Environmental Product Declaration

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for:

Granab subfloor system - Steel

from

Bygg och- Miljöteknik GRANAB AB

Programme:	The International EPD® System, www.environdec.com
Programme operator:	EPD International AB
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An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com

General information

Programme information

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
E-mail:	info@environdec.com

Accountabilities for PCR, LCA and independent, third-party verification
Product Category Rules (PCR)
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): *PCR 2019:14 Construction products. Version 1.2.3, date 2022-07-08* *UN CPC code: 42190*
PCR review was conducted by: *The Technical Committee of the International EPD® System, see www.environdec.com/TC for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact*
Life Cycle Assessment (LCA)
LCA accountability: *Lisa Hallberg, IVL Swedish Environmental Research Institute*
Third-party verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☒ EPD verification by individual verifier Third-party verifier: *David Althoff Palm, Ramboll Sweden AB* Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier: ☐ Yes ☒ No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

Company information

Owner of the EPD

Bygg och Miljöteknik GRANAB AB

Contact

Fredrik Blom (fredrik@granab.se)

Description of the organisation

GRANAB manufactures subfloor systems for homes, offices, schools and public buildings.

Name and location of production site

Bygg och Miljöteknik GRANAB AB – Production 1
Vårgårda, Sweden

Bygg och Miljöteknik GRANAB AB – Production 2
Lidköping, Sweden

Product information

Product name

Granab Subfloor System – Steel

Product description

Granab subfloor systems improves the quality of homes, offices, schools and public buildings: they are constructed with non-deformable galvanized steel floor girders, effective sound-dampening resilient suspension system. The subfloor system is secured to the subflooring and set at the desired height. On top of the subflooring, there is a particleboard and surface flooring made from parquet or carpet is laid over the particleboard. The particleboard and the surface flooring is not covered by the EPD since are not manufactured by Granab.

This is a specific product and not a multiple product. The corresponding product based on wood instead of steel is published in a separate EPD.

Manufacturing process

Granab systems are packed and delivered with pre-cut and dimension-adapted floor girders according to the Granab provided installation drawing with factory fitted support blocks and dampening elements. Each girder is labelled with a room name and length that matches the information on the installation drawing for each flat or other agreed-upon space subdivision.

UN CPC code: 42190

Geographical scope

Sweden

LCA information

Functional unit / declared unit

1 m2 Subfloor System

Reference service life

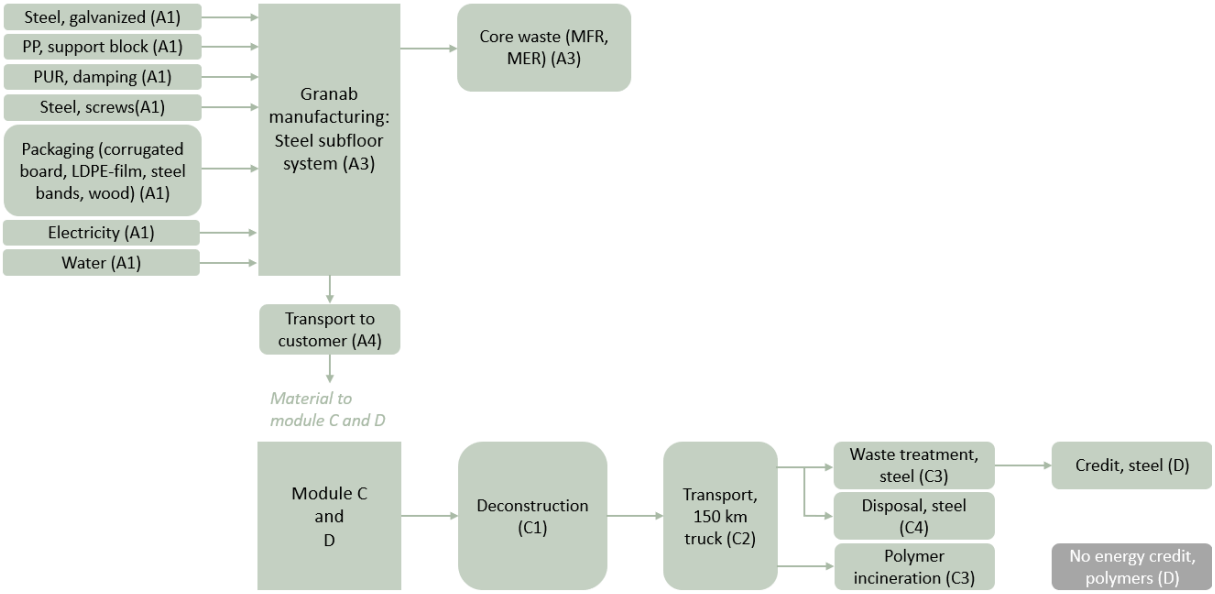
Not applicable

Database(s) and LCA software used

The LCA was modelled using the LCA software GaBi and corresponding database (2022.1) provided by sphera.

System boundaries and flowchart

Cradle to gate (A1-A3) with modules C1-C4, module D and with optional module A4.



The steel subfloor system mainly consists of steel and in addition some polymer materials. The core process (A3) only uses energy in terms of electricity, and since the electricity production is accounted for in A3, there is no impact for A3 in the LCA model, except for the core waste. The core waste corresponds to minor waste flows such as steel and plastics for recycling (MFR) and materials for energy recovery (MER) and here only a transport of the core waste has been considered.

An estimated average of 400 km by truck has been applied for the transport to customer (A4). For end of life (module C), the steel subfloor system has been assumed to end up in steel recycling. After deconstruction (C1) and transport (C2), 95% of the steel is assumed to be sorted out for recycling (construction waste treatment (C3)) and the rest is disposed (C4). The polymers are assumed to burn in the steel recycling (EAF; electric arc furnace) (polymer incineration (C3)).
The steel is provided a credit in module D, while the energy generated at polymer incineration is not since this is no “valuable” energy that can be recovered.

Product composition and packaging materials

Parts	Raw material	Amount	Composition	Post-consumer recycled material	Biogenic material	
		[kg per m2]	[% of total]	[% of total]	[% of total]	[kg C/kg product]
Profiles	Galvanized steel	2.0	85%	2%	0%	0
Support block	Polypropylene (PP)	0.2	11%	0%	0%	0
Expandable screw	Steel	0.05	2.0%	0%	0%	0
Damping element	Polyurethane (PUR)	0.05	2.2%	0%	0%	0
Total		**2.3**	**100%**	**2%**	**0%**	**0**

A majority of the subfloor system consists of steel (85%). The remaining parts are made from Polypropylene (PP), Polyurethane (PUR) and some steel (screws). The total weight of the subfloor system is 2.3 kg per m^2. The post-consumer recycled material of 2% arise from the steel. The steel subfloor system contains no biogenic materials.

Packaging material	Amount	Versus the product	Biogenic material	Biogenic material	
	[kg per m2]	[%]	[kg C/kg bio mtrl]	[kg C per m2]	[kg C/kg product]
Plastic packaging	0.01	0.4%	0	0	0
Steel band	0.01	0.2%	0	0	0
Wood based packaging	0.02	0.7%	0.43	0.007	0.003
Corrugated board	0.005	0.2%	0.52	0.002	0.001
Total	**0.04**	**1.6%**	**-**	**0.010**	**0.004**

Per declared unit (1 m2 subfloor system), there is 0.01 kg of biogenic material from packaging and packaging as such corresponds to 1.6 w-% in relation to the product weight.

Content of substances

The subfloor product does not contain substances of very high concern (SVHC) as defined and listed in the European Chemicals Agency (ECHA) Candidate List of substances of very high concern for Authorization, in levels above 0.01% by weight for the products.

Data

Data for material composition and manufacturing (A3) have been collected by Granab directly from the production sites. Supplier specific data were applied for the steel production, SSAB EPD 2020 (Metal coated steel). The indicator results from this EPD is according to EN15804+A1, but since the LCA consultant of the Granab EPD also made the SSAB EPD, life cycle inventory (LCI) data was available. For minor raw materials, energy sources and transport generic database data (Gabi/sphera) was applied. Swedish residual electricity mix was applied for the electricity used in Granab manufacturing, and corresponds to a fossil climate change of 44 gram CO_2 eq per kWh (Gabi/sphera). No allocations have been made, since not relevant. Waste management of packaging materials has been excluded due to very small waste flows. For the A4 transport an average distance of 400 km by truck was estimated by Granab and a diesel truck (Euro 6 and “reduktionspliktsdiesel” 2022) with a load factor of 60% was applied.

For the end of life (module C) generic data has been used to estimate C1 Deconstruction, C2 Transport (150 km by truck), C3 Waste processing and C4 Disposal.

The steel subfloor is assumed to end up at steel recycling due to the large content of steel, and the product is probably not sorted out into the different material parts. This in turn means that the other materials than steel (polymers) is burned in the electric arc furnace (EAF) when the steel is melted.

About 95% of the steel subfloor is assumed to end up at steel recycling (going through C3), while the rest ends up in C4. However since about 3% of the steel is based on external scrap in the first place (SSAB), the amount of steel to be credited in module D is 92% and another additional 10% is withdrawn to account for the losses in the steel recycling process which results in 83% to module D. For the steel, the credit in module D is made by applying the "value of scrap" published by worldsteel (1.6 kg CO_2eq per kg steel). The polymers (PP and PUR) are as mentioned assumed to burn in the EAF and for the incineration (C3) data from Gabi/sphera has been applied. Since the polymer parts end up together with the product in the steel recycling, module D (i.e. credit for generated energy) is not relevant and has therefore not been included in the LCA modelling.

Time representativeness

The site specific data used for the product manufacturing corresponds to 2019. The age of data from generic databases varies from 2017 – 2022. No data used is older than 10 years.

Data quality, modules declared, geographical scope, share of specific data (in GWP-GHG indicator) and data variation

Life cycle stage	Module		Modules declared (1)	Granab subfloor system: Steel		Variation - products	Variation - sites
				Geography	Specific data used		
Product stage	Raw material supply	A1	X	FI (2)	87%	Not relevant since only one product	Two sites, variation <10%
	Transport	A2	X	FI/SE (3)	1%		
	Manufacturing	A3	X	SE (4)	0%		
Construction process stage	Transport	A4	X	SE (5)	0%		
	Construction installation	A5	MND	-	-	-	-
Use stage	Use	B1	MND	-	-	-	-
	Maintenance	B2	MND	-	-	-	-
	Repair	B3	MND	-	-	-	-
	Replacement	B4	MND	-	-	-	-
	Refurbishment	B5	MND	-	-	-	-
	Operational energy use	B6	MND	-	-	-	-
	Operational water use	B7	MND	-	-	-	-
End of life stage	De-construction demolition	C1	X	SE	-	-	-
	Transport	C2	X	SE	-	-	-
	Waste processing	C3	X	SE	-	-	-
	Disposal	C4	X	SE	-	-	-
Resource recovery stage	Reuse-Recovery-Recycling-potential	D	X	SE	-	-	-
				Total	88%		

(1) Modules included in the EPD (X) and the modules not declared (MND).

(2) The raw material is mainly steel (corresponding to 85% of the raw materials) and the supplier is SSAB (Finland). For other raw materials (e.g. polymers) generic database data has been applied. The electricity production for the electricity used in the core process is included here as well, but this only corresponds to 0.3% of the GWP-GHG (A1-A3).

(3) The steel transportation data is specific in terms of distances and transport modes and this is the longest transport, for the other raw materials 500 km by truck has been assumed. The steel corresponds to 85% of the raw materials so 85% of the GWP-GHG for raw material transport has been applied here.

(4) In the manufacturing (core process) only electricity is used, but since electricity production is considered in A1, the core process becomes zero.

(5) Since the transport to the customer has just been assumed (as 400 km by truck) the specific data is zero.

The data quality is assessed to be very good since the site specific data corresponds to about 88% of the GWP-GHG indicator as declared above. For the production of the other raw materials (e.g. polymers), which is based on database data, the data quality is probably between fair and good.

Allocation

No co-product allocation has been applied since no co-products are generated and therefore allocation has not been relevant.

Cut-off criteria

The general rules for the exclusion of inputs and outputs follows the requirements in EN 15804. No significant cut offs have been made.

Packaging

The distribution packaging is mainly wood based packaging, corrugated board, steel band and plastics. In total the packaging corresponds to 0.04 kg per m^2.

Environmental Information

Potential environmental impact – mandatory indicators according to EN 15804+A2

Results per declared unit: 1 m2 of steel subfloor system corresponding to 2.3 kg												
PARAMETER	**Acronyms**	**UNIT**	**A1**	**A2**	**A3**	**TOTAL A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**
Global warming potential (GWP), excl biogenic carbon	GWP-GHG (1)	kg CO2 eq	5.40E+00	6.25E-02	4.45E-04	**5.47E+00**	3.92E-02	7.49E-04	1.47E-02	1.72E+00	1.46E-03	-2.70E+00
Climate Change - total	GWP-total	kg CO2 eq	5.52E+00	6.48E-02	4.63E-04	**5.58E+00**	4.08E-02	7.66E-04	1.53E-02	8.60E-01	1.44E-03	-2.82E+00
Climate Change - fossil	GWP-fossil	kg CO2 eq	5.53E+00	6.33E-02	4.50E-04	**5.59E+00**	3.96E-02	7.58E-04	1.48E-02	8.53E-01	1.49E-03	-2.82E+00
Climate Change - biogenic	GWP-biogenic	kg CO2 eq	-6.71E-03	9.07E-04	7.54E-06	**-5.79E-03**	6.65E-04	3.23E-06	2.50E-04	6.71E-03	-4.40E-05	-1.60E-03
Climate Change - land use and land use change	GWP-luluc	kg CO2 eq	1.49E-03	6.01E-04	5.07E-06	**2.09E-03**	4.47E-04	4.27E-06	1.68E-04	2.52E-05	2.74E-06	-6.17E-05
Ozone depletion	ODP	kg CFC-11 eq	5.50E-09	6.23E-16	8.44E-20	**5.50E-09**	7.44E-18	4.59E-17	2.79E-18	3.80E-14	3.49E-15	-6.71E-15
Acidification	AP	mole H+ eq	1.55E-02	2.57E-04	5.90E-07	**1.57E-02**	5.20E-05	4.43E-06	2.01E-05	2.64E-04	1.05E-05	-5.01E-03
Eutrophication aquatic freshwater	EP-freshwater	kg P eq	1.88E-05	4.75E-07	3.99E-09	**1.93E-05**	3.51E-07	2.29E-09	1.32E-07	2.86E-08	2.52E-09	-6.13E-07
Eutrophication aquatic marine	EP-marine	kg N eq	3.81E-03	1.17E-04	1.81E-07	**3.93E-03**	1.60E-05	2.17E-06	6.29E-06	9.24E-05	2.69E-06	-9.68E-04
Eutrophication terrestrial	EP-terrestrial	mole N eq	4.11E-02	1.33E-03	2.43E-06	**4.24E-02**	2.14E-04	2.40E-05	8.39E-05	1.34E-03	2.96E-05	-9.78E-03
Photochemical ozone formation	POCP	kg NMVOC eq	1.18E-02	3.07E-04	4.36E-07	**1.21E-02**	3.84E-05	4.19E-06	1.50E-05	2.42E-04	8.19E-06	-4.32E-03
Depletion of abiotic resources - minerals and metals	ADP-minerals & metals (2)	kg Sb eq	3.44E-04	5.95E-09	4.68E-11	**3.44E-04**	4.12E-09	6.40E-11	1.55E-09	6.61E-09	1.52E-10	-6.99E-06
Depletion of abiotic resources - fossil fuels	ADP-fossil	MJ	8.47E+01	8.12E-01	5.71E-03	**8.55E+01**	5.03E-01	1.02E-02	1.89E-01	2.54E-01	1.95E-02	-2.76E+01
Water use	WDP	m3	-8.41E-02	9.63E-04	3.64E-02	**-4.68E-02**	7.02E-04	6.87E-06	2.64E-04	8.01E-02	1.63E-04	-7.68E+00
	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										

(1) The GWP-GHG indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus almost equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

(2) 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.

Use of resources

Results per declared unit: 1 m2 of steel subfloor system corresponding to 2.3 kg												
PARAMETER	Acronyms	UNIT	A1	A2	A3	TOTAL A1-A3	A4	C1	C2	C3	C4	D
Use of renewable primary energy excluding renewable primary energy resources used as raw materials (PERE)	PERE	MJ	6.40E+00	8.45E-02	7.09E-04	**6.49E+00**	6.25E-02	5.82E-04	2.35E-02	4.31E-02	2.92E-03	1.73E+00
Use of renewable primary energy resources used as raw materials (PERM)	PERM	MJ	2.28E-01	0.00E+00	0.00E+00	**2.28E-01**	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) (PERT)	PERT	MJ	6.63E+00	8.45E-02	7.09E-04	**6.72E+00**	6.25E-02	5.82E-04	2.35E-02	4.31E-02	2.92E-03	1.73E+00
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials (PENRE)	PENRE	MJ	7.29E+01	8.13E-01	5.72E-03	**7.37E+01**	5.04E-01	1.03E-02	1.89E-01	2.54E-01	1.95E-02	-2.76E+01
Use of non-renewable primary energy resources used as raw materials (PENRM)	PENRM	MJ	1.18E+01	0.00E+00	0.00E+00	**1.18E+01**	0.00E+00	0.00E+00	0.00E+00	-1.18E+01	0.00E+00	0.00E+00
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) (PENRT)	PENRT	MJ	8.47E+01	8.13E-01	5.72E-03	**8.55E+01**	5.04E-01	1.03E-02	1.89E-01	-1.15E+01	1.95E-02	-2.76E+01
Use of secondary material (SM)	SM	kg	1.09E-01	0.00E+00	0.00E+00	**1.09E-01**	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels (RSF)	RSF	MJ	1.66E-22	0.00E+00	0.00E+00	**1.66E-22**	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non renewable secondary fuels (NRSF)	NRSF	MJ	1.95E-21	0.00E+00	0.00E+00	**1.95E-21**	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water (FW)	FW	m3	5.16E-03	1.12E-04	8.48E-04	**6.12E-03**	8.28E-05	6.58E-07	3.11E-05	1.91E-03	4.95E-06	-1.79E-01
	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										

Waste and output flows

Waste

Results per declared unit: 1 m2 of steel subfloor system corresponding to 2.3 kg												
PARAMETER	Acronyms	UNIT	A1	A2	A3	TOTAL A1-A3	A4	C1	C2	C3	C4	D
Hazardous waste disposed (HWD)	HWD	kg	2.85E-06	4.45E-11	3.72E-13	**2.85E-06**	3.28E-11	4.91E-14	1.23E-11	1.35E-11	1.00E-12	6.03E-09
Non-hazardous waste disposed (NHWD)	NHWD	kg	6.09E-02	2.88E-04	2.32E-06	**6.12E-02**	2.05E-04	1.47E-06	7.69E-05	1.01E-02	9.97E-02	3.51E-01
Radioactive waste disposed (RWD)	RWD	kg	2.88E-03	1.99E-06	1.56E-08	**2.89E-03**	1.37E-06	1.26E-08	5.15E-07	1.21E-05	2.17E-07	2.99E-06

Output flows

Results per declared unit: 1 m2 of steel subfloor system corresponding to 2.3 kg												
PARAMETER	Acronyms	UNIT	A1	A2	A3	TOTAL A1-A3	A4	C1	C2	C3	C4	D
Components for re-use (CRU)	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
Materials for recycling (MFR)	MFR	kg	1.00E-04	0.00E+00	4.33E-02	4.34E-02	0.00E+00	0.00E+00	0.00E+00	1.66E+00	0.00E+00	0.00E+00
Material for energy recovery (MER)	MER	kg	6.68E-05	0.00E+00	9.33E-03	9.40E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported electrical energy (EEE)	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
Exported thermal energy (EET)	EET	MJ	8.60E-04	0.00E+00	0.00E+00	8.60E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Other indicators

Information on biogenic carbon content

Biogenic carbon content (1)	Unit per DU	Amount
Biogenic carbon content in product	kg C	0.00E+00
Biogenic carbon content in packaging	kg C	9.54E-03

(1) 1 kg biogenic carbon is equivalent to 44/12 kg CO2.

Information on energy content

Energy content	Unit per DU	Amount
Energy content in product	MJ	1.18E+01

Disclaimers

ILCD classification	Indicator	Disclaimer
ILCD Type 1	Global warming potential (GWP)	None
	Depletion potential of the stratospheric ozone layer (ODP)	None
	Potential incidence of disease due to PM emissions (PM)	None
ILCD Type 2	Acidification potential, Accumulated Exceedance (AP)	None
	Eutrophication potential, Fraction of nutrients reaching freshwater end compartment (EP-freshwater)	None
	Eutrophication potential, Fraction of nutrients reaching marine end compartment (EP-marine)	None
	Eutrophication potential, Accumulated Exceedance (EP-terrestrial)	None
	Formation potential of tropospheric ozone (POCP)	None
	Potential Human exposure efficiency relative to U235 (IRP)	1
ILCD Type 3	Abiotic depletion potential for non-fossil resources (ADP-minerals&metals)	2
	Abiotic depletion potential for fossil resources (ADP-fossil)	2
	Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	2
	Potential Comparative Toxic Unit for ecosystems (ETP-fw)	2
	Potential Comparative Toxic Unit for humans (HTP-c)	2
	Potential Comparative Toxic Unit for humans (HTP-nc)	2
	Potential Soil quality index (SQP)	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 disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.		
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 experienced with the indicator.		

References

CEN European Committee for Standardisation (2021). EN15804:2012+A2:2019/AC:2021 (CEN 2021), Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.

GaBi Software System and database for Life Cycle Engineering version 10, sphera, Leinfelden-Echterdingen, Germany

General Programme Instructions for the International EPD® System. Version 4.0

Hallberg, L., LCA methodology report - GRANAB subfloor system EPD: Update 2022 of the steel system and added a corresponding wood based system, As basis for publication of EPD, November 2022

PCR 2019:14 Construction products. Version 1.2.3, date 2022-07-08

SSAB EPD, Metal coated steel sheets and coils, Environmental Product Declaration (EPD) - In accordance with ISO 14025 and EN 15804 +A1, S-P-01921, version 1.0, UN CPC 412, The International EPD® System, 2020-03-31.

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