Environmental Product Declaration

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

Steel reinforcing bar (weldable, non- weldable and high resistance concrete bars)

from

Compañía Siderúrgica Huachipato

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Programme Operator	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden EPD Latin America Chile office: Alonso de Ercilla 2996, Ñuñoa, Santiago. Mexico office: Av. Convento de Actopan 24 Int. 7ª, Colonia Jardines de Santa Mónica. Tlalnepantla de Baz, Estado de México, México. C.P. 54050.

Accountabilities for PCR, LCA and independent, third-party verification
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CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): *PCR 2019:14 Construction Products VERSION 1.11, 2021-02-05, UN CPC 412*
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Life Cycle Assessment (LCA)
LCA accountability: *Mariana Aguirre, EDGE Chile*
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: *Ruben Carnerero* *Email: r.carnerero@ik-ingenieria.com* Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier: ☒ Yes ☐ No

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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.

What is an EPD?

An Environmental Product Declaration (EPD) is an independently verified and registered document that communicates transparent and comparable information about the life-cycle environmental impact of products.

The following EPD has been developed by Compañía Siderúrgica Huachipato for its steel reinforcing bars (weldable, non-weldable and high resistance concrete bars).

Company information

Compañía Siderúrgica Huachipato S.A.
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Description of the organisation

Compañía Siderúrgica Huachipato S.A. (Siderúrgica Huachipato) is a company of the CAP Group and the main steel producing industry in Chile. The steel company is located in Talcahuano, on the shores of San Vicente's Bay, and has stood out for its positive productive, economic and social impact in the Bio Bío Region.

Since 1950, the Company leads the steel business in Chile and currently has a production capacity of 800 000 tons of liquid steel per year. Siderúrgica Huachipato is the only integrated steel producer in the country, which means that it produces steel from basic raw materials, such as iron ore, carbon and limestone, which guarantees products of high purity and controlled quality.

Through a wide range of products of recognized quality, Siderúrgica Huachipato contributes to the country's growth. It supplies important sectors of the economy, mainly mining, metallurgy and construction.

Currently, its production is oriented to long products, such as grinding bars, wire rod, concrete reinforcement bars and special steels.

Sustainability

From its origins the company has been concerned with developing its productive activity adjusted to quality standards, safeguarding the social and environmental balance of its operations. The company has an integrated management system, which guarantees continuous process improvement and guarantees the quality of products and services; and they have the following certifications:

- ISO 50001: 2018 Energy Management Systems
- ISO 14001: 2015 Environmental Management System
- ISO 9001: 2015 Quality Management System
- ISO 45001:2018 Occupational health and safety management systems

Siderúrgica Huachipato has also developed a Sustainability Report aligned with Global Reporting Initiative (GRI)1, where information about these initiatives can be found.

Energy

[1] Available in the following link: https://www.cap.cl/reporte-sostenibilidad-2018/

In addition to ISO 50001, the company has the Chilean Ministry of Environment Energy Efficiency seal Gold category, due to the implementation of several projects, including the reduction of steam in the manufacturing process through the implementation of better technologies.
In terms of renewable energy, the company is purchasing IREC certificates with the company Engie for an important percentage of its electricity consumption.

Zero waste

Siderúrgica Huachipato has a zero-waste strategy. This means that all waste has a use, avoiding waste going to landfill. The strategy has allowed that only 2% of waste goes to external landfill, while the rest is recycled, reused or sent to a zone of waste management (Zomare).

Emissions

Siderúrgica Huachipato has emission abatement systems in place to control air emissions. Among initiatives are the use of baghouse and sprinkling of carbon and coke areas. In terms of fuel use, the consumption of petroleum has decreased in recent years, allowing an impact reduction.

Biodiversity

Inside Siderúrgica Huachipato's facilities there is a wet area, formed by 3 lagoons and a flooding area, reaching 65 hectares. This ecosystem is protected, maintained and monitored periodically. Additionally, in 2018 the company planted 13 500 native trees in Talcahuano, as part of its reforestation initiative.

Water

The company constantly monitors underground water and discharges. In recent years, this monitory has allowed discharges of water with contamination levels well below what is requested by law.

Name and location of production site

Compañía Siderúrgica Huachipato S.A
Avenida Gran Bretaña N° 2910, Talcahuano, Bío Bío Region.

Product information

Product name

The product included in this EPD is Siderúrgica Huachipato' steel reinforcing bar, including weldable (CAPSOL®), non-weldable and high resistance concrete bars.

Product identification

Steel reinforcing bars for concrete included in this EPD are A440- 280H and A630- 420H, in his weldable and non- weldable format (Figure 1- for weldable bar, the identification includes an "S", which stands for *"Soldable"* (Weldable")) and Grades 60 and 80 for high resistance concrete bars. The specifications are presented in Table 1. The impact is presented for a declared unit of 1 kg of the different bars.

***Figure 1**- Siderúrgica Huachipato steel reinforcing bars included in this EPD*

***Table 1**- Product specifications*

Nominal diameter (mm)	Nominal section (cm^2)	Nominal weight (kg/m)	Delivery mode
6 (only with smooth surface)	0.283	0.222	Rolls and straight
8	0.503	0.395	
10	0.785	0.617	
12	1.131	0.888	
16	2.011	1.578	Straight
18	2.545	1.998	
22	3.801	2.984	
25	4.909	3.853	
28	6.158	4.834	
32	8.043	6.313	
36	10.179	7.990	

Product description

The evaluated product is steel reinforcing bar. These bars are products of circular section with longitudinal ribs and inclined projections with respect to its axis. Siderúrgica Huachipato's bars are used in the construction of reinforcements of any element of reinforced steel; and are certified under the Chilean Standard NCh204: 2006 for non- weldable bars, NCh3334:2014 for weldable (CAPSOL®), and NCh204, NHc3334, ASTM A615 and ASTM A706 for high resistance concrete bars. The chemical composition of bars is also in compliance Chilean regulations, and the specific content declaration are

presented in Table 2, Table 3, and Table 4 for non- weldable , weldable bars and high resistance concrete bars, respectively. The bars do not present any substances of very high concern.

***Table 2**- Content declaration- non- weldable bars*

Products	Chemical composition	Weight, kg	%	CAS Number	Post-consumer material, weight- %	Renewable material, weight-%
A440-280H & A630- 420H (non-weldable)	Iron	990	~99%	7439-89-6	24%	-
	Carbon	1.8- 4.4	0.18%- 0.44%	7440-44-0		-
	Manganese	6.0- 11.0	0.60% - 1.10%	7439-96-5		-
	Silicon	2.5	0.25%	7440-21-3		
	Phosphorus	0.4	0.040%	7723-14-0		-
	Sulphur	0.5	0.05%	7704-34-9		-
	TOTAL	**1000**	**100%**	**-**	**24%**	**-**

***Table 3**- Content declaration- weldable bars (CAPSOL®)*

Products	Chemical composition	Weight, kg	%	CAS Number	Post-consumer material, weight- %	Renewable material, weight-%
A630- 420H S (weldable)	Iron	990	~99%	7439-89-6	24%	-
	Carbon	2.7- 3.3	0.25%- 0.3%	7440-44-0		-
	Manganese	15.0 max	1.50% max	7439-96-5		-
	Silicon	5.0 max	0.50% max	7440-21-3		
	Chromium	2.5 max	0.25% max	7440-47-3		
	Phosphorus	0.3	0.03%	7723-14-0		-
	Sulphur	0.4	0.04%	7704-34-9		-
	TOTAL	**1000**	**100%**	**-**	**24%**	**-**

***Table 4**- Content declaration- high resistance concrete bars*

Products	Chemical composition	Weight, kg	%	CAS Number	Post-consumer material, weight- %	Renewable material, weight-%
Grade 60 and 80	Iron	980	~98%	7439-89-6	24%	-
	Carbon	3.0 max	0.30% max	7440-44-0		-
	Manganese	15.0 max	1.5% max	7439-96-5		-
	Silicon	5.0 max	0.50% max	7631-86-9		-

Products	Chemical composition	Weight, kg	%	CAS Number	Post-consumer material, weight- %	Renewable material, weight-%
	Chromium	2.5 max	0.25% max	7440-47-3		
	Phosphorus	0.35 max	0.035 % max	7723-14-0		
	Sulphur	0.45 max	0.045% max	7704-34-9		
	TOTAL	**1000**	**100%**	**-**	**24%**	**-**

***Table 5**- Packaging materials- weldable and non-weldable bars*

Packaging materials	Weight, kg	Weight-% (versus the product)
Paper	0.002	0.0002%
Steel wire	0.3	0.03%
TOTAL	**0.302**	**0.0302%**

Packaging

The steel reinforcing bars are tied with wire made also from steel and include a wire rod in of the end with a plastic label containing the information of the product.

Recycled material

Siderúrgica Huachipato steel reinforcing bars are a mix of pig iron and scrap recollected throughout the country (post-consumer). In the production of liquid steel, the scrap represents 24% of the total weight, with pig iron representing the remaining 76%. Companies can request the certification of recycled content to Siderúrgica Huachipato.

UN CPC code

The UN CPC code for the product is CPC 412.

Geographical scope

The EPD covers manufacture and sold in Chile.

LCA information

A life cycle assessment is a technique for assessing the environmental aspects and potential impacts associated with a product. By considering potential impacts throughout the life cycle of a product (upstream and downstream), the analysis avoids the shifting of burdens from one type of environmental impact to another, from one political region to another and from one stage to the other.

An Environmental Product Declaration (EPD) is an independently verified and registered document that communicates transparent and comparable information about the life cycle environmental impacts of products. The following information describes the scope and methodology of this EPD for Siderúrgica Huachipato steel reinforcing bars, allowing for comparison with other EPDs.

Functional unit

This EPD has a declared unit of 1 kg steel reinforcing bars (weldable, non- weldable and high resistance concrete bars) manufactured and sold in Chile for construction.

Reference service life

The reference service life for steel reinforcing bars is over 100 years.

Time representativeness and data collection

Foreground data on physical properties, raw material & energy requirements, transport of raw materials and manufacture of the bars was collected by the company for the year 2021. The information is considered good, as is summarized in

Table 6.

***Table 6**- Foreground data sources and quality*

	Product data	Module A1	Module A2	Module A3	Module A4	Module A5	Module B	Module C	Module D
Data	Range and physical properties	Raw material inputs Energy inputs	Transportation from suppliers to Siderúrgica Huachipato's installations	Water inputs Consumable inputs Waste outputs	Distribution information	Ancillary materials and energy for installation	Data on use of products	End of life of products	Recyclability potential
Source	Collected by Siderúrgica Huachipato staff for 2021	Collected by Siderúrgica Huachipato staff for 2021	Supplier locations provided by Siderúrgica Huachipato staff for 2021. Distances calculated with online tool. Transport specifications assumed from ecoinvent 3.6 processes.	Collected by Siderúrgica Huachipato staff for 2021	Collected by Siderúrgica Huachipato staff for 2021	Estimation based on products description and use made by Siderúrgica Huachipato staff	Estimation based on products description and use made by Siderúrgica Huachipato staff	Estimation based on types of waste treatment for each country of product sales	Estimation based on types of waste treatment for each country of product sales
Geographical representativeness		Very good			Very good	Fair	Good	Good	Good
Technical representativeness		Very good			Very good	Fair	Good	Good	Good
Time representativeness		Very good			Very good	Fair	Good	Good	Good

Database(s) and LCA software used

The inventory data for the process are entered in SimaPro LCA program and linked to the pre-existing data for the upstream feedstocks and services. Data were selected per geographic relevance from ecoinvent 3.6 database (Ecoinvent Centre, 2019).

System diagram

Figure 2 presents the system diagram. The analysis is cradle to grave. Table 7 summarises the steelmaking process.

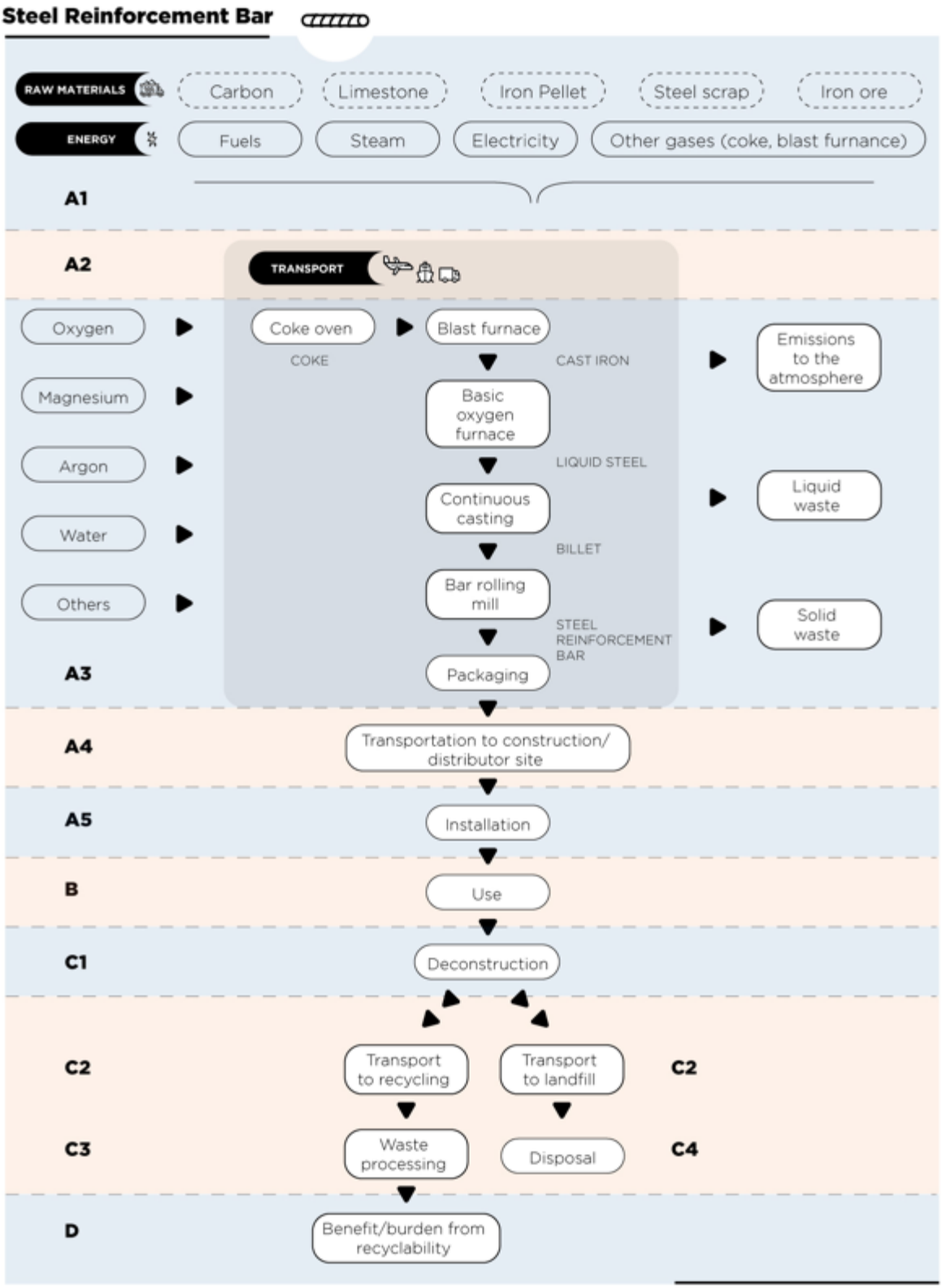
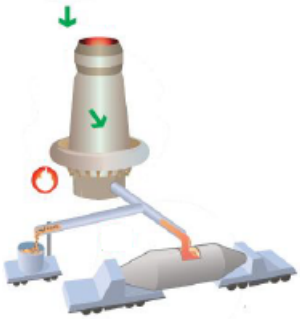
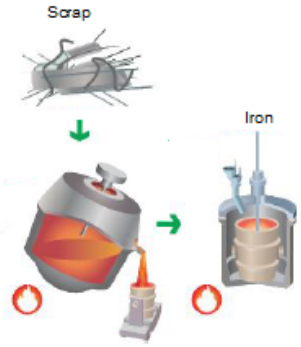
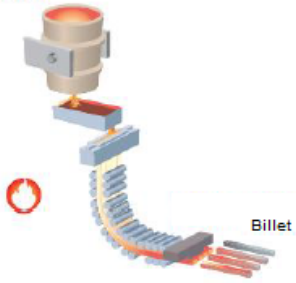
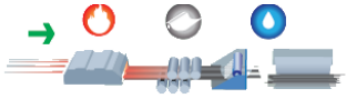


***Figure 2**- System diagram*

***Table 7**- Summary of steelmaking process*

Stage	Description	Scheme
Coke oven	Process to transform carbon into coke. After reception of carbon, this is crushed and mixed to the right proportions, to then go into the coke furnace. This process also generates coke gas, which is later used as fuel for other processes. The generated coke is cooled with water, which is afterwards saved and reused for further cooling processes. Some water is released as water vapour.	
Blast furnace	Coke, iron pellets and ore, and limestone are loaded into this furnace to produce hot metal and slag. These raw materials are loaded in the top of the furnace, while the hot metal and slag are received below.	
Basic oxygen furnace	In this process oxygen is used to remove the excess of carbon from the hot metal. Other inputs are used here, such as lime, ferrochromium, and dolomite. The process also uses scrap. The result from this stage is the liquid steel.	
Continuous casting	In this process, the liquid steel is poured into copper melds and transforms into billets. The copper melds allow the circulation of water, which allows the solidification of liquid steel into billet.	
Bar rolling mill	The billets from the previous stage are rolled and transformed into specific bars and wires, such as the bars for steel reinforcing bars	
Packaging	The bars are tied with wire made also from steel and include a wire rod in of the end with a plastic label containing the information of the product.	

Description of system boundaries

As previously mentioned, the scope of the analysis is cradle to grave. In accordance with the PCR 2019:14, the following system boundaries are applied on manufacturing equipment, maintenance of equipment and employees:

- Environmental impact from infrastructure, construction, production equipment, and tools that are not directly consumed in the production process are not accounted for in the LCI. Capital equipment and buildings typically account for less than a few percent of nearly all LCIs and this is usually smaller than the error in the inventory data itself. For this project, it is assumed that capital equipment makes a negligible contribution to the impacts as per Frischknecht et al. (2007) with no further investigation.
- Personnel-related impacts, such as transportation to and from work, are also not accounted for in the LCI. The impacts of employees are also excluded from inventory impacts on the basis that if they were not employed for this production or service function, they would be employed for another. It is very hard to decide what proportion of the impacts from their whole lives should count towards their employment. For this project, the impacts of employees are excluded.

Allocation

The steelmaking process generates different steel products (steel reinforcing bars, wire rods, among others). The first stages of the production (coke production and blast furnaces) process are common to all products; therefore, on a per functional unit basis, all products have the same inputs and outputs. From basic oxygen furnaces to bar rolling mills the processes are slightly different per product. For this, allocation was done by mass.

Gases generated as co- products are used internally for energy generation, therefore no allocation value was assigned to them. A similar situation happens with breeze coke, a co- product of the coke oven that is later used in the basic oxygen furnaces.

In the blast furnace stage, slag is produced and then sold. Since the values are very different (slag is sold for only a fraction of steel products), the allocation was done on an economic basis.

For other co- products generated in the process (dust, rejected lime, among others), their selling value is very low, so a worst-case scenario was selected, allocating no impact to these.

Greenhouse gas emissions from the use of electricity

Siderúrgica Huachipato uses a specific electricity mix, mostly from renewable sources. The following table presents the emission factor of the electricity used in the manufacturing process.

Electricity mix	Quantity	Unit
Specific electricity mix	1.66.E-01	$kgCO_2eq/kWh$

Modelling scenarios

Distribution

Siderúrgica Huachipato steel reinforcing bars are sold mostly in Chile, transported by truck. Distance is a weighted average according to the different cities where the product is sold. Table 8 has the relevant scenario information.

Table 8- Distribution scenario information

Scenario information	Unit
Vehicle type	Euro 5 lorry >32 metric ton
Type of fuel	Diesel
Weight transported (kg)	1000
Capacity utilisation (%)	50%

Installation

Installation of steel reinforcing bars considers the use of a crane and cutter, with a 5% loss of product during the process. No water or ancillary materials are needed. Table 9 presents relevant information.

Table 9- Installation scenario information

Scenario information	Unit
Ancillary materials for installation	No ancillary materials are needed for installation
Water use or other resources	No water or other resources are needed for installation
Energy type	Electricity (Chile's grid) and diesel.
Waste materials on the building site before waste processing, generated by the product's installation (kg)	No waste generated by the product's installation
Output materials (kg) (specified by type) as result of waste processing at the building site	Product waste and packaging waste are generated.
Direct emissions to ambient air, soil and water (kg)	No direct emissions generated by the product's installation (other than from diesel previously indicated)

Use stage

Once installed there are no replacement or maintenance needed for steel reinforcing bars. The reference service life for bars is 60+ years following difference references[2], because of the high-quality standard and uses of Siderúrgica Huachipato's steel, and because it is mostly used as structure of buildings.

[2] Acerinox S.A. EPD: https://api.environdec.com/api/v1/EPDLibrary/Files/b866e675-01be-453f-3a02-08d99c9745fc/Data
Valbruna: https://www.valbruna-stainless-steel.com/applications/building/reinforcing-bars#:~:text=More%20than%20100%20years%20of,Low%20life%20cycle%20cost
eTool: https://etoolglobal.com/wp-content/uploads/2015/10/BuildingComponentLifeExpectancy.pdf

End of life

The end-of-life modelling is based on the most realistic scenario, using recycling statistics for Chile. This comes from official statistics in the construction sector3, which only indicates a 7% recycling of steel used in construction.

The benefits associated with the recycling process for steel reinforcing bars is modelled as scrap steel that replaces iron ore in Siderúrigca Huachipato's production process.

Table 10 presents the scenario information.

Table 10- End of life scenario information

Processes	Unit
Collection process specified by type	kg collected separately = 950
Recovery system specified by type	kg for recycling = 67.83
Disposal specified by type	kg of product for final disposition = 882.17
Assumptions for scenario development	50 km is the estimated distance both for landfill and recycling Deconstruction includes the use of excavator and crane

[3] https://construye2025.cl/rcd/wp-content/uploads/2020/08/HDR-PAGINA_RCD_200825.pdf

Modules declared, geographical scope, share of specific data (in GWP-GHG indicator) and data variation:

	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	x	x	x	x	x	x	x	x	x	x	x	x	x	x
Geography	Chile																Chile
Specific data used	>90%					-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	<10%					-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	Not relevant					-	-	-	-	-	-	-	-	-	-	-	-

Environmental Information

This section presents the potential environmental impacts, use of resources, waste production and output flows of 1000 kg of Siderúrgica Huachipato's steel reinforcing bar. The figures are for non-weldable bars, but the conclusions are a similar for the three bars, given the very similar results.

Potential environmental impact

- Raw materials (Module A1) have a very relevant impact contribution across indicators, with the highest contribution in 8 out of 14 of those. Among the highest contributions are aquatic freshwater eutrophication (97%) and abiotic depletion- fossil (83%), in both cases due to the use of carbon.
- The manufacturing process (Module A3) has a very relevant contribution in total global warming potential (77%), due to the direct CO_2 emissions generated in the manufacturing process, mostly in the iron ore reduction process. Other important contributions are photochemical ozone formation (47%) and water depletion potential. The first is due to CO direct emissions from the process, while the second indicator is the water used in the manufacturing process that is more relevant.
- On third place in overall impact contribution is the transport of raw materials (Module A2) due to the burning of fossil fuel and the long distances travelled by some materials. Main impact contributions are to ozone depletion potential (42%) and terrestrial eutrophication (38%).
- Other modules have a small contribution (lower than 10%) for all impact indicators, with the exception of module A4 (distribution to site) where the ozone depletion potential reaches 13% contribution. Similar to what happens with module A2, the burning of fossil fuel in transport is the main contributor to this indicator.
- Module D, although small values because the recycling numbers are considered low, presents a negative impact (meaning a "benefit") across most indicators.

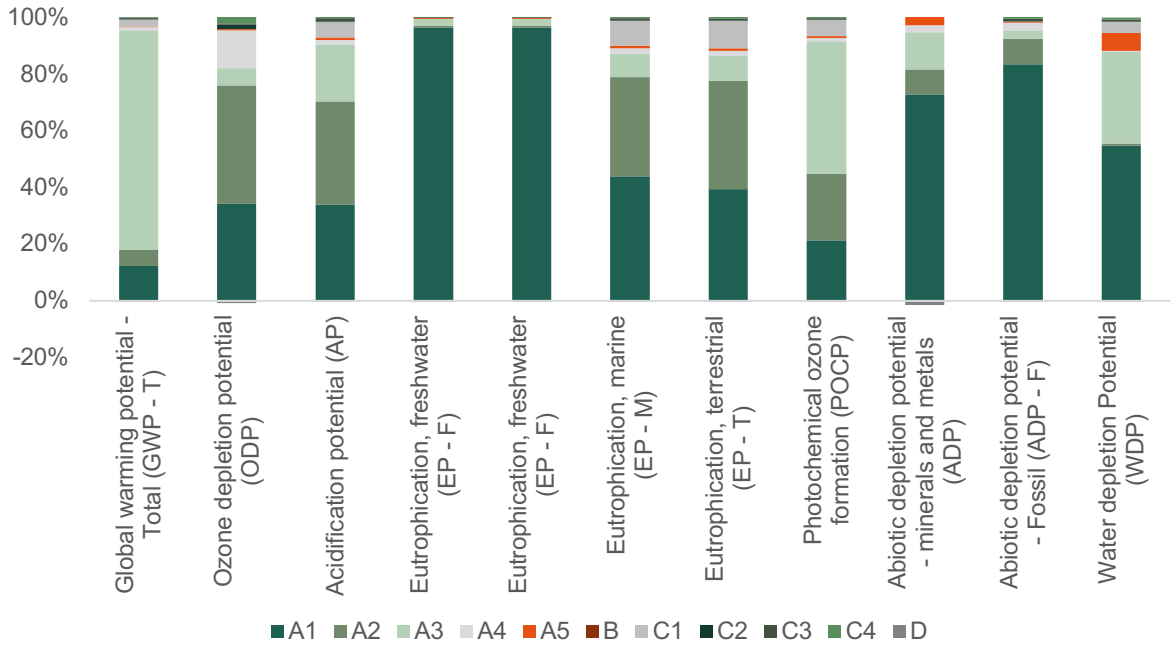


Figure 3- *Percentage contribution of life cycle stages to the different potential environmental impact categories.*

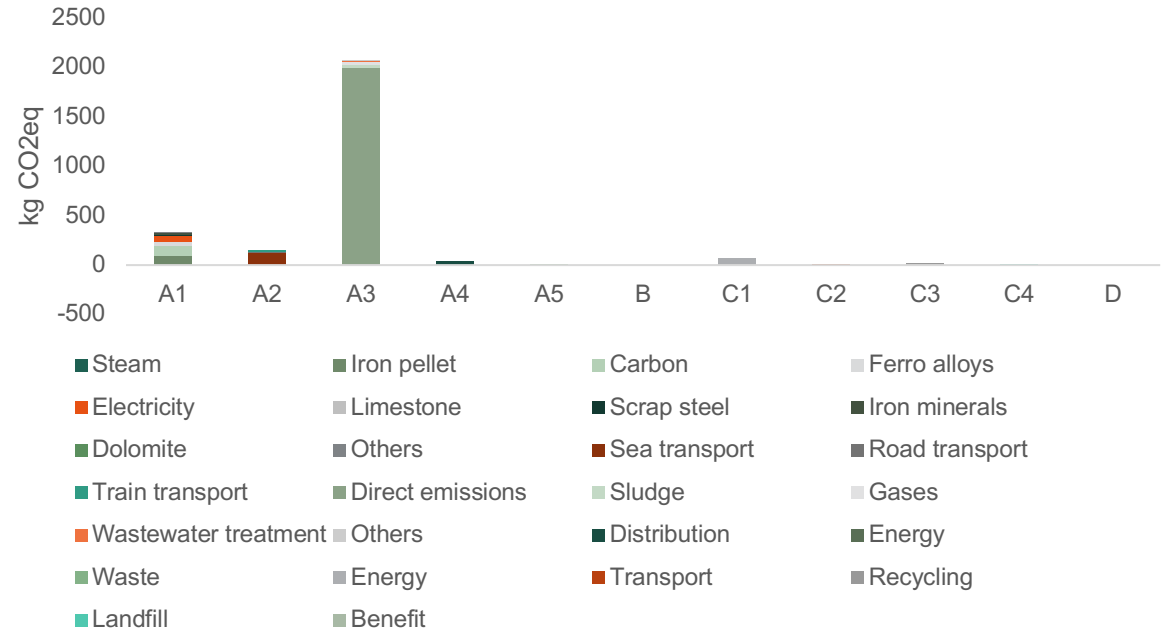


***Figure 4**- Contribution of main inputs and outputs to total global warming.*

Use of resources

- Similar to potential impacts, raw materials (Module A1) are the main contributor to use of resources, with 100% use of secondary materials because of the use of scrap, 100% contribution to non-renewable energy sources as materials (due to the use of coal as a raw material), 91% contribution to total use of non-renewable energy and 78% to total use of renewable energy.
- The manufacturing process (Module A3) has a relevant contribution to net freshwater use (40%) because of water used in the process, while the use of total non-renewable energy contributes to 11%.
- Other modules present low contribution to most indicators.

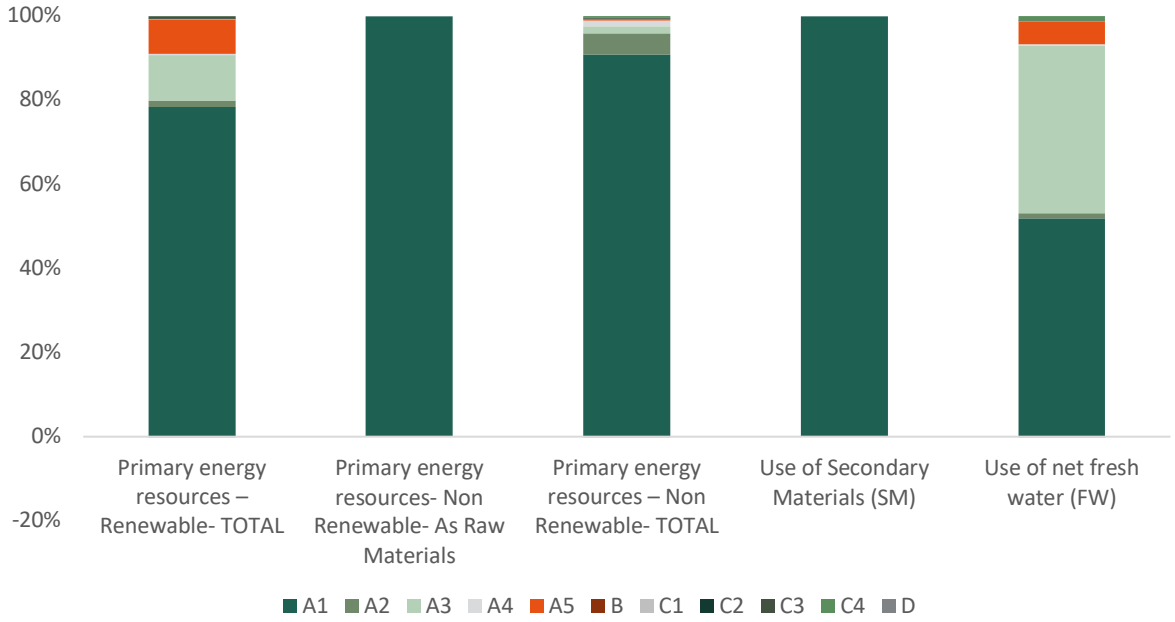


Figure 5: Percentage contribution of life cycle stages to the different use of resources categories.

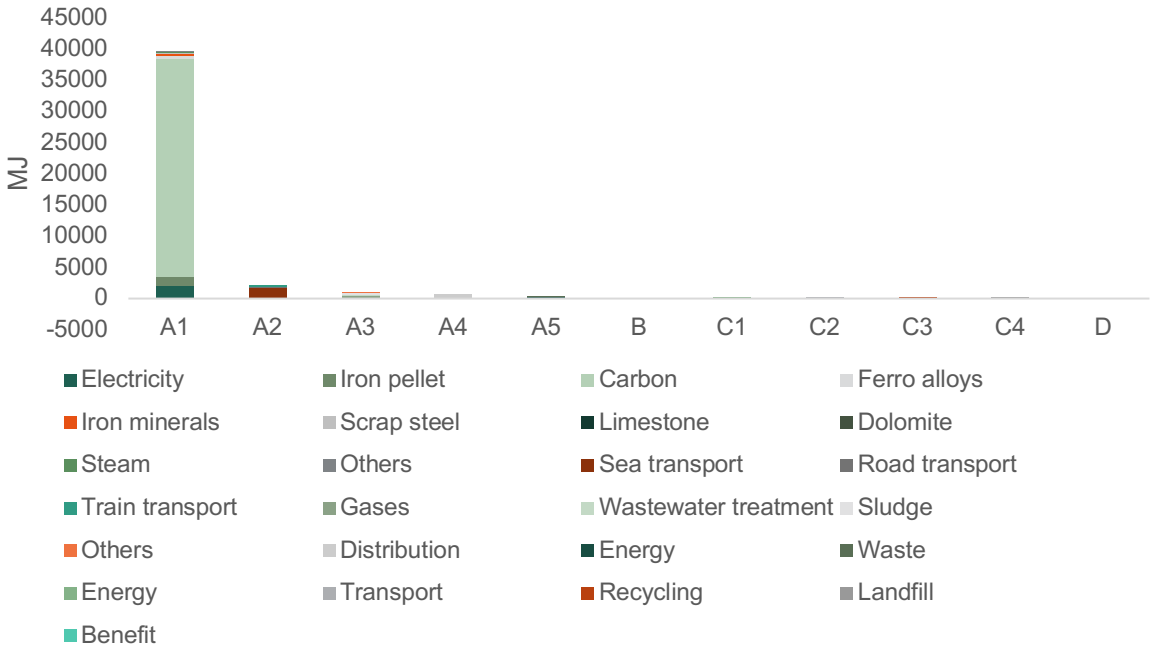


***Figure 6**- Contribution of main inputs and outputs to total energy use*

Waste production and output flows

- Raw materials (Module A1) have the highest contribution to hazardous waste (99%). This is because of iron pellets and its production.
- Sea transport (part of Module A2) has an important contribution to radioactive waste disposed (43%).
- In terms of non-hazardous waste disposed, product going to landfill (Module C4) has the main contribution (54%) because, as previously indicated, most of the product is still considered to go to landfill instead of recycling.

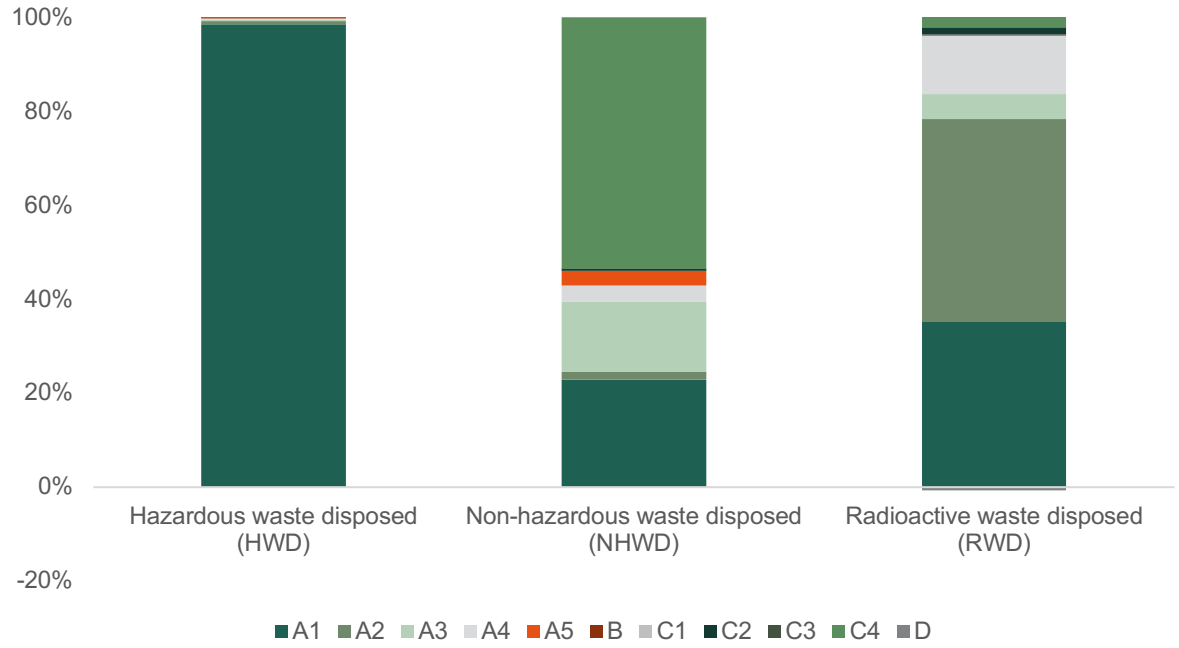


***Figure 7**- Percentage contribution of life cycle stages to the different waste categories.*

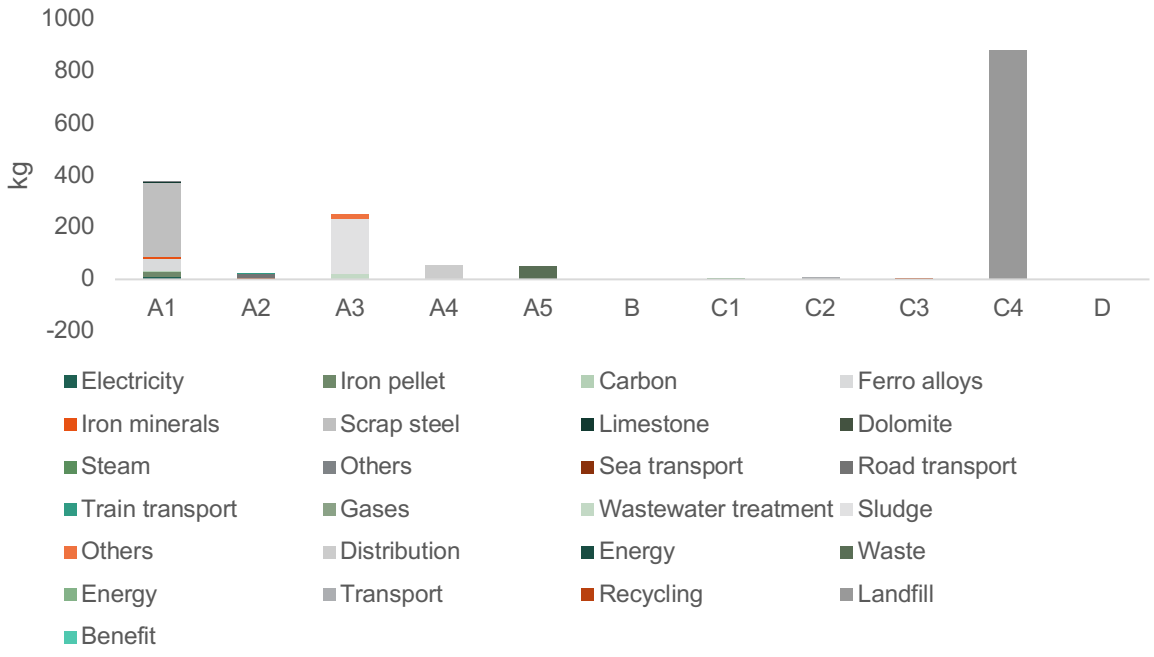


***Figure 8**- Contribution of main inputs and outputs to non- hazardous waste by module*

Mandatory impact category indicators according to EN 15804

Results for 1000 kg of non- weldable steel reinforcing bar by Siderúrgica Huachipato

Indicator	Unit	A1	A2	A3	Tot.A1 -A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-fossil	kg CO_2 eq.	3.32E+02	1.53E+02	2.07E+03	2.55E+03	3.82E+01	1.01E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.24E+01	4.69E+00	1.60E+01	4.65E+00	-3.41E+00
GWP-biogenic	kg CO_2 eq.	-2.34E+00	2.43E-01	1.50E+00	-5.95E-01	7.17E-02	9.59E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.05E-03	8.80E-03	4.92E-02	1.64E-02	-3.32E+00
GWP-luluc	kg CO_2 eq.	3.45E-01	1.69E-01	5.27E-02	5.66E-01	1.41E-02	2.36E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.34E-07	1.73E-03	6.11E-06	4.39E-03	-1.50E-02
GWP-total	kg CO_2 eq.	3.30E+02	1.54E+02	2.07E+03	2.55E+03	3.83E+01	1.01E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.24E+01	4.70E+00	1.60E+01	4.67E+00	-6.75E+00
ODP	kg CFC 11 eq.	2.27E-05	2.78E-05	4.15E-06	5.46E-05	8.79E-06	3.67E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.84E-09	1.08E-06	1.58E-07	1.88E-06	-4.80E-07
AP	mol H^+ eq.	3.41E+00	3.65E+00	2.02E+00	9.09E+00	1.62E-01	8.17E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.54E-01	1.99E-02	1.05E-01	4.37E-02	-2.25E-02
EP-freshwater	kg PO_4^{3-} eq.	5.03E+00	3.14E-02	1.23E-01	5.19E+00	8.54E-03	1.70E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.38E-04	1.05E-03	1.88E-03	1.31E-03	-2.21E-03
EP-freshwater	kg P eq.	1.64E+00	1.02E-02	4.01E-02	1.69E+00	2.78E-03	5.52E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.51E-05	3.41E-04	6.11E-04	4.25E-04	-7.20E-04
EP-marine	kg N eq.	1.22E+00	9.73E-01	2.33E-01	2.43E+00	4.85E-02	2.28E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.48E-01	5.96E-03	1.68E-02	1.52E-02	-8.93E-03
EP-terrestrial	mol N eq.	1.11E+01	1.08E+01	2.51E+00	2.44E+01	5.30E-01	2.42E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.71E+00	6.51E-02	1.80E-01	1.66E-01	-7.17E-02
POCP	kg NMVOC eq.	2.39E+00	2.62E+00	5.22E+00	1.02E+01	1.31E-01	5.87E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.50E-01	1.61E-02	4.80E-02	4.10E-02	-2.02E-02
ADP-minerals& metals*	kg Sb eq.	2.54E-03	3.03E-04	4.56E-04	3.30E-03	8.72E-05	1.02E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.37E-06	1.07E-05	2.18E-05	1.06E-05	-5.33E-05
ADP-fossil*	MJ	1.81E+04	1.99E+03	6.33E+02	2.07E+04	5.85E+02	9.91E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.23E+01	7.18E+01	1.02E+02	1.30E+02	-4.03E+01

WDP	m^3	4.14E+02	6.19E+00	2.45E+02	6.652E+02	2.18E+00	4.69E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.11E+01	2.68E-01	4.32E+00	5.83E+00	-1.92E-01
Acronyms	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																	

** Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.*

Additional mandatory and voluntary impact category indicators

Results for 1000 kg of non- weldable steel reinforcing bar by Siderúrgica Huachipato

Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-GHG[4]	kg CO_2 eq.	3.32E+02	1.53E+02	2.07E+03	2.55E+03	3.82E+01	1.01E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.24E+01	4.69E+00	1.60E+01	4.65E+00	-3.41E+00
Additional voluntary indicators e.g. the voluntary indicators from EN 15804 or the global indicators according to ISO 21930:2017																			

Disclaimers shall be added, if required by EN 15804.

[4] 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.

Resource use indicators

Results for 1000 kg of non- weldable steel reinforcing bar by Siderúrgica Huachipato																		
Indicator	**Unit**	**A1**	**A2**	**A3**	**Tot.A1 -A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	1.53E+03	2.98E+01	2.10E+02	1.77E+03	6.47E+00	1.61E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.24E-01	7.95E-01	1.18E+01	1.11E+00	-1.74E+00
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	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	1.53E+03	2.98E+01	2.10E+02	1.77E+03	6.47E+00	1.61E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.24E-01	7.95E-01	1.18E+01	1.11E+00	-1.74E+00
PENRE	MJ	1.90E+04	2.11E+03	6.73E+02	2.18E+04	6.21E+02	1.06E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.24E+01	7.62E+01	1.03E+02	1.38E+02	-4.29E+01
PENRM	MJ.	1.90E+04	0.00E+00	0.00E+00	1.90E+04	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	3.80E+04	2.11E+03	6.73E+02	4.08E+04	6.21E+02	1.06E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.24E+01	7.62E+01	1.03E+02	1.38E+02	-4.29E+01
SM	kg	2.85E+02	0.00E+00	0.00E+00	2.85E+02	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00
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	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	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	4.19E+00	9.97E-02	3.21E+00	7.50E+00	3.25E-02	4.31E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.14E-03	3.99E-03	1.46E-02	8.23E-02	-3.11E-03
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																		

Waste indicators

Results for 1000 kg of non- weldable steel reinforcing bar by Siderúrgica Huachipato																		
Indicator	**Unit**	**A1**	**A2**	**A3**	**Tot.A1 -A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	4.84E-01	3.23E-03	1.24E-03	4.88E-01	1.42E-03	5.10E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.10E-06	1.74E-04	5.57E-05	1.96E-04	-1.08E-04
Non-hazardous waste disposed	kg	3.77E+02	2.61E+01	2.48E+02	6.52E+02	5.41E+01	5.17E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.43E-02	6.64E+00	9.46E-01	8.82E+02	-2.24E+00
Radioactive waste disposed	kg	1.09E-02	1.34E-02	1.65E-03	2.60E-02	3.84E-03	1.02E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.81E-08	4.72E-04	6.05E-07	8.50E-04	-2.29E-04

Output flow indicators

Results for 1000 kg of non- weldable steel reinforcing bar by Siderúrgica Huachipato																		
Indicator	**Unit**	**A1**	**A2**	**A3**	**Tot.A1 -A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0.00E+00	0.00E+00	3.73E+02	3.73E+02	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.78E+01	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	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, 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	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	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

Results for 1000 kg of non- weldable steel reinforcing bar by Siderúrgica Huachipato		
BIOGENIC CARBON CONTENT	**Unit**	**QUANTITY**
Biogenic carbon content in product	kg C	0.00E+00
Biogenic carbon content in packaging	kg C	-3.33E-04

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

Mandatory impact category indicators according to EN 15804

Results for 1000 kg of weldable steel reinforcing bar by Siderúrgica Huachipato

Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-fossil	kg CO_2 eq.	3.61E+02	1.53E+02	2.07E+03	2.58E+03	3.82E+01	1.01E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.24E+01	4.69E+00	1.60E+01	4.65E+00	-3.41E+00
GWP-biogenic	kg CO_2 eq.	-2.24E+00	2.43E-01	1.50E+00	-4.96E-01	7.17E-02	9.59E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.05E-03	8.80E-03	4.92E-02	1.64E-02	-3.32E+00
GWP-luluc	kg CO_2 eq.	3.67E-01	1.69E-01	5.27E-02	5.88E-01	1.41E-02	2.36E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.34E-07	1.73E-03	6.11E-06	4.39E-03	-1.50E-02
GWP-total	kg CO_2 eq.	3.59E+02	1.54E+02	2.07E+03	2.58E+03	3.83E+01	1.01E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.24E+01	4.70E+00	1.60E+01	4.67E+00	-6.75E+00
ODP	kg CFC 11 eq.	2.37E-05	2.78E-05	4.15E-06	5.57E-05	8.79E-06	3.67E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.84E-09	1.08E-06	1.58E-07	1.88E-06	-4.80E-07
AP	mol H^+ eq.	3.65E+00	3.65E+00	2.02E+00	9.32E+00	1.62E-01	8.17E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.54E-01	1.99E-02	1.05E-01	4.37E-02	-2.25E-02
EP-freshwater	kg PO_4^{3-} eq.	5.07E+00	3.14E-02	1.23E-01	5.22E+00	8.54E-03	1.70E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.38E-04	1.05E-03	1.88E-03	1.31E-03	-2.21E-03
EP-freshwater	kg P eq.	1.65E+00	1.02E-02	4.01E-02	1.70E+00	2.78E-03	5.52E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.51E-05	3.41E-04	6.11E-04	4.25E-04	-7.20E-04
EP-marine	kg N eq.	1.28E+00	9.73E-01	2.33E-01	2.48E+00	4.85E-02	2.28E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.48E-01	5.96E-03	1.68E-02	1.52E-02	-8.93E-03
EP-terrestrial	mol N eq.	1.17E+01	1.08E+01	2.51E+00	2.50E+01	5.30E-01	2.42E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.71E+00	6.51E-02	1.80E-01	1.66E-01	-7.17E-02
POCP	kg NMVOC eq.	2.54E+00	2.62E+00	5.22E+00	1.04E+01	1.31E-01	5.87E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.50E-01	1.61E-02	4.80E-02	4.10E-02	-2.02E-02
ADP-minerals&metals*	kg Sb eq.	2.65E-03	3.03E-04	4.56E-04	3.41E-03	8.72E-05	1.02E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.37E-06	1.07E-05	2.18E-05	1.06E-05	-5.33E-05
ADP-fossil*	MJ	1.83E+04	1.99E+03	6.33E+02	2.09E+04	5.85E+02	9.91E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.23E+01	7.18E+01	1.02E+02	1.30E+02	-4.03E+01

WDP	m^3	4.19E+02	6.19E+00	2.45E+02	6.70E+02	2.18E+00	4.69E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.11E+01	2.68E-01	4.32E+00	5.83E+00	-1.92E-01
Acronyms	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																	

** Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.*

Additional mandatory and voluntary impact category indicators

Results for 1000 kg of weldable steel reinforcing bar by Siderúrgica Huachipato

Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-GHG[5]	kg CO_2 eq.	3.61E+02	1.53E+02	2.07E+03	2.58E+03	3.82E+01	1.01E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.24E+01	4.69E+00	1.60E+01	4.65E+00	-3.41E+00
Additional voluntary indicators e.g. the voluntary indicators from EN 15804 or the global indicators according to ISO 21930:2017																			

Disclaimers shall be added, if required by EN 15804.

[5] 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.

Resource use indicators

Results for 1000 kg of weldable steel reinforcing bar by Siderúrgica Huachipato																		
Indicator	**Unit**	**A1**	**A2**	**A3**	**Tot.A1 -A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	1.60E+03	2.98E+01	2.10E+02	1.84E+03	6.47E+00	1.61E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.24E-01	7.95E-01	1.18E+01	1.11E+00	-1.74E+00
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	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	1.60E+03	2.98E+01	2.10E+02	1.84E+03	6.47E+00	1.61E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.24E-01	7.95E-01	1.18E+01	1.11E+00	-1.74E+00
PENRE	MJ	1.93E+04	2.11E+03	6.73E+02	2.21E+04	6.21E+02	1.06E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.24E+01	7.62E+01	1.03E+02	1.38E+02	-4.29E+01
PENRM	MJ.	1.90E+04	0.00E+00	0.00E+00	1.90E+04	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	3.83E+04	2.11E+03	6.73E+02	4.11E+04	6.21E+02	1.06E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.24E+01	7.62E+01	1.03E+02	1.38E+02	-4.29E+01
SM	kg	2.85E+02	0.00E+00	0.00E+00	2.85E+02	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00
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	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	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	4.26E+00	9.97E-02	3.21E+00	7.57E+00	3.25E-02	4.31E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.14E-03	3.99E-03	1.46E-02	8.23E-02	-3.11E-03
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																		

Waste production and output flows

Waste indicators

Results for 1000 kg of weldable steel reinforcing bar by Siderúrgica Huachipato																		
Indicator	**Unit**	**A1**	**A2**	**A3**	**Tot.A1 -A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	4.84E-01	3.23E-03	1.24E-03	4.88E-01	1.42E-03	5.10E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.10E-06	1.74E-04	5.57E-05	1.96E-04	-1.08E-04
Non-hazardous waste disposed	kg	4.12E+02	2.61E+01	2.48E+02	6.86E+02	5.41E+01	5.17E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.43E-02	6.64E+00	9.46E-01	8.82E+02	-2.24E+00
Radioactive waste disposed	kg	1.16E-02	1.34E-02	1.65E-03	2.67E-02	3.84E-03	1.02E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.81E-08	4.72E-04	6.05E-07	8.50E-04	-2.29E-04

Output flow indicators

Results for 1000 kg of weldable steel reinforcing bar by Siderúrgica Huachipato																			
Indicator	**Unit**	**A1**	**A2**	**A3**	**Tot.A1 -A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0.00E+00	0.00E+00	3.73E+02	3.73E+02	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.78E+01	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	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, 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	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	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

Results for 1000 kg of weldable steel reinforcing bar by Siderúrgica Huachipato		
BIOGENIC CARBON CONTENT	**Unit**	**QUANTITY**
Biogenic carbon content in product	kg C	0.00E+00
Biogenic carbon content in packaging	kg C	-3.33E-04

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

Mandatory impact category indicators according to EN 15804

Results for 1000 kg of high resistance concrete bars by Siderúrgica Huachipato

Indicator	Unit	A1	A2	A3	Tot.A1 -A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-fossil	kg CO_2 eq.	3.83E+02	1.53E+02	2.07E+03	2.60E+03	3.82E+01	1.01E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.24E+01	4.69E+00	1.60E+01	4.65E+00	-3.41E+00
GWP-biogenic	kg CO_2 eq.	-2.25E+00	2.43E-01	1.50E+00	-5.05E-01	7.17E-02	9.59E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.05E-03	8.80E-03	4.92E-02	1.64E-02	-3.32E+00
GWP-luluc	kg CO_2 eq.	3.85E-01	1.69E-01	5.27E-02	6.06E-01	1.41E-02	2.36E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.34E-07	1.73E-03	6.11E-06	4.39E-03	-1.50E-02
GWP-total	kg CO_2 eq.	3.81E+02	1.54E+02	2.07E+03	2.60E+03	3.83E+01	1.01E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.24E+01	4.70E+00	1.60E+01	4.67E+00	-6.75E+00
ODP	kg CFC 11 eq.	2.45E-05	2.78E-05	4.15E-06	5.64E-05	8.79E-06	3.67E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.84E-09	1.08E-06	1.58E-07	1.88E-06	-4.80E-07
AP	mol H^+ eq.	3.77E+00	3.65E+00	2.02E+00	9.44E+00	1.62E-01	8.17E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.54E-01	1.99E-02	1.05E-01	4.37E-02	-2.25E-02
EP-freshwater	kg PO_4^{3-} eq.	5.10E+00	3.14E-02	1.23E-01	5.25E+00	8.54E-03	1.70E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.38E-04	1.05E-03	1.88E-03	1.31E-03	-2.21E-03
EP-freshwater	kg P eq.	1.66E+00	1.02E-02	4.01E-02	1.71E+00	2.78E-03	5.52E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.51E-05	3.41E-04	6.11E-04	4.25E-04	-7.20E-04
EP-marine	kg N eq.	1.30E+00	9.73E-01	2.33E-01	2.50E+00	4.85E-02	2.28E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.48E-01	5.96E-03	1.68E-02	1.52E-02	-8.93E-03
EP-terrestrial	mol N eq.	1.19E+01	1.08E+01	2.51E+00	2.52E+01	5.30E-01	2.42E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.71E+00	6.51E-02	1.80E-01	1.66E-01	-7.17E-02
POCP	kg NMVOC eq.	2.60E+00	2.62E+00	5.22E+00	1.04E+01	1.31E-01	5.87E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.50E-01	1.61E-02	4.80E-02	4.10E-02	-2.02E-02
ADP-minerals& metals*	kg Sb eq.	3.99E-03	3.03E-04	4.56E-04	4.75E-03	8.72E-05	1.02E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.37E-06	1.07E-05	2.18E-05	1.06E-05	-5.33E-05
ADP-fossil*	MJ	1.85E+04	1.99E+03	6.33E+02	2.12E+04	5.85E+02	9.91E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.23E+01	7.18E+01	1.02E+02	1.30E+02	-4.03E+01

WDP	m^3	4.28E+02	6.19E+00	2.45E+02	6.80E+02	2.18E+00	4.69E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.11E+01	2.68E-01	4.32E+00	5.83E+00	-1.92E-01
Acronyms	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																	

** Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.*

Additional mandatory and voluntary impact category indicators

Results for 1000 kg of high resistance concrete bars by Siderúrgica Huachipato

Indicator	Unit	A1	A2	A3	Tot.A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-GHG[6]	kg CO_2 eq.	3.83E+02	1.53E+02	2.07E+03	2.60E+03	3.82E+01	1.01E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.24E+01	4.69E+00	1.60E+01	4.65E+00	-3.41E+00
Additional voluntary indicators e.g. the voluntary indicators from EN 15804 or the global indicators according to ISO 21930:2017																			

Disclaimers shall be added, if required by EN 15804.

[6] 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.

Resource use indicators

Results for 1000 kg of high resistance concrete bars by Siderúrgica Huachipato																		
Indicator	**Unit**	**A1**	**A2**	**A3**	**Tot.A1 -A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	1.63E+03	2.98E+01	2.10E+02	1.87E+03	6.47E+00	1.61E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.24E-01	7.95E-01	1.18E+01	1.11E+00	-1.74E+00
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	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	1.63E+03	2.98E+01	2.10E+02	1.87E+03	6.47E+00	1.61E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.24E-01	7.95E-01	1.18E+01	1.11E+00	-1.74E+00
PENRE	MJ	1.95E+04	2.11E+03	6.73E+02	2.23E+04	6.21E+02	1.06E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.24E+01	7.62E+01	1.03E+02	1.38E+02	-4.29E+01
PENRM	MJ.	1.90E+04	0.00E+00	0.00E+00	1.90E+04	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	3.85E+04	2.11E+03	6.73E+02	4.13E+04	6.21E+02	1.06E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.24E+01	7.62E+01	1.03E+02	1.38E+02	-4.29E+01
SM	kg	2.85E+02	0.00E+00	0.00E+00	2.85E+02	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00
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	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	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	4.38E+00	9.97E-02	3.21E+00	7.69E+00	3.25E-02	4.31E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.14E-03	3.99E-03	1.46E-02	8.23E-02	-3.11E-03
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																		

Waste production and output flows

Waste indicators

Results for 1000 kg of high resistance concrete bars by Siderúrgica Huachipato																		
Indicator	**Unit**	**A1**	**A2**	**A3**	**Tot.A1 -A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	4.84E-01	3.23E-03	1.24E-03	4.88E-01	1.42E-03	5.10E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.10E-06	1.74E-04	5.57E-05	1.96E-04	-1.08E-04
Non-hazardous waste disposed	kg	4.23E+02	2.61E+01	2.48E+02	6.97E+02	5.41E+01	5.17E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.43E-02	6.64E+00	9.46E-01	8.82E+02	-2.24E+00
Radioactive waste disposed	kg	1.21E-02	1.34E-02	1.65E-03	2.72E-02	3.84E-03	1.02E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.81E-08	4.72E-04	6.05E-07	8.50E-04	-2.29E-04

Output flow indicators

Results for 1000 kg of high resistance concrete bars by Siderúrgica Huachipato																		
Indicator	**Unit**	**A1**	**A2**	**A3**	**Tot.A1 -A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0.00E+00	0.00E+00	3.73E+02	3.73E+02	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.78E+01	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	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, 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	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	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

Results for 1000 kg of high resistance concrete bars by Siderúrgica Huachipato		
BIOGENIC CARBON CONTENT	**Unit**	**QUANTITY**
Biogenic carbon content in product	kg C	0.00E+00
Biogenic carbon content in packaging	kg C	-3.33E-04

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

Differences versus previous versions

2020-04-30 Version 1

2020-12-02 Version 2

New verification: New product added to EPD (weldable steel reinforcing bar). Validation date has been extended by five years.

2022-04-16 Version 3

New verification: New product added to EPD (high resistance concrete bar) and update of data year from 2018 to 2021. Validation date has been extended by five years.

More details

In 2020 Siderúrgica Huachipato published an EPD of weldable and non- weldable reinforcing bar. Because of the need to have EPDs for other steel products, the company decided to update the previous version, which had 2018 data, to this version with information from 2021.

Overall, inputs and outputs have not change significantly since 2018. The main changes are in the increase in use of scrap in the casting process, and the type of electricity used by the company. While there was no renewable energy reported in 2018, 46% of the electricity in 2021 comes from renewable sources. Additionally, 27% of electricity is from hydroelectric sources.

In terms of methodology, in 2018 the company didn't measure direct CO_2 emissions from the process, and an estimate based on desktop research was used. This changed in 2021 and a more accurate (although higher number) is included in this EPD. This can be seen in Figure 9 below. Without considering module A3, A1+A2 is 22% smaller in 2021 than 2018, showing the improvements in production and type of electricity used by Siderúrgica Huachuipato.

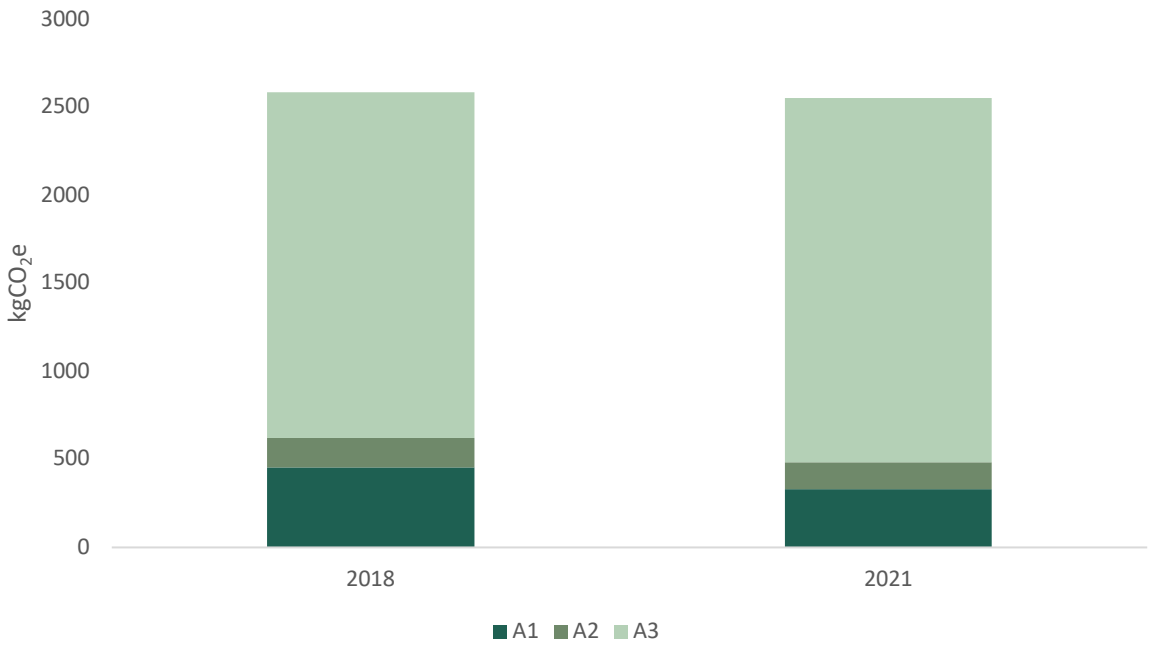


Figure 9- Total global warming potential difference between 2018 and 2021 (modules A1 to A3)

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