

Cornell University (Grant Recipient)

373 Pine Tree Road, Cornell University, Ithaca, New York 14850-2820 USA

25/06/2025

Attention: Douglas MacMartin

Dear Douglas ,

FPCW-PR01-P020 - Defining the minimum scale of an SAI test: a fundamental first step towards an outdoor large scale experiment— Standard Grant Funding Letter

Congratulations, we can't wait to see what you will achieve and very much look forward to working with you and your team.

You recently submitted an application in response to Exploring Climate Cooling and ARIA is pleased to offer you a Grant for the performance of the Project Activities up to the Maximum Sum, subject to your agreement to, and compliance with, the terms and conditions set out in this Grant Funding Letter and its Schedules.

1. Overview of the Grant

Any reference in this letter to "you" or "your" means the Grant Recipient and any capitalised terms have the meanings given in the ARIA Grant Conditions (Conditions).

The key elements of the Grant are described in the table below:

Project Activities	Defining the minimum scale of an SAI test: a fundamental first step towards an outdoor large scale experiment. A more detailed description of the Project Activities is set out in Schedule 2 (Project Activities).
Maximum Sum of the Grant (inclusive of taxes)	£444,970 (inclusive of all taxes where applicable)
Commencement Date	The commencement date is 15 July 2025
Completion Date	The completion is 14 July 2027
Grant Review Intervals	ARIA will review the Grant at quarterly intervals using the process referred to in clause 6 of the Conditions

Adequate Insurance	Commercial General Liability- \$1,000,000 million per occurrence Automobile Liability- Combined Single Limit Each Accident \$1,000,000 Million Umbrella Liability- \$1,000,000 per occurrence Educators Liability- \$1,000,000 per claim Workers Compensation- Self-Insured Retention \$1,500,000 per claim.	
Monitoring and Reporting	The performance reports referred to in clause 7 of the Conditions shall be provided at the frequency identified in Schedule 2 to the ARIA point of contact as set out in the project kick-off documentation.	
Project Representative	Douglas MacMartin, Associate Professor Sibley School of Mechanical and Aerospace Engineering [REDACTED]	
Grant Manager	Mark Symes, Programme Director [REDACTED]	
Escalation Contacts	ARIA	Grant Recipient
	Chief Product Officer [REDACTED]	[REDACTED] Sr. Grant & Contract Officer [REDACTED]
Notices	ARIA Contracts [REDACTED]	[REDACTED] Sr. Grant & Contract Officer [REDACTED]

2. Confirmation of Bank Details

- 2.1. You must complete and sign the Confirmation of Bank Details form available [here](#) as part of your acceptance of the Grant and return it to finance@aria.org.uk

3. The Grant Agreement

- 3.1. Once you sign a copy of this Grant Funding Letter in accordance with paragraph 6 (Acceptance) below, it will form a binding **"Grant Agreement"** between you and ARIA that includes and

incorporates the following documents:

- 3.1.1. the **Grant Conditions** in Schedule 1;
 - 3.1.2. the **Project Activities, Milestones** and **Grant Application** in Schedule 2;
 - 3.1.3. the **Royalty percentages** (including annexes) in Schedule 3; and
 - 3.1.4. the terms relating to Data Protection in Schedule 4.
- 3.2. The parties confirm that it is their intention to be legally bound by the Grant Agreement.

4. Warranties

- 4.1. By signing this Grant Funding Letter, you warrant and represent that:
- 4.1.1. your obligations under the Grant Agreement are legal, valid, binding and enforceable;
 - 4.1.2. all authorisations and consents necessary to enable you to enter into and perform the obligations in the Grant Agreement have been obtained;
 - 4.1.3. the person signing the Grant Agreement is duly authorised to sign on your behalf; and
 - 4.1.4. your Project Representative referenced in the table above is authorised to make decisions and provide information on your behalf.

5. Amendments to the Grant Conditions

- 5.1. Not Used

6. Acceptance

- 6.1. To accept this Grant Funding Letter, please arrange for an authorised signatory to sign and date the duplicate copy of this Grant Funding Letter as indicated below, and return to ARIA as a complete signed original of the Grant Agreement including its Schedules, accompanied by evidence of the authorised signatory's authority to enter into the Grant Agreement and to bind the Grant Recipient.
- 6.2. The offer of this Grant Funding Letter will expire on 4 July 2025.

Yours sincerely

for and on behalf of ARIA

Name of ARIA signatory:

Position Held:

Date:

I confirm the agreement of Cornell University to the terms and conditions in this Grant Funding Letter and its Schedules.

Signature:

Name:

Position:

Date:

SCHEDULE 1 - GRANT CONDITIONS

1. PRECEDENCE

- 1.1 Where there is any conflict between the documents that make up the Grant Agreement the conflict will be resolved in accordance with the following order of precedence:
- (a) the Grant Funding Letter;
 - (b) these Conditions;
 - (c) the remaining Schedules to the Grant Agreement with the exception of Schedule 2 Part 2 (the Grant Application);
 - (d) Schedule 2 Part 2 (the Grant Application); and
 - (e) any other documents incorporated by reference in, or developed in accordance with, the Grant Agreement.

2. DURATION AND PURPOSE OF THE GRANT

- 2.1 The Grant Agreement will subsist for the duration of the Funding Period unless extended by written agreement signed by a duly authorised representative of the parties or terminated earlier in accordance with its terms. Any provision of the Grant Agreement that expressly or by implication is intended to come into or continue in force on or after termination or expiry of the Grant Agreement shall remain in full force and effect, including clauses 1, 2, 4, 7.4, 8, 9, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22.3, 22.7, 22.8, 22.11, 22.12, 23, 24, 26, 27, 28, and 30.
- 2.2 You may only use the Grant for carrying out the Project Activities. You may not make any changes to the Project Activities without ARIA's prior written agreement.
- 2.3 You may not unreasonably withhold, condition or delay your agreement to any changes requested by ARIA to the Project Activities or the amount of the Grant. Any agreed change will be recorded in a written variation to the Grant Agreement in accordance with clause 26.

3. ENVIRONMENTAL AND SAFETY REQUIREMENTS

- 3.1 In performing the Project Activities, you shall meet the requirements of all applicable Laws regarding the environment and safety, including laboratory safety requirements, in all material respects.

4. PAYMENT OF GRANT

- 4.1 Subject to the remainder of this clause 4, ARIA will pay the Grant to you:
- (a) up to the Maximum Sum;
 - (b) in pounds sterling (GBP) by wire transfer into your bank account, details of which you provided in the Confirmation of Bank Details form attached to the Grant Funding Letter; and
 - (c) if a tax is chargeable in respect of the Grant, all payments will be deemed to be inclusive of all such taxes and ARIA will not be obliged to pay any additional amount.
- 4.2 The bank account of which you provided details in your Confirmation of Bank Details form (and any alternative bank details nominated subsequently by you) must be an ordinary business bank account

with appropriate segregation of duties and control. During the Funding Period, you must notify ARIA of any change of bank account details as soon as reasonably practicable on the same form and signed by an approved signatory. You must notify ARIA of any change of signatory for approval, as soon as known.

- 4.3 You will be the sole recipient of the Grant and you will be responsible for managing the Grant as between you and any Third Parties involved in performing the Project Activities.
- 4.4 You must promptly notify ARIA if any money is incorrectly paid to you for any reason, and must repay it as soon as reasonably practicable. Any amount not repaid will be recoverable as a civil debt.
- 4.5 ARIA reserves the right not to pay any Grant Claims that are not submitted within the period set out in the Grant Funding Letter or that are incomplete, incorrect or not accompanied by full supporting documentation (including any documentation that ARIA reasonably requests).
- 4.6 You may not apply for or obtain Duplicate Funding for any Project Activities.
- 4.7 You may not retain any Unspent Monies and must repay them to ARIA within 30 days after ARIA's request for repayment.

5. ELIGIBLE AND INELIGIBLE EXPENDITURE

- 5.1 ARIA will only pay the Grant for Eligible Expenditure incurred by you in carrying out the Project Activities. You must provide ARIA with any evidence reasonably requested by ARIA (including receipts, invoices and other documentary evidence) that all Grant Claims relate to costs that are Eligible Expenditure.
- 5.2 You may not in any circumstance claim as Eligible Expenditure paid-for lobbying, which means using the Grant to fund lobbying (via an external firm or in-house staff) in order to undertake activities intended to influence or attempt to influence Parliament, government or political activity; or attempting to influence legislative or regulatory action.

6. GRANT REVIEW

- 6.1 ARIA will review the Grant at the intervals specified in the Grant Funding Letter. The review will take into account your carrying out of the Project Activities against the Milestones. As part of the ARIA review process, ARIA will review the reports produced by you in accordance with clause 7.3.. The Grant Recipient will use reasonable, good faith, diligent efforts in performance of the Project Activities. However, ARIA and you acknowledge that research, developments, and outcomes may be somewhat uncertain, unanticipated, or unpredictable, and the Project Activities will be pursued without guarantee regarding the achievement of any specific results.
- 6.2 Following the review carried out under clause 6.1, ARIA may choose to do any of the following, taking into account any representations made by you in the course of the review:
 - (a) consent to the Project Activities and the Grant Agreement continuing in line with existing plans;

- (b) increase or decrease the Grant for the remainder of the Funding Period, as applicable;
- (c) redefine the Milestones;
- (d) require you to carry out remedial activity with the aim of improving delivery of the Project Activities; and/or
- (e) terminate the Grant Agreement in accordance with clause 22.

6.3 Any change to these Grant Terms, the Project Activities, or the Grant pursuant to clause 6.2(a), 6.2(c) or 6.2(d) will be recorded in a written variation to the Grant Agreement in accordance with clause 26.

7. MONITORING AND REPORTING

7.1 You must closely monitor the carrying out of the Project Activities throughout the Funding Period and must notify ARIA as soon as reasonably practicable of any actual or potential failure to comply with any of your obligations under the Grant Agreement.

7.2 ARIA does not limit its engagement with you to purely administrative activities and will require details of all Results and all material Foreground IP, so you must allow ARIA personnel to visit your premises at a reasonable frequency and at dates and times agreed with you to liaise with your applicable researchers for the purpose of identifying Foreground IP, evaluating Milestones and assessing progress with the Project Activities. ARIA will treat the and Foreground IP, and other information it learns from such visits, as your Confidential Information under clause 11.

7.3 You must provide ARIA with:

- (a) the Milestones and a report on your performance against the Milestones at the intervals and for the periods of time specified in the Grant Funding Letter. ARIA may copy and adapt the contents of any of the Milestones and those reports for ARIA's internal use to review, develop and shape ARIA's funded research programmes.
- (b) any assistance and information reasonably requested by ARIA to establish whether you have used the Grant in accordance with the Grant Agreement; and
- (c) a quarterly report on the use of the Maximum Sum, details broken down in accordance with ARIA's prescribed form.

7.4 ARIA is built for long-term impact and needs to be kept informed of the impact of its funding activities and compliance with the terms of the Grant Agreement. ARIA will therefore have the right to make reasonable requests for information from you from time to time after the end of the Funding Period about the impact metrics, commercial exploitation or other dissemination of the Results and how this has benefited the United Kingdom. You must respond and provide the information requested within one month (unless ARIA specifies otherwise). If requested, ARIA will treat the information provided as your Confidential Information under clause 11. Nothing in this Grant Agreement will be deemed to limit ARIA's ability to use, share or publish such information as part of aggregated and anonymised reporting. This clause 7.4 shall survive termination or expiry of this Grant Agreement.

8. AUDITING AND ASSURANCE

- 8.1 Within six months after the end of each Financial Year and after the end of the Funding Period you must provide ARIA with independent assurance that the Grant has been used for carrying out the Project Activities. To satisfy this requirement you must provide a statement showing that the use of the Grant which is signed by a senior finance individual.
- 8.2 Subject to clause 11, ARIA and/or its authorised representative may, at any time upon thirty (30) days written notice during the Funding Period and for up to 7 years after the end of the Funding Period, conduct audits in relation to your use of the Grant and your compliance with the Grant Agreement. You must act reasonably in cooperating with any such audit, including by granting access to relevant documentation, premises and personnel.
- 8.3 You must:
- (a) maintain an appropriate system of financial management and controls, maintain detailed records in relation to those controls, and provide copies of those records to ARIA on request; and
 - (b) retain, all relevant documentation relating to the Eligible Expenditure (including invoices, receipts and accounting records) during the Funding Period and for a period of 7 years thereafter.

9. FINANCIAL MANAGEMENT

- 9.1 You must:
- (a) maintain a sound administration and audit process, including internal financial controls, to safeguard against fraud and theft, money laundering, terrorist financing or any other impropriety, or mismanagement in connection with the administration of the Grant; and
 - (b) notify ARIA of any actual or suspected cases of fraud, theft or financial irregularity relating to the Project Activities as soon as they are identified, and keep ARIA informed of your remedial actions.
- 9.2 In the event of any actual or suspected fraud, theft or other financial irregularity (which includes use of the Grant for any purpose other than that envisaged by the Grant Agreement), ARIA may, at its absolute discretion:
- (a) require you to take any remedial steps that ARIA may reasonably specify; and/or
 - (b) suspend the Project Activities and future payment of the Grant to you,

and in all cases you must explain to ARIA what steps are being taken to investigate the fraud, theft or irregularity (as applicable) and must keep ARIA informed about the progress of any such investigation.

10. CONFLICTS OF INTEREST

- 10.1 You must inform ARIA promptly of any actual, perceived or potential conflicts between your and your Representatives' obligations under the Grant Agreement and your and their personal, business or professional interests. You must have adequate procedures to manage and monitor any actual or

potential conflicts of interest, whether identified in the application process or notified to ARIA during the Funding Period.

- 10.2 If ARIA is not satisfied that you are adequately managing any actual or potential conflicts of interest, or that these conflicts are not capable of such management, the parties will discuss the issues raised and try to agree a resolution. If this is not possible, ARIA may request you or your Representative to cease the conflicting activity and if that is not acceptable to you or your Representative, either party may terminate the Grant Agreement on at least 30 days' notice in writing.

11. CONFIDENTIALITY

- 11.1 Except to the extent set out in this clause 11 or where disclosure is expressly permitted by ARIA, You must treat all Confidential Information belonging to or disclosed by ARIA as confidential and will not disclose any such Confidential Information to any other person without the prior written consent of the ARIA, except to any persons who are directly involved in the provision of the Project Activities, who need to know the information and who are subject to binding obligations of confidentiality similar to those herein.

- 11.2 Both parties may publish a summary of the Grant Agreement in any medium (having redacted both parties' Confidential Information), including a summary of any changes to the Grant Agreement agreed from time to time. Additionally, Both parties may publish a copy of the Milestones (in whole or in part) in any medium.

- 11.3 Nothing in this clause 11 will prevent either party disclosing any Confidential Information of ARIA:
- (a) for the purpose of the examination and certification of its accounts and/or pursuant to section 6(1) of the National Audit Act 1983;
 - (b) to any government department, consultant, contractor or other person engaged by that party, provided that such party only discloses information necessary for the purpose concerned and obtains appropriate confidentiality undertakings in relation to such information;
 - (c) where disclosure is required by any applicable Law, including under the Information Acts to the extent they apply to that party and where no exception to disclosure under them is applicable; or
 - (d) where that party (acting reasonably) considers disclosure necessary or appropriate for the carrying out of its public functions.

- 11.3.2 Confidential Information shall not include the following:

- (a) Information that was previously known to you free of an obligation to keep it confidential (otherwise than by breach of clause 13);
- (b) was in the possession of the receiving party, without restriction as to its disclosure, before receiving it from the disclosing party; is received from a Third Party (who lawfully acquired it) without restriction as to its disclosure;
- (c) is already in the possession of or is independently developed by you;

- (d) is released with ARIA's written consent; or
- (e) the content of this specific version of the Grant Agreement, save in respect of any information which is exempt from disclosure under the Information Acts as they apply to the relevant party

11.4 Nothing in this clause 11 will prevent either party from using any techniques, ideas or know-how gained during the performance of its obligations under the Grant Agreement in the course of its normal business or activities, to the extent that this does not result in a disclosure of the other party's Confidential Information or an infringement of the other party's Intellectual Property Rights.

12. STATUTORY DUTIES

- 12.1 Each party must comply with its obligations under the Law, including where applicable the Information Acts, the EA and the HRA and you shall notify ARIA immediately of any investigation of or proceedings against you under the EA.
- 12.2 You acknowledge that ARIA is subject to requirements under the Information Acts (other than the FOIA) and you will provide reasonable assistance and cooperation to ARIA to assist ARIA's compliance with its information disclosure obligations.
- 12.3 You acknowledge that ARIA, acting in accordance with the Information Acts (other than the FOIA), may disclose information concerning you and the Grant Agreement without consulting you. ARIA must take reasonable steps to notify you of any request for information to the extent permissible and reasonably practical and will give you adequate opportunity to make representations before ARIA discloses any information relating to such matters. ARIA will be responsible for determining in its absolute discretion whether any information is exempt from disclosure in accordance with the Information Acts.
- 12.4 Where you are subject to the Information Acts and receive a request for disclosure that relates to ARIA or the Grant Agreement you will notify ARIA and give ARIA adequate opportunity to make representations to you before you disclose any information relating to such matters.
- 12.5 You must take account of the requirements of the National Security and Investment Act 2021 before assigning or licensing Results or Foreground IP. You are encouraged to give a voluntary notice to the Secretary of State under the Act in advance of any such assignment or licence if the assignment or licence is likely to meet the requirements of section 18 of the Act and inform ARIA if any mandatory or voluntary notification is made.
- 12.6 You must take account of the Secure Innovation and Trusted Research Guidance. You must also consider any risks to the physical safety and security of the public and implement any appropriate mitigations and measures where the Project Activities you carry out have the potential to interact with the public.

13. DATA PROTECTION

- 13.1 Each party must comply at all times with its obligations under the Data Protection Legislation. At ARIA's request you must provide ARIA with all relevant documents and information relating to your data protection policies and procedures that ARIA may reasonably request.
- 13.2 The parties do not envisage that either party will process any Personal Data for or on behalf of the other party under or in connection with the Grant Agreement. If either party anticipates that the other will process any Personal Data on its behalf under the Grant Agreement it must notify the other party and the parties must agree a variation to the Grant Agreement under clause 26 to incorporate appropriate provisions (such as those set out in Schedule 4) in accordance with, or as otherwise required by, the Data Protection Legislation.

14. SUBSIDY CONTROL AND STATE AID

- 14.1 ARIA intends that the Grant complies with the Subsidy Control Act 2022 on the basis that the Project Activities are not economic activities and do not give a specific advantage to one or more enterprises. You must take all reasonable steps to maintain this position and to assist ARIA to comply with the requirements of the Act and must cooperate with any investigations under the Act.
- 14.2 Not Used.
- 14.3 ARIA will immediately stop future payments of the Grant and may require repayment of some or all of the Grant if subsidy control or state aid laws so require for the funding to be compliant.

15. INTELLECTUAL PROPERTY RIGHTS

- 15.1 You must act in good faith and comply with the spirit of clauses 15 and 16 and not seek to avoid their application by artificial means.

Background IP

- 15.2 The Grant Agreement does not affect the ownership of your Background IP. You must notify ARIA during the Funding Period if any additional Background IP is required either to carry out the Project Activities or to exploit commercially any of the Results.

Foreground IP ownership

- 15.3 You will own all Foreground IP unless your policy is for individual researchers to own the Foreground IP they create. Where your individual researchers will own any of the Foreground IP you must impose on them the obligations relating to Foreground IP and Results contained in clauses 15 and 16.
- 15.4 You must submit all (i) Foreground IP and (ii) data generated from any activities or experiments identified in the Project Activities to the [Future Proofing our Climate and Weather Intellectual Property Pledge] promptly following creation or filing (as applicable) of such Foreground IP (unless otherwise agreed in writing with, or instructed by, ARIA). For clarity, your rights to use and commercialise Foreground IP set out in clauses 15 and 16 are subject to the terms of the [Future Proofing our Climate

and Weather Intellectual Property Pledge]. You hereby agree to comply and uphold the terms of the [Future Proofing our Climate and Weather Intellectual Property Pledge].

- 15.5 You must submit all (i) all patents within or covering the Foreground IP and (ii) data generated from any activities or experiments identified in the Project Activities to the [Future Proofing our Climate and Weather Intellectual Property Pledge] promptly following creation or filing (as applicable) of such patents and/or data (unless otherwise agreed in writing with, or instructed by, ARIA). For clarity, your rights to use and commercialise Foreground IP set out in clauses 15 and 16 are subject to the terms of the [Future Proofing our Climate and Weather Intellectual Property Pledge]. You hereby agree to comply and uphold the terms of the [Future Proofing our Climate and Weather Intellectual Property Pledge].

Attribution to ARIA

- 15.6 You must ensure that whenever any Results are used with or communicated to Third Parties or are exploited commercially, ARIA's funding of the Project Activities is suitably accredited in accordance with ARIA's accreditation guidelines in force at the time. When using ARIA's name and logo you will comply with ARIA's branding guidelines in force at the time.

Patenting and publication

- 15.7 You must ensure that all Foreground IP is protected and managed in a professional manner, which may include patenting of any Results that are patentable.
- 15.8 You must notify ARIA where practicable at least 30 days (and in any event at least 48 hours) before publication of any Results by any person. This is intended to give ARIA the opportunity to discuss with you the possibility of filing a patent application before publication, and if appropriate assisting you with that process.
- 15.9 You must give ARIA as much notice as possible, but no less than 30 days' notice, of any decision to abandon or withdraw patent protection for any of the Results for the lifetime of the relevant patents or such shorter period as is agreed with ARIA so that ARIA can consider whether it wishes to fund future prosecution and maintenance and/or request the assignment of the patents to ARIA or its nominee.

Inventor first preference

- 15.10 Subject to the terms of the [Future Proofing our Climate and Weather Intellectual Property Pledge] if any inventor or active participant in the Project Activities expresses interest in the exploitation of the Foreground IP they have developed, you must give them an opportunity to negotiate an assignment or commercial licence of the Foreground IP, on reasonable terms, prior to negotiating with any entity in which an inventor or active participant in the Project Activities is not involved as a shareholder or other key stakeholder.

16. COMMERCIALISATION OF RESULTS

- 16.1 Where they are capable of commercial exploitation you should seek to exploit the Results commercially.
- 16.2 If for any reason you choose not to exploit any such Results commercially within a reasonable timeframe you are encouraged to discuss the position with ARIA, and you may request that ARIA exploit them or assist you with their exploitation. In this case ARIA may request that you assign the relevant Foreground IP to it or its nominee. Any assignment would include a licence back to the relevant Foreground IP for research purposes.

Non-UK Commercialisation

- 16.3 Save as set out in the [Future Proofing our Climate and Weather Intellectual Property Pledge], to avoid any restriction on commercialisation, no consent is required from ARIA for any Non-UK commercialisation or any sale of Foreground IP to a Non-UK Entity. However, ARIA is set up to create value for the UK and therefore you must secure a fee payable to ARIA (**ARIA Non-UK Fee**) in each of the following circumstances:
- (a) where you are a Non-UK Entity;
 - (b) where you become a Non-UK Entity;
 - (c) where you assign or Commercially License any Foreground IP to a Non-UK Entity; or
 - (d) where you have assigned or Commercially Licensed any Foreground IP to a UK Entity that subsequently becomes a Non-UK Entity.
- 16.4 In order to avoid any unnecessary complexity, the ARIA Non-UK Fee will be based on the terms that you agree with any person to which you assign or Commercially License the relevant Foreground IP. This ARIA Non-UK Fee will amount to an additional twenty-five per cent (25%) of the value of the consideration (including upfronts, licence fees, milestone payments, royalties, shares or other securities, buyouts, exit fees and other consideration) that you receive from the exploitation of the relevant Foreground IP during any period that the above circumstances exist.
- 16.5 For example, if you would receive £100 (via royalty or royalty buyout), you must ensure your contractual mechanism enables you to collect an additional £25 and pay that additional amount to ARIA.
- 16.6 The ARIA Non-UK Fee is payable within 90 days after the end of each relevant Financial Year for receipts related to that calendar year. You are encouraged to use the clauses in Annex 1 in your Commercialisation Licences of Foreground IP.

Crown Body customers

- 16.7 You must ensure that any Crown Body is able to procure any products and services that are covered by, use or incorporate the relevant Foreground IP within a reasonable time period at prices that are no higher than those offered to or agreed with any other customer for equivalent quantities, and in suitable quantities for the Crown Body's requirements.

Spin-outs

- 16.8 ARIA seeks to maximise future investment of entrepreneurial talent and capital in start-up companies commercialising the Results of its funded activities. To that end, having funded the full economic cost

of the research, ARIA places restrictions on the level of equity stakes and royalties that you may negotiate in exchange for the assignment or Commercialisation Licence of any Foreground IP.

16.9 If you or your technology transfer company assign or licence any Foreground IP to any third party or to a start-up established for the purpose of commercially exploiting the Results (a NewCo) you together with any connected person (including any investment fund to which you may transfer any part of your stake) shall be entitled to negotiate for consideration consistent with your institution's practices.

16.10 Not Used.

16.11 Not Used.

17. ASSETS

17.1 You must keep a register during the Funding Period and for up to 7 years after the end of the Funding Period of all Assets, with all relevant details about each Asset. You must use any Assets purchased with Grant monies for the Project Activities.

17.2 At the end of the Funding Period all equipment purchased for use on the Project with funds provided by ARIA shall remain your property.

18. INSURANCE

18.1 You must maintain Adequate Insurance (including public liability insurance) either as a self-insurance arrangement or with an insurer of good repute to cover all insurable claims and liabilities under or in connection with the Grant Agreement. You must provide evidence of that insurance to ARIA on request.

19. ASSIGNMENT AND SUBCONTRACTING

19.1 Neither party may transfer, assign, novate or otherwise dispose of the whole or any part of the Grant Agreement or any rights under it, to another organisation or individual, without ARIA's the non-assigning party's prior written consent.

19.2 You shall not subcontract any of the Project Activities to a Third Party except to the extent permitted, and to the person or persons identified, in Schedule 2 Part 1. You must seek ARIA's prior consent to appoint any new Sub-Contractors not identified in Schedule 2 Part 1. You shall (i) be responsible for the acts and omissions of any Sub-Contractor as though they were your own.

20. BORROWING, LOSSES, GIFTS, SPECIAL PAYMENTS

20.1 You must obtain ARIA's prior written consent before:

- (a) borrowing or lending money from any source in connection with the Grant Agreement;
- (b) giving any guarantee, indemnity, security over any Asset or letter of comfort in relation to the Grant Agreement;
- (c) making any gift or writing off any debt or liability in connection with the Grant, and must keep a record of all gifts given and received in connection with the Grant.

21. PUBLICITY

- 21.1 The parties will agree the text of a press release or other announcement to publicise the award of the Grant and all such publicity must comply with ARIA's accreditation and branding guidelines. Neither party may make any other press release or announcement about the Grant or publicise details of the Grant Agreement without the other's consent, except as required by Law.
- 21.2 You must comply with all reasonable requests from ARIA to facilitate visits and provide reports, statistics, photographs (with consent of your personnel if required) and case studies that will assist ARIA in its promotional and impact assessment activities relating to the Project Activities.

22. EVENTS OF DEFAULT AND TERMINATION

Events of Default

- 22.1 ARIA may exercise its rights set out in clause 22.2 if any of the following events occur:
- (a) you fail to comply with any of your obligations under clauses 2.2, 7.2, 9.1, 11, 12, 13, 15.5 or 25, or commit a material breach of any other term of the Grant Agreement in the reasonable opinion of ARIA;
 - (b) you do not commence the Project Activities within 30 days after the Commencement Date unless an extension is agreed with ARIA;
 - (c) you fail to improve the performance of the Project Activities, notwithstanding your having undertaken the remedial activity agreed with ARIA in the remedial plan under clause 6.2(d);
 - (d) not used.
 - (e) you provide ARIA with any materially misleading or inaccurate information in your grant application or in subsequent related correspondence;
 - (f) you commit a Prohibited Act or fail to report a Prohibited Act to ARIA, whether committed by you or a Third Party, immediately upon becoming aware of it;
 - (g) you are subject to an Insolvency Event;
 - (h) the Grant or any part of it is held by a court or competent authority to be a prohibited subsidy under the Subsidy Control Act 2022 or an illegal state aid;
 - (i) you undergo a Change of Control which will, in the reasonable opinion of ARIA:
 - (i) be materially detrimental to, or result in fundamental changes to, the Project Activities;
 - (ii) result in your being unable to receive the Grant; and/or
 - (iii) raises national security concerns.

Rights reserved for ARIA in relation to an Event of Default

- 22.2 If an Event of Default has or may have occurred, ARIA may by written notice to you take any one or more of the following actions:
- (a) suspend the Project Activities and payment of the whole or any part of the Grant for such period as ARIA may determine, acting reasonably;

- (b) reduce the Maximum Sum, in which case the payment of Grant will thereafter be made in accordance with the reduction and notified to you; and/or
- (c) subject to clause 22.4, terminate the Grant Agreement with immediate effect as from the date of service of the notice of that termination.

22.3 Where this Grant Agreement is terminated for an Event of Default described in clause 22.1(f) or 22.1(h), ARIA may require you to repay the entire amount of the Grant previously paid to you.

Opportunity for you to remedy an Event of Default

22.4 If ARIA wishes to exercise any right under clause 22.2 in connection with an Event of Default which is capable of remedy:

- (a) ARIA will provide reasonable notice to you specifying particulars of the Event of Default, how it must be remedied and the timescales for its remedy; and
- (b) following receipt of a notification under clause 22.4(a), you will be given a reasonable opportunity to remedy the Event of Default before ARIA exercises the relevant right under clause 22.2.

22.5 Without prejudice to any other provision of the Grant Agreement, you may terminate the Grant Agreement on written notice to ARIA if ARIA commits a material breach of the Grant Agreement which is either not capable of being remedied or, if the breach is capable of being remedied, ARIA fails to remedy such breach within 30 (thirty) days of receiving written notice requiring it to do so.

General Termination Rights

22.6 Notwithstanding ARIA's right to terminate the Grant Agreement under clause 22.2(c), either party may terminate the Grant Agreement (in whole or in part) at any time by giving at least 60 days' prior written notice to the other party.

22.7 You must promptly notify ARIA in writing if at any time the principal investigator or any key researcher(s) named in Schedule 2 working on the Project Activities is unable or unwilling to continue to be involved in the Project Activities or is moving to a new organisation without the desire to continue the research. Within 60 days after the date of that notice, you must either:

- (a) nominate one or more successors, subject to ARIA's approval; or
- (b) agree that the Grant is transferred to another organisation subject to your and the new organisation's agreement in writing and ARIA's approval of the transfer

If ARIA is unwilling to accept the nominated successor(s) or does not approve a request for transfer, it may terminate the Grant Agreement by at least 30 days' written notice to you.

Consequences of Termination

22.8 If the Grant Agreement is terminated you must return any Unspent Monies to ARIA within 30 days after the date of the termination notice, save where ARIA gives written consent to their retention.

22.9 Where ARIA terminates the Grant Agreement in accordance with clause 22.6, ARIA will be liable to pay any Unavoidable Costs subject to:

- (a) you taking all reasonable steps to mitigate such loss; and
- (b) the Unavoidable Costs being:
 - (i) proven, reasonable, and not capable of avoidance or recovery;
 - (ii) incurred under arrangements or agreements that are directly associated with this Grant Agreement;
 - (iii) supported by full particulars, including a fully itemised and costed list of such costs, with supporting evidence and copies of any relevant Sub-Contracts, and such information has been provided to the reasonable satisfaction of ARIA;
 - (iv) costs not relating to Sub-Contracts with an entity which directly or indirectly controls you, is controlled by you, or is under direct or indirect common control with you;
 - (v) costs that would not have been incurred had this Grant Agreement continued until the end of the Funding Period as set out in the Grant Funding Letter (or, if it has been extended, the expiry of such additional period).

22.10 You shall ensure that any Sub-Contract, or the part of the Sub-Contract which relates to the Services, over £250,000 will terminate automatically and immediately upon termination of this Agreement.

22.11 If requested by ARIA from time-to-time, you must (acting in good faith) provide ARIA with a reasonable estimate of the Unavoidable Costs which would be payable under this Grant Agreement in the event that the Grant Agreement was terminated (calculated on the basis described in clause 22.8).

22.12 ARIA's total liability under clause 22.9 shall be limited to the Maximum Sum under the Grant Agreement (or relevant part), including any sums paid, due or becoming due to you at the date of termination.

22.13 If the Grant Agreement is terminated or expires ARIA will not be liable to pay any of your costs or those of any of your contractors or suppliers related to any transfer or termination of employment of any employees engaged in the provision of the Project Activities, unless they have been hired for the purpose of the Project Activities, are specified personnel in the Grant Funding Letter and are normal statutory or contractual requirements. You must at ARIA's request promptly prepare a written exit plan to provide for the cessation or seamless transfer to a Third Party of the Project Activities following expiry or termination of the Grant Agreement.

23. DISPUTE RESOLUTION

23.1 The parties must use all reasonable endeavours to resolve in good faith any dispute that arises during the term of the Grant Agreement.

23.2 All disputes and complaints must be referred in the first instance to the Grant Manager and the Project Representative.

- 23.3 If the dispute cannot be resolved between the Grant Manager and the Project Representative within a maximum of 15 Working Days, then the matter will be escalated to a formal meeting between the parties' Escalation Contacts.

24. LIMITATION OF LIABILITY

- 24.1 Neither party's liability for any of the following shall be subject to the limitations or exclusions of liability otherwise provided for in this clause:

- (a) fraudulent misrepresentation or any other fraudulent act or omission;
- (b) payment of sums properly due and owing to the other in the normal course of performance of this Grant Agreement;
- (c) liability which may not lawfully be excluded or limited.

- 24.2 Subject to clause 24.1, ARIA accepts no liability for any consequences or Losses, whether arising directly or indirectly, that may arise in connection with:

- (a) your carrying out the Project Activities;
- (b) the use of the Grant by any person;
- (c) any reduction, suspension, withdrawal or request for repayment of the Grant in accordance with this Grant Agreement; or
- (d) termination of the Grant Agreement in accordance with this Grant Agreement.

- 24.3 Subject to clause 24.1, neither party will be liable to the other party, whether for breach of contract, tort (including negligence) or otherwise, for:

- (a) loss of profit, sales or turnover;
- (b) loss of contracts or business opportunities;
- (c) loss of anticipated savings;
- (d) loss of goodwill or damage to reputation; or
- (e) any indirect, special or consequential loss or damage;

in each case arising out of or relating to the Grant Agreement, whether or not such loss or damage was foreseeable or the other party was advised of its possibility.

- 24.4 Subject to clause 24.1, each party's total aggregate liability arising out of or relating to the Grant Agreement or its subject matter or anything which it has done or not done in connection with the Grant Agreement or its subject matter (whether for breach of contract, tort, including negligence, or otherwise), will not exceed the amount of the Maximum Sum.

- 24.5 You shall under no circumstances in connection with this Grant Agreement be entitled to recover damages, or obtain payment, reimbursement, restitution or indemnity more than once in respect of the same loss, shortfall, damage, deficiency, breach or other event or circumstance.

- 24.6 ARIA shall be entitled to set off any of your outstanding liabilities against any amounts that are payable by it pursuant to this Grant Agreement.

25. RESEARCH ETHICS AND CODE OF CONDUCT

- 25.1 As a recipient of a Government grant you must operate in accordance with the Concordat.
- 25.2 All research data:
- (a) must be generated using sound scientific techniques and processes;
 - (b) must be accurately recorded in accordance with good scientific practices by the people conducting the research; and
 - (c) must be analysed appropriately, without bias and in accordance with good scientific practices.
- 25.3 The Results must be stored securely and be easily retrievable with document trails that allow reconstruction of key decisions and conclusions of the Project.
- 25.4 You must comply with the Code of Conduct and ensure that your Representatives undertake their duties in a manner consistent with the principles set out in the Code of Conduct. You must immediately notify ARIA if you become aware of any actual or suspected breaches of the principles contained in the Code of Conduct.

26. VARIATIONS

- 26.1 Any variation to the Grant Agreement will only be valid if it is agreed in writing and signed by an authorised representative of each party.

27. GENERAL

- 27.1 Notices: All notices and other communications in relation to this Grant Agreement must be in writing and will be deemed to have been duly given if personally delivered, e-mailed, or mailed (first class postage prepaid) to the address of the relevant party as stated in clause 2.1 of the Offer Letter. If personally delivered or if e-mailed all such communications will be deemed to have been given when received (except that if received on a non-working day or after 5.00 pm on any Working Day they will be deemed received on the next Working Day) and if mailed all such communications will be deemed to have been given and received on the third Working Day following such mailing.
- 27.2 Change of control: You must notify ARIA as soon as practicable in writing of any arrangements that are in progress or in contemplation that if completed will result in a Change of Control, and must provide to ARIA sufficient details about the circumstances surrounding the proposed Change of Control and the identity of the proposed acquiror to allow ARIA to assess whether clause 22.1(i) is likely to apply.

28. GOVERNING LAW

- 28.1 This Grant Agreement will be governed by and construed in accordance with the laws of England and Wales and the parties irrevocably submit to the exclusive jurisdiction of the courts of England and Wales.

29. NOT USED

30. DEFINITIONS AND INTERPRETATION

30.1 Where they appear in these Conditions or the Grant Agreement:

Adequate Insurance means the insurance requirements and amounts set out in the Grant Funding Letter.

Asset means any asset that is purchased, improved or developed using the Grant including equipment and fixed assets;

Background IP means IP that is:

(a) owned by or licensed to a party prior to the Commencement Date; or

(b) developed by or on behalf of a party during the Funding Period but not in connection with the Project Activities.

Bribery Act means the Bribery Act 2010 and any subordinate legislation made under that Act from time to time together with any guidance or codes of practice issued by the relevant government department concerning this legislation;

Change of Control means the sale of all or substantially all your assets; any merger, consolidation or acquisition of you with, by or into another person, or any change in the ownership of more than fifty percent (50%) of your voting capital in one or more related transactions;

Code of Conduct means the Code of Conduct for Recipients of Government General Grants published by the Cabinet Office in November 2018 which is available (at the Commencement Date) at https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/754555/2018-11-06_Code_of_Conduct_for_Grant_Recipients.pdf

including any subsequent updates from time to time;

Commencement Date means the date set out in the Grant Funding Letter;

Commercialisation Licence means a licence of IP other than a research or evaluation licence and/or subcontract manufacture (and **Commercially License** means to license under a Commercialisation Licence);

Commercialisation Hypothesis means the exploitation plan approved by ARIA and set out at Schedule 2 Part 2, as may be amended by agreement between the parties during and after the Funding Period;

Completion Date means the date set out in the Grant Funding Letter;

Concordat means the Concordat to Support Research Integrity which can be found at <https://ukrio.org/about-us/the-concordat-to-support-research-integrity/>

Conditions means these ARIA Grant Conditions;

Confidential Information means any information (however conveyed, recorded or preserved) disclosed by ARIA to the other party whether after the date of the Grant Agreement, which may include any information that ought reasonably to be considered to be confidential (whether or not it is so marked) relating to: (i) the business, affairs, customers, clients, suppliers or plans of the disclosing party; or (ii) the operations, processes, product information, know-how, designs, trade secrets or software of the disclosing party; (iii) any information developed by the parties in the course of carrying out the Project Activities which has not been published or otherwise publicly disclosed; (iv) Personal Data supplied by either party to the other for the purposes of, or in connection with, the Grant Agreement; notwithstanding the foregoing, neither party anticipates or plans disclosure to the other of any Personal Data in connection with this Grant Agreement and the activities conducted

hereunder; **Crown Body** means the government of the United Kingdom (including the Northern Ireland Assembly and Executive Committee, the Scottish Executive and the National Assembly for Wales), including, but not limited to, government ministers and government departments and particular bodies, persons, commissions or agencies from time to time carrying out functions on its behalf;

Data Protection Legislation means all applicable laws from time to time in force which apply to the party relating to the use of Personal Data, and any judicial or administrative interpretation of any of the above, and any guidance, guidelines, codes of practice, approved codes of conduct and approved certification mechanisms issued by any relevant supervisory authority as applicable;

Duplicate Funding means funding provided to you by a Third Party which is to fund the same activities as the Project Activities;

EA means the Equality Act 2000 and any subordinate legislation made under that Act from time to time together with any guidance or codes of practice issued by the relevant government department concerning the legislation;

EIR means the Environmental Information Regulations 2004 or Environmental Information (Scotland) Regulations 2004;

Eligible Expenditure means the payments made by you during the Funding Period for the purposes of carrying out the Project Activities which comply with clause 5 and ARIA's published eligibility rules (which provide for full economic cost reimbursement) and as agreed in the Grant Funding Letter;

Escalation Contact means the escalation contact appointed by ARIA or by you (as the case may be), which at the Commencement Date will be the individuals listed as such in the Grant Funding Letter;

Event of Default means any of the events or circumstances set out in clause 22.1;

Financial Year means 1 April to 31 March;

FOIA means the Freedom of Information Act 2000 and the Freedom of Information (Scotland) Act 2002, any subordinate legislation made under those Acts from time to time together with any guidance or codes of practice issued by the relevant government department concerning the legislation;

Foreground IP means any IP in the Results;

Funding Period means the period commencing on the Commencement Date and ending on the Completion Date or such later date as may be agreed between the parties unless otherwise determined in accordance with the terms of the Grant Agreement;

Future Proofing our Climate and Weather Intellectual Property Pledge means the pledging system for patents relating to approaches for intentionally altering the Earth system through solar radiation modification, modification of ocean circulations, modification of cloud properties, surface engineering works, or weather modification (operated by ARIA or by a third party), in the form set out at Annex A;

Grant means the sum or sums ARIA will pay to you up to the amount set out in the Grant Funding Letter, in accordance with clause 4 and subject to the provisions set out at clause 22.

Grant Agreement has the meaning given in the Grant Funding Letter;

Grant Claim means a request submitted by you to ARIA for payment of the Grant;

Grant Funding Letter means the letter from ARIA to you to which these Conditions are annexed;

Grant Manager means the individual who has been nominated by ARIA to be your day-to-day point of contact in relation to the Grant;

Grant Review means the process for reviewing the grant outlined in clause 6;

HRA means the Human Rights Act 1998 and any subordinate legislation made under that Act from time to time together with any guidance or codes of practice issued by the relevant government department concerning the legislation;

Ineligible Expenditure means expenditure incurred by you which is not Eligible Expenditure as set out in clause 5 and ARIA's published eligibility rules;

Information Acts means the Data Protection Legislation, FOIA and the EIR, as amended from time to time;

Insolvency Event means:

(i) where you pass a resolution, or the court makes an order that you be wound up (otherwise than for the purpose of a bona fide and solvent reconstruction or amalgamation); or (ii) a receiver, manager or administrator on behalf of a creditor is appointed in respect of all or part of your business or assets; or (iii) circumstances arise which entitle a court or creditor to appoint a receiver, manager or administrator or which entitle the court (otherwise than for the purpose of a solvent and bona fide reconstruction or amalgamation) to make a winding up order; or (iv) you cease to trade or are unable to pay your debts within the meaning of the Insolvency Act 1986 or any similar event occurs under the law of any other jurisdiction;

Intellectual Property Rights or **IP** means copyright, rights related to or affording protection similar to copyright, rights in databases, patents and rights in inventions, semi-conductor topography rights, trade marks, rights in internet domain names and website addresses and other rights in trade names, designs, know-how, trade secrets and any modifications, amendments, updates and new releases of the same and all similar or equivalent rights or forms of protection which subsist or will subsist now or in the future in any part of the world;

Law means any law, statute, bye-law, regulation, order, regulatory policy, guidance or industry code, judgement of a relevant court of law, or directives or requirements of any regulatory body, delegated or subordinate legislation;

Losses means all losses, liabilities, damages, costs, expenses (including legal fees), disbursements, costs of investigation, litigation, settlement, judgement, interest and penalties whether arising in contract, tort (including negligence), breach of statutory duty, misrepresentation or otherwise;

Maximum Sum means the maximum amount of the Grant stated in the Grant Funding Letter;

Milestones means the outputs of the Project Activities described in paragraph 3.2 of Schedule 2;

NewCo has the meaning given in clause 16;

Non-UK Entity means a legal entity that is not a UK Entity;

Personal Data has the meaning given to it in the Data Protection Legislation as amended from time to time;

Prohibited Act means:

(a) directly or indirectly offering, giving or agreeing to give to any servant of ARIA or the Crown any gift or consideration of any kind as an inducement or reward for (i) doing or not doing (or for having done or not having done) any act in relation to the obtaining or performance of the Grant Agreement; and/or (ii) showing or not showing favour or disfavour to any person in relation to the Grant Agreement;

(b) committing any offence: (i) under the Bribery Act; (ii) under legislation creating offences in respect of fraudulent acts; and/or (iii) at common law in respect of fraudulent acts in relation to the Grant Agreement; and/or

(c) defrauding or attempting to defraud or conspiring to defraud ARIA or the Crown;

Project means the Project Activities together with the Results;

Project Activities means the activities to be carried out by you that are described in the Grant Funding Letter and in Schedule 2 Part 1;

Project Representative means the representative appointed by you, who at the Commencement Date will be the individual listed as such in the Grant Funding Letter;

Representative means any of the parties' duly authorised directors, employees, officers, agents, professional advisors and consultants;

Results means all information, data, and materials generated in the course of the Project Activities;

Secure Innovation and Trusted Research Guidance means the best practice for the implementation of basic protective security measures guidance provided by NCSC and NPSA which can be found on ARIA's website;

Third Party means any person or organisation other than you or ARIA;

UK Entity means a legal entity whose ultimate parent company has its headquarters and principal establishment in the United Kingdom;

Unavoidable Costs means the amounts paid to you in respect of the termination as a direct result of the early termination of this Grant Agreement and which are not capable of recovery;

Unspent Monies means any monies paid to you which remain unspent at the end of the Funding Period because of termination or breach of the Grant Agreement. Unspent Monies do not include non-cancellable costs incurred prior to termination; and

Working Day means any day other than a Saturday, Sunday or public holiday in England and Wales.

30.2 In these Conditions and the Grant Agreement, unless the context otherwise requires:

- (a) references to "party" and "parties" are to the parties to the Grant Agreement;
- (b) the singular includes the plural and vice versa;
- (c) references to a person include an individual, company, body corporate, corporation, unincorporated association, firm, partnership or other legal entity or Crown Body;
- (d) references to clauses and Schedules are to the clauses of these Conditions and to the Schedules to the Grant Agreement;
- (e) a reference to any Law includes a reference to that Law as amended, extended, consolidated or re-enacted from time to time;
- (f) the words "including", "other", "in particular", "for example" and similar words will not limit the generality of the preceding words and will be construed as if they were immediately followed by the words "without limitation"; and
- (g) the headings in the Grant Agreement are for ease of reference only and will not affect the interpretation or construction of the Grant Agreement.

SCHEDULE 2

PART 1 - PROJECT ACTIVITIES

1. Background

Stratospheric aerosol injection (SAI) could be used to reflect a small amount of sunlight back to space, cooling the planet. We know with certainty that this would cool, and if it were started at high latitudes where the tropopause is lower, it could potentially be conducted using existing (but modified) aircraft, making this the most near-term option for radically reducing the risks of climate change. Nonetheless, there are still critical uncertainties that would need to be narrowed before informed decisions about using SAI could be considered robust.

You will start from the assumption that the nearest-term use of SAI is highly likely to be with sulfate aerosols, with gaseous dispersal of a precursor (SO₂ being the obvious candidate), and released from aircraft. The expectation that sulfate is the nearest-term option is due to the close similarity with natural analogues, and due to your knowledge of the environmental impacts of sulfate compared to novel materials; releasing as a gaseous precursor is expected to be more straightforward, and is again consistent with natural analogues. (And analyses consistently show that aircraft are likely the cheapest means of lofting material). This makes reducing the remaining uncertainties associated with SO₂ release a high priority for near-term research.

With SO₂, the biggest source of testable uncertainty that could be reduced at a scale relevant for an outdoor experiment is associated with aerosol microphysics, leading to uncertainty in the aerosol size distribution, and hence both lifetime and radiative efficacy; this ultimately affects the overall amount one needs to inject to achieve a given amount of cooling. This uncertainty comes from the potential competition between nucleation (new particle formation) and condensation/coagulation (particle growth) of H₂SO₄ vapors and already nucleated sulfate aerosols, which in turn is strongly dependent on spatial inhomogeneity, as well as on initial conditions (such as ion-induced nucleation within the plume of an aircraft). In a climate model, these small-scale processes are represented by simplified parametrizations, based on a small amount of existing observations after volcanic eruptions, pyrocumulus etc. However, these representations have already been demonstrated to be highly model dependent (roughly a factor of two range across models), including even dependent on the physical timescale of the calculations, due to competition between different simultaneous processes (nucleation versus coagulation) that need to be resolved at a high temporal scale. Even more critically, the existing observations that lead to current parameterizations are from analogues that are not fully representative of the conditions that would happen during SAI, and there is little basis to guess how large an effect this might have on predictions without direct experimentation.

An outdoor experiment could be designed specifically aimed at reducing this uncertainty, but it is unclear what scale this experiment would need to be. This is the primary question you will address here - not the detailed experiment design, but rather a robust scientific definition of the scale that such an experiment would need to be conducted at in order for it to meaningfully constrain some of the key microphysical uncertainties. This would not just be a critical first step in the design of the experiment, but would provide critical information for supporting evidence-based conversations on research governance.

There are two key observations that guide your thinking in the potential design of such an experiment:

It would be essential to conduct the putative experiment in as close a way as possible to the way SO₂ would be released in practice, in order to ensure that the conclusions were applicable to a realistic scenario. This would require release from an aircraft, and at release rates (kg/s or kg/km of travel) similar to rates expected in an actual SAI event. This would ensure both that the initial plume concentrations were relevant, and also that the test did not over- or under-represent effects from exhaust ions or aircraft wake turbulence for example.

It would be essential to be able to track the resulting plume until oxidation and aerosol formation were mostly complete, so 2-4 weeks. This would require a sufficiently large initial injection of material to ensure that after several weeks of mixing, the aerosol concentrations remained locally high enough that the plume could be found.

The initial plume of SO₂ from the aircraft would gradually spread, advecting with the local winds, and diffusing, but even after a few weeks would lead to a broad plume or tube of higher aerosol concentrations that would not necessarily be close to uniformly mixed throughout the scale of a climate model grid cell.

2. Aims and objectives of the Project Activities



Your goal is to determine the minimum size of an experiment that would allow for a substantial reduction in this uncertainty.

The two main questions that need to be answered to address this goal are (i) understand the range of plausible plume spreading rates, and (ii) assess the ability to forecast future plume location (to reduce the search space). In addition it is important to understand instrument detection thresholds, and to assess potential transboundary implications of such a test.

3. Project Activities

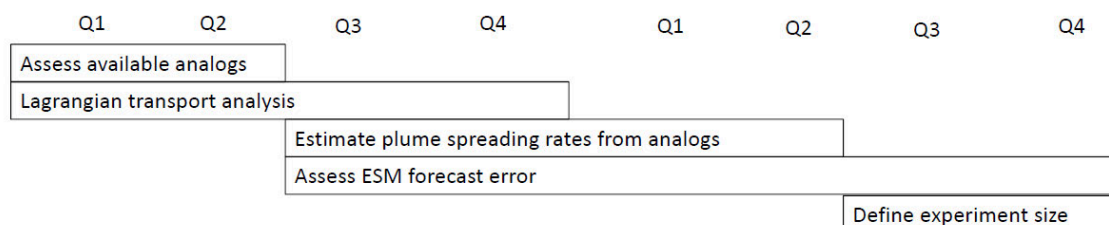
- 3.1 The first task is to quantify the range of plausible rates of plume diffusion over the first month following a hypothetical experimental release of material. To help constrain this, you will use satellite observations from TROPOMI after volcanic eruptions, which have been demonstrated to be capable of tracking plumes of SO₂ at a scale relevant to a large-scale SAI experiment. While this can only be used to determine spreading rates for spatial scales larger than the spatial resolution of TROPOMI (about 25 km horizontally), that can be extrapolated to bound spreading rates at smaller spatial scales as well. Analysis after different volcanic eruptions will provide information about how variable these rates might be under different stratospheric conditions. In addition, you will also explore the use of other potential analogs as well (e.g., pyrocumulus plumes), as described in your first milestone. This effort will allow you to determine, as a function of the initial SO₂ mass release rate, estimates for how broad the resulting plume would be as a function of time and the estimated peak aerosol concentration within the plume.
- 3.2 A related second task is to clarify the potential sensitivity of observational capability for remotely detecting SO₂ and detecting sulfate aerosols. The aerosols can be detected through upwards-facing LIDAR on aircraft; these instruments are already in use (on the NOAA SABRE

missions, for example), but you will engage in conversations about the potential for modifications for this particular mission.

- 3.3 The third task aims to provide statistical information about the movement of air plumes at different geographical locations and altitudes based on reanalyses and trajectory models. This provides a starting point for the final task below to understand the range of possible future plume locations if there is no forecast capability, and can clarify whether there are altitudes or locations that an experiment could be conducted at that would lead to more or less predictability. Furthermore, understanding the ultimate tropospheric deposition distribution will help inform future discussions around potential transboundary issues with outdoor SAI experiments. This will allow you to clarify under which conditions and injection amounts there might be foreseeable chances of some of the plume material falling into the troposphere within a country's airspace and hence the potential for deposition. This will provide information for the modality of "safe" outdoor experiments that do not significantly infringe on other countries' airspaces. This will allow you to address the potential relevance of the experiment in light of current, established protocols around environmental pollutants, such as the Convention on Long-Range Transboundary Air Pollution, by communicating at which scales, and from which locations, detectable transboundary effects could be relevant.
- 3.4 Finally, task 4 addresses the ability to forecast the future location of the center of the plume if the current location is known. Here you will use the Whole Atmosphere Community Climate Model (WACCM) in forecast mode, where it is initialized with stratospheric winds (based on re-analysis). By comparing short-term WACCM forecasts of volcanic aerosols against observations, initialized at different times in the evolution of the volcanic plume, this tool will allow you to quantify the likely predictive accuracy with lead time, better constraining the search region that would need to be explored to find the aerosol plume (assuming that it is not always continuously tracked). You will also explore the use of other potential analogs (e.g., pyrocumulus plumes) for which data may be available.
- 3.5 Collectively, these tasks will be integrated to determine what spatial scale of experiment would be needed to allow reliably finding the plume if it is not continuously observed. Once the plume location is known, existing observational assets could be used for in-situ sampling to determine aerosol concentrations, size distribution, etc. Knowing the required mass release is an essential precursor to designing details of aircraft release systems as well.
- 3.6 The tasks above are separated out in terms of the goals, whereas the milestones below are defined temporally. The first milestone ensures that you are evaluating all of the observational data available primarily for task 1, but potentially task 4 as well. The second milestone addresses task 3, and is a starting point for task 4. The third and fourth milestones complete tasks 1 and 4. (You do not include a milestone for the smaller task 2.)
- 3.7 The following Milestones will be used to monitor your delivery of the Project. The costs associated with completing these Milestones are estimated in the cost breakdown sheet 


ID	Milestones	Measure	Date
1	Identify key eruptions and other relevant analogs that can help constrain plume forecast and spreading, and download observational datasets	Compile a list of available analogs to study, provide an initial internal report providing an overview of which analogs are more useful and usable for future analyses	Commencement date + 6 months
2	Conduct Lagrangian analysis (based on reanalysis) to simulate transport and assess both variance of stratospheric transport and ultimate tropospheric deposition	Analyse simulations results in order to assess model's skills, highlighting differences with observations	Commencement date + 12 months
3	Estimate plume spreading rates (or equivalently mixing or diffusivity) from eruption and other analogs	Determine aerosol peak concentration over time relative to initial concentration and determine initial concentration needed for detectability with LIDAR	Commencement date + 18 months
4	Assess forecast error as a function of lead-time and location for initialized climate model simulations	Draft paper written that integrates information across project to define minimum size limit for a hypothetical experiment	Commencement date + 24 months

In addition to the above Milestones, the following project plan will be used to track progress throughout the project and may be updated from time to time:



3.8 The intended long-term outcomes are summarised below:

- Provide the basis for more detailed experimental design once size requirements are better understood.
- Much clearer understanding of the roadmap towards supporting informed decisions in this space, supporting research investment decisions to enable necessary experimentation
- Your findings can be used during future community engagements and attempts to co-design outdoor experiments, by providing a best estimate of impacts and scales at play, potentially facilitating the role of other ARIA R&D Creators.
- The first, scientifically backed, grounded estimate of minimal size for the detection of an experiment across different scales will have allowed for more informed conversations, helping policymakers understand at what scale of an experiment do concerns about transboundary effects and potential interactions with international treaties merit strengthened governance regimes, as well as guiding potential actors aiming to design such experiments towards safe, responsible and useful experimental protocols. This will also inform countries' strategies towards better integrated observational systems to detect and attribute changes due to potential SAI scenarios, for instance by improving precision and accuracy of future orbital observational systems, strengthen on-the-ground observations and improve modeling practices towards more relevant identification strategies.

4. Project Reporting requirements

You will complete, submit and attend the following reporting/meeting requirements at the frequency set out below:

Frequency	Requirement
Kick off	<ul style="list-style-type: none"> • Roles and responsibilities • External communications • Project details
Quarterly	<p>Reporting:</p> <ul style="list-style-type: none"> • Technical status - Red/Amber/Green • Delivery status - Red/Amber/Green • The latest progress against milestone(s) from last quarter • Invoicing and cost reporting <p>Optional:</p> <ul style="list-style-type: none"> • Key Learning, discoveries and decisions • Stories to highlight • Priorities for the next quarter • Challenges • Changes to team and new collaborations • technical evidence saved to drive e.g. report or presentation as requested by PD • review meeting slide deck saved to drive as requested by PD <p>Review meeting with ARIA Programme Team</p>
Annual	<ul style="list-style-type: none"> • ARIA impact metrics • Attendance at annual ARIA event
Ad hoc	<ul style="list-style-type: none"> • As required, Programme Director/ Programme Team may request additional information and evidence • Workshops - potential to be invited to ARIA workshops
Project closure	<ul style="list-style-type: none"> • Project closure report

5. Payment

5.1 Subject to your compliance with the terms of this Grant Agreement, ARIA will make Grant payments monthly in arrears based on actual costs incurred.

Monthly payments will align with the calendar month.

5.2 Before paying any Grant Claim, ARIA must be satisfied that the Project Activities have been carried out during the Funding Period (or that part of the Funding Period to which the claim for

Grant relates).

5.3 Grant Claims must be submitted to ARIA by the 15th Working Day of the month following the end of the relevant period.

5.4 Payment of the Grant Claim will be made within 30 days after ARIA approves your Grant Claim.

6. Principal investigator/key researchers

6.1 For the purposes of clause 22.7, the following principle investigators or key researchers have been identified:

Name	Role	Organisation
Douglas MacMartin	PI	Cornell University
Daniele Visioni	Co-PI	Cornell University

7. Sub-Contractors

7.1 For the purposes of clause 19, the following Sub-Contractors have been agreed:

Name	Description of activity	Location

PART 2 - GRANT APPLICATION

Application titled: Defining the minimum scale of an SAI test: A fundamental first step towards an outdoor large scale experiment dated 07 December 2024

SCHEDULE 3

Not Used

ANNEX 1

Clause for inclusion in licences of Foreground IP

[] **ARIA NON-UK FEE**

[].1 In this clause:

“ARIA” means the Advanced Research and Invention Agency;

“Crown Body” means the government of the United Kingdom (including the Northern Ireland Assembly and Executive Committee, the Scottish Executive and the National Assembly for Wales), including, but not limited to, government ministers and government departments and particular bodies, persons, commissions or agencies from time to time carrying out functions on its behalf;

“UK Entity” means a legal entity that has or whose ultimate parent company has its headquarters and principal establishment in the United Kingdom.

[].2 The Foreground IP was developed with funding from ARIA. As a condition of its funding ARIA requires that a benefit is returned to the United Kingdom where the Foreground IP is licensed by the Licensor to any person that is not a UK Entity. Accordingly, in addition to any other sums payable by the Licensee to the Licensor under this Agreement, the Licensee shall pay to the Licensor within 90 days after the end of each calendar year during the Relevant Period (as defined below), and within 90 days after the end of the Relevant Period, a fee (**ARIA Non-UK Fee**) on all amounts (including upfronts, licence fees, milestone payments, royalties, shares or other securities, exit fees, buyout or other consideration) payable by the Licensee to the Licensor under this Agreement in relation to the exploitation of any Foreground IP (**Relevant Amount**) that accrues during, or relates to, any period of time that the Licensee is not a UK Entity (**Relevant Period**). The amount of the ARIA Non-UK Fee is 25% of the Relevant Amount, and is payable by the Licensee to the Licensor in addition to the amounts that would otherwise be payable under this Agreement. For example if the Relevant Amount is £100 the ARIA Non-UK Fee is an additional £25, which the Licensee shall pay to the Licensor and the Licensor shall remit to ARIA.

Crown Body customers

[].3 You must also ensure that any Crown Body is able to procure any products and services that are covered by, use or incorporate the relevant Foreground IP within a reasonable time period at prices that are no higher than those offered to or agreed with any other customer for equivalent quantities and in suitable quantities for the Crown Body's requirements.

[].4 ARIA shall have the right to enforce this clause [] under the Contracts (Rights of Third Parties) Act 1999. Neither party may amend this Agreement in a way that detracts from ARIA's right to enforce its rights under this clause without ARIA's prior written consent.

- [1] When using this clause you may substitute the relevant defined terms used elsewhere in the agreement to capture the concept of "Foreground IP". Where the clause refers to the "Licensor" and "Licensee" please use the appropriate defined terms to include the licensor, licensee, assignor and assignee of the Foreground IP. This clause is not suitable for assignments of the Foreground IP in consideration of the payment of one or more lump sum payments. In those cases the Licensor needs to be informed, and potentially make an additional payment, if the Foreground IP is subsequently assigned to a non-UK Entity or if the Assignee ceases to be a UK Entity.

SCHEDULE 4

NOT USED

Annex A - Future Proofing our Climate and Weather Intellectual Property Pledge

1. Submission of Pledged Patents and Experimental Data

- 1.1 The Pledgor undertakes to submit relevant details of all Pledged Patents to the operator of the Pledge Repository in accordance with the Submission Guidelines.
- 1.2 The Pledgor undertakes to:
 - (a) submit (or provide a link to a publicly available digital copy of) all Experimental Data to the operator of the Pledge Repository in accordance with the Submission Guidelines; and
 - (b) publish such Experimental Data in accordance with the Submission Guidelines.

2. Experimental Data Licence

- 2.1 Subject to Clause 6.1, the Pledgor hereby grants a royalty-free, non-exclusive licence under the Experimental Data to any party that wishes to accept it ("Experimental Data Licensee") solely for the purpose of carrying out research in the Field.
- 2.2 The licence granted under Clause 2.1:
 - (a) is non-transferable and non-sublicensable;
 - (b) permits research activities but does not permit development, manufacture, sale or other exploitation of products or services under the Experimental Data.
- 2.3 The Experimental Data Licensee may conduct relevant research activities itself or in collaboration with a third party, provided that the Experimental Data Licensee must ensure that such third party agrees to comply with the terms of Clause 2.4 as if such third party were the Experimental Data Licensee.
- 2.4 The Experimental Data Licensee must:
 - (a) at all times when using the Experimental Data comply with all Laws; and
 - (b) to the extent that any data relating to the Field is generated by or on behalf of the Experimental Data Licensee in the course of carrying out research activities based on or using the Experimental Data or the Pledged Patents, make such data available on the terms of this Pledge (and such data shall be deemed to be Experimental Data pursuant to this Pledge).

3. Research Licence

- 3.1 Subject to Clause 6.1, the Pledgor grants a royalty-free, non-exclusive licence under the Pledged Patents to any party that wishes to accept it ("Research Licensee") solely for the purpose of carrying out research in the Field.
- 3.2 The licence granted under Clause 3.1:
 - (a) is non-transferable and non-sublicensable; and
 - (b) permits research activities but does not permit development, manufacture, sale or other exploitation of products or services under the Pledged Patents.
- 3.3 Subject to Clause 6.1, the licence granted in accordance with Clause 3.1 shall subsist until the expiry of the final Pledged Patent.

- 3.4 The Research Licensee may conduct relevant research activities itself or in collaboration with a third party, provided that the Research Licensee must ensure that such third party agrees to comply with the terms of Clause 3.5 as if such third party were the Research Licensee.
- 3.5 The Research Licensee must:
- (a) at all times when using the Pledged Patents comply with all Laws; and
 - (b) to the extent that any patents relating to the Field are filed by or on behalf of the Research Licensee covering data generated in the course of carrying out research activities based on or using the Pledged Patents or Experimental Data, make such patents available on the terms of this Pledge (and such patents shall be deemed to be Pledged Patents pursuant to this Pledge).

4. Commercial Licence

- 4.1 The Pledgor undertakes to grant a non-exclusive licence on reasonable terms under the Pledged Patents and/or Experimental Data to any Signatory that requests it ("Commercial Licensee") for the purpose of carrying out commercial activities (including development, manufacture, sale or other exploitation of products or services) in the Field.
- 4.2 The Pledgor must grant the licence set out Clause 4.1 in good faith and in a timely fashion following such a licence being requested by the Commercial Licensee.
- 4.3 The Commercial Licensee must at all times when using the Pledged Patents and/or Experimental Data comply with all Laws.

5. Pledgor Know-How

At the request of a Licensee, the Pledgor undertakes to negotiate in good faith with any Licensee regarding a non-exclusive licence in the Field under any Know-how owned by such Pledgor that is necessary for a Licensee to use the technology covered by the Pledgor's Pledged Patents. Such licence may be for research or commercial purposes as agreed between the Pledgor and Licensee.

6. Termination

- 6.1 The Pledgor may terminate any licence it grants to an Experimental Data Licensee and/or Research Licensee under this Pledge in the event that such Licensee:
- (a) materially breaches the terms of such licence or this Pledge; or
 - (b) breaches any Laws in its use of the Experimental Data or Pledged Patents (as applicable).

7. Transfers of Pledged Patents and/or Experimental Data

The Pledgor undertakes to make any future assignment of the Pledged Patents and/or Experimental Data to any other party (the "Recipient") conditional on the Recipient (and any successor in title) agreeing to be bound by the terms of this Pledge.

8. No Warranty

The Pledgor provides the Pledged Patents and the Experimental Data on an "as is" basis. The Pledgor makes no express or implied warranty or representation concerning the Pledged Patents or Experimental Data including but not limited to non-infringement or to the accuracy or completeness of the Pledged Patents or Experimental Data.

9. Compliance with Laws

For the avoidance of doubt, nothing in this Pledge operates to require a Pledgor, Licensee or Signatory to do any acts or grant any rights that do not comply with Laws.

10. Further Publication or Licensing

For the avoidance of doubt, nothing in this Pledge operates to restrain a Pledgor from publishing or licensing any Experimental Data or Pledged Patents more widely or on more permissive terms than those described herein.

11. Governing law and jurisdiction

This Pledge (including any non-contractual disputes or claims arising in connection with this Pledge) will be governed by and construed in accordance with the laws of England and Wales and the parties irrevocably submit to the exclusive jurisdiction of the courts of England and Wales.

Part 1 of Annex A: Definitions

1. In this Pledge, unless the context otherwise requires, the following definitions shall apply:

Experimental Data	means data generated by or on behalf of the Pledgor relating to the Field and identified by the Pledgor for inclusion in the Pledge pursuant to Clause 1.2;
Field	means approaches for intentionally altering the Earth system through solar radiation modification, modification of ocean circulations, modification of cloud properties, surface engineering works, or weather modification;
Know-how	means the information, methods, formulae, processes and/or applications which may or may not be documented and which enable the use of the technology covered by the Pledged Patents;
Law(s)	means any applicable law, statute, bye-law, regulation, order, regulatory policy, guidance or industry code having the force of law, rule of court, delegated or subordinate legislation in force from time to time;
Licensee	means any Commercial Licensee, Research Licensee or Experimental Data Licensee;
Pledge	means the commitments in relation to patents, know-how and data set out in this pledge document;
Pledge Repository	[TBC]
Pledged Patents	means patents or patent applications owned by the Pledgor relating to the Field and identified by the Pledgor for inclusion in the Pledge pursuant to Clause 1.1;
Signatory	means any party who has agreed to be bound by the terms of this Pledge; and

**Submission
Guidelines**

means the guidelines governing the submission of Experimental Data and details of the Pledged Patents to the Pledge Repository, as amended from time to time.