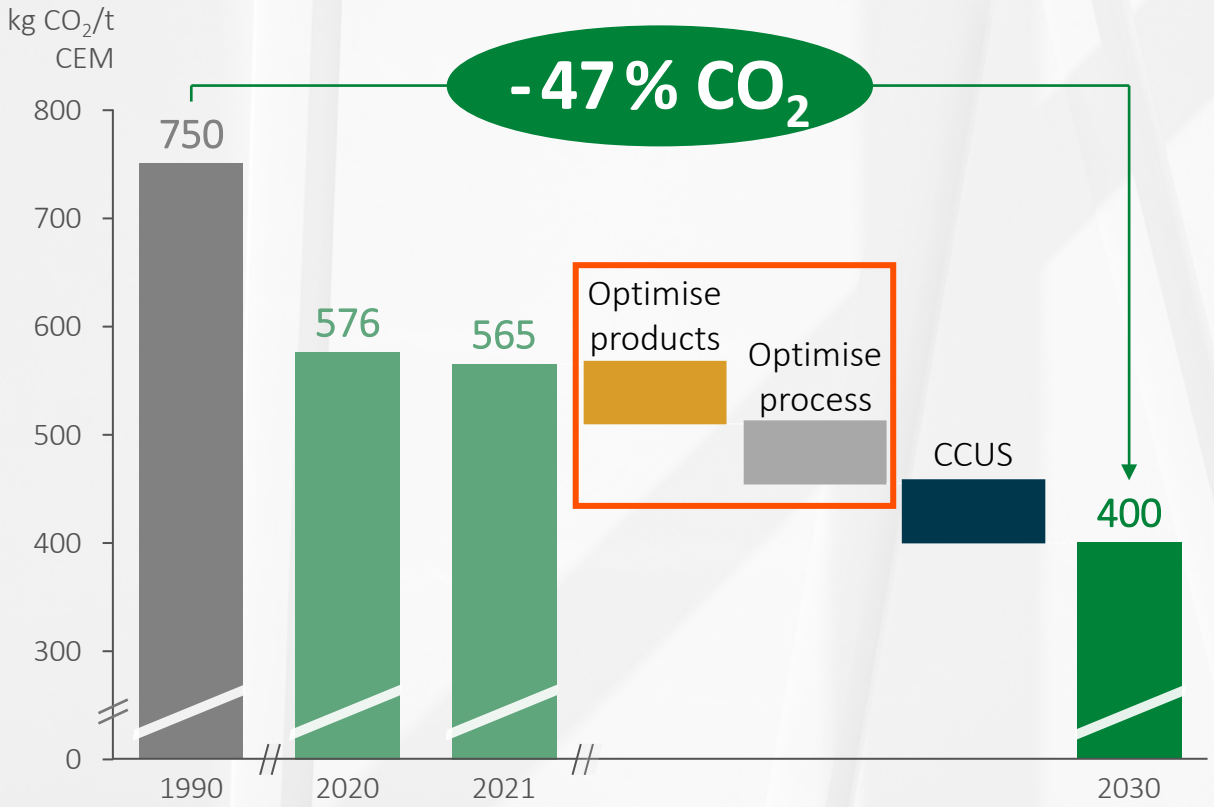
We drive sustainability through innovation

2022 Capital Markets Day – 24 May

Dr Wolfgang Dienemann
Director Global Research & Development

Optimising our products through innovation is a key lever to drive sustainability

Thereby, we transform construction and meet our customers' need for sustainable products and solutions.

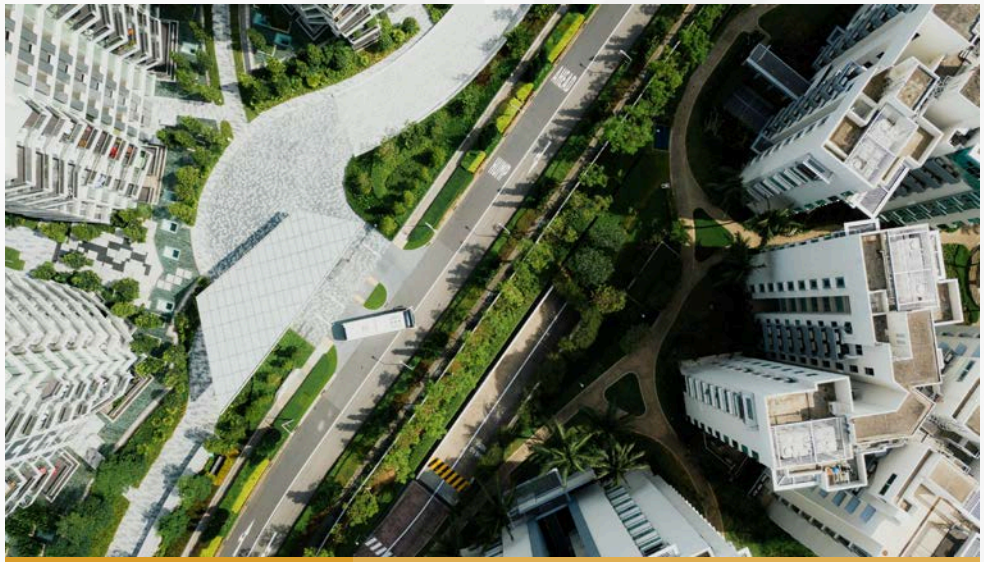


We advance the formulation of cement all the way to carbon-free.

Researching clinker replacements is key to reduce CO_2 footprint of cement

Important considerations for supplementary cementitious material (SCM)

- Locally available materials
- Pozzolanic or hydraulic properties
- Recycled materials and waste materials from other industries
- Sufficient reserves
- Cost efficient logistics



Products

< 68 %
clinker incorporation and drive circularity

We explore new formulations with established materials

Natural pozzolan in Iceland

Prospects

- Bringing the historical use to a new industrial dimension

USP

- **Superior quality** due to fast cooling (glacier):
  - High reactivity
  - Denser structure
  - Low water demand

Timing

- Secured access to 100 mt reserve of pozzolan
- Plant capacity of 1 mt p.a. (starting 2025/26)

We use a wide range of materials for clinker replacement

Calcined clay

Prospects

– Systematically screening potential clay sources worldwide

USP

– Up to 50% clinker replacement when combining calcined clay and limestone

Timing

– Recently announced JV in Ghana will build the world´s largest flash calciner
– Further projects in the pipeline e.g. in Africa – timeline: 2023/2024

We collaborate closely with partners from steel and other industries

Future steel and metal slags

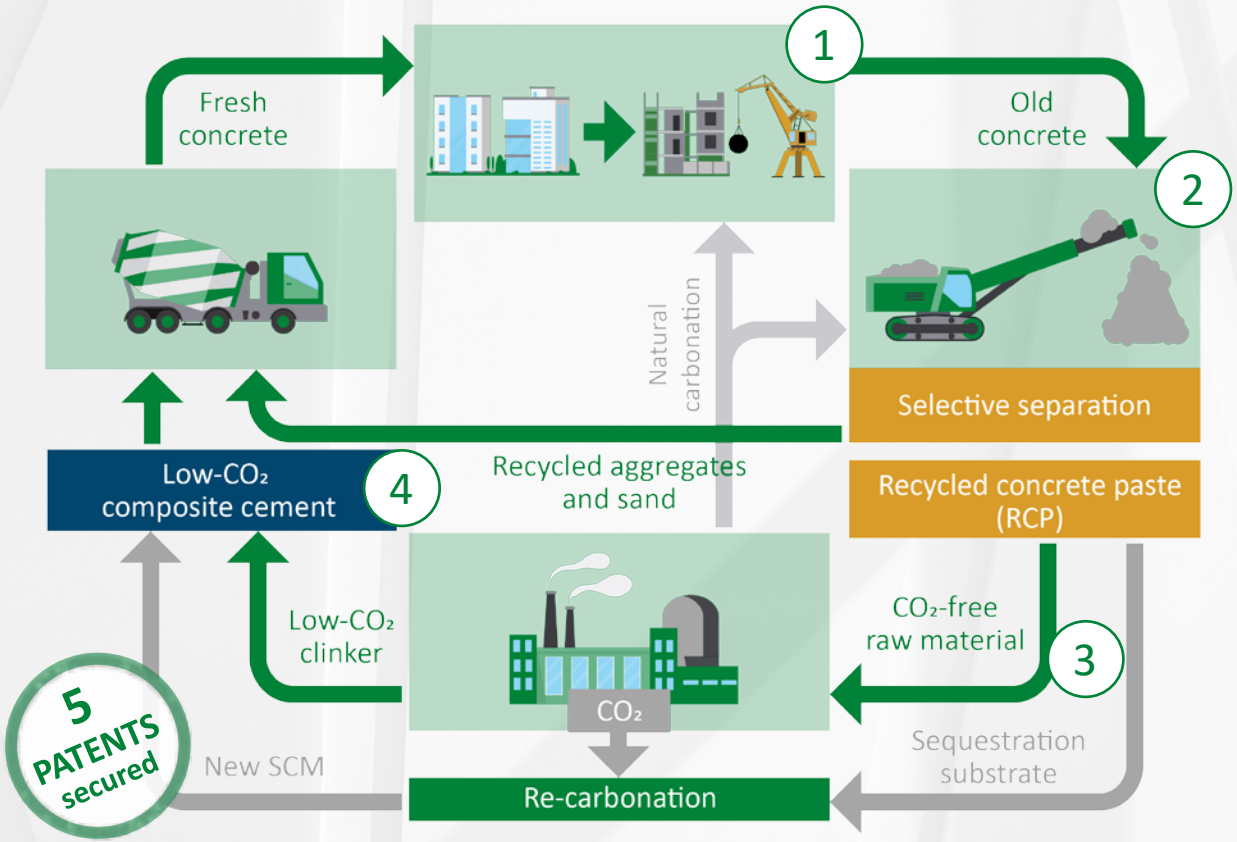
Prospects
- Steel industry also in transformational process

USP
- Enable use of future waste streams from iron production as early mover

Timing
- Several projects underway with industry partners
- State-funded (BMBF) project “SAVECO2“ with ThyssenKrupp with a budget of €2.2 m

We are implementing ground-breaking recycling and CO_2 mineralisation technologies.

We close the loop of materials and CO_2 in the concrete lifecycle



We identified optimal technologies for advanced recycling and scaling them up

Low-pressure grinding allows efficient **separation of demolished** concrete into:

- Sand
- Aggregates/gravel
- Recycled concrete paste (RCP)

Recycled aggregates and sand can **replace up to 100%** of natural virgin material.

Putting innovation into action:

- Pilot in Germany commissioned in Q3 2021
- Poland follows end 2022 to advance technologies

We make multiple use of RCP advantages and pioneer its carbonation

Giving new life to used concrete through a CO_2-negative process

We use RCP for clinker production

- Replace limestone in raw meal
- Calcium oxide in RCP is 80 % CO_2-free
- Reduces need for virgin materials

We use RCP as filler

- Replacing limestone
- Improved circularity
- Low-cost solution

We use RCP to store CO_2 permanently

- Carbonated RCP acts as a pozzolan
- World's 1st industrial-scale pilot
- Secured 5 patents

We use both as clinker replacement

We can build on our agile R&D team and trustful collaborations with partners.

HEIDELBERGCEMENT

ReConcrete-360° wins German Innovation Award for Climate & Environment 2022

Category: **"Process Innovations for Climate Protection"**
for an innovative ReConcrete-360° concept

Our R&D team conducts award winning research.

iKU
Der Innovationspreis für Klima und Umwelt 2022
Preisträger

HEIDELBERGCEMENT

1. We advance the formulation of cement all the way to carbon-free.

2. We are implementing ground-breaking recycling and CO_2 mineralisation technologies.

3. We can build on our agile R&D team and trustful collaborations with partners.


We are HeidelbergCement.
Leader in sustainable innovation.