

ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025 / ISO 21930

RMS VNSS
VOSSLOH COGIFER KIHN
TRAFIKVERKET



EPD HUB, HUB-0057

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GENERAL INFORMATION

MANUFACTURER

Manufacturer	VOSSLOH COGIFER KIHN
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Contact details	contact-kihn@vossloh.com
Website	www.vossloh.com

EPD STANDARDS, SCOPE AND VERIFICATION

Program operator	EPD Hub, hub@epdhub.com
Reference standard	EN 15804+A2:2019 and ISO 14025
PCR	EPD Hub Core PCR version 1.0, 1 Feb 2022
Sector	Construction product
Category of EPD	Third party verified EPD
Scope of the EPD	Cradle to gate with options, A5, and modules C1-C4 and D
EPD author	Fadi FIKANI, Simon Christiansen & associates, Ingénieurs-Conseils S.A.
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal certification ☒ External verification
EPD verifier	E.A as an authorized verifier acting for EPD Hub Limited

The manufacturer has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programs may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context.

PRODUCT

Product name	RMS VNSS
Additional labels	Welded rail profiles 60E1 and 50E3 18m Tong
Product reference	1013124 and 1013125
Place of production	Rumelange, Luxembourg.
Period for data	Data represents the 2019 calendar year.
Averaging in EPD	No averaging

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 kg
Declared unit mass	1 kg
GWP-fossil, A1-A3 (kgCO ₂ e)	2,62
GWP-total, A1-A3 (kgCO ₂ e)	2,61
Secondary material, inputs (%)	15,6
Secondary material, outputs (%)	92,0
Total energy use, A1-A3 (kWh)	7,07
Total water use, A1-A3 (m ³ e)	6,32E-3

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

Vossloh is a globally active, listed technology company with a core focus on rail infrastructure. The company provides an integrated offer for rail transportation, all from a single source. This includes unique, high-performance key products and complex systems such as track fastening systems, concrete ties, switch systems, crossings and the innovative services associated with the life cycle of rail tracks.

The Vossloh Group is represented in 20 countries worldwide. With an average of 3,482 employees, the Group generated sales worth €869.7 million in 2020 (45 percent from outside Europe). Vossloh solutions are benchmarks in many countries around the world. Global presence means that Vossloh customers receive integrated solutions for their infrastructure wherever they are, from one source.

Vossloh cogifer Kihn is an entity of the division Railway infrastructure. VC Kihn, the Luxembourg subsidiary, was founded in 1893 with the opening of a forge in a region rich in iron ore. For many years, VC Kihn has been a world-renowned specialist in the design and construction of tramway turnouts, crossings, and turnout combinations. VC Kihn is unique in the Group in its ability to forge switch tongs. The company offers a varied and increasingly demanding clientele its design skills, its large stock of numerically controlled machines, and its diversified experience that is more than a century old, all backed by a solid industrial shareholding. The support of the worldwide Vossloh group enables it to offer "turnkey" solutions to its customers, from integrated signalling solutions to assistance in the installation and maintenance of the equipment.

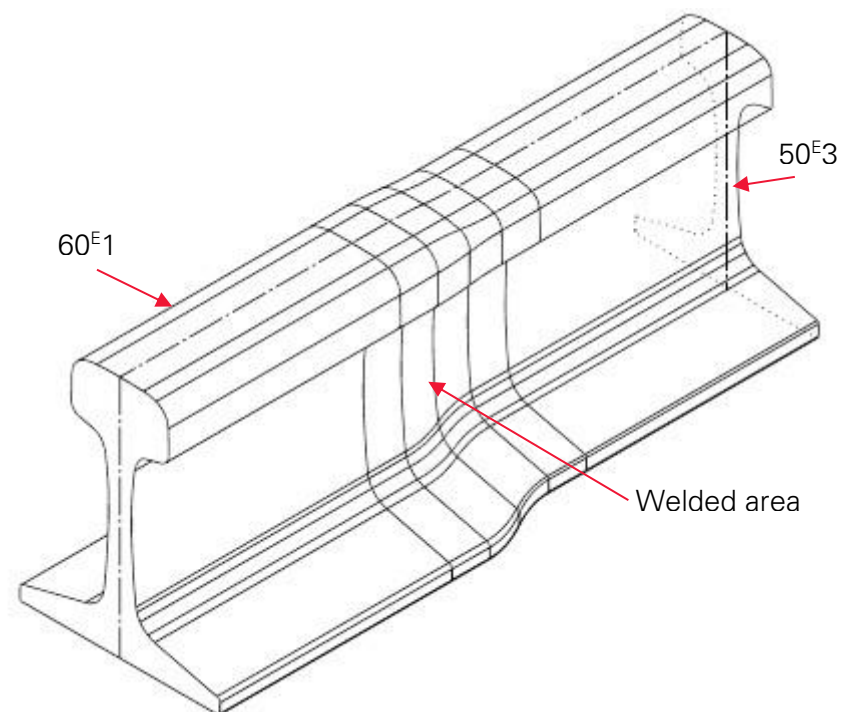
PRODUCT DESCRIPTION

Welded mixed rail: profile 60E1 and profile 50E3 welded together to a length of 18 m.

Products application: transition rail in a railway switch. Transition rail between the track rail and the tong rail in the switch. The tong rail allows a change of direction.

Technical specification: steel quality is LHT or low carbon heat treatment. Product Standards: EN 16273 norm for forging. EN 14587-1 norm for welding.

Physical properties of the product: 100% recyclable steel transition rails. Further information can be found at www.vossloh.com.



Transition rail profiles 60E1 and 50E3 welded section

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
Metals	>99.99	EU
Minerals	<0001	EU
Fossil materials	-	-
Bio-based materials	-	-

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

Biogenic carbon content in product, kg C	N/A
Biogenic carbon content in packaging, kg C	0.0018

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 kg of RMS VNSS Transition Rails 60E1/50E3 R350LHT
Mass per declared unit	1 kg

SUBSTANCES, REACH - VERY HIGH CONCERN

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

PRODUCT LIFE-CYCLE

SYSTEM BOUNDARY

This EPD covers the life-cycle modules listed in the following table.

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

Modules not declared = MND. Modules not relevant = MNR.

MANUFACTURING AND PACKAGING (A1-A3)

Vossloh receives two rail profiles 60E1 and 50E3 from Austria by train. They are unpacked and transported to a waiting area. Broken wood packaging beams and Polystyrene strapping are set aside for recycling. Profile 60E1 is then transferred to a manual station and get heated using a torch burning propane and oxygen from pressurized gas containers. While hot, the rail is transferred to a forging machine nearby. The machine forges the hot end to conform its profile to match the profile of 50E3 steel rail, in preparation for butt welding. The steel rail is then transferred to a manual grinding station to grind and square the forged end allowing a perfect surface match with its 50E3 counterpart. Profile 50E3 is also transferred and its end manually ground and squared, as needed, to match its counterpart. Both steel rails are then transferred to the soldering machine where they are introduced with their recently ground profiles facing each other in preparation to electric arc welding. The electric welding process does not require any additional metal, ancillary gases, or flux products.

After welding, the Mixed Welded Rail (Rail Mixte Soudé or RMS) is transferred to an on-site supplier to grind and smooth the welded area. The RMS is then transferred to the Press machine where it undergoes horizontal and vertical pressing as well as a last touch grinding. Next, the RMS is transferred to the control zone where the quality of the weld is checked with Ultrasound and Magnetic Crack Testing. Before leaving the control zone, the welded area of the RMS is coated with rustproof paint. The finished RMS is then transferred to the expedition area waiting for shipping. Shipping trucks lay the RMS on 8x 10x 2500 cm wood beams and strap them tight with reusable strapping.

The consumption of hydraulic oil by manufacturing machines is reported. The manufacturing process requires various sources of energy: namely electricity, diesel, compressed oxygen, and propane. The factory is provided heat and hot water from natural gas, and it resorts to electric lighting.

TRANSPORT AND INSTALLATION (A4-A5)

The transportation module A4 is out of the EPD scope.

Installation module A5 accounts for wood packaging biogenic carbon balancing.

It also accounts for RMS rail installation in the field assuming a fastening system that includes 4 Coach screws, 2 hook bolts, and 2 rail clips evenly spaced every 0.7m. A5 assumptions represent a typical installation practice used in the field.

No installation material losses occur during the process.

PRODUCT USE AND MAINTENANCE (B1-B7)

This EPD does not cover the use phase.

Air, soil, and water impacts during the use phase have not been studied.

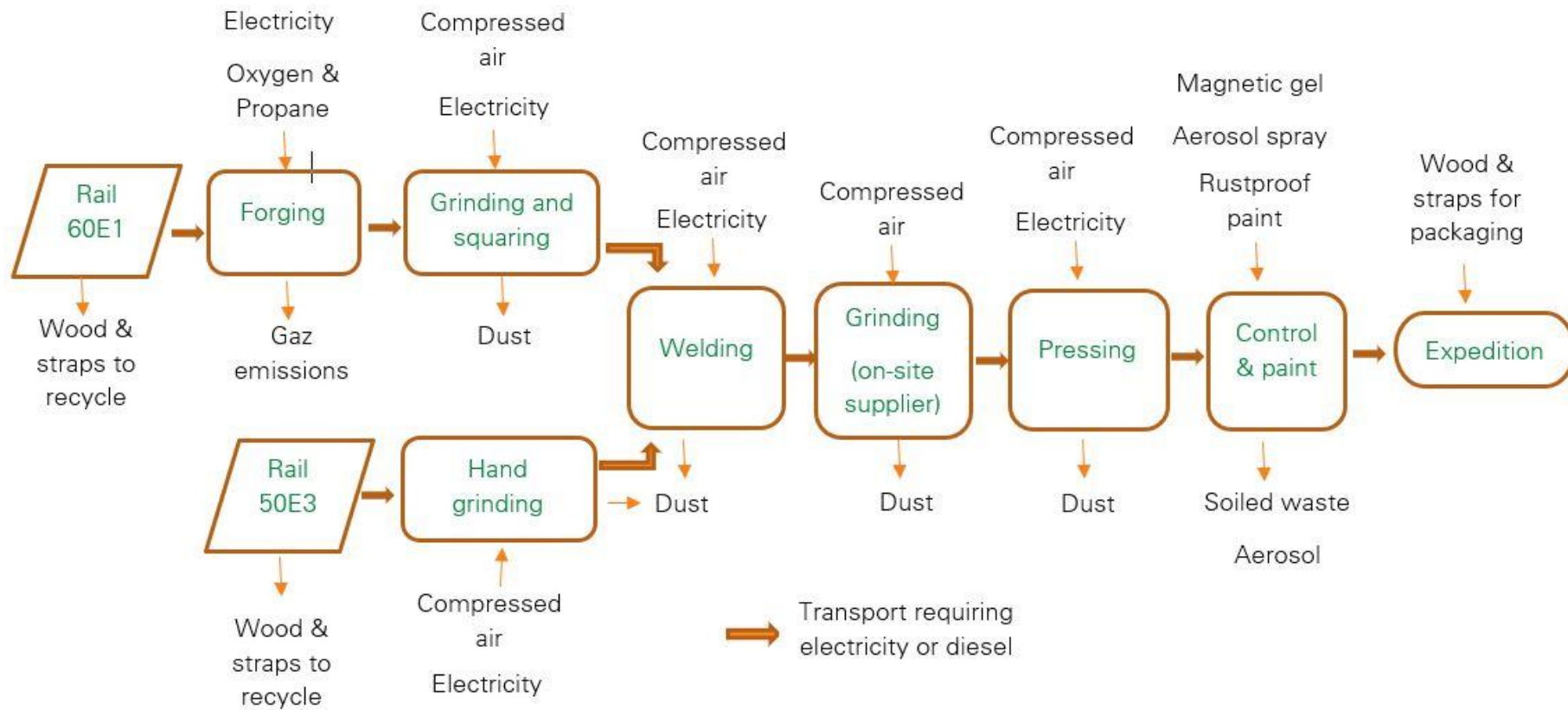
PRODUCT END OF LIFE (C1-C4, D)

References from similar products EPDs are used to estimate the railways dismantling consumption of energy. Railways dismantling is assumed to be done with an excavator consuming 28,15 kWh per ton of railways for diesel used by work machines. The source of energy is diesel fuel used by building machines (C1).

It is estimated that there is no mass loss during the use of the product. At its end-of-life, the product is assumed to have the same weight as the declared product. If not re-used for another similar application, the product is assumed to be sent to the closest recycling or landfill facility. Transportation distance to the closest disposal area is estimated to be 50 km and the transportation method is estimated to be large-tonnage truck (usual load capacity: 32 tons) EURO 5 (the most common) (C2).

References from similar products EPDs are used to estimate the railways end of life scenarios. Approximately 92% of steel is assumed to be recycled (C3). It is assumed that the 1 % of steel is taken to landfill for final disposal (C4). The remaining 7% of railway steel is assumed to be reused (D). Due to the recycling process, the end-of-life product is converted into recycled steel, while the shipping wooden beams are incinerated for energy recovery (D).

MANUFACTURING PROCESS



LIFE-CYCLE ASSESSMENT

CUT-OFF CRITERIA

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

The study includes all major raw material and energy consumption. All inputs and outputs of the unit processes, for which data is available, are included in the calculation. There is no neglected unit process more than 1% of total mass or energy flows. The module specific total neglected input and output flows also do not exceed 5% of energy usage or mass.

For easier modelling and because of lack of accuracy in available modelling resources some constituents under 0,15% of product mass are excluded from modules A1-A3. These include ancillary materials present in the product in very small amounts. The mass percentage per declared unit of those ancillary products is 0.16%.

The production of capital equipment, construction activities, and infrastructure, maintenance, and operation of capital equipment (except for use of hydraulic lubrication oil), personnel-related activities, energy (except for electrical and heating manufacturing area needs) and water use related to company management and sales activities are excluded.

ALLOCATION, ESTIMATES AND ASSUMPTIONS

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation. In this study, as per the reference standard, allocation is conducted in the following order:

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

3. Allocation should be based on economic values.

A general allocation for EPD input concerns calculating the weight ratio between 1 RMS unit and 1 RMS Kg (which represents 1 declared unit). As the EPD is done for the 18m RMS that weighs 1023 Kg, the weight allocation rate is $= 1/1023 = 0.00098$ or 0.098%.

Allocation could not be avoided for ancillary material and waste production, as the information was only measured on production process level. The inputs were allocated to studied product based on annual production volume. Those allocations were done by the customer before submitting the data to the EPD team.

Energy flow allocation regarding the heat and electricity consumption in the factory halls where the RMS are produced is done. The allocation, based on the 2019 energy consumption data, relies on the number of RMS VNSS produced relative to the total number of rails produced in the Forging unit halls. Since the production processes of these products are similar, the annual production percentages are used for allocation.

This LCA study is conducted in accordance with all methodological considerations, such as performance, system boundaries, data quality, allocation procedures, and decision rules to evaluate inputs and outputs.

Allocation used in Ecoinvent 3.6 environmental data sources follows the methodology 'allocation, cut-off by classification'. This methodology is in line with the requirements of the EN 15804 -standard.

AVERAGES AND VARIABILITY

N/A

LCA SOFTWARE AND BIBLIOGRAPHY

This EPD has been created using One Click LCA EPD Generator.

The LCA and EPD have been prepared according to the reference standards and ISO 14040/14044.

Ecoinvent and One Click LCA databases were used as sources of environmental data.

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

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

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

Ecoinvent database v3.6 (2019) and One Click LCA database.

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

GENERAL PRODUCT INFORMATION

Rail profiles 60E1 and 50E3 are shipped from Austria to Vossloh Luxembourg. Upon arrival, the profiles are forged and welded to form a 18m RMS VNSS Transition Rails 60E1/50E3 R350LHT Right or Left. All raw material quantities, manufacturing steps, energy requirements, and ancillary materials are exactly the same for the Right and Left Transition Rails that are represented in this EPD. The installation module (A5) is included in the EPD to balance the wood beams packaging Biogenic carbon mass as per EN 15804+A2 requirements.

The finished products are then shipped to Sweden where they get installed in the country's rail network. Trafikverket, the Swedish Transport Administration, is the final customer. It orders the track components from VNSS, for which VC Kihn produces the transition rails. Trafikverket is responsible for the long-term planning of the transport system for road, rail, shipping, and aviation. Its role is to develop an efficient and sustainable transport system. In this context, Trafikverket requires its suppliers to provide an EPD.

ENVIRONMENTAL IMPACT DATA

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total	kg CO ₂ e	2,49E0	4,96E-2	7,5E-2	2,61E0	MND	3,78E-2	MND	MND	MND	MND	MND	MND	MND	9,28E-3	4,58E-3	2,14E-2	5,28E-5	-1,15E0
GWP – fossil	kg CO ₂ e	2,48E0	4,92E-2	8,6E-2	2,62E0	MND	3,02E-2	MND	MND	MND	MND	MND	MND	MND	9,28E-3	4,58E-3	2,27E-2	5,27E-5	-1,17E0
GWP – biogenic	kg CO ₂ e	4,81E-3	2,81E-4	-1,11E-2	-6,04E-3	MND	7,57E-3	MND	MND	MND	MND	MND	MND	MND	2,58E-6	3,32E-6	-1,3E-3	1,04E-7	2,16E-2
GWP – LULUC	kg CO ₂ e	1,37E-3	5,93E-5	5,05E-5	1,48E-3	MND	2,33E-5	MND	MND	MND	MND	MND	MND	MND	7,84E-7	1,38E-6	2,58E-5	1,56E-8	-8,29E-5
Ozone depletion pot.	kg CFC-11e	1,36E-7	6,74E-9	1,62E-8	1,59E-7	MND	3,1E-9	MND	MND	MND	MND	MND	MND	MND	2E-9	1,08E-9	3,26E-9	2,17E-11	-3,6E-8
Acidification	mol H ⁺ e	1,25E-2	4,2E-4	4,75E-4	1,34E-2	MND	1,45E-4	MND	MND	MND	MND	MND	MND	MND	9,7E-5	1,92E-5	2,75E-4	5E-7	-4,69E-3
EP-freshwater ³⁾	kg Pe	1,12E-4	2,12E-6	7,65E-7	1,15E-4	MND	1,62E-6	MND	MND	MND	MND	MND	MND	MND	3,75E-8	3,72E-8	1,57E-6	6,36E-10	-4,99E-5
EP-marine	kg Ne	2,29E-3	1,47E-4	1,97E-4	2,63E-3	MND	3,33E-5	MND	MND	MND	MND	MND	MND	MND	4,29E-5	5,79E-6	6,07E-5	1,72E-7	-9,31E-4
EP-terrestrial	mol Ne	2,55E-2	1,63E-3	2,18E-3	2,93E-2	MND	3,47E-4	MND	MND	MND	MND	MND	MND	MND	4,7E-4	6,4E-5	7,05E-4	1,9E-6	-9,86E-3
POCP (“smog”)	kg NMVOCe	1,12E-2	4,43E-4	6,04E-4	1,23E-2	MND	1,24E-4	MND	MND	MND	MND	MND	MND	MND	1,29E-4	2,06E-5	1,92E-4	5,51E-7	-6,1E-3
ADP-minerals & metals	kg Sbe	2,89E-5	3,97E-7	1,28E-7	2,95E-5	MND	5,83E-7	MND	MND	MND	MND	MND	MND	MND	1,42E-8	7,81E-8	1,26E-6	4,81E-10	-3,07E-6
ADP-fossil resources	MJ	2,14E1	7,22E-1	1,7E0	2,38E1	MND	3,97E-1	MND	MND	MND	MND	MND	MND	MND	1,28E-1	7,12E-2	3,14E-1	1,47E-3	-9,21E0
Water use ²⁾	m ³ e depr.	1,62E0	7,84E-3	8,08E-3	1,63E0	MND	1,06E-2	MND	MND	MND	MND	MND	MND	MND	2,38E-4	2,65E-4	4,46E-3	6,81E-5	-2,17E-1

USE OF NATURAL RESOURCES

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Renew. PER as energy	MJ	1,05E0	6,22E-2	9,46E-2	1,21E0	MND	3,54E-2	MND	MND	MND	MND	MND	MND	MND	6,91E-4	8,96E-4	4,94E-2	1,19E-5	-9,74E-2
Renew. PER as material	MJ	0E0	0E0	9,58E-2	9,58E-2	MND	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	-8,9E-2
Total use of renew. PER	MJ	1,05E0	6,22E-2	1,9E-1	1,31E0	MND	3,54E-2	MND	MND	MND	MND	MND	MND	MND	6,91E-4	8,96E-4	4,94E-2	1,19E-5	-1,86E-1
Non-re. PER as energy	MJ	2,18E1	7,22E-1	1,7E0	2,42E1	MND	3,97E-1	MND	MND	MND	MND	MND	MND	MND	1,28E-1	7,12E-2	3,14E-1	1,47E-3	-9,21E0
Non-re. PER as material	MJ	0E0	0E0	0E0	0E0	MND	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Total use of non-re. PER	MJ	2,18E1	7,22E-1	1,7E0	2,42E1	MND	3,97E-1	MND	MND	MND	MND	MND	MND	MND	1,28E-1	7,12E-2	3,14E-1	1,47E-3	-9,21E0
Secondary materials	kg	1,56E-1	0E0	9,62E-7	1,56E-1	MND	4,92E-3	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	4,48E-1
Renew. secondary fuels	MJ	0E0	0E0	0E0	0E0	MND	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Non-ren. secondary fuels	MJ	0E0	0E0	0E0	0E0	MND	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Use of net fresh water	m ³	5,84E-3	2,53E-4	2,28E-4	6,32E-3	MND	3,3E-4	MND	MND	MND	MND	MND	MND	MND	1,13E-5	1,48E-5	1,28E-4	1,61E-6	-8,32E-3

6) PER = Primary energy resources

END OF LIFE – WASTE

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste	kg	4,33E-5	3,16E-3	1,64E-3	4,84E-3	MND	6,27E-3	MND	MND	MND	MND	MND	MND	MND	1,37E-4	6,92E-5	0E0	1,37E-6	-1,68E-1
Non-hazardous waste	kg	2,04E-2	1E-1	2,91E-2	1,5E-1	MND	7,24E-2	MND	MND	MND	MND	MND	MND	MND	1,47E-3	7,65E-3	0E0	1E-2	-1,79E0
Radioactive waste	kg	1,76E-4	4,26E-6	1,03E-5	1,91E-4	MND	1,66E-6	MND	MND	MND	MND	MND	MND	MND	8,94E-7	4,89E-7	0E0	9,74E-9	2,01E-6

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for re-use	kg	0E0	0E0	0E0	0E0	MND	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Materials for recycling	kg	0E0	0E0	2,92E-4	2,92E-4	MND	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	9,2E-1	0E0	0E0
Materials for energy rec	kg	0E0	0E0	5,74E-4	5,74E-4	MND	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Exported energy	MJ	0E0	0E0	0E0	0E0	MND	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0

ENVIRONMENTAL IMPACTS – EN 15804+A1, CML / ISO 21930

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Global Warming Pot.	kg CO ₂ e	2,63E0	4,84E-2	8,47E-2	2,77E0	MND	2,97E-2	MND	MND	MND	MND	MND	MND	MND	9,21E-3	4,54E-3	2,23E-2	5,17E-5	-1,12E0
Ozone depletion Pot.	kg CFC ₁₁ e	3,03E-11	5,81E-9	1,46E-8	2,04E-8	MND	2,7E-9	MND	MND	MND	MND	MND	MND	MND	1,59E-9	8,55E-10	2,77E-9	1,72E-11	-3,18E-8
Acidification	kg SO ₂ e	6,74E-3	3,12E-4	1,1E-4	7,16E-3	MND	1,05E-4	MND	MND	MND	MND	MND	MND	MND	1,37E-5	9,31E-6	1,71E-4	2,08E-7	-3,67E-3
Eutrophication	kg PO ₄ ³ e	7,97E-4	1,13E-4	3,21E-5	9,43E-4	MND	6,48E-5	MND	MND	MND	MND	MND	MND	MND	2,41E-6	1,88E-6	6,98E-5	4,03E-8	-2,09E-3
POCP ("smog")	kg C ₂ H ₄ e	1,17E-3	1,14E-5	1E-5	1,19E-3	MND	1,12E-5	MND	MND	MND	MND	MND	MND	MND	1,41E-6	5,9E-7	8,02E-6	1,53E-8	-8,84E-4
ADP-elements	kg Sbe	2,89E-5	3,97E-7	1,28E-7	2,95E-5	MND	5,83E-7	MND	MND	MND	MND	MND	MND	MND	1,42E-8	7,81E-8	1,26E-6	4,81E-10	-3,07E-6
ADP-fossil	MJ	2,14E1	7,22E-1	1,7E0	2,38E1	MND	3,97E-1	MND	MND	MND	MND	MND	MND	MND	1,28E-1	7,12E-2	3,14E-1	1,47E-3	-9,21E0

VERIFICATION STATEMENT

VERIFICATION PROCESS FOR THIS EPD

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

- This Environmental Product Declaration
- The Life-Cycle Assessment used in this EPD
- The digital background data for this EPD

Why does verification transparency matter? Read more online

This EPD has been generated by One Click LCA EPD generator, which has been verified and approved by the EPD Hub.

THIRD-PARTY VERIFICATION STATEMENT

I hereby confirm that, following detailed examination, I have not established any relevant deviations by the studied Environmental Product Declaration (EPD), its LCA and project report, in terms of the data collected and used in the LCA calculations, the way the LCA-based calculations have been carried out, the presentation of environmental data in the EPD, and other additional environmental information, as present with respect to the procedural and methodological requirements in ISO 14025:2010 and reference standard.

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

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

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

Elma Avdyli as an authorized verifier acting for EPD Hub Limited
07.06.2022

