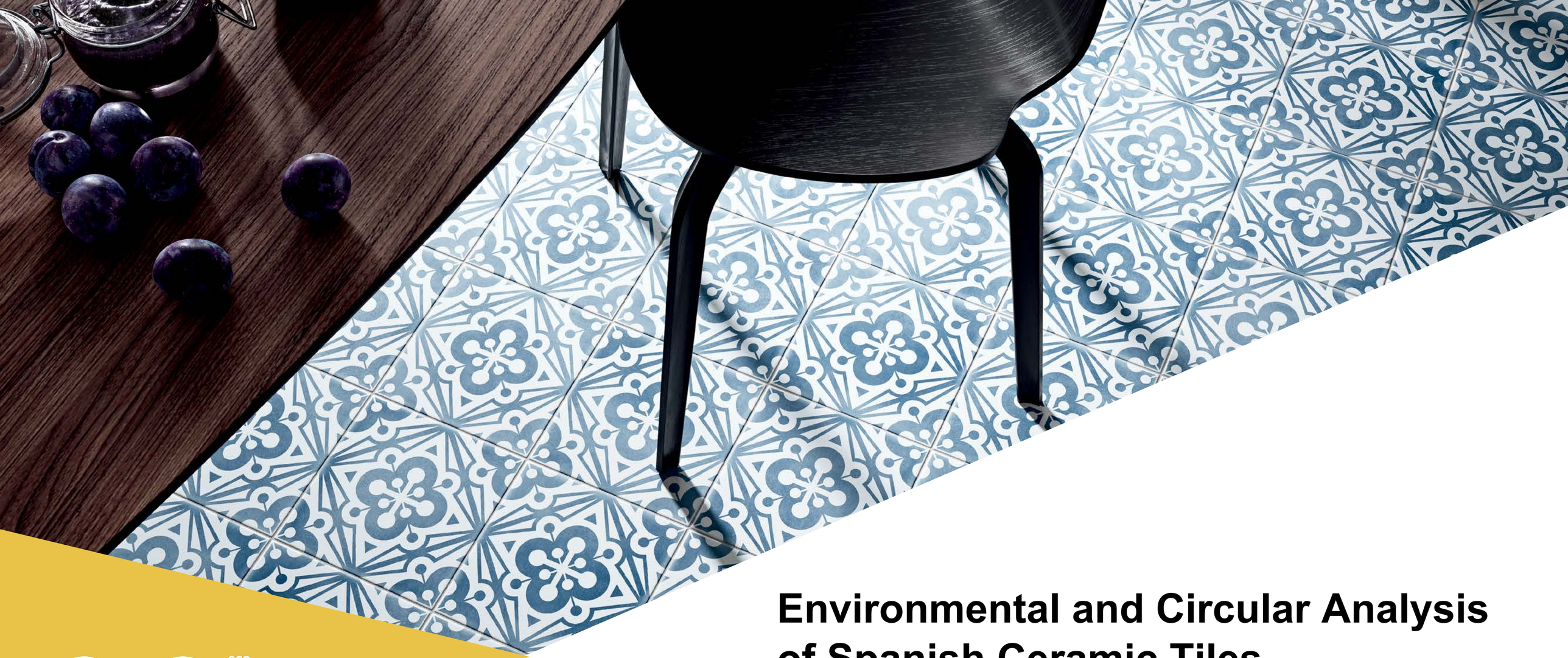

eco intelligent growth
cradle of the circular economy

Environmental and Circular Analysis of Spanish Ceramic Tiles

Relevant Information for Consumers

GENERALITAT VALENCIANA
Conselleria de Hacienda y Modelo Económico

MÒDEC

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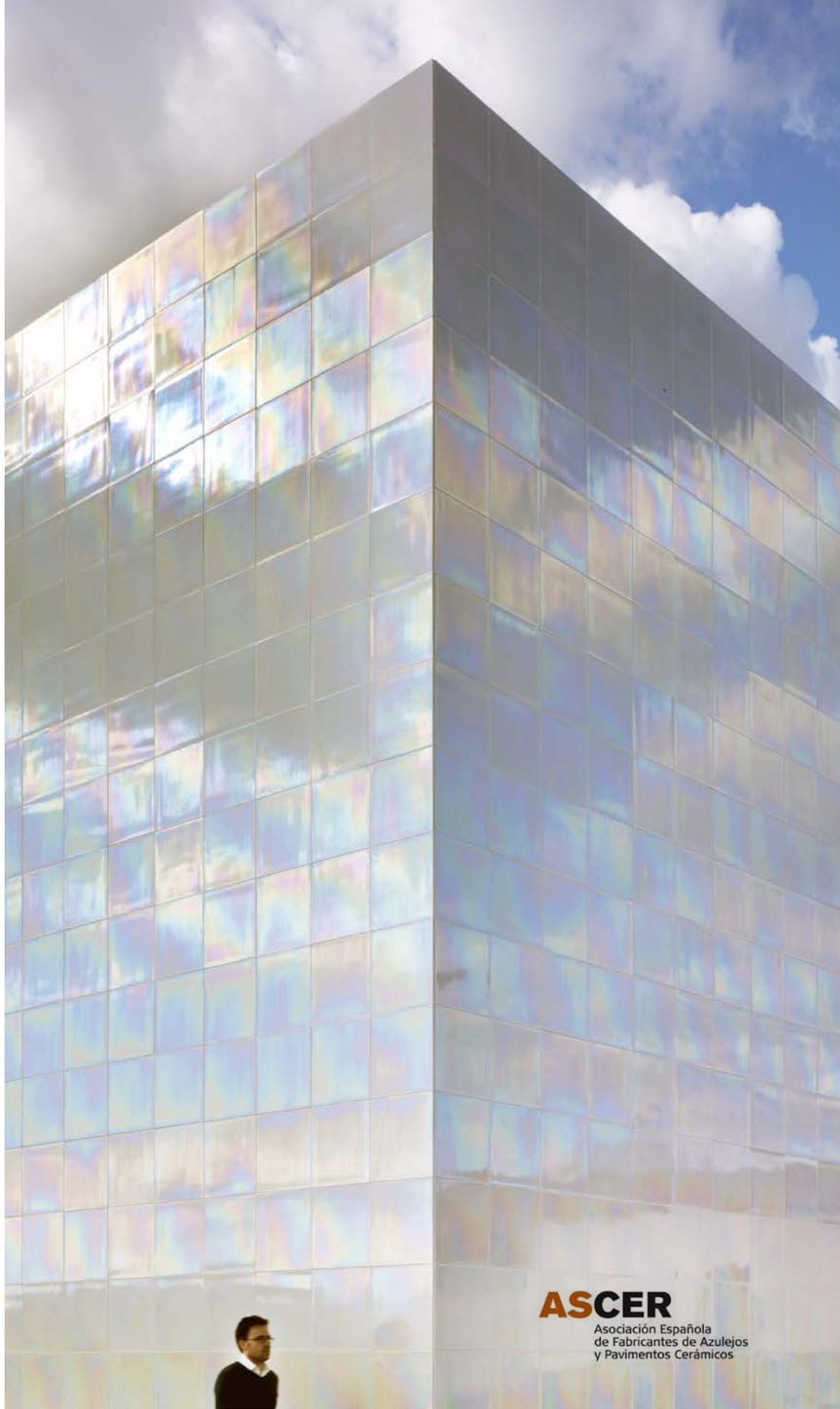

1. Introduction

This report has been developed with the aim of positioning the Spanish ceramic tile sector in the international market from the perspective of a circular economy, considering aspects of its impact on indoor air quality and its carbon cycle.

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A literature review for the Spanish and international ceramic tile industry has been carried out, analysing different aspects of the ceramic tile:

- The material's intrinsic characteristics;
- The carbon cycle of the ceramic tile and an analysis of the life cycle of the material compared to other types of flooring;
- The contribution of ceramic tiles to sustainable building programmes;
- The positioning of ceramic tiles in product certification programmes;
- Alignment of the Spanish ceramic tile industry with the 2030 Agenda for Sustainable Development.

This analysis reflects the commitment of the Spanish ceramic tile sector industry's commitment to be aligned with the paradigm shift towards a circular economy with a positive social, economic, and environmental impact.

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The Spanish ceramic tile industry and its environmental performance

137
companies

16,100
occupied

€3,842M
total sales

€2,941M
(76%) exports

187
countries

2020 Data

Determined to adapt its production processes to achieve net zero greenhouse gas emissions by 2050, the ceramic tile sector has been making technological and innovative improvements to its production processes to achieve results that go beyond reducing its carbon footprint. Its goal is also to optimise processes in other areas, such as raw materials and water management.

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Carbon footprint reduction

For decades, the Spanish ceramic tile industry has been adopting energy efficiency measures and the best available technologies to reduce the sector's carbon footprint and decrease CO2 emissions. The most representative measures adopted include:

- **Waste heat recovery,**
- **Replacement with more efficient burners in furnaces and the consequent reduction of gas consumption,**
- **High efficiency furnaces,**
- **High efficiency cogeneration systems,**
- **Use of natural gas (cleanest fuel currently available).**

Due to constant application of innovative technological improvements in energy efficiency, the total CO2 emissions of the ceramic tile industry per tonne of fired product have been cut by 60% since 1980.

Reuse of production process waste

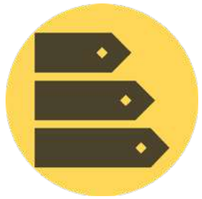
In the product process, the use of recycled material is encouraged, turning remnants into raw material for new products to cut down on waste. The sector manages to reuse an estimated 100% of the clay waste before it is fired and an effort is made to recover as much of the fired pottery as possible to lower the environmental impact of using virgin raw materials.

Water consumption and management

The sector makes efficient use of water resources to minimise water consumption per square metre of product manufactured. A total 80% of raw water consumption is for atomisers, where it is almost completely evaporated in the process. The remaining 20% of water consumption is part of a closed cycle in the production process, in which all wastewater is recycled and reused. This means that the wastewater discharge in the ceramic tile production process is equal to zero.

Environmental Product Declaration (EPD)

The Spanish ceramic tile industry has pioneered the development of a sectoral EPD for ceramic tiles at the European level, on the basis of a representative sample of Spanish tile production. The Spanish Association of Ceramic Tile Manufacturers (ASCER, as per the Spanish acronym) spearheaded this sectoral eco-label, which was developed in 2019. A significant number of ceramic tile manufacturers have also developed EPD's for their products.



High efficiency furnaces

100% (approx.) of raw materials are prepared with heat from cogeneration

100% of waste from the production process is recycled

Reduction of raw material use

100% recycling and recovery of wastewater

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Characteristics of ceramic tiles

Natural, plastic-free and free of toxic substances

Mostly composed of inorganic minerals, water and fire, and free from VOCs.

Local

The raw material (clay) is abundantly found in nature, often locally.

Hygienic, anti-allergic and aseptic

Waterproof, harmless, odourless and allergen-free material.

Easy maintenance

Easy to clean, without the use of harsh chemicals, enhancing indoor air quality.

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Flame retardant

Material naturally flame retardant and free of toxic fume emissions when exposed to fire.

Resistant and durable

Resistant to high and low temperatures, to water and humidity and to contact with aggressive chemicals. It is long-lasting.

Energy efficient

It provides with an insulation layer protection and ventilation of the building envelope provides acoustic insulation and thermal conductivity and inertia.

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2. The future of ceramic tiles

The European Union wants to be climate neutral by 2050 and one of its first goals to do so is to reduce greenhouse gas emissions by 55% by 2030.

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In 2020 the European Commission defined an action plan for the circular economy to promote circular products and processes and to identify strategic sectors for their implementation. One of the sectors identified was the building and construction sector, as it is responsible for more than 35% of carbon dioxide (CO_2) emissions in Europe. Consequently, new construction and renovation projects will have to prioritise environmental criteria to meet the targets set by the European Union.

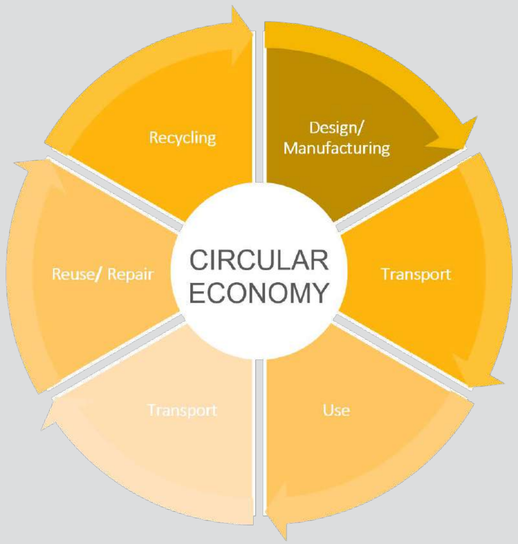
As for Spain, it has also established its own Circular Economy strategy under the European precepts: "Spain Circular 2030" (EEEC in its Spanish acronym), which establishes the necessary actions to implement circularity and lays the foundations to promote a new production and consumption model at a national level.

In general terms, the circular economy establishes a more sustainable model of production and consumption, based on the following principles:

1. **Eliminate waste and contamination from the design phase**
2. **Maintain products and materials in use**
3. **Regenerate natural systems**

In other words, the circular model seeks to design durable products, where materials and resources remain in use for as long as possible. In addition, it aims to minimise waste generated and increase materials reuse, recovery and recycling strategies. Therefore, when a product ends its life cycle, it can be used as a nutrient or raw material in the life cycle of another product.

The potential of ceramic tiles in a circular economy



In this context, ceramic tile is a product aligned with European and national objectives, thanks to its circularity potential and its ability to reduce negative environmental impacts. Made from 100% natural raw materials and found in abundance in nature, this material has a percentage of recycled raw materials in new products, it is designed to be durable and can be recovered at the end of its useful life, making it a raw material for other products, as long as the necessary conditions are provided to do so. It is also fire retardant and resistant to chemical abrasion, and therefore has the potential to accompany buildings throughout their life cycle.

The fact that it is a durable material and has a long-life span, estimated at 50 years, means that ceramic tiles are replaced less often. This characteristic contributes to reducing the use of virgin raw materials and the greenhouse gas emissions associated with their manufacture.

Eco-design:
Strategies such as eco-designing ceramic tiles to increase the fraction of aggregates of recycled origin in the product or maximising their recovery and recycling processes at the end of their life cycle can be a way of reducing their environmental impact, without depending on technological developments in the energy sector.

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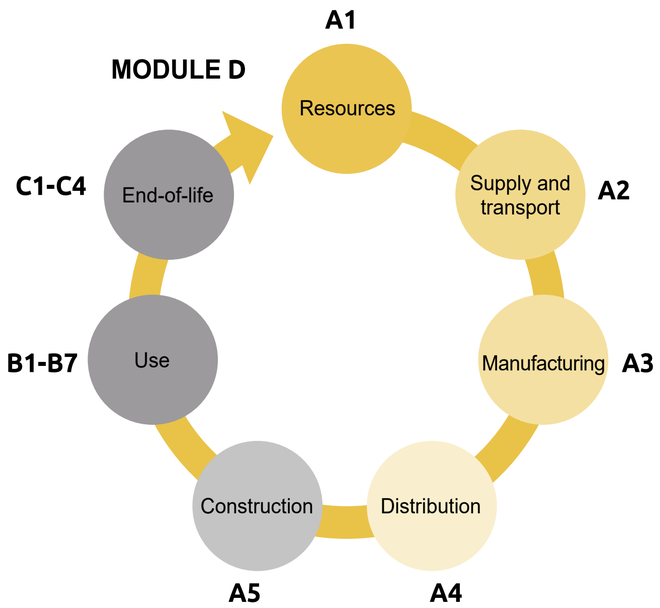
The environmental impact of ceramic tiles during their life cycle

Stages of a product life cycle



The main impact of the ceramic tile life cycle is in the extraction of raw materials and in the product manufacturing stage.

Resources, Supply and Transport, Manufacturing

These stages account for 88% of the emissions generated throughout the entire ceramic tile life cycle. Of this value, 17% corresponds to the extraction of raw materials (Resources), 68% to the Manufacturing stage and the remaining 3% corresponds to emissions related to Transport.

The environmental impact of the Manufacturing stage, the largest in the entire ceramic tile life cycle, comes mainly from the combustion of natural gas and the energy consumption of the equipment used for firing the pieces (furnaces) and the drying of raw materials and shaped pieces.

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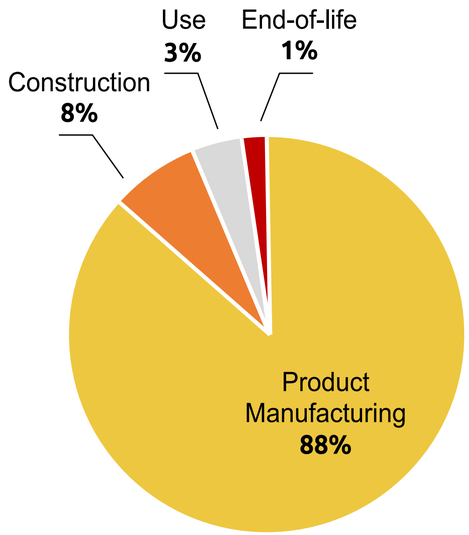
Global Warming Potential of Ceramic Tile during its life cycle



Distribution and Construction

The environmental impact is due, on the one hand, to the fact that 65% of ceramic tile production is exported. On the other hand, the impact is associated with the use of mortars or glues for laying the product, which also makes it difficult to recover the tile at the end of its life cycle.

Use

The environmental impact generated depends exclusively on the pattern of use and frequency of cleaning.

End of the Life Cycle

The environmental impact of the ceramic tile is directly related to the type of waste management it receives. In Spain, its most frequent destination is the landfill, together with other construction waste, which makes its recovery within a circular economy model difficult.

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Actions that contribute reducing the environmental impact

Ceramics sector

The ceramics industry has been working for decades to reduce the environmental impact of its products. During this time, it has managed to reduce CO2 emissions per square metre produced by 60% compared to those emitted by the sector in the 1980s, and total CO2 emissions by 24% compared to the 1990s. All this progress has been possible thanks to the energy efficiency measures rolled out by the industry.

Work continues to be actively pursued to reduce emissions from ceramic tiles, mainly at the manufacturing stage. An example of this is the various alternatives proposed, such as the incorporation of energy from renewable sources or the increase in the percentage of recycled material in the manufacture of the product.

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Consumers

Once the product leaves their premises, it is up to consumers to take small actions to help prevent further greenhouse gas emissions linked to this material:

Consumption

Consumers can push for all energy and circular developments to happen sooner. **This is achieved by increasing the demand for products with transparent information, sustainable and produced with clean energy. By doing so, investment in these parameters is boosted and thus the massification of these trends.**

Transport

The vast majority of ceramic tiles produced in Spain are exported to Europe or the rest of the world. Only a third portion is consumed in Spain. In this sense, **the environmental impact of exports could be reduced if there were greater support and incentives from the Public Administration for national products such as ceramic tiles.**

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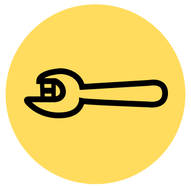
Mortars or glues

During the application of this product, if certain mortars or glues are used, the environmental impact of the ceramic tile is increased and its recovery at the end of its life cycle is made more difficult. **Dry tile installation, or the search for cement glue alternatives on the market that prove to be more environmentally friendly, is the most responsible and environmentally sustainable option.**



Maintenance

Ceramic tiles require virtually no maintenance throughout their life cycle. Therefore, the greenhouse gas emissions generated at this stage depend exclusively on the use and frequency of cleaning. **Choosing ecological and sustainable cleaning products contributes to the reduction of emissions in this stage and also improves the health of the people living indoor, as they do not breathe or come into contact with toxic substances.**

End-of-life

The most common destination is the landfill, along with the rest of the construction waste. If this is the case, **the correct dismantling and separation of the product and its fractions can help to ensure that at the end of its useful life the material re-enters another cycle as a raw material, as it is composed of materials of natural origin and is completely inert.**

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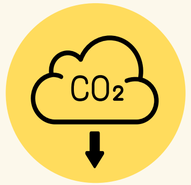
A bright future

The ceramic tile industry is a sector committed to reducing the environmental impact of its products and is working hard to do this. But to achieve the European Union's target of reducing CO2 emissions by 2050, it will need to combine several strategies that focus not only on the product's manufacturing stage, but also on the entire tile's lifecycle. Here, consumers can contribute by helping to make materials more easily recoverable at the end of their life stage and by facilitating their recycling processes.

In addition, another aspect where consumers can really make a difference is by making environmentally conscious choices, choosing products made from healthy materials, low in greenhouse gas emissions, locally sourced and built to last. Changing consumption habits and prioritising environmental benefits over aesthetic or economic ones provides long-term benefits for society as a whole.

THE CERAMIC TILE



Has a low environmental impact compared to other alternatives

Is made of healthy materials and can be 100% recyclable

Is durable and has a large circular potential to be exploited

Counts on an industry that is committed to continuous improvement

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3. Ranking of floorings in the construction sector

The impact of materials used in the construction sector varies greatly depending on the type of product.

People spend on average 90% of their time indoors, so the use of healthy materials is essential to safeguarding their health. In addition, many studies directly relate the health of spaces to workers' productivity.

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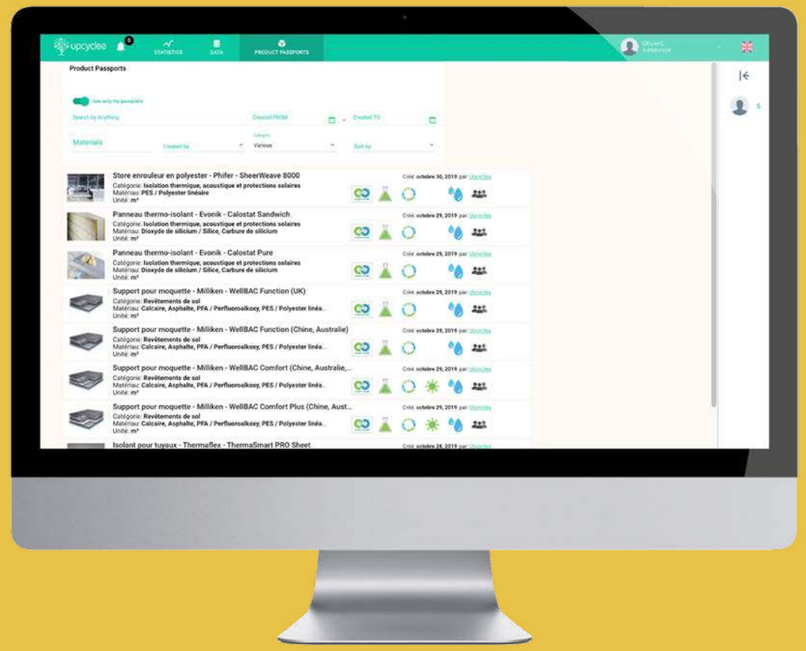
It is clear that the technical characteristics of products and their price are of the utmost importance when choosing them, but it is also of utmost importance to assess the carbon footprint of their life cycle, their circularity potential and their toxicity.

To gain this global vision of products, the use of tools such as the Materials Passport is essential, since it can compare all these impacts between materials and products and can facilitate informed decision making.

Material Passport

The Material Passport is the product's ID or, in other words, a digital duplicate of the product used in a building. Its function is to provide the description of products used in a building and to ensure they can be traced.

It provides all the information on the composition, the proportion of recycled and new materials, their possible future uses, and their environmental and social impacts. When created digitally and managed on a specialised platform, it allows the traceability of the materials applied in a given building and favours their correct management in the future.



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Comparison of floorings

The results obtained from the Material Passports have been used to compare floorings, as well as other indicators that provide a broader overview of the advantages and disadvantages of each product. The parameters taken into consideration were the following:

Ceramic tile

Wall-to-wall carpet

Wooden floors (parquet)

Luxury Vinyl Tile (LVT)

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The parameters of comparison have been:

Durability

Potential product lifetime, directly linked to its environmental impact and its circularity. The longer a material lasts, the lower its environmental impact.

Environmental Impact

Carbon footprint calculated for each material over its entire life cycle.

Cyclability Potential

Analysis of the potential of each material to be cyclable, in accordance with the principles of Circular Economy.

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Toxicity

Material free of substances toxic to human and environmental health, a key parameter for a material to be circular.

Use Phase

Advantages and disadvantages that the product presents during its use and installation phase. (Aesthetic characteristics of each flooring not taken into account).

Cost

Decisive factor in the choice of a construction material. The combination of this parameter with environmental criteria can be useful when choosing healthier alternatives within a given budget.

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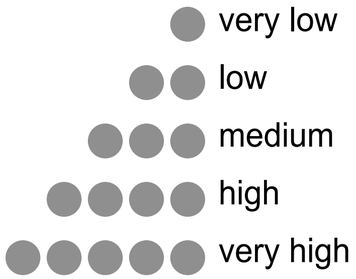
Flooring comparison results

For each criterion, scores are awarded from 1 to 5, depending on whether the materials meet the criteria to a greater or lesser extent. The criteria used to award scores for each indicator to each of the materials analysed are detailed in the methodological notes section of the annexes.

Criteria	Ceramic tile	Vinyl tile	Wooden floors	Wall-to-wall carpet
Durability	●●●●●	●	●●	●
Environmental impact	●●	●●●●●	●	●●●
Circularity	●●●	●●●	●●●●	●●●●●
Toxicity	●	●●●●	●	●●
Use	●●●●	●●●●	●●●	●●●
Cost (€)	●●	●●	●●●●●	●●●●



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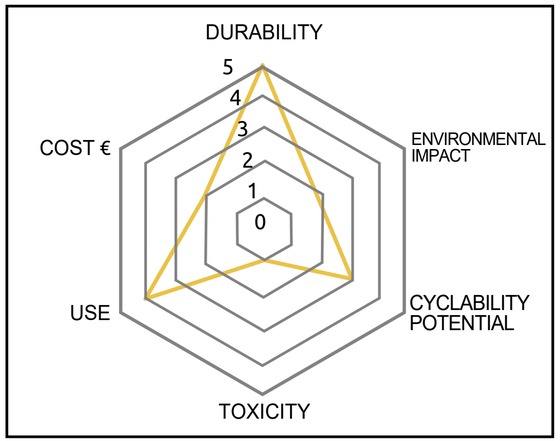
Ceramic tile



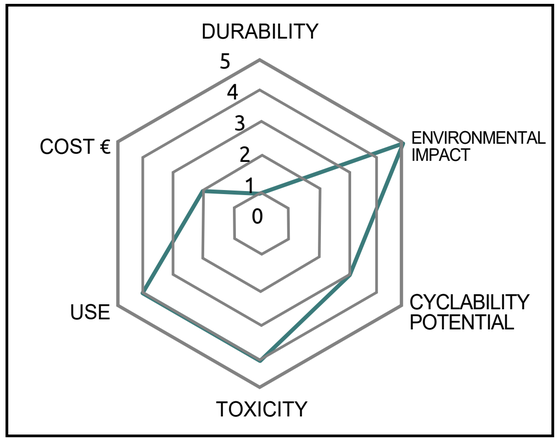
ADVANTAGES

- Customisation options.
- Free of toxic emissions.
- Strong and durable material.
- Easy to clean and low maintenance.
- Provides thermal inertia.
- Suitable for reuse and recycling.

DISADVANTAGES

- Material perceived as cold.
- Application with mortars and glues.

Vinyl tile (LVT)



ADVANTAGES

- Customisation options.
- Material easy to clean and maintain.
- Easy to install.
- Economical material.

DISADVANTAGES

- Potentially toxic to humans and the environment.
- Not resistant to more aggressive detergents.
- Impossible to recycle due to its chemical composition.

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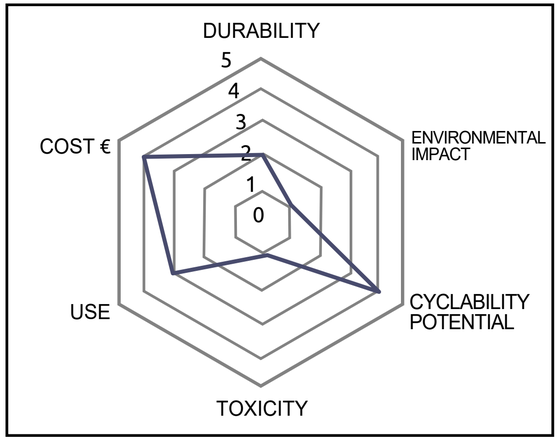
Wooden floors (parquet)



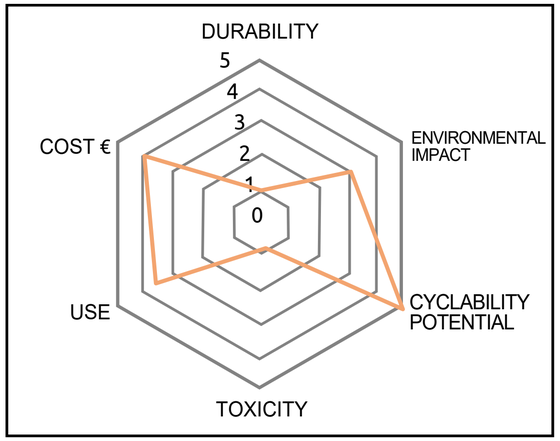
ADVANTAGES

- Natural material with low toxicity, depending on the type of treatment received.
- Provides comfort and hygiene.
- Natural heat and cold insulator.
- Suitable for reuse and recycling.
- CO_2 sink.

DISADVANTAGES

- Low possibility of customisation.
- Delicate material and difficult to maintain.
- Vulnerable to chemicals, humidity, sun exposure, knocks and scratches.
- High price.

Wall-to-wall carpet



ADVANTAGES

- Customisation options.
- Provides a feeling of warmth and comfort.
- Easy to install.
- Insulating, anti-slip and shock-absorbing properties.

DISADVANTAGES

- Accumulates dust mites and allergens in the use phase.
- Can cause mould growth.
- Requires a lot of maintenance and cleaning.
- Vulnerability to chemicals, stains, moisture and fire.
- May be composed of materials with a negative impact on human health and the environment, such as polyester.

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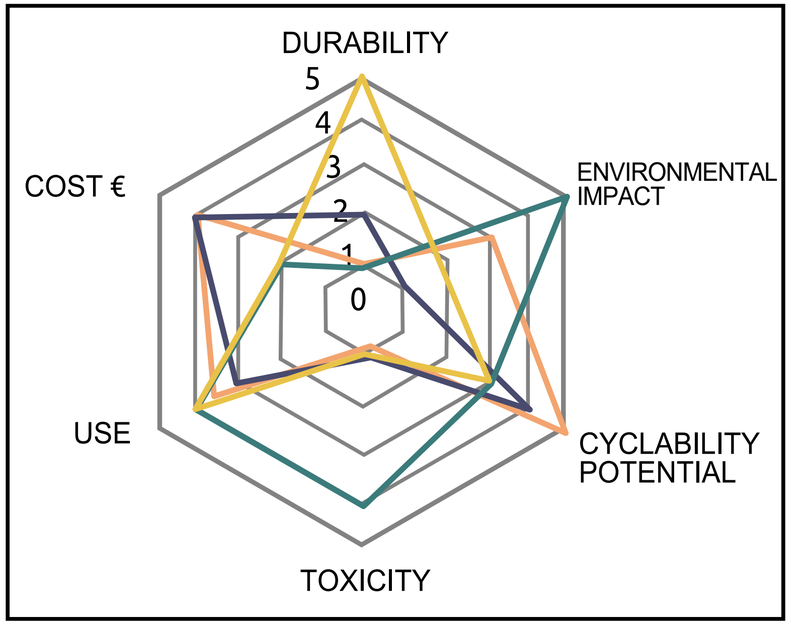
Flooring Ranking Conclusions



Each of the floorings analysed has advantages and disadvantages in the different criteria analysed, but it is up to the end consumer to prioritise one criterion over the other.

Opting for sustainable products with low environmental impacts is a sure value in the long term and will generate healthy spaces that can be inhabited for a long time.

Choosing long-lasting, non-toxic materials with a low environmental impact during their life cycle is a timeless decision.

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4. Ceramic tiles in green building certifications

The construction and refurbishment of buildings is associated with the consumption of large amounts of natural resources (materials, energy and water), as well as the generation of waste and greenhouse gas emissions into the air.

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Current resource management in the construction sector follows a linear pattern inherited from the first industrial revolution, based on extract, transform and dispose.

This pattern not only represents an environmental and health problem, but also leads to the depletion of natural resources. It is therefore an inefficient and unsustainable pattern.

Society's awareness of these limits has led to an increased demand to live and work in healthier and more sustainable buildings.

50%
of raw materials extraction

35%
of generated waste

5-12%
of GHG emissions

40%
of total energy consuption

Greater efficiency in the use of materials could save up to
80%
of emissions

In this sense, sustainable building standards seek to optimise the linear model in order to achieve a more circular pattern. They are intended as a guide to implement improvements in the different typologies of spaces, providing society with objective tools to evaluate and compare the level of sustainability of different buildings.

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Getting to know Green Building Programmes

There are multiple sustainable construction programmes for different building typologies and with different scopes. Some of the most widely implemented ones are outlined below:

LEED

Leadership in Energy and Environmental Design, of North American origin (*USGBC*), is one of the most widely used and most widely recognised programmes worldwide. It covers different types of spaces and reviews multiple areas of sustainability (energy efficiency, sustainable use of water and materials, comfort, indoor air quality, etc.).

BREEAM®

This is a certification of British origin (BRE). It is currently present in more than 90 countries with more than 500,000 certified buildings. There are different versions of the standard adapted to the reality of different countries. BREEAM®ES certification, like LEED, covers different types of buildings and analyses multiple areas of sustainability.

WELL BUILDING STANDARD™

Originally from North America (IWBI), but with an international scope, it is newer and complementary to the previous ones. It focuses on the health and well-being of occupants in buildings.

DGNB®

This is a German standard (DGNB e.V.) for the development of buildings, interior spaces and urban districts. It provides a system for the application, measurement and comparison of sustainability applied to built spaces, whether new or existing, and can be applied from the initial design phases to the construction and use phase of the space.

VERDE

This is a sustainability assessment tool for new residential and corporate buildings mainly, and has been developed by Green Building Council Spain (GBCe). Its application is focused on the Spanish building sector, but it also makes use of the DGNB® assessment system.

Passivhaus

A central European standard (Passiv Haus Institute), focused on reducing the energy consumption of buildings to a minimum while maintaining high levels of comfort inside. Currently, there are Passivhaus buildings on all five continents, but the areas of greatest implementation are Europe and North America.

Level(s)

A programme developed by the European Commission to create a common framework for measuring sustainability in residential and office buildings. It is based on the implementation of circular economy principles within the Construction sector.

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Performance of ceramic tiles in green building programmes

Ceramic tiles, thanks to their intrinsic properties, can contribute to compliance with the requirements of the different certification programmes mentioned. In general terms, this contribution is due to:

Free of toxic emissions into the air

The use of ceramic tiles makes it possible to reduce the concentration of chemical pollutants that can damage the indoor air quality of spaces, as they are materials that are free of emissions of toxic substances. In addition, the ceramic sector has auxiliary materials for installation that also comply with the limits defined in the different certification programmes.

Easy cleaning and high solar reflective colours

The use of ceramic tiles for roofs and light-coloured flooring contributes to mitigating the Heat Island Effect. Their easy cleaning and durability guarantee this long-term performance.

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Recyclable and with recycled material

Ceramic tiles are not combustible, and at the end of their use they are easily recyclable to obtain new materials, which can be reused to obtain other products. In addition, nowadays, many ceramic products incorporate material of recycled origin, avoiding the extraction of virgin raw materials.

Transparency and quantification of environmental impacts

Transparency regarding the origin of raw materials is an increasingly widespread practice in the sector and many manufacturers make this information on their products public. Sectoral and product-specific Life Cycle Analyses (LCAs) are also available that assess the impacts of ceramic tiles throughout their life cycle. Many ceramic products have an Environmental Product Declaration (EPD) and the Spanish ceramic tile sector already has a sectoral EPD encompassing a large number of manufacturers.

High durability

Due to their high durability and low wear and tear, ceramic tiles are materials that can be reused or recycled throughout their life cycle. Moreover, because they are so durable, the environmental impact over their entire life cycle (more than 50 years) is reduced when compared to other floorings with shorter life cycles.

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Impact on energy efficiency

Ceramic tile is a material with high thermal inertia, which contributes to delaying energy losses and regulating the interior temperature, being advantageous in climates with large temperature variations. It can be used in ventilated façades, in systems with radiant ceramic tiles, raised ceramic floors, flat roofs or solar protection with ceramic lattices, contributing to the energy improvement of spaces.

Circularity

The ceramic sector is implementing strategies to improve its products' circularity, making them more and more reusable, thus avoiding the generation of waste. It is worth noting that, in the ceramic tile manufacturing process, both process waste and industrial wastewater are reintroduced into the process in all manufacturing plants, which is evidence of the sector's alignment with this new, more sustainable economic model.

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5. Ceramic tiles in product certification

Product certification provides proof that a manufacturer produces products that meet certain quality, safety and environmental requirements. Having the accreditation of a certifying body sets the product apart and generates more trust in the brand and the quality it represents.

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When a manufacturer opts for product certification, it shows its commitment to information transparency in the construction materials industry and allows professionals and consumers to make decisions based on verified information.

There are countless certifications that can be used as a reference in the analysis of the ceramic tile with regard to their compliance with rigorous standards of sustainability, circularity and toxicity. The criteria analysed can encompass issues such as the quality of the manufacturing process; the use of natural resources such as raw materials, water and energy; greenhouse gas emissions during the product's life cycle; the level of toxicity contained or emitted by the product; and the social impact of the product, to name a few.

In order to contextualise ceramic tiles in product certifications and to understand their performance in the broad field of sustainability, the most recognised and widely implemented standards worldwide have been reviewed:

- Cradle to Cradle Certified®,
- EU Ecolabel,
- Greenguard Certification and,
- Indoor Air Quality Product Performance Standard for Building Interiors.

Getting to know product certifications

Crade to Cradle Certified®

This is an internationally recognised multi-attribute programme developed by the Cradle to Cradle Products Innovation Institute, a global benchmark in the promotion of the circular economy applied to products. It assesses products and their manufacturing process from the perspectives of the impact on human health and the environment, the circularity of materials and the corporate responsibility of manufacturers.

EU Ecolabel

This is a certification programme developed by the European Commission dedicated to identifying sustainably designed products. It aims to promote innovation, circular economy and the contribution towards climate neutrality in the European Union by 2050. The assessed products must comply with the most relevant criteria of the main international green building programmes applied in Europe.

GREENGUARD® Certification

This is a certification programme promoted by UL, a multinational consulting and certification company that assesses products for compliance with stringent safety and quality standards. It aims to recognise products that help reduce indoor air pollution and the risk of chemical exposure to workers and users.

Indoor Air Quality Product Performance Standard for Building Interiors

This is a standard developed by SCS Global Services, an international leader in the development of standards and certifications in the field of sustainability. As far as building materials are concerned, it has two certifications that assess their level of impact on indoor air quality (IAQ), namely the FloorScore® and the Indoor Advantage Gold - Building Materials. Both, the first one dedicated to the certification of floors and the second one to building materials in general, aim to promote safe and healthy spaces for people. They also confer transparency and credibility to manufacturers who are committed to products that contribute to indoor air quality.

All of the above programmes are recognised and can award scores in the main internationally recognised green building certifications such as LEED, BREEAM®, DGNB®, WELL™ and VERDE.

Performance of ceramic tiles in sustainable building programmes

From a cross-sectional view, it can be stated that ceramic tiles have the potential to meet the most stringent criteria of such certifications focused on people's health, the environment and the quality of manufacturing processes.

Material health

As a natural material made up of inorganic minerals and water, and because it is fired at high temperatures, ceramic tiles are free of components and emissions of toxic substances. As far as glaze and stain formulations are concerned, the Spanish sector tends to reduce the use of heavy metals, always complying with the relevant regulations.

It can contribute to the assessment criteria of:

Circular Economy

The high reuse rates of raw materials in the production process of ceramic tiles constitute a fact in the sector. In addition, ceramic tile is a material that can be easily reused or recycled at the end of its useful life, and can become part of the composition of other types of construction materials.

It can contribute to the assessment criteria of:

Energy management and greenhouse gas emissions

The ceramic tile industry is committed to energy efficiency measures and optimisation of fuel use in the manufacture of its products. The Spanish sector has been using natural gas as a fuel since 1980 and has high-efficiency furnaces and energy cogeneration systems in order to reduce its energy consumption and, consequently, its greenhouse gas emissions into the atmosphere.

It can contribute to the assessment criteria of:

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Water Resources

The sector has the treatment and recovery of practically 100% of the water that remains in the production cycle, without generating a negative impact on soil and water pollution.

It can contribute to the assessment criteria of:

Corporate Responsibility

Beyond the characteristics of ceramic tiles and the practices and trends of the Spanish ceramic tile sector, product certifications usually also have criteria that are more related to the practices of each manufacturer, and from this may result in higher or lower scores for each certified product in a given programme. Examples of such criteria may include the need to demonstrate that the company has adequate quality control or that it fosters a diverse, inclusive and socially equitable work environment.

It can contribute to the assessment criteria of:

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6. Aligning of the Spanish ceramics industry with the UN 2030 Agenda

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Good health and well-being

The material is naturally free of toxicity and VOCs emissions. It does not transmit odours and its waterproof and innocuous nature makes it more hygienic, anti-allergic and aseptic.

Clean water and sanitation

Water resources used as raw material, coolant and cleaning agent in the ceramic tile manufacturing process. 100% of the waste water is reused, achieving the zero waste goal.

Affordable and clean energy

The natural gas used as a transition fuel, the commitment to renewable energies and high-efficiency cogeneration of energy result in the constant reduction of global greenhouse gas emissions in the industry.

Decent work and economic growth

Almost 90% of the industry's workforce is on indefinite term contracts and there are few temp jobs. For every direct job generated, 2.8 additional jobs are provided to the Spanish economy.

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Industry, Innovation and Infrastructure

Commitment to technology and R&D&I-based projects, in addition to ongoing investment in sectoral projects promoted by specialised institutions.

Responsible production and consumption

Reintroduction of nearly 100% of the waste generated in the manufacturing process, enabling the recovery of the remaining waste and reducing the need for virgin raw materials. Its durability and long life cycle delays replacement and reduces unnecessary consumption.

Climate action

60% fewer emissions in the Spanish ceramics sector than in 1980, mainly thanks to the adoption of natural gas as a fuel and cogeneration. In addition, innovations to use as little material as possible while maintaining the same characteristics (thin large tiles).

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Methodological notes

Benchmark study of future scenarios

To undertake this study, the Life Cycle Assessment (LCA) carried out for the production of 1m2 of ceramic tile covered by the Environmental Product Declaration for the Spanish ceramic tile sector, valid until 2024, was used.

Benchmark study of coverings in the construction sector

The criteria for assigning points for each indicator are shown below:

SCORING CRITERIA

Estimated useful life (years)	Score	Carbon footprint (Kg de CO2eq)	Score	Circularity (%)	Score	Cost (€/m2)	Score
Between 10-15	1	Between 0-5	1	Between 0-20%	1	Between 0-30	1
Between 16-20	2	Between 6-10	2	Between 21-40%	2	Between 31-55	2
Between 21-25	3	Between 11-15	3	Between 41-60%	3	Between 56-80	3
Between 26-30	4	Between 16-20	4	Between 61-80%	4	Between 81-100	4
Over 30	5	Over 20	5	Over 80%	5	Over 100	5

SCORING BY FLOOR TYPE

Material	Estimated useful life (years)	Score	Carbon footprint (tn CO2 eq/tn product)	Score	Circularity (%)	Score	Cost (€/m2)	Score
Ceramic tile	50	5	0.613	2	41	3	37.00	2
Vinyl tile (LVT)	15	1	2.68	5	60	3	33.00	2
Carpet	10	1	1.50	3	93	5	95.00	4
Wood	20	2	0.242	1	70	4	118.00	5

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Glossary of acronyms and terms

Life Cycle Assessment: Life Cycle Assessment (LCA) is a tool to systematically assess the environmental aspects of a product or service system at all the stages of its life cycle.

Best Available Technology (BAT): The best available technology to achieve a high overall level of environmental protection, developed on a scale that allows implementation in the relevant activity under economically feasible conditions.

Volatile Organic Compounds (VOCs): Hydrocarbons that occur in a gaseous state at normal ambient temperature or are highly volatile at normal ambient temperature. They are classified into three levels of risk to human health and the environment, ranging from extremely hazardous to low impact. They can enter the human body through the respiratory tract or the skin and bioaccumulate in the body. Their health effects are reflected in respiratory problems, eye and throat irritation, dizziness, irritability, concentration difficulties, etc. In the long term, they may cause kidney, liver or central nervous system damage or even have a carcinogenic effect.

Environmental Product Declaration (EPD): Ecolabel type III, according to ISO 14020. It provides quantified, relevant, objective and verified information on the environmental impacts of a product throughout its Life Cycle Assessment (LCA).

Greenhouse gases (GHG): Gaseous components of the atmosphere, natural or anthropogenic, that absorb and emit radiation through the atmosphere and clouds, causing the greenhouse effect. The primary greenhouse gases in the earth's atmosphere are water vapour (H2O), carbon dioxide (CO2), methane (CH4), nitrous oxide (N2O) and ozone (O3). In addition to CO2, N2O and CH4 added by human activity, the atmosphere contains a number of greenhouse gases of entirely anthropogenic origin, such as halocarbons or other substances containing chlorine and bromine, together with sulphur hexafluoridee (SF6), lhydrofluorocarbons (HFC) and perfluorocarbons (PFCs).

REACH: Registration, Evaluation, Authorisation and Restriction of Chemicals is a European Community Regulation of 18 December 2006.

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