Environmental Product Declaration

In accordance with ISO 14025:2006 and 2026 and EN 15804:2012+A2:2019/AC:2021 for:

Hot Rolled Steel Sheet in Coils – Pickled and Oiled

from

Sahaviriya Steel Industries Public Company Limited

Programme:	The International EPD System, www.environdec.com
Programme operator:	EPD International AB
Type of EPD:	EPD of multiple products, based on the average results of the product group. The list of all products covered by this EPD refers to Page 5.
EPD registration number:	EPD-IES-0035914:001
Version date:	2026-11-13
Validity date:	2031-11-12
	An EPD may be updated or depublished if conditions change. To find the latest version of the EPD and to confirm its validity, see 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:	support@environdec.com

Product Category Rules (PCR)
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): PCR 2019: Construction Products, version 2.0.1 (valid until: 2030-04-07). Based on CEN standard EN 15804. UN CPC – 412
PCR review was conducted by: Technical Committee of the International EPD ® System. A full list of members is available on environdec.com. The review panel may be contacted via support@environdec.com. Review chair: Rob Rouwette (chair): start2see, Noa Meron (co-chair): thinkstep.

Third-party Verification
Independent third-party verification of the declaration and data, according to ISO 14025:2026, via: ☒ **Individual EPD verification without a pre-verified LCA/EPD tool** Third-party verifier: Claudia A. Peña, Director of PINDA LCT SpA., Email: claudia@epd-chile.com Approved by: 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 published in different EPD programmes, may not be comparable. For two EPDs to be comparable, they shall be based on the same PCR (including the same first-digit 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 identical scope in terms of included life-cycle stages (unless the excluded life-cycle stage is demonstrated to be insignificant); apply identical impact assessment methods (including the same version of characterisation factors); and be valid at the time of comparison.
For further information about comparability, see EN 15804 and ISO 14025.

INFORMATION ABOUT EPD OWNER

Owner of the EPD: Sahaviriya Steel Industries Public Company Limited

Address: 9 Moo 7 Mae Rumphueng, Bang Saphan, Prachuap Khirikhan 77140

Contact: KIATTICHAI WASUYING, E-mail: KiattichaiW@ssi-steel.com

Address and contact information of the LCA practitioner commissioned by the EPD owner, if applicable: ECEE company limited
INC-204, Innovation Cluster 1, 131 Thailand Science Park, Phahonyothin Road, Khlong Nueng, Khlong Luang, Pathum Thani 12120

Description of the organisation: Sahaviriya Steel Industries Public Company Limited (SSI) is a Thailand-based manufacturer of Hot-Rolled Steel Sheet in Coils – Pickled and Oiled (PO) products. The production site is located in Bang Saphan, Prachuap Khiri Khan Province, Thailand. SSI specializes in producing high-quality steel sheet products supplied for a wide range of downstream industrial applications, including automotive, electrical appliances, furniture, pipe and tube manufacturing, machinery, construction, and general manufacturing sectors.

Product-related or management system-related certifications: The Company holds the following voluntary Management System Certifications, all of which are regularly maintained and renewed:

- ISO 9001 – Quality Management System
- ISO 14001 – Environmental Management System
- ISO 45001 – Occupational Health and Safety Management System
- ISO 50001 – Energy Management System

PRODUCT INFORMATION

Product name: Hot Rolled Steel Sheet in Coils – Pickled and Oiled

Product identification: Hot Rolled Steel Sheet in Coils – Pickled and Oiled is produced by removing the oxide scale formed on the surface of hot rolled steel using hydrochloric acid in a continuous pickling line. After the pickling process, the steel surface is thoroughly rinsed with clean water to remove residual acid and is subsequently coated with rust-preventive oil to protect the surface during storage and transportation. The product is supplied in coil form in various grades, thicknesses, and widths to meet different application requirements. The available thickness ranges from 1,2 mm to 7,0 mm, with widths ranging from 750 mm to 1 600 mm, depending on the product grade and applicable specification. The product is manufactured according to the international standards, particularly EN 10025-2, EN 10111, ASTM A414, ASTM A515, ASTM A572, ASTM A656, JFS A1001, JIS G3101, JIS G3106, JIS G3113, JIS G3116, JIS G3131, JIS G3132, JIS G3134, JIS G4051, and SAE J403.



UN CPC code: 412 Products of iron or steel.

Product description: Hot-Rolled Steel Sheet in Coils – Pickled and Oiled (PO) is an intermediate steel product intended for further processing, including cutting, forming, galvanizing, painting, and fabrication into various steel components. The product is used in a wide range of applications, such as automotive components, furniture, electrical appliances, steel pipes, and other industrial products, depending on the steel grade, thickness, and specific processing requirements.

The key performance characteristics of the product include strength, formability, weldability, and suitable surface quality for subsequent manufacturing and processing by customers.

When incorporated into buildings or other construction works, the product contributes to the structural performance, durability, and functional requirements of the final steel components. The in-use performance and service life of the final product depend on its design, intended application, environmental exposure conditions, and the maintenance practices applied to the completed product or construction work.

As an intermediate product, the technical service life of hot-rolled steel sheet in coils – Pickled and Oiled is dependent upon the characteristics, intended application, service conditions, and maintenance requirements of the final product or construction work in which it is incorporated. Consequently, no Reference Service Life (RSL) is declared within this EPD.

List of Products Covered by the EPD Based on the Manufacturer's Product Brochure.

Type	Tensile Strength Minimum (N/mm^2 Class)	Width (mm.)	Thickness (mm.)
Hot Rolled Steel Sheet in Coil – Pickled & Oiled	290 – 400	750 – 850	1.2 – 7,0
		850 – 1250	1,2 – 7,0
		1 250 – 1 270	1,4 – 7,0
		1 270 – 1 350	1,5 – 7,0
		1 350 – 1 500	1,8 – 7,0
		1 500 – 1 524	2,0 – 7,0
		1 524 – 1 550	2,0 – 7,0
		1 550 – 1 600	2,0 – 7,0
	400 – 500	750 – 850	1,5 – 7,0
		850 – 1 075	1,5 – 7,0
		1 075 – 1 250	1,5 – 7,0
		1 250 – 1 350	1,5 – 7,0
		1 350 – 1 500	2,0 – 7,0
		1 500 – 1 550	2,0 – 7,0
		1 550 – 1 600	2,2 – 7,0
	500 – 650	750 – 850	1,8 – 7,0
		850 – 1 150	1,8 – 7,0
		1 150 – 1 200	1,8 – 7,0
		1 200 – 1 350	1,8 – 7,0
		1 350 – 1 500	2,3 – 7,0
		1 500 – 1 550	2,3 – 7,0
		1 550 – 1 600	2,3 – 7,0

Name and location of production site(s): Sahaviriya Steel Industries Public Company Limited 9 Moo 7 Mae Rumphueng, Bang Saphan, Prachuap Khirikhan 77140.

Technical data:

Name	Value	Unit
Density	7 850	kg/m^3
Modulus of elasticity (typical)	200 000	MPa
Melting point (typical)	1 450 – 1 530	°C
Thermal conductivity (typical)	50	W/m.K
Coefficient of thermal expansion	11,7	$10^{-6}K^{-1}$
Yield strength (min-max)	150 – 720	MPa

CONTENT DECLARATION

- The content declaration represents the average results of the product group covered by this EPD.

- The mass (weight) of one unit of a product, as purchased or per declared unit: The declared unit is 1 tonne of the Hot Rolled Steel Sheet in Coils – Pickled and Oiled

- Content of the product in the form of a list of materials and substances, and their mass: A list of the components and materials, along with their mass, of the Hot Rolled Steel Sheet in Coils – Pickled and Oiled is shown in the product content below.

Product content	Mass, kg	Post-consumer recycled material, mass-% of product	Biogenic material, mass-% of product	Biogenic material, kg C/product or declared unit
Hot Rolled Steel Sheet in Coil	999,9	10,8	0,0	0,0
Coated oil	0,1	0,0	0,0	0,0
TOTAL	1 000	10,8	0,0	0,0

- The mass and the content of distribution and/or consumer packaging:

Packaging materials	Mass, kg	Mass-% (versus the product)	Biogenic material, kg C/product or declared unit
Masking tape	0,020	0,002	0,0
Overlap zinc	0,026	0,003	0,0
Steel strapping	2,104	0,210	0,0
Paper laminate	0,271	0,027	0,001
Sticker	0,455	0,045	0,002
TOTAL	2,875	0,288	0,003

1 kg biogenic carbon in the product/packaging is equivalent to the uptake of 44/12 kg of CO_2.

- Information on the environmental and hazardous/toxic properties of a substances contained in the product: The products do not contain any of the substances of very high concern (SVHC).

- Other information on substances with hazardous and toxic properties: -

- The declared share of biogenic/recycled materials: The recycled content of a steel slab is approximately 10,8%.

LCA INFORMATION

Declared unit: The declared unit is 1 tonne of product.

Reference service life: A reference service life for hot rolled steel sheet in coils – pickled and oiled is not declared. Hot rolled steel sheet in coils – pickled and oiled are used in construction with many different application purposes. The lifetime therefore will be limited by the application and corresponding service. At the end of life, they will be recovered and recycled into a new steel product

Time representativeness: 2024-01-01 to 2024-12-31.

Geographical scope:
- Modules A1-A2: Global
- Modules A3: Thailand
- Modules C1-C4, D: Thailand

Database(s) and LCA software used: The LCI includes data collection from a variety of publicly available sources, taking into consideration the representativeness in technology, temporal and geographical scales. In case of missing data, proxy data from Ecoinvent 3.10 were referred to, and sensitivity analysis was conducted. For the modelling and calculation, the LCA software SimaPro version 9.6.0.1 was used.

EPD/LCA Tool used: SimaPro 9.6.0.1.

Description of system boundaries: Cradle to gate with modules C1–C4 and module D (A1–A3 + C + D)

A1: RAW MATERIAL SUPPLY
The production starts with the material supply. This module includes the mining and pretreatment processes before production (processing of raw materials, generation of electricity and fuels required for the manufacturing, and recycling process of secondary materials). Primary and secondary steel slabs are the main raw materials charged in the hot rolling mill process. The steel slabs are sourced from several overseas suppliers, including Japan, Indonesia, and other countries.

A2: TRANSPORTATION OF RAW MATERIALS TO THE MANUFACTURER
Transportation is relevant to the delivery of raw materials from the supplier to the gate of the manufacturing plant and internal transport. Steel slabs and other raw materials are transported to the manufacturing site from both domestic and international sources by trucks, and shipping vessels are the main transportation. Including transportation within and between processes.

A3: MANUFACTURING
The production process of hot rolled steel sheet in coils – pickled and oiled starts with placing a steel slab into a furnace, where it reaches temperatures between 1 250 and 1 300 degrees Celsius. This is followed by rolling and coiling processes that yield steel sheets with thicknesses from 0,9 to 20,0 mmand widths from 750 to 1 560 mm. Afterward, the steel undergoes an acid bath and receives a thin coating of oil to protect its surface from rust. The final product is Hot Rolled Pickled and Oiled Steel Coil, available in thicknesses ranging from 1,2 mm to 7,0 mm and widths between 650 mm and 1 650 mm.

Packaging materials are included in Modules A1–A3, and the packaging leaves the product system in Module A5. In accordance with Option A and Annex 3 of PCR 2019:14, the inherent non-renewable primary energy associated with the packaging is balanced by an equivalent virtual output of energy. As Module A5 is not declared in this EPD, the corresponding balancing flow is accounted for within the LCA model in Modules A1–A3.

C1-C4: DE-CONSTRUCTION DEMOLITION/TRANSPORT/WASTE PROCESSING/DISPOSAL
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 EoL scenario for the steel material is 95% recycling and 5% landfill reference from Iron and Steel Institute of Thailand. (2024).

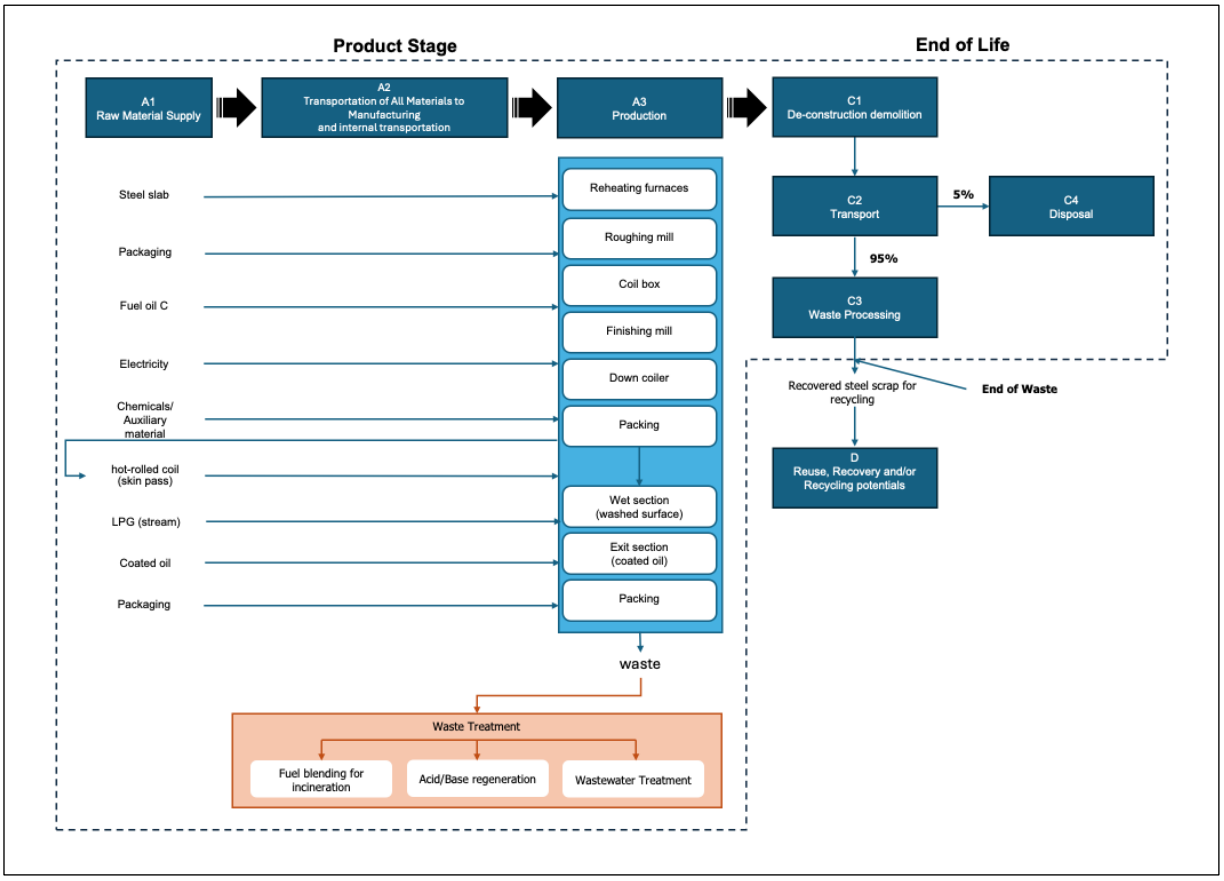
Default data for modelling C1, C2, C3 and C4 provided in PCR 2019:14 Construction products, version 2.0.1 as given below:

Process in C1	**Energy carrier**	**Quantity [kWh/tonne]**
Demolition/deconstruction of steel, wood, and other materials	Diesel	1,1
Process in C2	**Distance (km)**	**Means of transport**
Transport (for products/materials not to be incinerated)	80	16-32 tonne lorry (EURO 5), 50% load factor
Process in C3	**Energy carrier**	**Quantity [kWh/tonne]**
Loading and unloading at sorting facility	Diesel	1,8
Mechanical sorting	Electricity	2,2
Fragging of steel	Diesel	7,4
Process in C4	**Energy carrier**	**Quantity [kWh/tonne]**
Compacting of inert construction waste for landfills (including backfilling)	Diesel	1,6

D: REUSE-RECOVERY-RECYCLING-POTENTIAL
Module D assesses the impact of the net flows of recovered materials (recycled or reused) from the life cycle stages A to C. As mentioned above, 95% of waste steel scrap will be recycled, which is considered as a net flow for impact assessment.

The system scope excludes construction process stage (Modules A4–A5), and use stage (Modules B1–B7), which are therefore declared as Module Not Declared (ND). These modules are excluded because the product is an intermediate construction product, and the specific scenarios for transportation to the construction site, installation, and use phase depend on the final application, which cannot be determined at the manufacturing stage.

Process flow diagram:



More information:
Allocation procedures: Steel scrap generated during manufacturing has economic value and is sold as a secondary raw material. According to PCR 2019:14 v2.0.1 (§4.5.1). As the revenue difference between the main product and co-products exceeds 25%, economic allocation was applied using three-year average market prices (2022-2024) of Hot Rolled Steel Sheet in Coils – Pickled and Oiled and steel scrap obtained from The Iron and Steel Institute of Thailand. Waste streams without economic value are not allocated; their treatment burdens are fully accounted for in the module where they are generated (Polluter Pays Principle).

Data quality: foreground (primary) data are measured/calculated data collected directly from SSI's production records for the 2024 reference year; background (secondary) data are sourced from the Ecoinvent v3.10 database. Precision, completeness, consistency and representativeness are all assessed as high.

The climate impact of electricity purchased and used in the manufacturing process (module A3) is 0,696 kg CO_2 eq./kWh for the Thailand residual electricity mix (2024 reference year, PEA grid), modelled as a market-based residual electricity mix in accordance with PCR 2019:14 v2.0.1 Section 4.7.2.3, as no manufacturer-specific evidence of RECs, PPAs, GOs or other qualifying contractual instruments was available.

Modules C1–C4: The end-of-life stage of Hot Rolled Steel Sheet in Coils is modelled in accordance with the default end-of-life scenarios specified in PCR 2019:14. The default scenario assumes that 95% of the product is recycled, while the remaining 5% is disposed of in landfill at the end of its service life.

In accordance with PCR 2019:14, Clause 4.8.4, the following additional scenarios are also reported:

- Scenario A – 100% Recycling: All steel components are assumed to be recovered and recycled at the end of life. Module D accounts for the benefits and loads associated with the substitution of primary steel production.
- Scenario B – 100% Landfill: All steel components are assumed to be disposed of in landfill at the end of life. Under this scenario, no benefits from material recovery are assigned to Module D.

Module D scenario: Module D reports the net flow of recovered scrap steel reaching End-of-Waste (EoW) status in Module C3, after accounting for the 10,83% recycled content in Module A1 to avoid double counting. The recovered scrap is credited as secondary material substituting Electric Arc Furnace (EAF) / Induction Furnace (IF) steel production in Thailand, based on the default 95% end-of-life recycling rate.
Characterisation methods: Environmental Footprint (EF) 3.1 characterisation factors, in accordance with EN 15804+A2 and the applicable PCR

<u>Modules declared, geographical scope, share of primary data (in GWP-GHG results) and data variation (in GWP-GHG results):</u>

	Product stage			Distribution/ installation stage		Use stage							End-of-life stage				Beyond product life cycle
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Modules declared	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	GLO	GLO	TH	ND	ND	ND	ND	ND	ND	ND	ND	ND	TH	TH	TH	TH	TH
Share of primary data	14,283%GWP-GHG			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	<10%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Disclaimer	The share of specific/primary data and both variations (products and sites) refer to GWP-GHG results only.																

X = declared module; ND = module not declared; TH = Thailand; GLO = Global; RoW = Rest of World

Process	Source type	Source	Reference year	Data category	Share of primary data, of GWP-GHG results for A1-A3
Manufacturing of product	Collected data	EPD Owner	2023	Primary data	1,762%
Generation of electricity used in manufacturing of product	Database	Ecoinvent v. 3.10	2023	Primary data	0,639%
Transport of Inputs	Database	Ecoinvent v. 3.10	2023	Primary data	0,087%
Production of raw materials - Fuel	Database	Ecoinvent v. 3.10	2022-2023	Secondary data	0,0%
Production of raw materials - Other	Database	Ecoinvent v. 3.10	2022-2023	Secondary data	0,0%
Production of Hot Rolled Steel Sheet in Coil	Collected data	EPD Owner	2024	Primary data	11,795%
Total share of primary data, of GWP-GHG results for A1-A3					14,283%

Note: The share of primary data is calculated based on GWP-GHG results. It is a simplified indicator for data quality that supports the use of more primary data, to increase the representativeness of and comparability between EPDs. Note that the indicator does not capture all relevant aspects of data quality and is not comparable across product categories.

ENVIRONMENTAL PERFORMANCE

LCA results of the product(s) - main environmental performance results

Mandatory impact category indicators according to EN 15804

The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks.

The results of the end-of-life stage (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3).

Results per 1 Tonne of Hot Rolled Steel Sheet in Coils – Pickled and Oiled							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-total	kg CO2 eq.	2,4E+03	3,6E-01	1,6E+01	4,6E+00	2,7E-02	-9,9E+02
GWP-fossil	kg CO2 eq.	2,4E+03	3,6E-01	1,6E+01	4,6E+00	2,7E-02	-9,9E+02
GWP-biogenic	kg CO2 eq.	2,5E+00	2,2E-05	2,7E-03	5,0E-03	1,6E-06	-3,7E-01
GWP-luluc	kg CO2 eq.	1,1E+00	1,9E-05	6,2E-03	3,0E-03	1,4E-06	-1,8E-01
ODP	kg CFC 11 eq.	1,6E-05	4,8E-09	2,2E-07	7,9E-08	3,6E-10	-1,4E-06
AP	mol H+ eq.	1,0E+01	2,1E-03	5,2E-02	2,2E-02	1,5E-04	-2,9E+00
EP-freshwater	kg P eq.	8,6E-01	4,3E-06	1,2E-03	1,2E-03	3,2E-07	-4,2E-01
EP-marine	kg N eq.	2,5E+00	8,3E-04	1,7E-02	8,0E-03	6,2E-05	-8,5E-01
EP-terrestrial	mol N eq.	2,6E+01	9,0E-03	1,8E-01	8,4E-02	6,7E-04	-8,5E+00
POCP	kg NMVOC eq.	8,6E+00	2,8E-03	7,3E-02	2,6E-02	2,0E-04	-2,6E+00
ADP-minerals&metals*	kg Sb eq.	4,7E-03	6,0E-08	5,0E-05	1,2E-06	4,4E-09	-1,3E-03
ADP-fossil*	MJ	2,4E+04	4,7E+00	2,2E+02	6,0E+01	3,5E-01	-8,4E+03
WDP*	m3 depriv.	5,0E+02	4,4E-03	9,9E-01	2,4E-01	3,3E-04	-2,3E+02
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption						

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

** Disclaimer: The results of the impact categories abiotic depletion of minerals and metals may be highly uncertain in LCAs that include capital goods/infrastructure in generic datasets, in case infrastructure/capital goods contribute greatly to the total results. This is because the LCI data of infrastructure/capital goods used to quantify these indicators in currently available generic datasets sometimes lack temporal, technological and geographical representativeness. Caution should be exercised when using the results of these indicators for decision-making purposes.*

The EPD shall include a statement, in connection to the results of the impact indicators:" The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks."

The following statement, if the EPD covers the end-of-life stage: "The results of the end-of-life stage (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3)." For services, "A1-A3" shall be replaced by "A1-A5".

If results based on an old EF version is used to develop an EPD, the EPD shall include a statement that clarifies that an EPD based on an old EF version has been used as a data source, and that this was assessed to yield identical or conservative results compared to fully using the current EF version.

If biogenic carbon leaving the product system in module A5 (see Annex 2 of PCR) or recovered energy leaving the product system in modules A5 or C (see Annex 3 of PCR) have been balanced out already in modules A1-A3, a statement in this regard shall be included.

Additional mandatory and voluntary impact category indicators

Results per 1 Tonne of Hot Rolled Steel Sheet in Coils – Pickled and Oiled							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG*	kg CO2 eq.	2,4E+03	3,6E-01	1,6E+01	4,6E+00	2,7E-02	-9.9E+02
Particulate matter	disease inc.	2,0E-04	3,0E-08	1,2E-06	2,6E-07	2,3E-09	-1,0E-04
Ionising radiation**	kBq U-235 eq.	4,3E+01	1,0E-03	1,8E-01	1,2E-02	7,6E-05	9,3E+00
Ecotoxicity (freshwater)***	CTUe	1,3E+05	6,3E-01	1,2E+02	1,3E+01	4,7E-02	-9,5E+04
Human toxicity, cancer effect***	CTUh	3,7E-04	6,5E-10	1,6E-07	7,8E-09	4,9E-11	-2,8E-04
Human toxicity, non-cancer effects***	CTUh	6,4E-05	7,8E-10	2,7E-07	2,1E-08	5,8E-11	9,7E-05
Land use related impacts/Soil quality***	Pt	5,8E+03	3,1E-01	1,3E+02	3,5E+00	2,3E-02	-2,6E+03

Disclaimer: The GWP-GHG indicator is termed GWP-IOBC/GHG in the ILCD+EPD+ data format. The indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO2 is set to zero.

**This indicator accounts for all greenhouse gases except biogenic carbon dioxide update and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO2 is set to zero.*
***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.*
****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.*

Resource use indicators

Results per 1 Tonne of Hot Rolled Steel Sheet in Coils – Pickled and Oiled							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	1,0E+03	1,3E-02	2,8E+00	8,1E-01	9,4E-04	-9,2E+01
PERM	MJ	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00
PERT	MJ	1,0E+03	1,3E-02	2,8E+00	8,1E-01	9,4E-04	-9,2E+01
PENRE	MJ	2,4E+04	4,7E+00	2,2E+02	6,1E+01	3,5E-01	-8,4E+03
PENRM	MJ	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00
PENRT	MJ	2,4E+04	4,7E+00	2,2E+02	6,1E+01	3,5E-01	-8,4E+03
SM	kg	1,1E+02	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00
RSF	MJ	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00
NRSF	MJ	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00
FW	m^3	1,5E+01	1,3E-04	2,9E-02	6,9E-03	1,0E-05	-7,2E+00
Acronyms	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water; PENRM balancing for packaging occurs within Modules A1-A3 because Module A5 is excluded from the system boundary in accordance with Option A of PCR 2019:14.						

Waste indicators

Results per 1 Tonne of Hot Rolled Steel Sheet in Coils – Pickled and Oiled							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	6,1E-01	3,9E-05	5,5E-03	1,1E-03	2,9E-06	-1,8E-01
Non-hazardous waste disposed	kg	1,7E+02	1,7E-03	1,0E+01	1,1E-01	1,3E-04	-8,9E+01
Radioactive waste disposed	kg	1,1E-02	2,5E-07	4,4E-05	2,7E-06	1,8E-08	2,2E-03

Output flow indicators

Results per 1 Tonne of Hot Rolled Steel Sheet in Coils – Pickled and Oiled							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00
Material for recycling	kg	0,0E+00	0,0E+00	0,0E+00	9,5E+02	0,0E+00	0,0E+00
Materials for energy recovery	kg	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00
Exported energy, electricity	MJ	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00
Exported energy, thermal	MJ	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00

Additional LCA results of the product

This section provides results for alternate end-of-life scenarios.

Mandatory impact category indicators according to EN 15804 for 100% Recycling

Results per 1 Tonne of Hot Rolled Steel Sheet in Coils – Pickled and Oiled						
Indicator	**Unit**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-total	kg CO2 eq.	3,6E-01	1,6E+01	4,6E+00	0,0E+00	-1,1E+03
GWP-fossil	kg CO2 eq.	3,6E-01	1,6E+01	4,6E+00	0,0E+00	-1,0E+03
GWP-biogenic	kg CO2 eq.	2,2E-05	2,7E-03	5,0E-03	0,0E+00	-3,9E-01
GWP-luluc	kg CO2 eq.	1,9E-05	6,2E-03	3,0E-03	0,0E+00	-1,9E-01
ODP	kg CFC 11 eq.	4,8E-09	2,2E-07	7,9E-08	0,0E+00	-1,5E-06
AP	mol H+ eq.	2,1E-03	5,2E-02	2,2E-02	0,0E+00	-3,1E+00
EP-freshwater	kg P eq.	4,3E-06	1,2E-03	1,2E-03	0,0E+00	-4,4E-01
EP-marine	kg N eq.	8,3E-04	1,7E-02	8,0E-03	0,0E+00	-9,0E-01
EP-terrestrial	mol N eq.	9,0E-03	1,8E-01	8,4E-02	0,0E+00	-9,0E+00
POCP	kg NMVOC eq.	2,8E-03	7,3E-02	2,6E-02	0,0E+00	-2,7E+00
ADP-minerals&metals*	kg Sb eq.	6,0E-08	5,0E-05	1,2E-06	0,0E+00	-1,4E-03
ADP-fossil*	MJ	4,7E+00	2,2E+02	6,0E+01	0,0E+00	-8,9E+03
WDP*	m3 depriv.	4,4E-03	9,9E-01	2,4E-01	0,0E+00	-2,5E+02

Results per 1 Tonne of Hot Rolled Steel Sheet in Coils – Pickled and Oiled						
Indicator	**Unit**	**C1**	**C2**	**C3**	**C4**	**D**
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						

Additional mandatory and voluntary impact category indicators for 100% Recycling

Results per 1 Tonne of Hot Rolled Steel Sheet in Coils – Pickled and Oiled						
Indicator	**Unit**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG*	kg CO2 eq.	3,6E-01	1,6E+01	4,6E+00	0,0E+00	-1,1E+03
Particulate matter	disease inc.	3,0E-08	1,2E-06	2,6E-07	0,0E+00	-1,1E-04
Ionising radiation**	kBq U-235 eq.	1,0E-03	1,8E-01	1,2E-02	0,0E+00	9,9E+00
Ecotoxicity (freshwater)***	CTUe	6,3E-01	1,2E+02	1,3E+01	0,0E+00	-1,0E+05
Human toxicity, cancer effect***	CTUh	6,5E-10	1,6E-07	7,8E-09	0,0E+00	-3,0E-04
Human toxicity, non-cancer effects***	CTUh	7,8E-10	2,7E-07	2,1E-08	0,0E+00	1,0E-04
Land use related impacts/Soil quality***	Pt	3,1E-01	1,3E+02	3,5E+00	0,0E+00	-2,8E+03

Resource use indicators for 100% Recycling

Results per 1 Tonne of Hot Rolled Steel Sheet in Coils – Pickled and Oiled						
Indicator	**Unit**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	1,3E-02	2,8E+00	8,1E-01	0,0E+00	-9,7E+01
PERM	MJ	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00
PERT	MJ	1,3E-02	2,8E+00	8,1E-01	0,0E+00	-9,7E+01
PENRE	MJ	4,7E+00	2,2E+02	6,1E+01	0,0E+00	-8,9E+03
PENRM	MJ	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00
PENRT	MJ	4,7E+00	2,2E+02	6,1E+01	0,0E+00	-8,9E+03
SM	kg	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00
RSF	MJ	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00
NRSF	MJ	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00
FW	m^3	1,3E-04	2,9E-02	6,9E-03	0,0E+00	-7,6E+00
Acronyms	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water					

Waste indicators for 100% Recycling

Results per 1 Tonne of Hot Rolled Steel Sheet in Coils – Pickled and Oiled						
Indicator	**Unit**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	3,9E-05	5,5E-03	1,1E-03	0,0E+00	-1,9E-01
Non-hazardous waste disposed	kg	1,7E-03	1,0E+01	1,1E-01	0,0E+00	-9,5E+01
Radioactive waste disposed	kg	2,5E-07	4,4E-05	2,7E-06	0,0E+00	2,3E-03

Output flow indicators for 100% Recycling

Results per 1 Tonne of Hot Rolled Steel Sheet in Coils – Pickled and Oiled						
Indicator	**Unit**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0.0E+00	0.0E+00	0.0E+00	0,0E+00	0,0E+00
Material for recycling	kg	0.0E+00	0.0E+00	1,0E+03	0,0E+00	0,0E+00
Materials for energy recovery	kg	0.0E+00	0.0E+00	0.0E+00	0,0E+00	0,0E+00
Exported energy, electricity	MJ	0.0E+00	0.0E+00	0.0E+00	0,0E+00	0,0E+00
Exported energy, thermal	MJ	0.0E+00	0.0E+00	0.0E+00	0,0E+00	0,0E+00

Mandatory impact category indicators according to EN 15804 for 100% Landfilling

Results per 1 Tonne of Hot Rolled Steel Sheet in Coils – Pickled and Oiled						
Indicator	**Unit**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-total	kg CO2 eq.	3,6E-01	1,6E+01	0,0E+00	5,3E-01	1,4E+02
GWP-fossil	kg CO2 eq.	3,6E-01	1,6E+01	0,0E+00	5,3E-01	1,4E+02
GWP-biogenic	kg CO2 eq.	2,2E-05	2,7E-03	0,0E+00	3,2E-05	3,6E-02
GWP-luluc	kg CO2 eq.	1,9E-05	6,2E-03	0,0E+00	2,8E-05	2,2E-02
ODP	kg CFC 11 eq.	4,8E-09	2,2E-07	0,0E+00	7,0E-09	1,7E-07
AP	mol H+ eq.	2,1E-03	5,2E-02	0,0E+00	3,0E-03	4,0E-01
EP-freshwater	kg P eq.	4,3E-06	1,2E-03	0,0E+00	6,3E-06	5,5E-02
EP-marine	kg N eq.	8,3E-04	1,7E-02	0,0E+00	1,2E-03	1,2E-01
EP-terrestrial	mol N eq.	9,0E-03	1,8E-01	0,0E+00	1,3E-02	1,2E+00
POCP	kg NMVOC eq.	2,8E-03	7,3E-02	0,0E+00	4,0E-03	3,6E-01
ADP-minerals&metals*	kg Sb eq.	6,0E-08	5,0E-05	0,0E+00	8,7E-08	1,7E-04
ADP-fossil*	MJ	4,7E+00	2,2E+02	0,0E+00	6,9E+00	1,2E+03
WDP*	m3 depriv.	4,4E-03	9,9E-01	0,0E+00	6,5E-03	3,2E+01
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption						

Additional mandatory and voluntary impact category indicators for 100% Landfilling

Results per 1 Tonne of Hot Rolled Steel Sheet in Coils – Pickled and Oiled						
Indicator	**Unit**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG*	kg CO2 eq.	3,6E-01	1,6E+01	0,0E+00	5,3E-01	1,4E+02
Particulate matter	disease inc.	3,0E-08	1,2E-06	0,0E+00	4,4E-08	1,4E-05
Ionising radiation**	kBq U-235 eq.	1,0E-03	1,8E-01	0,0E+00	1,5E-03	-1,6E+00
Ecotoxicity (freshwater)***	CTUe	6,3E-01	1,2E+02	0,0E+00	9,3E-01	1,3E+04
Human toxicity, cancer effect***	CTUh	6,5E-10	1,6E-07	0,0E+00	9,6E-10	3,8E-05
Human toxicity, non-cancer effects***	CTUh	7,8E-10	2,7E-07	0,0E+00	1,1E-09	-1,5E-05
Land use related impacts/Soil quality***	Pt	3,1E-01	1,3E+02	0,0E+00	4,5E-01	3,7E+02

Resource use indicators for 100% Landfilling

Results per 1 Tonne of Hot Rolled Steel Sheet in Coils – Pickled and Oiled						
Indicator	**Unit**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	1,3E-02	2,8E+00	0,0E+00	1,9E-02	9,3E+00
PERM	MJ	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00
PERT	MJ	1,3E-02	2,8E+00	0,0E+00	1,9E-02	9,3E+00
PENRE	MJ	4,7E+00	2,2E+02	0,0E+00	6,9E+00	1,2E+03
PENRM	MJ	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00
PENRT	MJ	4,7E+00	2,2E+02	0,0E+00	6,9E+00	1,2E+03
SM	kg	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00
RSF	MJ	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00
NRSF	MJ	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00
FW	m^3	1,3E-04	2,9E-02	0,0E+00	2,0E-04	9,2E-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 indicators for 100% Landfilling

Results per 1 Tonne of Hot Rolled Steel Sheet in Coils – Pickled and Oiled						
Indicator	**Unit**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	3,9E-05	5,5E-03	0,0E+00	5,8E-05	2,2E-02
Non-hazardous waste disposed	kg	1,7E-03	1,0E+01	0,0E+00	2,5E-03	1,1E+01
Radioactive waste disposed	kg	2,5E-07	4,4E-05	0,0E+00	3,6E-07	-3,8E-04

Output flow indicators for 100% Landfilling

Results per 1 Tonne of Hot Rolled Steel Sheet in Coils – Pickled and Oiled						
Indicator	**Unit**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00
Material for recycling	kg	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00
Materials for energy recovery	kg	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00
Exported energy, electricity	MJ	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00
Exported energy, thermal	MJ	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00

ABBREVIATIONS

Abbreviation	Definition
General Abbreviations	
EN	European Norm (Standard)
EF	Environmental Footprint
GPI	General Programme Instructions
ISO	International Organization for Standardization
CEN	European Committee for Standardization
CLC	Co-location centre
CPC	Central product classification
GHS	Globally harmonized system of classification and labelling of chemicals
GRI	Global Reporting Initiative
SVHC	Substances of Very High Concern
ND	Not Declared
GWP-total	Global Warming Potential total
GWP-fossil	Global Warming Potential fossil
GWP-biogenic	Global Warming Potential biogenic
GWP-luluc	Global Warming Potential land use and land use change
ODP	Ozone Depletion Potential
AP	Acidification Potential
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 photochemical oxidants
ADP	Abiotic depletion potential
AWARE	Water use by Available WAter REmaining
PERE	Use of renewable primary energy excluding 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 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 material
RSF	Use of renewable secondary fuels
NRSF	Use of non-renewable secondary fuels
FW	Use of net fresh water
HWD	Hazardous waste disposed
NHWD	Non-hazardous waste disposed
RWD	Radioactive waste disposed
CRU	Components for re-use
MFR	Materials for recycling
MER	Materials for energy recovery
EEE	Exported electrical energy
EET	Exported thermal energy

REFERENCES

a) European Standards. (2019). EN 15804:2012+A2:2019/AC2021 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products.
b) General Programme Instructions of the International EPD System. Version 5.1.0, 2026-11-10.
c) IPCC. (2019). 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories.
d) ISO. (2000). ISO 14020: Environmental labels and declarations — General principles.
e) ISO. (2006). ISO 14025: Environmental labels and declarations - Type III environmental declarations — Principles and procedures.
f) ISO (2026). ISO 14025: Environmental statements and programmes for products — Environmental product declarations (EPDs).
g) ISO. (2006). ISO 14040:2006/Amd.1:2020 Environmental management – Life cycle assessment – Principles and framework AMENDMENT 1. Geneva: International Organization for Standardization.
h) ISO. (2006). ISO 14044:2006/Amd.1:2017: Environmental management – Life cycle assessment – Requirements and guidelines AMENDMENT 1. Geneva: International Organization for Standardization.
i) ISO. (2006). ISO 14044:2006/Amd.2:2020 Environmental management – Life cycle assessment – Requirements and guidelines AMENDMENT 2. Geneva: International Organization for Standardization.
j) PCR 2019:14 Construction Products (EN 15804:2012+2019:A2/AC:2021). Version 2.0.1, 2025-06-05.
k) The Iron and Steel Institute of Thailand. (2023). “Steel Scrap”: A Key Raw Material for Steel Production.
l) Electricity Generating Authority of Thailand. (2024). Annual report 2024. Bangkok, Thailand: Electricity Generating Authority of Thailand.
m) Energy Policy and Planning Office (EPPO), Ministry of Energy. (2024). Static electricity information. Retrieved June 26, 2026, from https://old.eppo.go.th/index.php/th/energy-information/static-energy/static-electricity?orders[publishUp]=publishUp&issearch=1
n) The Iron and Steel Institute of Thailand. (2024). “Steel Recovery Rate in Thailand 2024”
o) CEN. (2024). EN 15941:2024, Sustainability of construction works – Data quality for environmental assessment of products and construction work – Selection and use of data.
p) ECO Platform. (2024). ECO Platform standards, versions published 2024-12-20.108 Available on https://www.eco-platform.org/our-relevant-documents.html, accessed December 2024.

VERSION HISTORY

Version 1, 2026-11-13
- Original Version of the EPD

EPD
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