ArcelorMittal

Environmental
Product
Declaration

According to EN15804+A2 (+indicators A1)

This declaration is for:
EcoSheetPile™ Plus - Green Electricity

Provided by:
ArcelorMittal Projects Europe

MRPI® registration:
1.1.01103.2026

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Stichting MRPI®
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www.mrpi.nl

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ECO PLATFORM EPD VERIFIED

Nationale MILIEUDATABASE

MRPI milieu relevante product informatie

COMPANY INFORMATION

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MRPI® REGISTRATION

1.1.01103.2026

DATE OF THIS ISSUE

24-2-2026

EXPIRY DATE

24-2-2031

SCOPE OF DECLARATION

This MRPI®-EPD certificate is verified by Bob Roijen, SGS INTRON B.V. 6136 GV Sittard The Netherlands. The LCA study has been done by Kamiel Jansen & Pien van den Heuvel & Jaap van der Veen, Aveco de Bondt. The certificate is based on an LCA-dossier according to EN15804+A2 (+indicators A1). It is verified according to the 'Verification protocol for MRPI LCA project report & EPD 21th of May 2025, V. 5.2'. EPDs of construction products may not be comparable if they do not comply with EN15804+A2. Declaration of SVHC that are listed on the 'Candidate list of Substances of Very High Concern for authorisation' when content exceeds the limits for registration with ECHA.

PROGRAM OPERATOR

Stichting MRPI®
Kingsfordweg 151
1043 GR
Amsterdam

PRODUCT

EcoSheetPile™ Plus - Green Electricity

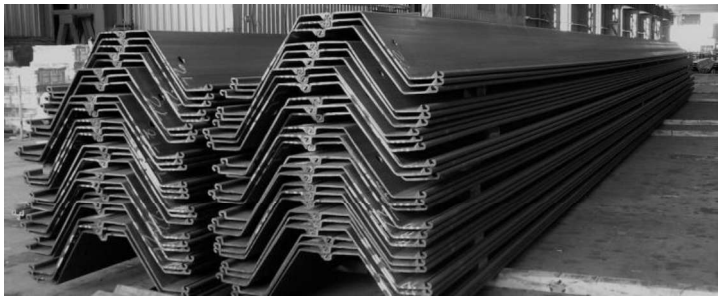
DECLARED UNIT / FUNCTIONAL UNIT

1000 Mass (kg)

DESCRIPTION OF PRODUCT

Steel sheet piles are rolled steel profiles with longitudinal clutches at each side. Sheet piles can be connected to each other, allowing the construction of a continuous wall.

VISUAL PRODUCT



MORE INFORMATION

https://projects.arcelormittal.com/foundationsolutions

Ing. L. L. Oosterveen MSc. MBA **Managing Director MRPI**	DEMONSTRATION OF VERIFICATION CEN standard EN15804 serves as the core PCR [1]
	Independent verification of the declaration and data according to EN15804+A2 (+indicators A1) Internal: External: X
	Third party verifier: Bob Roijen, SGS INTRON B.V. 6136 GV Sittard The Netherlands
	[1] PCR = Product Category Rules

DETAILED PRODUCT DESCRIPTION

Product description / Product definition
Steel sheet piles are rolled steel profiles with longitudinal clutches at each side. These clutches allow individual sheet piles to be connected to one another, creating a mechanical interlock and enabling the construction of a continuous wall. This EPD applies to 1 metric ton of EcoSheetPiles™ Plus. EcoSheetPiles™ Plus are produced at the ArcelorMittal sites Differdange/Esch-Belval in Luxembourg (296 Bd Charles de Gaulle, 4083 Esch-sur-Alzette, Luxembourg) from ca. 100% scrap in an electric arc furnace (EAF) process powered by 100% renewable electricity with Guarantee of Origin. A Guarantee of Origin belongs to this product and comes with purchase. EcoSheetPiles™ Plus are 100% reusable and recyclable. The types of EcoSheetPiles™ Plus available are: Z-shaped, U-shaped, straight-web, and H-shaped. The available steel grades for EcoSheetPile™ Plus profiles range from S240 GP to S500 GP (according to EN10248) and equivalent grades.

Application
Hot-rolled steel sheet piles are used to build quite impervious retaining walls and cut-off walls, in permanent or temporary applications in the construction and infrastructure field. Their primary purpose is to retain soil and/or water. Typical applications include:
- Ports and waterways: quay walls, jetties, breakwaters, riverbanks, embankments, flood protection walls, locks, and temporary cofferdams.
- Land-based structures: retaining walls, underground car parks, basements, underpasses, bridge abutments, cut-off walls (e.g. contaminated soils), and pit excavations.

Technical Data
This EPD is valid for EcoSheetPiles™ Plus steel piling products of varied grades and geometries, as well as different forms of delivery. Specific information on dimensions, tolerances, structural data and mechanical and chemical properties can be found in the relevant standards /EN 10248/.

Manufacturing process
The EcoSheetPiles™ Plus are manufactured on the sites of ArcelorMittal Belval & Differdange. The production goes through the following main technological steps:
- Scrap melting in Electric Arc Furnace
- Steel refining in Ladle Furnace;
- Continuous casting;
- Hot rolling;
- Cooling and finishing.

Reference service life
The reference service life of the sheet piles is taken as 100 years. In practice, the sheet piles are designed in accordance with the specific project requirements and the intended service life defined for that project.

Components
In the average composition, the base material of the sheet piles is iron, with alloying elements added either as ferroalloys or as pure metals. Variations in carbon content and alloying elements modify the chemical and physical properties of the steel, including strength, ductility, and toughness. Common alloying elements include manganese, copper, silicon, and others. The exact composition varies depending on the steel grade. These material additions represent only a small percentage of the final product by mass, as shown in the table.
* According to ISO14021:2016, the average recycled content, which includes pre- and post-consumer recycled scrap and additional sources of Fe (such as ferro alloys), is approximately 98%.

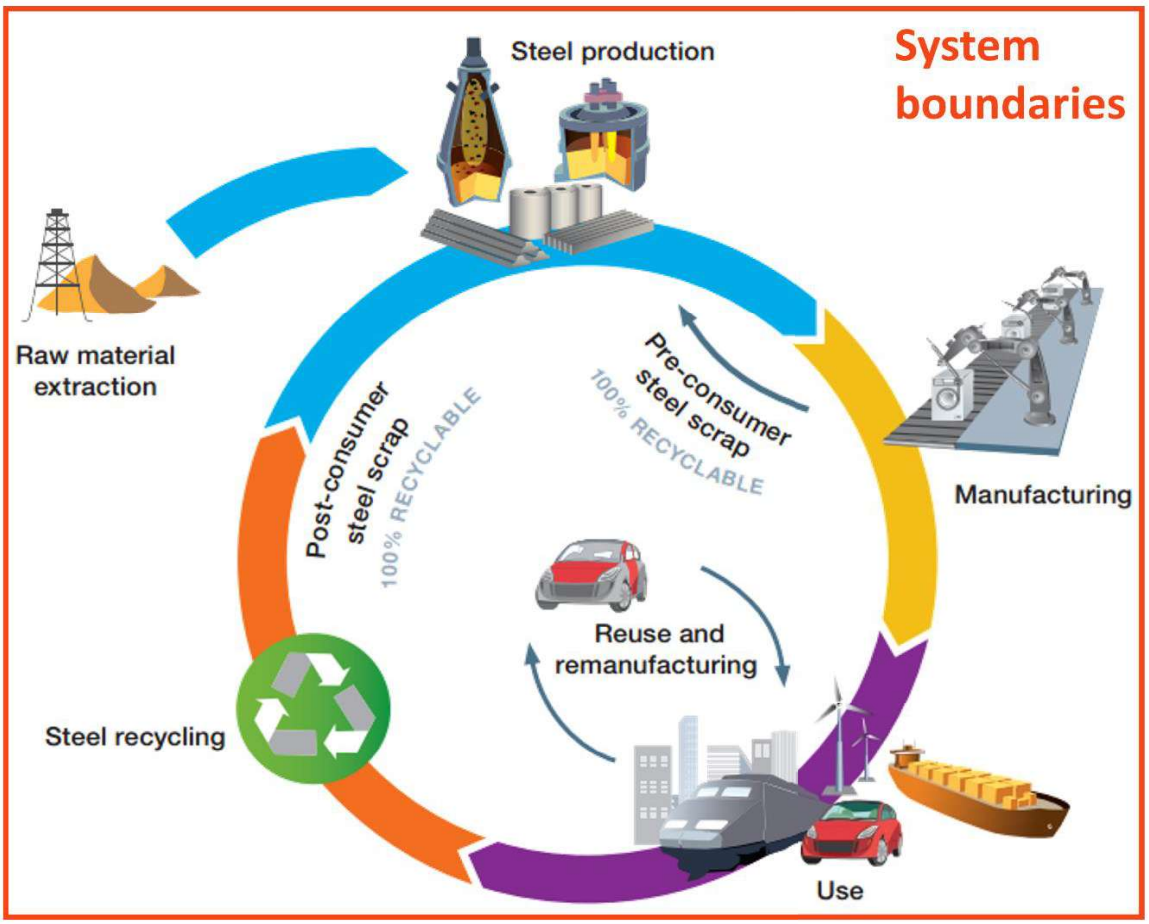
Component (> 1%)	(kg / %)
Iron	> 97%
Carbon	< 0,2 %
Manganese	< 1,7%
Silicon	< 0,55%
Copper	< 0,55%
Other	< 0.2%

SCOPE AND TYPE

The system boundary of this assessment covers the full life cycle from cradle to grave, including all activities related to the supply and transport of raw materials, the production process, installation, the use phase, and the end-of-life stage of the material after use.
The studied product is manufactured by a single producer and is applied in the Dutch market. This declaration encompasses a group of products (Z-shaped, U-shaped, straight-web, and H-shaped profiles) that are produced using the same manufacturing process at the ArcelorMittal production sites in Differdange and Esch-Belval. The environmental impact between the two mill locations is calculated using a weighted average. The difference between the two locations is small (less than 20%).
The reference year for data collection is 2019. The LCA model for this MRPI EPD was created using SimaPro software (version 9.6) and R<Think software (version 2.0). The underlying methodology is the NMD Determination Method v1.2, including Amendment 5. Life cycle inventory data for all raw materials and process inputs sourced from the background system are taken from:
- EcoInvent 3.6 and EF 3.0 (for Set 1 indicators)
- EcoInvent 3.9.1 and EF 3.1 (for Set 2 indicators)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport gate to site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction 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
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

X = Modules Assessed
ND = Not Declared



REPRESENTATIVENESS

The input data are representative for EcoSheetPiles™ Plus, a product of ArcelorMittal. The data are representative for The Netherlands.

ENVIRONMENTAL IMPACT per functional unit or declared unit (indicators A1)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
ADPE	kg Sb eq.	3,73E-03	1,52E-04	5,92E-03	9,81E-03	6,08E-04	1,52E-04	5,30E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,57E-05	1,08E-04	2,91E-04	9,15E-07	-2,25E-03
ADPF	MJ	3,75E+02	1,61E+02	4,62E+03	5,16E+03	5,50E+02	4,20E+02	1,61E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,13E+02	6,46E+01	2,28E+02	2,27E+01	-1,18E+03
GWP	kg CO2 eq.	2,74E+01	1,04E+01	3,18E+02	3,56E+02	3,55E+01	2,95E+01	5,69E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,21E+01	4,22E+00	1,67E+01	8,01E-01	-8,15E+01
ODP	kg CFC11 eq.	2,24E-06	1,79E-06	4,19E-05	4,60E-05	6,70E-06	5,02E-06	1,89E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,88E-06	7,49E-07	1,98E-06	2,65E-07	-1,05E-05
POCP	kg ethene eq.	2,76E-02	6,89E-03	1,41E-01	1,75E-01	2,16E-02	9,76E-03	7,41E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,80E-03	2,55E-03	1,31E-02	8,49E-04	-4,02E-02
AP	kg SO2 eq.	2,06E-01	4,10E-02	7,64E-01	1,01E+00	9,28E-02	9,82E-02	4,16E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,48E-02	1,86E-02	1,44E-01	5,92E-03	-2,32E-01
EP	kg (PO4) 3 eq.	3,16E-02	7,30E-03	9,60E-02	1,35E-01	1,52E-02	1,88E-02	8,06E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,49E-02	3,65E-03	3,10E-02	1,11E-03	-3,09E-02

Toxicity indicators and ECI (Dutch market)

HTP	kg DCB eq.	2,13E+01	4,91E+00	1,52E+02	1,78E+02	7,64E+00	9,71E+00	2,33E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,74E+00	1,78E+00	1,60E+01	3,27E-01	-4,08E+01
FAETP	kg DCB eq.	1,42E+00	1,15E-01	1,24E+00	2,78E+00	3,21E-01	1,80E-01	9,66E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,30E-01	5,19E-02	2,24E-01	8,12E-03	-6,37E-01
MAETP	kg DCB eq.	1,80E+03	4,51E+02	4,33E+03	6,59E+03	8,69E+02	5,71E+02	3,42E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,30E+02	1,87E+02	1,35E+03	2,79E+01	-1,51E+03
TETP	kg DCB eq.	6,25E-02	1,91E-02	9,20E-01	1,00E+00	4,36E-02	8,71E-02	3,03E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,55E-02	6,29E-03	5,22E-02	9,68E-04	-2,30E-01
ECI	euro	4,71E+00	1,27E+00	3,46E+01	4,06E+01	3,15E+00	3,03E+00	7,99E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,23E+00	5,09E-01	3,32E+00	1,10E-01	-9,31E+00
ADPF	kg Sb eq.	1,80E-01	7,73E-02	2,22E+00	2,48E+00	2,65E-01	2,02E-01	7,72E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,51E-01	3,11E-02	1,09E-01	1,09E-02	-5,69E-01

ADPE = Abiotic Depletion Potential for non-fossil resources
ADPF = Abiotic Depletion Potential for fossil resources
GWP = Global Warming Potential
ODP = Depletion potential of the stratospheric ozone layer
POCP = Formation potential of tropospheric ozone photochemical oxidants
AP = Acidification Potential of land and water
EP = Eutrophication Potential
HTP = Human Toxicity Potential
FAETP = Fresh water aquatic ecotoxicity potential
MAETP = Marine aquatic ecotoxicity potential
TETP = Terrestrial ecotoxicity potential
ECI = Environmental Cost Indicator
ADPF = Abiotic Depletion Potential for fossil resources

ENVIRONMENTAL IMPACT per functional unit or declared unit (core indicators A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-total	kg CO2 eq.	5,97E+01	1,54E+01	3,19E+02	3,94E+02	3,94E+01	3,31E+01	6,69E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,47E+01	4,70E+00	1,62E+01	8,08E-01	-9,03E+01
GWP-fossil	kg CO2 eq.	5,92E+01	1,53E+01	3,18E+02	3,93E+02	3,93E+01	3,30E+01	6,69E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,47E+01	4,68E+00	1,70E+01	8,18E-01	-9,00E+01
GWP-biogenic	kg CO2 eq.	3,88E-01	1,10E-02	8,38E-01	1,24E+00	2,91E-02	4,24E-02	3,83E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,56E-02	1,53E-03	-8,66E-01	-1,06E-02	-2,84E-01
GWP-luluc	kg CO2 eq.	5,49E-02	4,70E-02	1,36E-01	2,38E-01	1,28E-02	6,73E-03	4,04E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,70E-03	1,67E-02	1,94E-02	3,60E-04	-5,46E-02
ODP	kg CFC11 eq.	4,23E-07	2,70E-07	7,69E-06	8,38E-06	8,72E-07	7,10E-07	1,94E-08	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,33E-07	8,34E-08	2,30E-06	3,35E-07	-1,92E-06
AP	mol H+ eq.	4,77E-01	8,36E-02	7,94E-01	1,35E+00	9,32E-02	1,16E-01	5,04E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,75E-02	2,24E-02	1,81E-01	7,77E-03	-3,10E-01
EP-fresh water	kg P eq.	2,81E-03	2,51E-04	6,56E-03	9,62E-03	2,58E-04	3,53E-04	5,57E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,19E-04	4,66E-05	4,96E-03	1,46E-05	-2,21E-03
EP-marine	kg N eq.	1,05E-01	3,14E-02	1,75E-01	3,11E-01	2,68E-02	4,39E-02	1,94E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,47E-02	8,52E-03	4,07E-02	2,57E-03	-7,13E-02
EP-terrestrial	mol N eq.	1,18E+00	3,38E-01	2,02E+00	3,54E+00	2,82E-01	4,71E-01	2,07E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,70E-01	9,09E-02	4,76E-01	2,83E-02	-8,11E-01
POCP	kg NMVOC eq.	3,54E-01	1,11E-01	7,14E-01	1,18E+00	1,56E-01	1,63E-01	7,22E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,29E-01	3,10E-02	1,28E-01	8,24E-03	-2,70E-01
ADP-minerals & metals	kg Sb eq.	2,86E-04	4,71E-05	1,87E-03	2,20E-03	6,43E-05	4,16E-05	9,28E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,66E-05	1,47E-05	2,91E-04	9,15E-07	-5,05E-04
ADP-fossil	MJ, net calorific value	6,32E+02	2,21E+02	3,47E+03	4,32E+03	5,76E+02	4,33E+02	1,67E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,31E+02	6,71E+01	2,31E+02	2,29E+01	-9,91E+02
WDP	m3 world eq. Deprived	8,86E+00	1,37E+00	8,27E+01	9,29E+01	3,15E+00	2,48E+00	7,60E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,32E+00	3,66E-01	2,68E+00	1,06E+00	-2,13E+01

GWP-total	=	Global Warming Potential total
GWP-fossil	=	Global Warming Potential fossil fuels
GWP-biogenic	=	Global Warming Potential biogenictotal
GWP-luluc	=	Global Warming Potential land use and land use change
ODP	=	Depletion potential of the stratospheric ozone layer
AP	=	Acidification Potential, Accumulated Exceedence
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 Exceedence
POCP	=	Formation potential of tropospheric ozone photochemical oxidants
ADP-minerals & metals	=	Abiotic Depletion Potential for non-fossil resources [1]
ADP-fossil	=	Abiotic Depletion for fossil resources potential [1]
WDP	=	Water (user) deprivation potential, deprivation-weighted water consumption [1]

Disclaimer [1]:

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

ENVIRONMENTAL IMPACT per functional unit or declared unit (additional indicators A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PM	Disease inci-dence	6,52E-06	1,45E-06	5,21E-06	1,32E-05	3,23E-06	5,59E-07	1,07E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,63E-07	4,63E-07	2,38E-06	1,47E-07	-3,02E-06
IRP	kBq U235 eq.	1,88E+00	2,60E-01	7,74E+00	9,88E+00	2,64E-01	2,77E-01	1,06E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,52E-01	2,62E-02	1,04E+00	9,35E-02	-2,26E+00
ETP-fw	CTUe	6,73E+02	1,47E+02	3,07E+02	1,13E+03	2,69E+02	1,82E+02	7,73E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,46E+02	4,95E+01	5,44E+02	1,27E+01	-2,58E+02
HTP-c	CTUh	4,43E-06	1,00E-08	1,06E-07	4,55E-06	1,21E-08	9,94E-08	3,03E-10	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,59E-08	2,48E-09	1,69E-08	3,23E-10	-1,04E-06
HTP-nc	CTUh	1,02E-06	1,70E-07	2,39E-06	3,58E-06	2,50E-07	1,75E-07	3,73E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,19E-07	5,39E-08	7,32E-07	1,02E-08	-8,21E-07
SQP	-	3,31E+02	1,66E+02	1,18E+03	1,68E+03	5,97E+02	4,59E+01	3,31E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,48E+01	5,30E+01	4,30E+02	4,83E+01	-3,85E+02

PM = Potential incidence of disease due to PM emissions

IRP = Potential Human exposure efficiency relative to U235 [1]

ETP-fw = Potential Comparative Toxic Unit for ecosystems [2]

HTP-c = Potential Comparative Toxic Unit for humans, cancer [2]

HTP-nc = Potential Comparative Toxic Unit for humans, non-cancer [2]

SQP = Potential soil quality index [2]

Disclaimer [1]:

- This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste.

Disclaimer [2]:

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

OUTPUT FLOWS AND WASTE CATEGORIES per functional unit or declared unit (A1 en A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	kg	3,86E-03	1,30E-03	2,02E-02	2,53E-02	3,59E-03	2,75E-03	9,06E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,12E-03	4,28E-04	2,79E-04	1,61E-05	-5,81E-03
NHWD	kg	6,95E+01	1,19E+01	3,10E+01	1,12E+02	5,18E+01	2,44E+00	4,13E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,12E+00	4,43E+00	6,71E+00	1,50E+02	-2,58E+01
RWD	kg	1,44E-03	1,90E-04	6,12E-03	7,76E-03	1,68E-04	2,00E-04	4,00E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,04E-04	1,54E-05	1,33E-03	1,49E-04	-1,78E-03
CRU	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,19E+02	0,00E+00	0,00E+00
MFR	kg	0,00E+00	0,00E+00	1,75E+02	1,75E+02	0,00E+00	1,00E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,31E+02	0,00E+00	0,00E+00
MER	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EEE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
ETE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

HWD = Hazardous Waste Disposed
NHWD = Non Hazardous Waste Disposed
RWD = Radioactive Waste Disposed
CRU = Components for reuse
MFR = Materials for recycling
MER = Materials for energy recovery
EEE = Exported Electrical Energy
ETE = Exported Thermal Energy

RESOURCE USE per functional unit or declared unit (A1 and A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ	1,62E+02	5,95E+00	2,24E+03	2,41E+03	7,53E+00	2,89E+01	1,31E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,15E+00	8,04E-01	6,75E+01	1,17E+00	-5,52E+02
PERM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	1,62E+02	5,95E+00	2,24E+03	2,41E+03	7,53E+00	2,89E+01	1,31E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,15E+00	8,04E-01	6,75E+01	1,17E+00	-5,52E+02
PENRE	MJ	4,02E+02	1,75E+02	4,87E+03	5,45E+03	5,76E+02	4,44E+02	1,63E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,31E+02	6,82E+01	4,91E+02	4,87E+01	-1,25E+03
PENRM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	4,02E+02	1,75E+02	4,87E+03	5,45E+03	5,76E+02	4,44E+02	1,63E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,31E+02	6,82E+01	4,91E+02	4,87E+01	-1,25E+03
SM	kg	1,14E+03	0,00E+00	0,00E+00	1,14E+03	0,00E+00	1,14E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-2,62E+02
RSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NSRF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m3	3,50E-01	3,75E-02	2,56E+00	2,95E+00	9,98E-02	8,51E-02	1,73E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,72E-02	7,82E-03	7,34E-02	2,46E-02	-6,76E-01

PERE = Use of renewable primary energy excluding renewable primary energy 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 resources excluding non-renewable 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 resources
SM = Use of secondary materials
RSF = Use of renewable secondary fuels
NSRF = Use of non-renewable secondary fuels
FW = Use of net fresh water

BIOGENIC CARBON CONTENT per functional unit or declared unit (A1 and A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
BBCpr	kg C	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
BCCpa	kg C	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

BCCpr = Biogenic carbon content in product
BCCpa = Biogenic carbon content in packaging

CALCULATION RULES

The different environmental impact categories and additional parameters, which are required for EPDs in accordance with EN15804+A2 and the Dutch Bepalingsmethode (2025), are calculated. A distinction is made between set 1 and set 2 indicators. In the life cycle assessment the following is included in this study:

Production (A1-A3)
Modules A1-A3 of the EcoSheetPiles™ Plus production include:
- The provision of resources, additives, and energy;
- Transport of resources and additives to the production site;
- Production processes on-site including energy (green electricity mix);
- Production of additives, disposal of production residues, and consideration of related emissions;
- No emissions or waste from packaging are considered, as all raw materials, semi-products as well as the final products are transported bulk/loose.
- Recycling of production/manufacturing scrap. Steel scrap is assumed to reach the end-of-waste status once shredded and sorted, thus becomes input to the product system in the inventory.

The data for the production process (A3) were collected in 2019.

Construction (A4-A5)
A transport distance of 390 km by "Transport by Truck, Euro 6 Diesel" has been considered. This corresponds to the distance between the production site in Belval, Luxembourg to Utrecht, Netherlands, as suggested in the Bepalingsmethode. For project-specific calculations, the actual transport distance can be multiplied by the MKI values per ton-km.
In case of EN 15804+A1, the following values could be used:
- Euro 6 truck: 0,00891 MKI per ton-km
- Euro 6 truck with HVO100: 0,00765 MKI per ton-km
- Inland vessel: 0,00558 MKI per ton-km

In case of EN 15804+A2, the following values could be used:
- Euro 6 truck: 0,018 MKI per ton-km
- Inland vessel: 0,009 MKI per ton-km

Although the equipment needed during the construction phase can differ greatly per location and installation technique, it has been modelled on the same assumptions as the cat 3. report of the NMD for sheet piles. It is assumed that diesel consumption is 30 L per hour for an installation speed of 4 ton / hour (2 double AZ24-700 of 15m length). This leads to a diesel consumption of 7.5 L/ton. Also 1% construction waste has been assumed in A5. This loss is modelled as internally recycled, as it usually comes back to module A1.
For project-specific calculations the contractor can determine these values based on the actual use of equipment and estimated installation speed of the sheet piles.

Use stage (B1-B7)
Sheet piles corrode during their use (B1), leading to a material loss of approximately 11%, which is treated as landfilled inert waste. Also, it is not always possible to extract all the installed material, and hence a 4% additional loss is considered. This is modelled in module B1 using EcoInvent data and could be scaled to a project-specific percentage. There are no impacts associated with modules B2 through B7.

Demolition phase (C1)
This module has been modelled similarly to the module A5, again according to the cat 3. report of the NMD for sheet piles, with a reduction to compensate the 15% material lost and left behind, leading to a diesel consumption of 6.4 L/ton.

Transport (C2)
A 50 km transport has been assumed from the decommissioning site to the sorting/shredding location, as per the Bepalingsmethode. The scrap attains the end-of-waste point after shredding and sorting.

Waste processing (C3) and Disposal (C4)
The following scenario has been assumed, based on a thorough analysis on the end-of-life scenarios of the sheet piles from ArcelorMittal, considering the application, corrosion factors and the unrecoverable materials: 25% Reuse, 60% Recycling, and 15% Landfill (11 % corroded and 4% left in the ground). The end-of-life scenario is primarily based on a parametric study (different profiles, applications and corrosion rates), similar to the base scenario's in the NMD.
For temporary applications, it is assumed that the sheet piles are used eight times, leading to a quality factor of 7/8. End-of-life allocation complies the requirements of EN 15804:2012+A2 (2019), section 6.4.3.3 and generally follows the polluter pays principle. The needed recycling processes up to the end-of-waste point are included in C3, and the final disposal to landfill in C4.

Benefits and loads beyond the system boundaries (D)
This stage contains the potential loads and benefits of recycling and reuse of raw materials/products. The loads contain the necessary recycling processes from end-of-waste point up to the point-of-equivalence of the substituted primary raw material. Since amendment 5 of the Determination method, there is no more load for secondary material that will be lost at the end-of-life stage. The benefits for recycling are calculated based on the primary content and the primary equivalent. Reuse is modelled as - (A1-A3) x quality factor (7/8), the portion that cannot be reused (1/8), is recycled.

End-of-waste point
For the waste profiles, the profiles of the Steel Federation are used, and these profiles are applicable for the Netherlands. The iron or steel scrap is segregated at the source or while collecting and is kept separate; or the input waste is treated to separate the iron and steel scrap from the non-metal and nonferrous components. All mechanical treatment (such as cutting, shearing, shredding or granulating; sorting, separating, cleaning, de-polluting, emptying) needed to prepare the material for direct use has been completed.

Allocation rules
Steel production generates a number of co-products that are sold to and used by other industries.
These are mainly slags from Blast Furnace - Basic Oxygen Furnace or Electric Arc Furnace. The processes that produce these co-products cannot be further subdivided into sub-processes related to each co-product, so allocation is required. The steel industry's allocation method, developed by Worldsteel and EUROFER (2014), has been adapted for A1-A3 modelling. It aligns with EN 15804+A2 and uses physical allocation, considering input/output changes and inherent material properties. This method is deemed to provide the most representative partitioning of the processes involved.

Cut-off rules
Measurement of on-site emissions were performed by ArcelorMittal and those emissions are considered. The specific emissions that are linked to the provision of thermal- and electrical energy are also considered in the specific processes. All reported data are incorporated and modelled using the best available LCI data. Data for the sites were cross-checked with one another to identify potential data gaps. No processes, materials or emissions that are known to make a significant contribution to the environmental impact of the studied products have been omitted. On this basis, there is no evidence to suggest that input or outputs contributing more than 1% to the overall mass or energy of the system - or that are environmentally significant - have been omitted. It can be assumed that all excluded flows contribute less than 5% to the impact assessment categories. Packaging materials and its transportation are neglected due to low contribution to the overall life cycle results. The capital goods are included in the calculation.

Data quality
In this study, primary data were used to model all on-site processes. The foreground data collected by the manufacturer are based on yearly production amounts and extrapolations of measurements on specific machines and plants. The production data refer to 2019. These data were cross-checked to identify and eliminate data gaps.
Secondary data from Ecoinvent "cut-off by classification" database (3.6 for set 1 indicators, and 3.9.1 for set 2 indicators) were used as the main source for the secondary data for upstream and downstream processes database. These data were as technologically and geographically representative as possible.

SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

The End-of-Life scenarios (i.e. 25% reuse, 60% recycling and 15% landfill) considered in this study are based on the statistical data from ArcelorMittal. Ultimately, while using the EPD data for the Environmental Cost Indicator calculations, the end user must be able to determine the project-specific scenarios. Hence, three 100% scenarios are defined for reuse, recycling and landfill. To reach the desired project-specific end-of-life scenario, the user should multiply the project-specific ratios of reuse, recycling and landfill with the 100% scenarios, and add them together to get the project-specific end-of-life MKI value.

Additional information on the MKI for set 2 results from the main table and default scenario:
The MKI for modules A1-A3 is € 65,92 /ton; A4 is €7,25 /ton; A5 is €5,05 /ton; B1 is €0,18 /ton and B2-B7 = €0,-/ton.

End of Life scenario (set 1 results)	MKI C1	MKI C2	MKI C3	MKI C4	MKI D	MKI total C1-D
Default	2,23	0,51	3,32	0,11	-9,31	-3,14
100% reuse, quality factor 7/8	2,63	0,11	0,66	0	-35,63	-32,23
100% recycling	2,63	0,81	5,26	0	-0,68	8,02
100% landfill	0	0	0	0,73	0	0,73

End of Life scenario (set 2 results)	MKI C1	MKI C2	MKI C3	MKI C4	MKI D	MKI total C1-D
Default	3,73	0,97	4,20	0,24	-15,11	-5,97
100% reuse, quality factor 7/8	4,39	0,19	0,83	0	-57,82	-52,41
100% recycling	4,39	1,54	6,66	0	-1,10	11,49
100% landfill	0	0	0	1,60	0	1,60

DECLARATION OF SVHC

No substances listed on the "Candidate List of Substances of Very High Concern for Authorisation" by the European Chemicals Agency EC 1907-2006 are present in the steel in declarable quantities.

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