



Environmental Product Declaration



THE INTERNATIONAL EPD® SYSTEM



In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019 for:

Gerdau Beam Shapes

UOB (Ouro Branco) facility

from

GERDAU ACOS LONGOS S.A.



Programme:

Programme operator:

EPD registration number:

Publication date:

Valid until:

The International EPD® System EPD registered through the fully aligned regional programme: Hub EPD Brasil. More information at www.environdec.com

EPD International AB, Regional Hub: EPD Brasil. www.environdec.com

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An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com



Contents

General information	3
Programme information.....	3
Company information: Gerdau Corporation and Operations in Brazil	4
Owner of the EPD	4
Contact	4
Description of the organization.....	4
Product-related or management system-related certifications	4
Name and location of production site(s).....	4
Product information: Beam Shapes	5
Product name	5
Product identification.....	5
Product description	5
Content declaration.....	6
UN CPC code.....	6
Geographical scope	6
LCA information: Life Cycle Impact Assessment	7
Declared unit.....	7
Reference service life	7
Time representativeness	7
Database(s) and LCA software used	7
Description of system boundaries.....	7
Adopted premises to fill data gaps.....	7
Environmental performance indicators	10
Mandatory impact category indicators according to EN 15804.....	10
Additional mandatory and voluntary impact category indicators	11
Resource use indicators	11
Waste indicators.....	12
Output flow indicators	12
Information on biogenic carbon content	12
Other environmental performance indicators	13
Additional environmental information	14
References.....	15

General information

Programme information

Programme:	The International EPD® System. More information at www.environdec.com
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
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Accountabilities for PCR, LCA and independent, third-party verification

Product Category Rules (PCR)

CEN standard EN 15804 serves as the Core Product Category Rules (PCR)

Product Category Rules (PCR): *PCR 2019:14 version 1.11 (Construction Products) and UN CPC code 41252 – Sheet piling of iron or steel and welded angles, shapes and sections of iron or steel*

PCR review was conducted by: *Claudia A. Peña from ADDERE Research & Technology. Mobile: +56 9 9359 9210. E-mail: cpena@addere.cl*

Life Cycle Assessment (LCA)

LCA accountability: *Carolina Alves, Thays Sampaio, Peter Shonfield, Augusto Mello; ERM Brasil Ltda.*

Third-party verification

Independent third-party verification of the declaration and data, according to ISO 14025:2006, via:

EPD verification by individual verifier

Third-party verifier: *Claudia A. Peña, ADDERE Research & Technology*
 Approved by:



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. EPDs of construction products may not be comparable if they do not comply with EN 15804. For further information about comparability, see EN 15804 and ISO 14025.

Company information: Gerdau Corporation and Operations in Brazil

Owner of the EPD

GERDAU ACOS LONGOS S.A.

Contact

Av. das Nações Unidas, 8.501 - 6º andar – *São Paulo Municipality, São Paulo State, Brazil*
Naiara Lopes <naiara.lopes@gerdau.com.br>

Description of the organization

With a history spanning 122 years, Gerdau is Brazil's largest and one of the leading producers of long steel in the Americas and of special steel in the world. In Brazil, Gerdau produces flat steel and iron ore for its own use. Gerdau also has a new business division, Gerdau Next, which fosters entrepreneurship in segments adjacent to the steel industry. Guided by its purpose of empowering people who build the future, Gerdau has operations in nine countries and over 30 000 direct and indirect employees. Gerdau is the largest recycling company in Latin America and uses scrap as an important input, with 71% of the steel it produces made from scrap. Every year, Gerdau transforms 11 million tonnes of scrap into a variety of steel products. Gerdau also is the world's largest charcoal producer, with over 250 hectares of planted forests in the state of Minas Gerais. As a result of its sustainable production matrix, Gerdau currently has one of the industry's lowest average greenhouse gas emissions (CO₂eq). Gerdau's shares are listed on the São Paulo (B3), New York (NYSE) and Madrid (Latibex) stock exchanges.

Faced with an increasingly growing scenario for sustainable / green buildings and the requirements in relation to the products used in these types of constructions, Gerdau felt the need to start the certification of its products, in order to become competitive in this market in relation to its competitors. To achieve this goal, a Life Cycle Assessment (LCA) from cradle-to-gate was performed to support the preparation of EPD.

Product-related or management system-related certifications

Gerdau Beam Shapes strictly follow the specifications of ABNT NBR 15980 and ASTM A6/A6M standards, Furthermore, the producing plant is certified by ISO 14001 – Environmental Management Systems and ISO 9001 - Quality Management System which assure the ability to provide products and services that meet the requirements of customers, statutory, and applicable regulations, in order to increase customer satisfaction.

Name and location of production site(s)

- Gerdau Ouro Branco – Production of beam shapes;
Location: MG-443 Road, Km 07. Fazenda do Cadete – *Ouro Branco Municipality, Minas Gerais State, Brazil*

Product information: Beam Shapes

Product name

Gerdau Beam Shapes.

Product identification

Gerdau's beam shapes are supplied in a wide variety of gauges, between 150mm and 610mm in height.

Product description

Gerdau produces different beam shapes, providing a range of geometries to suit applications from construction to manufacturing. Gerdau also produces three primary categories of piling, typically used in deep foundation and geo-technical construction projects, such as foundations, marine, environmental and transportation.

Laminated in "I" and "H" shapes, they feature parallel tables that allow for better connections, fittings and structural finishing solutions. Gerdau's Beam Shapes are available for prompt delivery in high-strength steel, ASTM A 572 Grade 50, in a standard length of 12 meters, for all gauges.

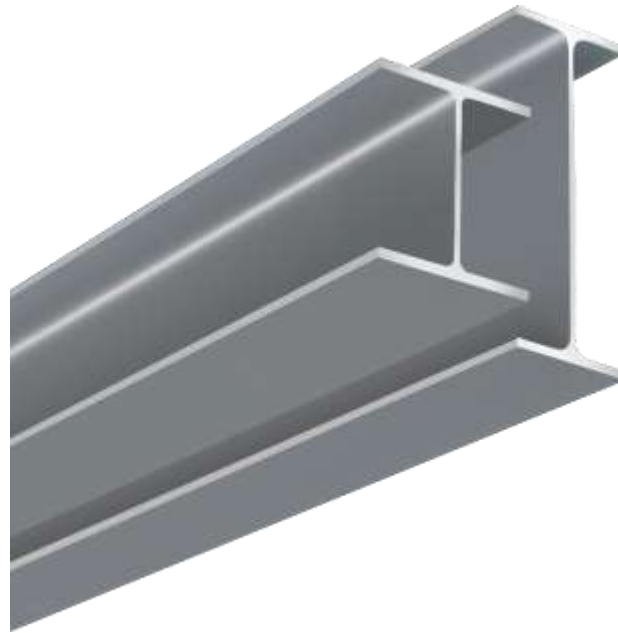


Figure 1: Beam shapes produced by Gerdau

Tables 1 and 2 represent the product mechanical properties and product composition, respectively.

Table 1: Mechanical properties for beam shapes produced by Gerdau

	ASTM A 572 Gr 50	ASTM A 572 Gr 60	ASTM A 992	COR 500	ASTM A 131 AH32	ASTM A 131 AH36
Yield Limit (MPa)	345 (minimum)	415 (minimum)	345 to 450	370 (minimum)	315 (minimum)	355 (minimum)
Strength Limit (MPa)	450 (minimum)	520 (minimum)	450 (minimum)	500 (minimum)	440 to 590	490 to 620
Minimum Elongation at break (%)	18	16	18	18	19	19

Table 2: Composition for beam shapes produced by Gerdau

Chemical composition	Quantity (%)
Iron	< 97.0%
Manganese	< 1.40%
Copper	< 0.50%
Carbon	< 0.30%
Others	< 1.30%

Content declaration

Table 3: Dangerous substances from the candidate list of SVHC for Authorisation

Dangerous substances from the candidate list of SVHC for Authorisation	EC No.	CAS No.	Weight-% per functional or declared unit
Not applicable			

The omission of the packaging materials is below the cut-off criteria and therefore not considered to affect the completeness of the study.

No dangerous substances from the candidate list of SVHC for authorization are present in the composition of beam shapes.

The main applications of beam shapes are: sheds and industrial constructions; multi-storey buildings; metal piles for foundations and retaining walls, bridges and viaducts.

UN CPC code

41252 – Sheet piling of iron or steel and welded angles, shapes and sections of iron or steel.

Geographical scope

Brazil

LCA information: Life Cycle Impact Assessment

Declared unit

The declared unit of this study is 1 metric ton of beam shapes for structural reinforcement, produced in Gerdaú's facility up to the gate.

Reference service life

Not applicable.

Time representativeness

Primary data for the core process was gathered for one year of operation (2019).

Database(s) and LCA software used

All primary data used was based on the manufacturer's specific data inventory. For consistency, the background life cycle inventory data from secondary sources used in this LCA were obtained from the databases contained within the Gabi 10.6.1.35 software; either Gabi from Sphera 2020.1, Ecoinvent 3.7.1 and World Steel inventories 2021 (WSA 2021) were used. Brazil specific data were preferably considered whenever available.

Description of system boundaries

This study is a cradle-to-gate (A1-A3) with modules C1-C4 and module D, carried out based on EN15804+A2 and the relevant PCR 2019:14 version 1.11 (Construction Products), which addresses the environmental aspects and potential environmental impacts from raw material acquisition to the point at which it leaves the gate of the UOB facility (A3). The LCA also included the end-of-life stage, from the building de-construction/ demolition to the final disposal of the product of interest, and the potential benefits and loads beyond the system boundary, mandatory according to the PCR.

The life cycle stages descriptions are shown below in Figure 2. Modules declared, geographical scope, share of specific data (in GWP-GHG indicator) and data variation are presented in Table 4 (note that 'X' denotes inclusion in the LCA).

Adopted premises to fill data gaps

The following premises were considered in the study in order to fill data gaps:

- When specific transport distances from external suppliers to the factory were not available, a weighted average distance was used.
- When consumption data could not be directly measured in the plant, the input quantities were estimated based on the technical lists.
- When minor discrepancies in the mass or energy balances occurred, auxiliary processes were applied to provide the missing quantities as input for the process under concern.

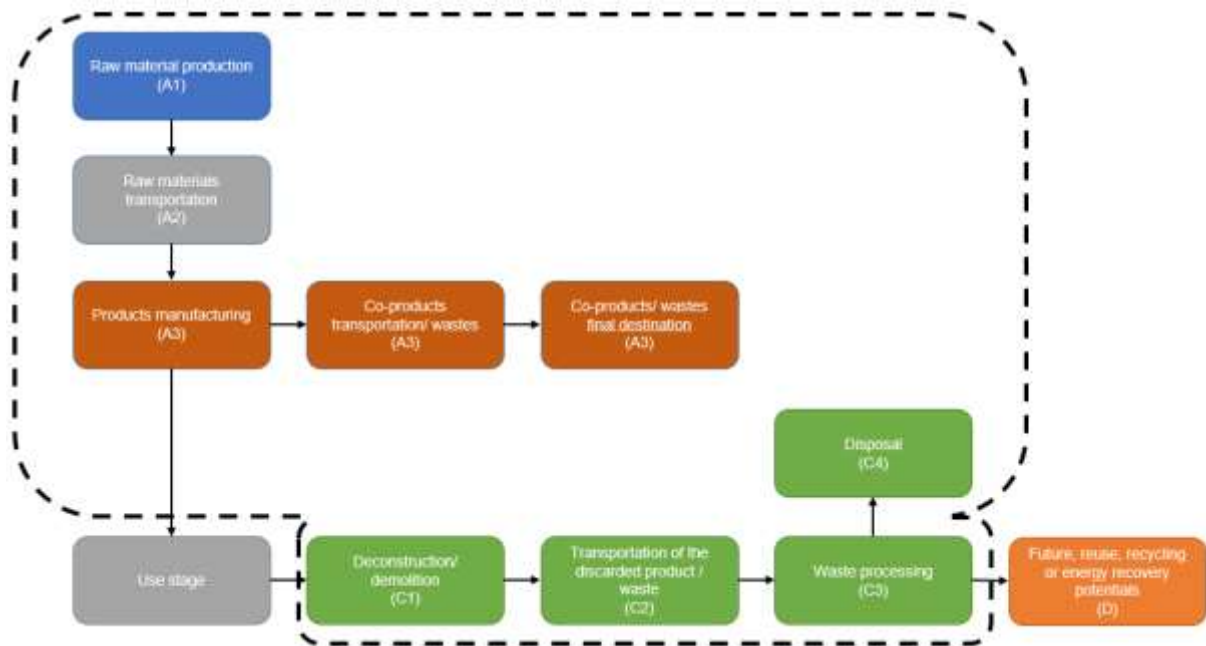


Figure 2: System boundary of the life cycle assessment for Gerdau Beam Shapes

The life cycle stages included within the system boundaries are:

- A1 – Primary raw material and alloys used for the manufacture of beam shapes;
- A2 – Includes the transportation of all raw materials and auxiliaries from suppliers to the Gerdau manufacturing facility;
- A3 – Metallurgical coke production, sinter production, Blast Furnace, pig iron production, Melt Shop, Rolling Mill, transportation of all co-products/ wastes from Gerdau to the final destination and waste disposal.
- C1 – Manual dismantling of metal parts. Thus, no environmental impact was attributed to the non-destructive removal of building waste in this module;
- C2 – Accounts for part of the waste processing, e.g. to a recycling site and transportation of waste e.g. to final sorting yard or disposal;
- C3 – It includes collection of waste fractions from the deconstruction and waste processing of material flows intended for reuse, recycling and energy recovery;
- C4 – Refers to waste disposal including physical pre-treatment and management of the disposal site; and
- D – Contains potential credits from the recycling of products considered in module C3 (95%).

The electricity used in the process is 70% from the GRID and 30% produced internally (at the Thermoelectric Plant and Blast Furnace). The electricity mix considered for this LCA was based on the GaBi dataset for Brazil, which is representative of the Brazilian energy matrix for the reference year.

Table 4: Description of the system boundary according to the PCR

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	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	Reuse-Recovery-Recycling-potential
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	BR	BR	BR	-	-	-	-	-	-	-	-	-	BR	BR	BR	BR	BR
Specific data used	>90%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	Not relevant			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	Not relevant			-	-	-	-	-	-	-	-	-	-	-	-	-	-

The following results are specific to the beam shapes manufactured in UOB facility.¹ The scenarios included are currently in use and are representative for one of the most probable alternatives.

¹ The characterisation model and factors used in this study are in accordance with EN15804 for assessing the environmental impacts of construction products.

Environmental performance indicators²

Mandatory impact category indicators according to EN 15804

Table 5: Core environmental impact indicators

Results per declared unit										
Indicator	Unit	A1	A2	A3	Tot.A1-A3	C1	C2	C3	C4	D
GWP-fossil	kg CO ₂ eq.	8.61E+02	8.15E+01	2.45E+03	3.39E+03	0.00E+00	2.36E+00	1.22E+00	2.44E+00	-1.77E+03
GWP-biogenic	kg CO ₂ eq.	1.13E+00	-3.43E-01	1.09E-01	8.96E-01	0.00E+00	-3.31E-02	3.62E-03	-2.50E-02	-1.01E+00
GWP-luluc	kg CO ₂ eq.	1.99E+00	2.36E+00	1.28E-01	4.48E+00	0.00E+00	1.95E-01	1.88E-02	2.44E-03	-3.88E-02
GWP-total	kg CO ₂ eq.	8.64E+02	8.35E+01	2.45E+03	3.40E+03	0.00E+00	2.52E+00	1.24E+00	2.42E+00	-1.78E+03
ODP	kg CFC 11 eq.	4.20E-06	1.04E-14	2.14E-06	6.34E-06	0.00E+00	5.53E-17	1.81E-08	5.77E-15	-4.22E-12
AP	mol H ⁺ eq.	3.92E+00	2.03E+00	8.62E-01	6.81E+00	0.00E+00	7.61E-03	8.21E-03	7.78E-03	-3.16E+00
EP-freshwater	kg PO ₄ ³⁻ eq.	2.35E-02	6.14E-04	3.62E-02	6.03E-02	0.00E+00	4.48E-05	2.96E-05	5.71E-06	-1.18E-03
EP-freshwater	kg P eq.	7.65E-03	2.00E-04	1.18E-02	1.97E-02	0.00E+00	1.46E-05	9.65E-06	1.86E-06	-3.86E-04
EP-marine	kg N eq.	7.88E-01	5.62E-01	4.18E-01	1.77E+00	0.00E+00	3.64E-03	1.63E-03	1.93E-03	-6.09E-01
EP-terrestrial	mol N eq.	8.48E+00	6.13E+00	4.55E+00	1.92E+01	0.00E+00	3.81E-02	1.53E-02	2.12E-02	-6.15E+00
POCP	kg NMVOC eq.	2.37E+00	1.53E+00	1.20E+00	5.10E+00	0.00E+00	6.62E-03	4.12E-03	6.08E-03	-2.72E+00
ADP-minerals&metals	kg Sb eq.	8.46E-04	3.23E-06	6.38E-06	8.56E-04	0.00E+00	1.15E-07	1.99E-07	1.68E-07	-4.40E-03
ADP-fossil	MJ	3.01E+04	1.04E+03	1.25E+03	3.24E+04	0.00E+00	3.17E+01	1.14E+01	3.56E+01	-1.74E+04
WDP	m ³	4.13E+02	8.88E-01	2.14E+02	6.28E+02	0.00E+00	6.26E-03	3.36E-01	-2.89E-02	-4.83E+03
Acronyms	<p>GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential 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; 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 for fossil resources potential*; WDP = Water (user) deprivation potential, deprivation-weighted water consumption*</p> <p>*: The results of these environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator</p>									

² The estimated impact results are only relative statements which do not indicate the end points of the impact categories, exceeding threshold values, safety margins or risks.

Additional mandatory and voluntary impact category indicators

Table 6: GWP additional indicator

Results per declared unit										
Indicator	Unit	A1	A2	A3	Tot.A1-A3	C1	C2	C3	C4	D
GWP-GHG ³	kg CO ₂ eq.	8.12E+02	8.01E+01	2.44E+03	3.33E+03	0.00E+00	2.30E+00	1.20E+00	2.29E+00	-1.69E+03

Additional voluntary indicators e.g. the voluntary indicators from EN 15804 or the global indicators according to ISO 21930:2017

Resource use indicators

Table 7: Indicators describing resource use

Results per declared unit										
Indicator	Unit	A1	A2	A3	Tot.A1-A3	C1	C2	C3	C4	D
PERE	MJ	2.05E+03	6.75E+01	2.80E+01	2.15E+03	0.00E+00	2.02E+00	1.85E+01	2.57E+00	1.09E+03
PERM	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
PERT	MJ	2.05E+03	6.75E+01	2.80E+01	2.14E+03	0.00E+00	2.02E+00	1.85E+01	2.57E+00	1.09E+03
PENRE	MJ	3.02E+04	1.04E+03	1.25E+03	3.24E+04	0.00E+00	3.17E+01	1.14E+01	3.56E+01	-1.74E+04
PENRM	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
PENRT	MJ	3.02E+04	1.04E+03	1.25E+03	3.24E+04	0.00E+00	3.17E+01	1.14E+01	3.56E+01	-1.74E+04
SM	kg	1.03E+02	0.00E+00	0.00E+00	1.03E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.50E+02
RSF	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
NRSF	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
FW	m ³	1.62E+01	2.06E-01	1.02E+01	2.66E+01	0.00E+00	1.88E-03	7.99E-02	3.67E-04	-1.13E+02
Acronyms	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water									

³ The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus almost equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

Waste indicators

Table 8: Environmental information describing waste categories

Results per declared unit										
Indicator	Unit	A1	A2	A3	Tot.A1-A3	C1	C2	C3	C4	D
Hazardous waste disposed	kg	1.53E-06	2.56E-08	2.80E-02	2.80E-02	0.00E+00	2.69E-10	8.37E-09	6.30E-09	3.79E-06
Non-hazardous waste disposed	kg	9.42E+00	9.49E-02	-8.36E-01	8.68E+00	0.00E+00	2.98E-03	7.65E-03	5.01E+01	2.21E+02
Radioactive waste disposed	kg	1.58E-01	1.55E-03	-3.66E-03	1.55E-01	0.00E+00	5.08E-06	4.55E-04	4.05E-04	1.88E-03

Output flow indicators

Table 9: Indicators describing resource use

Results per declared unit										
Indicator	Unit	A1	A2	A3	Tot.A1-A3	C1	C2	C3	C4	D
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
Material for recycling	kg	0.00E+00	0.00E+00	5.85E+02	5.85E+02	0.00E+00	0.00E+00	9.50E+02	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	2.37E+03	2.37E+03	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	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	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

Information on biogenic carbon content

Table 10: Information describing the biogenic carbon content at the factory gate

Results per declared unit		
BIOGENIC CARBON CONTENT	Unit	QUANTITY
Biogenic carbon content in product	kg C	-
Biogenic carbon content in packaging	kg C	-

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO₂.

UOB produces pig iron from coal and no biogenic carbon content is present in the finished products.

The omission of the packaging materials is below the cut-off criteria and therefore not considered to affect the completeness of the study.

Other environmental performance indicators

Table 11: Additional environmental impact indicators

Results per declared unit										
Indicator	Unit	A1	A2	A3	Tot.A1-A3	C1	C2	C3	C4	D
PM	Disease incidences	4.84E-05	3.35E-05	-8.69E-05	-5.01E-06	0.00E+00	4.14E-08	1.13E-07	8.43E-08	-6.00E-05
IR	kBq U235 eq.	1.50E+01	1.36E-01	7.34E-01	1.58E+01	0.00E+00	4.79E-04	3.38E-02	5.81E-02	3.27E+01
ETF-fw	CTUe	2.03E+04	1.53E+03	3.61E+03	2.54E+04	0.00E+00	6.42E+01	4.83E+00	1.05E+01	-1.12E+03
HTP-c	CTUh	4.02E-07	2.63E-08	3.03E-07	7.31E-07	0.00E+00	1.01E-09	7.83E-10	1.21E-09	-9.62E-07
HTP-nc	CTUh	1.98E-05	8.58E-07	3.87E-07	2.10E-05	0.00E+00	3.16E-08	9.80E-09	1.23E-07	-2.16E-05
SQP	Pt	1.88E+03	2.55E+02	8.74E+01	2.22E+03	0.00E+00	1.95E+01	9.62E+00	2.62E+00	2.60E+02
Acronyms	PM = Particulate matter emissions; IR = Ionizing radiation, human health; ETF-fw = Eco-toxicity (freshwater); HTP-c = Human toxicity, cancer effects; HTP-nc = Human toxicity, non-cancer effects, SQP = Soil quality potential/ Land use related impacts									

Additional environmental information

The environment is a frequent topic at meetings of our Board of Directors and strategic committees. Our Sustainability Policy and Environmental Stewardship System reinforce our commitment to creating value for our stakeholders, and break down into measures to promote energy efficiency, reduce GHG emissions, water management, and reuse and recycle waste. They reinforce the company's commitment to creating value for its stakeholders and are in line with global best practices and regulatory guidelines. These guidelines are cascaded to all company operations and describe the procedures and responsibilities to be followed.

Gerdau is committed to being part of the solution to achieve a low-carbon economy and has developed a medium- and long-term strategy to this end. For more information please check our commitment https://www2.gerdau.com.br/wp-content/uploads/2022/03/Gerdau_ING.pdf.

References

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