INERTI ARTIFICIALI AD ALTE PRESTAZIONI
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ZEROCENTO SRL

ENVIRONMENTAL PRODUCT DECLARATION

IPERGRIP

Plant: Riviera Francia, 7 35127 - Padova (PD) Italy

According to ISO 14025 and EN15804+A2:2019

Program Operator	EPD ITALY
Publisher	EPD ITALY

Declaration Number	ZERBAS02
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Release Date	05/12/2024
Expiration Date	05/12/2029



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GENERAL INFORMATION

EPD OWNER	
Company Name	ZEROCENTO srl
Registered Office	Viale Gran Bretagna, 3 - 35020 Ponte San Nicolò (PD), Italy
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PROGRAM OPERATOR	
EPD Italy	Via Gaetano De Castillia n° 10 - 20124 Milano, Italy
ABOUT THE EPD	
Product Name	IPERGRIP
Site	Riviera Francia, 7 - 35127 Padova, Italy
Brief description and technical information of the product	IPERGRIP products are artificial aggregates, produced in different sizes • IPERGRIP 0-4 • IPERGRIP 4-8 • IPERGRIP 8-12 • IPERGRIP 8-16 • IPERGRIP 31.5-50
Product application area	The study is carried out for the IPERGRIP family of products, and in particular for 1 ton of material in different sizes, produced at the Riviera Francia plant and used in the asphalt sector.
CPC Code (numero) https://unstats.un.org/unsd/classifications/Econ	15330 Bitumen and asphalt, natural; asphaltites and asphaltic rock

VERIFICATION INFORMATION	
PCR	PCR ICMQ-001/15 rev 3 Construction products and services for construction, EPD Italy. Issue date: 02/12/2019. The EN 15804 standard – Sustainability of constructions. Environmental product declarations. Key development rules for the product category - represents the framework reference for PCR (EN15804+A2:2019).
REFERENCE REGULATION	This declaration has been developed following the EPDItaly Regulation revision 6.0 of 30/10/2023, available on the www.epditaly.it website.

Project Report LCA	
Independent Verification/Validation Statement	The PCR review was performed by ICMQ S.p.A. and UNIMORE (University of Modena and Reggio Emilia) – info@epditaly.it. Independent declaration and data verification carried out in accordance with ISO 14025:2010 ☐Interna ☒Esterna Third-party verification carried out by: TÜV Italia srl, Viale Fulvio Testi, 280/6, 20126 Milan (www.tuvsud.com). Accredited by Accredia: N. 0008VV.
STATEMENT COMPARABILITA'	Environmental claims published within the same product category, but from different programs, may not be comparable. In particular, EPDs of construction products may not be comparable if they do not comply with EN 15804.
STATEMENT LIABILITY	ZEROCENTO relieves EPDItaly from any non-compliance with environmental legislation. The holder of the declaration will be responsible for the information and supporting evidence; EPDItaly declines all responsibility for the manufacturer's information, data and life cycle assessment results.
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COMPANY

ZEROCENTO Srl is a company that since 2010 has specialized in the production of an artificial aggregate, obtained from the waste of the steel industry, and intended for the production of conglomerates.

The aggregate production plants are located in Padova, Cremona and Brescia, and are designed to package a high-performance aggregate, ideal for all conglomerates. The total production capacity of the plants is around 4,500 tons per day, while the annual production is around 800,000 tons.

The Padova site, the subject of this study, is located within Acciaierie Venete S.p.A. in an area of about 20,000 square meters, of which 12,000 square meters relating to the recovery plant, under concession for the recovery of slag from the steel mill.

It is a product of excellence, which fully embraces the new circular economy policies and the new CAM (Minimum Environmental Criteria). However, the ZEROCENTO market goes as far as central Italy.

The company is certified ISO 9001 Certificate No. 42512/22/S issued on 04/03/2022 and ISO 14001 No. EMS-8967/S Certificate issued on 04/03/2022, in the IAF 24 sector, with the following field of application: *MANUFACTURE, BY IRON REMOVAL, SCREENING AND CRUSHING, OF AGGREGATES FROM THE RECOVERY OF SLAG FROM STEEL MILLS AND INTENDED FOR THE PRODUCTION OF BITUMINOUS MIXTURES, CONCRETE, ROAD CONSTRUCTION AND FOR USE IN CIVIL ENGINEERING WORKS*.

Figure 1: ZEROCENTO Riviera France (PD) plant.

SCOPE OF APPLICATION

The study is carried out for the IPERGRIP family of products, an artificial aggregate used in the asphalt sector. The IPERGRIP family is produced in the following sizes:

- IPERGRIP 0-4
- IPERGRIP 4-8
- IPERGRIP 8-12
- IPERGRIP 8-16
- IPERGRIP 31.5-50

ZEROCENTO Srl takes care of the reception of waste with EWC code 100202 and subsequent selection and shredding phase until the final material is obtained sold in different sizes.

The entire production process takes place at the Riviera Francia (PD) plant, and the data collected refers to the year 2023.

The boundaries of the analyzed system are included within the analysis "from cradle to gate + options, with modules C1-C4 and module D. In fact, modules A1-A3 are included within the EPD procedure, which include the production and consumption processes of energy and materials in the system considered (A1), transport to the factory gate (A2), manufacturing processes, as well as the treatment of process waste (A3). In addition, the module (A4) for the distribution of the product on the Italian territory and the modules related to the end of life of the product (C1-C4), as well as the benefits of the recycling and reuse of the product, have been included with the module (D). Table 1 shows the modules included in the analysis identified with an x and the undeclared modules, indicated by the wording MND.

Table 1: Modules included in the system boundaries (ND = Module not included; X = Module included)

	Product Stage			**Construction Stage**		**Use stage**							**End of life stage**				**Benefits beyond system boundaries**
	Raw Materials Supply	Transport	Manufacturing	Transport to site	On site processes	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction/Demolition	Transport	Waste processing	Disposal	Reuse/Recovery/Recycling
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules Declared	**X**	**X**	**X**	**X**	ND	ND	ND	ND	ND	ND	ND	ND	**X**	**X**	**X**	**X**	**X**

The analysis included all the environmental implications related to the production process. Considering the raw material of which the product is made, the concept of "polluter pays" was used as dictated by the standard itself, and therefore the production processes of the slag leaving the steel mills were not included.

Figure 2 graphically shows the boundaries of the system and the processes included in each phase of the life cycle.

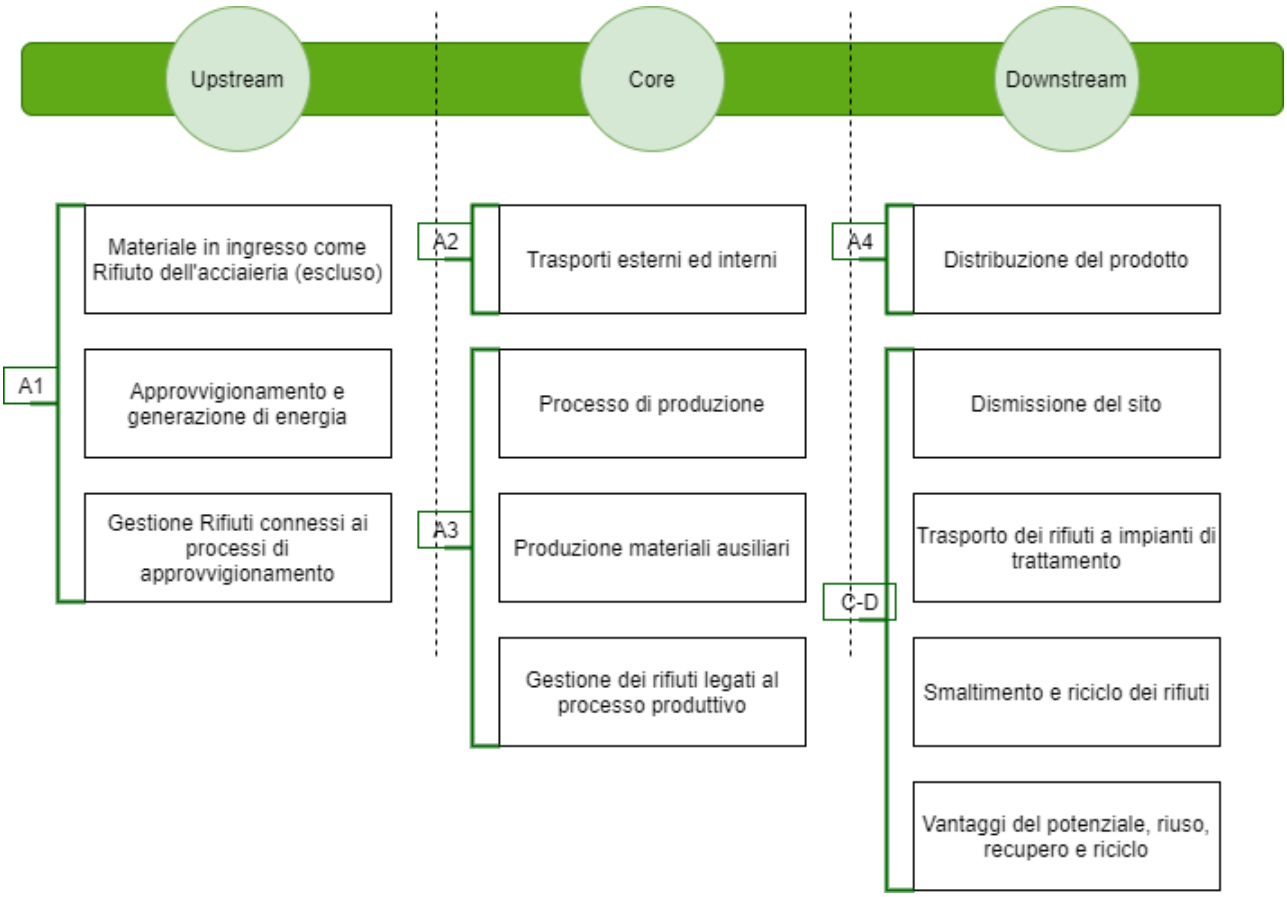

Figure 2: Lifecycle presentation.

Type of EPD	The EPD in question is “from cradle to gate” + options type, with modules C1-C4 and module D. The type of EPD is specific to IPERGRIP products.
Geographical validity	The services were calculated with reference to the ZEROCENTO production site, located in Riviera Francia, 7 (PD). The reference market is Italian.
Time validity	The reference period is the calendar year 2023.
Databases used:	Ecoinvent 3.10
Software:	SimaPro 9.6.1

DESCRIPTION OF THE PRODUCT AND PRODUCTION PROCESS

IPERGRIP products are artificial aggregates, produced in different sizes whose raw material is the same, the only difference that distinguishes them is a different screening phase depending on the size. The products in the IPERGRIP range (Figure 3) are classified as End of Waste (EoW), as they are obtained from the recovery of waste with an EWC code 100202, produced within the Acciaierie Venete S.p.A. steel mill.
IPERGRIP is a high-performance synthetic aggregate very similar to a natural basalt both in the chemical elements that compose it and in appearance.

This product is suitable for use in areas where it is necessary to use a tough and high-performance aggregate such as basalt. The performance of artificial aggregate material is higher than natural material (LA<14, CLA 55), the cost is much lower, and the new CAM regulations are fully complied with. This product is sold in the construction world, in particular in the asphalt sector.

Figure 3: IPERGRIP – Artificial aggregate in different sizes.

IPERGRIP does not contain substances classified as SVHCs (Substances of Very High Concern for Authorisation) in concentrations higher than the threshold limits, established in the Candidate List of SVHCs.

The product obtained certifications and CE marking in 2010 under number 0948-CPR-0106 from TÜV. CE marking of products for sizes with system 2+ according to the standards:

- UNI EN 12620;
- UNI EN 13450;
- UNI EN 13043;
- UNI EN 13242

The material, once reduced in size, is stored in an area divided into reinforced concrete partitions "tanks". These tanks allow the separation between the different sizes and allow the hydration of the material to complete the recovery process.

The production cycle that starts from the collection of industrial waste and arrives at the creation of the IPERGRIP artificial aggregate passes through various processing phases:

- maturation storage of the material for two months in heaps;
- crushing of the material in different screening processes according to the size (4 mm; 8 mm; 12 mm; 16 mm; 31.5 mm; 50 mm);
- elimination of ferrous residues through different iron removal cycles using magnets;

- wet maturation with periodic and scheduled washing in draining cementitious compartments to stabilize the material.

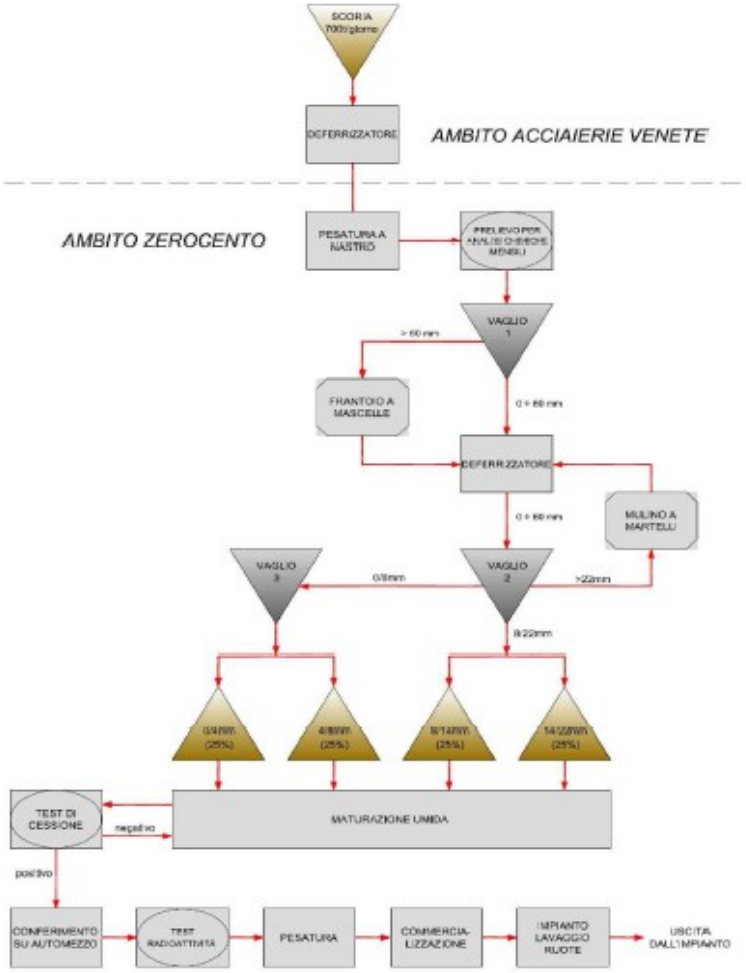

Figure 5: Process diagram of the Zerocento plant for the production of IPERGRIP artificial aggregate in different sizes

RESULTS

Below are the summary tables of the total impacts, relating to each indicator relating to the unit declared 1 tonne of IPERGRIP artificial aggregate.

Table 2 Evaluation of impacts associated with 1 t of IPERGRIP product

Impact category	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Climate Change	kg CO2 eq	1,60E+00	1.10E+01	2.09E-01	**1,28E+01**	1,90E+01	2.07E-01	6,78E+00	2.37E-01	4,03E+00	-8,10E-02
Climate Change - fossil	kg CO2 eq	1,58E+00	1.10E+01	2.09E-01	**1,27E+01**	1,90E+01	2.07E-01	6,78E+00	2.37E-01	4,01E+00	-1,17E-01
Climate Change - biogenic	kg CO2 eq	2.05E-02	7.04E-03	4,60E-04	**2.80E-02**	1.30E-02	6,74E-05	4.64E-03	2.59E-05	2,30E-02	3.32E-02
Climate Change - land use and transform.	kg CO2 eq	1.28E-04	3.29E-03	7,69E-05	**3,50E-03**	6,20E-03	2.20E-05	2.21E-03	2.06E-05	9,71E-04	2,56E-03
Ozone Depletion	kg CFC11 eq	3.37E-08	2.17E-07	4,77E-09	**2,56E-07**	3,77E-07	3.89E-09	1.35E-07	3.62E-09	1.25E-07	-1.43E-08
Acidification	mol H+ eq	4.17E-03	4.10E-02	5.33E-04	**4.57E-02**	5.94E-02	1.78E-03	2.12E-02	2.14E-03	4.42E-02	8,83E-03
Eutrophication Aquatic Freshwater	kg P eq	2.05E-04	6,88E-04	2.26E-05	**9,15E-04**	1.27E-03	8,95E-06	4,52E-04	6,91E-06	6,72E-03	-5,61E-04
Eutrophication Aquatic Marine	kg N eq	8,18E-04	1.52E-02	9,61E-05	**1.61E-02**	2.00E-02	8,22E-04	7,14E-03	9,91E-04	1.10E-02	3.20E-03
Eutrophication Terrestrial	mol N eq	8,67E-03	1.65E-01	9,98E-04	**1.75E-01**	2.18E-01	9.00E-03	7.77E-02	1.08E-02	1.18E-01	5.28E-02
Photochemical Ozone Formation	kg NMVOC eq	3.96E-03	6.41E-02	8,42E-04	**6,89E-02**	9,30E-02	2.74E-03	3.32E-02	3.24E-03	4.33E-02	7,36E-03
ADP1 - minerals and metals	kg Sb eq	1.65E-06	3.17E-05	5.17E-07	**3.38E-05**	6.07E-05	9,34E-08	2.17E-05	8,45E-08	7.66E-06	2.23E-07
ADP1 – fossil	MJ	2,32E+01	1,53E+02	2,98E+00	**1,79E+02**	2,67E+02	2,67E+00	9,51E+01	3,10E+00	9,32E+01	-2,19E+00
Water use	m3 depriv.	3.95E-01	5.91E-01	7,89E-02	**1,07E+00**	1,09E+00	7.02E-03	3.90E-01	6.71E-03	-5,23E+01	9,07E+00

[1] The results of this environmental impact indicator should be used with caution as uncertainties about these results are high or because experience with the indicator is limited.

Use of Resources

Table 3 Indicators Resource use

Impact category	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
PERE - Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ	3.95E-01	2,45E+00	7,75E-02	**2,92E+00**	4,53E+00	2.72E-02	1,62E+00	1.90E-02	1,94E+00	2,77E+00
PERM - Use of renewable energy resources as raw materials	MJ	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	5,00E-01
PERT = Total Use of Renewable Primary Energy Resources	MJ	3.95E-01	2,45E+00	7,75E-02	**2,92E+00**	4,53E+00	2.72E-02	1,62E+00	1.90E-02	1,94E+00	3,27E+00
PENRE - Use of primary non-renewable energy resources excluding primary non-renewable energy resources used as raw materials	MJ	4,73E+00	1,19E+01	3.12E-01	**1.69E+01**	2,19E+01	1.65E-01	7,80E+00	1.25E-01	6,29E+00	9,93E+00
PENRM - Use of non-renewable primary energy resources as raw materials	MJ	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	0.00E+00
PENRT = Total Use of Non-Renewable Primary Energy Resources	MJ	4,73E+00	1,19E+01	3.12E-01	**1.69E+01**	2,19E+01	1.65E-01	7,80E+00	1.25E-01	6,29E+00	9,93E+00
MS - Use of secondary materials	Kg	1,00E+03	0.00E+00	0.00E+00	**1,00E+03**	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF - Use of Renewable Secondary Fuels	MJ	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	0.00E+00
NRSF - Use of Non-Renewable Secondary Fuels	MJ	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	0.00E+00
FW - Use of fresh water	m3	1.17E-02	1.88E-02	1.99E-03	**3.25E-02**	3.47E-02	2.13E-04	1.24E-02	2.02E-04	-1,13E+00	2.04E-01

Outbound flows and waste produced

Table 4 Indicators Waste generation and output flows

Impact category	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Hazardous Waste Disposed	Kg	9,12E-05	1.03E-03	3.22E-05	**1.15E-03**	1.80E-03	1.79E-05	6.41E-04	2.14E-05	6,23E-04	-9,18E-05
Non-Hazardous Waste Disposed	Kg	3.12E-02	6,53E+00	1.50E-02	**6,57E+00**	1,27E+01	2.14E-03	4,52E+00	1.90E-03	4.01E+02	-6,85E+01
Radioactive Waste Disposed	Kg	1.49E-05	4.62E-05	1.63E-06	**6,27E-05**	8,49E-05	5,40E-07	3.03E-05	3.40E-07	3.05E-05	1.03E-04
Components for Re-Use	Kg	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	0.00E+00
Materials for Recycling	Kg	0.00E+00	0.00E+00	0.00E+00	**0.00E+00**	0.00E+00	0.00E+00	0.00E+00	6,00E+02	0.00E+00	0.00E+00
Materials for Energy Recovery	Kg	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	0.00E+00
Exported Energy	MJ	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	0.00E+00

As required by standard 15804:2012 + A2:2019, it has been decided not to report the information relating to additional environmental indicators.

The results of the impact assessment constitute relative information and are not capable of predicting future impacts on the final value of the category, exceedances of possible thresholds, safety margins or risks.

ADDITIONAL ENVIRONMENTAL INFORMATION

The following table shows the minimum content of recycled, recovered, by-product material contained in the IPERGRIP product.

MINIMAL CONTENT OF RECYCLED, RECOVERED AND BY-PRODUCT MATERIAL						
Product Name	**Recycled material**			**Recovered material**	**Byproducts**	**Total**
	Pre-recycled consumption	**Post-recycled consumption**	**Total recycled**			
IPERGRIP	100%	0%	100%	0%	0%	100%
PRODUCTION UNIT: Padova (PD)						
METHOD FOR DETERMINING THE CONTENT OF RECYCLED/RECOVERED/BY-PRODUCT: The methodology used to determine the recycled content (mass balance) followed the reference practice UNI/PdR 88:2020						
REFERENCE PERIOD OF THE DATA USED: 01/01/2023 – 31/12/2023						

Calculation methodology

The methodology followed as a reference standard is that of Life Cycle Assessment (LCA);

"LCA addresses environmental aspects and potential environmental impacts (e.g. resource use and environmental consequences of releases) throughout the product lifecycle, from the acquisition of raw materials through manufacturing and use, through end-of-life treatment, recycling and final disposal (i.e. cradle to grave)." [ISO 14040:2006].

Functional Unit/Declared Unit

The Declared Unit is 1 ton of IPERGRIP artificial aggregate in the sizes:

- 0-4 mm
- 4-8 mm
- 8-12 mm
- 8-16 mm
- 31.5-50 mm

This unit is chosen to take into account the different sizes of the individual codes. We speak of a declared unit precisely because we do not refer to the specific function of the material. Ultimately, all data is allocated to the chosen declared drive. The results are valid for all sizes.

The different sizes are not taken into account in the subdivision of the impacts and data collected, as they derive from the same material and the only difference is found in the screening of the production process, with no differences in both the input material and energy consumption.

Cut off rules

The criterion chosen for the initial inclusion of the input and output elements is based on the definition of a cut-off level of 1%, both in terms of mass, energy and environmental relevance. This means that a process has been neglected if it is responsible for less than 1% of the total mass, primary energy and total impact. However, all processes for which data are available have been taken into account, even if with a contribution of less than 1%. Consequently, this threshold value was used to avoid collecting unknown data, but not to neglect data that was still available. This choice is confirmed by similar LCA studies reported in the literature (Humbert et al., 2009).
The following contributions have been excluded in this study:

- Dependent travel;
- Energy for office heating.

Data quality

The data are site-specific in terms of weight, quantity, raw materials and waste, etc. As far as transport is concerned, resources and processes were taken from the Ecoinvent 3.10 database.

With regard to the quality of electricity data, the company procures through the national energy system and therefore the Italian residual mix is adopted as per the Ecoinvent databases: Electricity, medium voltage {IT}| electricity, medium voltage, residual mix | Cut-off, S with emission factor of 0.649 kg CO2 eq./kWh
With regard to generic data, criteria were applied throughout the analysis of:

- geographical equivalence, considered similar Italian or European systems;

- technological equivalence, considered comparable technological systems through literature searches;
- equivalence with respect to the boundaries of the system, considered systems that take into account similar inputs and outputs and similar phases.

For the definition of the quality of the data, reference was made to the methodology proposed by the 15804+A2:2019 standard.
Site-specific data refers to the year of production 2023, while for generic data, information between 2010 and 2023 was considered.

Period under review

The primary data collected under the present study refer to the year 2023, from January to December.

Allocation

In the present study, we have chosen to use an allocation on a mass basis.
The allocation of all phases was made for the quantity of material produced in 2023 including the different sizes, on which it was then possible to calculate the impact of the declared unit equal to 1 ton of product.

Reference scenarios

As dictated in the PCR itself, the phases of raw material procurement (UPSTREAM), transport and internal production (CORE PROCESS), and the distribution and disposal phases (DOWNSTREAM) were considered.
For the upstream phases, all impacts due to the production and supply of raw materials have been included (Module A1) and includes:

- the production of energy used;

For the Core phase, modules A2 and A3 have been included, which include:

- external and internal transport to the company, including handling with a mechanical shovel from the steel mill to the plant and from the plant to the factory gate;
- the production process, with the related energy consumption and auxiliary materials (such as water, additives and oil);
- the management of waste related to the production process.

For the Downstream phases, modules A4, C1, C2, C3, C4 have been included:

- Transport to the destination plants for the production of the final material, starting from the customer list to which the IPERGRIP product has been distributed and the average distance travelled.
- The phases of disposal of the material inserted within the context of use, and therefore within the bituminous conglomerates
- Transport of discarded material to final treatment plants
- Material recycling
- Disposal in landfills

For the distribution phase of the material downstream of the gate of the Zerocento plant, transport to the destination plants for the production of the final material was included.
The average distance was calculated by evaluating sales referring to 2023, obtaining an average distance value for distribution at the Italian level of 98 km. The transport for the distribution phase was modelled within the software using Ecoinvent's inventory for an average transport between 16 and 32 tonnes with European EURO5 labelling.

For the phases of decommissioning and final disposal of the material, reference was made to literature data, highlighting that the bituminous conglomerate, once decommissioned, is identified as milled asphalt, which is made up of bitumen and aggregate materials, including the IPERGRIP product. Milled asphalt is among the waste categorized within construction and demolition waste, and has been treated as such.

In addition, from a study conducted by Siteb – Italian Roads and Bitumen Association – on the recycling of road pavements in the main European countries (source Eapa) to date 60% of milled asphalt is reused in Italy.
However, it is estimated that the material could be 100% reused. It was therefore decided to analyze an Italian reference scenario, considering that 60% of the material is sent for recycling treatments and the remaining 40% is sent to authorized landfills for inert materials. This scenario is representative of the Italian situation, but also conservative, with respect to the recycling potential that the material can have, up to an ideal 100%.
Finally, the last step taken into account by the 15804 standard for the analysis from Cradle to Gate + options, modules C1-C4 and Module D is the benefit/load due to the reuse/recovery of materials.
In this case, the artificial aggregate treated and removed from the milled asphalt is reused for new bituminous conglomerates, replacing natural basalt or other artificial aggregate.
Since the artificial aggregate produced by Zerocento has technical characteristics similar to natural basalt, thanks to its recycling with milled asphalt it is possible to consider it as a substitute for natural basalt.
It was decided to include natural basalt as a substitute product, which is replaced by artificial aggregate, with a 1:1 substitution ratio.

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