Carbon to Sea Initiative

Open Call 2:
Targeted Research & Innovation

Advancing focused exploration of key questions for OAE safety, efficacy and potential scaling.

The Carbon to Sea Initiative regularly solicits proposals to address priority questions on ocean alkalinity enhancement (OAE) safety, efficiency, and scalability. OAE is still at an early, foundational stage: promising in principle and increasingly tested in the field, but not yet verified at the scale or confidence level needed to establish it as a serious contributor in a global CDR portfolio. However, significant research has advanced our understanding. Foundational science is maturing and field trials are underway to help us understand its applicability in a range of physical, biological, and biogeochemical environments. The near-term open questions are less about the underlying principles behind OAE, and more about whether it can be trusted and verified and delivered at a scale the climate math demands.

Two questions in particular determine whether the field can have a shot at a larger scale, and both cut across every OAE pathway and deployment context. The first is a question of trust: can we accurately quantify how much net carbon is removed when accounting for natural processes like sediment alkalinity cycling? The second is a question of supply: is there a sufficient source of alkalinity that is safe, low-carbon, efficient, and affordable enough to advance the field to meaningful scale?

Open Call 2 is structured around these two questions. The **Sediment Additionality Grants** (2A) address the quantification challenge and the **Alkalinity Innovation Grants** (2B) seek to address the supply challenge. Together, they are designed to open up new areas of development and generate rigorous evidence to inform our next set of questions.

#	Grant Name	Description
2A	Sediment Additionality	Investigates how OAE affects natural sediment alkalinity flux and the implications for CDR efficiency loss.
2B	Alkalinity Innovation	Advances new or improved alkalinity sources, feedstock processing methods. or operational approaches for OAE.

2A - Sediment Additionality Grants

A fundamental and underexplored question is the extent to which added alkalinity replaces, rather than supplements, natural sources of alkalinity. Marine sediments are one of the largest natural sources of alkalinity within the ocean, but alkalinity fluxes remain poorly constrained. Consequently, the OAE carbon credit methodology recognizes this as a challenge and recommends a risk-based avoidance and/or quantification of sediment-related OAE efficiency losses. Approaches for direct quantification, however, have not yet been standardized due to a lack of data and limitations in the mechanistic understanding of sediment interactions.

To date, research on marine sediment alkalinity flux has focused on first-order principles around drivers of alkalinity flux and the characterization of water column and pore-water dynamics. Additional research is needed to investigate the potential for unaccounted OAE efficiency losses, or gains, due to sediment-related processes.

Strategic knowledge gaps include, but are not limited to:

- Mechanistic and quantitative understanding of drivers of sediment alkalinity flux, and the impact of OAE activities on natural flux. Impacts may include suppressing or displacing alkalinity, enhancing it through stimulated feedstock dissolution, or secondary precipitation risk.
- Variability in flux magnitude and direction across sediment types (e.g. carbonate-rich, organic-rich, or silicate-rich sediments) and coastal settings, and implications to responsible and effective siting for OAE.
- Role of bioturbation, benthic community activity, and biologically mediated porewater diagenesis in governing sediment alkalinity flux, and how these processes are impacted by OAE.
- Approaches for integration of sediment alkalinity dynamics into oceanographic and biogeochemical models to simulate OAE to verify and project CDR efficiency estimates.

Not in scope for this RFP are localized studies on very unique sediments or circumstances that make it challenging to extrapolate to broader ocean environments.

2A - Sediment Additionality Grants	
Purpose	Projects should investigate how OAE interacts with sediment-related processes, with relevance specifically to impacts on OAE efficiency.
Who should apply	Researchers, labs, or scientific consortia with the necessary capabilities to characterize sediment types, sediment alkalinity flux with and without alkalinity perturbation; pore water

	diagenesis and bioturbation; and/or sediment model parameterization, development, and integration.
Outcomes	• Open-access findings on novel research (lab, mesocosm, or field studies) or analysis (reviews, modeling, or expert convenings) that significantly advance our understanding of key knowledge gaps and are rooted in real-world OAE scenarios, deployment pathways, and scaling scenarios. • Advance mechanistic understanding of the role of sediment-related processes in OAE efficiency, in different coastal settings, OAE pathways, and perturbation scales. • Inform key parameters for project siting as well as monitoring and modeling OAE-sediment dynamics. • Contribute toward consensus building on how to address sediment-related alkalinity cycling impacts in OAE assessments.
Total Funding	$500,000 USD

2B - Alkalinity Innovation Grants

The choice of an alkalinity source is one of the most consequential decisions in OAE design, affecting everything from efficiency to ecological safety, permitting complexity, carbon accounting, and operational logistics. The alkalinity source, its processing and preparation, and the method by which it is reacted with CO_2, are the defining features of an OAE pathway. Despite this, efforts to systematically identify, assess, develop, or source alkalinity are disjointed and incomplete, often evaluating feedstocks on a limited set of dissolution or environmental parameters.

Research should be rooted in real-world scenarios that reflect current availability of renewable energy, freshwater, and mineral resources, but may make reasonable assumptions about technological development and supply chain efficiency gains over time.

Strategic innovation priorities include, but are not limited, to:

- New methods to source, process or produce alkaline materials that improve their performance, efficiency, or dissolution. This may include quantifying and improving the conversion of alkaline sources into a realized alkalinity increase in seawater (could be lab- or field-tested).
- Thermochemical, electrochemical, or material-science approaches that transform abundant materials into faster dissolving, higher-performance alkaline feedstocks.
- Innovations that improve the operational, techno-economic, and life-cycle efficiency of alkalinity sourcing (e.g. lower carbon processing, byproduct or waste-stream upcycling, or improved procurement or transportation).

- Improved screening tools or methods to rapidly assess new or hybrid materials, including lab-to-field extrapolation models and compositional fingerprinting for safety, traceability, and field-readiness.

Not in scope for this RFP are projects focused on environmental testing or dispersal engineering of *existing alkalinity sources* or new sensor development for the purposes of in-field monitoring.

2B - Alkalinity Innovation Grants	
Purpose	Projects should investigate methods of improving alkalinity source availability and viability for current or novel OAE pathways. Projects may consider single or multiple potential sources of alkalinity.
Who should apply	Researchers, labs, companies, organizations, or scientific consortia with a demonstrated understanding of and necessarily capabilities to resolve one or more of the strategic knowledge gaps.
Outcomes	• Open-access findings on novel research and development towards alkalinity innovation. • Improved understanding of performance and effectiveness of novel categories of alkaline sources. • Improved "readiness" of new materials for advanced lab or field testing or integration with dispersal mechanisms. • Improved techno-economic and life-cycle viability of one or more alkalinity sources. • Contribute towards shared standards or frameworks for evaluating and comparing alkalinity sources across the field.
Total funding	$500,000 USD

Interested parties should **submit their preproposal by September 30, 2026** and refer to the Application Guidance document for details.

Projects must follow the OAE Data Management Protocol and the OAE Environmental Impact Monitoring Framework, if relevant. Applicants are encouraged to consult additional best practices.[1]

[1] State of the Planet's Guide to Best Practices in Ocean Alkalinity Enhancement Research; National Wildlife Federations's Informing mCDR Projects: Best Practices Guidance for Tribal and Indigenous Engagement; University of Delaware's Developing Best Practices for Community Engagement in Marine Carbon Dioxide Removal (mCDR) Research