

PHYTOPLANKTON CARBON SOLUTIONS PROGRAM

REQUEST FOR PROPOSALS

RFP#3: Focusing Biological Carbon Pump Research for PCS Application

REQUEST FOR PROPOSAL OVERVIEW

- **RFP #:** 3
- **RFP Title:** *Focusing Biological Carbon Pump Research for PCS Application*
- **Award Period:** Up to 30 months
- **Award Amount:** Up to \$2.5 million
- **Letters of Intent (LOI) Due:** Sunday, November 15, 2026, at 23:59 Eastern Time (ET)
- **Full Proposal Due:** EDF will invite full proposals and communicate due date to LOI applicants invited to submit a full proposal.
- **Proposal Contact Email:** oceanspcs@edf.org

EDF's Phytoplankton Carbon Solutions Program is soliciting proposals to improve understanding of the present function of and future changes in the biological carbon pump to inform the carbon sequestration and broader environmental impacts of Phytoplankton Carbon Solutions (PCS), focusing particularly on ocean iron fertilization (OIF) pathways. The successful team will propose and advance priority research projects to improve the fundamental science underpinning the functioning and projected future state of the biological carbon pump, with the goal of enabling more robust assessment of the efficacy and safety of PCS and OIF pathways for future decisions.

This solicitation is one of several PCS focus areas, and successful applicants will join a broader consortium to collaboratively advance PCS research priorities, working closely with other funded teams (see RFPs underway on [EDF's PCS funding opportunities page](#)). Therefore, it is expected that research activities should, over the course of the project period, integrate findings from RFP #1 *Characterization of Critical Uncertainties for Ocean Iron Fertilization* and RFP #2 *Evaluation and Improvement of Biogeochemical and Earth Systems Modeling Capacity to Enhance Assessment of Phytoplankton Carbon Solutions Risks and Benefits*, while contributing critical knowledge as inputs to those research efforts and those of RFP #4 *Evaluating Social and Ecological Desirability of OIF*.

I. BACKGROUND

Understanding and quantification of the biological carbon pump (BCP) are essential to constraining the safety and efficacy of purposeful PCS interventions. Previous PCS modeling studies have explored scenarios under which alteration of the BCP by OIF and other PCS pathways could potentially scale to climate-relevant carbon dioxide removal (CDR). Historical *in situ* iron fertilization experiments and study of natural iron enrichment mechanisms (e.g., due to island mass effect) have also provided insight into mechanisms linking nutrient supply to biological response. Quantification of the impacts and co-benefits of PCS interventions requires comparison

against a baseline scenario describing the present and future state of the BCP in the absence of intervention, a scenario that accounts for both natural variability and changes in ocean conditions resulting from climate change. While significant progress has been made in the last decades on constraining the BCP, its component parts, and its future trajectories over the coming decades through discrete research projects and coordinated international programs, large uncertainties remain which affect our ability to estimate the magnitude and evolution of the BCP in time and space. A direct result is that PCS CDR and social-environmental impact estimates remain highly model-, assumption-, and boundary-condition-dependent. This contributes to a lack of consensus across the field on the magnitude and uncertainty of CDR potential and potential biogeochemical and ecological ramifications of PCS under realistic deployment scenarios.

To assess PCS interventions, it is essential to deepen our understanding of the current and future functioning of the BCP, particularly regarding the biogeochemical, ecological, and physical processes governing the production, export, and remineralization of organic matter. Additionally, model projections can be improved through refinement of biological inputs derived through study of the BCP. Without that clarity, PCS research investments will continue to yield high scientific uncertainty. This outcome constrains decisions on whether PCS approaches warrant the further scientific advancement needed to establish whether PCS could deliver safe, climate-relevant, durable, measurable, socially acceptable, and governable CDR at scale. This RFP and the associated PCS Research Program are guided by a comprehensive research framework published by Ocean Visions (further described in Section 9), which prioritizes research on OIF pathways due to theoretical scalability.

II. OBJECTIVES

The objectives of this call for proposals are two-fold:

Objective 1: Advance our mechanistic understanding of the functioning of the BCP through strategic research initiatives that demonstrate the greatest benefit for the characterization and quantification of the BCP and the reduction of critical uncertainties in present and in future scenarios. Advancements:

- should address critical uncertainties in our ability to constrain the BCP in the present and over relevant timescales, in geographic areas that are relevant for PCS
- may address specific constraints in or refine inputs to current or future PCS or BCP modeling efforts,
- must be relevant to the operational quantification of OIF impacts and decision making (e.g., contribute to improved carbon accounting in evolving monitoring, reporting, and verification, or MRV, sense or estimation of environmental impacts of interventions).

Projects should provide a clear narrative supporting their selection of high-priority research topics or critical uncertainties to address. Results should address uncertainty assessments by grantees of RFP #1 and/or model limitations identified under RFP #2 while also being responsive to knowledge gained through RFP #1 activities.

Objective 2: Participate in and guide PCS Consortium discussions. Contribute to identifying research priorities and informing the development of research in other RFPs which may leverage these advancements, including in deriving a new understanding or estimates of PCS uncertainties (RFP #1), quantifying the impacts of OIF interventions (RFP #2), or interrogating the social and ecological desirability of PCS against baseline scenarios (RFP #4). Research ongoing under this RFP should also be responsive to the work of other research teams under the Consortium, functioning as a working group of the overall PCS Project.

III. VISION OF SUCCESS

A successful outcome under this RFP is the advancement of novel research in BCP science that can best contribute to decision-relevant knowledge pertaining to the functioning and future trajectories of the BCP, informing baseline scenario evaluation and enabling estimation of OIF efficacy and safety. New research or activities developed within the framework of this RFP will address critical uncertainties or opportunities that will have a measurable and strategic impact on our estimation of the BCP's temporal and spatial variability and/or its mechanistic functioning, generating new results and potentially highlighting new focus areas, critical uncertainties, or issues to consider. The research harnesses, augments, bridges, or accelerates ongoing research activities conducted by discrete labs, research projects, and international research consortia and focuses it on PCS-relevant questions.

Engagement of the broader BCP research community brings new perspectives, voices, and approaches to the field of PCS, enabling more robust research across the consortium and fostering an outcome-agnostic approach.

Real-world decision-making around any advancement of OIF or other PCS methods will depend on our ability to make constructive comparisons of the scalability of these approaches to "business as usual" scenarios and other CDR approaches. This requires robust estimates of potential CDR benefits and the ability to detect and prevent environmental and social risks. Results from research conducted under this RFP will contribute knowledge to the PCS Consortium teams that are working to quantify the safety and efficacy of PCS, enabling decision making on future PCS research activities.

IV. SCOPE OF WORK

Overview

This RFP will support up to two teams, each led by a Lead PI, who coordinates additional research teams or working groups, operating under shared protocols, to develop and execute a Scope of Work designed to identify, prioritize and execute research activities that enable improved estimation of the BCP, including its function and its trajectory, to improve OIF evaluation, globally

and regionally. The project should generate outputs that should be useful for [PCS stage-gate assessment](#) and funding decisions.

Research Questions

Guiding research questions include, but are not limited to:

- What priority syntheses, innovations, and advances are needed and possible to more accurately assess and predict the BCP at regional and global scales?
- What environmental conditions contribute to the growth of phytoplankton communities or facilitate the structuring of marine food webs which maximize carbon export efficiency (e.g., large cells, particle aggregation and disaggregation, high fecal pellet production, etc.)?
- Given knowledge on nutrient cycling and bioavailability, how does iron speciation/bioavailability influences carbon export and associated biogeochemical responses?
- What improvements in the representation of particle dynamics could translate to critical improvements in model-based quantification of the biological carbon pump?
- What factors influence the remineralization profile of exported carbon in current, future, and PCS scenarios?

Core Research Activities

We are seeking project proposals that address critical knowledge gaps in BCP science and that will result in the reductions in the uncertainty associated with the present and future projection of the major components of the BCP. Proposed activities should aim to harness, augment, be synergistic with, or responsive to ongoing BCP research activities, contributing to improved baseline estimation of the BCP through novel research and reduced uncertainty in the BCP trajectory with climate change, with clear applications to the quantification of the effect of PCS interventions.

Core research activities supporting RFP objectives could include but are not limited to:

1. Synthesis activities which bridge past and existing BCP research consortia activities to improve characterization or quantification of magnitude and uncertainty of the BCP's key processes in target OIF regions (e.g., Southern Ocean).
2. If existing capacity allows, targeted field or laboratory research that improves the representation of influential processes relevant for BCP models.
3. Study of natural blooms and their functioning.
4. Focused modeling activities that generate, synthesize and constrain the process understanding, observations, and parameterizations needed to improve BCP representation. The RFP #3 team will be expected to share progress with other RFPs, particularly RFP #2 and consider areas for collaboration over time.

Project narratives should explicitly articulate the potential impact of the proposed work, including the quantitative significance of proposed activities. For example, how large the current uncertainty in BCP estimation is and how much it would be reduced through proposed activities; and how

much progress the proposed project could make toward this; how the proposed work could enable real-world applications including but not limited to MRV or ecological impacts assessments of the impact of PCS.

Examples of specific topics include but are not limited to:

- Environmental forcing and predictability of phytoplankton community composition, bloom size, and drivers of bloom senescence
- Relationship between phytoplankton community composition and carbon export
- Particle dynamics as related to the quantifications of carbon export fluxes
- Improved understanding of nutrient and particularly iron cycling in ocean environments, including changes in iron inputs to the surface ocean or the role and cycling of iron-binding ligands
- Mesopelagic carbon cycling processes including bacterial respiration
- The impact of grazers and diel vertical migrators on carbon export
- Role of anthropogenic impacts and natural variability in projections of the BCP
- Air-sea interactions

Out of Scope Activities

- Narrowly focused studies restricted to single species, single trophic level, or overly isolated views of BCP dynamics
- Major field campaigns (add-on activities that leverage ongoing field work is permitted)
- Social and ecological risk assessment (covered under RFP #4 available on [EDF's PCS funding page](#)).
- Large-scale implementation and evaluation of PCS/OIF scenarios in Earth-system or integrated biogeochemical models where the primary purpose is prediction of intervention outcomes rather than improving/constraining BCP process representations (covered under RFP#2).

V. REQUIRED DELIVERABLES

Within the first 6 months:

- Deliver a detailed scope of work that proposes priority topics, approaches and team roles for executing the full project plan. Synchronize that plan through the PCS Consortium with the PCS Uncertainty and Viability Assessment Framework developed under RFP 1 and the Modeling team under RFP 2.

Throughout the grant period

- Active participation in annual PCS Consortium Meetings, regular cross-project leads meetings and EDF check-in meetings, and any additional collaborations emerging from shared goals within the Consortium.

- Recommended updates to assessment of uncertainties and PCS for different scenarios, and responsive to quantitative analyses as new findings or priorities emerge from within and outside the Consortium.
- Regular progress reporting to EDF, aligned with project milestones and EDF synthesis activities; format and frequency to be determined jointly by the grantee and EDF.
- Contributions to EDF-led synthesis and public communication of PCS research progress.
- Open-access publication of the framework, the data used to parameterize it, model source code and configuration files, and associated scenarios and outputs, following FAIR practices.

Project Conclusion:

- Final report (EDF to provide template)
- A peer-reviewed scientific publication, submitted within 6 months of the award conclusion.
- Open-access data publications, concurrent with the scientific publication.

VI. BUDGET AND GRANT DURATION

EDF intends to fund work that comprehensively addresses the two objectives listed above. The total funding available is up to \$2.5 million over a period of up to 30 months, inclusive of indirect costs (capped at 15%), and this may be allocated to one team for an amount up to \$2.5 million or up to two teams at lower amounts. Following the LOI stage, EDF may suggest the addition of expertise or request the integration of proposals or elements of proposals to formulate a team.

Funds may be used to support personnel, research expenses, workshops and convenings, participation in PCS Consortium meetings, synthesis activities, targeted lab experiments, limited field work, modeling, and publication and dissemination costs. Cost of ship time will need to be included in the grantees' budgets if applicable. Use of "in kind" ship time (e.g., ships of opportunity) or synergistic capacity obtained by leveraging ongoing research efforts should be noted in the project description.

Consistent with the principles of the PCS Research Program, funds may not be used to support commercial PCS activities or activities tied to carbon credit transactions.

Budgets should reflect the full scope of potential activities from evaluation and planning to targeted improvements.

VII. APPLICANT TEAM

Principal Investigators (PI) Criteria

All PIs must hold a PhD, be affiliated with a research institution, and have a publication record relevant to the scope of work and role on the project. Multi-institution and international teams are encouraged.

We require the designation of a Financial Lead who is the person responsible for financial and grants management for the project as a whole and acts as the lead reporting entity on finances and grant management to EDF. We also require the designation of a Lead PI who is responsible for the overall success of the project, bringing together distinct workstreams and technical aspects of the work to achieve overall objectives of the project. The Lead PI will act as the point for EDF for the scientific and technical aspects of the project. The Financial Lead and Lead PI could be the same for the project, but it is not required.

Full proposals will require a description of the proposed leadership structure, beyond the designation of the Financial Lead and Lead PI. For example, the Lead PI may choose to share leadership across various work streams within a project among multiple co-PIs. The definition of these roles is for operational clarity but not meant to impose a particular structure for the day-to-day functioning of the team. Applicants applying to multiple RFPs may serve in the Lead PI role in only one proposal.

At least one PI on the team must demonstrate prior experience leading a research project of comparable scale. Early Career Researchers (<10 years since obtaining a PhD) may serve as a PI. PIs of the successful team may be part of applicant teams to future Consortium funding opportunities but may not serve as Lead PI on multiple proposals. This approach helps ensure broad participation and leadership opportunities across the funding portfolio.

Team Criteria

The project team will be evaluated based on the collective expertise, [collaborative approach](#), and demonstrated ability to execute the proposed work. Team structure will also be considered, including the extent of international collaborations, career stage diversity, early career researchers in substantive rather than nominal roles, and representation of and beyond the established marine CDR research community. Teams will be expected to articulate plans to implement best practices in the conduct of research, including in the application of codes of conduct such as the [AGU Scientific Integrity and Professional Ethics Policy](#) and [Aspen Code of Conduct for Marine Carbon Dioxide Removal](#).

Teams may include members affiliated with non-research institutions (e.g., consulting, marine industry).

Ideal Team: Integrated team of core BCP and PCS scientists, experts with capacity to envision and execute critical innovations. Strategic capacity, leadership skills and open collaborative spirit will be essential. Teams composed of experts who bridge discrete, existing BCP research programs and consortia are encouraged.

VIII. Application Process

Step 1: Letter of Intent

LOIs must be prepared using the EDF-provided template and submitted as a single PDF through the webform on [EDF's PCS funding webpage](#). Submissions are due by **Sunday, November 15, 2026, at 23:59 Eastern Time (ET)** and will undergo internal review by EDF.

Step 2: Full Proposal

LOIs selected to advance will be invited to submit a full proposal. EDF will provide invited applicants with a proposal template and submission deadline. Invited proposals will be evaluated via a scientific peer-review panel, which will provide a funding recommendation to EDF. EDF makes the final funding decision.

RFP# 2 Proposal Timeline

LOI submission deadline	15 November 2026
Invitation for full proposal	25 November 2026
Full proposal due	<i>EDF will communicate the full proposal due date to applicants invited to submit a full proposal.</i>
Anticipated award decision	12 February 2027
Expected grant start date	1 April 2027

Please submit any questions related to the LOI and/or Full Proposal for this RFP to oceanspcs@edf.org.

IX. Connection to Ocean Visions Phytoplankton Carbon Solutions Research Framework

In January 2026, Ocean Visions published the [Phytoplankton Carbon Solutions Research Framework](#), which identified PCS / OIF modeling advances among the highest research priorities.

EDF's PCS Research Program, supported by the Grantham Environmental Trust through the Ocean Resilience and Climate Alliance (ORCA), responds directly to that recommendation. This RFP seeks proposals to improve the understanding of the ocean's biological carbon pump to enable more accurate quantification of the state of the BCP and its future trajectory. This research will in turn enable assessment of carbon dioxide removal (CDR) benefits and environmental impacts of Phytoplankton Carbon Solutions (PCS), focusing particularly on ocean iron fertilization (OIF) strategies.

This RFP funds the BCP component of the overall PCS Research Program and that will help inform and advance the work of the broader PCS Consortium. The objectives of this RFP build on the following recommendations from the [Ocean Visions' PCS report and PCS stage-gate framework](#):

- **PCS Recommendation 3:** Improve Understanding of the Ocean's Biological

Carbon Pump “Incorporate learnings from ongoing studies of the BCP, including research of natural phytoplankton conditions, targeted study of regional productivity shifts, studies of multi-trophic dynamics, and natural analogs of PCS pathways to increase PCS-relevant knowledge. Ensure knowledge integration to better characterize BCP baseline conditions and predictions to evaluate PCS interventions against ‘business as usual’ ocean health conditions.”