Advanced Research + Invention Agency ARIA

Exploring Climate Cooling

Programme oversight and governance

What are ARIA's core principles for governance of this programme?

The various governance measures that ARIA has put in place for this programme have been designed with the following principles in mind:

- **Deliver valuable knowledge.** We aim to select and design for research that will **address the most pressing critical scientific questions** surrounding approaches for actively cooling the climate.
- **Minimise risk.** All experiments should be designed to reduce direct risk as far as possible.
- **Engage with, and respect local communities.**
- **Be transparent, open** and **honest** at both the programme and project level, including around intentions, how the research is conducted, outputs, and impacts.
- **Communicate proactively**, to keep communities and the public fully informed on the programme and its outputs.
- **Be cognisant of the broader implications** of research on approaches for actively cooling the climate.
- **Learn.** Success will require a **willingness to adapt** to lessons learned during the programme and to changing circumstances

Measures to try and uphold these principles are discussed in the programme **thesis**. In particular, we are:

- Working with and refining a detailed framework for approving funding for outdoor experiments in order to be transparent about our decision-making, ways of minimising risk and engagement with communities.
- Opening the funding opportunity to a global pool of researchers in order to support a wider set of perspectives on critical questions.
- Maintaining a policy of transparent reporting of findings and open IP (when applied to climate intervention) in order to ensure that the knowledge gained is available for public benefit.

The programme's independent oversight committee (see below) is a mechanism intended to strengthen governance of the programme.

However, ARIA acknowledges that this is a complex and ethically-challenging research field and that circumstances unforeseen by the proposed governance measures may arise. By applying the principles above, ARIA will continue to iterate and update the programme's governance mechanisms in order to adhere to the principles above.

The role of the oversight committee and its relationship to the project teams

The programme oversight committee will have three main roles prioritised in this order:

1. Supporting ARIA's leadership in the effective oversight and governance of the outdoor experiments conducted as part of this programme, including producing guidance to ensure transparent and objective communication of findings.
2. Shaping the development of internationally-accepted and responsible norms and standards for oversight and governance of outdoor experiments of approaches for actively cooling the Earth.
3. Identifying constructive ways to contribute to the wider international discussion on possible governance mechanisms for these approaches.

The programme oversight committee is a panel of experts (including international members) that is independent of the project teams and the programme director and that makes recommendations directly to ARIA's leadership. Roughly half of the members of the oversight committee will be in place in time to contribute to the review of the full proposals, with the remaining members being appointed after project selection, but before these projects actually start. This two-intake approach will allow for independent oversight during project selection whilst also allowing the precise expertise of the committee to be tuned to best suit the projects that are ultimately selected.

The initial members of the committee (see biographies below) were identified by ARIA on the basis of their expertise and international standing across a wide range of areas relevant to climate science and climate engineering. Potential members were then invited to join the committee by ARIA's leadership after meeting with the programme director and ARIA's CEO. These initial members have been appointed for the duration of the programme (5 years). Members appointed during the second intake (or subsequently) will be appointed for the remaining duration of the programme by invitation of ARIA's leadership, after consulting

with the programme director and the existing members of the committee. At the outset, the committee will have the opportunity to deliberate on and refine its terms of reference, for approval by ARIA's leadership.

Members of the committee will be paid at a fixed rate by ARIA in order to ensure that they can dedicate sufficient time to programme oversight. Remuneration will not be dependent on the progress of the project teams or on the delivery of particular recommendations regarding these teams, supporting the committee's independence. Budget will be available to allow the committee members to join in-person ARIA meetings and workshops.

The names, affiliations and biographies of the current members of the committee, together with information on their specific roles on the committee and any potential conflicts of interest are supplied below.

It is expected that the oversight committee will discuss the development of plans for outdoor experiments with the project teams and programme director, but it will be the responsibility of the project teams to develop suitable technical and non-technical plans. The oversight committee will not be involved in any direct management or day-to-day decision making for any of the projects. This approach is designed to give project teams access to the expertise of the oversight committee members (promoting the development of plans and pre-experiment activities in line with best practice), whilst allowing the oversight committee members to maintain a high level of objectivity regarding individual projects.

Budget will be available to project teams to allow them to undertake the necessary pre-experiment public engagement and co-design activities. At the point at which project teams require additional budget in order to actually perform the outdoor tests, they will go through a formal "outdoor experiment funding approval" process, whereby their technical and non-technical plans and pre-experiment activities will be assessed, and approval for release of funds for the outdoor experiment (or series of linked experiments) will be either granted or refused by ARIA's leadership on the basis of the materials that the project teams submit for consideration.

An overview of the outdoor experiment funding approval process (and the role of the oversight committee in that process) is summarised in Figure 1. This figure also shows the relationship of the oversight committee to ARIA's leadership, the ARIA board committee for ethics and social responsibility (which has visibility across all of ARIA's programmes), the programme director, and to individual project teams.

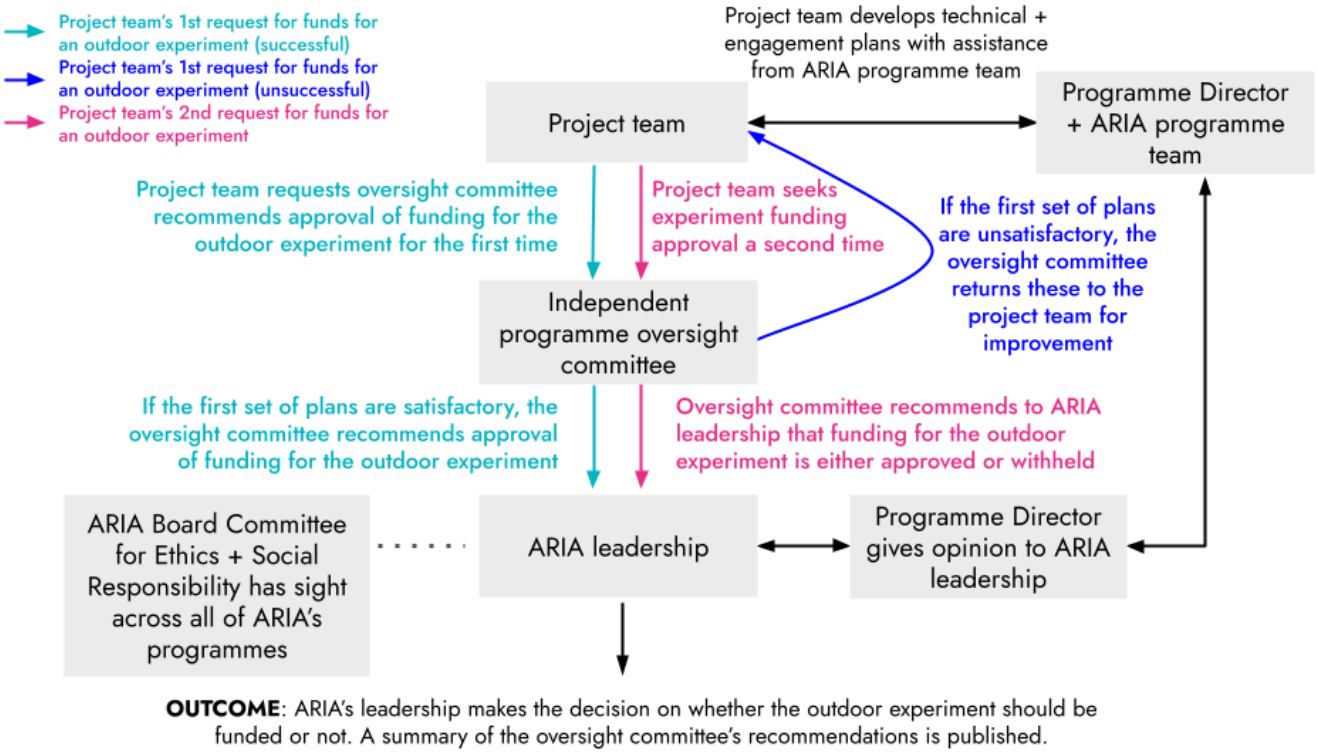

Figure 1: *The relationship of the oversight committee to ARIA's leadership, the ARIA board committee for ethics and social responsibility, the programme director, and to individual project teams, together with an overview of the process by which the oversight committee can insist on alterations to project teams' plans for outdoor experiments, and how subsequent decisions will be taken.*

At the outset of the outdoor experiment funding approval process, project teams will submit materials describing their plans and activities-to-date related to the outdoor experiment to the oversight committee, who will be able to scrutinise both the technical and non-technical aspects of these materials. The programme oversight committee will then make one of three recommendations to ARIA's leadership:

1. If the committee is thoroughly satisfied with the project team's plans and pre-experiment activities, then a recommendation will be made to ARIA's leadership that funding for the outdoor experiment (or series of linked experiments) should be approved (teal arrows in Figure 1).

2. If the committee is mostly satisfied with the project team's plans and pre-experiment activities, then a recommendation can be made to ARIA's leadership that funding for the outdoor experiment should be approved contingent on certain minor clarifications or amendments being made (teal arrows in Figure 1).
3. If the oversight committee is dissatisfied with the project team's plans and pre-experiment activities, then the oversight committee will have the power to refuse funding approval for any outdoor experiment (or series of linked experiments) on its own initiative at the first time of asking. Should this occur, the committee will be able to request alterations to a project team's plans and/or request that additional activities are performed prior to the start of an outdoor experiment (blue arrow in Figure 1). The project team will then be obliged to address these concerns and re-submit their updated materials to the oversight committee, with three outcomes then possible (pink arrows in Figure 1):
    a. The committee is now thoroughly satisfied, and recommends to ARIA's leadership that funding for the outdoor experiment is approved.
    b. The committee is now mostly satisfied, and recommends to ARIA's leadership that funding for the outdoor experiment can be approved contingent on certain minor clarifications or amendments being made.
    c. The committee remains dissatisfied, and recommends to ARIA's leadership that funding approval for the outdoor experiment is not granted.

The ultimate decision as to whether any individual outdoor experiment (or linked series of experiments) can be funded by ARIA therefore rests with ARIA's leadership. A summary of the committee's recommendations on any particular outdoor experiment (or linked series of experiments) will be made public on the ARIA website before the experiment takes place (in the cases where funding approval is ultimately granted), or at the end of the project in cases where funding approval is not granted. This summary will be prepared by the committee members, in consultation with the programme director.

When making recommendations as to whether any individual outdoor experiment (or linked series of experiments) can be funded by ARIA, the oversight committee will consider the following criteria:

- Is there sufficient scientific value in the proposed experiment and in the knowledge that could be gained by performing it to merit an outdoor experiment?
- Does the design of the experiment minimise risk sufficiently (e.g. to experimenters, the local environment and ecosystem, to property, etc)?

- Has sufficient meaningful engagement with the local community and key stakeholders taken place, and is there sufficient evidence of experimental co-design with these groups?
- Has there been sufficient consideration of the potential broader societal ramifications of the experiment?

Initial committee membership

The following are the initial members of the oversight committee. ARIA intends to add to the membership of this committee as the programme progresses. This includes the appointment of a permanent chair and the planned second cohort of members (the latter will join in early 2025). ARIA may subsequently also bring in additional members to the committee as necessary. The current membership therefore does not constitute the full weight of the committee, and membership will increase over the next few months.

As of September 2024, committee members are paid for their participation at a rate of £575/day. ARIA expects that participation will be ~1 day/month.

Committee Membership (as of September 2024)

Jessica Seddon (acting Chair)*

Dr. Jessica Seddon's work on environmental governance focuses on how new sources of data can be leveraged to enable new (and more sustainable) ways of interacting with the environment around us. Her career in India and the U.S. spans academic, programme leadership, and strategic advisory roles focused on institutional design for integrating science into policy and social initiatives. Dr. Seddon is currently Senior Fellow and Director of the Deitz Family Initiative on Environment and Global Affairs at the Yale Jackson School of Global Affairs and a co-founder of The Institutional Architecture Lab.

*As acting Chair, Jessica will be working as a bridge between the ARIA programme team and the Oversight Committee to build out the membership and refine some of the operational aspects of the Committee's relationship with ARIA.

Declared conflicts of interest: none

Arunabha Ghosh (ordinary member)

Dr Arunabha Ghosh is an internationally recognised public policy expert, author, columnist, and institution builder. He is the founder-CEO of the Council on Energy, Environment and Water, and has led CEEW to the top ranks as one of Asia's leading policy research institutions and among the world's 20 best climate think-tanks. He played a formative role in creating the International Solar Alliance, and was a founding board member of the Clean Energy Access Network. Co-author/editor of four books and with experience in 51 countries, he previously worked at Princeton, Oxford, UNDP (New York), and WTO (Geneva). The Asia Society honoured him with the 2022 Asia Game Changer Award, for his and CEEW's "incredible work, which is making a real difference for India and for the planet". Arunabha advises governments, industry, civil society, and international organisations around the world. He is the Co-convenor of the Our Common Air Commission. He served on the Government of India's G20 Finance Track Advisory Group and advised the Sherpa Track for India's G20 Presidency in 2022-23. In 2022, the UN Secretary-General appointed him to the High-level Expert Group on the Credibility and Accountability of Net-Zero Announcements by Non-State Actors. Dr Ghosh is currently Vice-Chair of the UN Committee for Development Policy, having been first nominated to the UNCDP by the UN Secretary-General in 2018. Arunabha is a member of several international expert advisory groups: Global Commission on the Economics of Water; High-Level Group of Economists, constituted by the French president for the One Planet Lab; and the Senior Consultative Group for the U.S. Department of State's Energy Transition Accelerator. In 2020, the Government of India appointed him Co-Chair of the energy, environment and climate change track for India's Science, Technology and Innovation Policy (STIP2020). He co-chaired the international governance working group of the Royal Society's Solar Radiation Management Governance Initiative. He is a member of the World Economic Forum's Global Future Council on Clean Air, having previously been a member of the Global Future Council on Energy. He serves on the Board of ClimateWorks Foundation. A frequent speaker and adviser to governments, industry and international organisations, he writes monthly columns

across various platforms, has hosted or featured in several documentaries, and his 2019 TED Talk on air quality (Mission 80-80-80) has surpassed 270,000 views. He was a World Economic Forum Young Global Leader. He holds a D.Phil. from Oxford.

Declared conflicts of interest: none

Nana Klutse (ordinary member)

Prof. Nana Ama Browne Klutse is a distinguished Ghanaian known for her expertise in climate modelling, climate change impacts, adaptation, and mitigation strategies, particularly in Africa. She has been involved in various high-profile research projects and has contributed significantly to global climate assessments, including her work with the Intergovernmental Panel on Climate Change (IPCC) as the Vice Chair of the Working Group I. She is a full professor, researcher and the Head of the Department of Physics at the University of Ghana. She focuses on climate variability, climate change modelling, Solar Radiation Management, and the impacts of climate change on society for her research and often addresses how climate change affects sectors such as agriculture, water resources, and health in Africa. Prof. Klutse has also been an advocate for integrating indigenous knowledge systems with scientific research to develop more comprehensive and context-specific climate adaptation and mitigation strategies. Her work aims to inform policy decisions and promote sustainable development in the face of climate change challenges. She has received various awards and recognitions for her contributions to climate science and her efforts to improve understanding and action on climate change in Africa.

Declared conflicts of interest: none

Jack Stilgoe (ordinary member)

Dr Jack Stilgoe is a professor in science and technology studies at University College London, where he researches the governance of emerging technologies. He is part of the UKRI Responsible AI leadership team (www.rai.ac.uk).

He worked with EPSRC and ESRC to develop a framework for responsible innovation that is now being used by the Research Councils. Among other publications, he is the author of 'Who's Driving Innovation?' (2020, Palgrave) and 'Experiment Earth: Responsible innovation in geoengineering' (2015, Routledge). He is currently chairing an oversight committee for public dialogue on geoengineering research for the Natural Environment Research Council (NERC). He previously worked in science and technology policy at the Royal Society and the think tank Demos. He is a trustee of the Royal Institution.

Declared conflicts of interest: none

Shuchi Talati (ordinary member)

Dr. Shuchi Talati is a climate technology governance expert and founder of The Alliance for Just Deliberation on Solar Geoengineering (DSG). DSG is a nonprofit organisation working towards just and inclusive deliberation about research and potential use of solar geoengineering. She is a contributing author to the American Geophysical Union's Ethical Framework for Climate Intervention Research, Experimentation, and Deployment. Dr. Talati was the co-chair of the Independent Advisory Committee to oversee SCoPEx, an effort to provide oversight for the proposed solar geoengineering experiment by Harvard University. She most recently served as a Presidential Appointee in the Biden-Harris Administration at the U.S. Department of Energy where she focused on creating just and sustainable frameworks for carbon dioxide removal. Dr. Talati has previously held roles in academia and civil society advising on policy and governance for emerging climate technologies, including as a Visiting Scholar at the Kleinman Center for Energy Policy at the University of Pennsylvania, an AAAS/AIP Congressional Science Fellow in the U.S. Senate and the Fellow on geoengineering research governance and public engagement at the Union of Concerned Scientists. Dr. Talati has a BS in environmental engineering from Northwestern University, an MA in climate and society from Columbia University, and PhD from Carnegie Mellon in engineering and public policy.

Declared conflicts of interest: none