

LOW-CARBON CAMPUS

POWERED BY BIOCHAR ENHANCED CONCRETE

PROJECT PARTNERS

SOM

CENTRAL CONCRETE SUPPLY COMPANY
A Subsidiary of Vulcan Materials Company

BIOFORCETECH Corporation

Valorize Systems

PREPARED BY VALORIZE SYSTEMS

2025

OVERVIEW



SOM, Central Concrete, Bioforcetech, and Carbon Pilot are setting a precedent for low-carbon construction in the bay area by integrating biochar-enhanced concrete with Bioforcetech's OurCarbon® biosolids biochar at an Oakland school campus. The project demonstrates how innovative materials can reduce environmental footprints without compromising structural integrity.

BACKGROUND

OurCarbon biochar, a material created from wastewater solids called biosolids, is being used to replace portions of traditional aggregate in concrete. This helps reduce the embodied carbon of building materials —one of the most effective ways to lower a building's overall carbon footprint while maintaining strength and durability.

The introduction of biochar into the concrete mix used on this project required a coordinated effort between multiple stakeholders, including the owners, designers, material providers, contractors, and carbon accountants.



OurCarbon® enhanced concrete being poured by Central Concrete.

OurCarbon®
a Bioforcetech brand

WHY?

RE-WIRING WASTE MANAGEMENT THROUGH CARBON UTILIZATION

In the U.S., nearly one third of biosolids end up in landfills, releasing methane, a potent greenhouse gas. Transforming biosolids into biochar, like OurCarbon®, offers a sustainable alternative that stores carbon permanently and can replace traditional aggregates in concrete.

Using OurCarbon® in concrete has three key benefits:

- Prevents methane emissions by diverting biosolids from landfills.
- Stores carbon long-term in a durable material.
- Provides a carbon negative additive that reduces the embodied carbon emissions from each truckload of concrete.



Landfill where much of US produced biosolids end up

PROJECT TEAM

SOM served as the architect and structural engineer, coordinating with Central Concrete, which developed and tested the mix, and FTF, the engineer of record, overseeing its structural integration.

SOM

Serving as the architect and structural engineer for the campus expansion, SOM identified key areas where biochar-enhanced concrete could be incorporated and led coordination efforts between all stakeholders.

CENTRAL CONCRETE SUPPLY COMPANY
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Central Concrete developed, tested, and batched the concrete mix, ensuring it met ACI strength, workability, and architectural standards before delivery to the job site.

FTF ENGINEERING

FTF served as the engineer of record for the areas where biochar concrete was utilized, overseeing its integration structural and design specifications.

PROJECT TEAM

When integrating new materials into construction projects, developers collaborate with specialized third parties. Bioforcetech supplied their biosolids biochar, OurCarbon®, for the project, Valorize Systems ensured accurate impact measurement and reporting, and Braun Intertec conducted tests to confirm the biochar's suitability for industrial concrete, helping secure stakeholder buy-in.

BIOFORCETECH Corporation

Bioforcetech provides the equipment that converts biosolids into biochar. Their technology produces OurCarbon®, which was used as a carbon-negative additive in the concrete.

BRAUN INTERTEC

Braun Intertec conducted preliminary tests with OurCarbon to test its viability for use in industrial concrete applications, providing third-party support for OurCarbon's use on this project before it began.

Valorize Systems

Valorize Systems developed the project team by matching construction requirements with vetted biochar suppliers. Their measurement, reporting, and verification platform was used to ensure that all environmental impacts were accurately quantified and reported.

STRATEGIC BUY-IN AT EVERY STEP



Central Concrete batch testing biochar mix design

SOM is a collective of architects, designers, engineers, and planners working together to build a better future. Their success in this project was built on securing stakeholder alignment at every step.

SOM worked closely with the concrete supplier, contractor, and engineer on record to share previous testing by Bioforcetech with third party labs to de-risk the project and align on strategy to deploy the biochar.

ENGAGING STAKEHOLDERS

CONCRETE PROVIDER

When working with new materials like biochar, it's critical to make sure the material has been thoroughly tested by the concrete provider to make sure it meets the specifications from the design firm and placement requirements from the contractor.

CONTRACTORS

Contractors were led through a workshop about biochar and what to expect on pouring day. This facilitated buy-in from the people who would be working with the material on the site.

USING ORGANIC WASTE TO DECARBONIZE CONCRETE



Contractors laying OurCarbon® enhanced concrete

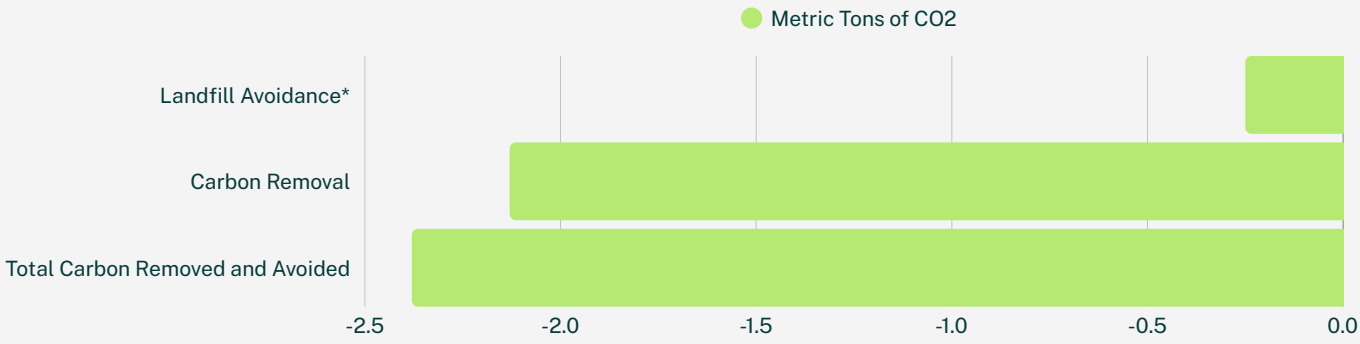
Bioforcetech has developed a process to transform organic waste, including sewage sludge and food waste, into a carbon-negative material called OurCarbon®. This process involves diverting waste from landfills, drying it using heat-producing microbes, and then converting it to biochar through pyrolysis. The resulting material sequesters carbon in a stable form, preventing greenhouse gas emissions.

When used in concrete, every pound of OurCarbon® that goes into concrete stores over 1 pound of CO2e durably, with the carbon benefit going directly to the building's overall embodied carbon.

MEASURING IMPACT

Valorize System's platform helps the construction industry implement sustainability projects by matching stakeholders, streamlining project management, and verifying climate impacts. They start by matching concrete companies with vetted low-carbon raw material suppliers like Bioforcetech and their OurCarbon®. Then, project impacts are verified by tracking supply chain activities such as material sourcing, production, and end use.

With Valorize, low-carbon construction projects happen faster without the greenwashing.



*California's landfills are uniquely strong in regulation and methane management. The diversion of biosolids from landfill in other regions of the country can have a significantly higher avoidance impact.

RESULTS

The project achieved a **12% and 16.6% decrease in carbon dioxide (CO_2) emissions** compared to the concrete mixes that would have been used in this project, with a combined carbon removal and avoidance impact of **2.38 metric tons of CO_2.**



Spreading OurCarbon® enhanced concrete on footings

Project Impact (tCO2e)

Biochar Carbon Removal

-2.13

Landfill Avoidance*

-0.25

Concrete GWP Reduction

Site Work

-14%

Footings

-16.6%

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LEARNING

The integration of biochar-enhanced concrete showed that testing early and often is crucial for its smooth adoption in the construction industry, using existing data to streamline validation and ensure reliable performance.

Test thrice, pour once



Testing OurCarbon® enhanced concrete

The integration of biochar-enhanced concrete relied on existing data and collaboration. Bioforcetech had characterized and tested their OurCarbon® material in early commercial pours, with prior work at Central Concrete's research lab enabling a smooth transition to quality control.

Extensive testing confirmed carbon storage, durability, and performance standards to meet building codes and ensure workability for footings and slabs. This process streamlined batching and instilled confidence in the final product’s performance.

CHALLENGES

Securing project buy-in required months of supplier vetting, testing, and thorough de-risking with the concrete supplier, contractor, and school. Incorporating the new material also involved multiple iterations to integrate it with the concrete mix, and adding binders to ensure the required strength.



Mixing OurCarbon® with Central Concrete's mix

Material Workability

A unique operational challenge was conditioning the biochar to saturated surface dry (SSD) since it is packaged dry in super sacks and needs to flow out of the super sacks into the concrete mixer truck. This is important to avoid the concrete mix losing slump unexpectedly. This also was a critical aspect of communication for accurate carbon accounting.

Stakeholder Collaboration

Achieving project buy-in required months of testing, stakeholder engagement, and de-risking to ensure seamless integration of biochar into the concrete mix. Despite these challenges, the project stayed on schedule and met all performance requirements.



Final testing to ensure concrete workability

EPD RESULTS

76.5 LBS CO2 STORED
per cy OurCarbon® enhanced concrete

GLOBAL WARMING POTENTIAL (GWP) REDUCTION

Application	Baseline EPD	OurCarbon® enhanced concrete.	GWP Reduction
Footing	209 kg CO_2e/cy	174.3 kg CO_2e/cy	**16.6%**
Sitework	248 kg CO_2e/cy	213.3 kg CO_2e/cy	**14.0%**

These EPDs are a cradle-to-gate assessment. End-use emissions (B1) must be considered to quantify the net carbon removal of each project.

The values represent the global warming potential for concrete that would have been used in the footing and sitework portions of the project, compared to the OurCarbon® enhanced alternative.

GLOBAL POTENTIAL

This successful pour of OurCarbon biochar enhanced concrete serves as a blueprint for sustainable construction, proving that waste valorization can be seamlessly integrated into high-performance building materials.



Central Concrete truck collecting mix material

If scaled globally, biochar-enhanced concrete could **remove 450 million tonnes of CO_2 annually** — a transformative opportunity for the construction and waste management sectors.

THANK YOU!

Inspired by this project? Contact us to explore how biochar can transform your construction projects and reduce your environmental footprint.



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