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Pathways to market for novel Supplementary Cementitious Materials (SCMs) in Europe

A practical roadmap to decarbonize cement and concrete

Purpose

This white paper aims to provide a practical, regulation-focused roadmap for bringing new Supplementary Cementicious Material (SCM) and recycled concrete-derived binders to market in Europe. It identifies bottlenecks and proposes policy fixes to accelerate the decarbonization of cement and concrete.

Content

Abbreviations

Activated Cement Paste	ACP
Conformité Européenne (European Conformity)	CE
Construction Products Regulation	CPR
Declaration of Performance	DoP
European Assessment Document	EAD
End of Life	EoL
Environmental Product Declaration	EPD
European Technical Assessment	ETA
European Union Emissions Trading System	EU ETS
Factory Production Control	FPC
Nitrogen Oxides	NOx
Supplementary Cementitious Materials	SCMs

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Phasing out virgin matierals in concrete.

Executive summary

Decarbonizing cement and concrete hinges on the rapid market entry of low-carbon supplementary cementitious materials (SCMs) and circular aggregates. Yet Europe's certification and standardization framework, designed primarily to ensure safety, slows the adoption of new materials. This creates barriers to entry, favors incumbents, and traps innovators in low-value niches.

This white paper maps the value chain for recycled concrete-derived materials, explains the regulatory bottlenecks, and sets out a multi-pronged solution strategy:

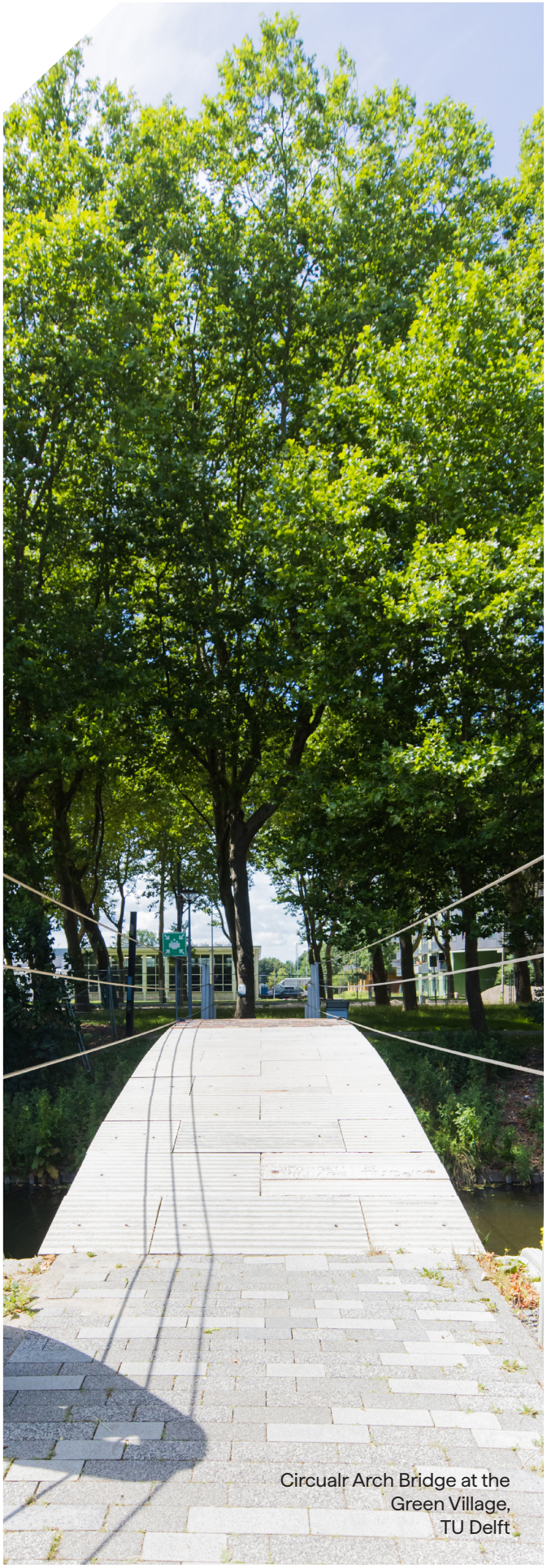
— Compliance reform
Streamline and harmonize the existing certification process, with standardized testing and fairer representation of SMEs and academic experts in standards committees.

— Policy reform for scaling SCMs
Introduce fast lanes for low-risk applications, shift toward performance-based standards, and mandate uptake of low-carbon materials through public procurement.

— Policy reform to phase out business-as-usual
Strengthen European Union Emissions Trading System (EU ETS) allocations, include embodied-carbon thresholds in procurement, and redirect subsidies toward decommissioning high-emission plants instead of prolonging them.

— Technological innovation
Deploy predictive tools and digital models that provide reliable forecasts of long-term performance, reducing the need for slow and prescriptive standards.

By pursuing these tracks in parallel, Europe can unlock the potential of SCMs, accelerate circular economy in construction, and ensure cement and concrete contribute to - not hold back - the continent's climate goals, while positioning itself as the global leader in sustainable construction technology.



Circualr Arch Bridge at the Green Village, TU Delft

Introduction

The goal of this white paper is to accelerate the market entry of low-carbon cement and concrete mixes in Europe. The current challenge is that prescriptive standards and slow committee procedures delay approvals, causing innovators to get trapped in non-structural and low value niches for new materials.

Further complexity arises from national interpretation of standards (e.g., EN206, which is not harmonized at EU level), country-specific assessor expectations.

Weak economic signals, such as an underpowered EU ETS and limited green public procurement, fail to either phase out polluting business-as-usual industries or reward low-carbon alternatives.

everox novel SCM: Activated Cement Paste, made from End-of-Life concrete

The certification road-blocks slowing green concrete

The purpose of the paper is to explain how and why the current certification system for cement and concrete constrains innovation and the adoption of low carbon solutions. It focuses on the interaction between EU-level standards and national implementation, using the Netherlands (BRL/KOMO/CROW system) as an illustrative case of how these dynamics play out in practice.

In principle, a new cementitious product or low-carbon concrete solution must pass a three-gate sequence before it can be used at scale in mainstream, structural applications: Gate 1 (cement-level acceptance) determines whether a binder can be marketed as “cement” via EN 197-x or alternative routes such as European Technical Assessment (European Technical Assessment[1] (ETA) / national routes)). Gate 2 (concrete-level acceptance) determines whether that cement or SCM[2] can actually be used in standard concrete mixes under EN 206 and its national annexes. Gate 3 (product/application-level acceptance) is where national quality marks (e.g. BRL/KOMO in the Netherlands), assessment guidelines and client/insurer expectations decide whether the material is used in everyday projects and mainstream markets rather than limited to experimentation and niche markets. In practice, CE-marking at Gate 1 does not guarantee passage through Gate 2 and 3; a product can be technically “on the market” yet effectively excluded from standard structural applications and thus unavailable for concrete producers.

At Gate 1, current cement standards further embed clinker as the organizing principle. EN 197-1:2011, EN 197-5:2021 and EN 197-6:2023 define 32 cement types based solely on clinker percentage rather than measured performance. This approach ties classification and CE-marking to composition, rather than directly to performance. This makes clinker content the key determinant of classification and approval.

For new cement constituents (or SCMs), standards have some flexibility since they allow for “minor constituents” (<5% by mass). Beyond this threshold, producers must typically seek an ETA - a route intended to authorise a binder for specific applications. However, both routes severely limit addressable markets and obtainable prices, since neither constitutes full compliance within

the principal cement and concrete standards. There is also an impact on time-to-market since ETA procedures typically take 6–18 months and impose significantly higher administrative and financial burdens, especially for smaller businesses (in comparison, EN 197 conformity may provide CE-marking within 6 weeks).

Further, even when an ETA results in CE-marking, concrete-level acceptance remains uncertain. EN 206:2013 only recognises cement types listed in EN 197-1:2011, excluding newer types recognised under EN 197-5, EN 197-6, or ETA, reinforcing market fragmentation and prolonging approval processes for structural applications. The result is a systemic bias towards either

a) keeping innovations within the "minor constituent" window, limiting clinker substitution and business value,

or

b) accepting prolonged and uncertain approval processes that may still not unlock full market access.

Gate 2 adds another layer of constraint and fragmentation in the EN 197/EN 206 relationship. Even if a binder meets EN 197-x or obtains an ETA, it is not automatically recognised as a cement for concrete under EN 206. Although cement standards are harmonized at EU level by CEN (EN 197), the same isn't true for the concrete standards which have national interpretations (EN 206), further complicating the picture. For example, even though EN 197-6 allows cements containing up to 20% recycled concrete fines, such cements are not recognised under EN 206.

As a result, a national-level EN 206 approval is still required before the cement can be used in standard-compliant concrete.

This is problematic since blending SCMs directly in concrete as a cement replacement is the preferred path for many material producers (more diverse and numerous customer base, lower transport costs, higher obtainable prices). However, this also requires a certification of the SCM as a reactive additive in concrete (or type II filler).

The process is lengthy and costly, with most producers lobbying to fit within existing standards to avoid multi-year delays. In the Netherlands, concrete producers may only use secondary raw materials that carry an independent quality mark. A KOMO certificate - issued by an accredited third party under an assessment guideline (BRL[5]) - verifies that the product consistently meets all mechanical, durability, and environmental limits in national regulations and relevant EN standards. Securing KOMO approval transforms a material from an "innovative waste stream" into a legally accepted, off-the-shelf constituent for concrete.

If a new material is not covered by an existing BRL (or standard), the process for creating or updating a standard is led by CROW[4] . This is the third gate (product/application-level acceptance), and what determines real market access, regardless of CE-marking. At industry's request, CROW will form a committee to decide how a new material should be standardized. If the material does not fit an existing definition, a new standard must be created from scratch, a process that typically takes 3 to 5 years.

If CROW accepts the mandate, it forms a working group of industry representatives to agree on a testing scheme. At this stage many delays occur: what might look like a one-year process on paper often stretches into 3-5 years. Working groups are typically staffed with experts from incumbent businesses, who are not motivated by disrupting their market with new solutions, and because the process requires extensive long-term performance results on large-scale applications. As a result, most producers of new materials lobby to fit within an existing standard.

At the European market level, the situation is more complex: the ETA procedure for new binders in cement and their use in concrete functions as a black box, with unclear criteria and timelines for granting approvals. When an ETA is issued at cement level, additional testing is still required to prove performance in concrete. Moreover, the system is not harmonized across the 27 EU Member States: concrete standards remain a national competence, and each country adapts its rules to local conditions, resulting in a fragmented regulatory landscape that undermines the emergence of a truly pan-European standard and effective harmonization.

At this point in the gate process, potential new materials are usually only available in small pilot quantities, because producing large volumes for scale testing requires building a factory, something financiers will not support until they know the output materials will be standard-compliant. This "chicken-and-egg" dynamic prolongs debates about testing procedures and risk mitigation.

In our Dutch case, eventually CROW draws up a Recommendation (Aanbeveling) attesting the material conformity. After that, once material is produced onsite, KIWA tests and certifies conformity for industrial production. Once conformity with the BRL is confirmed, KIWA issues the KOMO certificate and conducts regular follow-up sampling.

This process is not only lengthy but also costly. Time and money means startups and new entrants wait years for certification without generating revenue, struggling to stay alive and prevented from generating impact - while incumbents continue operating high-carbon plants, locking society into a 4–6 °C heating pathway by century's end.

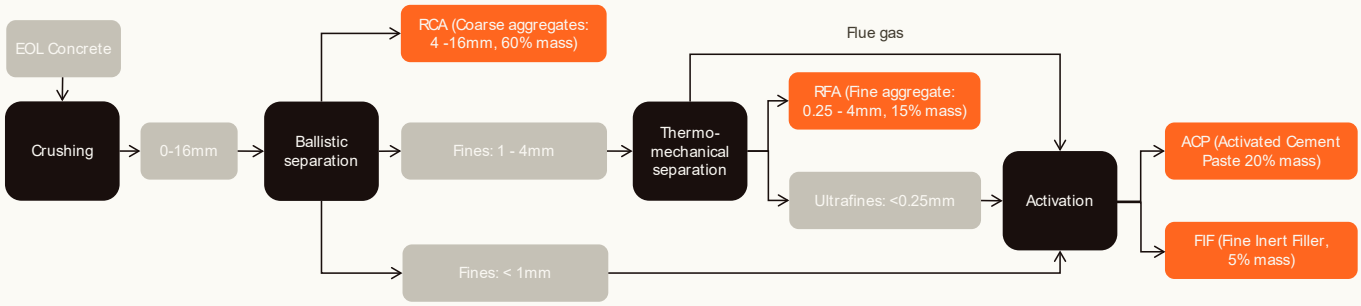
Despite the need for change having never been more urgent, the system is stuck in a structural feedback loop: updating standards requires long-term performance validation; long-term validation requires large-scale production; large-scale production requires major financing; and financing requires certainty of future certification. To make matters worse, the lack of standardized approaches among EU countries for SCMs and reactive additions reduces the possibility for best-practice sharing. National interpretation of standards (e.g., EN 206), country-specific assessor expectations, and local permitting procedures further complicate the process. Meanwhile, weak economic signals such as the EU ETS and green procurement fail to reward low-carbon materials or phase out traditional materials.

As a result, innovative low-carbon solutions developed in the EU increasingly find faster paths to deployment outside Europe, in markets where standards allow performance-based acceptance rather than prescriptive clinker rules. The EU internal market thus risks losing technological leadership in precisely the sector it aims to decarbonise. The status-quo: innovators are launching materials as minor constituents or in non-structural niches where performance and compliance matter less, and established high carbon materials continue to dominate the market.

This highlights an urgent need for regulatory reform: without faster routes to certification, Europe risks missing its 2030 emissions targets for construction materials altogether.

The everox process

everox aims to unlock concrete-to-concrete circularity by upcycling 100% EoL concrete into aggregate, sand, and SCM. With a vision to phase out the use of virgin materials in new concrete, everox generates a high yield of high reactive SCMs from waste concrete from its patented process, which involves a combination of crushing, ballistic separation, thermo-mechanical separation, and activation.



Regulatory landscape for novel SCMs

This section outlines the possible European standards routes for SCMs and related trends in this space.

Route A: Cement Constituent (sold to a cement/ grinding plant): The SCM is incorporated at the cement manufacturing stage; cement producer holds Conformité Européenne (CE) / Declaration of Performance (DoP) for the cement type (with your material within composition limits and performance criteria).

— Pros: Clear market channel; cement maker manages standards/compliance; broad acceptance once certified.

— Cons: You depend on cement producers' blends, logistics, and incentives; approvals tied to their cement types; price capture can be limited, longer transport routes to the cement plant adds cost and reduces comptitiveness

Route B: Reactive type II additive at concrete plant (sold to ready mix/precast): the SCM is supplied as a reactive addition/cement substitute at the concrete stage under concrete standards and project specifications; producer performs mix trials, Factory Production Control (FPC), and declares conformity.

— Pros: Closer to end user; enables local loops; faster iteration with mix designs; optional "home brew" mixes.

— Cons: Patchwork of national annexes and assessor expectations; certification and insurance must be designed case by case; heavier QA/QC burden on buyers and suppliers.

Regulatory trend: Performance vs prescriptive based standards

— Trend: Shift to performance-based acceptance (durability/performance indicators instead of fixed compositions).

— Reality: Key durability indicators (e.g., chloride ingress, carbonation resistance) require long horizons. The sector is developing accelerated proxies and surrogate indices, but a full transition will be slow.

Living lab
South Pier Ijmuiden, Netherlands.
Two of the most sustainable everox butterfly blocks, achieve strenght class C40/50 under harsh conditions, with 30% cement replaced by everox Activated Cement Paste.

Top risks and mitigations

The pathway to certifying and scaling new SCMs is challenging, with three recurring bottlenecks: (i) slow standards and acceptance cycles; (ii) permitting and project-delivery risk; and (iii) commercial risk and price compression

One of the main risks is committee delays, as standards bodies can be slowed by reviewing timelines to reach consensus, often due to incumbent interests. To mitigate this, innovators should pursue parallel European Technical Assessments (ETAs), form buyer coalitions that create demand pressure, and seek oversight from independent third parties to keep processes on track. However, most of these mitigations will reduce the market potential of the material, and also reduce its commercial value.

Another barrier is permitting processes for new production facilities, where local planning andenvironmental approvals can delay projects.

Addressing this risk requires proactive early screening of potential sites, careful site selection that allows for high volumes of delivery and offtake such as close engagement with communities to anticipate and resolve concerns.

A third challenge is price compression, which occurs when new, sustainable materials compete purely on cost with conventional high-carbon products. This can be countered by differentiating through Environmental Product Declarations (EPDs), highlighting local content advantages, bundling recycled concrete aggregates and fines into integrated offerings, and securing long-term offtake agreements that provide stability to both producers and buyers.

What does this mean for everox?

everox is currently launching its Activated Cement Paste (ACP) in the Netherlands. Despite the existence of a cement standard, harmonized at EU level (EN-197-6) which permits the inclusion of this material in cement, there are no regulations or standards for its inclusion in concrete.

Due to this, everox engaged CROW to kick off the certification process in Avugust 2024. After approximately 6 months, a working group was formed, and much debate was generated about which procedure to pursue. Ultimately, a staged inclusion in BRL 1804, with an optional upgrade to BRL 1802 was chosen. BRL 1804 certifies the filler itself as a raw material. This is the quickest legal path to get RCF accepted as a Type I inert filler. Later, BRL 1802 can certify concrete mixes using RCF in the binder.

BRL 1804 requires fewer long-duration tests than 1802. However, a minimum of 6 months is required. Once KOMO-certified under 1804, RCF can be sold to Dutch concrete producers without case-by-case exemptions. Most data generated for 1804 also support eventual 1802 approval.

everox fine inert filler, made from End-of-Life concrete

Solution proposition

The proposed solution involves several approaches:

— Compliance track
Establish a single, harmonized route to update standards for cement and concrete, with standardized testing. Ensure standards bodies are not dominated by incumbents by mandating SME and academic representation and public regulators are properly invovled and ready to step-in to promote change

— Policy reform for SCMs
Create fast lanes for low-risk applications, escalate to structural use based on performance, and mandate adoption of new materials in certain applications.

— Policy reform to phase out business as usual
Tighten ETS allocations, set embodied-carbon thresholds in procurement, and subsidize decommissioning of outdated plants (instead of upgrading them with CCS retrofits).

— Technological route
Use predictive tools to model long-term performance of new mixes, enabling performance-based standards to replace overly prescriptive rules.

Policy recommendation

Modernise standards and approvals

— Fast lane for low risk uses
Create a time bound, evidence based fast track for non-structural and moderate exposure classes with an escalator to structural classes upon accumulating performance data.

— Balanced committees
Mandate SME and independent academic representation quotas in technical committees; publish dissenting opinions to curb prescriptive lock ins.

— ETA/ European Assessment Document (EAD) agility
Resource EAD drafting for circular SCMs; set service level agreements for turnaround times; allow data portability across Member States.

Align incentives in the real economy

— Public procurement
Require embodied carbon thresholds and circular content for public works, with verifiable EPDs and performance-based equivalence.

— Phase out funding
Pair innovation grants with retirement financing for legacy high-emission facilities (modeled on vehicle scrappage+: decommissioning + new low carbon installation).

— Logistics enablement
Plan industrial recycling clusters with guaranteed barge/rail access to reduce truck borne Nitrogen Oxides (NOx) and local opposition.

— Make carbon pricing bite
EU ETS: Reduce free allocations more rapidly, tighten ex post adjustments to production, limit banking that blunts price signals, and synchronise CBAM with domestic allocation reforms to favour low carbon SCM uptake.

— Funding for testing and performance-based standards: Either through Horizon Europe or the EU Innovation Fund, create a funding opportunity to fast-track the development of performance-based (“recipe-free”) cement and concrete. The funding instrument would require open protocols and knowledge transfer to spread capability rapidly across member states and, where appropriate for competitiveness, internationally.

Call to action for policy makers

If Europe is serious about meeting its climate targets, it must move faster to bring low-carbon SCMs into the mainstream. The current regulatory and market framework was built for an industry of incumbents, in a time of stability, not for the innovators developing the materials we urgently need for systemic change.

Policymakers can shift this trajectory by introducing an EU- or Member-State-level fast track for SCMs, backed by clear service-level agreements to accelerate technical assessments.

Establishing predictable timelines and transparent evaluation criteria would give innovators and investors confidence that compliant materials can reach the market within a defined time frame, rather than facing years of regulatory uncertainty.

Public procurement must send stronger signals by mandating embodied-carbon thresholds in tenders and rewarding environmental performance, not just lowest cost. The ETS must be tightened to reflect the true price of carbon, and subsidies should shift away from extending the life of old, high-emission assets toward co-funding their decommissioning and scale-up of clean alternatives.

Conclusion

In short, regulation should not only protect safety - it should actively accelerate the transition.

The cement and concrete sector is one of Europe's hardest-to-abate industries, but it also offers one of the greatest opportunities for rapid decarbonization. Certified, circular SCMs already exist, and innovators are ready to scale them.

What holds them back is not technology, but bureaucracy and weak market signals.
Europe can unlock this potential by reforming certification, tightening carbon pricing, and aligning procurement rules with climate goals.

At the same time, industry must step up and push for systemic change, form coalitions with early adopters, and design supply chains that meet environmental and logistical realities.

Europe can either allow prescriptive standards and bureaucracy to keep the industry on a high-carbon path - or it can lead the world in building a climate-resilient, circular economy for cement and concrete. The time for decisive action is now.

Endnotes

[1]European Technical Assessment (ETA): a conformity route established under the EU Construction Products Regulation (CPR) for products or compositions not (yet) covered by a harmonised European Standard. An ETA can allow CE-marking, but does not in itself guarantee compliance with concrete standards such as EN 206.

[2]SCM: a class of reactive mineral additions (e.g., slag, fly ash, silica fume) used to reduce clinker factor in cement and concrete. SCMs improve durability and lower embodied CO_2, and are therefore central to decarbonisation pathways in construction materials.

[3]Centrum voor Regelgeving en Onderzoek in de Grond-, Water- en Wegenbouw en de Verkeerstechniek: a Dutch knowledge platform and non-profit foundation focused on infrastructure, public space, traffic, and transport.

[4]Kiwa Nederland B.V. is an RvA accredited certification body and the scheme manager ("schemabeheerder") for BRL 1804. It is also one of several KOMO licensed organisations that inspect production, perform quality testing and issue the resulting KOMO product certificate or attest. everox and Dura Vermeer have chosen Kiwa as their preferred certifier.

[5] BRL: Beoordelingsrichtlijn, an assessment guideline that forms the basis for a national quality mark / certificate in the Netherlands

Let's everox that.

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