ARTICLE

Portuguese Natural Stone: Sustainability Proven by Numbers

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Key Message:
Natural stone stands out as the material with the best overall environmental performance at the product stage, with clear leadership in carbon footprint and a balanced profile across the remaining dimensions.

Executive Summary

This article summarizes the results of the project "Environmental Footprint of the Natural Stone Sector", promoted by ASSIMAGRA, with the objective of quantifying and comparing the environmental performance of Portuguese natural stone against its main competing construction materials — ceramics, glass and concrete. Based on third-party verified Environmental Product Declarations (EPDs) and primary data collected from representative companies in the sector, the study assessed the carbon footprint, water footprint and full environmental footprint of the materials at the product stage (modules A1 to A3), in accordance with ISO 14040/44, EN 15804:2012+A2, the GHG Protocol and the Water Footprint Assessment Manual. The results show that natural stone has the lowest median carbon footprint among all the materials analysed — 4.8 kg CO_2eq/m², compared with 13.4 for ceramics, 15.3 for concrete and 39.1 for laminated glass — fossil resource consumption equivalent to concrete and significantly lower than glass and ceramics, and a balanced overall environmental profile, with low-to-moderate median values across most impact categories assessed. These data position natural stone as the cladding and flooring material with the most favourable overall environmental profile at the product stage.

4.8 kg CO_2eq/m²
median total GWP

136.3 MJ/m²
fossil resources (median)

4.1 m³/m²
water use (median)

1. Introduction — The Awakening of Environmental Awareness in Construction

The construction sector is at an unprecedented turning point. The European Green Deal has set an ambitious path towards climate neutrality by 2050, and the construction sector — responsible for around 36% of CO_2 emissions and 40% of energy consumption in the European Union — is at the centre of this transformation [1]. Regulatory instruments such as the EU Taxonomy for sustainable activities, the new Construction Products Regulation (CPR), which since January 2025 has progressively required the publication of environmental data [2], and the promotion of Green Public Procurement (GPP) are redefining market rules, demanding transparency, rigour and, above all, hard data [3].

Within this new paradigm, the ability to demonstrate the environmental performance of a construction material has ceased to be a competitive differentiator and has become a condition for market access. Environmental Product Declarations (EPDs), based on Life Cycle Assessment (LCA) studies, are becoming mandatory for the placing on the market of construction materials in Europe. By 2028, manufacturers will have to declare at least five environmental indicators; by 2032, the full sixteen indicators defined in the LCA framework will be required [2].

Natural stone, and Portuguese stone in particular, has always been valued for its durability, versatility and aesthetics. It enjoys an intuitive reputation as a “sustainable” material — after all, it is a product of nature, extracted and processed without recourse to intensive thermal processes. Yet this perception lacked the quantitative and scientific validation needed to prove it unequivocally and position it against competing materials.

To meet this strategic need, ASSIMAGRA — Associação Portuguesa da Indústria dos Recursos Minerais — launched the project “Environmental Footprint of the Natural Stone Sector”. This pioneering study involved representative companies from the sector and analysed real products using robust international methodologies (ISO 14040/44, EN 15804:2012+A2, GHG Protocol and Water Footprint Assessment Manual) [4] [5] [6]. For the first time, the sustainability of Portuguese stone was translated into verifiable figures and systematically benchmarked against competing materials based on third-party verified EPDs. This article presents the results of that work, offering a solid factual basis for architects, engineers, contractors and policymakers.

2. What Is the Environmental Footprint?

2.1. Life Cycle Assessment

Far from being mere “green intuition”, measuring sustainability is a science. The concept of environmental footprint is based on the Life Cycle Assessment (LCA) methodology, a technical and systematic analysis that quantifies the environmental impacts of a product across all stages of its existence. This study adopted a “Cradle to Gate” boundary, covering modules A1 to A3 defined in EN 15804, as described in the following table.

Module	Stage	Description
A1	Extraction	Processing raw materials at the quarry (cutting, blasting, handling)
A2	Transport	Movement of blocks from the quarry to the processing plant
A3	Processing	Sawing, cutting, surface finishing (polishing, honing, bush-hammering) and packaging

The functional unit adopted for comparing materials is 1 m² of cladding or flooring, using thicknesses representative of each product type. This choice ensures a common basis for comparison, although it is recognised that differences in composition, density and manufacturing processes between materials introduce limitations that must be considered when interpreting the results [8].

2.2. Environmental Indicators

The environmental footprint is communicated through three main dimensions, each offering a complementary perspective on product performance.

The Carbon Footprint is the best-known and most visible indicator. It measures total greenhouse gas (GHG) emissions associated with the product, expressed in kilograms of carbon dioxide equivalent (kg CO_2eq). Calculated in accordance with the GHG Protocol [5], it includes both direct emissions (for example, diesel combustion) and indirect emissions (consumed electricity, purchased materials). For comparison between materials, the total GWP (Global Warming Potential) indicator from EPDs was used, since comparable data for competing materials calculated using the same GHG Protocol methodology applied to natural stone were not available [8].

The Water Footprint assesses not only the volume of water consumed, but above all the impact on the quality and availability of water resources. In this comparative study, the EPD impact categories relevant to the water dimension were analysed: water use (m³/m²), freshwater eutrophication (kg P eq./m²), marine eutrophication (kg N eq./m²) and freshwater ecotoxicity (CTUe/m²) [6] [8].

The Full Environmental Footprint provides the broadest picture, analysing additional impact categories according to the EF 3.1 methodology recommended by the European Commission [7]. In the comparative report, three complementary categories considered representative were selected: use of fossil resources (MJ), use of mineral and metal resources (kg Sb eq.) and particulate matter emissions (disease incidence) [8].

2.3. Data Sources and Indicators

The comparative analysis was based on third-party verified EPDs, complemented by the results of the environmental footprint study carried out within the project for natural stone products. Four representative products were selected for each competing material (ceramics, glass and concrete) and thirteen natural stone products [8].

Given the limited amount of data available per category and the spread observed among values, the median was chosen as the central tendency indicator, as it was considered less influenced by extreme values and more suitable for an indicative reading of the typical behaviour of the set analysed. In addition, arithmetic mean values are also presented, allowing a fuller reading of the distribution of results [8].

> The environmental footprint is not an opinion. It is a scientific measurement, based on real data collected from companies, processed with internationally recognised tools (SimaPro, Ecoinvent database) and framed by ISO and European standards.

3. Portuguese Natural Stone under the Microscope — The Real Numbers

The study analysed in detail thirteen representative products from the natural stone sector, originating from different regions of Portugal and complemented by EPDs for European products. The results are presented in aggregated form, reflecting the environmental performance of the sector.

3.1. Carbon Footprint

The carbon footprint of Portuguese natural stone, measured using the total GWP indicator (modules A1 to A3), shows the following aggregated values for the set of thirteen products analysed:

Statistical Indicator	Value (kg CO_2eq/m^2)
Mean	9.9
Median	4.8
Range	-0.1 to 33.0

The difference between the mean (9.9 kg CO_2eq/m^2) and the median (4.8 kg CO_2eq/m^2) reflects the presence of some products with more intensive processing routes that raise the mean, while most products lie at significantly lower values. The median of 4.8 kg CO_2eq/m^2 represents the sector's typical behaviour and constitutes the most robust reference value for comparative purposes [8].

Analysis of environmental hotspots shows that the main contributors to the carbon footprint of natural stone are diesel consumption in extraction operations, grid electricity consumed during processing, and auxiliary materials (namely diamond wire and cutting tools). In most products, the extraction stage (module A1) is the largest contributor to carbon impact, while transport (module A2) has only a residual influence [9].

3.2. Water Footprint

The water footprint of natural stone reflects the characteristics of its production processes, which depend on a continuous water supply for cutting, sawing and finishing operations. The sector shows increasingly circular water management, with recirculation systems implemented in most facilities. Variability in the results is often linked to the indirect water footprint of auxiliary materials and not only to direct process water consumption [8] [9].

3.3. Full Environmental Footprint

Analysis of the additional impact categories confirms that the sector's main environmental hotspots are fossil fuel consumption (diesel in quarries), grid electricity and auxiliary materials. In most products, extraction is the stage with the greatest contribution to overall environmental impact, which clearly indicates where improvement efforts should be concentrated: equipment electrification, transition to renewable energy and optimisation of cutting processes [9].

4. Comparative Analysis with Competing Materials

This is the central section of the study for the sector's strategic positioning. The comparative analysis, carried out in report E9 [8], benchmarked natural stone products against their main competitors in cladding and flooring applications — ceramics, laminated glass and concrete — using data from third-party verified EPDs and employing both mean and median as central tendency indicators.

4.1. Carbon Footprint — Natural Stone as the Clear Leader

The following table summarises the mean and median total GWP (A1-A3) obtained for each material group.

Material	Mean (kg CO_2eq/m²)	Median (kg CO_2eq/m²)
Natural Stone	**9.9**	**4.8**
Ceramics	12.1	13.4
Concrete	17.4	15.3
Laminated glass	40.0	39.1

The results consistently indicate that **natural stone presents the lowest carbon footprint among the products analysed.** The median for natural stone (4.8 kg CO_2eq/m²) is 2.8 times lower than ceramics (13.4), 3.2 times lower than concrete (15.3) and 8.1 times lower than laminated glass (39.1). Even when considering the mean — which is more sensitive to extreme values — natural stone (9.9 kg CO_2eq/m²) remains in first place, below ceramics (12.1), concrete (17.4) and glass (40.0) [8].

The following table presents the same comparison for fossil GWP, which isolates emissions associated with the combustion of fossil fuels.

Material	Mean (kg CO_2eq/m^2)	Median (kg CO_2eq/m^2)
Natural Stone	**9.2**	**5.3**
Ceramics	12.7	14.1
Concrete	17.4	15.3
Laminated glass	39.6	38.6

Natural Stone also leads by a wide margin in fossil GWP, confirming that its carbon advantage is not an artefact but the result of a structural difference in production processes [8].

Natural Stone vs. Ceramics — Ceramics show a median of 13.4 kg CO_2eq/m^2 and a mean of 12.1 kg CO_2eq/m^2. Firing in natural-gas kilns, at temperatures that may exceed 1,100 °C, is the main impact driver. The variability observed among ceramic products is mainly linked to the number of firing cycles applied, this stage being the principal hotspot due to intensive natural gas use [8]. By both mean and median, ceramics have a significantly higher carbon footprint than natural stone.

Natural Stone vs. Concrete — Concrete shows a median of 15.3 kg CO_2eq/m^2 and a mean of 17.4 kg CO_2eq/m^2. Differences between solutions are strongly influenced by functional thickness and cement dosage per tonne. The production of clinker — an essential component of Portland cement — requires the calcination of limestone in kilns at temperatures between 1,400 °C and 1,600 °C, a process that releases significant amounts of CO_2 both through fossil fuel combustion and through the chemical decomposition of carbonates [8]. Natural stone, by contrast, is already geologically “ready” — it does not need to be recreated in a factory.

Natural Stone vs. Glass — Laminated glass is the material with the highest carbon footprint in the comparison, with a median of 39.1 kg CO_2eq/m^2 and a mean of 40.0 kg CO_2eq/m^2. Float glass melting processes at temperatures between 1,500 °C and 1,700 °C, followed by tempering and lamination, are dominated by natural gas and grid electricity, resulting in a carbon footprint eight times higher than natural stone by median and four times higher by mean [8].

4.2. Water Footprint — Mid-Range Performance with an Advantage over Glass

Analysis of the impact categories relevant to the water footprint reveals a mid-range position for natural stone, with clear advantages over glass and results that are comparable to, or slightly higher than, those of ceramics and concrete.

Impact Category	Ceramics	Glass	Concrete	**Natural Stone**
	Mean / Median	Mean / Median	Mean / Median	**Mean / Median**
Water Use (m^3/m^2)	1.8 / 1.8	111.3 / 10.6	1.4 / 1.4	**40.2 / 4.1**
Freshwater eutrophication (kg P eq./m^2)	0.00009 / 0.00010	0.0039 / 0.0023	0.00043 / 0.00048	**0.00132 / 0.0008**
Marine eutrophication (kg N eq./m^2)	0.0067 / 0.0068	0.1772 / 0.0637	0.0138 / 0.0115	**0.031 / 0.019**
Freshwater ecotoxicity (CTUe/m^2)	38.3 / 38.3	280 / 280	165 / 56	**289 / 156**

In the water use category, natural stone shows a median of 4.1 m^3/m^2 and a mean of 40.2 m^3/m^2. The large gap between mean and median indicates the presence of products with atypical water consumption that inflate the mean, making the median the more representative indicator of the sector's typical behaviour. Natural stone lies between ceramics (median 1.8 m^3/m^2) and concrete (median 1.4 m^3/m^2), which benefit from closed-loop systems and processes less dependent on continuous wet operations, and glass (median 10.6 m^3/m^2), whose cooling and intensive washing systems generate significantly higher consumption [8]. In natural stone, cutting, sawing and finishing processes require continuous water for cooling, although recirculation is common practice in the sector.

In the eutrophication categories (freshwater and marine), natural stone shows intermediate values, higher than ceramics and concrete but significantly lower than glass, both by mean and by median. In freshwater ecotoxicity, natural stone (median 156 CTUe/m^2) lies above ceramics (median 38.3 CTUe/m^2) and concrete (median 56 CTUe/m^2), but below glass (median 280 CTUe/m^2) [8].

In summary, natural stone demonstrates intermediate water performance: it is neither the most impactful option nor the least demanding in terms of water. It does, however, offer clear advantages over glass across all the water-related categories analysed.

4.3. Environmental Footprint — Fossil Resources, Minerals and Particulate Emissions

Analysis of the three complementary environmental impact categories reveals significant differences between materials and confirms the favourable position of natural stone.

Impact Category	Ceramics	Glass	Concrete	**Natural Stone**
	Mean / Median	Mean / Median	Mean / Median	**Mean / Median**
Use of fossil resources (MJ/m²)	183.9 / 206.6	532.6 / 542.1	135.3 / 135.6	**223.2 / 136.3**
Use of mineral and metal resources (kg Sb eq./m²)	0.00005 / 0.00005	0.00025 / 0.00010	0.000037 / 0.000031	**0.00147 / 0.000034**
Particulate matter emissions (disease inc./m²)	0.0000005 / 0.0000005	0.0000014 / 0.0000014	0.0007287 / 0.0002808	**0.0000053 / 0.0000034**

In the use of fossil resources, natural stone shows a median of 136.3 MJ/m², virtually equivalent to concrete (135.6 MJ/m²). These two materials record the lowest values in this category. Ceramics (median 206.6 MJ/m²) are 1.5 times higher, while glass (median 542.1 MJ/m²) shows fossil resource consumption approximately four times higher than natural stone [8]. By mean, natural stone (223.2 MJ/m²) lies slightly above ceramics (183.9 MJ/m²), reflecting the presence of some more energy-intensive products; however, the median — the more robust indicator — confirms a leading position shared with concrete. This result is particularly relevant because it reflects natural stone's lower dependence on intensive thermal processes and fossil fuels, positioning it favourably in the context of the energy transition.

In the use of mineral and metal resources, natural stone presents a considerably higher mean value (0.00147 kg Sb eq./m²) than the other materials analysed (ceramics: 0.00005; glass: 0.00025; concrete: 0.000037). However, its median value (0.000034 kg Sb eq./m²) is lower than that of ceramics (0.00005) and glass (0.00010), suggesting that the elevated mean is driven by a smaller number of higher-impact cases rather than being representative of the typical value across the sector. This result should be interpreted with caution, since it does not necessarily represent the extraction of stone as a raw material, but rather mainly reflects the use of mineral and metal resources associated with consumables and equipment in the production process, namely diamond wire and cutting tools [8].

For particulate matter emissions, natural stone shows very low values both by mean (0.0000053 disease incidence/m²) and by median (0.0000034 disease incidence/m²), on the same order of magnitude as ceramics and glass, and significantly lower than concrete (median 0.0002808 disease incidence/m²), whose production and handling of cement and aggregates generate more pronounced particle emissions [8]. It should, however, be noted that data coverage for this category is limited and heterogeneous, so the results should be interpreted as indicative of trends.

4.4. Overall Environmental Profile — Natural Stone as the Most Balanced Material

The combined analysis of the eight most relevant impact categories, represented graphically in report E9 by a normalised radar chart, highlights clear and differentiated trends among the materials assessed [8].

Environmental Dimension	Best Performance	Position of Natural Stone
Carbon footprint — total GWP	**Natural Stone**	**1st place** (median 4.8 / mean 9.9 kg CO_2eq/m²)
Carbon footprint — fossil GWP	**Natural Stone**	**1st place** (median 5.3 / mean 9.2 kg CO_2eq/m²)
Use of fossil resources	Concrete / **Natural Stone**	**1st-2nd place** (median 136.3 MJ/m²)
Use of mineral and metal resources	Concrete / **Natural Stone**	**1st-2nd place** (median 0.00003 Kg Sb eq)
Particulate matter emissions	Ceramics / **Natural Stone**	**2nd place** (very low value)
Water use	Concrete	3rd place (intermediate)
Freshwater eutrophication	Ceramics	3rd place (intermediate)
Marine eutrophication	Ceramics	3rd place (intermediate)
Freshwater ecotoxicity	Ceramics	3rd place (intermediate)

Glass tends to show the highest values in several categories, reflecting the energy and material intensity of its production processes. Ceramics display an overall profile with low-to-moderate median values across most categories, consistent with technologically mature industrial processes. Concrete shows an intermediate profile, standing out for more pronounced impacts in the particulate matter emissions category [8].

Across the categories analyses, natural stone shows low-to-moderate median values and a relatively homogeneous distribution of impacts, reflecting predominantly mechanical processes and a lower intensity of industrial transformation. Overall, natural stone presents a balanced environmental profile, reflecting lower energy dependence and reduced pressure on resources and emissions when compared with industrial materials of greater complexity [8].

5. The Reasons behind the Numbers — Why Natural Stone?

The excellent environmental performance of Portuguese Natural Stone, particularly in the carbon dimension, is not accidental. It is the result of four fundamental factors that structurally distinguish it from competing materials.

Geology as an ally. Nature has done the "heavy lifting" over millions of years. Stone has already undergone the geological pressure and temperature processes that gave it its properties. There is no need to "recreate" the material in a factory — only to extract and shape it. This is the fundamental difference compared with concrete (which requires the calcination of limestone at temperatures above 1,400 °C), ceramics (which require the firing of clays at temperatures above 1,100 °C) and glass (which requires the melting of silica at temperatures between 1,500 °C and 1,700 °C).

Mechanical versus thermal processes. Stone processing is essentially a "cold" process. Sawing, polishing, honing, bush-hammering and cutting operations are mechanical and do not involve kilns or direct combustion. Energy consumption is dominated by electricity — which in Portugal has a growing renewable component — and by diesel in quarries, a clear hotspot for future improvements. Data from report E9 confirm this advantage: natural stone and concrete have the lowest median fossil resource consumption (136 MJ/m²), while ceramics consume 207 MJ/m² and glass 542 MJ/m² [8].

Unrivalled durability. A natural stone floor or cladding system has a service life that easily exceeds 50 years and may last for centuries with proper maintenance. When environmental impact is considered per year of service life, stone spreads its initial impact in an incomparable way. It is relevant to note that the EPDs of the laminated glass products analysed indicate a reference service life of only 20 to 30 years, compared with 50 years for natural stone, ceramics and concrete [8]. If the comparison were adjusted to actual service life, natural stone's advantage would be even more pronounced.

Technological development of the sector. The Portuguese industry has invested significantly in modernisation. Several facilities already have photovoltaic panels for self-consumption, water recirculation systems are increasingly common, and waste management is evolving towards more circular models. The study clearly identified the replacement of diesel by electric solutions in extraction and the transition to renewable sources as the levers with the greatest potential to reduce the footprint.

> The fundamental difference lies not only in what we do. It lies in what we do not need to do. While competing materials require kilns, combustion and intensive chemical processes to create their materials, natural stone already exists — we simply reveal it.

6. Limitations and Caveats in Interpreting the Results

The scientific robustness of this study requires a transparent identification of its limitations, as detailed in report E9 [8].

First, the results are based on a combination of sources — third-party verified EPDs and primary project data — with different levels of detail and representativeness. Methodological differences remain between studies, including inclusion and exclusion criteria, allocation rules and consumables modelling, which may influence the comparative results.

Second, the values presented correspond to medians and means from a limited set of studies, which reduces the influence of extreme values but does not ensure full statistical representativeness for each material. Data coverage is particularly limited for some impact categories, such as freshwater ecotoxicity and particulate matter emissions, which are not mandatory under EN 15804:2019.

Third, although a common functional unit (1 m²) was adopted, there are relevant differences between materials in terms of density, thickness and mass per functional unit, which should be considered when interpreting the results.

In view of these limitations, the results should be interpreted as indicative of trends and orders of magnitude, rather than as absolute or definitive values of environmental performance [8]. Even so, the consistency of the observed trends — notably the advantage of natural stone in carbon footprint and fossil resource consumption, both by mean and by median — lends robustness to the main conclusions.

7. The New Tool: Measuring to Create Value

The project did not merely produce retrospective data. Based on the results and the calculation algorithms developed, a Digital Environmental Footprint Calculation Platform — "StonePRINT" — was created, an innovative tool that will be made available within the StonebyPortugal ecosystem for companies in the sector.

Benefit	Description
Preparation of EPDs	Facilitates and speeds up the preparation of Environmental Product Declarations, reducing cost and time
Response to tenders	Make it possible to respond with concrete data to specifications requiring sustainability criteria
Credible communication	Provides quantified arguments for architects, specifiers and end consumers
Identification of improvements	Allows each company to identify its environmental hotspots and prioritise improvement investments
Regulatory compliance	Anticipates the requirements of the new EU Construction Products Regulation (CPR)

This platform will enable each company, autonomously and accessibly, to calculate the carbon footprint and water footprint of its own products by entering its specific production data — energy, water and material consumption, and waste volumes. Results are generated using the same methodologies applied in the study, ensuring consistency and credibility.

> Sustainability has ceased to be a generic promise and has become a certified figure, accessible to the entire Portuguese natural stone industry.

8. Conclusion — Stone as an Ally of a Sustainable Future

The data presented in this article, based on the comparative report E9 of the project “Environmental Footprint of the Natural Stone Sector”, are consistent and convergent. The results obtained indicate that Portuguese natural stone presents a very favourable environmental profile and, within the set of products analysed, the best overall environmental performance at the product stage. These conclusions should be interpreted considering the methodological limitations and the representativeness of the data used.

The results show that natural stone has the lowest carbon footprint, both by median (4.8 kg CO_2eq/m²) and by mean (9.9 kg CO_2eq/m²) — values 2.8 to 3.2 times lower than those of ceramics and concrete, and up to 8.1 times lower than those of laminated glass. At the same time, it has one of the lowest levels of fossil resource consumption (median 136.3 MJ/m², virtually equivalent to concrete), very low particulate matter emissions, and a balanced overall environmental profile with low-to-moderate median values across most impact categories assessed [8].

In the water dimension, natural stone occupies an intermediate position, with clear advantages over glass but higher values than ceramics and concrete in some categories. This is an area where the sector has scope to improve, notably through optimisation of water recirculation systems and effluent management.

The study also reveals that the sector has significant potential to reduce its environmental footprint even further. Replacing diesel with electric solutions in extraction, increasing the share of renewable energy, optimising consumables use and valorising waste are clear and feasible pathways for consolidating the environmental competitive advantage of natural stone.

The message for the market — architects, engineers, contractors, property developers and policy-makers — is clear: by choosing Portuguese natural stone, you are choosing the material with the lowest carbon footprint, a balanced environmental profile and a certified environmental identity, underpinned by scientific data, international methodologies and an industry committed to continuous improvement.

Because the future of architecture is not built on opinions. It is built on data.

Methodological Note

This article is based on the results of reports E7 (Environmental Assessment Report: Environmental Footprint, Carbon Footprint and Water Footprint) and E9 (Comparative Report with Materials Competing with Natural Stone, Version 2, February 2026), developed within the project “Environmental Footprint of the Natural Stone Sector”, promoted by ASSIMAGRA. The study was carried out by Business as Nature (BasN) and GET2C and followed ISO 14040/44, EN 15804:2012+A2, the GHG Protocol and the Water Footprint Assessment Manual. Primary data were collected from participating companies for the 2023 reference year, and secondary data came from the Ecoinvent database, processed in SimaPro. The comparative analysis was based on third-party verified EPDs consulted in the International EPD System, the DAPHabitat system and equivalent schemes in other European countries.

References

[1] European Commission. The European Green Deal. Available at: https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en

[2] European Commission. (2025). New EU rules on the safety and sustainability of construction products. Available at: https://single-market-economy.ec.europa.eu/news/new-eu-rules-safety-and-sustainability-construction-products-mark-new-step-sectors-competitiveness-2025-01-07_en

[3] European Commission. Green public procurement. Available at: https://commission.europa.eu/funding-tenders/tools-public-buyers/green-procurement_pt

[4] ISO 14040:2006. Environmental management — Life cycle assessment — Principles and framework.

[5] GHG Protocol. (2011). Product Life Cycle Accounting and Reporting Standard. World Resources Institute.

[6] Hoekstra, A.Y., Chapagain, A.K., Aldaya, M.M. & Mekonnen, M.M. (2011). The Water Footprint Assessment Manual. Earthscan.

[7] Sala, S. et al. (2019). Indicators and assessment of the environmental impact of EU consumption. EUR 29648 EN, Publications Office of the European Union.

[8] Business as Nature & GET2C. (2026). E9 — Comparative Report with Materials Competing with Natural Stone (Version 2). Project “Environmental Footprint of the Natural Stone Sector”. ASSIMAGRA.

[9] BASN, GET2C & SERQ. (2025). E7 — Environmental Assessment Report: Environmental Footprint, Carbon Footprint and Water Footprint. Project “Environmental Footprint of the Natural Stone Sector”. ASSIMAGRA.

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