Supplementary cementitious materials

How can they help tackle cement and concrete's emissions problem?

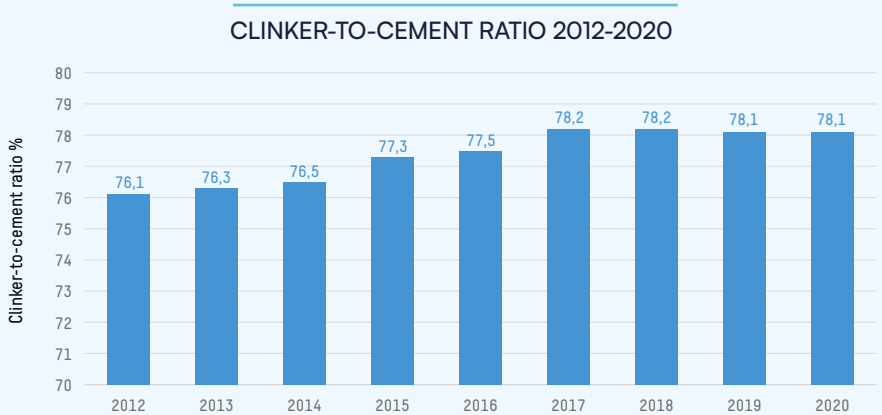
ALLIANCE for LOW-CARBON CEMENT & CONCRETE

What are supplementary cementitious materials?

SCMs are a set of materials — often industry by-products — that serve as partial replacement of traditional clinker in cement, or as partial replacement of cement in concrete mixes.

Why do we need SCMs?

- The cement and concrete industry has **a massive emissions problem**, accounting for 8% of the world's total CO_2 emissions.
- Traditional clinker is the main culprit of cement emissions, **accounting for over 90% of its footprint.**
- Despite the fact that ample solutions are ready to be scaled up, **the use of clinker in cement is virtually unchanged in Europe.** And globally, the share of clinker is on the rise.
- However, the tides are turning. The urgent need to decarbonise cement and concrete production combined with **growing research and development** has already resulted in breakthrough solutions to reduce the amount of traditional clinker.
- By combining different SCMs, more options to **reduce traditional clinker usage** have become available and are gaining global traction.



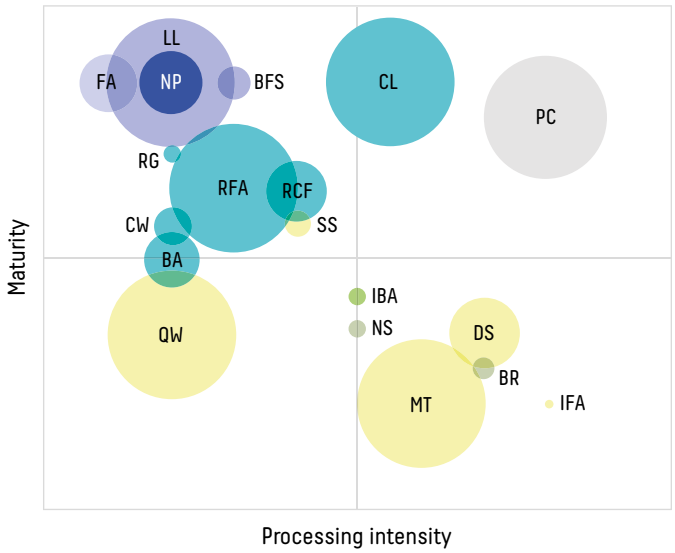
Source: Jamcem Consulting – based on GNR and ERMCO data, 2023

> *In Europe, the proportion of clinker in cement is as high as 78%.*

SCMs are ready to be scaled up, today

SCMs have the potential to massively reduce emissions, which will keep growing unless we make SCMs the norm! If, however, SCMs were the norm today, we could reduce emissions by at least 50%.

OVERVIEW OF EXISTING AND EMERGING SCMs



BA - Biomass ash
BFS - Blast furnace slag
BR - Bauxite residue
CL - Calcined clay
CW - Ceramic waste
DS - Dredging sediments
FA - Coal fly ash
IBA - Incinerated bottom ash
IFA - Incinerated fly ash
LL - Limestone filler
MT - Mine tailings
NP - Natural pozzolan
NS - Non-ferrous slag
PC - Portland cement
QW - Quarrying waste
RCF - Recycled concrete fines
RFA - Reclaimed coal fly ash
RG - Recycled glass
SS - Steel slag

Summary graph showing the source supply or reserve volumes (circle areas) of common, emerging, and future SCMs plotted as a function of maturity and processing intensity measured by gigatonnes per year.

Source: Snellings, Suraneni & Skibsted, 2022

- A growing number of SCMs are immediately scalable at low to no costs.
- Not only are SCMs a key lever in reaching a net-zero cement and concrete value chain, but they also extend the longevity of concrete structures and reduce the need for primary resources.

Policies have a key role to play in promoting the uptake of SCMs! Decision-makers urgently need to:

- Move from recipe-based to performance-based cement and concrete standards, allowing all SCMs to be placed **on the market upon meeting a set of performance criteria.**
- Incentivise traditional clinker substitution in emission trading schemes by shifting from the allocation of free allowance at the level of **clinker production to process neutral allowances.**
- Prioritise funding for the development and upscaling of SCMs, **ensuring that both start-ups and scale-ups** have stable access to finance.

ALLIANCE for
LOW-CARBON CEMENT
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Our Alliance was created to steer the sector towards viable decarbonisation pathways. Our members represent mature materials designers and producers, and also start-ups working in biotechnology, capturing carbon, and sustainable construction. We are all rooted in the circular economy and sustainable construction, and we all share the desire to change our industry — and prevent catastrophic climate change.

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