TŘINECKÉ ŽELEZÁRNY

EPD

ENVIROMENTAL PRODUCT DECLARATION

According to the standard EN ISO 14025:2010

and EN 15804+A2:2019

Organization	**TŘINECKÉ ŽELEZÁRNY a.s.**
Programme holder	Ministry of the Environment of the Czech Republic
The document was processed by	Technical and Testing Institute for Construction Prague, SOE
Declaration number	7240006
Issue date	07-05-2024
Valid to	06-05-2029 according to EN 15804+A2:2019

Rails

1. General information

TŘINECKÉ ŽELEZÁRNY a.s.	
Program: "National Programme for Environmental Labelling" - Czech Republic (NPEZ) **Programme holder:** Ministry of the Environment of the Czech Republic Ministry of the Environment of the Czech Republic Department of Voluntary Instruments 100 10 Praha 10, Vršovická 1442/65 www.mzp.cz, www.cenia.cz	**Name and address of manufacturer:** **TŘINECKÉ ŽELEZÁRNY a.s.** Průmyslová 1000, Staré Město 739 61 Třinec, Czech Republic
Declaration number: 7240006	**Declaration unit:** **1t of products**
Product category rules: EN 15804+A2:2019 as a basic PCR **Issue date:** Valid to: 06.05.2029 according to EN 15804+A2:2019	**Product:** **Rails**

TŘINECKÉ ŽELEZÁRNY a.s., through this Environmental Product Declaration Type III (EPD), expresses its attitude towards environmental issues and proves that it has adequate data on the environmental impacts caused by the production of its products.

TŘINECKÉ ŽELEZÁRNY, a.s. (hereinafter referred to as TŽ) is a part of the TŘINECKÉ ŽELEZÁRNY - MORAVIA STEEL (hereinafter referred to as TŽ-MS) group. The group consists of approximately 30 companies that focus on the production of long steel products (TŽ) and, as a rule, the processing of these products. The main 15 production companies of the TŽ-MS group employ 13 thousand employees, while TŽ itself has almost 7 thousand employees. The TŽ-MS Group produces approximately 2.5 million tonnes of steel annually, which is used mainly in the automotive, engineering, railway and construction industries, as well as in the energy and consumer goods industries.

The largest manufacturing company is TŽ, which produces rolled wire, bar section steel, rails, semi-finished products, drawn steel, seamless tubes and small rails. Broad gauge rails are mostly supplied to the European market according to EN 13674-1 and to the North American market according to the NS RT 01 a CN 12-16-D standard. In addition, customers who purchase rails require compliance with the terms of their own specifications and technical delivery conditions. TŽ produces approximately 230 thousand tonnes of rails annually.

This EPD provides quantified environmental information on a harmonised and scientifically sound basis for a construction product. This EPD also aims to provide basic product information in the context of life cycle assessment of buildings and other structures and to help identify those products that are less burdensome on the environment.

With regard to the possibility of comparing products **within the life cycle assessment of buildings** on the basis of their EPD, which is carried out by determining their contribution to the environmental performance of the building, it is necessary that the EPD of the given building products is prepared in accordance with the requirements of EN 15804+A2:2019 *Sustainability of construction works - Environmental product declaration - Core rules for the product category of construction products.*

1.1 Product data

1.1.1 Product

Rails

These products are:

TŽ produces broad gauge **rails** for main railway lines and metro systems. It also provides tram rails for urban track systems, switch rails for switches and track crossings, and mining rails, which are most commonly used in mines and forestry drift railways.

1.1.2 Use of the product

The rails are generally used by railways including underground, tramways, industrial and mining railways. The rails, together with sleepers and small rails, form the trackbed. The rail field in the track bed forms the railway superstructure.

Figure 1: 136RE broad gauge rail (Canada), Canadian National Railway Company

Figure 2: Broad gauge rail 60E2 (Germany), Deutsche Bahn

Figure 3: Tram rails NT1 (ČR), company Transport Company of the capital city of Prague

1.1.3 Product specifications

At present, TŽ mostly produces rail steel designated as R260. Its minimum tensile strength is 880 MPa and ductility is A5 min., at least 10%. The carbon content ranges from 0.6 to 0.8 %. Rails on more heavily loaded lines are alloyed with manganese (up to 1.3 %), silicon (up to 0.6 %) and other elements.

Our customers are mainly railway companies in Europe, USA, Canada, Israel and other countries. TŽ meet the strictest quality requirements according to standards:

Table 1: List of standards used for the production of rails

Regulation number	Name of the regulation
PN TŽ 42 0191	Hot-rolled NT-shaped grooved rails
PN TŽ 42 0192	Hot rolled grooved block rails
PN TŽ 42 0193	Hot-rolled NT-shaped entering rails
PN TŽ 42 0194	Xa-shaped rails
PN TŽ 42 0195	Railroad switch and tongue rails for switches
PN TŽ 42 0199	Rails S10, S14, S18 a S20 – TDP
PN TŽ 42 0203	Broad gauge rails UZ
PN TŽ 42 0204	Broad gauge rails
PN TŽ 42 0206	Production of broad-gauge rails P50 and P65
TDP 202-31-07	Railway rails - TDP
TDP 202-160-09	Rails for railways
TPD 202-30	TPD for Vignola railway rails
TPD 202-09	Railroad switch and tongue rails for switches
01/2010	Broad gauge rails II. quality
ČSN EN 13674-1	Railway applications - Track - Rail - Part 1: Vignole railway rails 46 kg/m and above
ČSN EN 13674-2	Railway applications - Track - Rail - Part 2: Switch and crossing rails used in conjunction with Vignole railway rails 46 kg/m and above
I-ASM-FW-FB 009	Special provisions for rails
DBS 918 254-1	Rail No.1: Vignola rails weighing 46 kg/m and above - TDP
CN 12-16-D	Binding CN specification for the industrial production of steel rails
AREMA 2023	AREMA Handbook for Railway Technology
CPR	Specifications for TZ Intermediate Rail
NS RT 01	Norfolk Southern Corporation - Specification for Steel Rails
E-01-0041.2	Tech.Spec. for Manufacture and Supply of RAILS: 60E2 Profile and R260 Grade, 54E1 Profile and R260 Grade, 50E6 Profile and R260
EPS-ENG-2003/07.00	Steel Rails Technical Specification
Id-106	Technical conditions for the construction and acceptance of railway rails - Requirements and testing
SPC00011	TECHNICAL SPECIFICATIONS. RAILS.
SPC00262	Product specification - Rolled base plates 46E3, 54E1 / 54E5 and 60E1 / 60E2
A-52	Technical specification for delivery of rails

1.1.4 Rules for use

The products shall be manufactured in accordance with the standards referred to in point 1.1.3.

1.1.5 Environment and health during the use phase

Under normal conditions of use, the products do not produce any adverse health effects or release volatile organic compounds into indoor air.

No environmental impacts and no emissions to water, air or soil are expected due to the areas of use of the product.

1.1.6 Method of product delivery

The products shall be supplied in accordance with the standards referred to in paragraph 1.1.3.

Třinecké železárny is certified by the TUV NORD certification authority and holds the following certificates:

- Quality management system according to ISO 9001
- Quality management system in the automotive industry according to IATF 16949
- Environmental management system according to ISO 14001
- Energy management system according to ISO 50001

The rails are usually transported on coupled railway wagons designed for this purpose.

To secure the load of rails, many types of loadings use timber fixtures, for which a return is required. Bundling of individual rails with wire or tape is less common. Also, the interleaving of individual layers of rails with wood shims is sparse for wagon loads, with the use of wood fixtures predominating.

1.1.7 Basic raw materials and auxiliary substances

The basic material of the rails is steel. Alloying elements are added in the form of ferro-alloys or metals (the most common elements are manganese, chromium and vanadium). Substances listed as substances of very high concern subject to authorisation by the European Chemicals Agency are not present in steel in declarable quantities.

Table 2: Composition of the final product, packaging, biogenic carbon content and proportion of scrap in the steelmaking plant

Product components	Weight %	Material after use (post-consumer), Weight %	Biogenic carbon content in kg C/DU
Steel	100	0	0
Total	100	0	0
Percentage of scrap added to steelmaking inputs	23.02	0	0
Packaging materials			
Metal tapes	24.20	9.01E-02	0
Plastic - product packaging	0.03	9.43E-05	0
Wood - supports	75.77	2.82E-01	2.82E+00
Total	100	3.72E-01	2.82E+00

The following basic materials are used for the production of TŽ rails:

- Coking coal
- Ore concentrates, agglomerates, lump ore and pellets
- Carbonate components (limestone, dolomite)
- Steel scrap
- Refining components and additives (ferroalloys, etc.)

1.1.8 Description of the production process

The steel for the rails is produced in oxygen converters, by processing raw steel from blast furnaces. The input semi-finished products for the production of rails are usually cast

rectangular contour bars produced by continuous casting technology and subsequently heated to rolling temperature in a step furnace. Less common is the use of semi-finished products - rectangular and circular contour rolls and ingots heated in deep furnaces. The actual production of the rails takes place in the rolling mill of billets and rough sections, where the input semi-finished product is shaped to the final dimension after heating in the block mill and then on the return line.

After leaving the line, each rail is checked for dimension using continuous laser hot-dimensioning and surface quality using a high-speed camera system. Each rolled rail is then stamped with the melt number, casting stream number and casting stream sequence, and other features as required by standards and customer requirements. After cooling on the cooling bed, the rails are straightened in both horizontal and vertical directions on a disc straightener. After straightening, each rail passes through a measuring centre, which is equipped with laser equipment for continuous measurement of the straightness and dimensions of the rail in the cold, as well as a line for checking surface and internal defects. The rails checked in this way are cut to the prescribed lengths on sawing machines and, if the customer requests, the ends of the rails are punched. The rail ends are then straightened and the final output quality control is carried out.

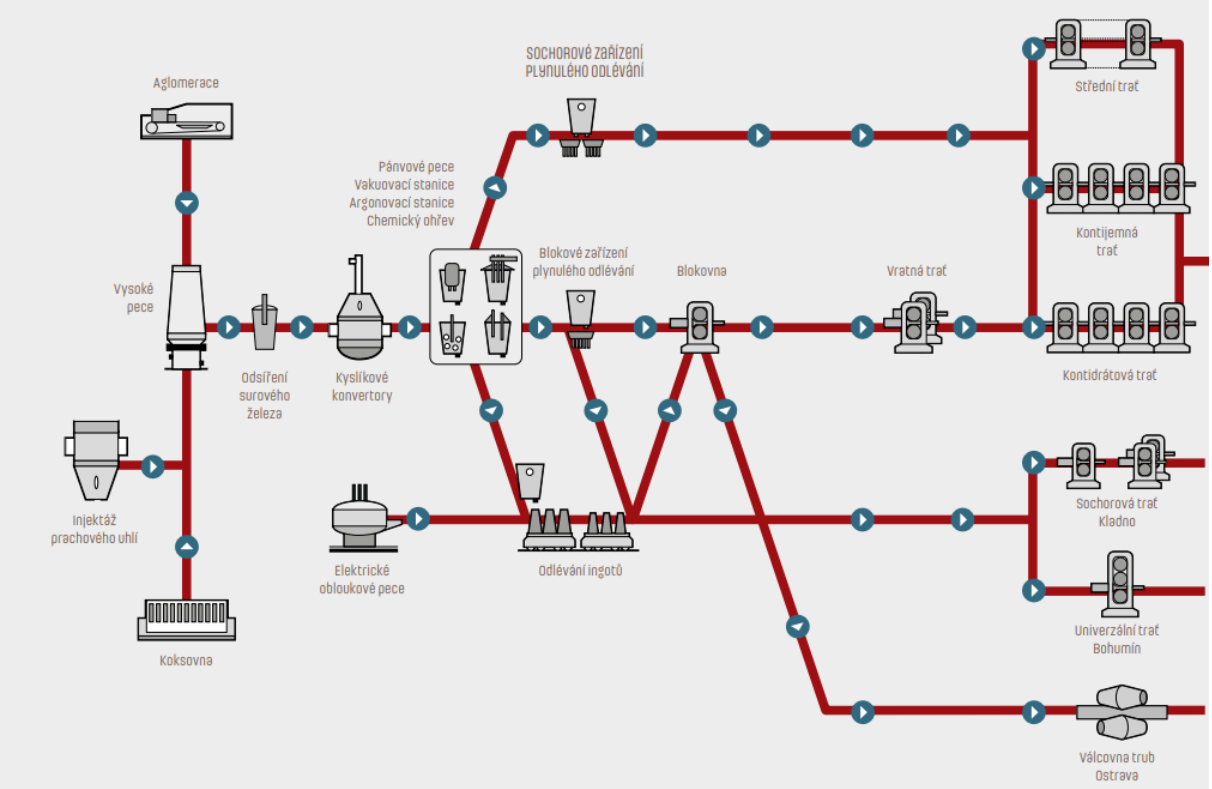


Figure 4: Diagram of the production process in TŽ

1.1.9 Waste management

According to the current state of knowledge, there is generally no expected environmental damage from the dismantling and recycling of steel structures.

From a recycling point of view, used and worn rails are fully usable as steel scrap, the highest quality type of scrap that is reused in steel production.

1.2 LCA: Calculation rules

1.2.1 Declared unit

The declared unit is **1 t of the average product produced – rails**.

2 Product system and system boundaries

The boundary of the product lifecycle system consists of **information modules A1 – A3 "Production Phase", "End of Life Phase" C1 – C4 and D** according to EN 15804+A2:2019. The project report includes all relevant processes for the EPD type **"Cradle to Gate with modules C1-C4 and module D"**.

Information on the boundaries of the product system is given in Table 3.

Table 3: Product system boundary information - information modules

Information about product system boundaries – information modules (**X** = Included, **ND** = module not declared)																
Production stage			**Construction stage**		**Usage stage**							**End-of-life stage**				**Additional information beyond the life cycle**
Supply of mineral resources	Transport	Production	Transport to the construction site	Construction/installation process	Usage	Maintenance	Repair	Replacement	Reconstruction	Operational energy consumption	Operating water consumption	Demolition/deconstruction	Transport	Waste treatment	Removal	Benefits and costs beyond the system. Potential for reuse, recovery, and recycling
A1	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
X	**X**	**X**	ND	ND	ND	ND	ND	ND	ND	ND	ND	**X**	**X**	**X**	**X**	**X**

The system boundary is defined to include both the processes that provide material and energy inputs to the system and the downstream production and transport processes to the plant gate and the treatment of any waste generated from these processes.

The production phase includes the following modules:

- **A1 –** extraction and processing of raw materials and production of packaging from raw materials
- **A2** – transport of raw materials from supplier to manufacturer, waste collection
- **A3** – production of products, production of auxiliary materials and semi-finished products, energy consumption, including waste treatment, until the end of the waste or after the removal of the last material residues during the production phase.

The end-of-life phase includes modules:

- **C1** – deconstruction, demolition; dismantling or demolition of a building product, including the initial classification of materials on site.
- **C2** – transport to a waste treatment site; transport of the discarded product within the waste treatment process, e.g. to a recycling site, and transport of the waste, e.g. to a final disposal site.
- **C3** – treatment of waste for reuse, recovery and/or recycling, e.g. collection of waste fractions from deconstruction, treatment of waste from material streams for reuse, recycling and energy recovery.
- **C4** – waste disposal, including pre-treatment and site management.

Benefits and costs beyond the product system are presented in Module D.

Module D includes:

- **D** – the potential for reuse, recovery and/or recycling, expressed in terms of net impacts or benefits.

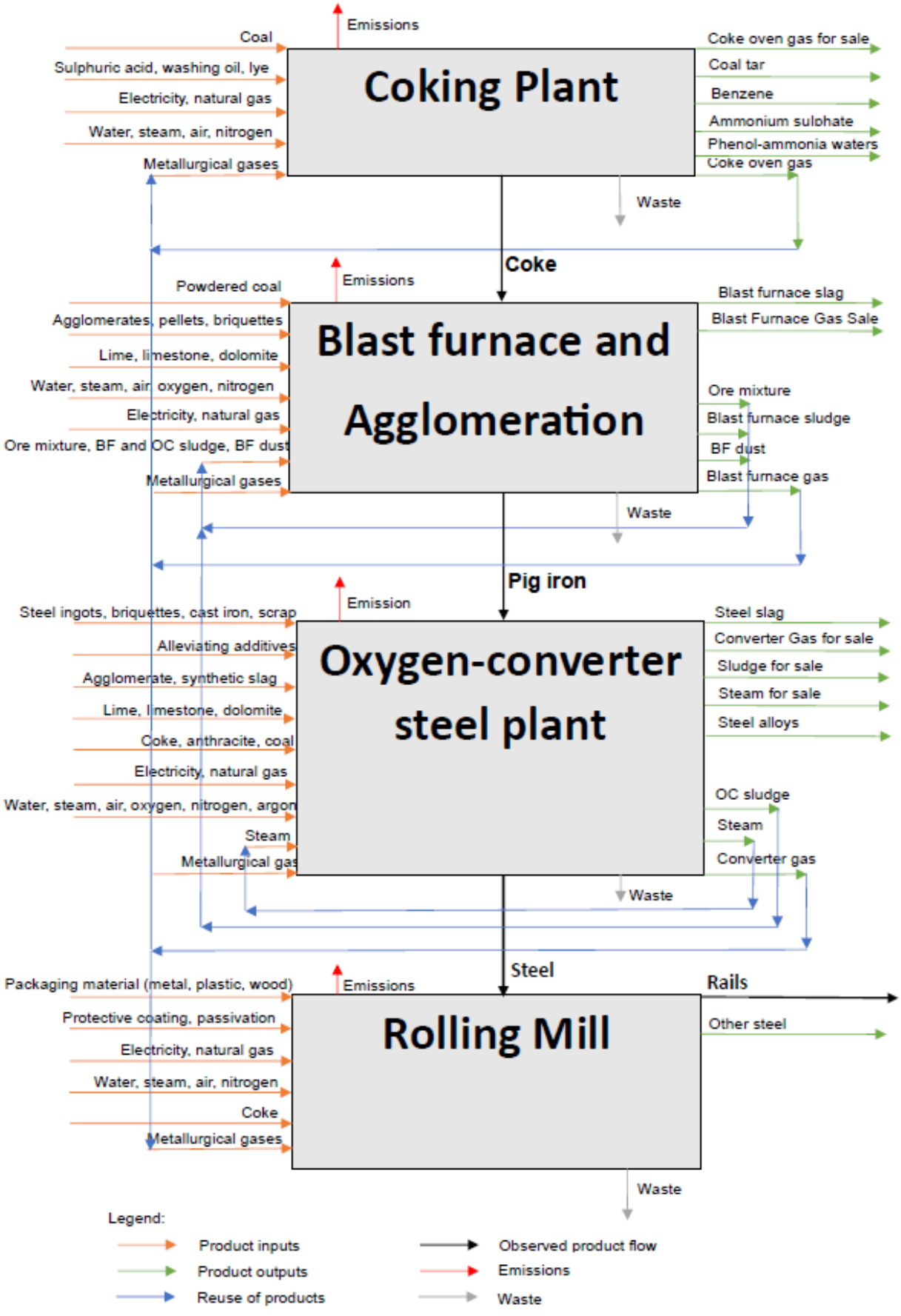
The product system boundaries are considered to **include only production processes, not administrative activities**.

The end-of-life scenarios for the products (C1-C4, D) were based on data resulting from an expert estimate of the possibility of reprocessing this rail after deconstruction of the railway structure (in the framework of scrap metal take-back as a substitute for part of the inputs to production. These are the following diagrams:

Production of these products is carried out by the following named sub-plants of TŘINECKÉ ŽELEZÁRNY a.s.:

- Coking plant
- Blast furnace and agglomeration
- Oxygen converter steel plant
- Rolling mill

The processes of these sub-plants are included in the product system boundaries according to the following diagram:


Emissions
Coal
Sulphuric acid, washing oil, lye
Electricity, natural gas
Water, steam, air, nitrogen
Metallurgical gases
Coking Plant
Coke oven gas for sale
Coal tar
Benzene
Ammonium sulphate
Phenol-ammonia waters
Coke oven gas
Waste
Coke
Emissions
Powdered coal
Agglomerates, pellets, briquettes
Lime, limestone, dolomite
Water, steam, air, oxygen, nitrogen
Electricity, natural gas
Ore mixture, BF and OC sludge, BF dust
Metallurgical gases
Blast furnace and Agglomeration
Blast furnace slag
Blast Furnace Gas Sale
Ore mixture
Blast furnace sludge
BF dust
Blast furnace gas
Waste
Pig iron
Emission
Steel ingots, briquettes, cast iron, scrap
Alleviating additives
Agglomerate, synthetic slag
Lime, limestone, dolomite
Coke, anthracite, coal
Electricity, natural gas
Water, steam, air, oxygen, nitrogen, argon
Steam
Metallurgical gas
Oxygen-converter steel plant
Steel slag
Converter Gas for sale
Sludge for sale
Steam for sale
Steel alloys
OC sludge
Steam
Converter gas
Waste
Steel
Packaging material (metal, plastic, wood)
Protective coating, passivation
Electricity, natural gas
Water, steam, air, nitrogen
Coke
Metallurgical gases
Emissions
Rolling Mill
Rails
Other steel
Waste
Legend:
Product inputs
Product outputs
Reuse of products
Observed product flow
Emissions
Waste

2.1 Assumptions and measures taken

The processes required for the installation of production equipment and the construction of infrastructure were not included in the analysis. Administrative processes are also not included - inputs and outputs are balanced at the production stage.

The time span of the specific data required, provided by TŘINECKÉ ŽELEZÁRNY a.s., for the preparation of this report was set as the representative time span for the calendar year 2022.

2.2 Exclusion rules

For the study, all the operational data related to product formulations, energy data, diesel consumption and the distribution of annual waste production and emissions according to the records of the sub-plants of the coking plant, blast furnace and sinter plant, oxygen-converter steel plant and rolling mill were taken. For all inputs and outputs considered, transport costs were considered or differences in transport distances were recognised.

In terms of waste produced, only waste that is produced in significant quantities in terms of composition and quantity compared to 1 t of the final product was included in the analysis.

In the case of the blast furnace and agglomeration and rolling mill plants, the compressed air and blown wind data were omitted from the analysis because their production is included in the electricity consumption.

The data on the consumption of nitrogenous lime at the oxygen-converter steelworks were omitted due to the unavailability of generic data on environmental impacts, with respect to composition and quantity per tonne of the final product.

Data on the consumption of detergent oils at the coking plant have been omitted due to the unavailability of generic data on environmental impacts, with respect to the composition and quantity in 1 t of the final product.

For some input data, due to the complexity of obtaining them, alternative methods were chosen in the form of a qualified calculation based on the available information. Some input data were converted to the units needed for the selected generic process data in the environmental impact assessment calculation program.

2.3 Sources of environmental data

The specific data required for the production phase was determined based on the quantity of input materials consumed and the output – the production of finished products from the respective sources of the required data. Consumption quantities of basic raw materials and other inputs were reported on the basis of data from the information system.

All inputs and outputs were entered in Si units, namely:

- Material and auxiliary inputs and product outputs in tonnes.
- Sources used as energy input (primary energy) were expressed in MWh or GJ, including renewable energy sources (hydropower, wind power)
- Water consumption was expressed in m^3 (cubic metres)
- Transport related inputs were expressed in km (distance), tkm (meterials moved) and litres (diesel consumption etc.)
- Time was expressed in practical units depending on the scale of assessment: minutes, hours, days, years

The source of input data was the operational data obtained from the organisation recorded in the SAP information system, as well as outputs from monitoring and measurement of waste production and emissions.

For the complete analysis of environmental parameters was used:

- SimaPro computer software, version 9.5 SimaPro Analyst (Ecoinvent database version 3.9.1)

2.4 Data quality

Time period: For the specific data, the manufacturer's data from 2022 was used (the requirement to use average data over a 1year period was met). For generic data, data from the Ecoinvent database version 3.9.1 was used.

Technological aspect: Data corresponding to the current production of individual types of sub-products and corresponding to the current state of current technologies in individual sub-plants coking plant, blast furnace and sinter plant, oxygen-converter steel plant, rolling mill (product recipes, technological procedures) were used.

Completeness aspect: Most of the input data is based on consumption balances that are accurately recorded in the information system. As part of the completeness check, the company TŘINECKÉ ŽELEZÁRNY a.s. was visited and it was checked whether all inputs/outputs used are recorded in the records (except for the excluded input data listed in Chapter 2). The reliability of the source of specific data is due to the uniformity of the methodology of the method of collecting information from the information system

Geographical aspect: General data from the Ecoinvent database valid for the Czech Republic are used (e.g. energy inputs), and if data for the Czech Republic are not available, data valid for the EU or according to the supplier's location are used.

Consistency aspect: Uniform considerations (allocation rules, data age, technological validity, temporal validity, geographical validity) are applied throughout the report.

Credibility aspect: All relevant data have been checked to ensure that the mass balances can be compared with each other.

2.5 Assessment period

Data provided by the sub-production units of TŘINECKÉ ŽELEZÁRNY a.s. for the period 2022 are used.

2.6 Allocation

The allocation of inputs and outputs has been made in the Report Castle. A uniform method based on weight shares was used for allocation. The inversion and evaluation considered data converted to a declared unit of 1 t of intermediate products produced (for the production sections (coke oven, blast furnace and sinter plant, oxygen-converter steel plant) and 1 t of final product produced (rolling mill).

As part of the data inversion, the entire production process was divided into production sections:

- Production of 1 t of coke within the coking plant
- Production of 1 t of pig iron within the blast furnace and sinter plant
- Production of 1 t of billets within the oxygen-converter steel plant
- Production of 1 t of rails in the rolling mill

The consumption of input quantities and the quantity of produced outputs (waste, emissions) according to external sales of co-products (external sales of by-products or energy) were allocated to the individual production sections according to input and output flows. The allocation was made on the basis of a mass analysis. For the calculation of resource

consumption, the share distribution of resource types for electricity was used according to OTE, a.s. data for 2022.

2.7 Comparability

Environmental product declarations from different programmes may not be comparable. Comparison or assessment of data reported in EPDs is only possible if all data reported in accordance with EN 15804+A2:2019 have been established according to the same rules.

2.8 Product variability

The results are always given for 1 t of average product.

2.9 LCA: Results

Information on environmental impacts is expressed in the following tables. Individual results for the impact categories are presented in Table 4-8. They are based on the declared unit (DU) - 1 t of product.

The impact assessment was carried out using the characterisation factors used in the European Life Cycle Reference Database (ELCD) provided by the European Commission - Directorate General of the Joint Research Centre - Institute for Environment and Sustainability.

2.9.1 Parameters describing environmental impacts

Table 4: Mandatory impact category indicators according to EN 15804:2012+A2:2019/AC:2021

Results per functional or declared unit															
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP - fosil	kg CO_2 ekv.	1.14E+03	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.35E+02	6.25E+00	3.85E+01	0.00E+00	-4.49E+02
GWP - biogenic	kg CO_2 ekv.	-4.51E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.76E-01	2.36E-03	3.17E+01	0.00E+00	-2.47E-02
GWP - luluc	kg CO_2 ekv.	1.25E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.31E-02	4.21E-03	1.54E-02	0.00E+00	-1.96E-01
GWP - total	kg CO_2 ekv.	1.14E+03	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.35E+02	6.26E+00	7.02E+01	0.00E+00	-4.49E+02
ODP	kg CFC 11 ekv.	1.25E-05	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.40E-06	1.13E-07	3.86E-07	0.00E+00	-5.86E-06
AP	mol H^+ ekv.	6.93E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.80E-01	5.78E-02	1.31E-01	0.00E+00	-2.79E+00
EP - freshwater	kg P ekv.	6.81E-01	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.42E-01	7.14E-04	5.89E-03	0.00E+00	-7.13E-02
EP - marine	kg N ekv.	1.60E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.81E-01	2.58E-02	3.90E-02	0.00E+00	-6.76E-01
EP - terrestrial	mol N ekv.	1.60E+01	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.74E+00	2.80E-01	4.29E-01	0.00E+00	-7.58E+00
POCP	kg NMVOC ekv.	5.18E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.12E-01	8.14E-02	1.33E-01	0.00E+00	-3.29E+00
ADP - minerals& metals*	kg Sb ekv.	2.57E-03	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.50E-05	1.29E-05	4.38E-04	0.00E+00	-2.45E-04
ADP -fosil*	MJ	2.11E+04	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.10E+03	7.63E+01	2.73E+02	0.00E+00	-2.76E+03
WDP*	m^3	5.59E+02	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.25E+01	4.00E-01	2.76E+00	0.00E+00	-1.89E+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.*

Table 5: Additional mandatory and voluntary impact category indicators

Results per functional or declared unit															
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP - GHG[1]	kg CO_2 ekv.	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
PM	Disease incidence	8.31E-05	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.26E-05	6.33E-07	2.15E-06	0.00E+00	-4.86E-05
IRP	kBq U235 ekv.	1.06E+02	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.30E+01	1.37E-01	3.49E+00	0.00E+00	-1.13E+01
ETP - fw	CTUe	4.05E+03	ND	ND	ND	ND	ND	ND	ND	ND	ND	3.01E+02	2.98E+01	2.06E+02	0.00E+00	-7.46E+02
HTP - c	CTUh	1.19E-06	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.10E-08	2.32E-09	1.34E-08	0.00E+00	-1.10E-06
HTP - nc	CTUh	1.70E-05	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.94E-07	4.02E-08	2.28E-07	0.00E+00	-2.10E-05
SQP	dimensionless	3.24E+03	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.60E+02	4.09E+01	1.01E+03	0.00E+00	-6.76E+02
Acronyms	**GWP-GHG** = this indicator includes all greenhouse gases except biogenic uptake and emissions of carbon dioxide and biogenic carbon stored in the product; as such the indicator is identical to GWP-total except that the CF for biogenic CO 2 is set to zero, **PM** = Potential incidence of disease due to PM emissions, **IRP** = Potential Human exposure efficiency relative to U235, **ETP-fw** = Potential Comparative Toxic Unit for ecosystems, **HTP-c** = Potential Comparative Toxic Unit for humans, **HTP-nc** = Potential Comparative Toxic Unit for humans, **SQP** = Potential soil quality index														

[1] *This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO_2 is set to zero.*

2.9.2 Parameters describing resource use

Table 6: Resource use indicators

Results per functional or declared unit															
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	1.04E+03	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.99E+01	2.09E+00	8.72E+01	0.00E+00	-1.24E+02
PERM	MJ	0.00E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	1.04E+03	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.99E+01	2.09E+00	8.72E+01	0.00E+00	-1.24E+02
PENRE	MJ	2.24E+04	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.23E+03	8.11E+01	2.88E+02	0.00E+00	-2.92E+03
PENRM	MJ	0.00E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	2.24E+04	ND	ND	ND	ND	ND	ND	ND	ND	ND	2.23E+03	8.11E+01	2.88E+02	0.00E+00	-2.92E+03
SM	kg	2.30E+02	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	1.47E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
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														

2.9.3 Other environmental information describing different waste categories and output flows

Table 7: Additional environmental information – Waste indicators

Results per functional or declared unit															
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	0.00E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-hazardous waste disposed	kg	0.00E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Radioactive waste disposed	kg	0.00E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 8: Additional environmental information – Output flow indicators

Results per functional or declared unit																
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0.00E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling	kg	0.00E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	1.00E+03	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, electricity	MJ	0.00E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	MJ	0.00E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

The result tables shall only contain values or the letters "ND" (Not Declared). It is not possible to specify ND for mandatory indicators. ND shall only be used for voluntary parameters that are not quantified because no data is available.

2.9.4 LCA: Interpretation

The environmental impact of production is mainly influenced by the sub-process of blast furnace iron production and steel production.

- **Global warming potential (GWP)** - The iron and steel production process has a decisive influence on its overall value. In addition, the production and use of nitrogen is a major contributor.
- **Stratospheric ozone depletion potential (ODP) -** the value of the indicator is mainly driven by the iron and steel production process. Less significant is the effect of nitrogen use in the process.
- **Potential for eutrophication (EP) -** is most affected by production in iron and steel. Nitrogen use and energy consumption also contribute to a lesser extent.
- **Ground-level ozone production potential (POCP) -** the value of the indicator is mainly driven by the iron and steel production process.
- **Potential for acidification of soil and water (AP) -** a significant share of the iron and steel production process.
- **Potential for raw material depletion (ADP elements and fossil) -** the influence of iron and steel production is decisive, especially the consumption of raw materials such as coal, iron ore, oxygen, etc.

3 LCA: scenarios and other technical information

Information modules A4, A5 and B1-B7 were not included in the LCA.

4 LCA: Additional information

The EPD does not include additional documentation related to the declaration of supplementary information.

5 Reference

ČSN ISO 14025:2010 Environmentální značky a prohlášení - Environmentální prohlášení typu III - Zásady a postupy (Environmental labels and declarations - Type III environmental declarations - Principles and procedures)

ČSN EN 15804+A2:2019 Udržitelnost staveb - Environmentální prohlášení o produktu - Zásadní pravidla pro produktovou kategorii stavebních výrobků (Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products)

ČSN EN ISO 14040:2006 Environmentální management - Posuzování životního cyklu - Zásady a osnova (Environmental management - Life Cycle Assessment - Principles and Framework)

ČSN EN ISO 14044:2006 Environmentální management - Posuzování životního cyklu – Požadavky a směrnice (Environmental management - Life Cycle Assessment – Requirements and guidelines)

ČSN ISO 14063:2007 Environmentální management - Environmentální komunikace - Směrnice a příklady (Environmental management - Environmental communication - Guidelines and examples)

ČSN EN 15643-1:2011 Udržitelnost staveb - Posuzování udržitelnosti budov - Část 1: Obecný rámec (Sustainability of construction works - Sustainability assessment of buildings - Part 1: General framework)

ČSN EN 15643-2:2011 Udržitelnost staveb - Posuzování udržitelnosti budov - Část 2: Rámec pro posuzování environmentálních vlastností (Sustainability of construction works - Assessment of buildings - Part 2: Framework for the assessment of environmental performance)

ČSN EN 15942:2013 Udržitelnost staveb - Environmentální prohlášení o produktu - Formát komunikace mezi podniky (Sustainability of construction works - Environmental product declarations - Communication format business-to-business)

TNI CEN/TR 15941:2012 Udržitelnost staveb - Environmentální prohlášení o produktu - Metodologie výběru a použití generických dat (Sustainability of construction works - Environmental product declarations - Methodology for selection and use of generic data)

ČSN EN 16449:2014 Dřevo a výrobky na bázi dřeva - Výpočet obsahu biogenního uhlíku ve dřevě a přeměny na oxid uhličitý (Wood and wood-based products - Calculation of the biogenic carbon content of wood and conversion to carbon dioxide)

Handbook ILCD - JRC EU, 2011

Regulation 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals and establishing a European Chemicals Agency (REACH).

Regulation (EC) No 1272/2008 of the European Parliament and of the Council on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006 (CLP Regulation).

Package SimaPro LCA, Pré Consultants, Netherlands, www.pre-sustainability.com.

Centre Ecoinvent, www.Ecoinvent.org

SAP - information system of producer

6 Verification EPD

Independent verification of the declaration and data according to ČSN ISO 14025:2010			
CEN standard EN 15804+A2 CEN serves as the core PCR[a]			
☐	internal	☒	external
Third party verifier[b]:			
Elektrotechnický zkušební ústav, s. p. Pod Lisem 129/2, Troja 182 00 Praha 8 Czech Republic ezú elektrotechnický zkušební ústav		Mgr. Miroslav Sedláček *Head of the certification body*	
Certification Body No. 3018 accredited by Czech Accreditation Institute, o.p.s. according to ČSN EN ISO/IEC 17065:2013			
[a] Product category rules [b] Optional for business-to-business communication, mandatory for business-to-consumer communication (see ISO 14025:2006,9.4)			

This document is a translation of the EPD issued in Czech. In cause of doubt use the Czech version of this EPD as a reference.

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