



# Intent To Submit Guidance

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

## Key dates and information

Funding type:	Grant, <i>up to 48 months duration</i>
Total Fund:	Up to £2.5m, <i>up to 5 projects</i>
CTRF launch Webinar and Intent to Submit call opens:	16 January 2024
Intent to submit deadline:	26 February 2024 16:00 GMT
Full application deadline:	26 April 2024 16:00 BST
CTRF Advisory Board Meeting:	Mid-June 2024
Interview date:	w/c 1 July 2024
Earliest Project Start Date:	1 October 2024

This guidance **must be read** in conjunction with the [Call for Proposals 2024](#) document **before** completing this form.

## 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.

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. 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.

## 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 (CDR), and to a lesser extent other greenhouse gases (GHGs), such as methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O). 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 challenges 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.

## 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 CO<sub>2</sub> 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 (e.g. **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 biomineralisation 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 CO<sub>2</sub>-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 bio sequestration. CTRF welcomes highly innovative, multidisciplinary proposals that address a challenge related to enhanced bio sequestration. Please discuss speculative applications with CTRF at [research@ctrfoundation.com](mailto: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 Case for Support and Justification of Resources.

### **Funding available**

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 Costs Policy](#).

### **How to apply**

There are two parts 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 submit an Intent to Submit through our website by the deadline **16:00 GMT on 26 February 2024**. You will be required to provide a list of principal and co-investigators who will likely be involved, a title, a 400-word (2,500 characters) summary of your proposed project, select appropriate keywords from the list provided, and your nominated names of up to three potential peer reviewers. Please see below 'How to apply' Part 1: Intent to Submit Guidance below for detailed instructions.

Full proposals must be submitted by **16:00 BST on 26 April 2024**. You must apply using the specific online Call Application form and submit this with all relevant attachments. A template of the Full Call for Proposal form will be available to view prior to the closing date of the Intent to Submit, and then the online form will be available for completion from **1 March 2024** onwards. Please see Call for Proposal guidance 'How to apply' Part 2: [Call for Proposal 2024](#) for detailed call instructions.

[CTRF Standard Grant Eligibility](#) rules apply.

#### **Part 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 **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. 400 words/2,500 characters) – including context, significance, and goals of the proposed project.
- opportunity to select up to 5 appropriate keywords that best match the focus areas of your project.



- nominate up to 3 potential reviewers (with a minimum of 1) with the expertise to review your proposal and highlight any perceived conflicts.

### **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?).

### **Next Steps**

CTRF will review the Intent to Submit (ITS), assess eligibility and scope of the proposal. When your ITS submission has been assessed for scope and eligibility and is successful, you will progress to the next stage. There will also be a template Full Call for Proposals form available on our website for you to review.

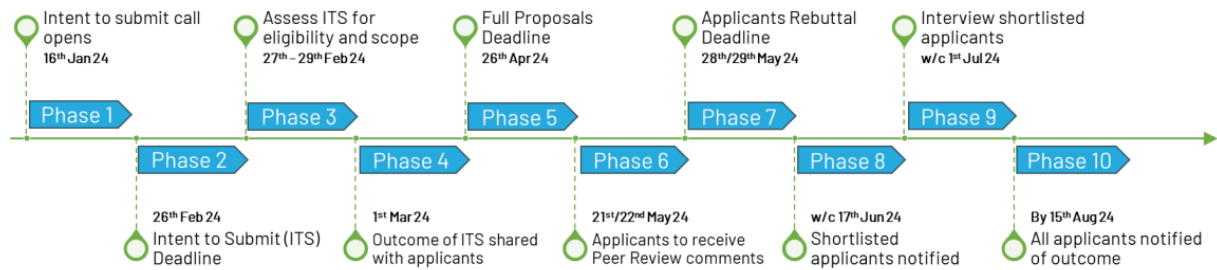
CTRF will be identifying appropriate peer reviewers to review your proposal as soon as possible, using the project summary as a guide. The aim, when allocating peer reviewers to review your proposal, is to use at least one of your nominated peer reviewers, and other specialists in the field currently and on our database.

When the Call for Proposal goes live on the **26 February 2024**, and you have received a PIN code from us, you can copy and paste the information from the template Call for Proposals to the online form that will be available on our website from **1 March 2024**. Please note that the template is for your offline use only and CTRF will require the information and attachments submitted through the application form on our [website](#).



Key dates

## CTRF 2024 Call for Proposal Timeline



Ask about this funding opportunity:

CTRF Research Team

E-mail: [research@ctrfoundation.com](mailto:research@ctrfoundation.com)

Telephone: 01865 648928