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

Continuously cast steel blooms

ŽELEZIARNE® PODBREZOVÁ

Programme:	EPD program operator:	EPD registration number:	Publication date:	Valid until:	Geographical scope:
The International EPD® System www.environdec.com	EPD International AB	S-P-05745	2022-03-31	2027-03-30	Europe

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

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MANUFACTURER INFORMATION

Manufacturer:
Železiarne Podbrezová a. s.
Address:
Kolkáreň 35, 976 81 Podbrezová, Slovakia
Contact details:
adamcak@zelpo.sk
Website:
www.zelpo.sk

AREA OF CUSTOMER OPERATION

European Union countries are our main markets in the following order: Germany, Poland, the Czech Republic, Italy, Slovakia, Hungary and Austria.
The company supplies hundreds of customers in 50 countries on every continent, annually.

PRODUCT IDENTIFICATION

Product name:
Continuously cast steel blooms
Additional label(s):
-
Place of production:
Kolkáreň 35, 976 81 Podbrezová, Slovakia
CPC code:
-

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GENERAL INFORMATION

EPD INFORMATION

The EPD owner has the sole ownership, liability, and responsibility for the EPD. Construction products EPDs may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context.

EPD program operator	EPD International AB
EPD standards	This EPD is in accordance with EN 15804+A2 and ISO 14025 standards.
Product category rules	The CEN standard EN 15804 serves as the core PCR. In addition, the EPD International PCR 2019:2014 version 1.11 (2021-02-05) is used..
EPD author	Silvia Vilčeková, Eva Krídlová Burdová, SALVIS, s.r.o.
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal certification ◉ External verification
Verification date	2022-03-30
EPD verifier	Hetal Parekh Udas
EPD registration number	S-P-05745
Eco Platform #	-
Publication date	2022-03-31
Valid until	2027-03-30

The International EPD System
EPDs within the same product category but from different programmes may not be comparable.

PRODUCT INFORMATION

CONTINUOUSLY CAST STEEL BLOOMS AND BILLETS

Železiarne Podbrezová has an annual production capacity of 380 000 tons of steel blooms and billets. In 2020, we produced 279 949 tonnes of steel in total. Of the total quantity produced, 216 322 tonnes of steel were used for own production of steel tubes and 63 627 tonnes were sold to external customers.

Steel blooms and billets are the starting materials for production of seamless steel tubes. In addition to the production of tubes they can also be used to produce other metallurgical semi-finished products using hot forming (rolling, forging, pressing, etc.).
The greatest consumption of the parts obtained from continuous casting material is present in the petrochemical industry. In this specific industry, the protagonist is the flange: a part used to connect pipes and valves. Further sectors of application are the following: agricultural machinery (wheel hubs), earth movement (joints, levers, forks), railway (joints, levers)

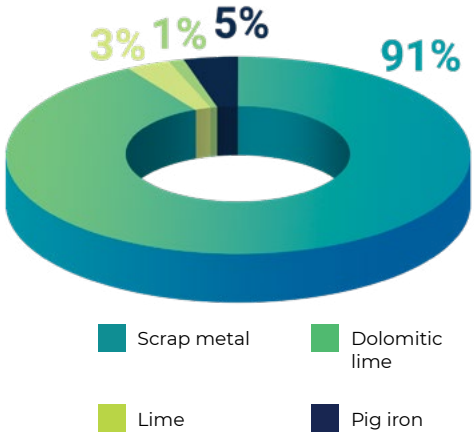
SUBSTANCES, REACH - VERY HIGH CONCERN

The product does not contain any REACH SVHC substances in amounts greater than 0,1 % (1000 ppm).

Product raw material composition

Product and packaging material	Weight kg	Post-consumer %	Renewable %	Country region of origin
Scrap metal	1043.3	100	-	EU
Lime	40.4	-	-	EU
Dolomitic lime	14.9	-	-	EU
Pig iron	52.4	-	-	EU
Wire drawing	0.009	-	-	EU
Softwood	0.44	-	-	EU

Share of main raw materials

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PRODUCT INFORMATION

Steels

All steel is cast as deoxidized. Chemical composition of steels corresponds to individual standards and steel grades.

Supply conditions and the surface of steel blooms

After casting blooms are not heat treated. The surface corresponds to the method of casting and meets the requirements that are included in the agreed technical delivery regulations.

Lengths of steel blooms

Blooms and billets are available in lengths of 4 000 - 10 000 mm with length tolerance of + 50 mm. Straightness deviation is 1% of the length. Obliqueness of the front side is 5 °

Marking of steel blooms

Each bloom is marked with heat number, steel grade code and stream number. The data is stamped or upon agreement written with non-washable paint on the front side of the bloom.

Packaging of steel blooms and billets

Square ones – in layers on the top of each other
Circular ones – on special wooden pads or tied with steel tape.

Chemical composition boundary of steels of blooms and billets in the range

The elements content in weight %

	C	Mn	Si	Cr	Mo	Ni	V	S	P
min	0,05	0,3	0,1	0,05	0,05	max	0	max	max
max	1,2	2,5	1,3	2,5	1,1	3,4	0,8	0,035	0,035

	Cu	Sn	Al	Ti	B	Nb	N	O
min	max	max	0,005	0	0	0	0	0
max	0,4	0,04	0,05	0,05	0,001	0,05	0,01	0,0035

Blooms of square cross-section

Square side [mm]	Dimensional tolerance [mm]	Sidelong max* [mm]	Cross-section area [sqmm]	Weight [kg/m]
105	±3	±4	11 000	86,0
125	±3	±5	15 600	121,5
150	±3	±6	22 420	175,5
160	±3	±6	25 600	198,0
180	±3	±7	32 100	253,5
200	±4	±7	39 680	312,0
205	±4	±7	40 652	317,0
225	±5	±9	50 170	395,0
280	±6	±11	76 662	615,0

* Obliqueness = difference of diagonals of the square

Billets of circular cross-section

Diameter [mm]	Tolerances [mm]	Ovality [mm]	Cross-section area [mm]	Weight [kg/m]
150	±2	3	17 662	137,7
180	±3	5	25 434	198,4
210	±4	5	34 618	270
240	±4	5	45 216	352,7
260	±5	6	53 066	414
280	±5	7	61 575	480

Technical data / physical characteristics
Further information can be found at https://www.steeltube.sk/

PRODUCT LIFE CYCLE

MANUFACTURING AND PACKAGING A1-A3

A1 Raw materials
The product is manufactured at the facility in Podbrezová, Slovakia. The major charge material of electric-arc steelmaking is scrap steel. In electric arc furnaces, the charged material is directly exposed to an electric arc, and the current from the furnace terminals passes through the charged material. Molten metal is tapped into the ladle from the furnaces. After undergoing any ladle treatments, the ladle is transported to the top of the casting machine. Billets are created directly via continuous casting and are further processed via rolling in the rolling mill into seamless tubes.

Truck transport is carried out by trucks with a capacity of >32 t, and Euro 5 engine.

The environmental impacts considered for the production stage cover the manufacturing of the production materials (i.e. casting, rolling and packaging)) and fuels used by machines. The environmental impacts of this stage have been calculated using the most recent data in regard to what applied in the factory. The data is from the year 2020. The study considers the losses of main raw materials occurring during the manufacturing process.

TRANSPORT AND INSTALLATION A4-A5

A4 Transport
Transportation impacts occurred from final products delivery to construction site cover fuel direct exhaust emissions, environmental impacts of fuel production, as well as related infrastructure emissions. The transportation distance is defined according to PCR. The transportation distance is determined according to google maps. 22.73% of the products are delivered to the construction site. Average distances of transportation from production plant to building site are assumed as 461 km and 1125 km and the transportation methods are lorry and train, respectively. 77.27% of the products remain in the production plant and are used for the production of co-products. Average distance is 2.5 km and the transportation method is railway. Vehicle capacity utilization volume factor is assumed to be 1 which means full load. In reality, it may vary but as role of transportation emissions in total results is small, the variety in load is assumed to be negligible. Empty returns are not taken into account as it is assumed that return trip is used by the transportation company to serve the needs of other clients. Transportation does not cause losses as product are packaged properly.

Modul A4 - calculation scenario

Parameter	Value
Vehicle type used for transport	EURO 5 truck with a trailer with an average load 32 t
Distance to the construction site	100-2100 km
Capacity utilization (including returns)	100 %
Weight of transported products	23 t
Capacity utilization factor	1

PRODUCT USE AND MAINTENANCE B1-B7

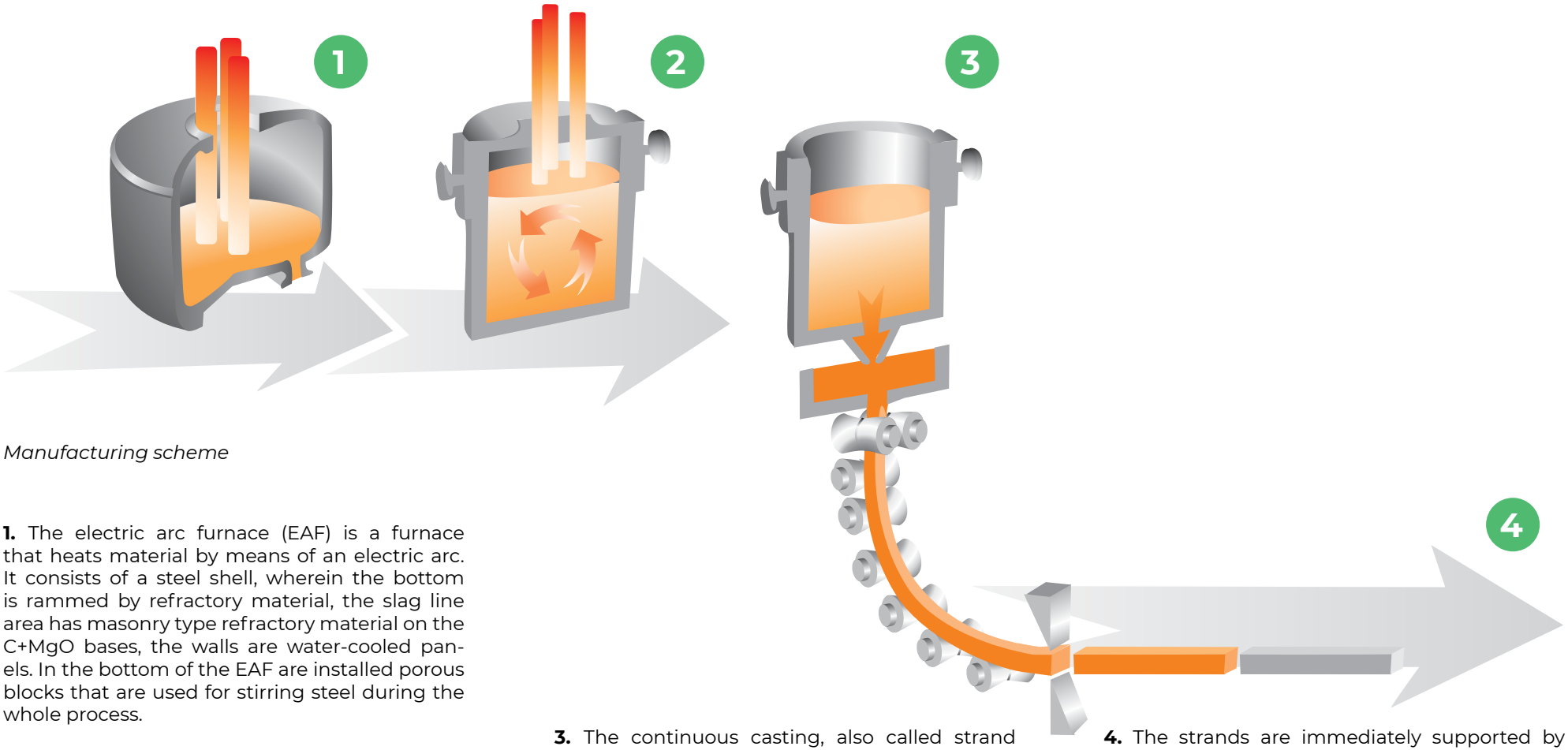
This EPD does not cover the use phase. Air, soil and water impacts during the use phase have not been studied.

PRODUCT END OF LIFE C1-C4

Demolition is assumed to take 10 kWh / tonne of element. It is assumed that 100% of waste is collected. Transportation distance to the closest disposal area is estimated as 50 km and the transportation method is assumed as lorry which is the most common. 95% of steel is assumed to be recycled based on World Steel Association, 2020. It is assumed that 5% of steel is taken to landfill for final disposal.

BEYOND THE SYSTEM BOUNDARIES D

D Benefits and loads
Due to the recycling process the end-of-life product is converted into a recycled steel.



Manufacturing scheme

1. The electric arc furnace (EAF) is a furnace that heats material by means of an electric arc. It consists of a steel shell, wherein the bottom is rammed by refractory material, the slag line area has masonry type refractory material on the C+MgO bases, the walls are water-cooled panels. In the bottom of the EAF are installed porous blocks that are used for stirring steel during the whole process.

2. The ladle furnace (LF) is the final processing stage, molten steel is subjected to further refining in a number of alternative processes collectively known as ladle metallurgy. The objectives of ladle metallurgy are the following: steel homogenization, deoxidization or killing, superheat adjustment, ferro alloys and carbon additions, desulfurization, micro cleanliness, inclusion morphology, improvement in toughness, ductility, and transverse properties.

3. The continuous casting, also called strand casting, is the process whereby molten steel is solidified into a “semifinished” billet, bloom for subsequent rolling The ladle sits in a slot on a rotating turret at the casting machine. From the ladle, the hot metal is transferred via a refractory shroud (pipe) to a holding bath called a tundish. Metal is drained from the tundish through another shroud into the top of an open-base copper mold. In the mold, a thin shell of metal next to the mold walls solidifies before the middle section, now called a strand, exits the base of the mold into a spray chamber.

4. The strands are immediately supported by closely spaced, water-cooled rollers which support the walls of the strands against the ferrostatic pressure (compare hydrostatic pressure) of the still-solidifying liquid within the strands.

CALCULATION RULES

A1
RAW MATERIAL SUPPLY

Module A1 covers the processing of all raw materials and energy carriers necessary for the production of the final product, as well as the superior processes required for the production and processing of all other inputs (e.g. packaging).

- processing of raw materials, specifically for the production of steel, mainly steel scrap, limestone, ferroalloys. All raw materials are delivered to Železiarne Podbrezová

A2
TRANSPORT TO THE PRODUCTION PLANT

The module includes the transport of all raw materials from the provider to the place of production in Podbrezová.

- Transportation of purchased steel scrap
- Transport of other raw materials;
- Relevant means of transport: railway, trucks.

A3
PRODUCTION

The module covers the production process, including energy and water consumption, direct emissions and the treatment of waste generated at this stage.

- Production processes: seamless steel mill, processing and finalization at the Podbrezová plant;
- Production and consumption of fuels (petrol, diesel, propane) for internal transport;
- Production, transmission and consumption of electricity purchased from public providers;
- Water consumption for production processes (mainly for cooling machines and products) and wastewater discharge;
- The process of processing waste generated during production processes.

A4
TRANSPORT TO THE FINAL DESTINATION

Includes transportation of final products to customers;

- Transport of blooms and billets to the final customer;
- Rail transport, lorries can be combined as means of transport.

LIFE-CYCLE ASSESSMENT INFORMATION

Period for data: **2020**

DECLARED AND FUNCTIONAL UNIT

Declared unit: **1 tonne**
Mass per declared unit: **1000 kg**

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

Biogenic carbon content in product, kg C: **0.0**
Biogenic carbon content in packaging, kg C: **0,653**

LIFE CYCLE ASSESSMENT

SYSTEM BOUNDARY

This EPD covers the cradle to gate with options scope with following modules; A1 (Raw material supply), A2 (Transport) and A3 (Manufacturing), A4 (Transport), as well as C1 (Deconstruction), C2 (Transport at end-of-life), C3 (Waste processing) and C4 (Disposal). In addition, module D - benefits and loads beyond the system boundary is included.

System boundary (STN EN 15804+A2)

Product stage			Assembly stage		Use stage							End of life stage				Beyond the system boundaries
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction /demolition	Transport	Waste processing	Disposal	Reuse, Recycling, Recovery
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X
Geography																
EU	EU	EU	EU										EU	EU	EU	EU

MND = „module not declared"

CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the EN 15804:2012+A2:2019. The study does not exclude any hazardous materials or substances.

The study includes all major raw material and energy consumption.

All inputs and outputs of the unit processes which data are available for which data is available are included in the calculation. There is no neglected unit process more than 1% of total mass and energy flows. The total excluded input and output flows do not exceed 5% of energy usage or mass.

The life cycle analysis includes all industrial processes from raw material acquisition to production, distribution and end-of-life stages.

ALLOCATION, ESTIMATION AND ASSUMPTIONS

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation.

In this study, as per EN 15804, allocation is conducted in the following order;

1. Allocation should be avoided.
2. Allocation should be based on physical properties (e.g. mass, volume) when the difference in revenue is small.
3. Allocation should be based on economic values.

Allocation used in Ecoinvent 3.6 environmental data sources follows the methodology 'allocation, cut-off by classification'.

This methodology is in line with the requirements of the EN 15804 standard.
This LCA study is conducted in accordance with all methodological considerations, such as performance, system boundaries, data quality, allocation procedures, and decision rules to evaluate inputs and outputs.

All estimations and assumptions are given below:

- Module A2, A4 & C2: Vehicle capacity utilization volume factor is assumed to be 1 which means full load. In reality it may vary but as the role of transportation emission in total results is small and so the variety in load assumed to be negligible. Empty returns are not taken into account as it is assumed that return trip is used by transportation companies to serve the needs of other clients.
- Module A4: Transportation doesn't cause losses as products are packaged properly. Also, volume capacity utilisation factor is assumed to be 1 for the nested packaged products. Additionally, transportation distances and vehicle types are assumed according to the delivery in the last year.
- Module C1: Demolition is assumed to take 0.01 kWh/kg for element. It is assumed that 100% of the waste is collected.
- Module C2: Transportation distance to the closest disposal area is estimated as 50 km and the transportation method is assumed as lorry which is the most common.
- Module C3, C4, D: 95% of steel is assumed to be recycled based on World Steel Association, 2020. It is assumed that 5% of steel is taken to landfill for final disposal. Due to the recycling process the end-of-life product is converted into a recycled steel.

AVERAGES AND VARIABILITY

Any average and variation are not considered since this EPD refers to one specific product produced in one production plant.

The International EPD System additional data requirements
Data specificity and GWP-GHG variability for GWP-GHG for A1-A3.

Supply-chain specific data for GWP-GHG: >90%

ENVIRONMENTAL IMPACT DATA

Core environmental impact indicators - EN 15804+A2, PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
GWP – total	kg CO2e	9,91E1	1,44E0	8,01E1	1,81E2	5,05E1	MND	MND	3,3E0	8,34E0	2,21E1	2,64E-1	0E0
GWP – fossil	kg CO2e	9,95E1	1,44E0	7,71E1	1,78E2	5,12E1	MND	MND	3,3E0	8,33E0	2,34E1	2,63E-1	0E0
GWP – biogenic	kg CO2e	-4,48E-1	1,04E-3	-3,04E-1	-7,51E-1	2,63E-1	MND	MND	9,17E-4	4,45E-3	-1,34E0	5,22E-4	0E0
GWP – LULUC	kg CO2e	2,34E-2	4,33E-4	3,24E0	3,26E0	5,63E-2	MND	MND	2,79E-4	2,96E-3	2,66E-2	7,82E-5	0E0
ODP	kg CFC11e	6,76E-6	3,38E-7	2,04E-5	2,75E-5	7,61E-6	MND	MND	7,12E-7	1,89E-6	3,37E-6	1,08E-7	0E0
AP	mol H+e	4,72E-1	6,04E-3	3,47E-1	8,25E-1	4,11E-1	MND	MND	3,45E-2	3,4E-2	2,84E-1	2,5E-3	0E0
EP-freshwater2)	kg Pe	4,65E-3	1,17E-5	2,5E-3	7,15E-3	1,99E-3	MND	MND	1,33E-5	6,97E-5	1,62E-3	3,18E-6	0E0
EP-marine	kg Ne	1,03E-1	1,82E-3	5,72E-2	1,62E-1	1,43E-1	MND	MND	1,52E-2	1,01E-2	6,27E-2	8,61E-4	0E0
EP-terrestrial	mol Ne	1,12E0	2,01E-2	6,83E-1	1,82E0	1,58E0	MND	MND	1,67E-1	1,12E-1	7,28E-1	9,48E-3	0E0
POCP ("smog")	kg NMVOCe	5,57E-1	6,47E-3	1,81E-1	7,45E-1	4,34E-1	MND	MND	4,59E-2	3,42E-2	1,99E-1	2,75E-3	0E0
ADP-minerals & metals	kg Sbe	3,22E-4	2,45E-5	1,19E-4	4,66E-4	4,66E-4	MND	MND	5,03E-6	2,25E-4	1,3E-3	2,41E-6	0E0
ADP-fossil resources	MJ	1,11E3	2,24E1	3,87E3	5E3	7,57E2	MND	MND	4,54E1	1,26E2	3,25E2	7,36E0	0E0
Water use1)	m3e depr.	1,13E1	8,32E-2	3,53E1	4,67E1	7,55E0	MND	MND	8,46E-2	4,05E-1	4,61E0	3,4E-1	0E0

GWP: Global Warming Potential (Climate Change)
ODP: Ozone Depletion Potential
AP: Acidification Potential for Soil and Water
EP: Eutrophication Potential
POCP: Photochemical Ozone Creation potential
ADPE: Abiotic Depletion Potential – Elements
ADPF: Abiotic Depletion Potential – Fossil Fuels

Eutrophication aquatic freshwater is reported as kg PO4 eq, although the reference given ("EUTREND model, Struijs et al., 2009b, as implemented in ReCiPe") uses the unit kg P eq. EN 15804+A2 disclaimer 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 experience with the indicator.

Use of natural resources

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
PERE	MJ	2,3E1	2,82E-1	9,09E2	9,32E2	5,83E1	MND	MND	2,45E-1	1,77E0	5,1E1	5,95E-2	0E0
PERM	MJ	0E0	0E0	1,13E1	1,13E1	0E0	MND	MND	0E0	0E0	0E0	0E0	0E0
PERT	MJ	2,3E1	2,82E-1	9,2E2	9,43E2	5,83E1	MND	MND	2,45E-1	1,77E0	5,1E1	5,95E-2	0E0
PENRE	MJ	1,11E3	2,24E1	3,87E3	5E3	7,57E2	MND	MND	4,54E1	1,26E2	3,25E2	7,36E0	0E0
PENRM	MJ	0E0	0E0	0E0	0E0	0E0	MND	MND	0E0	0E0	0E0	0E0	0E0
PENRT	MJ	1,11E3	2,24E1	3,87E3	5E3	7,57E2	MND	MND	4,54E1	1,26E2	3,25E2	7,36E0	0E0
SM	kg	1,97E-1	0E0	1,04E-4	1,97E-1	0E0	MND	MND	0E0	0E0	0E0	0E0	0E0
RSF	MJ	0E0	0E0	0E0	0E0	0E0	MND	MND	0E0	0E0	0E0	0E0	0E0
NRSF	MJ	0E0	0E0	0E0	0E0	0E0	MND	MND	0E0	0E0	0E0	0E0	0E0
FW	m^3	7,7E-1	4,66E-3	7,95E-1	1,57E0	2,52E-1	MND	MND	4,01E-3	2,15E-2	1,33E-1	8,05E-3	0E0

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 nonrenewable primary energy resources
SM: Use of secondary material
RSF: Use of renewable secondary fuels
NRSF: Use of non-renewable secondary fuels
FW: Net use of fresh water

LIFE CYCLE ASSESSMENT RESULTS

End of life – waste

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
HWD	kg	8,94E0	2,17E-2	4,81E0	1,38E1	3E0	MND	MND	4,88E-2	1,28E-1	0E0	6,87E-3	0E0
NHWD	kg	1,21E3	2,41E0	2,02E2	1,41E3	1,02E2	MND	MND	5,22E-1	8,76E0	0E0	5E1	0E0
RWD	kg	2,34E-3	1,54E-4	3,46E-2	3,71E-2	4,56E-3	MND	MND	3,18E-4	8,61E-4	0E0	4,87E-5	0E0

HWD: Hazardous waste disposed
NHWD: Non-hazardous waste disposed
RWD: Radioactive waste disposed

End of life – output flows

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
Components for reuse	kg	0E0	0E0	0E0	0E0	0E0	MND	MND	0E0	0E0	0E0	0E0	0E0
Materials for recycling	kg	0E0	0E0	0E0	0E0	0E0	MND	MND	0E0	0E0	9,5E2	0E0	0E0
Materials for energy recovery	kg	0E0	0E0	0E0	0E0	0E0	MND	MND	0E0	0E0	0E0	0E0	0E0
Exported energy	MJ	0E0	0E0	0E0	0E0	0E0	MND	MND	0E0	0E0	0E0	0E0	0E0

Environment impact, GWP-GHG, International EPD system

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
GWP – GHGl	kg CO2e	9,95E1	1,44E0	7,71E1	1,78E2	5,12E1	MND	MND	3,3E0	8,33E0	2,34E1	2,63E-1	0E0

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 5 (IPCC 2013) This indicator Is almost equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

Environment impact - EN 15804+A1, CML / ISO 21930

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
GWP	kg CO2e	9,5E1	1,43E0	7,88E1	1,75E2	5,05E1	MND	MND	3,27E0	8,26E0	2,31E1	2,58E-1	0E0
ODP	kg CFC11e	5,88E-6	2,69E-7	2,65E-5	3,26E-5	6,47E-6	MND	MND	5,63E-7	1,51E-6	2,86E-6	8,59E-8	0E0
AP	kg SO2e	3,34E-1	2,93E-3	2,88E-1	6,25E-1	2,99E-1	MND	MND	4,87E-3	1,67E-2	1,77E-1	1,04E-3	0E0
EP	kg PO4 3e	1,47E-1	5,91E-4	7,4E-2	2,22E-1	1,06E-1	MND	MND	8,57E-4	3,43E-3	7,21E-2	2,02E-4	0E0
POCP	kg C2H4e	6,66E-2	1,85E-4	1,25E-2	7,92E-2	1,12E-2	MND	MND	5,01E-4	1,1E-3	8,28E-3	7,64E-5	0E0
ADP-elements	kg Sbe	3,22E-4	2,45E-5	1,19E-4	4,66E-4	4,66E-4	MND	MND	5,03E-6	2,25E-4	1,3E-3	2,41E-6	0E0
ADP-fossil	MJ	1,11E3	2,24E1	3,87E3	5E3	7,57E2	MND	MND	4,54E1	1,26E2	3,25E2	7,36E0	0E0

GWP: Global Warming Potential (Climate Change)
ODP: Ozone Depletion Potential
AP: Acidification Potential for Soil and Water
EP: Eutrophication Potential
POCP: Photochemical Ozone Creation potential
ADPE: Abiotic Depletion Potential – Elements
ADPF: Abiotic Depletion Potential – Fossil Fuels

SCENARIO DOCUMENTATION

MANUFACTURING ENERGY SCENARIO DOCUMENTATION

Scenario parameter	Value
Electricity data source and quality	Electricity, high voltage, production mix (Reference product: electricity, high voltage), Slovakia Ecoinvent 3,6, year: 2019
Electricity CO2e / kWh	0,367
District heating data source and quality	-
District heating CO2e / kWh	-

TRANSPORT SCENARIO DOCUMENTATION (A4)

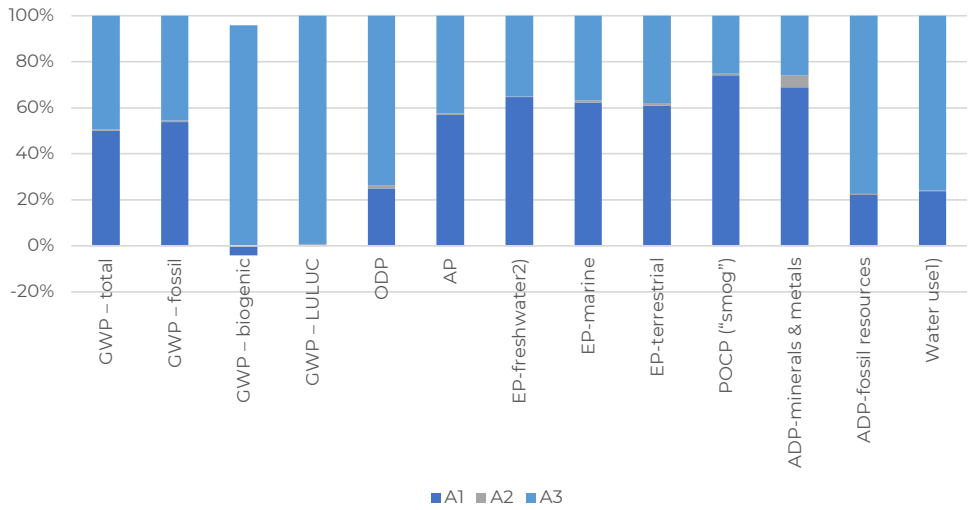
Scenario parameter	Value
A4 specific transport	0.0901 CO2e / tkm (lorry), 0.0388 CO2e / tkm (train)
A4 average transport distance	1125 km (19.43%), 461 km (3.3%), 2.5 km (77.27%)
A4 Capacity utilization (including empty return)	100 %
A4 Bulk density of transported products	7800 kg/m3
A4 Volume capacity utilization factor	1

END OF LIFE SCENARIO DOCUMENTATION

Scenario parameter	Value
Collection process – kg collected separately	1000
Collection process – kg collected with mixed waste	-
Recovery process – kg for re-use	-
Recovery process – kg for recycling	950
Recovery process – kg for energy recovery	-
Disposal (total) – kg for final deposition	50
Scenario assumptions e.g. transportation	End-of-life product is transported 50 km with an average lorry.

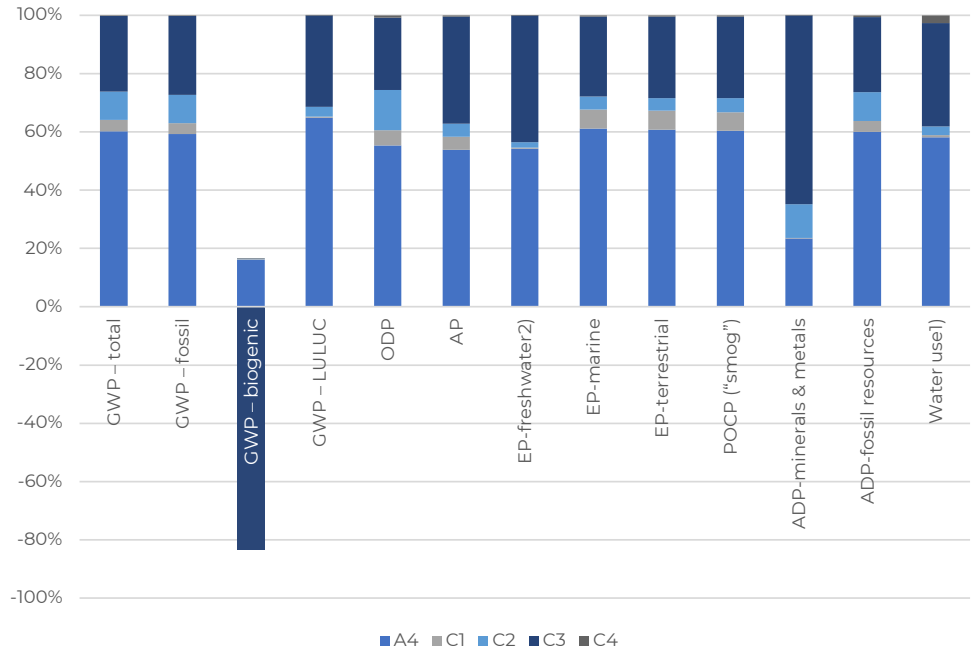
LIFE CYCLE INTERPRETATION

Figure depicts the percentage share of information modules A1-A3 on GWP impact category. Module A3 contributes the most to the impacts.



Percentage of modules A1-A3 on environmental impacts for of 1 t of product

Figure illustrates how modules A4, C1-C4 contribute to GWP.



Percentage of modules A4 and C1-C4 on environmental impacts for of 1 t of product

BIBLIOGRAPHY

ISO 14025:2010 Environmental labels and declarations – Type III environmental declarations Principles and procedures.

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

ISO 14044:2006 Environmental management. Life cycle assessment. Requirements and guidelines.

Ecoinvent database v3.6

EN 15804:2012+A2:2019 Sustainability in construction works – Environmental product declarations – Core rules for the product category of construction products.

The CEN standard EN 15804+A2 serves as the core PCR. In addition, the EPD International PCR 2019:2014 version 1.11 (2021-02-05) is used.

EPD. General Programme Instructions of the international EPD® system. Version 4.0

LCA background report 24.11.2021

ADDITIONAL INFORMATION

Environmental policy of Železiarne Podbrezová a.s. adopted by the company's management in 1999 contributes to protection against air pollution, which significantly improved the quality of the environment. In this area as well as in energy efficiency, the company have invested heavily in reducing natural gas consumption and thus in reducing CO2 emissions. In addition, the company is constantly increasing the share of renewable energy sources in its total energy consumption.

The strategic role of the company is to minimize the impact of its activities on the environment. The environmental plan is evaluated and updated annually. The plan identifies strategies and environmental projects (energy, water, waste, chemical risks and noise) that aim to minimize the company's environmental footprint. In addition to the defined objectives, the plan sets out the necessary resources (including capital expenditures) to ensure progress and cost savings.

SCRAP AND RAW MATERIALS

In 2020, steel scrap accounted for 100 % of the company's steel making process, totalling 293 thousand tons, of which 20 % was internally recycled. It should also be noted that the steelworks recycles metal waste from machining in various production processes (turnings, chips, etc.)

ENERGY CONSUMPTION

The company is committed to responsible performance and strives to improve the energy efficiency of its facilities and reduce carbon emissions. Electricity consumption in 2020 was 248,028 MWh (nuclear energy 38%, renewables 36% and fossil fuels 26%). The company produced a total of 66,376 MWh of electricity in its own small hydropower plants and cogeneration unit. The share of own production in the total annual consumption is 30%.

WASTE

As is the case with all industrial activities, the company generates a considerable amount of different types of waste. About 70 % of the produced slag is processed into artificial compacted aggregate. Steel slag is formed by oxidizing elements of molten steel and slag-forming additives. Artificial aggregate is produced by crushing, magnetic separation of parts and subsequent sorting into dimensional fractions.

Depending on the origin and type, the waste is treated in accordance with local regulations, with maximum emphasis on material recycling and energy recovery.

ABOUT THE MANUFACTURER

Železiarne Podbrezová was founded in 1840 under the old Austrian Empire. Currently, it counts more than 3 000 employees. In particular, it has its own steel manufacturing plant, a modern tube mill and a large cold drawn tubes division. Its headquarter, production plants but also its branches are all over the European Union: specifically, in Slovakia, Czech Republic, Spain, Italy, Poland and Germany.

Železiarne Podbrezová Group is an integral cycle manufacturer; transforming scrap into seamless steel tubes, precision seamless tubes and continuously cast billets. Lastly, the company succeeds in providing timely service and product innovation.

The company established and implemented a quality management system for the successful management, improvement of performance, and competitiveness of the organization as a continuous improvement of the activities and processes in order to benefit all interested parties - customers, owners, employees, and suppliers.

Products are certified in accordance with AD2000 - Merkblatt WO, PED 2014/68/EU, American Petroleum Institute, BUREAU VERITAS, DNV. GL, Lloyd´s Register EMEA. Quality management system and waste management are certified according to ISO standards. Železiarne Podbrezová production mills are EN ISO 45 001 and EN ISO 14001 certified, representing 100% of production. Other requirements taken into account include ISO 9001, ISO/TS 16949, API Q1.

The ZP a.s. environmental policy adopted by the company's management in 1999 has contributed to air pollution protection that significantly improved the quality of the environment. Both in this area and in the energy efficiency, ZP a.s. invested heavily into reduction of natural gas consumption and thus reduction of CO2 emissions. Furthermore, the company has continuously increased the share of renewable energy sources in its overall energy consumption.

ŽP a.s. has been able to reduce CO2 emissions by almost 52% compared to 1990 by making dozens of investments, bringing it significantly closer to meeting this ambitious goal. Even more interesting, however, is the decrease in CO2 emissions per tonne of steel produced, which in 2019 represented 58% compared to 1990.

Source: GreenSteel Project: The path to green steel production in Železiarne Podbrezová, 2021.

EPD AUTHOR AND CONTRIBUTORS

Manufacturer: **Železiarne Podbrezová a. s.**
EPD author: **Silvia Vilčeková, Eva Krídlová Burdová, Salvis, s.r.o.**
EPD verifier: **Hetal Parekh Udas**
EPD program operator: **The International AB System**
Background data EPD-034: **This EPD is based on Ecoinvent 3.6 (cut-off) and One Click LCA databases.**
LCA software: **The LCA and EPD have been created using One Click LCA Pre-Verified EPD Generator for Primary Steel and Aluminium and all Metal-Based Products**

ADDITIONAL ENVIRONMENTAL INFORMATION

74% of electricity consumed from renewable and nuclear sources

100% of production by ISO 14001 certified sites

100% of the total steel produced from scrap

100% of the company products are recyclable

VERIFICATION OVERVIEW

VERIFICATION PROCESS FOR THIS EPD

This EPD has been verified in accordance with ISO 14025 by an independent, third-party verifier by reviewing results, documents and compliancy with EN 15804, ISO 14025 and ISO 14040/14044, following the process and checklists of the program operator for:

- This Environmental Product Declaration
- The Life-Cycle Assessment used in this EPD
- The background report (project report) for this EPD

Why does verification transparency matter? (https://www.oneclicklca.com/why-epd-verification-transparency-matters/)

VERIFICATION OVERVIEW

Following independent third party has verified this specific EPD:

EPD verification information	
Independent EPD verifier	Hetal Parekh Udas, One Click LCA Ltd.
EPD verification started on	2021-12-14
EPD verification completed on	2022-03-30
Supply-chain specific data %	>90 % of A1-A3 GWP-GHG
Approver of the EPD verifier	The International EPD System

Author & tool verification	
EPD author	Silvia Vilčeková, Eva Krídlová Burdová, Salvis, s.r.o.
EPD author training completion	2020-09-30
EPD Generator module	Primary Steel and Aluminium and all Metal-Based Products
Independent software verifier	Ugo Pretato, Studio Fieschi & soci Srl.
Software verification date	2021-05-11

THIRD-PARTY VERIFICATION STATEMENT

I hereby confirm that, following detailed examination, I have not established any relevant deviations by the studied Environmental Product Declaration (EPD), its LCA and project report, in terms of

- the data collected and used in the LCA calculations,
- the way the LCA-based calculations have been carried out,
- the presentation of environmental data in the EPD, and
- other additional environmental information, as present

with respect to the procedural and methodological requirements in ISO 14025:2010 and EN 15804:2012+A2:2019.

I confirm that the company-specific data has been examined as regards plausibility and consistency; the declaration owner is responsible for its factual integrity and legal compliance.

I confirm that I have sufficient knowledge and experience of construction products, this specific product category, the construction industry, relevant standards, and the geographical area of the EPD to carry out this verification.

I confirm my independence in my role as verifier; I have not been involved in the execution of the LCA or in the development of the declaration and have no conflicts of interest regarding this verification.

VERIFICATION AND REGISTRATION (ENVIRONDEC)

Author & tool verification	
PCR	PCR 2019:14 Construction products, version 1.11
PCR review was conducted by:	The Technical Committee of the International EPD® System. See www.environdec.com/TC for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact.
Independent third-party verification of the declaration and data, according to ISO 14025:2006:	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal certification ◉ External verification
Third party verifier	Hetal Parekh Udas One Click LCA Ltd. Suvilahdenkatu 10 B, 00500 Helsinki, Finland www.oneclicklca.com Approved by: The International EPD® System Technical Committee, supported by the Secretariat
Procedure for follow-up during EPD validity involves third party verifier	☐ yes ◉ no

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