looper

mpa Dimension Stone

Stone: naturally low-carbon

Choose local. Cut carbon. Keep quality

Natural Stone: low-carbon, local, long-life, circular

Natural stone is the low-carbon choice: far lower manufacturing CO_2, local miles matter, long life/low maintenance, and easy reuse.

Lower CO_2 than alternatives

Evidence shows that natural stone's manufacturing footprint averages about 0.09 $kgCO_2e/kg$ (best-performing results are near 0.02). Typical alternatives are higher: ready-mix 0.15, precast 0.35, bricks 0.27, timber 0.17 and structural steel 2.06.

Choose local first

Transport can outweigh extraction and processing with carbon intensity stepping up from UK to Europe to Global, making local stone the lowest-carbon choice. cutting miles, and strengthening regional supply chains.

Built to last

Natural stone performs for generations with minimal maintenance—every decade not replaced avoids another full cycle of quarrying, processing, and transport.

Naturally circular

Stone is easy to reclaim: it can be lifted, re-cut, or re-finished for a second life, and designing for reuse/recycling reduces carbon emissions; each reuse stretches that small footprint over many more years.


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A Comparative Analysis of Carbon Footprints: Natural Stone vs. Other Construction Materials

Understanding Carbon Emissions Across the Construction Lifecycle

From the first rock quarried to the last beam salvaged, every step in a product's construction lifecycle—making materials, moving them, installing, using, maintaining, and finally reusing or recycling—creates a different kind of carbon impact that we can measure, compare, and reduce.

Think of it as a story with six chapters - Making products is usually the biggest slice. Transport and on-site work add up fast. Care and replacement during use carry a carbon cost. Designing for reuse and recycling shrinks the end-of-life footprint. Together, these constitute the "embodied" carbon emissions for a product.

Reducing Embodied Carbon Through the Use of Natural Stone

A review of Environmental Product Declaration documents (EPDs) was conducted to compare natural stone products with other construction materials on environmental sustainability.

Construction Material	Number of EPDs
Pre-cast Concrete	509
Ready-mix Concrete	75,461
Clay Brick	85
Concrete Masonry Unit	527
Steel (Structural)	246
Timber (Framing)	3
Dimension Stone	**11**

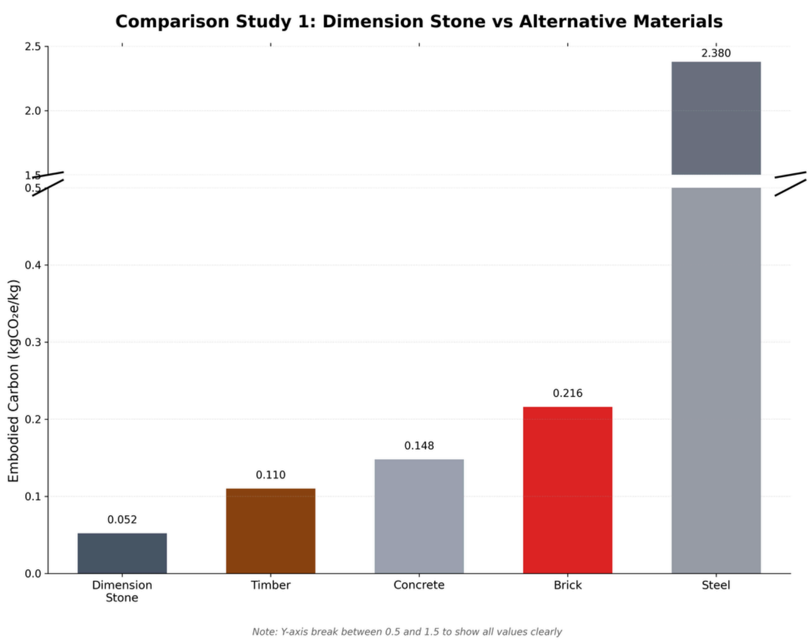
An Environmental Product Declaration (EPD) is like a nutrition label for building materials. It summarises, in a common format, a product's environmental impacts—especially its carbon footprint. The figures come from a life-cycle assessment and are independently verified. EPDs enable fair, apples-to-apples comparisons.

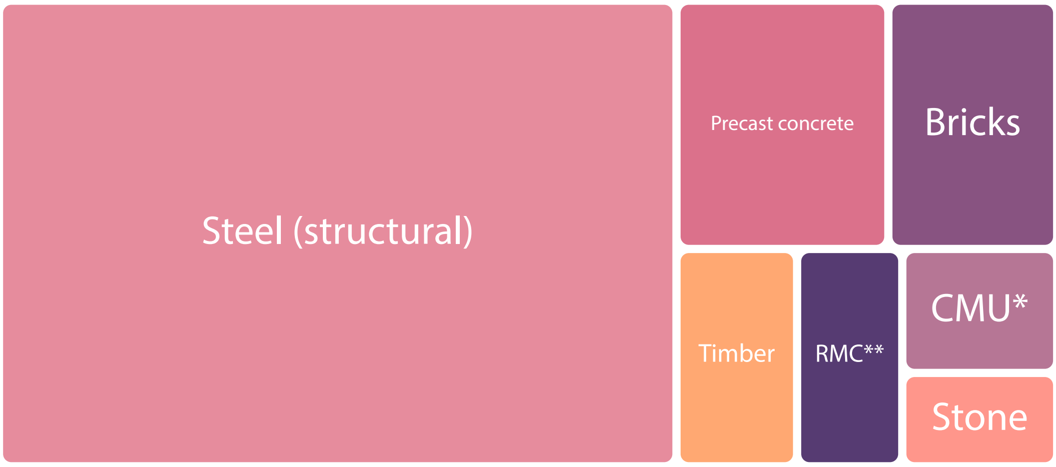
Most figures in this review come from EC3—the Embodied Carbon in Construction Calculator—created by Building Transparency. EC3 is a free, open-access database of digitised, third-party-verified EPDs. Stone results use publicly available EPDs worldwide.

Comparative Life-Cycle Performance of Common Building Materials

This section distills what the EPDs show when we compare materials on a consistent basis. It highlights where the biggest carbon savings are hiding—and how natural stone fits into the picture.

Across the reviewed EPDs, natural stone shows among the lowest per-kilogram embodied carbon (A1–A3). In our sample, stone's average value is about 0.09 $kgCO_2e/kg$, with best-in-class results near 0.02 and a conservative upper end near 0.20. By comparison, ready-mix concrete trends around 0.15, precast concrete near 0.35, bricks roughly 0.27, concrete masonry units about 0.13, and timber framing near 0.17—while structural steel is much higher at roughly 2.06 $kgCO_2e/kg$. On the chart, stone's bar is the shortest; steel's is the tallest by a wide margin. For practical decisions—cladding, paving, interior finishes—this means stone is often a straightforward way to lower upfront emissions relative to many alternatives.





*CMU: Concrete Masonry Units **RMC: Ready-Mix Concrete

A second view presents the carbon intensities of structural construction materials per kg with a hotspot analysis setup. The figure illustrates that structural steel dominates the footprint (about 64%), while stone contributes only a small slice (about 3%) alongside precast concrete (~11%), bricks (~8%), timber (~5%), ready-mix (~5%) and CMU (~4%).

Practical Specification Takeaway

The bottom line: specifying natural stone—locally sourced and backed by EPDs—is a practical, immediate lever for reducing embodied carbon in construction projects.

The EPD review indicates that natural stone carries a notably smaller "upfront" carbon load than many conventional alternatives, and its long service life and ability to be salvaged or reused can compound those benefits over time.

The Hidden Cost of Distance: Carbon Emissions from Imported Stone Transport

Understanding Transport Impacts on Carbon Emissions Across the Construction Lifecycle

Examining how transport shapes emissions highlights key choices that determine a project's overall carbon footprint.

01 Distance Matters

Importing stone long distances by road and sea increases carbon emissions.

02 Local Sourcing Reduces Impact

Choosing locally quarried stone cuts transport emissions, shortens lead times, and strengthens regional supply chains.

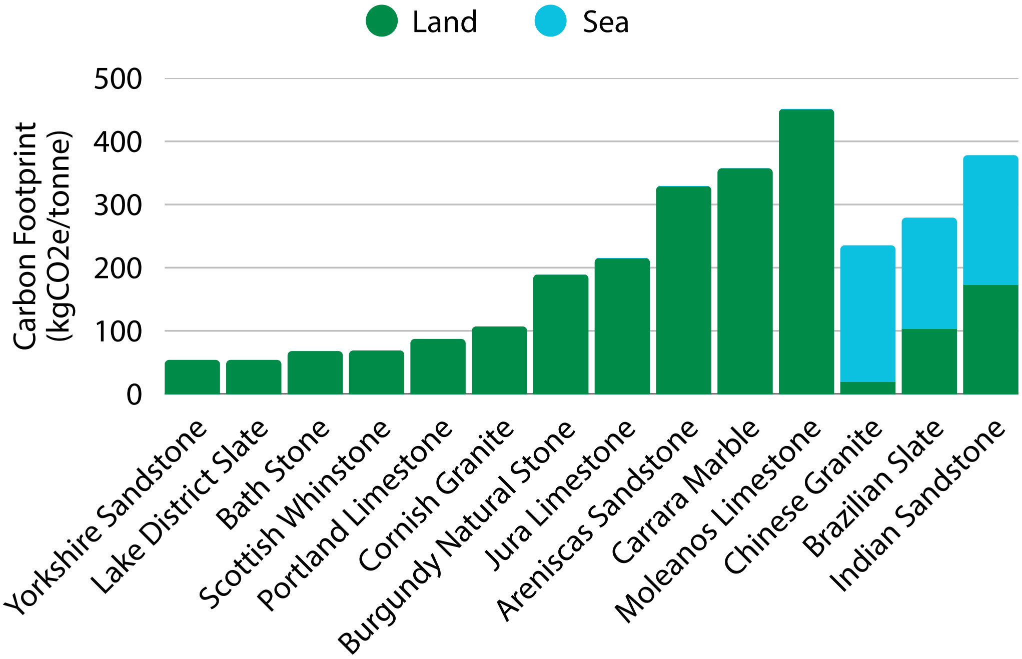
03 Smart Choices Build Sustainable Futures

Selecting materials with transparent origins supports net-zero goals and demonstrates true environmental responsibility.

Exploring how sourcing locations influence embodied emissions reveals the broader climate implications behind each procurement choice.

UK stone travels directly by HGV. European scenarios combine longer road legs with short-sea freight and final delivery. Global scenarios add longer sea shipping to Felixstowe.

The destination assumed in the assessment applies a weighted approach based on annual sales data for London, Manchester and Glasgow for stone products.



Transport carbon footprint: Stone procured from various global regions (Land intensive European sourcing - typical practice)

Indirect sourcing from Brazil to China to UK: Analysis

There are also examples where Brazilian stone is routed to China for processing before shipment to the UK. This increases the total journey from 9,816 km to 41,357 km. Transport emissions rise from approximately 135 to 478 kgCO_2e/t—an additional 344 kgCO_2e/t, or 255%.

The indirect route is therefore more than four times longer and produces over 3.5 times the transport footprint. It demonstrates why specifications should disclose the quarry, processing location and complete logistics route—not simply the stone's country of origin.

A Route-Based Comparison of Stone Transport

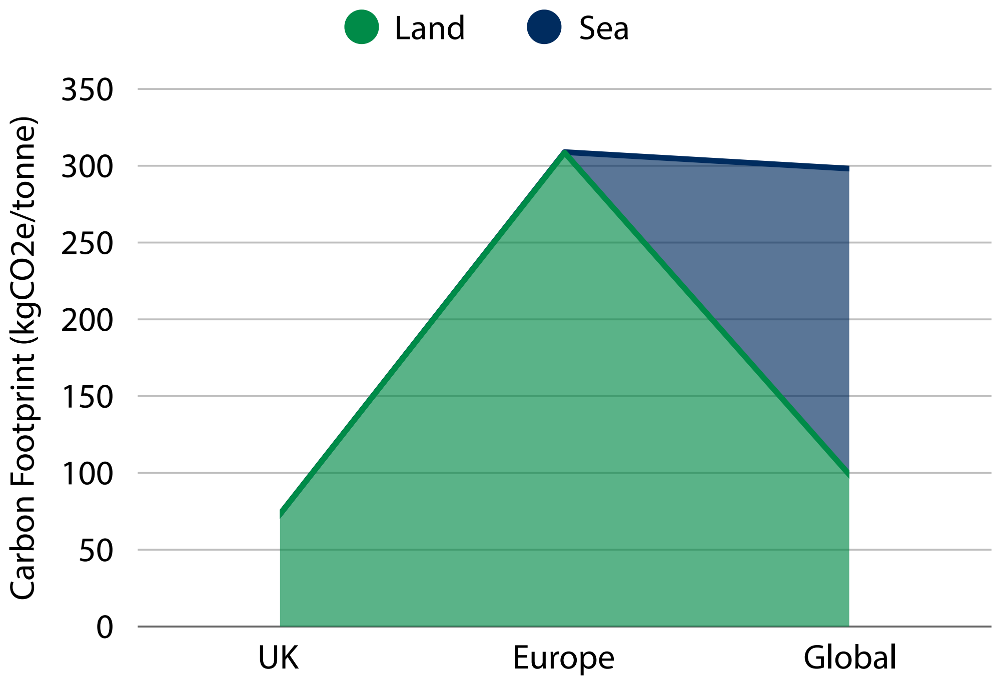
Representative quarry-to-site routes quantify how distance and transport mode drive A4 emissions.

Scope: A4 transport only, functional unit one tonne delivered. Road factors are 0.1868 $kgCO_2e/t{\cdot}km$ for UK/Europe and 0.1979 for Rest of World; the sea factor is 0.01024.

Latest weighted carbon emission results (assuming destinations - London, Manchester, and Glasgow) for UK being 73 $kgCO_2e/t$, Europe 309 and Global 298. UK remains the clear low-carbon option. Europe and Global vary by route, so more specific results can be disclosed with actual quarry, processing and freight legs rather than relying on origin alone.

Chinese granite sensitivity: the latest representative Changtai–Xiamen quarry-to-port leg is 50 km. This is an unusually local case as other sources of chinese granite can be much further away such as a red granite quarried from Sakura in Xijiang which has to travel 600km by road and 2400km by rail to the nearest container port for shipping to the UK

The figures below compare average land and sea contributions under land-intensive and sea-intensive routing assumptions.



Average Transport carbon footprint: Procurement with land intensive European sourcing (typical practice); Multiple sites of use

Local is a route, not a label

Using imported stone can miss project-specific opportunities. Scottish Whinstone has a footprint of 18 kgCO_2e/t compared to Chinese granite at 235 kgCO_2e/t based on transport to the UK—a thirteen-fold difference. Portland Limestone is about 36 kgCO_2e/t compared to Portuguese limestone at 451 kgCO_2e/t. Matching the nearest technically suitable quarry to the project can therefore significantly reduce A4 emissions.

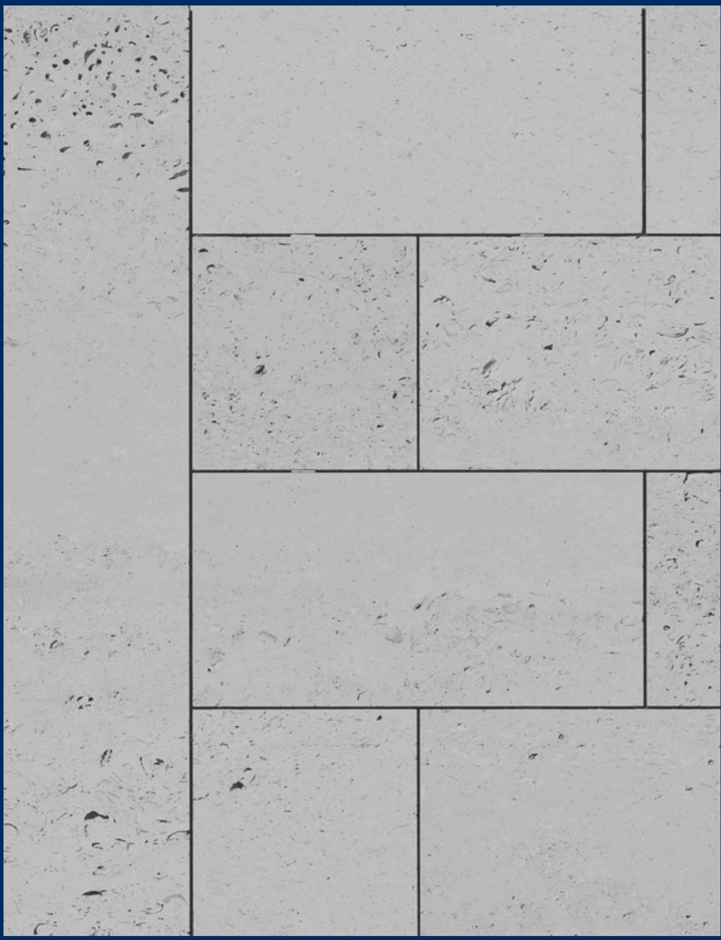
Validating the Carbon Credentials of Natural Stone

Evidence That Stands Up to Scrutiny: Verified Data Supporting Stone's Low-Carbon Performance

Built on open dataset and third-party-verified EPDs, this study offers a transparent, traceable basis for comparison. Every number is source-linked and calculated consistently for decisions that stand up to audit.

While most of the figures are drawn from the EC3 platform, any data gaps are fulfilled by careful selection of only credible, recent EPDs for stone with clear system boundaries, declared units, and independent verification. Calculations follow the ISO 14040/44 life-cycle framework so results remain comparable across scenarios and robust under technical review. The framework defines the principles and framework for conducting a Life Cycle Assessment (LCA) to evaluate the environmental impacts of a product or service across its entire life cycle.

Shaping a lasting legacy.



Sustainable Design Focus

Natural stone embodies resilience and environmental care. Its strength, long life, and low-carbon nature make it the cornerstone of responsible, future-ready construction.

Local Impact Matters

Sourcing locally reduces emissions, supports skilled communities, and ensures each project reflects both regional identity and genuine sustainability.

Natural stone connects tradition and innovation, reminding us that sustainable choices today shape the strength and beauty of tomorrow's built environment.