's going to be a political question and not a scientific one."[14]

14 The quotes scattered throughout the remainder of the report come from meeting participants. The meeting was closed-door, so no attribution linking particular participants or organization to quotes is given.

> "We need to be better educated so when we are having conversations with people, large institutions, [and] with governments about where to put their money, it is important to be better informed about whether geoengineering is a piece of the puzzle or not. And it is important for civil society to not have a one-size-fits-all approach [to geoengineering]."

> "I think who would benefit from deployment of geoengineering technologies would be a useful place to start. Who is actually developing the technologies? Who is funding the development; who has patents on those technologies? Are the powers behind geoengineering similar or different to the ones behind our current political systems or not, like the oil industry?"

than stand on the sidelines, while there is still time to shape it. On the other hand, several participants suggested that it was premature to even be discussing research in this context.

In trying to envisage the nature of a civil society role, participants focused a good deal on the "public interest." Many of the participants saw their organizations as protecting and speaking for a public that otherwise lacks voice. To that end, participants spoke about a need to shift the conversation from a focus on environmental benefits and harms to the human consequences. Who will benefit? Who will be harmed? It was remarked that while there is money now going toward geoengineering research, there is very little being directed to those asking such questions or seeking to frame the debate for the public.

Such questions are not straightforward, however. It is a tricky undertaking to attribute benefits and costs to identifiable groups when discussing speculative technologies. Building on such an understanding, some noted that a potential role for civil society lies with the development of metrics to evaluate the impact of geoengineering on human populations, with a focus on the most vulnerable.

While many suggested that the science is out ahead of civil society on geoengineering, some, in the context of the conversation on meaningful civil society action, suggested that it is in fact civil society that has a jump on scientific research and understandings. There is increasing focus now, for instance, on ethics and governance related to geoengineering. The scientific community, on the other hand, is still working largely in the realm of speculation and modeling, where the modeling work tends to focus on worst case scenarios. Any pursuit of high-altitude sulfate injection, suggested one participant, is likely to be regional and staged, rather than being a global action. The implication is that civil society is focusing on worst-case scenarios being developed by modelers, when in reality geoengineering will likely be a more cautious undertaking.

At the same time, though, others pointed out that even smaller scale regional deployment of geoengineering technologies raises a host of governance and coordination concerns, particularly, again, in the highly likely event that scientific nuance is lost in the cut and thrust of politically-motivated action.

Some also suggested a need to redirect the entire conversation. Focusing on geoengineering as a solution, or even as a component of a response, misses the fundamental driver of climate change, which, contended many at the meeting, is overuse of resources, and the cultural and social forces that drive such resource overuse.

BREAKOUT SESSION II:
ETHICS, JUSTICE, GOVERNANCE, AND FRAMING

The second closed-door breakout session invited meeting participants to wrestle with ethical and governance questions raised by geoengineering research and potential deployment. Participants were also asked to consider questions of justice and ethics around geoengineering, and to think about how, if civil society is to engage in a meaningful way with the geoengineering conversation, important issues and positions are best framed.

Geoengineering entails a deliberate intervention in the workings of the global climate system. A growing body of scientific work points to the technical feasibility of such an enterprise. It is a wholly different question, though, to ask and answer whether geoengineering is desirable. The desirability of geoengineering is not strictly a technical or scientific matter. It comes down to a complex mix of social, political, justice, and ethical questions.

ON JUSTICE: WHO WINS AND WHO LOSES?

To begin to get at such questions, and to link the second breakout session to the first, participants were asked, "who wins and who loses in a geoengineered world?"

It quickly became apparent that such a question raises some thorny concerns. Many participants started by reiterating that the most vulnerable people and communities should be accorded paramount importance and voice when considering geoengineering. Some then suggested that the poor, particularly in the developing world, are unlikely to receive benefits from geoengineering and will be forced to bear any associated costs. Such a calculus makes many geoengineering technologies unattractive to those focused on justice concerns.

> "Society is notoriously bad at even small-scale infrastructure development projects, the tried and true technologies. Take hydro power for example. The idea of cumulative impact assessments is a new concept; looking at downstream impacts on communities and ecosystems. I can't think of a hydropower project that does not impact the poorest people detrimentally, and that's on a small regional scale, so thinking of this [geoengineering] on a larger scale, while I agree it's terrifying that arctic permafrost is about to go, the idea that we could aim to cool a region like that and the implications that could have (on the trade winds, the thermohaline circulation, on small scale farmers,) … We can't get a hydro damn working properly and account for all its implications. It's scary to think we might try geoengineering and imagine better outcomes."

In support of this vote against the development of far-reaching geoengineering technologies, one participant suggested that we should look to learn lessons from large-scale engineering projects in the past, and argued that such a record is not altogether good. "We're bad," it was suggested, "at even small-scale development projects. We can't even get a hydro power project right" much less be expected to manage something at a regional or global level that has the

scale and complexity of a geoengineering endeavor. Others, coming from much the same place, suggested a personal reluctance to promote the idea of geoengineering as a solution given that poorer countries lack money (resources for resilience) if unintended consequences occur.

Some participants, though, suggested an alternative line of reasoning. They made the case that there are problems with starting from the position that the poor are liable to be harmed in a geoengineered world, and pushed back against the notion that geoengineering is an idea being developed by the rich world entirely for the rich world's benefit. In fact, argued some, many proposed geoengineering efforts might be a boon for the poor, by helping to ameliorate some of the potentially most serious impacts of climate change that are projected to occur during this century and beyond, with likely disproportionate impacts on the global South. Indeed, some argued that rather than see the poor as being victimized by geoengineering efforts, it is in fact the most vulnerable who have the most to gain from geoengineering research and potential deployment.

> "I think actually that the poor might be the ones that benefit the most, because what you are doing is reducing the impacts that they get from climate change, that's the intent. … I think if you could keep the climate generally cooler you are going to allow them to continue agriculture at low latitudes that would probably lost to global warming, and that's why I think it's really important to do this analysis. It's not geoengineering or not, it's [geoengineering] in association with everything else that's going on. I mean global warming is going to have devastating effects on people in developing countries."

One participant suggested that the positive implications of geoengineering efforts for the poor is easily seen by a thought experiment involving the slowing or stemming of Arctic ice melt. Some research has suggested that Arctic ice melt is a problem that could be tackled by the targeted application of sulfate or similar particles into the upper atmosphere at upper latitudes. By stopping ice melt, such efforts could prevent the release of large amounts of methane from newly exposed tundra, and could combat sea level rise. Such effects, it was argued, are certainly good for rich countries, but are absolutely imperative for poor countries, particularly those countries with vulnerable people threatened by rising seas.

Still, this argument was not enough to convince some of geoengineering's desirability. It would be far preferable, some argued, to seek to intensify mitigation and adaptation efforts, and to accept inevitable suffering and losses in such a world, than to gamble on large-scale geoengineering. A counter-argument, raised by some, was that the world's feckless response to addressing climate change to date provides very little hope for the future. Thus, a more straightforward path like geoengineering emerges as an extraordinarily attractive proposition.

> "The number of arguments [about geoengineering] that have a lot of truth to them and that make you worry about it are impressive…..worries about negative consequences, worries it will scuttle or weaken efforts aimed at mitigation, worries about patents and then people being economically motivated to deploy, these things go on and on. There's enough to worry about that I think many environmentalists have the attitude "I don't know about this;" really sincere people who just aren't sure it's worth investing effort in it because it's so problematic."

Another pro-geoengineering argument that was made is that "while geoengineering doesn't solve the problem, it buys us time." Some clearly gave great weight to such an argument. The idea is that

mitigation and adaptation efforts are currently proceeding at far too slow a pace given the magnitude of the climate problem. But with the breathing room provided by targeted geoengineering responses, there is hope for new technological advances, for a revival of international political processes, and for the building of social and material resilience.

The idea has intuitive merit. Some, though, pushed back against it, by asking the question, if geoengineering technologies buy time, then how will that time be used? One participant suggested that if geoengineering interventions were to allow breathing room it would be used by developing countries to pursue conventional development pathways, meaning further large-scale industrialization driven by fossil fuels. This could generate more wealth and, potentially, new forms of technological and societal response to climate change. At the same time, such development would add to and complicate the climate change challenge. If geoengineering spurs another spasm of fossil-fuel driven economic expansion, then what has really been gained?

> "Geoengineering would potentially be a boon to a lot of folks in developing countries who are looking for that additional time to pursue economic growth and prosperity along the models that we already know (I'm not saying these are good models; that is not the optimal form of growth) …"

An overriding message from all involved in the conversation concerned the need to account not just for environmental impacts of geoengineering, but also to understand political, social, and cultural impacts. A central issue then becomes one of resilience, in at least two related senses. First, can geoengineering technologies be used in such a way that the particular needs of the most vulnerable populations and communities are considered paramount? Second, can the poor reasonably be expected to manage the unintended consequences of geoengineering endeavors, and if not, how is geoengineering to be understood within the broader set of issues related to climate change risk?

These lines of inquiry get at some longstanding concerns in the climate change conversation. What would it mean, in particular, to allow the poor and marginalized to speak for themselves when it comes to the crafting of responses to climate change? How are wealthier countries to put forth not just the material interventions that offer more physical resilience in developing countries, but the less tangible forms of support that protect against climate change's negative social and cultural impacts?

ON GOVERNANCE

A substantial portion of the second breakout session of the meeting was devoted to discussion of governance issues, including geoengineering research, development, and deployment. In the context of regulation of research, participants discussed whether formal regulation was required. There was a consensus that, at the minimum we need greater transparency, with tracking of private research by a pertinent body at either the domestic or international level. The National Institutes of Health was cited as one example of a body that could do so. It was also suggested that research should be published in academic journals to help ensure sufficient review.

It was also agreed that at some threshold there might be a need for international reporting, and perhaps at some point, monitoring or regulation of research by a pertinent international institution. There was also a discussion of the current sources of funding for climate geoengineering research. There are modest geoengineering research programs in Germany, the Netherlands and the United Kingdom. In the U.S., the CIA

recently announced partial funding for a National Academy of Sciences study on geoengineering.[15] Moreover, there is research that is not explicitly characterized as geoengineering that may be pertinent to many of the proposed approaches. Some participants drew a distinction from other cutting-edge research programs, including synthetic biology and nanotechnology, where they believed that government oversight was extremely important because of potential concerns about occupational hazards.

Participants in the sessions also talked about potential avenues for regulating potential deployment of geoengineering technologies. Many participants argued that the question of whether international regulation of technologies would be warranted was a matter of scale and impacts. For example, in the case of deployment of air capture, the impacts would likely be localized, and wouldn't warrant international regulation, in contrast to technologies such as sulfur injection or cloud brightening. Several regimes were mentioned, including the United Nations Convention on Biological Diversity and the London Convention, the Convention on Long-range Transboundary Air Pollution, and the United Nations Framework Convention on Climate Change.

There was also discussion about whether it would be possible and desirable to have a number of regimes engaged in regulation, or would the optimal regulatory approach be under the umbrella of one regime? One participant indicated that regulation by one regime would probably make it easier to conduct experiments, though that wasn't necessarily a desirable thing.

Some participants in the latter portion of this session also emphasized the need to more precisely define the term "climate geoengineering." Some participants raised the question of whether carbon capture and sequestration could be considered a form of geoengineering, at least at full-scale where its impacts could be global. One participant also pointed out that the Wilson Center did some work on "soft geoengineering," technologies which are likely not to result in global impacts – white roofs to reflect sunlight; bubbles in deep ocean.[16] The Center's publication discusses several criteria for characterizing a technology as "soft" climate geoengineering; this includes whether the technologies are scalable, are likely to have few or no negative impacts on ecosystems or human institutions, are rapidly reversible, and are cost-effective.

Finally, several participants also suggested that we might wish to engage in a comparative risk assessment of climate impacts versus potential impacts of geoengineering to determine if deployment would be just or moral.

ON FRAMING — STRATEGIC CIVIL SOCIETY ENGAGEMENT WITH GEOENGINEERING

A final line of discussion concerned how civil society actors might actively seek to frame the geoengineering conversation, in pursuit of stronger action on climate change and more inclusion of a diverse set of perspectives.

Some suggested that the dominant framing for geoengineering now is as a "solution" to climate change. Few scientists would make such a claim, but the general public may still construe the promise of geoengineering as "this will make climate change go away and we don't have to change our behaviors." There was talk about pushing back against such a framing, to instead speak of geoengineering as a nested option—mitigation first; then adaptation; then geoengineering if all else fails.

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15 Russel, Kyle. "The CIA Wants To Control The Weather Through 'Geoengineering.'" Business Insider, [July 23, 2013] available at http://www.businessinsider.com/cia-weather-control-with-geoengineering-2013-7#ixzz2lDB2IU7Nhttp://www.businessinsider.com/cia-weather-control-with-geoengineering-2013-7, site visited on Nov. 20, 2013.

16 Olson, Robert. "Soft Geoegineering: A Gentler Approach to Addressing Climate Change," Environment: Science and Policy for Sustainable Development, Volume 54, Issue 5, 2012. http://www.tandfonline.com/doi/abs/10.1080/00139157.2012.711672?journalCode=venv20#.UqoTMGRDsvo Video proceedings from a 2012 Wilson Center Science and Technology Innovation Program event, "Consider Soft Geoengineering," available at http://www.wilsoncenter.org/event/considering-soft-geoengineering

A few participants went further, arguing that geoengineering should be characterized publicly as a "terrible choice." It was argued that if members of the public and political class who hear about geoengineering view it as such a terrible option they may be willing to support stronger mitigation and adaptation responses. Geoengineering, in other words, can be viewed by civil society organizations as a strategic opening, as a way to frame a "terrible choice" for policy makers and for the public.

> "What's the framing that's most useful? Maybe this concept of the "terrible choice:" that you put geoengineering together with climate, and the discussions you have around it are not all one way or another, it's just honestly trying to look at the whole thing and realizing that we might have to do geoengineering if we can't deal with climate change, realizing all the uncertainties about impacts of geoengineering, maybe you get people to take climate change much more seriously."

Yet some participants pushed back against this framing. It was suggested that we, collectively, already know that climate change is a terrible thing. Why should it be supposed that talking about geoengineering will advance the climate change conversation in productive ways? It could, instead, be the case that the public and political leaders grab hold of geoengineering as a false promise, and use it as an excuse to avoid making tough choices and taking tough actions.

In an ideal world, some argued, geoengineering would be a strategic tool. It would be just one among many forms of society-wide response. There would be robust and honest conversations about the tradeoffs of pursuing particular options, taking account of the entire suite of benefits and costs associated with mitigation, adaptation, and geoengineering activities. Yet history teaches that responses to social problems and the assessment of complex technologies never proceed in such a reasoned fashion. "Society," one participant noted, "is lousy at strategy."

SYNTHESIS

This meeting brought together a diverse set of voices and elicited a wide range of views, some at odds with expected positions of particular actors in the broader climate change and justice conversations. It was clear that there is no single civil society "perspective" on climate geoengineering. It was clear, too, that there is excitement, bemusement, and trepidation in equal measure at the thought of wider engagement with geoengineering.

GEOENGINEERING AS A LAST RESORT

The one thing on which there appeared broad consensus throughout the day was that mitigation and adaptation are preferable to geoengineering—that geoengineering is, and should be, seen only as a last resort. Yet given this consensus, there is a surprising divergence on the question of whether geoengineering is a politically feasible response to climate change, and how geoengineering should be seen in relation to other forms of response.

On the one hand, some participants argued that mitigation and adaptation have proved infeasible pathways on their face. One need only look to the failure of current political processes and the difficulties attendant with producing large-scale social change. Behavioral change, it was argued, is a non-starter. This makes geoengineering a politically enticing option.

On the other hand was the view that it would in fact likely prove quite difficult to marshal any kind of political consensus around geoengineering, either within a given country or between a set of countries. The most vivid comment in this line of discussion was that any actor deploying full-scale geoengineering projects would necessarily be "rogue," because deployment would occur despite the objections of others.

GEOENGINEERING AS A GAMBLE

A major tension seems to revolve around the question of geoengineering as a gamble (or, as Joe Romm put it in the meeting's public opening panel, an "experimental treatment for a fatal condition"). One clear sentiment at the meeting was that if the world sticks to mitigation and adaption without geoengineering, there is bound to be widespread suffering, but it will be anticipated suffering. The effects of geoengineering would be unpredictable, perhaps catastrophically so—and so it is unreasonable to accept such risk. From this perspective it is better to choose predictable losses over unpredictable losses.

In contrast to this perspective was another clear attitude, embodying the idea that either choice—geoengineering or no geoengineering—is a gamble. A firm stand against research or deployment of geoengineering technologies means, potentially, increasing the impacts of climate change, and that will bring about a world every bit as catastrophically unpredictable as a world in which geoengineering takes place. In this view, geoengineering may be the lesser gamble—because it is scientific, iterative, solution-oriented, and perhaps more likely to be effective than the attempts at behavioral change involved in mitigation and adaptation.

GEOENGINEERING CONVERSATION REVEALING OF DEEPLY HELD VALUES

A similar oppositional set of understandings was apparent as participants discussed the desirability of geoengineering research. Listing a couple of comments together illustrates the tension:

1. Many environmentalists hold an underlying distrust of human interventions into the natural environment;
2. The environmental condition is deteriorating so rapidly, and the human imprint is so pronounced now in all of the planet's processes, that ever-larger scales of human intervention are not just required, but inevitable.

The first comment harkens to a deep set of commitments common to many in the environmental movement: it is human activity that has produced the climate crisis, and to imagine that human technological interventions will be part of an effective response to climate change is the height of folly.

Yet even some who agree with the first comment would, perhaps grudgingly, agree with the second: that the climate situation demands human activities that would in prior ages scarcely have been considered. Geoengineering falls within and is revealing of this schism in environmental thinking. Such schisms are not easily reconciled. Geoengineering will continue to be a particularly difficult subject matter for individuals and civil society organizations from the "distrust human interventions" camp to grapple with, even as it pushes the limits of what some within the "human intervention is required" camp are willing to accept.

THE ROLES OF THE SCIENTIFIC COMMUNITY AND CIVIL SOCIETY ACTORS

A final point that emerged from the day's conversations: what roles do science and the scientific community play in the emerging geoengineering conversation? Is it the role of the scientific community to overcome latent geoengineering skepticism within civil society? Is it the role of civil society to use that skepticism productively to ask difficult questions about geoengineering?

It is likely that skepticism does not map exactly onto civil society—there are likely geoengineering "skeptics" in the scientific community and "believers" in civil society. In which case, what is the role of civil society? To encourage debate? As was discussed in one session, any decision to deploy full-scale geoengineering projects will be a political decision, not a scientific one. So perhaps the role of civil society is, at best, to attempt to have such a decision be well-considered.

Some participants took the position that the conversation is rapidly getting ahead of itself. As one of our moderators concluded in closing remarks, it is as though we are having a discussion about "What school to send our kid to before we have the kid." Perhaps, though, that is exactly the reason to push now for more wide ranging civil society engagement. The conversation has not yet devolved, as another of the moderators put it, into a "catechism of call and response." There is room now to fashion some robust frameworks for understanding and talking about geoengineering. This is imperative, lest all seeking to understand and shape the future of geoengineering research and potential deployment fall into the old political trap of talking past one another.

NEXT STEPS

The Civil Society Meeting on Geoengineering was envisioned as an important first step toward understanding where civil society stands, how the issue is framed, and current narratives. It proved helpful in clarifying core issues and helping those present understand the sentiment of key non-governmental actors.

The Washington Geoengineering Consortium (WGC) intends to carry out its work, via strategic partnerships, through a number of related activities, as outlined below.

ENGAGEMENT WITH CIVIL SOCIETY AND PUBLIC ACTORS

The WGC has as its chief goal the generation of space for perspectives on geoengineering from civil society actors and the wider public, to produce a heightened level of engagement around issues of justice, agency, and inclusion.

To this end, we intend to continue to convene both public and closed-door meetings when such a format provides a useful space for necessary open and frank conversation or for informative dialogue between differing viewpoints.

The WGC also provides briefings about geoengineering in general, and particularly about the political, legal, and social questions posed by particular CDR and SRM technologies. These briefings are offered to civil society organizations, to policymakers, and to public audiences.

EDUCATIONAL MATERIALS

The WGC website hosts a growing set of materials that will be of interest to all concerned with geoengineering and its implications. The WGC is currently producing, for the website, a series of short video statements and podcast conversations with leading voices, and with crucial missing voices, in the conversation around geoengineering. The website will also soon host a collection of legal research materials and other resources that should prove useful to civil society actors, policymakers, and researchers.

RESEARCH AND POLICY DEVELOPMENT

The core members of the WGC have particular expertise in legal and political analysis of geoengineering technologies. The WGC aims to become a central hub for the production of high-quality, policy-relevant research. Central themes include the production of regulatory language to guide emerging domestic and international governance of geoengineering technologies, and detailed analysis of the social and political implications of various geoengineering options.

Please follow our work at **www.dcgeoconsortium.org**

APPENDIX 1:
ORGANIZATIONS REPRESENTED

Civil Society Representation
Biofuel Watch
Bipartisan Policy Center
Center for the Advancement of Steady State Economics
Climate Institute
Climate Progress
Climate Reality Project
Ecologic Institute
Environmental Defense Fund
Food and Water Watch
Greenpeace America
Hudson Institute
Oxfam America
Oxfam International
Sierra Club
Stimson Center
U.S. Climate Action Network
Woodrow Wilson Center

Other organizations represented included:
National Oceanic and Atmospheric Administration
U.S. Department of State
Staff of the U.S. Senate
The Huffington Post
Climate Wire
American Society of Heating, Refrigerating and Air Conditioning Engineers
American University
Johns Hopkins University
University of Maryland

APPENDIX 2:
MEETING AGENDA

1:30–2:30 PM Panel
Geoengineering Introduction

The meeting will open with a short panel discussion to explore the current state of science and research on geoengineering technologies, as well as to introduce the major strains of conversation around the topic. What is the work that is happening and who is doing it? What are the various arguments being deployed in favor of research and deployment of various geoengineering approaches? What are the major objections? Who are the actors with a stake in the development of geoengineering technologies, and how do their various interests align or clash?

2:30–2:45 PM Coffee Break

The opening sessions will be followed by two one-hour moderated conversations, based around small group discussions to allow input from participants.

2:45–3:45 PM Discussion Session 1 —
Benefits and Risks for People and the Climate

The first moderated session will focus on the potential benefits and risks of research and potential deployment of various geoengineering technologies.

Participants will be invited to engage with the following kinds of questions:

- What are the chief environmental, social, and political implications of the major geoengineering technologies now under consideration?
- What are the impacts of broader climate change mitigation efforts of increased attention to geoengineering?
- How compelling are ethical arguments for and against investment in geoengineering research and deployments?

3:45–4:00 PM Coffee Break

4:00–5:00 PM Discussion Session 2 —
Justice and Civil Society's Role

The second session will tackle questions of justice and the role to be played by civil society in shaping the geoengineering conversation moving forward. Climate change most threatens those who are already worst off. Some commentators have suggested that geoengineering would be a boon to marginalized populations, by offering real, readily deployable responses to climate change-related hazards. Others have suggested that geoengineering technologies threaten to replicate existing patterns of exclusion by concentrating decision-making and other forms of authority in troubling ways.

At the same time, there is much confusion about what geoengineering entails. Few in the broader public are familiar with the term geoengineering, let alone the sorts of activities that the term seeks to describe. Robust civil society engagement with geoengineering entails, at least in part, the sparking of a meaningful public conversation.

This session will ask participants to grapple with the following sorts of concerns:

- For whose benefit are geoengineering technologies being developed, and to whose potential detriment?
- What will it take to ensure that those who are already excluded from the climate conversation have their voices and wellbeing protected if geoengineering should advance?
- What are the North-South implications of geoengineering?
- How should civil society engage the public over geoengineering, and to what purpose?

5:00–5:30 PM Panel
Review and Next Steps

A written record will be taken during discussion sessions, without attribution. A summary of the discussion will be published to this website in the weeks following the meeting. The meeting will be helpful for civil society organizations that are engaged in shaping climate, health, and human rights policy in trying to understand the risks and benefits of engaging with the conversation around geoengineering technologies.

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