

Sustainable Concrete Performance

MasterCO₂re[™]:
Intelligent cluster system
for low-clinker concrete



Core Challenge

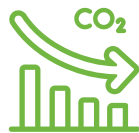
Global concrete production accounts for 8% of man-made CO₂ emissions worldwide. The ambitious CO₂ reduction targets expressed in the European Green Deal of being climate-neutral by 2050 can only be achieved if the construction sector makes a significant step towards sustainable construction. Reducing the embodied carbon in concrete is, therefore, integral to climate neutrality – with admixtures playing a pivotal role in contributing to the achievement of CO₂ reduction.





What's the European Green Deal?

Climate change and environmental degradation are severe and existential threats to the world. With the Green Deal, the EU is pursuing the goal of being the first continent in the world to be climate neutral by 2050. The derived sub-targets of the Green Deal are further in line with the EU's commitment to global climate protection measures under the Paris Agreement.



55% less CO₂ compared to 1990 levels by 2030



Net-zero greenhouse gas emissions by 2050

Our Core Mission: Simplifying Complexity

“The core of growth is simplicity.”

Concrete is the most used building material in the world and it is difficult to envision buildings without it. From a material point of view, its superior properties cannot be replaced by other construction materials as it combines:



Cost efficient and
highly flexible use



Durable



High compressive
strength



Non-flammable



Pressure and
moisture resistance



Fully circular

Core Ingredients of Concrete

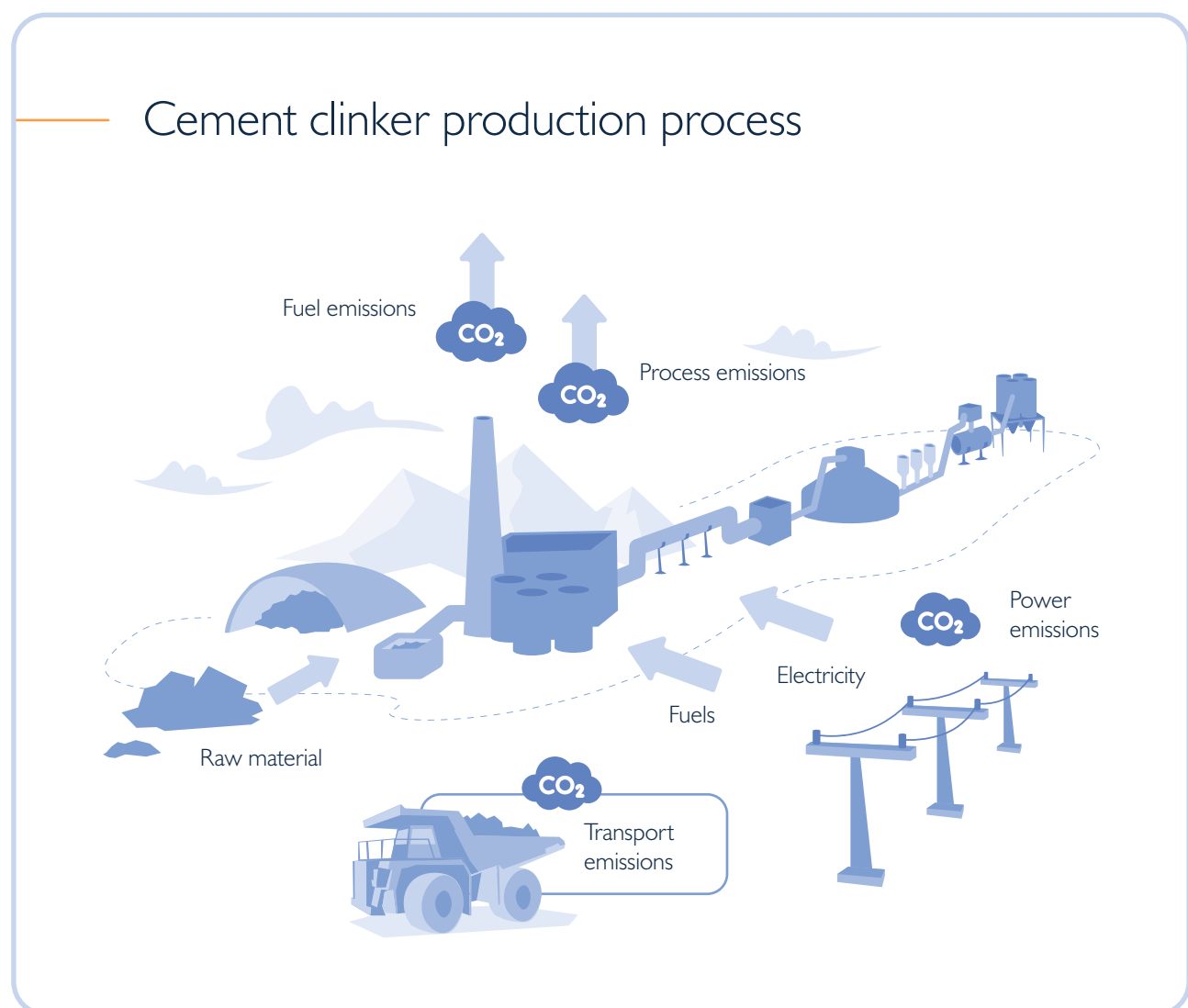
With global consumption of 13.5 billion m³, concrete is by far the most widely used man-made material. It combines durability, strength, and design capability with impressive global availability. In its simplest form, concrete consists of cement, water, sand, and gravel. Cement is the binder that connects concrete's primary constituents and provides it with its remarkable properties. Modern concrete formulations also incorporate chemical admixtures which impart distinctive properties to the material in both its fresh and hardened states.

Clinker, the main component of cement, is produced by burning natural raw materials such as limestone, clay, and marl at very high temperatures. This process is responsible for most of the CO₂ emissions of cement. Although clinker generally accounts for only about 10% of the volume of concrete, it is responsible for up to 90% of the CO₂ embodied in concrete.



Lowering the percentage of clinker in concrete is, therefore, a crucial goal to make construction more sustainable in the future. This can be achieved mainly in three ways:

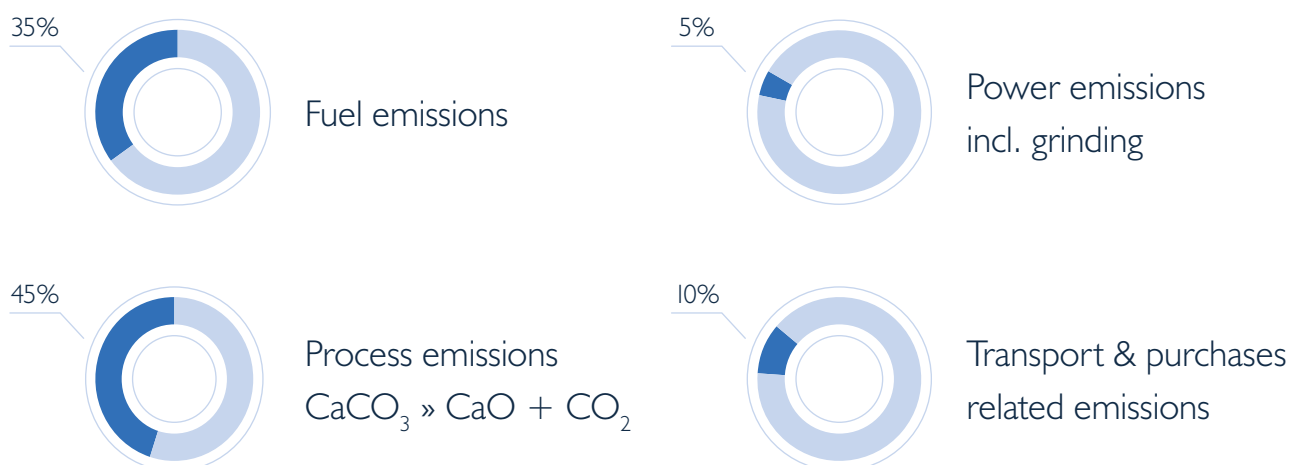
First, by using already clinker-reduced cement types; second, by further reducing the content of conventional cement; and third by replacing a significant portion of cement with supplementary cementitious materials (SCMs).



While low-clinker concrete holds the greatest potential for CO₂ reduction in concrete, it also poses major challenges for concrete producers. Limestone filler and SCMs are promising cement substitutes but differ in surface area and quality variations, leading to strong effects on concrete performance. Loss in workability, worsening of rheology, and reduction of strength are the main undesirable outcomes that frequently occur.

MasterCO₂re™ is our product range for ready-mix and precast applications that addresses the performance gaps and limitations associated with challenging starting materials that conventional superplasticizers cannot overcome – simplifying your challenges and supporting your sustainable journey.

CO₂ emission drivers in cement clinker production

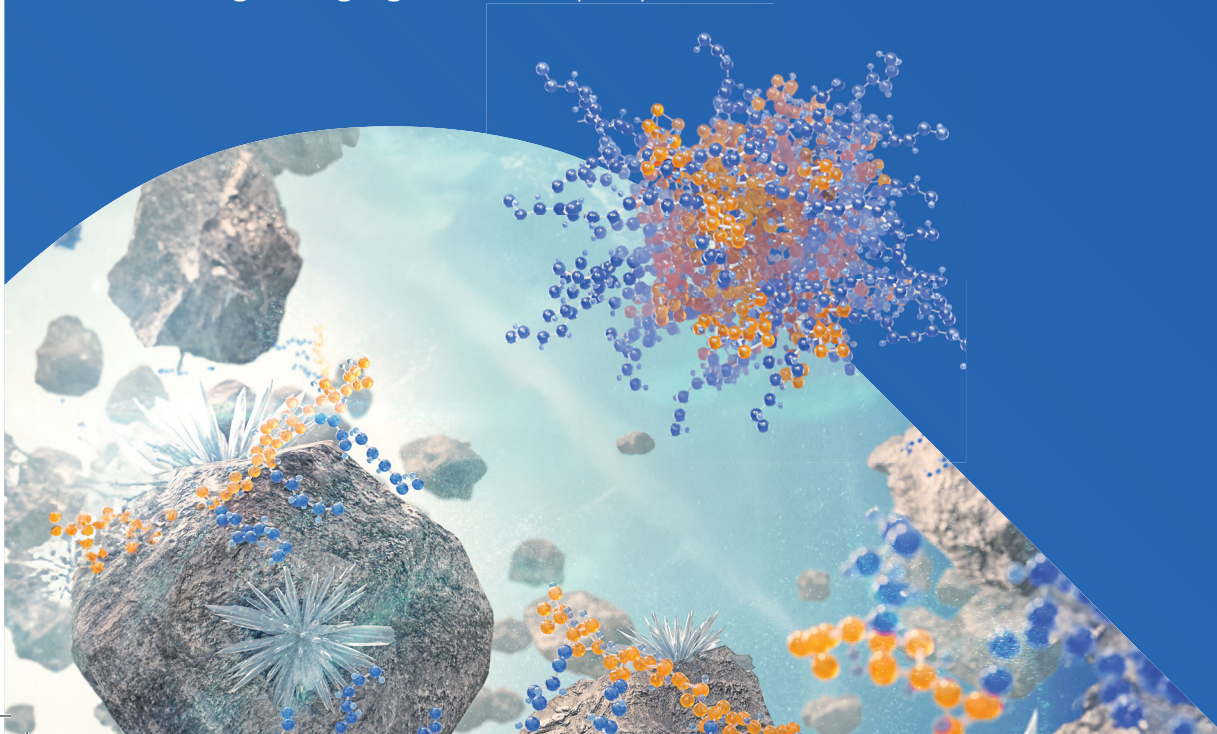


Unveil the Power of MasterCO₂re™

Transforming construction requires rethinking familiar processes and deploying advanced solutions that pave the way to stay ahead of the industry. MasterCO₂re™ is a smart technology based on an intelligent cluster system (ICS) that delivers its effects precisely when required. A portion of its freely available polymers is immediately dispersed for initial water reduction. The finely tuned chemical structures of the diverse polymer clusters optimize both workability retention and cement hydration by adapting the release mechanism of polymers to the characteristics of the cement matrix. The unique mechanism of action of MasterCO₂re™ thus ensures excellent flowability and rheology even at high temperatures, allowing easy pumping and placing of concrete.

MasterCO₂re™ successfully counteracts the potential of high-water absorption and undesirable interactions with admixtures caused by the variation in chemical and mineralogical composition of binders. Finally, MasterCO₂re™ allows you to significantly reduce the clinker content in your concrete mix while maintaining the water-to-cement ratio to achieve the required compressive strengths.

Master Builders Solutions® game-changing solution pushes the limits of low-clinker concrete by enabling the easy usage of high volumes of clinker substitutes while safeguarding high concrete quality.



MasterCO₂re™ at a glance:



Superb workability retention



Excellent strength properties

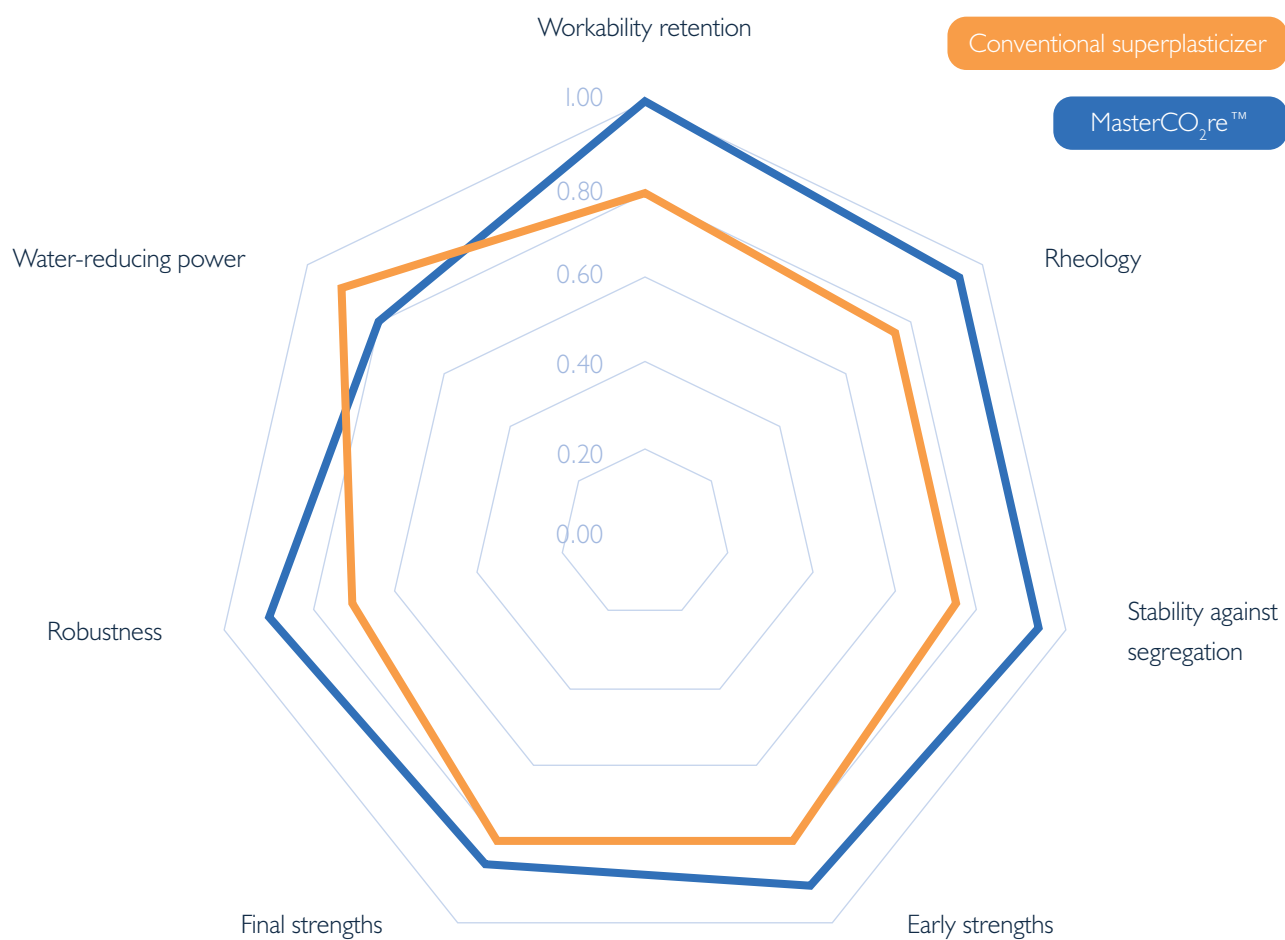


Advanced rheology



Unmatched robustness

MasterCO₂re™ overall concrete performance



Unveil the Power of MasterCO₂re™



Pushing the limits with our new intelligent cluster system technology

Our flagship project EDGE East Side Berlin, meets the highest environmental and technological standards and represents the optimum that can already be realized today within the framework of the German concrete standard. With the help of our advanced admixture solutions considering our intelligent cluster system (ICS) technology, a high-performance concrete mix with about 50% less CO₂ compared to the industry reference value of C35/45, was developed and successfully applied. Despite the high concrete and air temperatures of up to 35°C, the concrete was easily pumped over a total length of 275m and up to a height of 140m thanks to the superior robustness of our ICS admixture solution. The EDGE East Side Berlin Tower is a prime example of what can already be realized today – and even more, is achievable with advanced admixture technologies when moving outside normative standards and breaking through existing boundaries.



Photo source: bloomimages

Promsa – Cementos Molins

Our reference in Barcelona (Spain)



**Watch Promsa –
Cementos Molins' success story**

info.master-builders-solutions.com/masterco2restory

Unveil the Power of MasterCO₂re™



Master Builders Solutions® for the Construction Industry

MasterAir®

Complete solutions for air entrained concrete

MasterCast®

Solutions for the manufactured concrete product industry

MasterCem®

Solutions for cement manufacture

MasterCO₂re™

Solutions for low-clinker concrete

MasterEase®

Low viscosity for high performance concrete

MasterFinish®

Solutions for formwork treatment and surface improvement

MasterFiber®

Comprehensive solutions for fiber reinforced concrete

MasterGlenium®

Solutions for high performance concrete

MasterKure®

Solutions for concrete curing

MasterLife®

Solutions for enhanced durability

MasterMatrix®

Advanced rheology control for concrete

MasterPel®

Solutions for hydrophobization, anti-efflorescence and surface protection

MasterPolyheed®

Solutions for mid-range concrete

MasterPozzolith®

Solutions for water-reduced concrete

MasterRheobuild®

Solutions for high strength concrete

MasterRoc®

Solutions for underground construction and surface improvement

MasterSet®

Solutions for set control

MasterSphere®

Solutions for guaranteed freeze-thaw resistance

MasterSuna®

Solutions for sand and gravel in concrete

MasterSure®

Solutions for extraordinary workability retention

Master X-Seed®

Advanced accelerator solutions for concrete

Unveil the Power of MasterCO₂re™: Intelligent Cluster System for Low-clinker Concrete Production

info.master-builders-solutions.com/en/masterco2re



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