



Call for Proposals 2024

The application of biotechnology to carbon removal from the atmosphere into both terrestrial and ocean systems.

Important information

Funding type:	Grant, <i>up to 48 months duration</i>
Total Fund:	Up to £2.5m, <i>up to 5 projects</i>
Opening Date:	16 January 2024
Intent to submit:	26 February 2024 16:00 GMT
Closing date:	26 April 2026 16:00 BST
Interview date:	w/c 1 July 2024

Overview

[Carbon Technology Research Foundation](#) (CTRF) funds research into new methods of carbon sequestration, which have their roots in nature, but which could be scaled significantly using biotechnology. The scope of biotechnology to supercharge the carbon removal process can't be underestimated, but much more research is needed to understand its potential impact. CTRF is inviting the research community to respond to this opportunity, making new discoveries in the fight against climate change.

Through this Call for Proposals, CTRF will fund cutting-edge research into the application of biotechnology to deliver enhanced, scalable solutions to carbon sequestration. Projects focussed on the utilisation of cutting-edge genomics and synthetic biology tools whilst investigating the role of microorganisms and plants in carbon sequestration processes are of particular interest to CTRF. Key research challenges have been identified and these will form the priority areas of this Call. These opportunities represent a snapshot of what may be possible in the application of biotechnology to the enhancement of nature-based carbon sequestration. CTRF remains open to highly transformative research which has the potential to disrupt and encourages researchers to engage with us in speculative discussion prior to application.



Projects can be up to 48 months in duration. Whilst there is no upper limit on the volume of funding that can be requested for an individual project, up to £2.5m has been allocated for this theme and we anticipate funding in the region of 3-5 projects. CTRF will fund the direct costs of the research plus an overhead contribution as defined in our Indirect Cost Policy (available on our 'Apply for Funding' page under 'Key documents' section on our [website](#)).

There are two sections to the application process: the Intent to Submit and the Full proposals. **NOTE:** the intent to submit **will be** used to assess whether the research project fits within the scope specified in the criteria above. Applicants will be advised if their Intent to Submit is considered out of scope and should not submit a Full Research Proposal.

Applicants should complete an Intent to Submit by 16:00 GMT on **26 February 2024**. You will be required to provide a title, a 2,500 characters (roughly 400 words) summary of your proposed project, 5 keywords that best describe your research proposal, your recommended 3 potential reviewers and a list of principal and co-investigators who will likely be involved. Please read [Intent to Submit Guidance](#) 'How to apply Section 1: Intent to Submit' for details on how to apply online.

Full proposals must be submitted by 16:00 BST on **26 April 2024**. You must apply using the specific Call Application form available through our website and submit this with all relevant and requested attachments. A template of the Full Call for Proposal form will be available for you to review all the questions. Please note that the template document is for your use only and CTRF will require the information submitted through the application form on our website.

Please see How to apply Section 2: Full Proposal section for detailed instructions and the CTRF Step-by-step guide to Call for Proposal submission document for the online submission through our website (available on our 'Apply for Funding' page on our [website](#)).

CTRF [Standard Grant Eligibility](#) rules apply (available on our 'Apply for Funding' page under 'Key documents' section on our [website](#)).

Background

By 2050, an estimated 10 Gt of CO₂ /pa need to be removed from the atmosphere to meet the goals of The Paris Agreement, with this number expected to double by the end of the century. Finding cost-effective, scalable solutions that are commensurate with the scale of the problem is a huge challenge facing the scientific community and why the carbon removal sector urgently needs greater investment in R&D.

CTRF was founded in 2020, to fund research programmes which target the enhancement of natural carbon sequestration processes. Biological systems for carbon capture and sequestration offer some potential advantages over physical and chemical alternatives, including for example, self-replicating organisms and harnessing the energy of the sun. Despite its potential, the scale up of natural processes through the application of biotechnology is poorly understood and underfunded.



Who can apply

CTRF is a global funder; we aim to fund the highest impact research programmes. Researchers in higher education institutions or public or not-for-profit research establishments are eligible to apply for a CTRF grant. Please see CTRF's [Standard Terms and Conditions of Grants](#) (available on our 'Apply for Funding' page under 'Key documents' section on our website).

Eligible principal investigators for a CTRF standard research grant must be at least one of the following:

- employed at the administering research organisation at equivalent to lecturer-level or above (tenure-track).
- hold a fixed-term contract that extends beyond the duration of the proposed project and the host organisation is prepared to provide all the normal support available to permanent employees.
- hold an externally funded fellowship. These will be considered on a case-by-case basis, please discuss with CTRF in advance of your application.

Applicants can be the **lead/principal investigator on one proposal only** and co-investigator on additional proposals.

Scope

Through this Call for Proposals, CTRF will invest in cutting-edge research on the application of biotechnology to deliver enhanced, scalable solutions to carbon dioxide removal (and to a lesser extent other greenhouse gases (GHGs), such as methane (CH₄), nitrous oxide (N₂O)). CTRF is interested in projects which target carbon removal from the atmosphere into both terrestrial and ocean/freshwater systems. Key research challenges have been identified by CTRF and these will form the priority areas of this Call. You will be provided with the opportunity to specify which priority area your proposal is most relevant to in the Full Proposal under section 1 'Application Summary Information' of the application form.

Research Challenges

Whilst this opportunity is open to any proposal addressing a research challenge related to enhanced carbon removal through the application of biotechnology to natural processes, CTRF particularly welcomes proposals that:

- Utilise ground-breaking technological advances in **genome editing** (eg. CRISPR-Cas) and **synthetic biology** to enhance natural sequestration by key groups of organisms: **bacteria, algae, archaea, fungi, and higher plants**.
- Seek to improve the photosynthetic efficiency of **higher plants** (and **algae**) through:
 - Metabolic engineering to optimise efficiency of key enzymes.
 - Replacement of key CO₂ fixation enzymes with more efficient carboxylation enzymes or engineering of photorespiration bypass routes.
 - Optimise other components of the photosynthetic machinery.



- Enhance light absorption through expansion of the photosynthetic active radiation spectrum.
- Creation of novel engineered carbon-fixing pathways.
- Modifying canopy or changing the morphology and biochemical composition of the root system.
- Engineering aquaporins.
- Utilising trees as carbon sinks.
- Attempt to understand unicellular & simple multicellular photosynthetic organisms (eg. **microalgae**) role in carbon sequestration and engineer more efficient strains.
- Engineering of faster-growing strains of **macroalgae** and/or strains that produce a higher proportion of carbon in their biomass.
- Investigate the role of **bacteria** in both terrestrial and oceanic carbon sequestration. Engineering of these photoautotrophic organisms to sequester carbon more efficiently and/or to enhance their biomineralization capabilities.
- Apply genome editing to molecular breeding of **fungi** to enhance their carbon sequestration capabilities in marine and terrestrial ecosystems.
- Try to understand the potential of soil carbon sequestration for carbon removal; **investigate and adapt the root-soil ecosystem** and explore symbiotic relationships with microbes and fungi.
- Explore co-cultivation of nitrogen-fixing or carbon concentrating organisms such as **cyanobacteria**.
- Undertake fundamental research into the sequestration potential of **archaea**.
- The application of **biotechnology to enhanced weathering**; investigating colonies of microorganisms, plants, lichens, and fungi that co-exist in local ecology to speed up dissolution rates.
- Seek to promote **bio-enhanced mineralisation** through engineering of sub-surface microbiota.

Artificial ocean alkalization, cell-free CO₂-fixing enzymatic systems and the generation of artificial leaves and hybrid systems (the combination of biotic and abiotic components) are peripheral to the scope of CTRF. All applicants seeking to explore the biological aspects of these carbon removal innovations are encouraged to contact CTRF for an initial remit discussion.

This list is non-exhaustive, representing a snapshot of what may be possible in the world of enhanced biosequestration. CTRF welcomes highly innovative, multidisciplinary proposals that address a challenge related to enhanced biosequestration. Please discuss speculative applications with CTRF at research@ctrfoundation.com

What we expect to see in proposals

Proposals should address research challenges detailed in this call. Your proposal should:

- Be adventurous and ambitious, demonstrating high impact potential in the carbon removal space.



- Propose a credible methodology and pathway to impact, whilst demonstrating awareness of the inevitable challenges associated with scale-up of these biotechnologies.
- Detailed plans for dissemination and knowledge exchange with relevant stakeholders such as industry or government.
- Demonstrate credibility in the assembled research team alongside an effective project management plan and appropriate allocation of resources.

Project partners

Commercial, government or third sector project partners are welcomed. Each project partner should be able to demonstrate a clear interest in the project achieving outcomes and impacts relevant to its business or mission. Project partner engagement must demonstrably extend beyond an advisory role, such as by providing direct investment to support a project research activity or in-kind support, for example access to equipment or other resources or employee time allocated to research activities. **Project partners are unable to receive any funding from CTRF to achieve their project deliverables.** Any collaborators involved in an advisory capacity, in addition to any contract research organisation undertaking a specific (set of) deliverable(s) should be clearly described as such within the Full Application form, submitted via our website.

Funding available

In 2024 there is up to £2.5m available for grants. It is anticipated that CTRF will fund up to 5 projects.

CTRF will fund the direct costs of the research plus a contribution to eligible institution overheads at a rate of 10%. Please refer to CTRF's [Indirect Costs Policy](#) for information on how to calculate this appropriately. Projects are expected to be no more than 48 months in duration.

Equipment under £10,000 in value (including VAT) should be in the 'Directly Incurred – Equipment Costs' heading, and a single quote should be provided as part of your application. Any individual items of equipment over £10,000 which will be utilised to deliver the proposed research should be discussed with CTRF in advance of application and further guidance will be provided.

How to apply

There are two parts to the application process: the Intent to Submit and the Full proposal.

NOTE: the Intent to Submit **will be** used to assess whether the research project fits within the scope specified in the criteria above. Applicants will be advised if their Intent to Submit is considered out of scope and should not submit a Full Call Application form.



Stage 1: Intent to Submit

Please complete the Intent to Submit form (available on our 'Apply for Funding' section of our [website](#)). **NOTE:** Full proposals will only be considered from applicants who submitted an Intent to Submit through our website by the deadline, **26 February 2024 16:00 GMT**.

The Intent to Submit requests:

- Names and affiliations of principal and co-investigators in the team.
- Project title.
- Project summary (max. 2,000 characters /400 words) – including context, significance, and goals of the proposed project.
- Nominate 3 potential reviewers (with a minimum of at least one) and highlight any perceived conflicts.
- Please select up to 5 appropriate keywords from the words provided that best match the focus areas of your project.

Project Summary Guidance

We are looking for the greenhouse gas removal challenge that is going to be addressed, the need for this research and how you intend to deliver it. As a guide you could approach this as follows:

Context (the goal or ideal) – put the challenge in context of the climate crisis (what do you already know in relation to this research; what is the desired goal; explain how things should be?).

Significance (the reality) – describe the precise issue that the research will address (what do we need to know; explain how the current situation falls short of the goal or ideal; what is the significance of not addressing this problem?).

Relevance – show the relevance of the research in relation to the solutions required (why do we need to know it?).

Solution (the consequences) – set the objectives of the research and the potential impact (what are you hoping to achieve, what are the potential future outcomes?).

Stage 2: Full proposal

You must apply to CTRF using the specific call Application form, submitted through our website by **16:00 BST on 26 April 2024**.

All applications received after this deadline will not be accepted. Please ensure you are aware of and comply with any internal institutional deadlines that may be in place.

Please contact CTRF for further guidance on completing your application at research@ctrfoundation.com. Your host organisation will be able to provide advice and support on completing your application.



Attachments

In addition to the application form, the following documents must be submitted to CTRF:

- **Case for support images/infographics:** Include supplementary images/infographics only that could not be included in the Case for Support section.
- **Workplan/Gantt chart** (no more than 1 side of A4).
- **Budget template [here](#) *or* a detailed project costing printout** from your institution's costing and pricing tool.
- **CVs** (up to 2 pages of A4 each) for named:
 - PI and any Co-I's involved in the project.
 - Postdoctoral staff, researcher co-investigators and visiting researchers.
- **Letters of support** from all project partners, confirming any support being provided.
- **Host organisation letter of support** (up to 2 sides of A4) confirming agreement in principle to support the project and associated research staff for the proposed duration and confirmation of costings provided.

You should attach your documents as PDFs to avoid errors. They should be completed in single-spaced Arial size 11 font or similar-sized sans serif typeface with margins of at least 2cm. CTRF reserves the right to reject any proposal which does not comply with these specifications.

Submitting your application

The application form, case for support (supporting images/infographics), workplan, detailed costing printout, CVs and letters of support should be submitted through our website by **16:00 BST on 26 April 2024**.

How we will assess your application

Assessment process

Stage 1: Intent to Submit

The intent to submit **will be** used to assess whether the research project fits within the scope specified in the criteria above. Applicants will be advised if their Intent to Submit is considered out of scope and should not submit a Call for Proposal. During the Intent to Submit stage, you will be asked to nominate 3 reviewers (with a minimum of at least one) from different organisations with the expertise to review your proposal. Please identify any potential [conflicts](#) to CTRF during the Intent to Submit phase, we will take these into consideration during the peer review process.

Stage 2: Full proposal

Full proposals will then undergo peer review. This involves assessment by relevant independent experts (peer reviewers), identified by CTRF with at least one of your nominated reviewers, if possible, who will score the proposal against the set assessment criteria and provide written commentary.



You will receive a copy of the reviewer comments and be given the opportunity to provide a written response. Please note the turnaround time required for rebuttal will be strictly enforced at 7 calendar days. CTRF reserves the right to reject proposals at this stage if reviews are unsupportive.

CTRF's Scientific Advisory Council (SAC) will meet to discuss your application, the written reviews, and your rebuttal, subsequently assigning the proposal a numerical score against the selection criteria. The SAC will then produce a rank ordered list of proposals and make funding recommendations to the CTRF Board.

We have included the option to offer shortlisted proposals the opportunity to attend an interview, and therefore shortlisted applicants required for interview should expect to be contacted the week commencing **17 June 2024**. All applicants should expect to hear the outcome of their application by **15 August 2024**.

In the event of this funding opportunity being substantially oversubscribed, CTRF reserves the right to modify or extend the assessment process.

Assessment criteria

Proposals submitted to this funding opportunity will be assessed against the following criteria:

1. **Research excellence:** The novelty of the project, timeliness, ambition, and appropriateness of methodology proposed.
2. **Importance:** The proposed research has the potential to be transformative in the carbon sequestration sector. Plans for scale-up, dissemination and knowledge exchange with potential beneficiaries of the research should be demonstrated.
3. **Research team:** The applicant(s) have the track record and ability to deliver the proposed project. The balance of skills of the project team, including collaborations identified will be assessed.
4. **Resources and management:** The effectiveness of the proposed programme and the management strategy. Have the resources requested been fully justified, referring to:
 - 4.1. Any equipment, or the viability of the arrangement described to access equipment needed for this project, and particularly on any university or third-party contribution.
 - 4.2. Any resources requested for activities to either increase impact or for scale-up.
5. **Fit to scope:** Alignment of the research programme to the aims and scope of the opportunity, including whether it undertakes novel, ambitious, adventurous, and timely biotechnology to enhance biosequestration.
6. Presents a credible translation pathway for the research outputs.
7. Takes an appropriately interdisciplinary approach, considering the whole system in which the proposed research outcomes will exist.



Nominating reviewers

As part of the Intent to Submit process you will be required to nominate up to 3 potential reviewers (at least one reviewer) with the expertise to assess your proposal. Please ensure that any nominations meet CTRF’s policy on [Conflicts of Interest](#).

Grant conditions

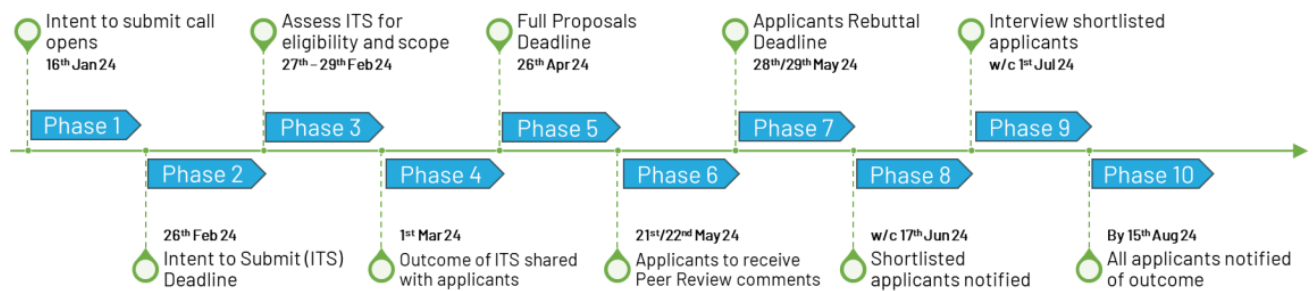
Grants are awarded under the standard CTRF [Standard Terms and Conditions of Grant](#). All queries on eligibility should be directed to research@ctrfoundation.com.

Reporting Requirements

If you are successful in securing funding, you will need to report your research outcomes and make an expenditure statement to CTRF annually. You will be provided with templates for this purpose. This will continue for up to 5 years after funding ends.

Key dates

CTRF 2024 Call for Proposal Timeline



CTRF launch webinar:	16 January 2024
Applications open:	16 January 2024
Intent to submit deadline:	26 February 2024
Application deadline:	26 April 2024
CTRF Advisory Council Meeting:	Mid-June 2024
Interview:	week commencing 1 July 2024

Supporting documents available on our website:

- FAQs
- CTRF Standard Grant Eligibility
- Justification of Resources Policy
- Conflicts of Interest Policy
- Budget Template (optional template for use)
- Standard Terms and Conditions of Grant



Carbon Technology Research Foundation

Contact details

For help and advice on costings and writing your proposal please contact your research office in the first instance, allowing sufficient time for your organisation's submission process.

Ask about this funding opportunity:

CTRF Research Team

E-mail: research@ctrfoundation.com

Telephone: 01865 648 928