ENVIRONMENTAL PRODUCT DECLARATION

in compliance with ISO 14025 and EN 15804:2012+A2:2019

Basalt railway ballast

(31.5/50mm size)

Produced by Basalti Orvieto Srl
in the production site of Cornale Castel Viscardo TR – ITALY

Program Operator	EPDItaly
Publisher	EPDItaly
Declaration Number	OBB50
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General Information

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UN CPC code: 15320 - Pebbles, gravel, broken or crushed stone, macadam; granules, chippings and powder of stone

PCR ICMQ-001 Prodotti e servizi per le costruzioni, rev.3 del 02/12/19, valid till 01/12/2024

Reference documents: Regolamento del Programma EPDItaly (Rev.5.2 16/02/2022), available at: www.epditaly.it and EN 15804:2012+A2:2019

LCA Project Report: Neri et al., 2023. LCA Report "Project report per la certificazione EPD di Aggregati sfusi (granulometria da 0/2 a 50 mm) di Basalti Orvieto Srl" ver. 01 INDACO$_2$ srl

The PCR revision was performed by BTicino - CESI - ECAM RICERT - ENEL - Take Care International – info@epditaly.it.
Independent third-party verification of the declaration and data, according to ISO 14025:2006:
☐ Internal ☒ External
Third party verifier: *ICMQ S.p.A., via Gaetano De Castillia n° 10 - 20124 Milano, Italia. Accredited by Accredia.*

Publisher and Programme Operator: *EPDItaly via de Castilla 10, 20124 Milano, Italy*

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programmes may not be comparable. Construction products may not be comparable if not compliant with EN 15804:2012+A2:2019

The EPD Owner relieves EPDItaly of any non-compliance with environmental legislation. The EPD Owner is responsible for information and supporting evidences.
EPDItaly declines the responsibility for the information, data and results provided by the EPD Owner for the life cycle assessment

Company information

Description of the organisation:

Basalti Orvieto S.r.l. operating since 1994 in the mining and processing of non-metallic minerals and deals with the extraction, processing and marketing of basalt, whose applications range from structural to ornamental construction as it is a strategic material for the construction, depending on the processing, of railway ballast, of aggregates for the packaging of draining and sound-absorbing bituminous conglomerate or for the creation of high-performance concrete, or for interior and exterior coatings.

Basalti Orvieto is a small enterprise operating with thirty years, experience in producing first-class aggregates for buildings and constructions sector, train railways ballast, packing of bituminous drainage conglomerate, s.m.a, slurry-seal, production of concrete

Currently the Castel Viscardo ore quarry is active, with about 35 direct and indirect employees.

The material is extracted from a flow of Leucititic Tephrite (group of Basalts) on a front of about 35 meters. Furthermore, given the homogeneous characteristics of the structure, the stone is used for ornamental applications. Cultivation covers an area of about 35 ha, some of which have already been excavated and some to be excavated for a reserve in a bench of approximately 4,000,000 cubic meters. Inside the extraction site there is a plant for the production of ballast and aggregates. The production potential of the aforementioned plant is approximately 2,500 cubic meters / day.

The products deriving from the processing of basalt aggregates are also used in the industrial field for the production of reinforced coatings and compounds for all those applications where an important resistance to temperature or fire is required. Other use deal with automotive, such as reinforcement for polyester/epoxy based composites, for the manufacture of interior and exterior panels. Basalt is also applied in other industrial uses concerning wear materials such as clutches and brake pads.

The company has a photovoltaic system that meets about half electricity needs of the overall plant.

Name and location of production site: Castel Viscardo quarry (TR)

Fig.1 Basalti Orvieto quarry

Product information

Product name: Basalt railway ballast (31.5/50mm size)

Product identification and description: The product is constituted by stone aggregates obtained by mechanical grinding of basalt rock and subsequent sifting to obtain the 31.5/50mm size (Fig.2).

Fig.2 Ballast 31.5/50

UN CPC code: 15320 - Pebbles, gravel, broken or crushed stone, macadam; granules, chippings and powder of stone.

Geographical scope: Italy

Content declaration

The raw material is a basic rock of volcanic effusive nature containing naturally occurring mineral elements, such as silica, alumina, potassium and calcium. It does not contain free crystalline silica nor minerals containing asbestos. Tab.1 shows more details on the characteristics of the product.

These products are subjected to careful and constant controls to ensure a quality standard complying with the applicable reference standards.

Tab.1 Content declaration of Ballast

CHEMICAL COMPOSITION		
Silicon Oxide (SiO2)	45 - 49	%
Aluminium Oxide (Al2O3)	20.5 – 25.6	%
Potassium Oxide (K2O)	8 – 10	%
Iron oxides (Fe2O3)	5.2 – 8.5	%
Calcium oxides (CaO)	7.5 – 8.5	%
Magnesium Oxide (MgO)	1.9 – 2.6	%
Sodium Oxide (Na2O)	2.2 – 4.9	%

None of the substances listed in the current version of the "Candidate List" European Regulation 1907/2006 / EC REACH (Registration, Evaluation, Authorization and restriction of chemicals) is included in the products marketed, concentrations higher than 0.1% by weight. The product is not subject to classification or labelling in accordance with Directive 67/548 / EC and EC Regulation no. 1272/2008 (CLP) and its updates, as it is considered an article/item and therefore beyond their application field.

Packaging

Distribution/consumer packaging: the product is distributed in bulk. No packaging is used.

LCA information

Time representativeness:	data refer to the year 2021
Type of EPD	A1-A3, C1-C4, D EPD of specific product
Database used:	EcoInvent Database v.3.8.
LCA software used:	SimaPro 9.3.0.3
Reference Service Life	Not applicable (module B is not included in this declaration)

The scope of the present Environmental Product Declaration is to assess potential environmental impact values for the **Ballast** production based on the Life Cycle Assessment methodology and make them explicit. A description follows with details on declared unit, system boundaries, key assumptions and a flow chart describing the lifecycle stages of the product.

A comprehensive quantitative evaluation of environmental performances in the **Ballast** production chain has been provided based on Life Cycle Assessment (LCA). The lifecycle includes all the main processes from the withdrawing of raw materials, to the basalt stone extraction, grinding and sifting (i.e. Product Stage, A1-A3 modules). It includes also End of Life Stage (i.e. C1-C4 modules) and benefits and loads beyond the system boundaries (D module).

Declared Unit

The Declared Unit (DU) is **1 t of Ballast 31.5/50.**

Description of system boundaries

Based on a “from cradle to gate” with modules C1-C4 and D, the **Ballast** lifecycle system boundaries concern:

A1 module: it consists in the “from cradle to gate” set of processes that includes:

- production of raw materials used (e.g. chemical products and components of explosives, detonators and fuses);
- production of materials for packaging of raw materials (e.g. PVC, PE, cardboard box);
- production of machineries components that are substituted for ordinary maintenance (annual or more frequent).
- production of electricity, fuels (i.e. gasoline) and water; these consumptions include both quarry activities grinding and sifting;

The use of energy (electricity and gasoline) and water were based on data reported in the company annual reports and allocated to the mass processed in each phase.

A2 module: it includes transport of raw materials from the main suppliers to Basalti Orvieto srl;

A3 module: it consists in processes within the production plant (from gate to gate) that includes:

- direct air emissions due to the use of fuel for vehicles;
- treatment of water used during the production process;
- end-of-life treatment of the materials used during the production processes.

The A3 module is divided into the following sub-phases, useful for the choice of allocation criteria for materials and energy during the assessment:

1 – Basalt stone extraction: activities of tracking, perforation, explosive loading, explosion, disaggregation, material loading and transport to the processing plant. The stone blocks are partly sold and partly sent for primary crushing.

2 – First grinding: activities of grinding using grinders and conveyor belts. From this phase fraction 1 is obtained and sent to the next step.

3 – Second grinding: activities of grinding of fraction 1, using grinders and conveyor belts. From this phase fraction 2 is obtained and sent to the next step.

4 – Milling 1: fraction 2 is reduced in size using mills. From this phase fraction 3 is obtained and sent to the next step.

5 – Sifting 1: fraction 3 is sifted through the use of sifters. From this phase the fractions 4, 5, 6, and 7 are obtained.

Waste from the production process, mainly explosive, detonator and fuses packaging (e.g. cardboard and PVC) are burned during explosions, than they were considered sent 100% incineration, also lubricant oil is treated like 100% incineration. Paper, paperboard, plastic, wood for packaging of materials and machineries components are collected by specific companies and sent to recycling (100% recycling). Machinery tyres were considered sent 100% to landfill. Transport of waste to the waste plant was considered as 50km average distance. The wastewater treatment was also included.

C1 module: ballast removal. Estimated consumption of 7.5L of diesel per tonne of product removed.
C2 module: transport of the exhausted ballast to the landfill. An average distance of 50km has been assumed
C3 module: Waste sorting for recycling: electricity consumption to reduce the size of ballast (assumed 2.5kwh/t, that correspond to the electricity needed to obtain 10/16 size).
C4 module: treatment of ballast in landfills. Considered zero.
D module: possible benefits from material recycling: the benefit was calculated as emissions avoided by a hypothetical replacement of the gravel component in concrete.

Figure 3a and 3b show the system boundaries and flow chart of the **Ballast**, divided into A1-A3, C1-C4 and D modules.

Product stage			Construction process stage		Use stage							End of Life stage				Recovery stage
Upstream	Core		Downstream													Other info
Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Future, reuse, recycling or energy recovery potentials
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X

Fig.3a Modules declared for **Ballast** production. X=included module MND= Module Not Declared

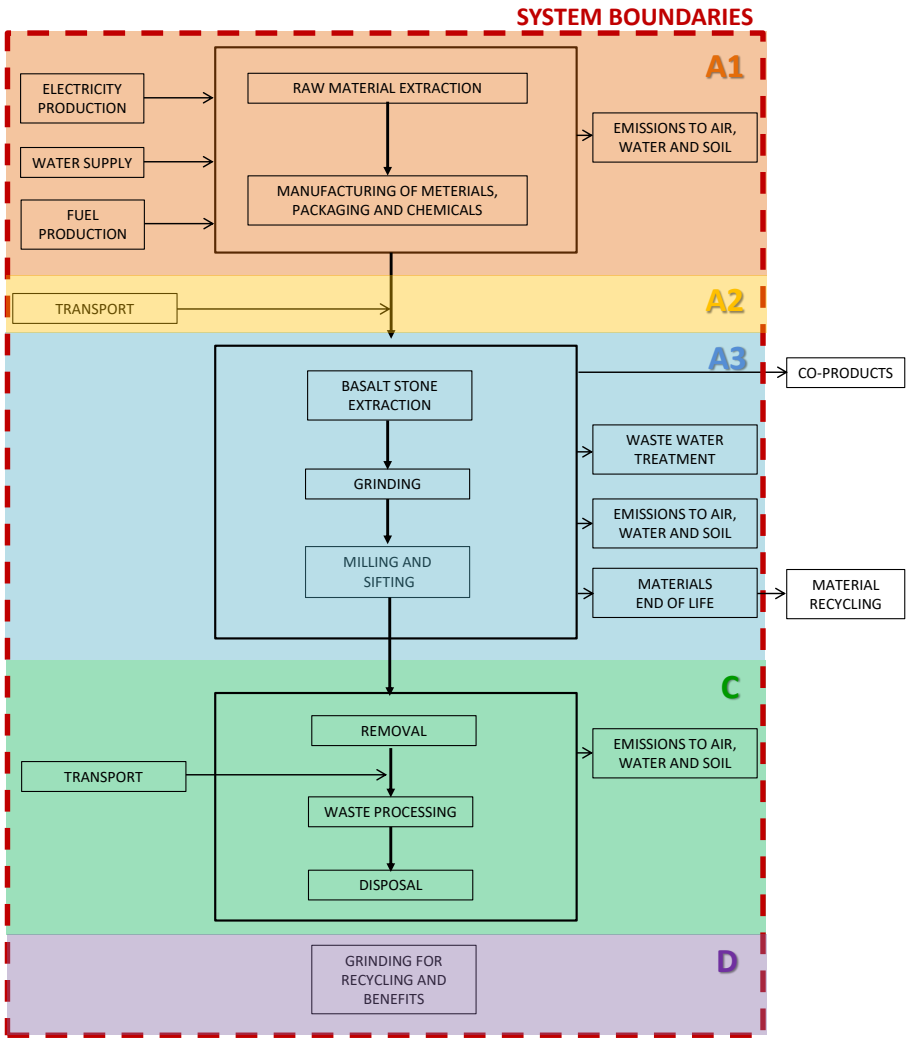

Fig.3b Flow chart and system boundaries of **Ballast** production.

Excluded lifecycle stages: Based on the definition of system boundaries and cut-off criteria, a number of processes were considered not relevant or not directly referred to the **Ballast** lifecycle.
Excluded processes are the following:

- construction of buildings and machineries used in the Castel Viscardo site;
- production and maintenance of machineries with more than 5 years estimated lifetime;
- activity and travels of employers;
- use stage of the product.

Not significant data were neglected. The considered cut-off is under the threshold of relevance (1% of total inputs), in accordance with the maximum percentage for exclusion.

More information:

The LCA has been performed in compliance with ISO 14040:2006 and ISO 14044:2006, ISO 14025:2006 (Environmental labels and declarations - Type III), EN 15804:2012+A2:2019, PCR ICMQ-001 Prodotti e servizi per le costruzioni, rev.3 del 02/12/19, valid till 01/12/2024 and EPD ITALY Programme Rule Rev.5.2 16/02/2022

Primary data have been collected in the Basalti Orvieto production plant of Castel Viscardo (TR – IT) based on direct interviews with employers involved in production processes, during specific field-visits in different plant sections or derived from registered company reports. All quantities derive from primary data, as recommended by data quality requirements.

Environmental impacts due to the use of energy (electricity, gasoline), and water were based on data registered in company reports. The electricity consumption in each core sub-phase derives from direct monitoring carried out and documented by TECNO srl. Electricity used by the company is partly auto-produced by photovoltaic panels and partly supplied by the grid mix (modelled as residual mix, according to AIB report).

Selected generic data (secondary data) refer to the Ecoinvent database v.3.8.

The LCA has been performed based on the SimaPro 9.3.0.3 software, selected method EN15804+A2

Impacts associated with proxy data not exceed 1% of the overall environmental impact from the product system. The environmental impacts totally derived from primary or selected generic data. All primary and selected generic data, database and accounting models are compliant with the data quality requirements.

An estimated quantity less than 3% of losses, relative to the raw material, along the production chain, are not included and considered not relevant for the assessment. Direct emissions (i.e. CO_2, CH_4 and N_2O) related to the use of gasoline are included in the A3 module.

The LCA study was performed by Elena Neri and Gaia Esposito (INDACO$_2$ srl, Siena, Italy) Neri et al., 2022.

Environmental performance

Potential environmental impact in accordance to EN 15804:2012+A2:2019

The assessed potential environmental impacts are reported in **table 2**, detailed into upstream, core and downstream processes. Values refer to the declared unit (**1 t of Ballast**).

Tab.2 Environmental Impact Potentials referred to the **Ballast** production system per DU (2021).

IMPACT INDICATOR	UNIT	A1	A2	A3	TOT A1-A3	C1	C2	C3	C4	TOT C1-C4	D
GWP - fossil	kg CO2 eq	1.47E+00	1.35E-02	2.38E+00	3.87E+00	2.38E+01	2.54E+01	1.32E+00	0.00E+00	5.05E+01	-2.11E+00
GWP - biogenic	kg CO2 eq	7.78E-02	5.27E-05	1.51E-02	9.30E-02	1.85E-02	9.93E-02	1.64E-01	0.00E+00	2.82E-01	-9.78E-02
GWP - luluc	kg CO2 eq	5.60E-04	8.09E-06	1.40E-04	7.08E-04	1.03E-03	1.52E-02	1.47E-04	0.00E+00	1.64E-02	-1.22E-03
GWP - total	**kg CO2 eq**	**1.55E+00**	**1.36E-02**	**2.40E+00**	**3.96E+00**	**2.39E+01**	**2.55E+01**	**1.49E+00**	**0.00E+00**	**5.08E+01**	**-2.21E+00**
ODP	kg CFC11 eq	7.36E-07	2.95E-09	1.23E-08	7.51E-07	5.39E-06	5.57E-06	1.95E-07	0.00E+00	1.12E-05	-3.59E-07
AP	mol H+ eq	9.70E-03	5.28E-05	6.84E-04	1.04E-02	3.85E-02	1.22E-01	5.37E-03	0.00E+00	1.65E-01	-1.95E-02
EP - freshwater	kg P eq	2.68E-04	1.26E-06	5.30E-05	3.23E-04	2.51E-04	2.37E-03	2.18E-04	0.00E+00	2.84E-03	-3.51E-04
EP - Marine	kg N eq	1.54E-03	1.45E-05	1.26E-04	1.68E-03	4.78E-03	3.89E-02	8.77E-04	0.00E+00	4.46E-02	-7.13E-03
EP - terrestrial	mol N eq	1.88E-02	1.58E-04	1.13E-03	2.01E-02	5.23E-02	4.25E-01	1.01E-02	0.00E+00	4.87E-01	-8.25E-02
POCP	kg NMVOC eq	5.51E-03	4.93E-05	3.79E-04	5.94E-03	2.15E-02	1.23E-01	2.80E-03	0.00E+00	1.47E-01	-2.19E-02
ADP – minerals&metals*	kg Sb eq	8.93E-06	8.42E-08	8.17E-06	1.72E-05	4.24E-06	1.58E-04	2.62E-06	0.00E+00	1.65E-04	-3.31E-05
ADP – fossil*	MJ	5.06E+01	1.95E-01	1.05E+00	5.18E+01	3.24E+02	3.68E+02	1.75E+01	0.00E+00	7.09E+02	-2.63E+01
WDP*	m3 depriv.	4.18E-01	7.56E-04	7.65E-02	4.96E-01	4.44E-02	1.42E+00	4.04E-01	0.00E+00	1.87E+00	-2.12E+00

(GWP – fossil) Global warming potential fossil fuels; (GWP – biogenic) Global warming potential biogenic; (GWP – luluc) Global warming potential land use and land use change; (GWP – total) Global warming potential total; (ODP) Depletion potential of stratospheric ozone layer; (AP) Acidification potential accumulated exceedance; (EP – freshwater) Eutrophication potential fraction of nutrients reaching freshwater end compartment; (EP – Marine) Eutrophication potential fraction of nutrients reaching marine end compartment; (EP – terrestrial) Eutrophication potential accumulated exceedance; (POCP) Formation potential of tropospheric ozone; (ADP – minerals&metals) Abiotic depletion potential for non-fossil resources; (ADP – fossil) Abiotic depletion potential for fossil resources; (WDP) Water (user) deprivation potential, deprivation-weighted water consumption

** Disclaimer 2 – The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator*

Results highlight that gasoline and grid electricity consumption are the most relevant aspect in terms of environmental impact management in the A1-A3 modules, particularly referring to GWP, AP, EP and POFP categories. The revealed hotspots constitute the starting point to identify and develop solutions to mitigate impacts and optimizing the whole process, for a continuous improvement on company management.

Neverless, the assessment allowed to highlight the best practices implemented by the company. The use of self-produced electricity from photovoltaic panels makes it possible to avoid about 13% of the total emissions (i.e. 0.57 $kgCO_2eq$ per DU) if compared with the same production process with electricity totally from national mix (residual mix). Ongoing monitoring and constant renewal of the vehicles, privileging the most efficient technologies, minimised the consumption (and consequently the impact) of fuels. Water consumption (and related impact) is also minimised by using it only when strictly necessary (i.e. limited to dust removal, avoiding the use of settling with flocculants).

The net benefit for ballast recycling would allow to avoid 0.72 $kgCO_2eq$ per ton of Ballast recycled and substituted to gravel virgin material in cement.

Use of resources

Tab.3 Total renewable and non-renewable resources used in the **Ballast** production system per DU (2021).

PARAMETER		UNIT	A1	A2	A3	TOTAL A1-A3	C1	C2	C3	C4	D
Primary energy resources - RENEWABLE	Used as ENERGY carrier	MJ, net calorific value	1.24E+00	4.28E-03	4.34E+00	5.58E+00	9.09E-01	8.05E+00	0.00E+00	2.80E+00	-8.85E+00
	Used as RAW MATERIALS	MJ, net calorific value	7.03E-01	1.52E-03	3.60E-02	7.41E-01	3.07E-01	2.86E+00	0.00E+00	1.60E+00	-1.84E+00
	TOTAL	MJ, net calorific value	1.94E+00	5.80E-03	4.38E+00	6.32E+00	1.22E+00	1.09E+01	0.00E+00	4.39E+00	-1.07E+01
Primary energy resources - NON RENEWABLE	Used as ENERGY carrier	MJ, net calorific value	5.13E+01	2.01E-01	1.15E+00	5.27E+01	3.25E+02	3.80E+02	1.96E+01	0.00E+00	-3.49E+01
	Used as RAW MATERIALS	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	0.00E+00	0.00E+00
	TOTAL	MJ, net calorific value	5.22E+01	2.01E-01	1.15E+00	5.35E+01	3.25E+02	3.80E+02	1.96E+01	0.00E+00	-3.49E+01
Secondary Material		kg	0	0	0	0.00E+00	0	0	0	0	0
Renewable secondary fuels		MJ	0	0	0	0.00E+00	0	0	0	0	0
Non-Renewable secondary fuels		MJ	0	0	0	0.00E+00	0	0	0	0	0
Use of fresh water		m3	1.40E-02	3.05E-05	2.58E-03	1.66E-02	3.51E-03	5.74E-02	9.84E-03	0.00E+00	-1.43E+00

Waste production and output flows
Waste production

Tab.4 Total waste generation for the **Ballast** production system per DU (2021).

WASTE TYPE	UNIT	A1	A2	A3	TOTAL A1-A3	C1	C2	C3	C4	D
hazardous	kg	1.25E-04	5.57E-07	5.84E-05	1.84E-04	8.66E-04	1.05E-03	2.76E-05	0.00E+00	-1.01E-04
non hazardous	kg	1.27E-01	6.61E-03	2.09E-02	1.55E-01	1.64E-01	1.24E+01	4.07E-02	0.00E+00	-9.03E-03
radioactive	kg	2.90E-04	1.33E-06	3.82E-06	2.95E-04	2.31E-03	2.51E-03	4.22E-05	0.00E+00	-3.01E-01

Output flows

Tab.5 Total output flows for the **Ballast** production system per DU (2021).

WASTE TYPE	UNIT	A1	A2	A3	TOTAL A1-A3	C1	C2	C3	C4	D
Components for reuse	kg	0	0	0	0	0	0	0	0	0
Material for recycling	kg	0	0	1	1	0	0	0	0	0
Materials for energy recovery	kg	0	0	0	0	0	0	0	0	0
Exported energy, electricity	MJ	0	0	0	0	0	0	0	0	0
Exported energy, thermal	MJ	0	0	0	0	0	0	0	0	0

Information on biogenic carbon content

Tab.6 Information describing the biogenic carbon content at the factory gate per DU.

PARAMETER	UNIT	QUANTITY
Biogenic carbon content in the product	kg C	0
Biogenic carbon content in the accompanying packaging	kg C	0

Additional Environmental Impact Indicators

Tab.7 Additional Environmental Impact Indicators referred to the **Ballast** production system per DU (2021).

IMPACT INDICATOR	UNIT	A1	A2	A3	TOT A1-A3	C1	C2	C3	C4	TOT C1-C4	D
PM*	**disease inc.**	5.56E-08	7.08E-10	5.83E-09	**6.22E-08**	1.94E-07	1.38E-06	0.00E+00	9.03E-07	**2.48E-06**	-4.38E-07
IRP**	**kBq U-235 eq**	2.46E-01	1.12E-03	7.80E-03	**2.55E-01**	1.46E+00	2.12E+00	0.00E+00	6.61E-01	**4.23E+00**	-5.54E-01
ETP-fw*	**CTUe**	3.54E+01	1.77E-01	4.16E+00	**3.97E+01**	1.72E+02	3.33E+02	0.00E+00	7.61E+01	**5.81E+02**	-2.60E+01
HTP-C*	**CTUh**	1.49E-09	7.44E-12	1.26E-10	**1.62E-09**	1.40E-09	1.40E-08	0.00E+00	1.74E-09	**1.71E-08**	-2.63E-09
HTP-NC*	**CTUh**	1.62E-08	1.75E-10	5.25E-09	**2.16E-08**	3.82E-08	3.29E-07	0.00E+00	3.60E-08	**4.03E-07**	-2.99E-08
SQP*	**Pt**	8.71E+00	9.84E-02	3.70E-01	**9.17E+00**	4.09E+01	1.85E+02	0.00E+00	3.05E+02	**5.32E+02**	-6.04E+01

(PM) Potential incidence of desease due to PM emissions; (IRP) Potential Human exposure efficiency relative to U235; (ETP-fw) Potential comparative toxic unit for ecosistems; (HTP-C) Potential comparative toxic unit for umans; (HTP-NC) Potential comparative toxic unit for umans; (SQP) Potential soil quality index

** Disclaimer 2 – The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator*

*** Disclaimer 1 - This impact indicator deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to \radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator*

Additional Environmental Information

Basalti Orvieto Management, is commitment to keep its ISO 14001: 2015 Environmental Management System updated, and is determined to continuously improve.

To achieve this goal, the organization is constantly committed to:

• Ensure compliance with the legislation and regulations of applicable prescriptions and obligations

• Evaluate and monitor all direct or indirect effects produced on the environment, during the operation activities, and set up improvement actions aimed at reducing the most significant impacts;

• Take action to make current and potential customers, as well as the community, aware of the company's commitment to the environment;

• Set up actions, aimed at the continuous improvement of their environmental performances and pollution prevention;

• Define actions that guarantee periodic verification of environmental requirements;

• Ensure the resources availability needed to achieve the defined objectives and goals, relating to pollution prevention;

• Ensure particular attention in qualifying and evaluating suppliers, so to guarantee continuity of services / supplies and compliance with mandatory regulations;

• Initiate all necessary actions to pursue energy saving and a optimized use of raw materials, aimed at a continuous improvement of all environmental and service delivery performances;

• Timely review external and internal context, the risks and opportunities and the environmental aspects related to the activities, and the expectations of the involved parties.

Desiring to ensure its tenacious commitment, the Management involves all staff, asking to all a collaborative contribution, so to achieve the present and future objectives, that will represent a qualitative and performance improvement, for the entire Organization.

Glossary

Biogenic carbon: carbon which is contained in biomass [ISO 14067:2018]

Biogenic carbon dioxide (CO2): CO_2 obtained by the oxidation of biogenic carbon [ISO 14067:2018]

Carbon dioxide equivalent (CO2 equivalent): unit for comparing the radiative forcing of a greenhouse gas to carbon dioxide. The carbon dioxide equivalent is calculated using the mass of a given greenhouse gas multiplied by its global warming potential [ISO 14064:2020]

Carbon footprint: net amount of greenhouse gas emissions and greenhouse gas removals, expressed in carbon dioxide (CO_2) equivalents. The CO_2 equivalent is calculated using the mass of a given greenhouse gas multiplied by its global warming potential. [ISO 14067:2018]

Functional/declared unit: quantified performance of a product system for use as a reference unit [ISO 14040:2021]

Global warming potential (GWP): factor describing the radiative forcing impact of one mass-based unit of a given greenhouse gas relative to an equivalent unit of carbon dioxide over a given period of time [ISO 14064:2021]

Life cycle assessment (LCA): compilation and evaluation of the inputs, outputs and the potential environmental impacts of a product system throughout its life cycle [ISO 14040:2021]

Raw material: primary or secondary material that is used to produce a product. Secondary material includes recycled material. [ISO 14040:2021]

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