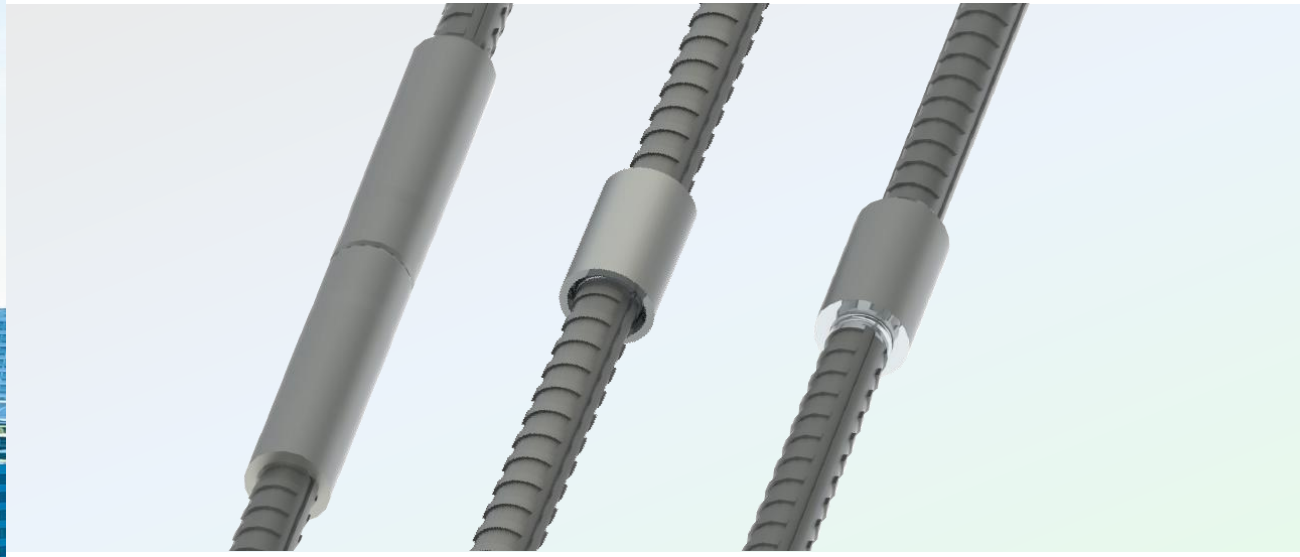
ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025

Griptec, Bartec/Fortec, Rolltec Carbon Lite couplers

Dextra Manufacturing Co., Ltd.



EPD HUB, HUB-5979

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Life Cycle Assessment study has been performed in accordance with the requirements of EN 15804, EPD Hub PCR version 1.2 (24 Mar 2025) and JRC characterization factors EF 3.1.

Created with One Click LCA

Dextra

GENERAL INFORMATION

MANUFACTURER

Manufacturer	Dextra Manufacturing Co., Ltd.
Address	191 Chalermprakiet Rama 9, 48 Alley, Dokmai, Prawet, Bangkok, Thailand
Contact details	thailand@dextragroup.com
Website	www.dextragroup.com

EPD STANDARDS, SCOPE AND VERIFICATION

Program operator	EPD Hub, hub@epdhub.com
Reference standard	EN 15804:2012+A2:2019/AC:2021 and ISO 14025
PCR	EPD Hub Core PCR Version 1.2, 24 Mar 2025
Sector	Construction product
Category of EPD	Third party verified EPD
Parent EPD number	-
Scope of the EPD	Cradle to gate with options, A4-A5, and modules C1-C4, D
EPD author	Tanyarade Nateweera, Dextra Manufacturing
EPD verification	Independent verification of this EPD and data, according to ISO 14025: o Internal verification þ External verification
EPD verifier	Vera Durão, as an authorised verifier acting for EPD Hub Limited

This EPD is intended for business-to-business and/or business-to-consumer communication. 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	Griptec, Bartec/Fortec, Rolltec Carbon Lite couplers
Additional labels	Carbon Lite coupler
Product reference	-
Place(s) of raw material origin	China
Place of production	Bangkok, Thailand
Place(s) of installation and use	Worldwide
Period for data	Calendar year 2025
Averaging in EPD	No grouping
Variation in GWP-fossil for A1-A3 (%)	-
GTIN (Global Trade Item Number)	-
NOBB (Norwegian Building Product Database)	-
A1-A3 Specific data (%)	27

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 kg
Declared unit mass	1 kg
Mass of packaging	0,1177 kg
GWP-fossil, A1-A3 ($kgCO_2e$)	1,58
GWP-total, A1-A3 ($kgCO_2e$)	1,48
Secondary material, inputs (%)	85,9
Secondary material, outputs (%)	0
Total energy use, A1-A3 (kWh)	8,12
Net freshwater use, A1-A3 (m^3)	-0,01

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

Dextra specializes in the design, manufacturing, and distribution of engineered construction solutions. Dextra business lines include:

- Products for the reinforcement concrete, for both civil and nuclear applications,
- Engineered bar systems (tie bars, tension rods, post-tensioning bars)
- Rock and soil anchors used in various applications such as geotechnical works.

Overall, Dextra provides a complete solution, encompassing engineering, manufacturing, and product delivery, including specialized equipment like bar-end preparation machines.

PRODUCT DESCRIPTION

Dextra's Carbon Lite coupler range (Griptec®, Bartec®/Fortec®, and Rolltec®) is a full-performance mechanical splicing system for concrete reinforcing bars with diameters from Ø12 to Ø50 mm, manufactured using EAF-produced steel with high recycled content, without affecting its mechanical performance.

The mechanical performance of the Carbon Lite couplers is verified through testing in accordance with internationally recognized standards for mechanical reinforcement couplers, including applicable ISO, European, national, and industry standards (e.g. ISO 15835-1 and equivalent regional standards).

Declared performance characteristics include static tensile strength, slip or permanent elongation, ductility, cyclic and fatigue behaviour, and bar-break performance, ensuring suitability for structural applications in reinforced concrete construction.

Further information can be found at www.dextragroup.com.

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass %	Material origin
Metals	100	Asia
Minerals	-	-
Fossil materials	-	-
Bio-based materials	-	-

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

Biogenic carbon content in product, kg C	0
Biogenic carbon content in packaging, kg C	0,03

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 kg
Mass per declared unit	1 kg
Functional unit	-
Reference service life	-

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	x	x	ND	ND	ND	ND	ND	ND	ND	x	x	x	x	x		
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction/ demolition	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling

Not declared = ND.

MANUFACTURING AND PACKAGING (A1-A3)

The environmental impacts considered in the product stage cover the manufacturing of raw materials used in production, as well as packaging materials and other ancillary materials. This stage also includes the fuels used by machinery, the handling and treatment of production waste at the manufacturing facilities, and all material and energy losses occurring during manufacturing processes, including losses during electricity transmission. A market-based approach is used in modelling the electricity mix utilized in the factory.

The steel raw materials are produced in China through Electric Arc Furnace (EAF) routes with high recycled content. These materials are then transported from China to the manufacturing facility in Thailand. Transport distances and modes for raw materials are included in the model: sea freight from China to Thailand, followed by road transportation from the port to the manufacturing site.

At the factory, the materials undergo cutting, forming, and threading into their final shapes. The manufacturing process requires electricity to power production equipment. A market-based approach is used in modelling the electricity mix utilized in the factory. After production, the finished couplers are packaged using plastic caps and placed in wooden boxes with attachment elements.

During manufacturing, approximately 2–10% of steel is lost (depending on whether the input is tube or bar). All steel scrap generated during manufacturing is collected by a waste transportation service provider and transported by road to a local recycling facility located 21.6 km from the production site. Hazardous waste arising from ancillary materials is transported to an authorized waste management provider, where it undergoes fuel blending followed by incineration to ensure compliant treatment and final disposal. The transportation distance for hazardous waste is assumed to be 129 km. These distances and treatment routes are based on actual operational practices at the facility.

TRANSPORT AND INSTALLATION (A4-A5)

Transportation impacts occurred from final products delivery to construction site (A4) cover fuel direct exhaust emissions, environmental impacts of fuel production, as well as related infrastructure emissions.

Transportation impacts associated with delivering the final products to the construction site (A4) include direct exhaust emissions from fuel combustion, upstream impacts from fuel production, and emissions related to transportation infrastructure. The average transport distance from the production plant to customer sites is 7,830 km, and transport is assumed to be carried out by lorry. A vehicle capacity utilization factor of 1.0 (full load) is applied. Although actual load factors may vary, transportation contributes only marginally to the overall environmental impacts, therefore, this variation is considered negligible. To ensure a conservative approach, empty return trips are included through the use of average load factors in the background datasets. No product losses occur during transportation due to adequate packaging. At the construction site (A5), no additional energy is required, as the products can be assembled manually.

Environmental impacts in this stage are limited to the generation of packaging waste (e.g., plastic caps and wooden boxes) and the release of biogenic CO_2 associated with the wooden packaging components.

The treatment of plastic packaging waste at the project site is assumed to consist of 50% landfill, 19% incineration, 9% recycling, and 22% mismanagement, according to the OECD (2022) report. Wood waste is assumed to be treated as 85% recycling and 15% landfill, based on the Business Waste Statistics 2024. The transportation distances to the waste treatment plant are assumed to be 25 km for mismanagement, 50 km for landfill, 100 km for incineration, and 150 km for recycling plants.

PRODUCT USE AND MAINTENANCE (B1-B7)

The use phase is not included in the assessment as it is not relevant for the product. Air, soil, and water impacts during the use phase have not been studied.

PRODUCT END OF LIFE (C1-C4, D)

For the end-of-life stage, no dedicated energy is required for dismantling, as the product is removed as part of the overall building demolition process (Module C1).

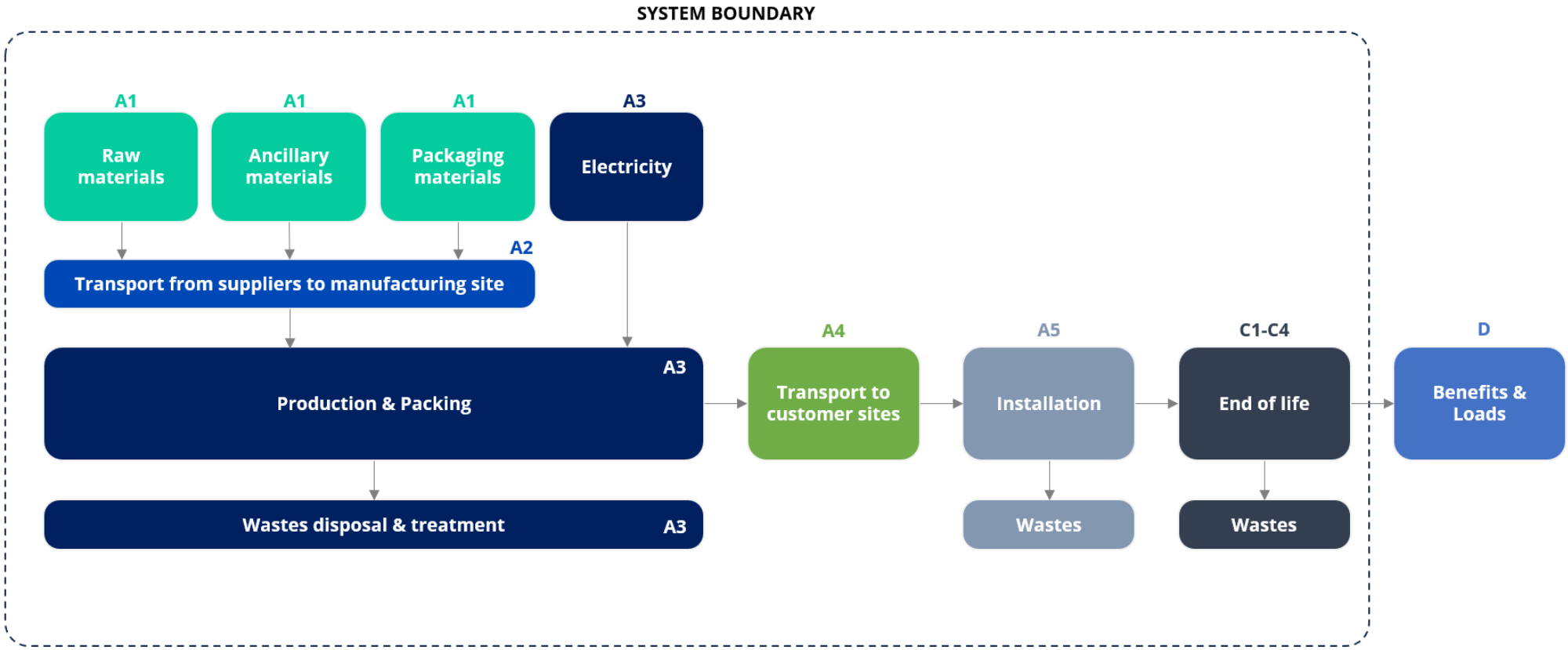
Following demolition, it is assumed that different waste materials are collected separately and transported to appropriate waste treatment or processing facilities. Steel waste is assumed to undergo 85% recycling and 15% landfill, in accordance with World Steel Association (2021).

Transportation distances are defined in accordance with the applicable EN 17662 cPCR default assumptions. Transport from the deconstruction site to scrap processing or disposal facilities (including recycling and landfill) is assumed to be 100 km. Transport from the deconstruction site to plants for storage and upgrade to reusable products is assumed to be 200 km. Transport from the scrap processing plant to the site where end-of-waste status is achieved is assumed to be 200 km. Transportation is conducted by lorry (C2).

Module C3 encompasses energy and resource inputs related to sorting, dismantling, and processing of materials for recycling. Landfilling and incineration processes are addressed in Module C4.

The steel used in the product is manufactured from 100% scrap-based steel. Therefore, no benefits or loads from end-of-life recycling of product steel are declared in Module D, in order to avoid double counting of recycled content already accounted for in the upstream production stages. Module D includes benefits and loads only from the recycling of steel packaging materials, which are assumed to be produced from virgin steel.

FLOW DIAGRAM



LIFE-CYCLE ASSESSMENT

CUT-OFF CRITERIA

The study does not exclude any modules or processes that are mandatory according to the reference standard and the applied PCR. No hazardous materials or substances are excluded from the assessment. All relevant material and energy flows related to the product system, for which data are available, are included in the calculation.

No unit processes or input/output flows were excluded based on quantitative cut-off criteria. Any exclusions made are applied solely due to the definition of the system boundaries.

The production of capital equipment, construction activities and infrastructure, maintenance and operation of capital equipment, personnel-related activities, and energy and water use related to company management and sales activities are excluded in accordance with the defined system boundaries.

VALIDATION OF DATA

Data collection for production, transport, and packaging was conducted using time and site-specific information, as defined in the general information section on page 1 and 2. Upstream process calculations rely on generic data as defined in the Bibliography section. Manufacturer-provided specific and generic data were used for the product's manufacturing stage. The analysis was performed in One Click LCA EPD Generator, with the 'Cut-Off, EN 15804+A2' allocation method, and characterization factors according to EN 15804:2012+A2:2019/AC:2021 and JRC EF 3.1.

ALLOCATION, ESTIMATES AND ASSUMPTIONS

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation.

All allocations are done as per the reference standards and the applied PCR. In this study, allocation has been done in the following ways:

Data type	Allocation
Raw materials	No allocation
Packaging material	Allocated by mass or volume
Ancillary materials	Allocated by mass or volume
Manufacturing energy and waste	Allocated by mass or volume

PRODUCT & MANUFACTURING SITES GROUPING

Type of grouping	No grouping
Grouping method	Not applicable
Variation in GWP-fossil for A1-A3, %	-

This EPD is product and factory specific.

LCA SOFTWARE AND BIBLIOGRAPHY

This EPD has been created using One Click LCA EPD Generator for EPD Hub V3 and EPD Process Certification v3.2.4. The LCA and EPD have been prepared according to the reference standards and ISO 14040/14044. The EPD Generator uses Ecoinvent v3.10.1/3.11/3.12 and One Click LCA databases as sources of environmental data. Allocation used in Ecoinvent 3.10.1/3.11/3.12 environmental data sources follow the methodology 'allocation, Cut-off, EN 15804+A2'.

- Supplier-specific Product Carbon Footprint information developed in accordance with ISO 14067, used as supporting data for GWP of steel raw materials only.
- World Steel Association (worldsteel), Life Cycle Inventory (LCI) study 2021 data release, used as a reference for steel recycling rates in the construction sector for end-of-life scenarios (Modules C3–C4).
- OECD (2022), Global Plastic Outlook, used as supporting literature for plastic waste treatment assumptions where regional data is unavailable.

DATA SOURCES AND DATA QUALITY

Life-cycle module	Data source	Data type	Scenario description
A1–A3	Manufacturer-specific data and generic manufacturing and waste treatment datasets from Ecoinvent database	Mixed specific & generic	Scrap-based steel raw materials, on-site manufacturing, and production waste handling (recycling and disposal at manufacturing site
A4	Generic transport datasets from Ecoinvent database	Worldwide average	Global transport by sea and road
A5	Generic waste treatment datasets from Ecoinvent database	Worldwide average	Packaging waste treatment
C1–C4	Generic waste treatment datasets and EN 17662 cPCR	Scenario-based	Recycling and landfill scenarios
D	Generic recycling datasets	Worldwide average	Benefits only for steel packaging

ENVIRONMENTAL IMPACT DATA

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

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, EF 3.1

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total[1)]	kg CO_2e	8,12E-01	3,44E-02	6,32E-01	1,48E+00	9,84E-02	1,34E-01	ND	ND	ND	ND	ND	ND	ND	ND	1,35E-02	ND	1,98E-02	-3,72E-02
GWP – fossil	kg CO_2e	8,04E-01	3,44E-02	7,41E-01	1,58E+00	9,80E-02	2,22E-02	ND	ND	ND	ND	ND	ND	ND	ND	1,30E-02	ND	2,00E-02	-1,72E-02
GWP – biogenic	kg CO_2e	7,03E-03	1,04E-05	-1,10E-01	-1,03E-01	1,75E-05	1,11E-01	ND	ND	ND	ND	ND	ND	ND	ND	5,55E-06	ND	-2,75E-04	-2,00E-02
GWP – LULUC	kg CO_2e	1,28E-03	1,73E-05	2,33E-04	1,53E-03	3,73E-04	4,48E-05	ND	ND	ND	ND	ND	ND	ND	ND	4,93E-04	ND	2,41E-05	-6,63E-06
Ozone depletion pot.	kg CFC-$_{11}$e	8,82E-09	5,44E-10	4,10E-08	5,04E-08	1,61E-09	1,58E-10	ND	ND	ND	ND	ND	ND	ND	ND	4,90E-10	ND	2,80E-10	-2,24E-09
Acidification potential	mol H^+e	6,18E-03	7,93E-04	2,80E-03	9,77E-03	2,66E-03	2,85E-05	ND	ND	ND	ND	ND	ND	ND	ND	4,26E-05	ND	2,35E-04	-6,68E-05
EP-freshwater[2)]	kg Pe	6,09E-04	1,62E-06	1,02E-04	7,13E-04	3,46E-06	1,73E-06	ND	ND	ND	ND	ND	ND	ND	ND	1,04E-06	ND	1,28E-05	-7,22E-06
EP-marine	kg Ne	1,60E-03	2,01E-04	5,86E-04	2,38E-03	6,68E-04	4,01E-05	ND	ND	ND	ND	ND	ND	ND	ND	1,85E-05	ND	5,32E-05	-1,33E-05
EP-terrestrial	mol Ne	1,37E-02	2,23E-03	6,19E-03	2,21E-02	7,38E-03	9,30E-05	ND	ND	ND	ND	ND	ND	ND	ND	1,56E-04	ND	5,99E-04	-1,40E-04
POCP ("smog")[3)]	kg NMVOCe	4,92E-03	6,19E-04	2,17E-03	7,71E-03	2,01E-03	3,30E-05	ND	ND	ND	ND	ND	ND	ND	ND	6,02E-05	ND	1,79E-04	-5,88E-05
ADP-minerals & metals[4)]	kg Sbe	3,67E-06	6,51E-08	4,04E-06	7,78E-06	1,19E-07	3,88E-08	ND	ND	ND	ND	ND	ND	ND	ND	4,79E-08	ND	1,35E-06	-2,01E-07
ADP-fossil resources	MJ	1,67E+01	4,38E-01	1,12E+01	2,84E+01	1,22E+00	7,56E-02	ND	ND	ND	ND	ND	ND	ND	ND	1,86E-01	ND	2,81E-01	-2,56E-01
Water use[5)]	m^3e depr.	7,90E-01	1,58E-03	2,47E+00	3,26E+00	3,86E-03	2,25E-02	ND	ND	ND	ND	ND	ND	ND	ND	1,23E-03	ND	6,04E-03	-3,78E-03

1) GWP = Global Warming Potential; 2) EP = Eutrophication potential. Required characterisation method and data are in kg P-eq. Multiply by 3,07 to get PO4e; 3) POCP = Photochemical ozone formation; 4) ADP = Abiotic depletion potential; 5) EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

ADDITIONAL (OPTIONAL) ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, EF 3.1

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Particulate matter	Incidence	1,54E-07	1,51E-09	3,46E-08	1,90E-07	3,44E-09	4,54E-10	ND	ND	ND	ND	ND	ND	ND	ND	1,22E-09	ND	3,27E-09	-7,93E-10
Ionizing radiation[6)]	kBq U235e	6,05E-02	3,08E-04	1,29E-02	7,37E-02	6,01E-04	1,89E-04	ND	ND	ND	ND	ND	ND	ND	ND	1,76E-04	ND	2,23E-03	-8,37E-04
SQP[7)]	-	3,77E+00	9,14E-02	1,41E+01	1,80E+01	1,89E-01	8,84E-02	ND	ND	ND	ND	ND	ND	ND	ND	1,67E-01	ND	5,40E-01	-5,79E-02

6) EN 15804+A2 disclaimer for Ionizing radiation, human health. 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; 7) SQP = Land use related impacts/soil quality.

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[8)]	MJ	1,15E+00	4,74E-03	1,51E+00	2,67E+00	1,09E-02	-1,27E+00	ND	ND	ND	ND	ND	ND	ND	ND	4,14E-03	ND	4,75E-02	1,01E-01
Renew. PER as material	MJ	0,00E+00	0,00E+00	8,91E-01	8,91E-01	0,00E+00	-8,91E-01	ND	ND	ND	ND	ND	ND	ND	ND	0,00E+00	ND	0,00E+00	1,50E-01
Total use of renew. PER	MJ	1,15E+00	4,74E-03	2,40E+00	3,56E+00	1,09E-02	-2,16E+00	ND	ND	ND	ND	ND	ND	ND	ND	4,14E-03	ND	4,75E-02	2,51E-01
Non-re. PER as energy	MJ	1,67E+01	4,38E-01	9,41E+00	2,66E+01	1,22E+00	-5,70E-01	ND	ND	ND	ND	ND	ND	ND	ND	1,90E-01	ND	2,81E-01	-3,12E-01
Non-re. PER as material	MJ	0,00E+00	0,00E+00	6,79E-01	6,79E-01	0,00E+00	-6,79E-01	ND	ND	ND	ND	ND	ND	ND	ND	0,00E+00	ND	0,00E+00	5,80E-02
Total use of non-re. PER	MJ	1,67E+01	4,38E-01	1,01E+01	2,73E+01	1,22E+00	-1,25E+00	ND	ND	ND	ND	ND	ND	ND	ND	1,90E-01	ND	2,81E-01	-2,54E-01
Secondary materials	kg	8,59E-01	2,08E-04	1,18E-02	8,71E-01	5,80E-04	3,21E-05	ND	ND	ND	ND	ND	ND	ND	ND	8,47E-05	ND	3,20E-04	8,88E-03
Renew. secondary fuels	MJ	1,38E-04	1,01E-06	3,82E-04	5,21E-04	1,88E-06	3,13E-06	ND	ND	ND	ND	ND	ND	ND	ND	1,01E-06	ND	1,48E-05	-1,21E-06
Non-ren. secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00
Use of net fresh water	m^3	-1,79E-02	3,77E-05	3,63E-03	-1,42E-02	1,06E-04	2,17E-04	ND	ND	ND	ND	ND	ND	ND	ND	4,90E-05	ND	1,39E-04	-8,28E-05

8) 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	4,22E-01	6,39E-04	3,46E-02	4,57E-01	1,71E-03	5,31E-03	ND	ND	ND	ND	ND	ND	ND	ND	4,04E-04	ND	1,73E-03	-3,98E-03
Non-hazardous waste	kg	1,95E+01	1,04E-02	6,30E-01	2,01E+01	2,34E-02	4,41E-01	ND	ND	ND	ND	ND	ND	ND	ND	6,07E-03	ND	6,76E-02	-2,15E-01
Radioactive waste	kg	1,47E-05	7,57E-08	2,71E-06	1,75E-05	1,46E-07	4,77E-08	ND	ND	ND	ND	ND	ND	ND	ND	4,27E-08	ND	5,71E-07	-2,17E-07

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	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00
Materials for recycling	kg	0,00E+00	0,00E+00	5,20E-02	5,20E-02	0,00E+00	2,12E-02	ND	ND	ND	ND	ND	ND	ND	ND	0,00E+00	ND	8,50E-01	0,00E+00
Materials for energy rec	kg	0,00E+00	0,00E+00	2,85E-02	2,85E-02	0,00E+00	5,70E-03	ND	ND	ND	ND	ND	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00
Exported energy	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00
Exported energy – Electricity	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00
Exported energy – Heat	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	ND	ND	0,00E+00	ND	0,00E+00	0,00E+00

ENVIRONMENTAL IMPACTS – EN 15804+A1, CML

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_2e	8,01E-01	3,43E-02	7,38E-01	1,57E+00	9,79E-02	2,61E-02	ND	ND	ND	ND	ND	ND	ND	ND	1,34E-02	ND	2,00E-02	-1,69E-02
Ozone depletion Pot.	kg CFC_{-11}e	7,43E-09	4,33E-10	3,60E-08	4,39E-08	1,28E-09	1,39E-10	ND	ND	ND	ND	ND	ND	ND	ND	3,91E-10	ND	2,40E-10	-2,23E-09
Acidification	kg SO_2e	5,05E-03	6,31E-04	2,30E-03	7,98E-03	2,12E-03	2,20E-05	ND	ND	ND	ND	ND	ND	ND	ND	3,22E-05	ND	1,88E-04	-5,47E-05
Eutrophication	kg PO_4^3e	1,93E-03	7,39E-05	1,02E-03	3,03E-03	2,55E-04	9,86E-06	ND	ND	ND	ND	ND	ND	ND	ND	3,68E-05	ND	2,85E-05	-1,21E-05
POCP (“smog”)	kg C_2H_4e	4,23E-04	3,27E-05	1,45E-04	6,01E-04	1,06E-04	3,03E-06	ND	ND	ND	ND	ND	ND	ND	ND	3,44E-06	ND	1,13E-05	-7,23E-06
ADP-elements	kg Sbe	3,52E-06	6,42E-08	3,46E-06	7,05E-06	1,17E-07	3,07E-08	ND	ND	ND	ND	ND	ND	ND	ND	4,71E-08	ND	1,35E-06	-1,82E-07
ADP-fossil	MJ	1,58E+01	4,33E-01	1,08E+01	2,70E+01	1,21E+00	7,26E-02	ND	ND	ND	ND	ND	ND	ND	ND	1,84E-01	ND	2,42E-01	-2,41E-01

ADDITIONAL INDICATOR – GWP-GHG

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-GHG[9)]	kg CO_2e	8,05E-01	3,44E-02	7,42E-01	1,58E+00	9,84E-02	2,22E-02	ND	ND	ND	ND	ND	ND	ND	ND	1,35E-02	ND	2,01E-02	-1,72E-02

9) This indicator includes all greenhouse gases excluding biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. In addition, the characterisation factors for the flows – CH4 fossil, CH4 biogenic and Dinitrogen monoxide – were updated. This indicator is identical to the GWP-total of EN 15804:2012+A2:2019 except that the characterisation factor for biogenic CO2 is set to zero.

SCENARIO DOCUMENTATION

DATA SOURCES

Manufacturing energy scenario documentation

1. Electricity, consumption mix w/o renewables, Thailand , 2023, Thailand, One Click LCA, 0.81 kgCO2e/kWh

Transport scenario documentation - A4 (Transport resources)

1. Market for transport, freight, sea, container ship, 7829.872892458024 km
2. Market for transport, freight, lorry 16-32 metric ton, EURO5, 55.899509203826966 km

Installation scenario documentation - A5 (Installation waste)

1. Treatment of waste polyvinylchloride, sanitary landfill, Ecoinvent, 0.015 kg
2. Treatment of waste polyvinylchloride, municipal incineration, Ecoinvent, Materials for energy recovery, 0.0057 kg
3. Treatment of waste polyvinylchloride, unsanitary landfill, dry infiltration class (100mm), Ecoinvent, 0.0066 kg
4. Treatment of waste steel, inert material landfill, Ecoinvent, 0.001154 kg
5. Sorting and pressing of iron scrap, Ecoinvent, Materials for recycling, 0.006536 kg
6. Treatment of waste wood, untreated, sanitary landfill, Ecoinvent, 0.068 kg
7. Treatment of waste wood, post-consumer, sorting and shredding, Ecoinvent, Materials for recycling, 0.012 kg
8. Treatment of waste polyvinylchloride, municipal incineration, Ecoinvent, Materials for recycling, 0.0027 kg

End-of-life scenario documentation - C1-C4 (Data source)

1. Sorting and pressing of iron scrap, Ecoinvent, Materials for recycling, 0.85 kg
2. Treatment of waste steel, inert material landfill, Ecoinvent, 0.15 kg

Scenario information	Value
Scenario assumptions e.g. transportation	Transport from deconstruction site to scrap processing or disposal facilities (including recycling and landfill): 100 km. Transport from deconstruction site to plant for storage and upgrade to reusable product: 200 km. Transport from scrap processing plant to site where end-of-waste is achieved: 200 km.

THIRD-PARTY VERIFICATION STATEMENT

EPD Hub declares that this EPD is verified in accordance with ISO 14025 by an independent, third-party verifier. The project report on the Life Cycle Assessment and the report(s) on features of environmental relevance are filed at EPD Hub. EPD Hub PCR and ECO Platform verification checklist are used.

EPD Hub is not able to identify any unjustified deviations from the PCR and EN 15804+A2 in the Environmental Product Declaration and its project report.

EPD Hub maintains its independence as a third-party body; it was not involved in the execution of the LCA or in the development of the declaration and has no conflicts of interest regarding this verification.

The company-specific data and upstream and downstream data have been examined as regards plausibility and consistency. The publisher is responsible for ensuring the factual integrity and legal compliance of this declaration.

The software used in creation of this LCA and EPD is verified by EPD Hub to conform to the procedural and methodological requirements outlined in ISO 14025:2010, ISO 14040/14044, EN 15804+A2, and EPD Hub Core Product Category Rules and General Program Instructions.

Verified tools

Tool verifier: Magaly Gonzalez Vazquez
Tool verification validity: 27 March 2025 - 26 March 2028

Vera Durão, as an authorised verifier acting for EPD Hub Limited

10.04.2026