fortera

ReCarb® Plant

Redding, CA | USA

Paving the Way to Zero CO_2 Cement

ReCarb Plant

Redding, CA | USA | 2024

NET-ZERO INDUSTRIES AWARD National Winner 2023

BloombergNEF Pioneers
Finalist 2024 for Challenge 2: Decarbonizing the Construction Operation of Buildings

Small Scale
Commercial Plant

ReAct®
Blend & Pure Product

Industrial Carbon Mineralization
and Multi-Pollutant Utilization Process

One of the Largest Industrial CO_2 Mineralization Plants in the World

This first-of-its-kind plant executes Fortera's patented ReCarb® process technology on a commercial scale, while also providing the building and industrial sectors with a scalable solution to drastically reduce carbon emissions.

Located on CalPortland's campus in Redding, CA, the Fortera Redding ReCarb Plant takes industrial CO_2 from CalPortland's kiln and mineralizes it through Fortera's patented ReCarb process, creating ReAct® — the market leader in green cement solution.

15,000 tons
per year of ReAct® green cement produced.

9,600 tons
per year of CO_2 savings.

- 6,600 tons
  per year directly captured in ReAct product
- 3,000 tons
  per year offset from energy savings

> "We've invented a way to manufacture low-carbon cement that is commercialization-ready and able to economically scale globally."
>
> *Ryan Gilliam, PhD, CEO*

ReCarb® | Process

Our focus to work alongside our customers will pave a path to zero CO_2 cement production by upcycling carbon emissions directly from the kiln.

Traditional Cement Plant vs. ReCarb Plant Process

Inspired by nature, this patented scalable process for making cement uses CO_2 instead of emitting it. We intercept the CO_2 emitted when limestone is heated during calcination, and upcycle it to be used to create low-carbon cement.

Traditional Cement Plant

- Limestone
- Iron Oxide
- Quartz
- Clay Minerals

↓

Kiln
1450°C

↓

Portland Cement

CaO	Aluminates
Sulphates	Ferrites
Alite	Belite

VS

ReCarb Plant Process

Fortera leverages existing raw materials and infrastructure

- Limestone

↓

CO_2 waste
also multi-pollutants

Kiln
900°C–1100°C

↓

Calcium Oxide [CaO]

↓

ReCarb Process

↓

ReAct Products

Paving the Way to Zero CO_2 Cement

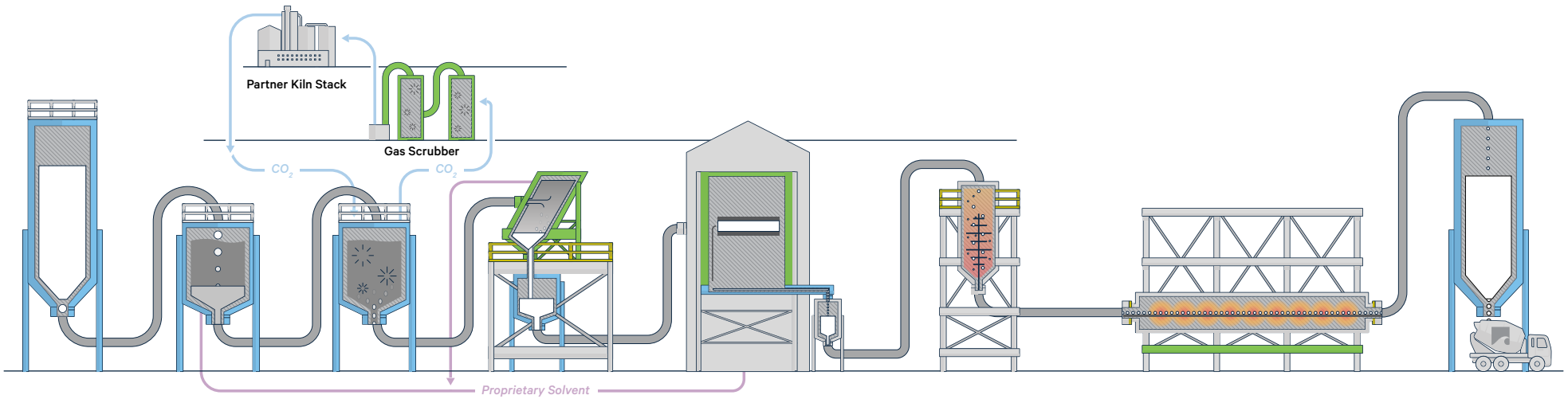
Fortera's patented ReCarb Process generates cement with 70% less CO_2 from its proprietary chemistry, and when combined with green energy becomes a zero CO_2 cement.

Current Energy Sources *achieving 10% to 70% reduction in CO_2*	
Current Energy Sources + ReAct Binary Blends	10%
Current Energy Sources + ReAct Ternary Blends	40%
Current Energy Sources + ReAct Pure	70%

VS

Green Energy Sources *achieving 80% to 100% reduction in CO_2*	
Green Energy Sources + ReAct Blends	80%
Green Energy Sources + ReAct Pure	100%
Green Energy Sources + ReAct Pure + CCUS	>100%

Redding ReCarb Plant Process



ReAct® | Product

Award-winning ReAct is a highly engineered green cement product that is developed through Fortera's patented ReCarb process.

The ReAct product portfolio contains two primary variations: ReAct Blend—engineered to work with cement to improve early strength and flow—and ReAct Pure—a standalone cement replacement.

ReAct Blend

The Fortera Redding ReCarb Plant will produce ReAct Blend with a 15% blend to the market. This equates to 10% lower CO_2 emissions per ton of blended cement.

ReAct Product Range	Fine	Coarser
BET Surface Area (m^2/g)	5 – 7	0.9 – 1.9
D_{10} (µm)	2.5 – 4	10 – 13
D_{50} (µm)	5 – 7.5	19 – 24
D_{90} (µm)	9 – 12	31 – 36

Description

ReAct Blend's fineness and morphology are designed to increase packing efficiency, accelerate cement hydration, and improve workability.

ASTM

C150, C595, C1157

Key Benefits

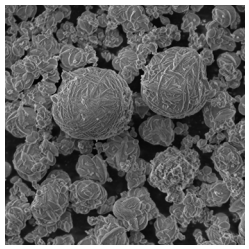
Low Clinker Blend

Ample Surface Area for Nucleation Effect

Improved Particle Packing

Faster Strength Gain

Strong Reactivity with Alumina



Applications

Portland Limestone Cement

PLC Extender

LC³ Enabled

Slag Extender

Fly Ash Extender

ReAct Pure

ReAct Pure is a white calcium carbonate cement, that is a reactive form of calcium carbonate known as vaterite.

ReAct Product Range	Pure
Function	Cement
BET Surface Area (m^2/g)	1 – 4
D_{10} (µm)	7 – 10
D_{50} (µm)	14 – 18
D_{90} (µm)	23 – 28

Description

ReAct Pure is a binder based on the transformation of vaterite to aragonite or calcite, which has been successfully utilized to manufacture building materials.

ASTM

C330 – LW Aggregate

C1288 – Fiber-Cement Boards

Key Benefits

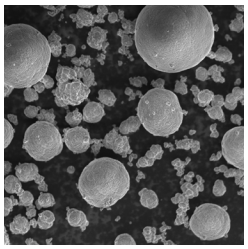
High CO_2 Avoidance

Good Strength to Weight Ratio

Rapid Curing at Elevated Temperatures

Dimensionally Stable

Superior Whiteness



Applications

Fiber-Cement Board

Lightweight Aggregate

2024 SUSTAINABLE PRODUCT OF THE YEAR

GREEN BUILDER MEDIA

This editorial team selection represents today's most innovative products that make homes more efficient, resilient, healthy, intelligent, and safe.

Preview the Plant
Scan Here

15390 Wonderland Blvd.
Redding, CA 96003

Learn more at
www.forteraglobal.com

Questions? Contact:
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