



# Carbon2Business From an emission to a raw material

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1.  
**CLIMATE TRANSITION  
THE TRANSFORMATION OF  
THE BUILDING INDUSTRY**

# HOLCIM Germany

## Leader in sustainable and innovative solutions

Leader in innovative  
and digital  
construction  
products

Part of Holcim Group:  
Leading the way to  
sustainability



**Holcim**  
Germany



**~130**  
Locations



**~1.800**  
Employees  
(2022)



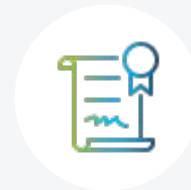
**765**  
Mio EUR  
turnover (2022)



**Net Zero**  
Promise



**SBTi**  
validated goals  
up to 2030



**ESG rankings**  
From MSCI to  
sustainalytics



**Green solutions**  
Goal: 1/3 of our  
turnover

# Four segments

## Innovative, sustainable and digital construction products and solutions

**Cement & Binders**



**Aggregates**



**4**

**BUSINESS  
SEGMENTS**

**Ready-mixed Concrete and Pumping**



**Products & Solutions**



# Climate transition

## Pioneer in the decarbonisation of industry

### Cement is the foundation of a modern world.

It is and remains indispensable for the construction of buildings, infrastructure and the energy transition.



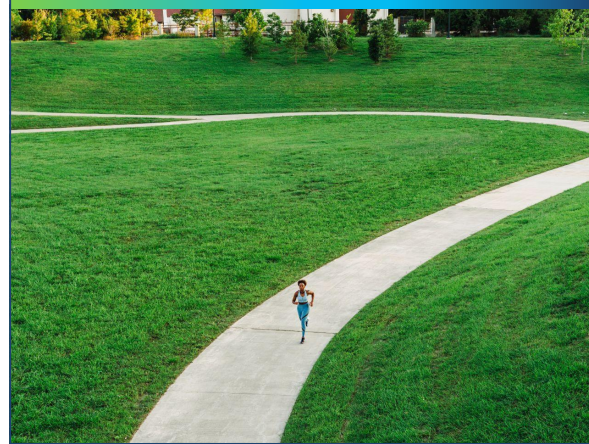
### But it needs to become more sustainable.

To ensure that one of the most important building materials remains available in the future and does no longer affect the climate.

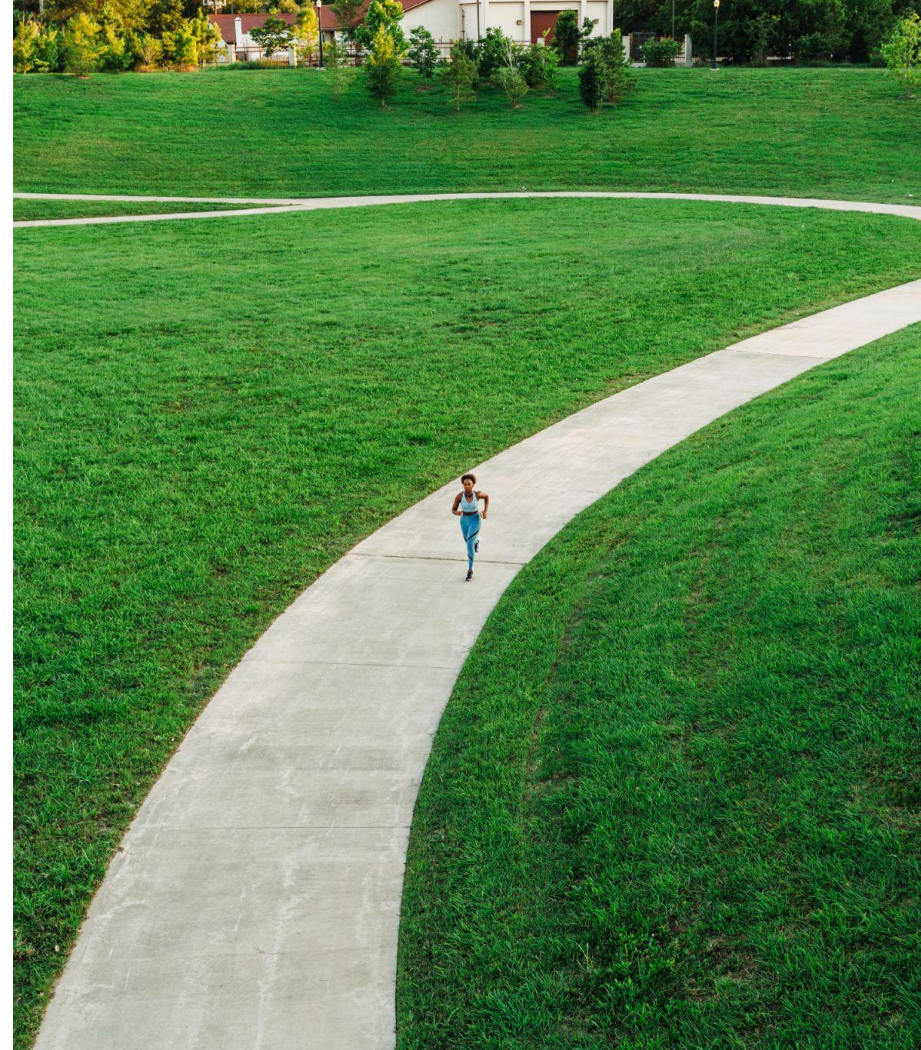


### We are working on this with all our strength.

Green Cement production is our commitment. For the people, the industry and the planet.



# **HOLCIM Germany: Pioneer in sustainable construction**



# Decarbonisation of industry

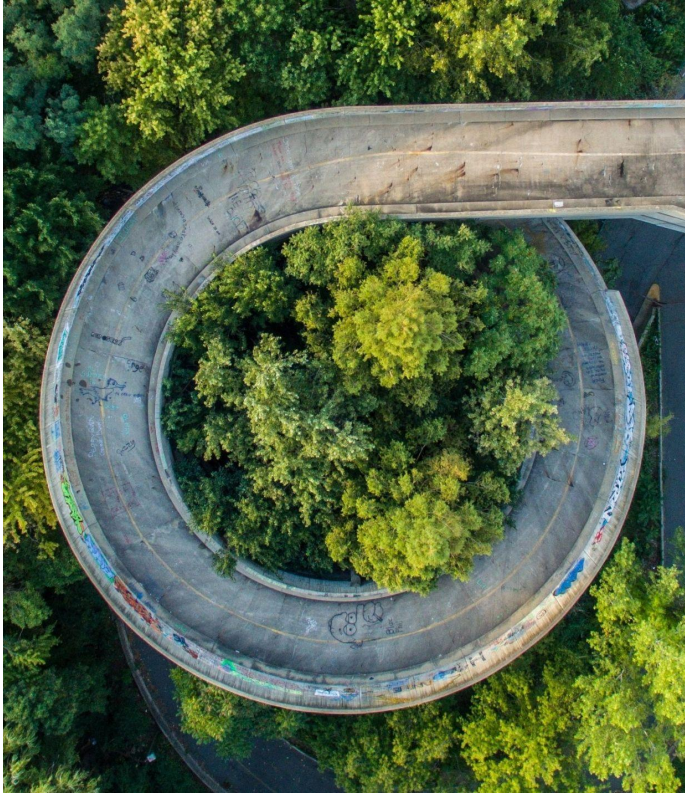
## Climate transition also means cement transition

- Due to its process-related unavoidable CO<sub>2</sub> emissions, the cement industry has a special obligation in the climate-friendly transformation of society
- Build more with less material: **Conservation of resources** through smarter construction methods
- **Reduction of clinker content** in cement through the use of clinker substitutes such as slag sand
- Decarbonisation of products through **carbon capture process** (projects in every cement factory)
- Understanding **CO<sub>2</sub>** as a raw material and using it in cycles



# Setup of a circular economy

## Concrete must become concrete again



- In Germany, the construction industry is responsible for more than 50% of the total waste generated. This must change urgently - material must be used in a cycle instead of in a linear way.
- **Equivalent recycling:** Target processing of aggregates and use as secondary raw materials in “R-concrete”
- **Co-processing:** Simultaneous energy and material recovery of waste streams that are not suitable for mechanical recycling in the cement plant by subsidiary Geocycle
- **Urban Mining:** The city as a warehouse for raw materials. We are a member of Madaster and Resource, the pioneers of building materials databases.



**Climate transition  
appears in  
increasing weather  
extremes**



# CO<sub>2</sub> MARKET

## Why green concrete is so important

**Cement industry is an unavoidable industrial CO<sub>2</sub>-source.**

The German cement industry emits 20 Mio. t CO<sub>2</sub> per year; which corresponds to about ca. 3% of the total emissions in Germany.

### CO<sub>2</sub>-Emissions in the cement manufacturing:

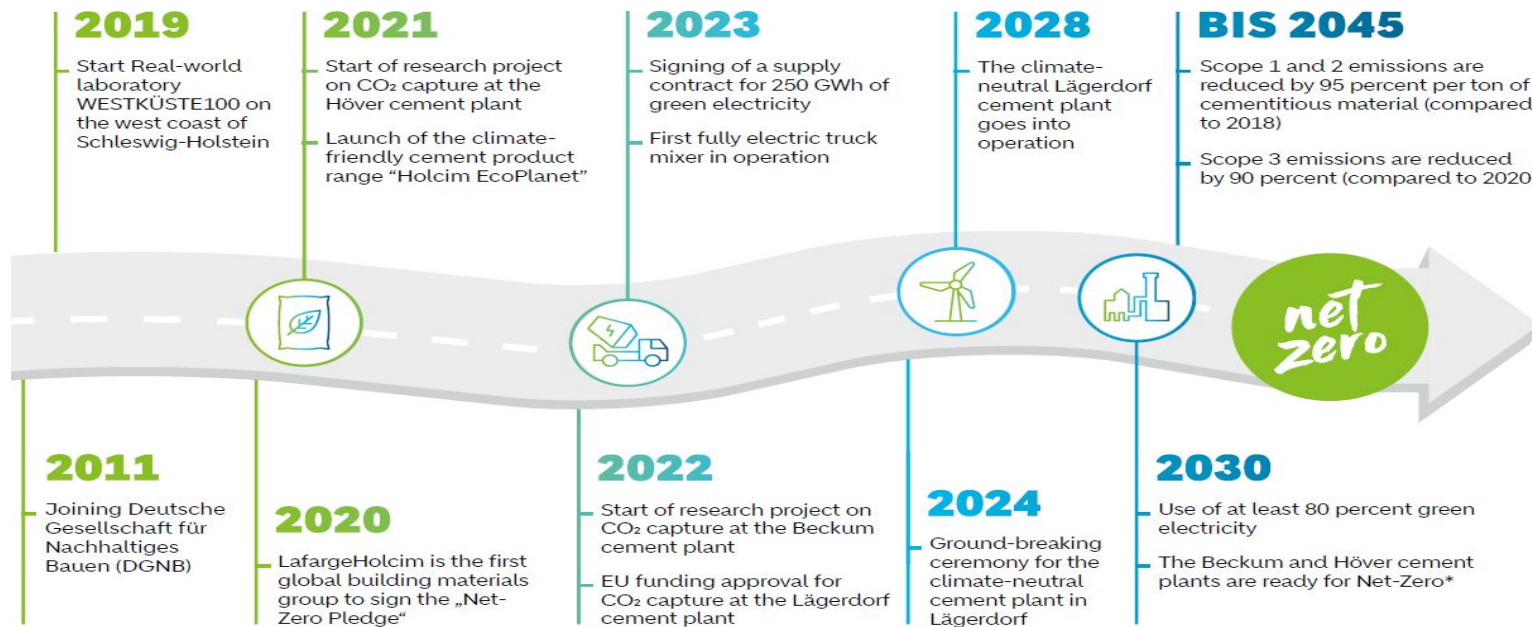
2/3 due to raw materials!  
Future use of Carbon Capture technologies



1/3 from combustion process; avoidable in the future through the use of sustainable green fuels and CC technologies

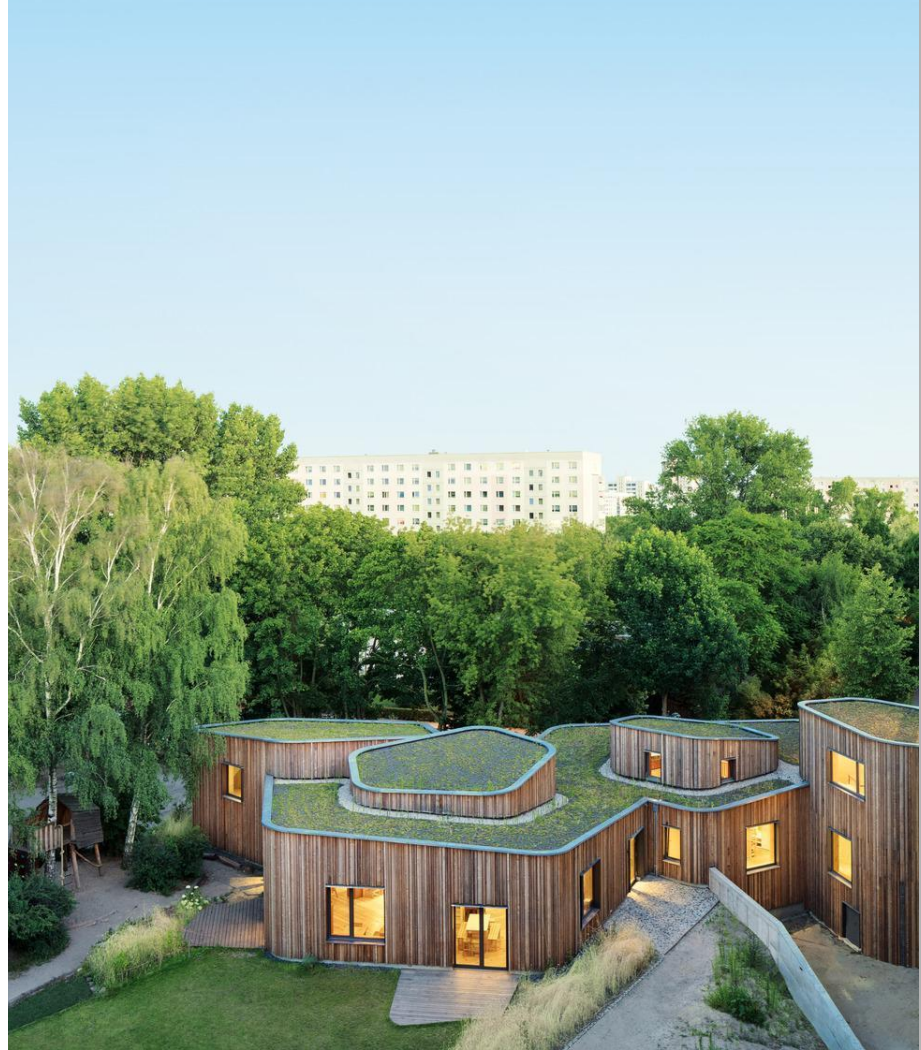


## ROADMAP FOR DECARBONIZATION HOLCIM GERMANY



\*Plants to be converted by 2030. Net-Zero operation is dependent on external infrastructure and legislation.

**The transformation of the construction industry is a key element of a successful climate transition.**



# Innovative solutions

## Building tomorrow now

Increasing the speed of construction, developing sustainable solutions, defying the shortage of skilled workers - the industry needs innovative solutions to meet the challenges.

Our approach:

- **Serial construction** with smart precast concrete elements are assembled on site and save time and resources
- **Digital solutions** such as the ORIS road construction platform increase efficiency and transparency
- **3D printing** not only reduces material costs, but also labour requirements - with strong partners we develop smart solutions



**The world's first  
carbon-neutral  
cement plant is  
built here**



# C2B-Lägerdorf: A kiln changes the world



# Project Overview

## Decarbonisation of the plant with the kiln line 12



Funded by the European Union  
Emissions Trading System  
Innovation Fund

- By the **end of the decade**, we want to operate the world's first climate-neutral cement plant in Lägerdorf.
- A prerequisite for this is the **construction of the new kiln line 12** and the conversion of the plant to a so-called second-generation **oxyfuel process**.
- The EU will fund the C2B-Lägerdorf project with **110 Mio EUR from the 'Innovation Fund'**. The whole CAPEX spending is **several hundred million euros**.
- Almost **100% of the CO<sub>2</sub> emissions** are captured in cement production and **more than one million tons of CO<sub>2</sub> are saved annually**.
- The exhaust gas is then further processed into a **high-purity CO<sub>2</sub> gas as basic material for the chemical industry** and used as a **raw material for other industries** (CCU project).









# Project Overview

## Unique conditions for CCU in Lägerdorf



Funded by the European Union  
Emissions Trading System  
Innovation Fund

<b>Green energy</b>	The location in Schleswig-Holstein/Germany offers a <b>surplus of green energy</b> as renewable energy is gained from wind power which is generated on- and offshore at the coast.	
<b>Location</b>	Schleswig-Holstein as a country between the seas offers fast sea access for the further transport of CO <sub>2</sub> , especially via the nearby deep-sea port in Brunsbüttel with import and export possibilities. (~ 30km).	
<b>Industry</b>	Due to its proximity to the further processing industry (e.g. ChemCoast Park in Brunsbüttel), Lägerdorf offers optimal conditions for the further transport of CO <sub>2</sub> .	
<b>Raw materials</b>	The chalk stocks last for another 100 years at the site in Lägerdorf, thus providing raw material and site security.	

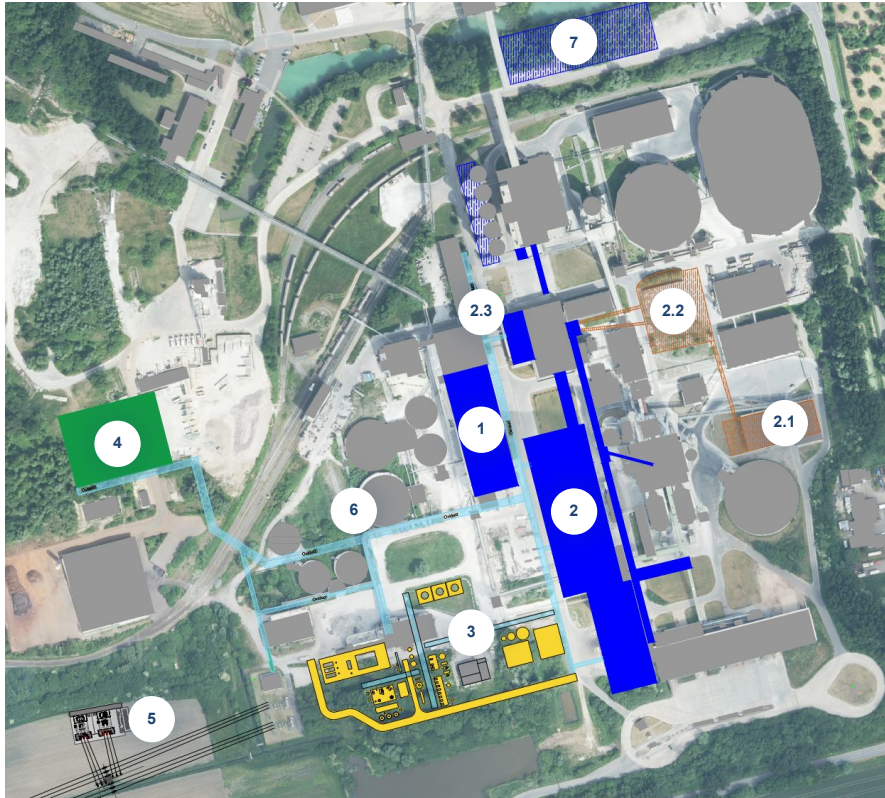
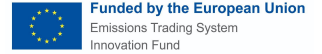


Together we are making a big contribution to our Net Zero mission!



# Technical concept

## How look the new plant?



<p><b>1 Renewed chalk sludge filtration, moisture reduction &lt;14%</b></p> <ul style="list-style-type: none"> <li>Compressed air compressor system</li> </ul>	<p>Improved filtration due to lower filter cake moisture, essential for improving the energy efficiency of the cement lathe system</p>
<p><b>2 Oxyfuel-cement kiln 12 with:</b></p> <ul style="list-style-type: none"> <li>Fluff (2.1)</li> <li>Renotherm®-unity(2.2)</li> <li>new central polab/laboratory (2.3)</li> </ul>	<p>Oxyfuel cement rotary kiln system incl. fuel handling and central control room incl. new automated product lab</p>
<p><b>3 CO<sub>2</sub> capture system incl. additional facilities:</b></p> <ul style="list-style-type: none"> <li>Cooling water cooling</li> <li>Nachspeiswasseraufbereitung</li> <li>Process condensate treatment</li> </ul>	<p>Cleaning carbon dioxide and providing energy</p>
<p><b>4 Air separation plant (ASU)</b></p>	<p>O<sub>2</sub>- source</p>
<p><b>5 New 110/20-kV-Substation</b></p>	<p>104 MW plant feeding and integration of the wind farm into the plant grid</p>
<p><b>6 Infrastructure</b></p> <ul style="list-style-type: none"> <li>Pipe/cable bridges</li> <li>Streets</li> </ul>	<p>Supply lines for various gases as well as water quality, electricity and fire fighting</p>
<p><b>7 BuildingOfTomorrow@Lägerdorf</b></p> <ul style="list-style-type: none"> <li>Location on the canal (7)</li> </ul>	<p>Visitor centre and project office (~170 Pers.) during the project phase, administrative function from 2029</p>

**CO<sub>2</sub> will be a raw material in the future**



# CO<sub>2</sub> MARKET

## From climate poison to important raw material carriers

### Fuels

#### E-Methan



Production of e-CH<sub>4</sub> from CO<sub>2</sub> and H<sub>2</sub>, mostly used as fuel in the logistic and in the industry.

#### E-Methanol



Production of E-Methanol from CO<sub>2</sub> and H<sub>2</sub> used as green fuel in maritime transport

#### E-Kerosene



Production of E-Kerosene from CO<sub>2</sub> and H<sub>2</sub> used as green fuel in the aviation sector

#### E-Methanol chemical industry



Production of E-Methanol from CO<sub>2</sub> and H<sub>2</sub> for the substitution of fossil methanol in the chemical industry

### Basic chemical industry

#### Polyurethane



Addition from CO<sub>2</sub> as a raw material to the manufacturing process from polyurethane (PU) as a substitution for fossil CO<sub>2</sub>

#### Urea



Production of urea from CO<sub>2</sub> and low carbon ammonia (e.g. green ammonia)

### Building material

#### Concrete prefabricated parts



Hardening of cement through injection of CO<sub>2</sub> into concrete to accelerate hardening by mineralization

#### Aggregate



Carbonisation of natural, manufactured and recycled concrete aggregates (RCA)



**HOLCIM**