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Hot rolled bars and wires

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Basic information

This declaration is the Type III Environmental Product Declaration (EPD) based on EN 15804+A2:2019 and verified according to ISO 14025 by an external auditor. It contains the information on the impacts of the declared construction materials on the environment and their aspects verified by the independent body according to ISO 14025. Basically, comparison or evaluation of EPD data is possible only if all the compared data were created according to EN 15804+A2:2019.

Life cycle analysis (LCA): A1-A3, C1-C4 and D modules in accordance with EN 15804+A2:2019 (Cradle-to-Gate with options)

The year of preparing the EPD: 2024

Standards (not full list): EN 10080, EN 1992-1-1/A1, ISO 16120, ASTM A6, BS 4449, BS 4482, SS 212540, PN-H-93220, DIN 488

Service Life: 50 years

PCR: ITB-PCR A

Declared unit: 1 ton

Reasons for performing LCA: B2B

Representativeness: European (Warsaw and Hamburg), 2023

MANUFACTURER

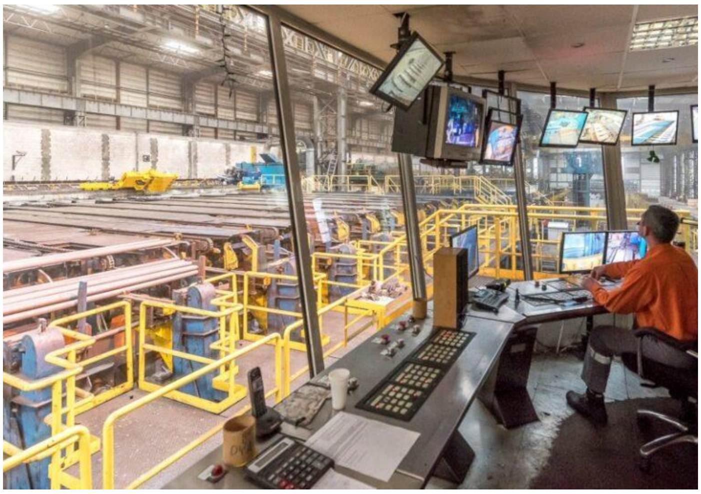


Figure 1 The view of manufacturing plant located in Warsaw

ArcelorMittal Europe has a long and rich tradition of producing bars and wire rod in its locations in Germany and Poland (covered by this EPD). ArcelorMittal Hamburg plant is located at Germany's largest sea port which is an important logistical advantage. ArcelorMittal Hamburg is acknowledged as a global leader in high-quality wire rod production. It is also a pioneer in melt shop productivity and energy efficiency. ArcelorMittal Warszawa plant is located at the northern edge of Warsaw and is acknowledged as a specialized production facility in SBQ and special bars.
These plants are at the forefront of technical innovation and provide best-in-class customer service. They offer a wide spectrum of wire rod, round bars, ribbed bars, wires and forging billet, products covering the full range of final applications. In recent years, ArcelorMittal European plants have made major investments in state-of-the-art equipment: a new bar mill and new SBQ finishing capacities in Warsaw, a new wire rod mill and updated billet/bloom casters in Duisburg, a new finishing line in Gandrange, a rebar in coil production line in Zenica and a new vacuum degassing station. Furthermore, the wire rod rolling mills of Sosnowiec, Hamburg and Gijón are upgraded. All this with the aim to significantly improve the capability and the quality of products and support the development of customers in the most demanding market segments. Products find applications in every major market segment – construction, infrastructure, automotive, mechanical engineering, yellow goods and energy.
The commitment to reducing the company's carbon footprint is a key element in company development strategy, enabling customers to develop lighter and more cost-effective designs. ArcelorMittal has started the construction of an electric arc furnace (EAF) for long products at its Gijón plant, which is expected to produce its first heat in the first quarter of 2026. This investment of €213 million will be the first major EAF project to be implemented within the company's decarbonisation programme in Europe and will constitute the first step towards low-carbon emissions steelmaking in Asturias. This project places the Long Products division in Asturias at the forefront of decarbonisation in Europe, as it is the first large investment undertaken as part of ArcelorMittal's decarbonisation programme on this continent. The installation of this state-of-the-art technology will enable ArcelorMittal to produce high added value rails and wire rod, through a process that incorporates the highest safety standards (Source: ArcelorMittal to construct an electric arc furnace at its Gijón plant - GreenSteelWorld.com).

PRODUCTS

The products covered by this EPD include hot rolled bars and wire rods. These products are classified as either final products, such as ribbed bars and coils for reinforcing, or as intermediate products used in the manufacturing of other products depending on the final application.

Hot rolled wire rod and bars are rolled steel product, produced from a semi and having a round, rectangular or other cross-section. Particularly fine cross-sections may be achieved by subsequent cold forming (drawing).

By subsequent cold forming (e.g. drawing) or forming (e.g. forging) they can be used in a wide variety of fields such as construction, industrial, mechanical, energy and automotive application (more details can be found under Home | ArcelorMittal Bars & Rods).

The final products can be steel cord for tires, ropes, screws, bolts, fences, shopping carts, wire hangers, nails, chains, springs, mesh, welding wire, bearings, reinforcing steel for concrete reinforcement, including specific applications such as Krybar®, rock bolts, tie bars and threaded bars for mining and geotechnical application. Hot rolled wire rod is also used for prestressed concrete structures enabling the creation of stronger and lighter structures for supporting greater loads.

With respect to alloying content, the products represent an average production from the sites described in the scope of this EPD. The products are obtained from scrap and/or direct reduced iron (DRI) melted in an electric arc furnace (EAF) followed by hot rolling, cold processing, thermal treatment, surface treatment and additional production steps where appropriate.

For the application and use of the hot rolled bars and wires, the following standards could apply (the list non exhaustive):

EN 10263, EN 16120, EN 10267, EN 10089, ISO 14171, EN 10080, EN 1992-1-1, EN 1992-1-2, EN 1992-2, EN 1992-3. All additional technical information about the product is available on the manufacturer's website.

LIFE CYCLE ASSESSMENT (LCA) – general rules applied

Unit

The declared unit used in this study is defined as one metric ton of hot rolled bars and wires ready to be transported from ArcelorMittal to its clients. However, the same manufacturing process and the similarities of product allow a declared unit based on mass unit of products.
This is a product specific EPD, from a specific manufacturer, produced at different sites (Warsaw and Hamburg, presented separately). A weighted average based on 2022 production was used to obtain the results.

Note: The EPD shows the additional result tables (Informative annex) reporting separately the potential results of using a renewable electricity grid mix in production and up to 100% scrap. The hot rolled bars and wires branded as XCarb® use up to 100% scrap and 100% renewable electricity (when used Guarantees of Origin).

System boundary

The life cycle analysis of the declared products covers “Product Stage” A1-A3, C1-C4+D modules in accordance with EN 15804+A2:2019 and ITB PCR A (cradle to gate with options). Energy and water consumption, emissions as well as information on generated wastes were inventoried and were included in the calculation. It can be assumed that the total sum of omitted processes does not exceed 1% of all impact categories. The environmental impact of the product studied has been assessed by considering all significant processes, materials, and emissions contributing to more than 1% to the total impact categories included in the EPD. The production of capital equipment, facilities, and infrastructure required for manufacture has not been considered.There are no known flows or process deliberately excluded.

Allocation

The allocation rules used for this EPD are based on general ITB PCR A (2023). Production of the hot rolled steel is a line process conducted in the EAF plants. All impacts from raw materials extraction and processing are allocated in module A1 of the LCA. Impacts from the global line production were inventoried and 99.5% was allocated to the production of the hot rolled steel profiles based on the products mass basis. Water and energy consumption, associated emissions and generated wastes are allocated to module A3. For the current product route, allocation was applied only in the Electric Arc Furnace process using the method developed by the Worldsteel association, which is compliant with ISO 21930:2017 and EN 15804+A2:2019 standards. The methodology is based on physical allocation and considers the manner in which changes in inputs and outputs affect the production of co-products and material flows that carry specific inherent properties. The method is deemed to provide the most representative partitioning of the processes involved. For all background data used in the model, the standard allocation assumptions of the used datasets were maintained.

System limits

The life cycle analysis (LCA) of the declared products covers: product stage – modules A1-A3, end of life – modules C2-C4 and benefits and loads beyond the system boundary – module D (cradle-to-gate with options) in accordance with EN 15804+A2:2019 and ITB PCR A. Energy and water consumption, emissions as well as information on generated wastes were inventoried and were included in the calculations. It can be assumed that the total sum of omitted processes does not exceed 5% of all impact categories. In accordance with EN 15804+A2:2019, machines and facilities (capital goods) required for the production as well as transportation of employees were not included in LCA.

Modules A1 and A2: ***Raw materials supply and transport***

Steel scrap (pre and post-consumer) used to produce hot rolled bars and wires come from local scrap suppliers. DRI is produced locally in Hamburg facility. The scrap and DRI content for products sold as XCarb® **R**ecycled and **R**enewably **P**roduced (RRP) are adjusted as per XCarb® RRP definition. Means of transport include trains and lorries. European standards for average combustion were used for calculations. According to ISO 14021:2016 average pre- and post-consumer scrap is 67.8% for average production in Hamburg and 87.4% for average production in Warsaw.

The product does not contain any of the substances of very high concern (SVHC) regulated by the Regulation (EC) No 1907/2006 (REACH) or the Regulation (EC) No 1272/2008 of European parliament. Also, no packaging is considered in the scenario.

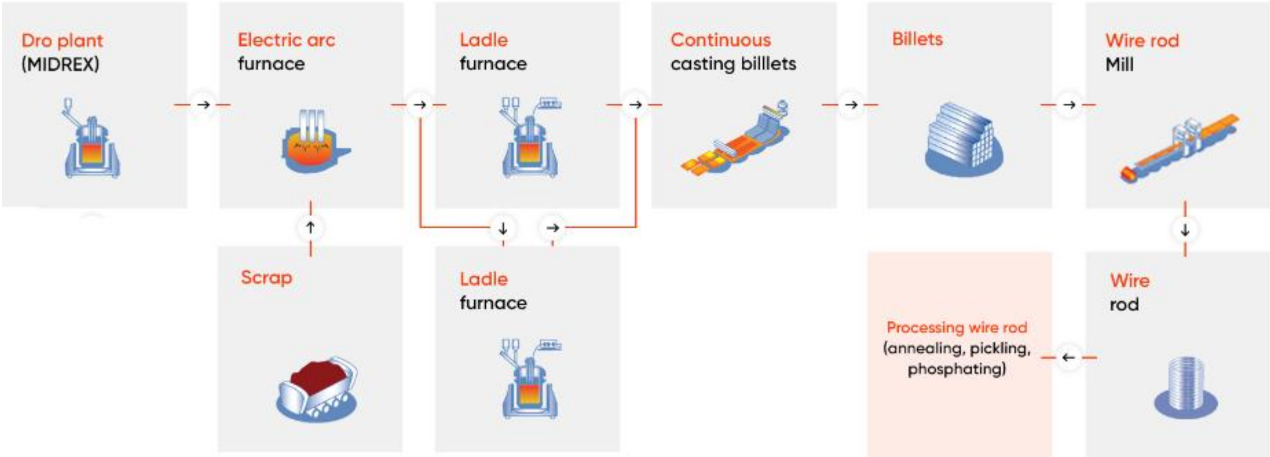
Module A3: ***Production***

A scheme of the hot rolled steel production is presented in Figure 2 (Warsaw and Hamburg). In Hamburg scrap metal and DRI (when applicable) is melted in an electric arc furnace to obtain liquid steel. This is then refined to remove impurities and alloying additions can be added to give the required properties. Hot metal (molten steel) is then cast into steel billets before being sent to the rolling mill where billets are rolled and shaped to the required dimensions for the finished bars and wire rod. The following table provides the detailed description of the production facilities and products.

Table 1. Description of the manufacturing facilities in Warsaw and Hamburg

	Warsaw	**Hamburg**
Steel plant	Electric arc furnace with eccentric bottom tapping Ladle furnace Vacuum degassing 4-strand billet caster	Electric arc furnace + Direct reduction plant 2 ladle furnace 7-strand billet caster
Rolling mill	22 stands in continuous system roll line	High speed 2-strand 26 stands including pre-block and no-twist Morgan finishing block
Finishing and other operations	Straightening machines Milling and chamfering devices Surface control (circoflux) Ultrasonic control device Antimixing control - spectrotest devices Packaging, marking	Annealing, pickling, phosphating upon request by third parties
Heat treatment	Soft annealing, normalising, isothermal, spheroidising and stress revealing treatments, quenching and tempering Peeling	Upon request by third parties
Cast semi products	Blooms (mm2): ■ 220; length (m): 4 - 10 Billets (mm2): ■ 140; 160; 220; length (m): 4 - 14.8	Billets (mm^2): ■ 130;140; length (m): 5 - 16
Finished products	Bars (mm): ● 20 - 105; length of bars: 3.5,-12m for SBQ Rebars (mm): ● 10 - 50; length max 15m for rebars Krybar® (mm): ● 12 - 32	Wire rod (mm): ● 5.5 to 17

Hamburg



Warsaw

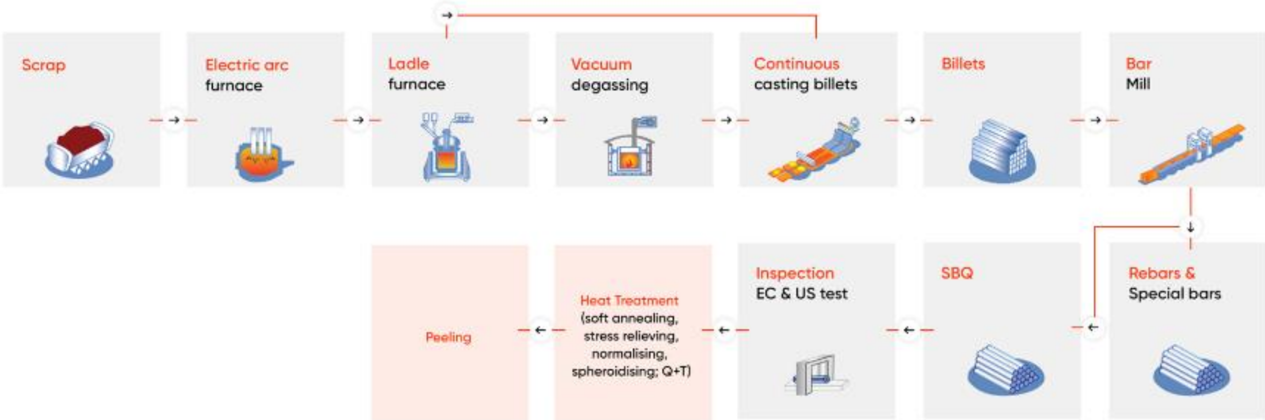


Figure 2. Manufacturing process scheme (A1-A3) for Hamburg (upper graph) and Warsaw (lower graph)

Modules *C and D: End-of-life (EOL)*

Within this EPD, the modules C1-C4 are included. These modules consider the dismantling of the considered product (C1), the transportation of the dismantled components to their End of Life (EoL) destination (C2), the waste processing for recovery or recycling (C3) as well as the disposal (C4), if given. At EoL, the steel material leaves the product system in C3 for recycling in Module D. The considered End-of-Life scenario for the steel material is 95 % recycling and 5 % landfilling. Module D presents credits resulting from the recycling of the primary steel scrap calculated in accordance with the net scrap approach developed by World Steel Association Potential environmental benefits are given for the net steel scrap that is produced at the end of a final product's life. This net scrap is determined as follows: Net scrap = Amount of steel recycled at end-of-life – Scrap input from previous product life cycles.

Table 1. End-of-life scenario for the hot rolled bars and wires

Material	Material recovery	Recycling	Landfilling
steel scrap	100%	95%	5%

Electricity at end-of-life (module C) has been modelled using an average electricity mix as the location where the product reaches end-of-life is unknown.

Data collection period

The data for manufacture of the declared products refer to period between 01.01.2022 – 31.12.2022 (1 year). The life cycle assessments were prepared for Poland and Europe as reference area.

Data quality

The data selected for LCA originate from ITB-LCI questionnaires completed by Hamburg plant and Warsaw plant and verified. No data collected is older than five years and no generic datasets used are older than ten years. The representativeness, completeness, reliability, and consistency is judged as good. All primary data were collected from ArcelorMittal production facilities. The sources of secondary data are the database (Sphera) and are representative for the years 2018-2023. The data quality assessment addressed the following parameters: time-related coverage, geographical coverage, technological coverage, precision, completeness, representativeness, consistency, reproducibility, sources of data, and uncertainty. All primary data are collected for the year 2022. All secondary data come from the (GaBi) 2023 databases and are representative of the years 2018-2023 (< 10 years). As the study intended to compare the product systems for the reference year 2022, temporal representativeness is good. All primary and secondary data are collected specific to the countries/regions under study. Where country / region specific data are unavailable, proxy data are used. Geographical representativeness is considered very good.

Assumptions and estimates

The impacts of the representative products were aggregated using weighted average.

Calculation rules

LCA was performed using ITB-LCA tool developed in accordance with EN15804+A2:2019.

Additional information

Foreground data electricity consumption was modelled using residual mix electricity datasets from the consumption share of 2022 year, composed by Germany and Poland residual mixes. As a general rule, no particular environmental or health protection measures other than those specified by law are necessary.

LIFE CYCLE ASSESSMENT (LCA) – Results

Declared unit

The declaration refers to declared unit (DU) – 1 metric ton of hot rolled bars and wires produced in Warsaw and Hamburg. The following life cycle modules (Table 3) were included in the analysis. The following tables 4-7 show the environmental impacts of the life cycle of selected modules (A1-A3+C1-C4+D).

Table 2. System boundaries for the environmental characteristic of the product.

Environmental assessment information (MD – Module Declared, MND – Module Not Declared, INA – Indicator Not Assessed)																
Product stage			Construction process		Use stage							End of life				Benefits and loads beyond the system boundary
Raw material supply	Transport	Manufacturing	Transport to construction site	Construction-installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal	Reuse-recovery-recycling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
MD	MD	MD	MND	MND	MND	MND	MND	MND	MND	MND	MND	MD	MD	MD	MD	MD

Table 3. Life cycle assessment (LCA) results for specific product – environmental impacts of (DU: 1 metric ton) – Warsaw (global production)

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Global Warming Potential	eq. kg CO_2	7,75E+02	4,28E+01	2,63E+01	1,36E+00	4,30E-01	2,29E+02
Greenhouse potential - fossil	eq. kg CO_2	7,74E+02	4,26E+01	2,61E+01	1,34E+00	4,44E-01	2,31E+02
Greenhouse potential - biogenic	eq. kg CO_2	9,91E-01	-1,44E-01	-1,08E-01	9,82E-03	-1,53E-02	-1,36E+00
Global warming potential - land use and land use change	eq. kg CO_2	3,15E-01	3,73E-01	2,45E-01	1,04E-03	1,40E-03	3,07E-02
Stratospheric ozone depletion potential	eq. kg CFC 11	1,63E-06	1,54E-11	3,45E-12	2,20E-11	1,15E-12	-3,09E-10
Soil and water acidification potential	eq. mol H+	2,41E+00	2,46E-01	1,92E-01	3,30E-03	3,20E-03	5,64E-01
Eutrophication potential - freshwater	eq. kg P	1,85E-02	1,50E-04	9,69E-05	4,80E-06	9,07E-07	5,37E-05
Eutrophication potential - seawater	eq. kg N	5,52E-01	1,19E-01	9,51E-02	9,70E-04	8,26E-04	9,06E-02
Eutrophication potential - terrestrial	eq. mol N	5,93E+00	1,32E+00	1,05E+00	1,04E-02	9,09E-03	8,12E-01
Potential for photochemical ozone synthesis	eq. kg NMVOC	1,55E+00	2,31E-01	1,82E-01	2,63E-03	2,49E-03	3,68E-01
Potential for depletion of abiotic resources - non-fossil resources	eq. kg Sb	9,94E-03	2,77E-06	1,76E-06	1,95E-07	2,08E-08	1,31E-03
Abiotic depletion potential - fossil fuels	MJ	9,49E+03	5,81E+02	3,61E+02	2,71E+01	6,00E+00	2,29E+03
Water deprivation potential	eq. m^3	1,35E+02	6,23E-01	3,20E-01	2,66E-01	4,95E-02	1,56E+01

Table 4. Life cycle assessment (LCA) results for specific product – additional impacts indicators (DU: 1 metric ton) - Warsaw (global production)

Indicator	Unit	A1-A3	C1-C4	D
Particulate matter	disease incidence	4,32E-05	1.67E-06	5,29E-06
Potential human exposure efficiency relative to U235	eg. kBq U235	1,79E+01	1.23E+00	-5,18E+00
Potential comparative toxic unit for ecosystems	CTUe	3,12E+03	6.82E+02	1,20E+02
Potential comparative toxic unit for humans (cancer effects)	CTUh	9,59E-07	1.48E-08	-9,42E-08
Potential comparative toxic unit for humans (non-cancer effects)	CTUh	7,88E-06	6.60E-07	-4,49E-07
Potential soil quality index	dimensionless	1,64E+03	3.96E+02	2,97E+01

Table 5. Life cycle assessment (LCA) results for specific product - the resource use (DU: 1 metric ton) - Warsaw (global production)

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Consumption of renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	1.63E+03	4,68E+01	2,63E+01	1,51E+01	9,78E-01	-9,05E+01
Consumption of renewable primary energy resources used as raw materials	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total consumption of renewable primary energy resources	MJ	1.63E+03	4,68E+01	2,63E+01	1,51E+01	9,78E-01	-9,05E+01
Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	9.49E+03	5,83E+02	3,62E+02	2,71E+01	6,00E+00	2,29E+03
Consumption of non-renewable primary energy resources used as raw materials	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total consumption of non-renewable primary energy resources	MJ	9.49E+03	5,83E+02	3,62E+02	2,71E+01	6,00E+00	2,29E+03
Consumption of secondary materials	kg	1,10E+03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Consumption of renew. secondary fuels	MJ	2,16E-17	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Consumption of non-renewable secondary fuels	MJ	2,54E-16	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Net consumption of freshwater	m^3	4,56E+00	4,96E-02	2,88E-02	1,22E-02	1,52E-03	2,33E+01

Table 6. Life cycle assessment (LCA) results for specific product – waste categories (DU: 1 metric ton) - Warsaw (global production)

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Hazardous waste	kg	1,50E-08	9,53E-10	1,12E-09	-1,96E-09	1,31E-10	1,71E-05
Non-hazardous waste	kg	1,43E+01	9,69E-02	5,52E-02	1,87E-02	3,00E+01	-2,77E+01
Radioactive waste	kg	1,14E-01	2,88E-03	6,78E-04	3,99E-03	6,83E-05	-2,51E-04
Components for re-use	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	0,00E+00	0,00E+00	0,00E+00	9,70E+02	0,00E+00	0,00E+00

Table 8. Life cycle assessment (LCA) results for specific product – environmental impacts of (DU: 1 metric ton) - Hamburg (global production)

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Global Warming Potential	eq. kg CO_2	7,13E+02	4,28E+01	2,63E+01	1,36E+00	1,43E-01	-1,97E+02
Greenhouse potential - fossil	eq. kg CO_2	7,10E+02	4,26E+01	2,61E+01	1,34E+00	1,48E-01	-1,98E+02
Greenhouse potential - biogenic	eq. kg CO_2	2,16E+00	-1,44E-01	-1,08E-01	9,82E-03	-5,10E-03	4,67E-01
Global warming potential - land use and land use change	eq. kg CO_2	6,89E-01	3,73E-01	2,45E-01	1,04E-03	4,67E-04	-9,17E-02
Stratospheric ozone depletion potential	eq. kg CFC 11	1,53E-06	1,54E-11	3,45E-12	2,20E-11	3,82E-13	-1,69E-07
Soil and water acidification potential	eq. mol H+	1,81E+00	2,46E-01	1,92E-01	3,30E-03	1,07E-03	-4,92E-01
Eutrophication potential - freshwater	eq. kg P	1,78E-02	1,50E-04	9,69E-05	4,80E-06	3,02E-07	-1,99E-03
Eutrophication potential - seawater	eq. kg N	5,52E-01	1,19E-01	9,51E-02	9,70E-04	2,75E-04	-1,08E-01
Eutrophication potential - terrestrial	eq. mol N	5,99E+00	1,32E+00	1,05E+00	1,04E-02	3,03E-03	-1,08E+00
Potential for photochemical ozone synthesis	eq. kg NMVOC	1,72E+00	2,31E-01	1,82E-01	2,63E-03	8,31E-04	-3,80E-01
Potential for depletion of abiotic resources - non-fossil resources	eq. kg Sb	5,15E-03	2,77E-06	1,76E-06	1,95E-07	6,94E-09	-1,24E-03
Abiotic depletion potential - fossil fuels	MJ	9,11E+03	5,81E+02	3,61E+02	2,71E+01	2,00E+00	-2,19E+03
Water deprivation potential	eq. m^3	9,82E+01	6,23E-01	3,20E-01	2,66E-01	1,65E-02	-1,89E+01

Table 9. Life cycle assessment (LCA) results for specific product – additional impacts indicators (DU: 1 metric ton) - Hamburg (global production)

Indicator	Unit	A1-A3	C1-C4	D
Particulate matter	disease incidence	3,62E-05	1.64E-06	-6,73E-06
Potential human exposure efficiency relative to U235	eg. kBq U235	2,41E+01	1.23E+00	3,05E-02
Potential comparative toxic unit for ecosystems	CTUe	2,23E+03	6.79E+02	-3,08E+02
Potential comparative toxic unit for humans (cancer effects)	CTUh	8,67E-07	1.44E-08	-4,65E-08
Potential comparative toxic unit for humans (non-cancer effects)	CTUh	4,18E-06	6.24E-07	-2,26E-07
Potential soil quality index	dimensionless	1,63E+03	3.95E+02	-1,95E+02

Table 10. Life cycle assessment (LCA) results for specific product - the resource use (DU: 1 metric ton) – Hamburg (global production)

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Consumption of renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	1,75E+03	4,68E+01	2,63E+01	1,51E+01	3,26E-01	-1,46E+02
Consumption of renewable primary energy resources used as raw materials	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total consumption of renewable primary energy resources	MJ	1,75E+03	4,68E+01	2,63E+01	1,51E+01	3,26E-01	-1,46E+02
Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	9,17E+03	5,83E+02	3,62E+02	2,71E+01	2,00E+00	-2,20E+03
Consumption of non-renewable primary energy resources used as raw materials	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total consumption of non-renewable primary energy resources	MJ	9.17E+03	5,83E+02	3,62E+02	2,71E+01	2,00E+00	-2,20E+03
Consumption of secondary materials	kg	9,11E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Consumption of renew. secondary fuels	MJ	5,19E-18	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-5,71E-19
Consumption of non-renewable secondary fuels	MJ	6,10E-17	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-6,71E-18
Net consumption of freshwater	m^3	3,08E+00	4,96E-02	2,88E-02	1,22E-02	5,05E-04	-1,24E+01

Table 11. Life cycle assessment (LCA) results for specific product – waste categories (DU: 1 metric ton) – Hamburg (global production)

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Hazardous waste	kg	8,36E-07	9,53E-10	1,12E-09	-1,96E-09	4,36E-11	-8,99E-06
Non-hazardous waste	kg	6,25E+00	9,69E-02	5,52E-02	1,87E-02	1,00E+01	1,37E+01
Radioactive waste	kg	1,84E-01	2,88E-03	6,78E-04	3,99E-03	2,28E-05	-2,01E-02
Components for re-use	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,10E+02
Materials for recycling	kg	0,00E+00	0,00E+00	0,00E+00	8,80E+02	0,00E+00	0,00E+00

Informative annex n° 1 for XCarb® Recycled and Renewably Produced (RRP) *- regarding the impacts of potential production using 100% green electricity and up to 100% scrap input scrap for production*
The information in the annex 1 provides illustrative information on the estimated impacts of production of products for which the manufacturer may provide the sources of origin certificate of scrap content and green electricity purchase to a dedicated extent, verified by a third party.

Table A1. Life cycle assessment (LCA) results for specific product – environmental impacts of (DU: 1 metric ton) – XCarb® RRP Warsaw (specific type of production)

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Global Warming Potential	eq. kg CO_2	3,68E+02	4,28E+01	2,63E+01	1,36E+00	4,30E-01	2,34E+02
Greenhouse potential - fossil	eq. kg CO_2	3,67E+02	4,26E+01	2,61E+01	1,34E+00	4,44E-01	2,35E+02
Greenhouse potential - biogenic	eq. kg CO_2	3,45E-01	-1,44E-01	-1,08E-01	9,82E-03	-1,53E-02	-1,39E+00
Global warming potential - land use and land use change	eq. kg CO_2	2,95E-01	3,73E-01	2,45E-01	1,04E-03	1,40E-03	3,13E-02
Stratospheric ozone depletion potential	eq. kg CFC 11	1,65E-06	1,54E-11	3,45E-12	2,20E-11	1,15E-12	-3,16E-10
Soil and water acidification potential	eq. mol H+	1,23E+00	2,46E-01	1,92E-01	3,30E-03	3,20E-03	5,76E-01
Eutrophication potential - freshwater	eq. kg P	1,80E-02	1,50E-04	9,69E-05	4,80E-06	9,07E-07	5,48E-05
Eutrophication potential - seawater	eq. kg N	3,26E-01	1,19E-01	9,51E-02	9,70E-04	8,26E-04	9,25E-02
Eutrophication potential - terrestrial	eq. mol N	3,52E+00	1,32E+00	1,05E+00	1,04E-02	9,09E-03	8,29E-01
Potential for photochemical ozone synthesis	eq. kg NMVOC	9,11E-01	2,31E-01	1,82E-01	2,63E-03	2,49E-03	3,75E-01
Potential for depletion of abiotic resources - non-fossil resources	eq. kg Sb	1,01E-02	2,77E-06	1,76E-06	1,95E-07	2,08E-08	1,33E-03
Abiotic depletion potential - fossil fuels	MJ	4,38E+03	5,81E+02	3,61E+02	2,71E+01	6,00E+00	2,34E+03
Water deprivation potential	eq. m^3	1,31E+02	6,23E-01	3,20E-01	2,66E-01	4,95E-02	1,59E+01

Table A2. Life cycle assessment (LCA) results for specific product – additional impacts indicators (DU: 1 metric ton) - XCarb® RRP Warsaw (specific type of production)

Indicator	Unit	A1-A3	C1-C4	D
Particulate matter	disease incidence	3,33E-05	1.67E-06	5,40E-06
Potential human exposure efficiency relative to U235	eg. kBq U235	1,22E+01	1.23E+00	-5,28E+00
Potential comparative toxic unit for ecosystems	CTUe	1,13E+03	6.82E+02	1,23E+02
Potential comparative toxic unit for humans (cancer effects)	CTUh	1,04E-06	1.48E-08	-9,61E-08
Potential comparative toxic unit for humans (non-cancer effects)	CTUh	6,26E-06	6.60E-07	-4,59E-07
Potential soil quality index	dimensionless	5,75E+02	3.96E+02	3,03E+01

Table A3. Life cycle assessment (LCA) results for specific product - the resource use (DU: 1 metric ton) - XCarb® RRP Warsaw (specific type of production)

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Consumption of renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	8,04E+03	4,68E+01	2,63E+01	1,51E+01	9,78E-01	-9,23E+01
Consumption of renewable primary energy resources used as raw materials	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total consumption of renewable primary energy resources	MJ	8,04E+03	4,68E+01	2,63E+01	1,51E+01	9,78E-01	-9,23E+01
Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	4,38E+03	5,83E+02	3,62E+02	2,71E+01	6,00E+00	2,34E+03
Consumption of non-renewable primary energy resources used as raw materials	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total consumption of non-renewable primary energy resources	MJ	4,38E+03	5,83E+02	3,62E+02	2,71E+01	6,00E+00	2,34E+03
Consumption of secondary materials	kg	1,11E+03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Consumption of renew. secondary fuels	MJ	2,16E-17	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Consumption of non-renewable secondary fuels	MJ	2,54E-16	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Net consumption of freshwater	m^3	3,27E+00	4,96E-02	2,88E-02	1,22E-02	1,52E-03	2,38E+01

Table A4. Life cycle assessment (LCA) results for specific product – waste categories (DU: 1 metric ton) - XCarb® RRP Warsaw (specific type of production)

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Hazardous waste	kg	-1,17E-06	9,53E-10	1,12E-09	-1,96E-09	1,31E-10	1,75E-05
Non-hazardous waste	kg	1,46E+01	9,69E-02	5,52E-02	1,87E-02	3,00E+01	-2,83E+01
Radioactive waste	kg	5,34E-02	2,88E-03	6,78E-04	3,99E-03	6,83E-05	-2,56E-04
Components for re-use	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	0,00E+00	0,00E+00	0,00E+00	9,70E+02	0,00E+00	0,00E+00

Table A5 Life cycle assessment (LCA) results for specific product – environmental impacts of (DU: 1 metric ton) – XCarb® RRP Hamburg (specific type of production)

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Global Warming Potential	eq. kg CO_2	4,87E+02	4,26E+01	2,61E+01	1,34E+00	1,48E-01	-8,37E+01
Greenhouse potential - fossil	eq. kg CO_2	4,86E+02	-1,44E-01	-1,08E-01	9,82E-03	-5,10E-03	8,45E-02
Greenhouse potential - biogenic	eq. kg CO_2	8,54E-01	3,73E-01	2,45E-01	1,04E-03	4,67E-04	-6,21E-02
Global warming potential - land use and land use change	eq. kg CO_2	5,28E-01	1,54E-11	3,45E-12	2,20E-11	3,82E-13	-1,70E-07
Stratospheric ozone depletion potential	eq. kg CFC 11	1,54E-06	2,46E-01	1,92E-01	3,30E-03	1,07E-03	-2,26E-01
Soil and water acidification potential	eq. mol H+	1,38E+00	1,50E-04	9,69E-05	4,80E-06	3,02E-07	-1,89E-03
Eutrophication potential - freshwater	eq. kg P	1,72E-02	1,19E-01	9,51E-02	9,70E-04	2,75E-04	-5,73E-02
Eutrophication potential - seawater	eq. kg N	4,13E-01	1,32E+00	1,05E+00	1,04E-02	3,03E-03	-6,02E-01
Eutrophication potential - terrestrial	eq. mol N	4,50E+00	2,31E-01	1,82E-01	2,63E-03	8,31E-04	-1,96E-01
Potential for photochemical ozone synthesis	eq. kg NMVOC	1,34E+00	2,77E-06	1,76E-06	1,95E-07	6,94E-09	-7,39E-04
Potential for depletion of abiotic resources - non-fossil resources	eq. kg Sb	5,16E-03	5,81E+02	3,61E+02	2,71E+01	2,00E+00	-1,03E+03
Abiotic depletion potential - fossil fuels	MJ	6,64E+03	6,23E-01	3,20E-01	2,66E-01	1,65E-02	-1,26E+01
Water deprivation potential	eq. m^3	9,58E+01	4,26E+01	2,61E+01	1,34E+00	1,48E-01	-8,37E+01

Table A6 Life cycle assessment (LCA) results for specific product – additional impacts indicators (DU: 1 metric ton) - XCarb® RRP Hamburg (specific type of production)

Indicator	Unit	A1-A3	C1-C4	D
Particulate matter	disease incidence	3,23E-05	1.64E-06	-4,25E-06
Potential human exposure efficiency relative to U235	eg. kBq U235	1,24E+01	1.23E+00	-6,86E-01
Potential comparative toxic unit for ecosystems	CTUe	1,47E+03	6.79E+02	-1,77E+02
Potential comparative toxic unit for humans (cancer effects)	CTUh	8,91E-07	1.44E-08	-8,56E-08
Potential comparative toxic unit for humans (non-cancer effects)	CTUh	3,60E-06	6.24E-07	-3,37E-07
Potential soil quality index	dimensionless	6,90E+02	3.95E+02	-7,98E+01

Table A7 Life cycle assessment (LCA) results for specific product - the resource use (DU: 1 metric ton) - XCarb® RRP Hamburg (specific type of production)

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Consumption of renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	3,29E+03	4,68E+01	2,63E+01	1,51E+01	3,26E-01	-3,50E+02
Consumption of renewable primary energy resources used as raw materials	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total consumption of renewable primary energy resources	MJ	3,29E+03	4,68E+01	2,63E+01	1,51E+01	3,26E-01	-3,50E+02
Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	6,69E+03	5,83E+02	3,62E+02	2,71E+01	2,00E+00	-1,04E+03
Consumption of non-renewable primary energy resources used as raw materials	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total consumption of non-renewable primary energy resources	MJ	6,69E+03	5,83E+02	3,62E+02	2,71E+01	2,00E+00	-1,04E+03
Consumption of secondary materials	kg	9,69E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Consumption of renew. secondary fuels	MJ	5,19E-18	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-5,71E-19
Consumption of non-renewable secondary fuels	MJ	6,10E-17	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-6,71E-18
Net consumption of freshwater	m^3	2,60E+00	4,96E-02	2,88E-02	1,22E-02	5,05E-04	-3,35E+00

Table A8 Life cycle assessment (LCA) results for specific product – waste categories (DU: 1 metric ton) - XCarb® RRP Hamburg (specific type of production)

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Hazardous waste	kg	2,89E-08	9,53E-10	1,12E-09	-1,96E-09	4,36E-11	-2,26E-06
Non-hazardous waste	kg	5,55E+00	9,69E-02	5,52E-02	1,87E-02	1,00E+01	3,03E+00
Radioactive waste	kg	6,35E-02	2,88E-03	6,78E-04	3,99E-03	2,28E-05	-6,96E-03
Components for re-use	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,10E+02
Materials for recycling	kg	0,00E+00	0,00E+00	0,00E+00	8,80E+02	0,00E+00	0,00E+00

Verification

The process of verification of this EPD is in accordance with ISO 14025 and ISO 21930. After verification this EPD is valid for a 5-year-period. EPD does not have to be recalculated after 5 years. if the underlying data have not changed significantly.

The basis for LCA analysis was EN 15804+A2 and ITB PCR A (1.6)
Independent verification corresponding to ISO 14025 (sub clause 8.1.3.) [x] external [ ] internal
External verification of EPD: Halina Prejzner. PhD. Eng. LCI audit and verification: Michał Chwedaczuk. M.Sc. Eng. LCA, LCI audit and input data verification: Michał Piasecki. PhD., D.Sc., eng.

Note 1: The declaration owner has the sole ownership, liability, and responsibility for the information provided and contained in EPD. Declarations of construction products may not be comparable if they do not comply with EN 15804+A2. For further information about comparability. see EN 15804+A2 and ISO 14025.

Note 2: ITB is a public Research Organization and Notified Body (EC Reg. no 1488) to the European Commission and to other Member States of the European Union designated for the tasks concerning the assessment of building products' performance. ITB acts as the independent. third-party verification organization (see ISO 17025/17065/17029). ITB-EPD program is recognized and registered member of The European Platform - Association of EPD program operators and ITB-EPD declarations are registered and stored in the international ECO-PORTAL.

Normative references

- ITB PCR A General Product Category Rules for Construction Products (v.1.6..2023)
- ISO 14025:2006. Environmental labels and declarations – Type III environmental declarations – Principles and procedures
- ISO 21930:2017 Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services
- ISO 14044:2006 Environmental management – Life cycle assessment – Requirements and guidelines
- ISO 15686-1:2011 Buildings and constructed assets – Service life planning – Part 1: General principles and framework
- ISO 15686-8:2008 Buildings and constructed assets – Service life planning – Part 8: Reference service life and service-life estimation
- EN 15804:2012+A2:2019 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products
- ISO 14067:2018 Greenhouse gases — Carbon footprint of products — Requirements and guidelines for quantification
- PN-EN 15942:2012 Sustainability of construction works – Environmental product declarations – Communication format business-to-business
- ISO 20915:2018 Life cycle inventory calculation methodology for steel products
- World Steel Association 2017 Life Cycle inventory methodology report for steel products

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CERTIFICATE № 688/2024
of TYPE III ENVIRONMENTAL DECLARATION

Products:

Hot rolled bars and wires

Manufacturer:

ArcelorMittal Long Products Europe
24-26 boulevard d'Avranches, L-1160 Luxembourg

confirms the correctness of the data included in the development of
Type III Environmental Declaration and accordance with the requirements of the standard

EN 15804+A2: 2019

Sustainability of construction works.
Environmental product declarations.
Core rules for the product category of construction products.

This certificate, issued on 24th October 2024 is valid for 5 years
or until amendment of mentioned Environmental Declaration

Head of the Thermal Physic, Acoustics and Environment Department
Agnieszka Winkler-Skalna, PhD

INSTYTUT TECHNIKI BUDOWLANEJ

Deputy Director for Research and Innovation
Krzysztof Kuczyński, PhD

Warsaw, October 2024