Environmental Product Declaration

In accordance with ISO 14025 and EN 15804:2012+A2:2019/AC:2021 for:

Drawn and ground steel bars

EPD of multiple products, based on the average results of the product group

STILMA SpA

41123 Modena – via Emilia Ovest, 960/A

Programme:	The International EPD® System. www.environdec.com
Programme operator:	EPD International AB
EPD registration number:	EPD-IES-0028402:001
Version date:	2026-04-17
Validity date:	2031-04-16

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EPDs within the same product category but registered in different EPD programmes may not be comparable. For two EPDs to be comparable, they shall be based on the same PCR (including the same version number up to the first two digits) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

1. GENERAL INFORMATION

MANUFACTURER	Stilma S.p.A.
PROGRAMME USED	The International EPD® System. Address: EPD International AB Box 210 60 SE-100 31 Stockholm Sweden Website: www.environdec.com E-mail: info@environdec.com
EPD REGISTRATION NUMBER/DECLARATION NUMBER	EPD-IES-0028402:001
PRODUCT / PRODUCT FAMILY NAME AND MANUFACTURER REPRESENTED	Drawn and ground steel bars, manufactured by Stilma S.p.A.
PRODUCT DESCRIPTION AND USE	Drawn and ground steel bars primarily intended for applications in the construction, general industry, and automotive sectors.
DECLARATION ISSUED	2026-04-17
VALID UNTIL	2031-04-16
OWNER OF DECLARATION	Stilma S.p.A. 41123 Modena – via Emilia Ovest, 960/A Tel ++39 059 824911
EPD PREPARED BY	Tecno ESG Società Benefit https://www.tecnoesg.it/
SCOPE	The LCA is based on 2024 production data for drawn and ground steel bars manufactured by Stilma S.p.A. manufacturing plants in Modena (MO) and San Maurizio (RE). This EPD covers information modules production stage A1-A3, end-of-life stages C1-C4 and resource recovery stage D (cradle-to-gate with module C1-C4, module D) according to EN 15804:2012+A2:2019/AC:2021.
FUNCTIONAL UNIT / DECLARED UNIT	The declared unit (DU) is 1 metric ton of drawn and ground steel bars plus packaging.

CEN standard EN 15804 served as the core Product Category Rules–PCR	
PCR:	PCR 2019:14 Construction products and Construction Services, Version 2.0.1.
Product group classification:	The UN CPC code of the product is 412" Products of iron or steel"
PCR review was conducted by:	The Technical Committee of the International EPD® System. Review chairs: Rob Rouwette (chair), Noa Meron (co-chair). The review panel may be contacted via the Secretariat www.environdec.com/contact
Independent verification of the declaration and data, according to ISO 14025:	☐ EPD process certification ☒ EPD verification
Third party verifier:	TÜV Sud (TÜV Italia srl – Central Office - I-20126 MILANO Viale Fulvio Testi 280/6). ACCREDIA Registration number: 00077
Accredited or approved by:	The International EPD System
Procedure for follow-up of data during EPD validity involves third party verifier:	☐Yes ☒No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

2. ABOUT THE COMPANY

Stilma S.p.A., based in Modena, is a specialized manufacturer of semi-finished long steel products, with over sixty years of experience in the processing of high-quality engineering steels. The company has a long tradition and today has four plants—Modena, San Maurizio, San Cesario, and Campogalliano —each dedicated to specific stages of production, such as drawing, grinding, peeling, and heat treatment.
Stilma's product range is extensive and designed to meet the needs of the most demanding sectors. The company produces hardened bars, structural steels, quenched and tempered steels, case-hardening steels, free-cutting steels, bearing steels, and stainless steels.
Thanks to the flexibility of its plants, Stilma is also able to provide customized finishing processes, such as grinding, drawing, and cutting to size, always ensuring rigorous quality controls throughout the production cycle.
The variety of products, the possibility of customization, extensive quality control and the internationally recognized quality standard certifications make its semi-finished products suitable for a wide range of industrial applications, from precision mechanical components to more complex sectors such as automotive, high-precision mechanics, industrial engineering, and construction.

The company has implemented the following certifications:

- Quality management system, complying with the requirements of ISO 9001:2015;
- Environmental management system, complying with the requirements of ISO 14001:2015;
- Energy management system ISO 50001:2018.

These certifications guarantee not only the reliability of its products, but also a responsible approach to resource and environmental management, aspects that are increasingly important in industrial production.

3. PRODUCT INFORMATION

3.1 Product description and use

The company sources semi-finished steel materials in various forms, such as wire rods and bars, all complying with European and internationally recognized quality standards and certifications. Using a range of hot and cold production technologies, Stilma manufactures both standard bars and customized special bars tailored to specific customer requirements. Stilma produces a wide range of sizes and profiles (e.g., square, hexagonal, etc.).
This declaration refers to the drawn and ground steel bars, intended for use in construction, industrial engineering, mechanics, and automotive sectors.
This EPD covers multiple products. For each environmental indicator, the reported results refer to an average product. This average product is defined by a weighted average recycled content calculated based on the actual production volumes in the reference year.

3.2 Technical data

Main technical data referring to drawn and ground steel bars are given in Table 1 and Table 2. This EPD is valid for products of various grades and geometries, as well as different forms of delivery.

Table 1 – *Technical information.*

	Drawing and grinding
	 
Material thickness	30-100 mm
Weight	From 0.46 kg (3 meters bar) to 401 kg (6.5 meters bar)

Table 2 *– Range of technical information of drawn and ground steel bars.*

Reference Standards	**UNI EN 10025; ISO 683-1; ISO 683-2; ISO 683-3; ISO 683-4**
Quality steel grade	**080A15, 100Cr6 (risolf.), 115CrV3, 11SMn30, 11SMn37, 11SMnPb30, 11SMnPb37, 16MnCr5, 16MnCrS5, 16NiCrS4, 17CrNiMo6-4, 18NiCrMoS5, 20MnCr5, 20MnCrS5, 20MnV6, 36SMnPb14, 41CrS4, 42CrMoS4, 44SMn28, 44SMnPb28, 46S20, C15E, C22E, C35E, C45E, E335, Fe590S, S235JR, S355J2, SAE 1018, SAE 1045, SAE 1144, SAE 12L14/12L15.**

3.3 Geographical scope

Stilma's drawn and ground steel bars are manufactured in Modena (MO) and San Maurizio (RE), Italy.

3.4 Time representativeness

Data describing the acquisition of raw materials and manufacturing process covers production year 2024. The background data used in the study have been applied through Ecoinvent datasets which are less than 10 years old.

3.5 Base materials / Ancillary materials

Main materials of the studied steel bars, including the packaging, are reported in Table 3. The base material of steel is an alloy of iron and carbon. Other elements such as Nickel, Manganese and Copper may be present, depending on the steel designation/grade.

Table 3 – *Content declaration of drawn and ground steel bars and related packaging.*

Product components	**Weight kg/UF**	**Post consumer material, weight %**	**Biogenic material**, weight-% and kg C/declared unit**
Steel	1000	62-67	0

Packaging materials	**Weight kg/UF**	**Weight versus product (%)**	**Weight biogenic carbon, kg C/declared unit**
Ferrous metals	0.55-0.56	0.0549-0.0559	0
Wood	0.001-0.24	0.0001-0.0240	0.001-0.121
Plastic	0.29-0.33	0.0290-0.0330	0
Paper	0.20-0.28	0.0200-0.0280	0.10-0.14
Sum	0.93-1.50	0.1040- 0.1408	0.10-0.26

* An estimated percentage of recycled material in the steel is calculated as a weighted average of the recycled content associated with the incoming raw material.

**Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO_2

3.6 Packaging

Stilma S.p.A has different types of standard packaging procedures depending on the type of product, its size, the technology used to create it and the surface finish requested by the customer.
The packaging of steel bars produced by Stilma mainly consists of metal straps, seals, plastic rings and tape, used to wrap the steel bars. In addition, wooden boxes, crepe paper and plastic film are used to protect the bars.

3.7 Reference service life

For the products under study, it is not possible to quantify the exact useful life, as it also depends on their future use. However, it is emphasized that even when the end-of-life is reached, the product can be recycled and reused again to generate other raw materials.

3.8 Recycling / Re-use phase

Steel can be recycled without any damage or degradation to its properties.

3.9 Further information

Further information can be found through the enquiry desk:
Tel. +39 059 824911

3.10 Manufacturing

Stilma steel bars are manufactured through drawing and grinding processes, resulting in steel bars with different shapes, lengths, and thicknesses. The semi-finished steel products used to manufacture the profiles are imported from various suppliers, mainly located in Europe, UK and India, and are purchased in the form of bars and wires.

Drawing and grinding

The Modena and San Maurizio facilities produces cold-drawn and ground round bars. Material originates from steel mills or internal supply and may arrive either as bars or coils. Prior to drawing, the material is shot-blasted or grit-blasted to remove mill scale. Three cold-drawing lines operate using oil-based lubricants for both drawing and rolling. Coils are used for diameters up to 42 mm, while bars are used for diameters up to 100 mm. Finished bars are classified as cold-drawn and supplied in variable lengths. For small diameters, wooden crates treated against biological agents may be used to prevent deformation.

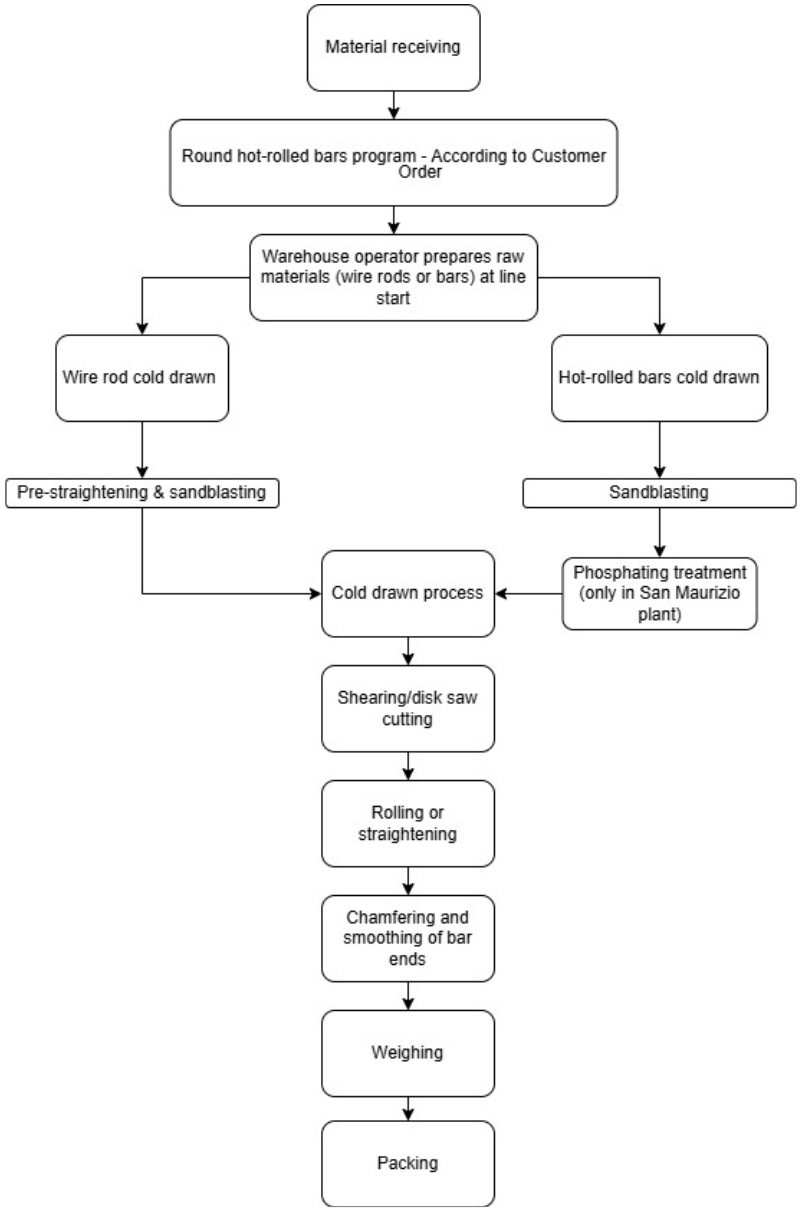

Figure 1. *Steel bars manufacturing process – Drawing and grinding of steel bars.*

4. LCA INFORMATION

Figure 2 shows a flow diagram of the system under study. The system boundary covers A1 - A3 product stages referred to as 'Raw material supply', 'Transport' and 'Manufacturing'. In addition to the manufacturing phase (modules A1-A3), this EPD contains the End-of-life stage (deconstruction and demolition as C1; transport to waste processing as C2; waste processing for reuse, recovery and/or recycling as C3; disposal as C4; benefits and loads beyond the system boundary, as module D). Accordingly, the EPD is a cradle-to-gate declaration with module C1-C4, module D.
Usage of results from A1-A3 without considering the results of module C is not encouraged.
The system boundaries in tabular form for all modules are shown in the Table 4 below.

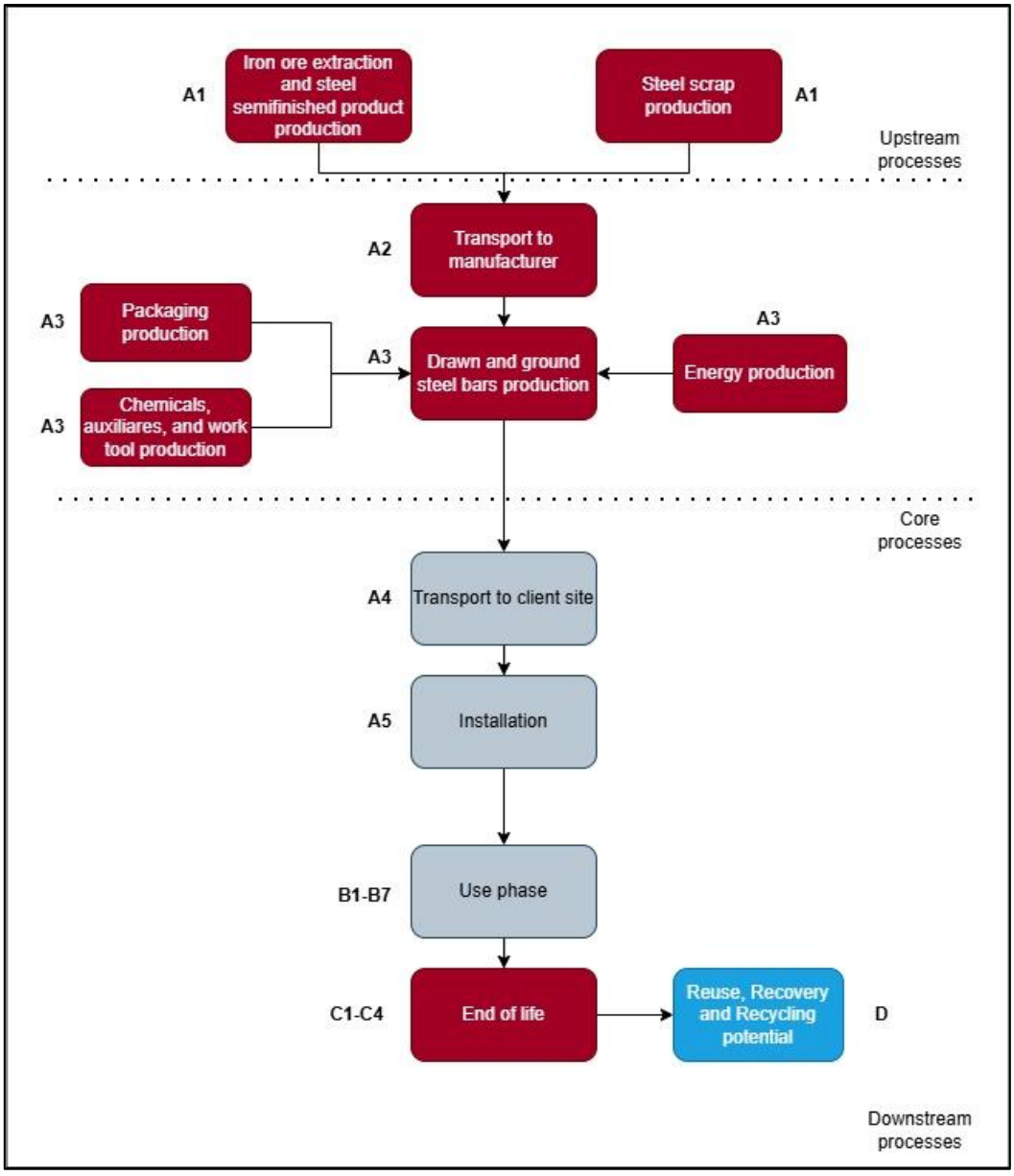

Figure 2. *Flow diagram of system boundary under assessment (in grey the excluded processes).*

Table 4 – *System boundaries chosen for the LCA (X-module included in LCA. ND – module not included. NA – not applicable).*

	Product stage			Construction process stage		Use stage							End-of-life stage				Benefits and loads beyond the system boundaries
	Raw material Supply	Transport	Manufacturing	Transport from the gate to the site	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal	Reuse Recovery Recycling potential
Module	**A1**	**A2**	**A3**	A4	A5	B1	B2	B3	B4	B5	B6	B7	**C1**	**C2**	**C3**	**C4**	**D**
Module declared	**X**	**X**	**X**	ND	ND	ND	ND	ND	ND	ND	ND	ND	**X**	**X**	**X**	**X**	**X**
Geography	**EU 27, GLO**	**EU 27**	**IT**	-	-	-	-	-	-	-	-	-	**EU 27**	**EU 27**	**EU 27**	**EU 27**	**EU 27**
Share of specific data	**<10% on GWP - GHG**																
Variation products	**-33%/+14%**																
Variation sites	**-33%/+14%**																

5. LCA CALCULATION RULES

LCA calculation rules are reported in Table 5.

Table 5 – *LCA calculation rules.*

5.1	**FUNCTIONAL UNIT/ DECLARED UNIT**	The declared unit is 1 metric ton of drawn and ground steel bars.
5.2	**SYSTEM BOUNDARIES**	The study is "Cradle-to-gate with modules C1 – C4 and module D (A1 – A3 + C + D)". The modularity and “polluter-pays” principles were followed.
5.3	**ESTIMATES AND ASSUMPTIONS**	Datasets from Ecoinvent 3.11 with emission factors for each raw material have been characterized to adjust them to the characteristics of manufacturing of Stilma S.p.A suppliers or countries where suppliers are located. All transportation of semi-finished steel purchased, chemicals and other consumables have been included in the LCA considering real distances travelled by materials used from January – December 2024. For the production of chemicals, auxiliaries and packaging materials (and their disposal), generic data has been used, make them country-specific whenever possible. The electricity mix at the Stilma S.p.A. plant is primarily sourced from an external energy supplier and reflects the location of the manufacturing facility. The Italian residual grid electricity mix was used. In addition, the Modena plant is partially supplied with electricity generated by on-site photovoltaic systems. An average of 130 km is taken as a distance from construction site to waste processing and disposal sites (C2). A transport distance from construction site to recovery treatment site of 80 km was assumed. Waste processing for reuse, recovery and/or recycling is taken into consideration for the current study (C3). At the end of the product’s life, 90% of steel is collected to be recycled and the rest ends up at landfills according to World Steel Association (C4). Potential impacts and avoided burdens resulting from the packaging and steel scrap recycling at the end of life are assigned to module D.

5.4	**CUT-OFF RULES**	All major raw materials and all the essential energy is included. General cut-off criteria are given in standard EN 15804:2012+A2:2019/AC:2021 Clause 6.3.6. In compliance with these criteria, the infrastructure of the manufacturing site/ LCI dataset, and personnel related activities (travel, office operations and supplies) are excluded from the study.
5.5	**BACKGROUND DATA**	All primary product data was provided by Stilma S.p.A plant. All secondary data was retrieved using SIMAPRO 10.2.0.0 software, with Ecoinvent 3.11 database.
5.6	**DATA QUALITY**	Manufacturing facility specific data from Stilma S.p.A are based on 1 year average for process data. The following rules for time scope of data were applied - < 10 years for background data and < 2 years for manufacturer's data. The quality level concerning datasets used in the EPD can be considered as “good” according to Annex E of the EN 15804 (current version).
5.7	**PERIOD UNDER REVIEW**	The data is representative of the manufacturing processes of 2024 year (January-December).
5.8	**ALLOCATIONS**	According to ISO 14040 and 14044, for the allocation procedure physical properties are used to drive flow analysis.

Description of system boundaries
This EPD evaluates the environmental impacts of 1 metric ton of drawn and ground steel bars from cradle-to-gate with module C1-C4, D. Within the Life Cycle Assessment of the declared steel profiles, the following processes are considered:

Product stage, A1-A3

DESCRIPTION OF THE STAGE
The product stage of the steel products is subdivided into three modules: A1, A2 and A3 respectively “raw material supply”, “transportation” and “manufacturing”.

A1, RAW MATERIAL SUPPLY
This includes the extraction and processing of all raw materials and energy which occur upstream from the manufacturing process.

A2, TRANSPORTATION TO THE MANUFACTURER
The external transportation of raw materials, chemicals, auxiliary and packaging materials to the gate of manufacturing plant. The modelling includes transportation with truck for each supplier.

A3, MANUFACTURING
This module includes the manufacture of main product, chemicals, auxiliaries and packaging material. The processing of any waste arising from this stage is also included.

End-of-life stage, C1-C4

DESCRIPTION OF THE END-OF-LIFE-STAGE
The end-of-life stage includes:

C1, DECONSTRUCTION, DEMOLITION
Deconstruction includes dismantling or demolition of the product from the construction, including initial on-site sorting of the materials.

C2, TRANSPORTATION TO WASTE PROCESSING
This stage includes the transportation of the demolished items to final disposal. A transport distance to recovery treatment site of 80 km was assumed. A transport distance to landfill site of 130 km was assumed.

C3, WASTE PROCESSING FOR REUSE, RECOVERY AND/OR RECYCLING
Steel must be mechanically separated from the concrete or any other material surrounding it prior to recycling so that the steel can be made available to a downstream product system as secondary material. This is considered in module C3.

C4, DISPOSAL
The landfilling scenario for steel waste and packaging not recovered for recycling is modelled using statistical data from the World Steel Association and Eurostat.
Transport and disposal of the packaging delivered together with the product to the end customer is included in module C.

***Table 6** – End-of-life stage.*

Parameter	Value (expressed per functional/declared unit)
C1) Collection process specified by type	900 kg collected separately for metal recycling and transported by truck to recycling site 100 kg collected with mixed construction waste and transported by truck to landfill site
C2) Assumption for scenario development (e.g., transportation)	Diesel consumption 0.04L per tkm 80 km from demolition site to recycling facility 130 km from demolition site to waste handling
C3) Recovery system specified by type	Product to material recovery: 900 kg steel Packaging materials to material recovery: 0.53 kg/DU ferrous metals 0.10 kg/DU plastics 0.03 kg/DU wood 0.26 kg/DU paper
C4) Disposal specified by type	Product to landfill: 100 kg of steel waste Packaging materials to landfill: 0.052674 kg/DU ferrous metals 0.048767 kg/DU plastics 0,026550 kg/DU wood 0,029671 kg/DU paper Packaging materials to incineration: 0.00 kg/DU ferrous metals 0,086600 kg/DU plastics 0.021843 kg/DU wood 0.022562 kg/DU paper

Reuse/recovery/recycling potential, D

DESCRIPTION OF THE STAGE

Module D, relating to information on the potential for reuse/recovery/recycling, is assessed considering the benefits of the avoided impact of future extractions and production of raw materials, brought about by the recycling of the packaging materials. The processes necessary to make the materials of the product (at the end-of-life) new raw materials for subsequent life cycles are considered.

DATA QUALITY ASSESSMENT

The share of primary data is calculated based on GWP-GHG results. It is a simplified indicator for data quality that does not capture all relevant aspects of data quality. The indicator is not comparable across product categories.

***Table 7** – Data quality of drawn and ground steel bars.*

Process	Source type	Source	Reference year	Data category	Share of primary data of GWP-GHG results for A1-A3 %
Steel production	Database, Company data	Ecoinvent 3.11 (adapted)	2019-2024	Secondary data	0
Generation of electricity used in manufacturing of product	Company data, Association of Issuing Bodies, 2025	Ecoinvent 3.11 (adapted)	2024	Primary data	7
Transport of steel, consumables to manufacturing site	Database, Company data	Ecoinvent 3.11	2019-2024	Secondary data	0
Manufacturing of product (on site emissions, use of resources)	Database, Company data	EPD Owner	2024	Primary data, Secondary data	2
Packaging production	Database, Company data	Ecoinvent 3.11	2019-2024	Secondary data	<1
Other process	Database, Company data	Ecoinvent 3.11	2019-2024	Secondary data	<1
Total share of primary data, of GWP-GHG results for A1-A3					**9**

VARIATION BETWEEN PRODUCTS AND SITES

This EPD covers steel bars of different grades and dimensions manufactured at two production sites. The environmental results are based on a weighted average calculated from the corresponding production volumes of the steel processed at each site.

Differences in environmental impacts among the products are mainly due to variations in recycled content and raw material input between the two sites. The products are therefore included in a single multiple-product EPD in accordance with PCR 2.0.1.

Environmental impact results for modules A1–A3 are calculated per ton of product using the weighted average. The maximum variation between products and sites, defined as the difference between the lowest and highest values, is reported as required by PCR 2.0.1.

This EPD complies with PCR 2.0.1 and EN 15804 and does not claim compliance with ISO 21930.

Table 8 – *Variation between sites.*

		Variation %	
Impact category	Unit	**Modena (MO)**	**San Maurizio (RE)**
GWP-GHG	kg CO2 eq	+14%	-33%
Climate change - Total	kg CO2 eq	+14%	-33%
Climate change - Fossil	kg CO2 eq	+14%	-33%
Climate change - Biogenic	kg CO2 eq	+14%	-33%
Climate change - Land use and LU change	kg CO2 eq	+15%	-34%
Ozone depletion	kg CFC11 eq	+19%	-44%
Acidification	mol H+ eq	+13%	-30%
Eutrophication, freshwater	kg P eq	+14%	-32%
Eutrophication, marine	kg N eq	+14%	-32%
Eutrophication, terrestrial	mol N eq	+14%	-33%
Photochemical ozone formation	kg NMVOC eq	+15%	-34%
Resource use, minerals and metals	kg Sb eq	+12%	-29%
Resource use, fossils	MJ	+15%	-35%
Water use	m3 depriv.	+16%	-37%

6. ENVIRONMENTAL INFORMATION

In the following tables, the environmental impacts per declared unit are reported for the environmental categories recommended by the EPD's General Programme Instruction (version 5.0.1, February 2025) and those indicated in PCR 2019:14 version 2.0.1 for Construction Products and Construction Services. The LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks. To obtain the results following the provisions of EN 15804:2012+A2:2019/AC:2021, the " EN 15804+A2 life cycle impact assessment (LCIA) and life cycle inventory (LCI) indicators" calculation method was used for environmental impacts, resource use, waste categories and output flows.

7. RESULTS INTERPRETATION

The impact assessment phase of LCA is aimed at evaluating the significance of potential environmental impacts using the LCI results. In general, this process involves associating inventory data of specific environmental impact categories with category indicators, thereby attempting to quantify these impacts. The impact assessment and the interpretation of this study are performed according to the ISO 14040 and ISO 14044 guidelines. This document declares the results for 1 metric ton of drawn and ground steel bars.
It is observed that the most influential phases in the life cycle are modules A1-A3, which collectively contribute to more than 90% of the total impact. The largest share of the total Global Warming Potential (GWP) is linked to the extraction and manufacturing of raw materials, with a particular emphasis on primary and secondary steel production (data not shown). Steel production is an energy- and resource-intensive process, but increasing the use of recycled materials can significantly reduce its impact.
Usage of results from A1-A3 without considering the results of module C is not encouraged.

Information about energy mix used in the manufacturing process
The electricity used in the manufacturing process is sourced from a combination of the Italian residual mix (AIB Report, May 2025) and on-site photovoltaic renewable energy. The corresponding emission factor is 0.617 kg CO_2 eq./kWh.

Core Environmental Impact Indicators

Table 9 – *LCA results of potential environmental impact referred to 1 metric ton of drawn and ground steel bars plus packaging.*

Impact Categories	Unit	Product stage	End of life stage				Benefits and loads beyond the system boundary
		A1-A3	C1	C2	C3	C4	D
Climate change - Total	kg CO2 eq	9.01E+02	3.75E-01	1.31E+01	3.50E+00	6.33E-01	-3.60E+02
Climate change - Fossil	kg CO2 eq	8.88E+02	3.75E-01	1.31E+01	3.47E+00	4.65E-01	-3.60E+02
Climate change - Biogenic	kg CO2 eq	1.27E+01	6.66E-05	2.93E-03	2.93E-02	1.68E-01	-3.72E-01
Climate change - Land use and LU change	kg CO2 eq	3.20E-01	1.54E-05	2.06E-04	2.04E-03	1.46E-05	-2.45E-02
Ozone depletion	kg CFC11 eq	6.86E-07	9.60E-11	3.19E-09	8.67E-10	8.07E-11	-6.30E-07
Acidification	mol H+ eq	3.18E+00	3.46E-03	3.37E-02	2.92E-02	2.54E-03	-1.39E+00
Eutrophication, freshwater	kg P eq	3.32E-01	3.13E-06	6.72E-05	6.17E-04	1.09E-05	-2.64E-01
Eutrophication, marine	kg N eq	7.55E-01	1.63E-03	1.29E-02	1.29E-02	1.35E-03	-3.05E-01
Eutrophication, terrestrial	mol N eq	7.90E+00	1.79E-02	1.40E-01	1.40E-01	1.27E-02	-3.29E+00
Photochemical ozone formation	kg NMVOC eq	3.08E+00	5.34E-03	5.58E-02	4.18E-02	3.84E-03	-1.13E+00
Resource use, minerals and metals	kg Sb eq	1.14E-03	1.31E-08	3.40E-07	1.41E-07	1.05E-08	-3.63E-03
Resource use, fossils	MJ	5.52E+03	4.72E-02	1.15E+00	1.15E+01	1.59E-01	-2.72E+03
Water use	m3 depriv.	5.25E+02	3.65E-03	5.66E-02	1.65E-01	5.40E-03	-4.65E+01

EN 15804+ A2 disclaimers for Abiotic depletion and Water use indicators and all optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator. The use of the results of modules A1-A3, without considering the results of module C, is discouraged. "Reading example: 1.57E-03 = $1.57*10^{-3}$ = 0.00157".

Environmental impacts – GWP-GHG

Table 10 *– LCA results of GWP-GHG referred to 1 metric ton of drawn and ground steel bars plus packaging.*

Impact Categories	Unit	Product stage	End of life stage				Benefits and loads beyond the system boundary
		A1-A3	C1	C2	C3	C4	D
GWP-GHG	kg CO2 eq	8.89E+02	3.75E-01	1.31E+01	3.48E+00	5.07E-01	-3.60E+02

This indicator includes all greenhouse gases excluding biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product as defined by IPCC AR 6 (IPCC 2021). This indicator is almost equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

Use of Natural Resources

Table 11 *– LCA results of use of resources referred to 1 metric ton of drawn and ground steel bars plus packaging.*

Impact Categories	Unit	Product stage	End of life stage				Benefits and loads beyond the system boundary
		A1-A3	C1	C2	C3	C4	D
Use of renewable primary energy (PERE)	MJ	1.78E+03	1.07E-02	4.33E-01	3.43E+00	1.96E-02	-2.60E+02
Primary energy resources used as raw materials (PERM)	MJ	5.19E+00	1.09E-06	3.02E-05	2.69E-04	7.44E-06	3.74E+00
Total use of renewable primary energy resources (PERT)	MJ	1.79E+03	1.07E-02	4.33E-01	3.43E+00	1.96E-02	-2.57E+02
Use of non-renewable primary energy (PENRE)	MJ	5.50E+03	4.72E-02	1.15E+00	1.15E+01	1.59E-01	-2.73E+03
Non-renewable primary energy resources used as raw material (PENRM)	MJ	2.02E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.29E+00
Total use of non-renewable primary energy resources (PENRT)	MJ	5.52E+03	4.72E-02	1.15E+00	1.15E+01	1.59E-01	-2.72E+03
Use of secondary materials (SM)	kg	7.75E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary Fuels (RSF)	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renew, secondary Fuels (NRSF)	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water (FW)	m3	1.79E+02	4.04E-02	2.13E-01	2.88E-03	-2.41E+00	0.00E+00

End of Life – Waste

Table 12 – *LCA results of waste categories referred to 1 metric ton of drawn and ground steel bars plus packaging.*

Impact Categories	Unit	Product stage	End of life stage				Benefits and loads beyond the system boundary
		A1-A3	C1	C2	C3	C4	D
Non-hazardous waste	kg	3.32E+01	1.72E-04	5.74E-03	1.24E-02	1.00E+02	-8.05E+00
Hazardous waste	kg	6.79E-02	3.36E-05	1.15E-03	2.83E-04	2.42E-05	-3.87E-02
Radioactive waste	kg	1.89E-02	2.29E-07	1.05E-05	1.12E-04	2.53E-07	3.89E-03

End of Life – Outflows

Table 13 – *LCA results of output flows referred to 1 metric ton of drawn and ground steel bars plus packaging.*

Impact Categories	Unit	Product stage	End of life stage				Benefits and loads beyond the system boundary
		A1-A3	C1	C2	C3	C4	D
Components for reuse	kg	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	9.01E+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
Exported energy - electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy - heat	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Recovered energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Results for additional scenarios for End-of-life modules

The following paragraphs report the environmental impact results obtained for 1 metric ton of drawn and ground steel bars under two end-of-life scenarios, namely 100% recycling and 100% landfill.

100% RECYCLING SCENARIO

Use of Natural Resources

***Table 14** – LCA results of use of resources referred to 1 metric ton of drawn and ground steel bars plus packaging, 100% recycling scenario.*

Impact Category	Unit	End of life stage				Benefits and loads beyond the system boundary
		C1	C2	C3	C4	D
Use of renewable primary energy (PERE)	MJ	1.07E-02	4.07E-01	3.81E+00	3.17E-03	-3.59E+02
Primary energy resources used as raw materials (PERM)	MJ	1.09E-06	2.84E-05	2.99E-04	2.06E-07	3.74E+00
Total use of renewable primary energy resources (PERT)	MJ	1.07E-02	4.07E-01	3.81E+00	3.17E-03	-3.59E+02
Use of non-renewable primary energy (PENRE)	MJ	4.72E-02	1.08E+00	1.28E+01	6.82E-03	-3.83E+03
Non-renewable primary energy resources used as raw material (PENRM)	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.29E+00
Total use of non-renewable primary energy resources (PENRT)	MJ	4.72E-02	1.08E+00	1.28E+01	6.82E-03	-3.83E+03
Use of secondary materials (SM)	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary Fuels (RSF)	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renew, secondary Fuels (NRSF)	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water (FW)	m3	1.97E+01	1.96E+01	2.76E-01	2.76E-01	-3.15E+00
Caption: PERE = Use of renewable primary energy excluding the renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding the non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water						

Table 15 – *LCA results of output flows referred to 1 metric ton of drawn and ground steel bars plus packaging, 100% recycling scenario.*

Impact Category	Unit	End of life stage				Benefits and loads beyond the system boundary
		C1	C2	C3	C4	D
Climate change - Total	kg CO2 eq	3.75E-01	1.23E+01	3.89E+00	3.60E-01	-5.07E+02
Climate change - Fossil	kg CO2 eq	3.75E-01	1.23E+01	3.86E+00	1.92E-01	-5.06E+02
Climate change - Biogenic	kg CO2 eq	6.66E-05	2.76E-03	3.19E-02	1.68E-01	-6.55E-01
Climate change - Land use and LU change	kg CO2 eq	1.54E-05	1.94E-04	2.27E-03	7.90E-07	-3.44E-02
Ozone depletion	kg CFC11 eq	9.60E-11	3.01E-09	9.63E-10	1.39E-11	-8.89E-07
Acidification	mol H+ eq	3.46E-03	3.17E-02	3.24E-02	8.01E-05	-1.95E+00
Eutrophication, freshwater	kg P eq	3.13E-06	6.32E-05	6.86E-04	3.28E-06	-3.72E-01
Eutrophication, marine	kg N eq	1.63E-03	1.21E-02	1.43E-02	2.34E-04	-4.29E-01
Eutrophication, terrestrial	mol N eq	1.79E-02	1.32E-01	1.55E-01	3.91E-04	-4.63E+00
Photochemical ozone formation	kg NMVOC eq	5.34E-03	5.25E-02	4.64E-02	1.16E-04	-1.60E+00
Resource use, minerals and metals	kg Sb eq	1.31E-08	3.20E-07	1.57E-07	1.43E-09	-5.11E-03
Resource use, fossils	MJ	4.72E-02	1.08E+00	1.28E+01	6.82E-03	-3.83E+03
Water use	m3 depriv.	3.65E-03	5.33E-02	1.83E-01	2.35E-03	-6.54E+01

Environmental impacts – GWP-GHG

Table 16 *– LCA results of GWP-GHG referred to 1 metric ton of drawn and ground steel bars plus packaging, 100% recycling scenario.*

Impact Category	Unit	End of life stage				Benefits and loads beyond the system boundary
		C1	C2	C3	C4	D
GWP-GHG	kg CO2 eq	3.75E-01	1.23E+01	3.86E+00	2.34E-01	-5.06E+02

End of Life – Waste

Table 17 – *LCA results of waste categories referred to 1 metric ton of drawn and ground steel bars plus packaging, 100% recycling scenario.*

Impact Category	Unit	End of life stage				Benefits and loads beyond the system boundary
		C1	C2	C3	C4	D
Non-hazardous waste	kg	1.72E-04	5.42E-03	1.75E-02	6.49E-01	-1.72E+01
Hazardous waste	kg	3.36E-05	1.09E-03	3.16E-04	5.20E-06	-8.24E-02
Radioactive waste	kg	2.29E-07	9.88E-06	1.25E-04	2.45E-07	8.30E-03

End of Life – Outflows

Table 18 *– LCA results of output flows referred to 1 metric ton of drawn and ground steel bars plus packaging, 100% recycling scenario.*

Impact Category	Unit	End of life stage				Benefits and loads beyond the system boundary
		C1	C2	C3	C4	D
Components for reuse	kg	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	1.00E+03	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
Exported energy - electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy - heat	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Recovered energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

100% LANDFILL SCENARIO

Table 19 *– LCA results of use of resources referred to 1 metric ton of drawn and ground steel bars plus packaging, 100% landfill scenario.*

Impact Category	Unit	End of life stage				Benefits and loads beyond the system boundary
		C1	C2	C3	C4	D
Use of renewable primary energy (PERE)	MJ	1.07E-02	6.61E-01	6.71E-03	1.67E-01	0.00E+00
Primary energy resources used as raw materials (PERM)	MJ	1.09E-06	4.62E-05	5.51E-07	7.26E-05	0.00E+00
Total use of renewable primary energy resources (PERT)	MJ	1.07E-02	6.61E-01	6.71E-03	1.52E+00	0.00E+00
Use of non-renewable primary energy (PENRE)	MJ	4.72E-02	1.76E+00	2.86E-02	0.00E+00	0.00E+00
Non-renewable primary energy resources used as raw material (PENRM)	MJ	0.00E+00	0.00E+00	0.00E+00	9.99E+02	0.00E+00
Total use of non-renewable primary energy resources (PENRT)	MJ	4.72E-02	1.76E+00	2.86E-02	2.32E-04	0.00E+00
Use of secondary materials (SM)	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary Fuels (RSF)	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renew, secondary Fuels (NRSF)	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water (FW)	m3	1.22E-03	6.17E-02	4.55E-04	1.18E-02	0.00E+00
Caption: PERE = Use of renewable primary energy excluding the renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding the non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water						

***Table 20** – LCA results of potential environmental impact referred to 1 metric ton of drawn and ground steel bars plus packaging, 100% landfill scenario.*

Impact Category	Unit	End of life stage				Benefits and loads beyond the system boundary
		C1	C2	C3	C4	D
Climate change - Total	kg CO2 eq	3.75E-01	2.00E+01	2.23E-02	3.09E+00	0.00E+00
Climate change - Fossil	kg CO2 eq	3.75E-01	2.00E+01	1.67E-02	2.92E+00	0.00E+00
Climate change - Biogenic	kg CO2 eq	6.66E-05	4.48E-03	5.55E-03	1.69E-01	0.00E+00
Climate change - Land use and LU change	kg CO2 eq	1.54E-05	3.15E-04	4.22E-06	1.39E-04	0.00E+00
Ozone depletion	kg CFC11 eq	9.60E-11	4.88E-09	4.35E-12	6.82E-10	0.00E+00
Acidification	mol H+ eq	3.46E-03	5.15E-02	7.78E-05	2.46E-02	0.00E+00
Eutrophication. freshwater	kg P eq	3.13E-06	1.03E-04	1.56E-06	7.99E-05	0.00E+00
Eutrophication. marine	kg N eq	1.63E-03	1.97E-02	3.61E-05	1.14E-02	0.00E+00
Eutrophication. terrestrial	mol N eq	1.79E-02	2.15E-01	3.52E-04	1.23E-01	0.00E+00
Photochemical ozone formation	kg NMVOC eq	5.34E-03	8.53E-02	1.28E-04	3.74E-02	0.00E+00
Resource use. minerals and metals	kg Sb eq	1.31E-08	5.20E-07	5.66E-10	9.22E-08	0.00E+00
Resource use. fossils	MJ	4.72E-02	1.76E+00	2.86E-02	1.52E+00	0.00E+00
Water use	m3 depriv.	3.65E-03	8.66E-02	4.05E-04	3.28E-02	0.00E+00

Environmental impacts – GWP-GHG

Table 21 *– LCA results of GWP-GHG referred to 1 metric ton of drawn and ground steel bars plus packaging, 100% landfill scenario.*

Impact Category	Unit	End of life stage				Benefits and loads beyond the system boundary
		C1	C2	C3	C4	D
GWP-GHG	kg CO2 eq	3.75E-01	2.00E+01	1.90E-02	2.96E+00	0.00E+00

End of Life – Waste

Table 22 – *LCA results of waste categories referred to 1 metric ton of drawn and ground steel bars plus packaging, 100% landfill scenario.*

Impact Category	Unit	End of life stage				Benefits and loads beyond the system boundary
		C1	C2	C3	C4	D
Non-hazardous waste	kg	2.29E-07	1.60E-05	2.14E-07	2.03E-06	0.00E+00
Hazardous waste	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Radioactive waste	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

End of Life – Outflows

***Table 23** – LCA results of output flows referred to 1 metric ton of drawn and ground steel bars plus packaging, 100% landfill scenario.*

Impact Category	Unit	End of life stage				Benefits and loads beyond the system boundary
		C1	C2	C3	C4	D
Components for reuse	kg	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
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy - electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy - heat	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Recovered energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Abbreviations

Abbreviation	Definition
CPC	Central product classification
GRI	Global Reporting Initiative
ND	Not Declared
LCA	Life Cycle Assessment
DU	Declared Unit
ISO	International Organization for Standardization
GPI	General Programme Instructions
UNI	European Norm (Italian)
EN	European Norm (Standard)
GWP	Global warming potential
GHG	Greenhouse gases
ND	Not Declared

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ISO 14040:2006. Environmental management – Life cycle assessment – Principles and framework.

ISO 14044:2021. Environmental management – Life cycle assessment – Requirements and guidelines.

Version history

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Differences versus the previously published version:

- graphical improvements have been applied to all the tables throughout the document.
- minor editorial corrections to the text.

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For the realisation of this EPD and the LCA study, which constitutes its scientific basis, Stilma S.p.A manufacturing plant availed itself of the technical and methodological support of Tecno ESG Società Benefit, an Italian consulting firm supporting companies in the integration of ESG criteria, with the aim of combining sustainable business growth with positive environmental and social impact The working team of this EPD is composed of Fabiana Corcelli (Ergo srl-Tecno Group) and Valentina Mariga (Tecno ESG).