PROJECT VESTA

TURNING THE TIDE ON CLIMATE CHANGE WITH GREEN SAND BEACHES

ACCELERATING EARTH’S NATURAL PROCESSES TO REMOVE CO2 FROM THE ATMOSPHERE
A MISSION TO DRAMATICALLY ACCELERATE THE REMOVAL OF CO2 FROM THE ATMOSPHERE

For billions of years, the CO2 released from volcanic activity was kept in balance by the weathering of volcanic rock.

The earth’s natural cycle of releasing and capturing carbon has been pushed out of balance by humanity and our industrial pursuits. Today, the current release of CO2 by humans is now 40X the natural cycle.

Earth’s natural weathering processes just can’t keep up with emissions to counteract the increased CO2 in the atmosphere. Fortunately, by increasing the amount of weatherable rock exposed to the environment, we can remove CO2 from the atmosphere and help mitigate climate change.

Weathering is the process of rocks breaking down from contact with CO2, water, and ocean organisms. While carbon can be captured in a variety of ways, the overwhelming majority (99.9%) of Earth’s carbon dioxide is currently stored in rocks.

CO2 concentrations in the ocean are increasing as atmospheric concentrations rise - transforming CO2 into carbonic acid and acidifying the ocean.

We know that this acidification has catastrophic cascading effects on ocean ecosystems - causing coral bleaching, slowing the growth of marine species, disrupting algae populations, and much more. Adding a type of silicate rock called Olivine can counteract these effects.

Project Vesta’s plan is to intervene in the carbon cycle by exposing silicate rock to water and CO2.
OLIVINE: UNIQUELY SUITED TO REMOVE CO2 FROM THE ATMOSPHERE, DE-ACIDIFY THE OCEAN AND REGENERATE AQUATIC ECOSYSTEMS

Olivine, more commonly known as peridot, is one of the Earth’s most abundant minerals - making up more than 50% of the upper mantle.

While highly abundant, olivine is mostly located underground.

Project Vesta endeavors to excavate massive quantities of the rock and utilize the free energy of wave motion of beaches to accelerate the weathering process of the rock.

Olivine is especially well suited to balance the carbon cycle, given its global abundance and unique chemical makeup - which allows for rapid transfer of carbon dioxide out of the atmosphere and into a material that is bioavailable for marine organisms.

At the right scale, the accelerating weathering of olivine can “turn the tide” on climate change by bringing the carbon cycle back into balance. This is process is scaleable to global levels.

Olivine is found all over the world, with huge reserves in vast formations typically occurring near the surface. Significant quantities are sitting as waste piles on the property of old mines.

**Olivine rock can be acquired on the market today for less than $25 per ton.** As demand increases and new and larger olivine mines open, the price will go down significantly. Basic models on similar open pit rock mines demonstrate a price below $10.

**1 TONNE OLIVINE WEATHERED = 1.25 TONNES CO2 REMOVED**

**7 KM^3 VOLUME OF OLIVINE ON 2% OF THE WORLD’S SHELF SEAS = 100% OFFSET OF YEARLY ANTHROPOGENIC CO2 EMISSIONS**

Limestone is created by corals and other organisms through the use of calcium carbonate in their shells, permanently fixing CO2.

The resulting bicarbonate solution from the reaction of olivine, CO2 and ocean water is alkaline, and thus combats ocean acidification by raising the pH level of water in the surrounding area.

Silicate is a byproduct of the weathering reaction. Silicate is the limiting factor for diatoms, an algae that is the base of many marine ecosystems.

ProjectVesta.org
GREENING OUR BEACHES: THE PLAN

In order to accelerate the weathering of olivine, Project Vesta will utilize the power of Earth’s tidal and wave forces to mechanically activate olivine and prevent a build-up of silica.

The natural milling process of waves and constant refreshing of water and high oceanic CO2 concentrations make beaches the ideal place to accelerate olivine weathering on a large scale.

The next milestone for Project Vesta’s is the creation of the first olivine green sand beach.

Project Vesta has partnered with Deltares, an independent Dutch institute specializing in applied ecological research, to model and measure the rate of olivine weathering on our projects.

PHASE 1: IMPACT BEACHES

A beach deployment as a trial to demonstrate the concept, determine the standard weathering rate and finalize safety tests before scaling up. Individuals and organizations would be able to sponsor the sequestering of carbon through olivine weathering to offset their carbon footprint.

PHASE 2: COUNTRY SCALE

Olivine beaches can scale so that individual countries with coastlines can offset their total CO2 output. A financially viable and scalable path toward carbon neutrality.

PHASE 3: REGIONAL SCALE

Entire regions with opportune, high-energetic marine environments could partner to offset their CO2 and more efficiently scale up mining and distribution.

PHASE 4: GLOBAL SCALE

In order to offset all of humanity’s yearly CO2 output, the world would need to distribute a volume of 7 km$^3$ of olivine across the 2% most tidally active shelf seas and beaches. Olivine is located all over the world and a global effort would unite countries with varying resources, labor skills, and coastlines.
Bringing balance back to the planet and the carbon cycle is a major undertaking, requiring a global community.

Project Vesta is a community supported project in two ways.

1. Project Vesta (a not for profit) will be working to shift the cultural notion of beauty by selling olivine inlaid jewelry that corresponds directly to olivine being mined and placed on beaches. For example, the purchase of $300 necklace will be directly responsible for getting 12 tons of olivine to a beach, which will ultimately remove 15 tons of CO2 from the atmosphere.

2. Project Vesta is a nonprofit, open-source, and globally distributed endeavor. Our organization will take an active role in creating beaches and act as a clearinghouse for proposed olivine projects - carrying out CO2 life cycle analysis for the projects and calculating the dissolution rates for specific beaches. Our open group invites anyone with skills to add to the effort to join our team and contribute.

To get involved, please fill out the form on the Project Vesta website.

As citizens and stewards of spaceship Earth - join us in the fight to remove CO2 from the atmosphere and restore ecosystem health.

“We're all here together as stewards of our biosphere, on this spaceship called earth. Given this obvious truth, it's imperative for us to cooperate with each other on high leverage and high impact endeavors that sit at the intersection of agency and legacy for everyone. That's why I'm excited to volunteer with Project Vesta” - David Sneider, Project Vesta