Technical Project Report

GENERAL ASPECTS

CLIENT	VENISTON SRL	
TECHNICAL SUPPORT	Document developed by EcamRicert Ltd.	
REFERENCES	CONSTRUCTION PRODUCTS AND CONSTRUCTION SERVICES, PCR 2019:14, v 1.3.4 General Program Instructions for the International EPD® System. Version 4 UNI EN 15804:2019 UNI EN ISO 14044:2021	

Version	2
Date	03/02/2025

SUMMARY

PREMISE

This study was conducted for **VENISTON SRL** . The study was performed by EcamRicert Srl . This report illustrates the study carried out on 1 m2 of the product “Skyline – terrazzo tile”, excluding the packaging, using the Life Cycle methodology Assessment (LCA). The analysis was applied following the main indications of the UNI EN ISO 14040:2021, UNI EN ISO14044:2021 and UNI EN 15804:2019 standards. To carry out the calculation procedures, required by the main standards, the SimaPro v 9 .3 software was used. It should be noted that to guarantee the reliability and traceability of the information, as well as to certify compliance with the technical standards, it is consolidated practice to entrust the certification of any environmental declaration, regarding LCA studies, to the verification of an independent third party.

THE CONTEXT

The globalization of markets, digital connectivity and the scarcity of natural resources contribute to increasing the complexity of the context in which companies operate (Sebastiani, 2013). The uncertainties that arise from this complexity make it increasingly difficult to predict rapid changes in the market and therefore companies increasingly demonstrate the need to develop their resilience and at the same time their flexibility to face this unpredictable future (Sebastiani, 2013). To be successful, or even simply to be able to carry out their activities regularly, companies must adopt an increasingly strategic approach capable of supporting the sudden changes that may occur in a long-term perspective (Sebastiani, 2013). It is in this direction that the concept of corporate sustainability is emerging : a business approach capable of integrating sustainability strategies and practices into traditional business mechanisms in order to create value, not only from an economic point of view, but also in social and environmental terms (**Errore. L'origine riferimento non è stata trovata.**). It is a "corporate philosophy that cuts deeply and transversally across the entire structure and that in many cases requires a radical transformation of business models that starts from a remodeling of the corporate DNA up to a profound green revision (energy and water consumption, emissions, waste, use of resources, efficiency, etc.) of processes and products" (M. Fasan, 2017)allowing to explore new ways to compete in an increasingly complex reality. A sustainable company is therefore a well-structured and organized reality so that, in a long-term perspective, a balance is created between the economic, social and environmental dimensions (Sebastiani, 2013). According to the "Three Ps" model: Planet People Profit (Elkington 1997), the pursuit of sustainable development at corporate level is achieved if profits are compatible with environmental integrity and social equity: the Planet dimension refers to an efficient management of natural resources and an optimization of the environmental impacts associated with products in a life cycle perspective (M. Fasan, 2017); the People dimension aims to ensure opportunities and resources for all members of society, with particular attention to the health and safety of workers and consumers; the Profit dimension finally deals with ensuring economic prosperity, maintaining an adequate competitive position (Siano, 2012). In this sense, companies that adopt a sustainable business approach assume more competitive positions: the integration of the three dimensions of sustainability within business processes leads companies to pay constant attention to the social and environmental context in which they operate, to establish relationships with a growing number of stakeholders and therefore to be more receptive (and flexible) to continuous changes.

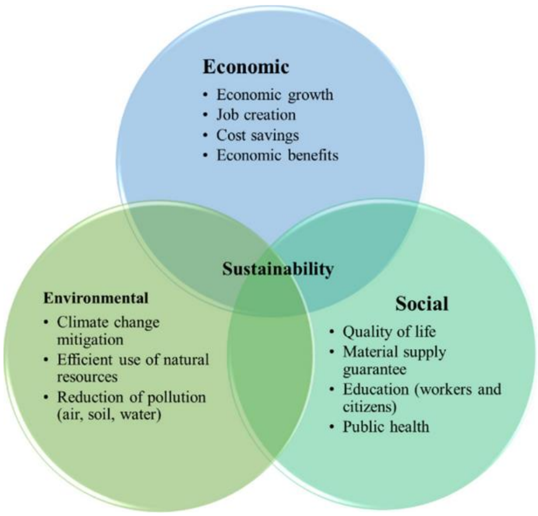


Figure 1- sustainability as a balance between economic costs, environmental impacts and benefits for the community

THE COMPANY[1]

Veniston Srl is an Italian company specialized in the production of high-quality terrazzo flooring, handcrafted with natural materials such as marble and recycled stone. Committed to sustainability, the company reduces its environmental impact through the total recycling of production water and the minimization of its ecological footprint. Veniston tiles, durable and customizable, combine tradition and innovation, offering a wide range of colors and shapes for exclusive design projects.

Figure 1: VENISTON SRL plant

[1] *The source of information for the paragraph is: https://www.veniston.it/*

1. LIFE CYCLE APPROACH

The Life Cycle Approach (LCA) allows to map, understand and reduce the potential environmental risks arising from the manufacturing of products and the activity of organizations and services. The relevance of this method consists in analyzing the phases of a production process, an organization or a service, as correlated and connected, becoming a fundamental design support for the development and improvement according to the reference markets. According to international standards, the following methodological procedures are provided:

A. **Improve**: qualitative selection of parameters to measure.

B. **Cataloging**: quantitative evaluation of parameters related to unit processes within the system boundaries in relation to the reference unit. The result is a design matrix structured for environmental performance indicators.

C. **Analyze**: evaluation of the environmental effects connected to the environmental performance indicators to identify the possible environmental risks of the examined system. Subsequently, the analysis of the results obtained is planned to act on the study setup and define the possible lines of intervention to improve its control.

The methodological approach described is foreseen in the field of environmental management by standards that represent the design basis for specific guidelines and for the main sustainability protocols. At an international level, the LCA methodology is reaching a strategic importance as a scientifically suitable and recognized tool for the framing of significant environmental aspects through voluntary environmental policy instruments.

2 LIFE CYCLE IMPACT ASSESSMENT – LCA ANALYSIS

2.1 OBJECTIVE OF THE STUDY

(UNI EN ISO 14044:2021 par. 4.2.2)

The aim of the analysis is to calculate the eco profile attributable to the processing and production phase of the products made by VENISTON SRL.

The company wants to optimize the design of its products with a view to environmental sustainability that allows it to guide market choices investing on systems to minor consumption Of resources, controlling and mitigating The impacts environmental direct And indirect in an optics Of politics integrated. The analytical approach chosen is *top -down*, starting from the definition of the general boundaries of the study systems and going into the details of each unitary process included in these boundaries. The study is therefore both B2B, Business to Business, and B2C, Business to Consumer, as the results of the analysis will be published on the communication platforms dedicated to Environmental Product Declarations. In fact, the results of the life cycle assessment will be intended for external communication in accordance with the protocols structured by the EPD Program Operator, through the documentary form of the EPD.

Please note that the publication/dissemination of the LCA report is not foreseen.

It is specified that the environmental profile of the product “Skyline – terrazzo tile” will be reported.

The study involved the product:

“Skyline – terrace tile”

Table 1: Content declaration for the declared unit “ Skyline – terrazzo tile ”

COMPOSITION		Kg/ m²
RAW MATERIAL	White Carrara	27
	Botticino	7.5
	White cement	5
	Carbonate	10
COMPOSITION		**Kg/ m²**
PACKAGING	Plastic film (PTE)	0.12
	Pallet	2.5

It is specified that the product is manufactured in the company's own factories.

3. PRODUCT CATEGORY RULES FOR LCA

3.1.LIFE CYCLE PHASES AND INFORMATION MODULES

(see UNI EN 15804:2019 par. 6.2)

In accordance with the requirements of the reference documents and the PCR followed (CONSTRUCTION PRODUCTS PCR 2019:14, v 1.3.4 par 2.2.2), the approach pursued was “Cradle to gate” with modules C1–C4 and module D (A1–A3 + C + D)”

3.2.DECLARED UNIT

(see UNI EN 15804:2019 par. 6.3.3)

The declared unit is the reference for the normalization (in a mathematical sense) of the material and energy flows that are included in the information modules investigated in order to produce data and information expressed on a common basis. The declared unit therefore constitutes the reference for the combination of the flows attributed to the object of the analysis and the combination of the environmental impacts relating to the modules recalled.
In accordance with the directives of the reference standard and the product rule, it is considered as a declared unit, expressed according to: 1 m2 of product “Skyline – terrazzo tile”, excluding packaging.

3.3.REFERENCE USEFUL LIFE (RSL)

(see UNI EN 15804:2019 par. 6.3.4)

With reference to what is indicated in PCR 2019:14 VERSION 1.3.4, paragraph 4.2 “Reference service life” (RSL), the reference service life (RSL) will not be covered or specified.

3.4.SYSTEM BOUNDARIES

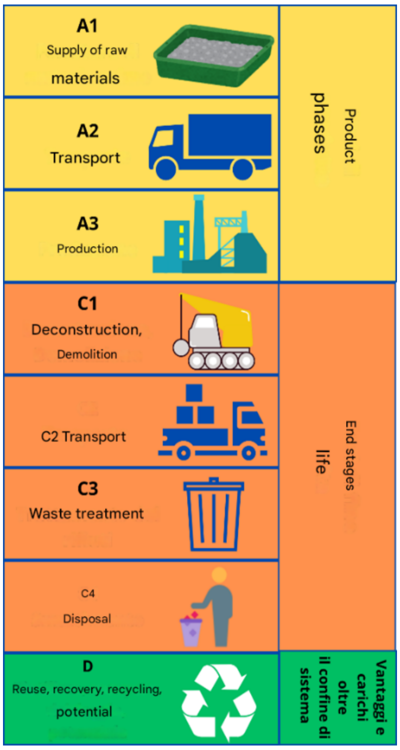
(see UNI EN 15804:2019 par. 6.3.5)

The purpose of defining the system boundaries is to circumscribe a spatial, temporal and operational area within which to collect reliable data that reflect the real environmental performance of the system and provide a complete description of it. The detail and extension of the study are defined by these boundaries that allow determining the unit processes to be included in the model. Along these unit processes, the macro-consumptions involved in the production of the products were identified and on which the calculation model was set up and analyzed (2019:14, v 1.1, § 4.3, Figure 2). In the end-of-life phase of the product, two different end-of-life scenarios were envisaged.

	PRODUCT STAGE			CONSTRUCTION ON PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishing	Operational energy use	Operational water use	Deconstruction, demolition	Transport	Waste processing	Disposal	Reuse-recovery-recycling potential
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	EN	EN	EN	-	-	-	-	-	-	-	-	-	-	EU	EU	EU	EU
Specific data used	> 90%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – product	not relevant			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – site	not relevant			-	-	-	-	-	-	-	-	-	-	-	-	-	-

Box 1: System boundaries considered in the study. The GWP-GHG value for electricity generated in A1 and used in A3 is 6.55E-01 kgCO2/kWh

Figure 2: Modules and macro production processes



3.5.TEMPORAL, GEOGRAPHICAL AND TECHNOLOGICAL BOUNDARIES

The temporal boundaries include the period from January 2023 - December 2023, a time frame considered as representative of the company's activities and the results of the study will be framed within these boundaries. These were chosen given the most complete availability of information relating to the study. The geographical boundaries of the study are to be identified in the international and national Italian territory (in particular for the manufacturing phase). The technological boundaries refer to the average technological level relating to the specific temporal/geographical context of the above-mentioned boundaries.

3.6.ORGANIZATIONAL BOUNDARIES

In defining the organizational boundaries, the first step was to identify the organizations of **VENISTON SRL** and the installations that make up the company, with regard to the unitary processes involving the products under examination. This involves defining the organizational boundaries, i.e. the responsibilities attributable to **VENISTON SRL** with regard to the life cycle analysis according to the boundaries already described. The approach followed is that of control, since the purpose of the study is to monitor and improve the environmental performance of the product studied.

The analytical approach has allowed us to study the products by evaluating them as systems affected by input and output factors, and consequently subject to work cycles causing environmental impacts in compliance with the reference PCR. It is specified that the activity of **VENISTON SRL** takes place in the production plant of:

- Via Alessandro Volta, 24, 37023 Grezzana (VR)

The company **VENISTON SRL** does not rely on third parties for the processing carried out, with regards to the products considered, at the above-mentioned plant.

3.7.OPERATIONAL BOUNDARIES

The details have been detailed processes unitary relatively to the production plant. Within these boundaries, the characteristic material and energy flows of the unit processes categorisable according to environmental performance indicators were considered, on which the environmental impacts were subsequently calculated. Characteristic data were therefore collected that can to imply a impact environmental. These data, for the information module [A3] – *Manufacturing*, have the property of being mostly site-specific, an important feature that allows to increase the reliability of the study and make the calculation model a more realistic representation of the production process under examination. The operational processes can be traced back to the following:

Figure 3: Operating process related to the product under analysis

UNITARY PROCESS N.	UNITARY PROCESS NAME
1	RAW MATERIAL COLLECTION
2	DRY MIXING
3	WET MIXING

4	VIBRO-COMPACTED TILE FORMING
5	SEASONING
6	SANDING
7	PACKAGING

3.8.EXCLUSION CRITERIA

(see UNI EN 15804:2019 par. 6.3.6)

cut- off criteria were applied.

3.9.RECRUITMENTS

The assumptions that have been made are reported below and concern mainly the end-of-life modules. In particular:

- For module C1 (demolition, end of life) a power of the instrumentation used equal to 130 Wh was considered, necessary for any demolition.
- For module C2 (transport, end of life) 50 km was assumed as an estimate of the distance in kilometres for transporting the waste for treatment or disposal.
- For modules C3 (recovery, end of life) and C4 (landfill, end of life) it is declared that 10% of the material is recovered and reground, while the remaining 90% is destined for disposal.

3.10. DATA SELECTION

(see UNI EN ISO 15809:2014 par. 6.3.7)

In choosing the data to be used for the study, we tried to privilege primary data that could be catalogued by the company. Such data constitute the primary source of information for the inventory analysis. The latter can be grouped according to environmental performance indicators, to which the environmental performance results will subsequently be referred. The identifiable environmental performance indicators are reported in Table 2:

Table 2- Environmental performance indicators investigated divided by information modules

MODULE	INDICATOR	
A1 – Raw material supply	Raw material	UPSTREAM
	Electricity consumption	
A2 – Transport	Transport of raw materials and packaging	
A3 - Manufacturing	Material (packaging)	CORE
	Water consumption	
	Transport of waste generated	
	Treatment of waste generated	
C1 - De- construction demolition	Demolition-related consumption	END OF LIFE
C2 - Transport	Waste transportation	
C3 - Waste processing	Waste treatment	
C4 - Disposal	Disposal	

3.11. DATA QUALITY REQUIREMENTS

(see UNI EN ISO 15804:2019 par. 6.3.8)

The choice of the indicators above was based on the fact that they are characteristic of the system examined within the boundaries described. Furthermore, with particular attention to the company's production processes, the aforementioned indicators are:

- Physically measurable, and traceable by the company through appropriate documents;
- Monitorable and potentially controllable from the company;
- They represent an economic cost for the company.

The characteristics of the data of the flows massive and energetic of the indicators of performance environmental above reported, reflect, where technically possible, specific quality requirements, which:

- Relation to a specific time period (*time- related coverage*);
- Relation to a specific geographical context (geographical coverage);
- Report at a certain technological level (technology coverage);
- Having a defined degree of precision, completeness,
- Representativeness,
- Consistency (consistency) and reproducibility (reproducibility);
- Characterized by a source (sources of the data);
- Characterized by a defined degree of uncertainty (uncertainty of the information).

The quality requirements of the collected data are reported in Table 3:

Table 3- Data quality requirements according to UNI EN 15804:2019

QUALITY REQUIREMENTS	COMPLIANCE
Time coverage	The data were collected in the year to which they refer and cover its entire duration (2023).
Geographic coverage	The data were collected in the geographical area to which they refer in accordance with the geographical boundaries defined
Technology coverage	Average technological level compliant with the defined temporal and geographical boundaries
Completeness	All material and energy flows considered significant have been analysed and accounted for
Representativeness	Representation of media data in accordance with established technological and geographical boundaries
Data source	Administrative data, tax bills, purchase invoices (company source), company software
Uncertainty of information	Data uncertainty is specified within the data characteristics for each information module.

4. INVENTORY ANALYSIS

(see UNI EN 15804:2019 par. 6.4)

4.1. DATA COLLECTION

(see UNI EN 15804:2019 par. 6.4.1)

The inventory analysis is aimed at defining, quantifying and compiling the material and energy flows involved in the production of the families studied. This phase is conducted according to the indications provided by UNI EN ISO 14044:2021. Editable files have been created specifically for data collection. The inventory data (energy, water, matter, transport, waste, emissions) have been related to the total production in kg in order to arrive at consumption according to the chosen declared unit. In this study, therefore, an attempt was made to divide the input and output data while maintaining the principle of modularity: the materials and energy flows to and from the environment are therefore assigned to the module in which they occur. The allocation criteria adopted for the LCA model comply with the reference standards (EN 15804, ISO 14044) and are mainly based on the kg of production. The data inventory in Excel format is attached to this report.

4.2. CALCULATION PROCEDURES

(see UNI EN 15804:2019 par. 6.4.2)

An LCA calculation requires two different types of information:

- data relating to the environmental aspects of the system considered (materials or energy flows entering the production system). This data usually comes from the company that is performing the LCA calculation.

- data related to the life cycle impacts of the material or energy flows entering the production system. This data usually comes from databases.

Specific data is defined here as:

- data collected from the actual manufacturing facility where the product-specific processes are performed;
- actual data from other parts of the life cycle attributable to the product under study, for example site-specific data on the production of materials or generation of electricity supplied by contracted suppliers and on transport data on distances, means of transport, load factor, fuel consumption, etc. of contractual transport suppliers; and
- LCI data from transportation and energy databases, combined with actual transportation and energy parameters as listed above.

All other data is considered proxy data (any data is better than zero) or data that can be proven to be conservative.

4.3. REFINEMENT OF SYSTEM BOUNDARIES

(see UNI EN ISO 14044:2021 par 4.3.3.4)

The system boundaries and the related information modules investigated have not been refined after the previous operations. These may be reviewed with the updating and deepening of the study with a view to environmental sustainability and continuous improvement.

4.4. DISTRIBUTION OF INPUT FLOWS AND OUTPUT EMISSIONS

(see UNI EN 15804:2019 par. 6 .4.3)

As regards the modelling of some primary and secondary data, i.e. deriving from re-elaborations of activity data through appropriate mathematical considerations, they have been defined on the basis of the following distribution criterion:

- Physical distribution, based on massive ratios or balances (e.g. proportion of raw materials constituting the product family for a certain quantity).

5. LIFE CYCLE IMPACT ASSESSMENT

(see UNI EN 15804:2019 par. 6.5 and UNI EN ISO 14044:2018 par. 4.4)

The objective of this phase is to convert the results of the inventory analysis, i.e. all the input and output flows that concern the investigated unit processes, into environmental impact data (i.e. the eco-profile of the product) in order to produce reliable and easy-to-understand results and to evaluate the extent of the latter along the investigated information modules. Starting from the resulting environmental performances, it is possible to trace the environmental profile of the product under study.

5.1. CHOICE OF IMPACT CATEGORIES, CATEGORY INDICATORS AND CHARACTERIZATION MODELS

(see UNI EN ISO 14044:2021 par. 4.4.2.2)

For the life cycle impact assessment (LCIA – *Life Cycle Impact Assessment*), the following impact categories were selected according to UNI EN 15804:2019 (see par. 6.5 of the standard) and the reference PCR (see par. 5.4.5) and the respective characterization factors according to UNI EN 15804:2019. The categories investigated are reported in Table 4:

Table 4- List of impact categories used in accordance with the reference standard and related characterization factors

CATEGORY	INDICATOR	UM
Climate change	GWP - Total	kg $_{CO2}$ eq
Climate change - Fossil	GWP- fossil	kg $_{CO2}$ eq
Climate change - Biogenic	GWP- biogenic	kg $_{CO2}$ eq
Climate change - Land use and LU change	GWP- luluc	kg $_{CO2}$ eq
Ozone depletion	ODP	kg CFC11 eq
Acidification	AP	mol H+ eq
Eutrophication , freshwater	EP- freshwater	kg P eq
Eutrophication , marine	EP-marine	kg N eq
Eutrophication , terrestrial	EP- terrestrial	mol N eq
Photochemical ozone formation	POCP	kg NMVOC eq
Resource use, minerals and metals	ADP-minerals&metals	kg Sb eq
Resource use, fossils	ADP- fossil	MJ
Water use	WDP	m ^{3} deprive .
Particular matter	PM	disease inc.
Ionizing radiation	IRP	kBq U-235 eq
Ecotoxicity , freshwater	ETP- fw	CTUe
Human toxicity , non- cancer	http-c	CTUh
Human toxicity , cancer	http- nc	CTUh
Land use	SQP	Pt

GWP-total = Climate change; GWP-fossil = Climate change - fossil; GWP-biogenic = Climate change - biogenic; GWP- luluc = Climate change - land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water deprivation potential; PM = Particulate matter, IRP = Ionising radiation, ETP- fw = Ecotoxicity freshwater, HTP- nc = Human toxicity non cancer, HTP-c = Human toxicity cancer, SQP = Land use

SimaPro 9 calculation software (Developer 9.2.0.2) was used and the following databases were selected: “ECOINVENT 3.8”. For the characterization of the inventory data with reference to the various types of impact on which the system under examination acts, the “EN 15804 +A2 Method” was applied as a calculation method.

5.2.CLASSIFICATION

(see UNI EN ISO 14044:2021 par. 4.4.2.3)

After choosing the impact categories and calculation models, we proceed with the placement of the various material or energy flows contained in the inventory, with respect to the various impact categories previously selected based on the capacity of the substances, or activities, to contribute to the various environmental problems. To build the impact categories, the following damage categories are used:

- ecology: effects on living species and the ecosystem;
- effects on human health and safety;
- resources: exhaustion of energy and material sources;
- social implications and habitat degradation.

5.3.CHARACTERIZATION

(see UNI EN ISO 14044:2021 par. 4.4.2.4)

Characterization is a step that prepares the calculation of the environmental impact. The impact categories represent in a certain sense the environmental problems associated with the product system. Therefore, their choice, in addition to satisfying the objective and the scope of the study, must be representative of the physical characteristics of the product system analyzed. The characterization models are calculation models developed by specific research centers or certified bodies (such as the IPCC) that allow the development of numerical conversion factors, specific and characteristic of each impact category. In the characterization phase, the method assigns to each input or output flow, defined in the inventory, a factor that allows the calculation, for example, of the relative impact, caused by substances emitted into the air and their effects on the ecosystem and on human health. In this phase, the values of the different impact categories must be expressed in the units of each category. The inventory is then developed and the data converted into environmental impacts for each pre-selected category type according to a well-defined unit of measurement that depends on the category itself and that allows comparison. The aggregation of all impacts generated by each input or output element of the inventory grouped within the same impact category generates the impact of the entire category. The mathematical relationship according to which the impacts for each category are determined, with reference to the declared unit is the following:

$$Impact_i \left[\frac{kg\ X\ eq}{kg\ product}\right] = \sum_{j=1}^{n} \left(FC_i \left[\frac{kg\ X\ eq}{kg\ Y}\right] * Inventory\ Data_j \left[\frac{kg\ Y}{kg\ product}\right]\right)$$

Where:

- $Impact_i \left[\frac{kg\ X\ eq}{kg\ product}\right]$= is the impact of the *i-th* impact category measured in reference to the declared unit where$X$ It depends on the category itself as indicated in Table 4, third column:
- $FC_i \left[\frac{kg\ X\ eq}{kg\ Y}\right]$ = is the characterization factor of the *i-th* impact category where $Y$is the unit of measurement with which the inventory data classified in the *i-th category is measured.*
- $Inventory\ Data\ _j \left[\frac{kg\ Y}{kg\ product}\right]$ =is the j-th inventory data that is classified in the i-th impact category with reference to the declared unit.

6. INTERPRETATION OF THE LIFE CYCLE

(cf. UNI EN 15804:2019)

It is specified that the product does not contain biogenic carbon.

6.1.PRESENTATION AND ANALYSIS OF RESULTS "Skyline – terrace tile"

Table Table 5shows the impact on the environmental performance of categories A1, A2, A3 attributed to the production of "Skyline – terrazzo tile".

Table 5: Environmental performance "Skyline – terrazzo tile".

Impact category	Unit	Total A1-A3	C1	C2	C3	C4	TOTAL	D
Global Warming Potential - total (GWP-total)	kg CO2 eq .	8,93E+00	8,59E-02	2,66E-01	5,64E-02	5,45E-01	9,89E+00	-1,42E+00
Global Warming Potential - fossil fuels (GWP-fossil)	kg CO2 eq .	1,29E+01	8,58E-02	2,65E-01	5,60E-02	5,42E-01	1,39E+01	-1,42E+00
Global Warming Potential - biogenic (GWP-biogenic)	kg CO2 eq .	-3,98E+00	3,73E-05	1,37E-04	3,69E-04	2,82E-03	-3,98E+00	-8,60E-04
Global Warming Potential - land use and land use change (GWP-luluc)	kg CO2 eq .	6,77E-03	8,08E-06	9,08E-05	1,27E-05	3,20E-04	7,20E-03	-6,74E-04
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC-11 eq .	2,04E-06	1,40E-09	5,34E-09	1,13E-09	1,31E-08	2,06E-06	-4,51E-08
Acidification potential, Accumulated Exceedance (AP)	mol H+ eq .	5,29E-02	3,56E-04	8,57E-04	4,18E-04	3,63E-03	5,81E-02	-7,01E-03
Eutrophication potential - freshwater (EP-freshwater)	kg P eq .	2,54E-03	1,84E-05	1,80E-05	1,74E-05	1,38E-04	2,73E-03	-3,21E-04
Eutrophication potential - marine (EP-marine)	kg N eq .	1,13E-02	5,94E-05	2,91E-04	1,63E-04	1,35E-03	1,31E-02	-1,20E-03
Eutrophication potential - terrestrial (EP-terrestrial)	mol N eq .	1,26E-01	6,27E-04	3,17E-03	1,78E-03	1,46E-02	1,46E-01	-1,34E-02
Photochemical Ozone Creation Potential (POCP)	kg NMVOC eq .	4,66E-02	2,38E-04	1,40E-03	5,76E-04	5,09E-03	5,39E-02	-5,73E-03
Abiotic depletion potential - non-fossil resources (ADPE)*	kg Sb eq .	1,57E+02	1,21E+00	3,84E+00	8,95E-01	1,15E+01	1,74E+02	-2,03E+01
Abiotic depletion potential - fossil resources (ADPF)*	MJ, net calorific value	9,91E-05	1,18E-07	7,16E-07	1,77E-07	1,25E-06	1,01E-04	-3,22E-05
Water (user) deprivation potential (WDP)*	m3 world eq . deprived	3,23E+00	2,11E-02	1,83E-02	-1,10E-01	4,85E-01	3,65E+00	-4,85E-01
Particulate Matter emissions (PM)	Disease incidence	3,98E-07	1,20E-09	2,64E-08	4,65E-08	8,06E-08	5,53E-07	-1,53E-08
Ionizing radiation, human health (IRP)	kBq U235 eq .	7,82E-01	6,05E-03	4,67E-03	3,94E-03	1,53E-02	8,12E-01	-9,32E-02
Eco-toxicity - freshwater (ETP- fw)	CTUe	7,06E+01	2,93E-01	1,82E+00	5,89E-01	4,23E+00	7,75E+01	-1,11E+01
Human toxicity, non-cancer effect (HTP- nc)	CTUh	2,24E-07	8,14E-10	4,96E-09	1,15E-09	5,48E-09	2,37E-07	-4,28E-08

Human toxicity, cancer effects (HTP-c)	CTUh	8,75E-08	2,38E-10	3,28E-09	6,40E-10	6,22E-09	9,79E-08	-1,19E-08
Land use related impacts/Soil quality (SQP)	dimensionless	3,91E+02	1,34E-01	3,87E+00	8,59E-01	2,59E+01	4,21E+02	-3,76E+00

* The results of this environmental impact indicator should be used with caution as the uncertainties on these results are high or due to limited experience with this indicator (see UNI EN 15804:2019);

Within the A1-A3 category, module A1 is the module with the greatest environmental impact.

Table 6*"Skyline – terrazzo tile"* resources.

Impact category	Unit	Total A1-A3	C1	C2	C3	C4	TOTAL	D
Use of renewable primary energy as energy carrier (PERE)	MJ, net calorific value	2,61E+01	5,47E-02	5,92E-02	7,27E-02	3,83E+01	6,45E+01	-1,22E+00
Use of renewable primary energy resources used as raw materials (PERM)	MJ, net calorific value	3,81E+01	0,00E+00	0,00E+00	0,00E+00	-3,81E+01	0,00E+00	0,00E+00
Total use of renewable primary energy (PERT)	MJ, net calorific value	6,42E+01	5,47E-02	5,92E-02	7,27E-02	2,05E-01	6,45E+01	-1,22E+00
Use of non-renewable primary energy as energy carrier (PENRE)	MJ, net calorific value	1,54E+02	1,21E+00	3,84E+00	8,96E-01	1,41E+01	1,74E+02	-2,03E+01
Use of non-renewable primary energy resources used as raw materials (PENRM)	MJ, net calorific value	2,62E+00	0,00E+00	0,00E+00	0,00E+00	-2,62E+00	0,00E+00	0,00E+00
Total use of non-renewable primary energy resource (PENRT)	MJ, net calorific value	1,57E+02	1,21E+00	3,84E+00	8,96E-01	1,15E+01	1,74E+02	-2,03E+01
Use of secondary material (SM)	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-3,31E-01
Use of renewable secondary fuels (RSF)	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-5,06E-01
Use of non-renewable secondary fuels (NRSF)	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-2,48E-04
Net use of fresh water (FW)	m3	9,45E-02	5,22E-04	5,76E-04	-2,15E-03	1,17E-02	1,05E-01	-1,87E+01

Table 7: Output flows and waste *"Skyline – terrazzo tile ".*

Impact category	Unit	Total A1-A3	C1	C2	C3	C4	TOTAL	D
Dangerous waste disposed (HWD)	kg	7,24E-04	4,31E-06	2,53E-05	5,77E-06	7,84E-05	8,38E-04	-9,59E-05
Non- hazardous waste disposed (NHWD)	kg	8,47E+00	1,63E-03	3,29E-01	8,84E-01	4,47E+01	5,43E+01	6,06E-01
Radioactive waste disposed (RWD)	kg	1,90E-04	1,34E-06	1,16E-06	9,10E-07	3,75E-06	1,97E-04	-2,38E-05
Components for reuse (CRU)	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling (MFR)	kg	1,50E+00	0,00E+00	0,00E+00	4,05E+00	0,00E+00	0,00E+00	0,00E+00
Materials for energy recovery (MER)	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported electrical energy (EEE)	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported thermal energy (EET)	MJ, net calorific value	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Table 8: The indicator includes all greenhouse gases included in the total GWP, but excludes the absorption and emissions of biogenic carbon dioxide and the biogenic carbon stored in the product. This indicator is therefore equal to the GWP indicator originally defined in EN 15804:2012+A1:2013 of the product "Skyline – terrazzo tile ".

Additional mandatory environmental impact indicators	Unit	Total A1-A3	C1	C2	C3	C4	TOTAL	D
Global Warming Potential (GWP-GHG)	kg CO2 eq .	1,28E+01	8,52E-02	2,64E-01	5,57E-02	5,39E-01	1,38E+01	-1,41E+00

Table 9: Biogenic carbon content in the product "Skyline – terrazzo tile "

Biogenic carbon content	Unit	Total A1-A3	C1	C2	C3	C4	TOTAL	D
Biogenic carbon content in product	kg C	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Biogenic carbon content in accompanying packaging	kg C	1,42E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

6. CONCLUSIONS, LIMITATIONS AND RECOMMENDATIONS

(see UNI EN ISO 14044:2018 par 4.5.4)

The work presented here highlights how it is possible to analyze the products under study along the information modules. The dynamic calculation model will allow VENISTON SRL to have a system available that can demonstrate in real time how the change of an input parameter of a unit process can vary its contribution in terms of environmental impact, and therefore, be able to identify those significant and controllable parameters capable of leading to a reduction of the resulting environmental risks. In the case of the product "Skyline – terrazzo tile," the analysis showed that the informational module with the greatest impact is module A1-A3, which accounts for 92,03% of the overall environmental contributions. Within this module, the most significant environmental performance indicator is related to carbonate, which accounts for 28,90% of the total impact of module A1-A3. This is followed by electricity usage, contributing 22,65%, and pallets, which represent 14,32%.

In the interactive scenario of VENISTON SRL with its stakeholders, bearers of collective and individual interests, communicating its environmental management policy regarding the production of its products becomes crucial and synonymous with a company that wants to be perceived as reliable and transparent.
It is also recalled that the calculation model is implementable, a feature declared when it is updated also in terms of the inclusion of any new related unitary processes. Finally, it is the company's intention to continue to integrate this study in the design phase in the future so as to be able to provide the production of specific products by associating them with a monitoring system, with a view to environmental sustainability of its business and continuous improvement.

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ANNEX A: DATA QUALITY

In line with what is defined by the PEF recommendation ((2013/179/EU)), it has been established that the data and in particular the datasets used, to be considered valid, must reach at least a level of "good quality" or a DQR (Overall Data Quality Index) between 2 and 3.

It has been established that the DQR is the result of the following calculation:

- DQR= (TEMPORAL REPRESENTATIVENESS (TiR)+ TECHNICAL REPRESENTATIVENESS (TeR)+ GEOGRAPHICAL REPRESENTATIVENESS (GR)/3

Based on the DQR value, the qualities shown in Figure 2:

overall data quality level based on the achieved data quality index	
Overall Data Quality Index (DQR)	Overall data quality level
≤ 1.6	"Excellent quality"
from >1.6 to 2.0	"Very good quality"
from 2.0 to 3.0	"Good quality"
from 3.0 to 4.0	"Satisfactory quality"
>4	"Poor quality"

Figure 2: Data quality level

The score to be assigned to TiR, TeR and GR is based on what is indicated in figure 3 of the PEF recommendation ((2013/179/EU). The overall data quality level is equal to 2, which translates into a "very good data quality" as reported in table 10.

Table10:The overall level of data quality

		SOURCE	TEMPORAL REPRESENTATIVENESS	TECHNICAL REPRESENTATIVENESS	GEOGRAPHICAL REPRESENTATIVENESS	DQR
Terrazzo tile						
Electricity, medium voltage {IT}| market for electricity, medium voltage | Cut-off, U (RESIDUAL MIX 24 - DATI RIFERITI A 23)	Electricity consumption	Ecoinvent	1	2	1	1,33
Heat, central or small-scale, natural gas {Europe without Switzerland}| market for heat, central or small-scale, natural gas | Cut-off, U	Natural gas	Ecoinvent	2	2	2	2,00
Tap water {Europe without Switzerland}| market for tap water | Cut-off, U	Water consumption	Ecoinvent	2	2	2	2,00
Limestone, crushed, washed {CH}| market for limestone, crushed, washed | Cut-off, U	Carrara white marble, Botticino	Ecoinvent	2	2	3	2,33
Cement, CEM II/B {Europe without Switzerland}| market for cement, CEM II/B | Cut-off, U	White cement	Ecoinvent	2	2	2	2,00

Calcium carbonate, precipitated {RER}| calcium carbonate production, precipitated | Cut-off, U	Carbonate	Ecoinvent	2	2	2	2,00
Polyethylene terephthalate, granulate, amorphous {RER}| polyethylene terephthalate production, granulate, amorphous | Cut-off, U+Extrusion, plastic film {GLO}| market for extrusion, plastic film | Cut-off, U	PET cap	Ecoinvent	2	2	2	2,00
EUR-flat pallet {RER}| market for EUR-flat pallet | Cut-off, U	Pallet	Ecoinvent	2	2	2	2,00
Lubricating oil {GLO}| market for | Cut-off, U	Release oil	Ecoinvent	2	2	3	2,33
Inert waste {Europe without Switzerland}| treatment of inert waste, sanitary landfill | Cut-off, U	Waste to disposal	Ecoinvent	2	2	2	2,00
Transport, freight, lorry >32 metric ton, EURO5 {RER}| market for transport, freight, lorry >32 metric ton, EURO5 | Cut-off, U	Transport	Ecoinvent	2	2	2	2,00
Waste concrete, not reinforced {Europe without Switzerland}| treatment of waste concrete, not reinforced, sorting plant | Cut-off, U; Calcium carbonate, precipitated {RER}| calcium carbonate production, precipitated | Cut-off, U	Treatment for inert recovery and recycling	Ecoinvent	2	2	2	2,00