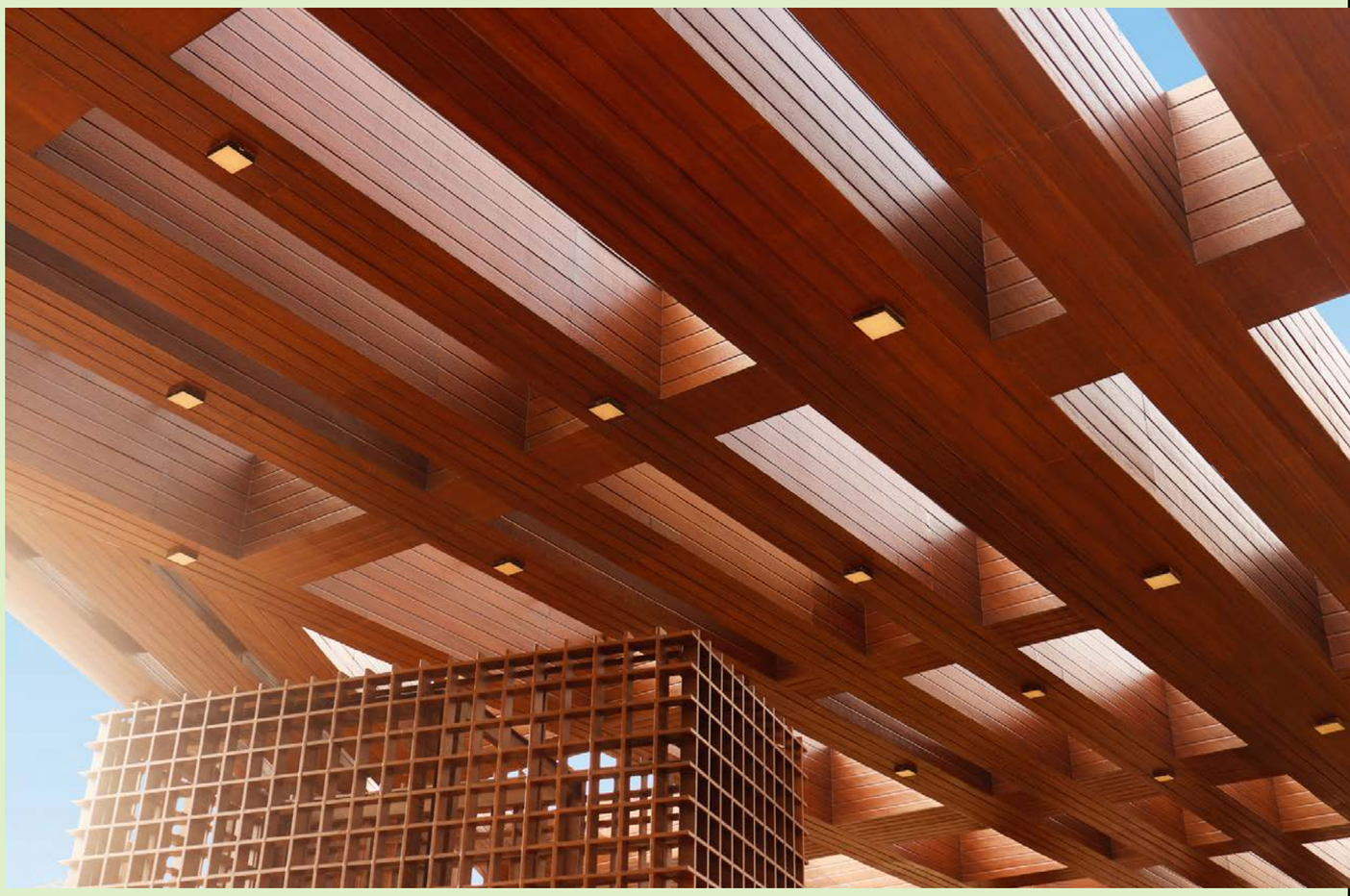
Environmental Product Declaration

In accordance with **ISO 14025:2006** and

EN 15804:2012+A2:2019/AC:2021 for:

Conwood Product

This EPD of multiple products, covers a range of conwood product, based on the weighted average results of the product group for Conwood Ceiling Border, Conwood Eave, Conwood Lath, Conwood Lap Siding, Conwood Decorative Panel, Conwood Mould, Conwood Decorative Deck, Conwood Deck, Conwood Decorative Stair, Conwood Sunshade, Conwood Plank, Conwood Fence, and Conwood Beyond



PT. Conwood Indonesia

Kawasan Industri Jababeka VI, Blok C2/3, Jatireja,
Kecamatan Cikarang Timur, Kabupaten Bekasi,
Jawa Barat 17530

Programme
The International EPD® System,
www.environdec.com

EPD registered through the fully aligned regional hub
EPD Southeast Asia,
https://www.epd-southeastasia.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

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General information

Programme information

Programme	**The International EPD ® System** EPD registered through the fully aligned regional hub: EPD Southeast Asia
Address:	**EPD International AB** Box 210 60, SE-100 31 Stockholm, Sweden **EPD Southeast Asia** Kencana Tower Level M, Business Park Kebon Jeruk Jl. Raya Meruya Ilir No. 89, Jakarta Barat 11620, Indonesia **Website** www.environdec.com www.epd-southeastasia.com **Email** 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): Product Category Rules (PCR) of Construction Products (PCR 2019:14 Version 1.3.4), and UN CPC 3757	
PCR review was conducted by: Claudia A. Peña from PINDA LCT SpA.	**Review chair:** No chair appointed The review panel may be contacted via the Secretariat www.environdec.com/contact.
Life Cycle Assessment (LCA) LCA accountability: PT Life Cycle Indonesia Corresponding practitioner: Jessica Hanafi, Ph.D., Gloria FJ Kartikasari, Elbert Fernando, Jonathan Aditya, Natalia Susanto Salim	
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: Marcus Wendin, Miljögiraff, Marcus@miljogiraff.se, https://miljogiraff.se/ **Approved by:** The International EPD® System Technical Committee, supported by the Secretariat	
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

PT. Conwood Indonesia

Contact

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Phone: +62 812-8888-1422

Product-related or management system-related certifications

- ISO 9001:2015 Quality Management System
- ISO 14001:2015 Environmental Management System
- ISO 45001:2018 Occupational health and safety Management System
- Green Label Indonesia
- TKDN Tingkat Kandungan Dalam Negeri.

Name and location of production site(s)

Kawasan Industri Jababeka VI, Blok C2/3, Jatireja, Cikarang Timur, Jatireja, Kec. Cikarang Tim., Kabupaten Bekasi, Jawa Barat 17530

Description of the organisation

PT Conwood Indonesia is a subsidiary of Conwood Co., Ltd. and part of Siam City Cement Public Co., Ltd. (Thailand), one of Thailand's largest cement and aggregates manufacturers. Established in 2011 and began operations in 2012 to import and distribute wood replacement products in Indonesia. In 2014, Conwood Indonesia opened a manufacturing plant on an 8-hectare site in Jababeka Industrial Estate.

Conwood's wood replacement products are crafted with advanced Swiss technology, ensuring they are beautiful, durable, termite-proof, and incombustible. These products are suitable for both indoor and outdoor applications in residential and commercial buildings, including Eave and Ceiling Applications, Wall Applications, Floor Applications, Decorative Applications, and Accessory Applications.

In accordance with Conwood's Mission to developing, producing, and selling innovative architect building material product with 0% wood, Conwood innovatively combine the beauty and workability of real wood with the strength and durability of concrete, while maintaining the natural appearance of wood.

Product information

Product name

Conwood Product

Product identification

Building material made from cellulose components and cement fiber produced through a process and material as an innovative wood replacement solution product

Product description

Conwood's wide-ranging product lines are designed to serve every building and decorative need from private homes, and curated spaces to large-scale constructions. Conwood is a cement board product which in its production process prioritizes efficiency and effectiveness that pays attention to environmental aspects including using high quality materials while minimizing waste, maximizing reuse or recycling of resources, and minimizing the use of hazardous materials. The main materials used in this process are natural recycled fibers such as used cardboard and implementing 3R (Reduce, Reuse, Recycle) with the goal that no waste is released into the environment. Conwood products innovatively combine the beauty and ease of working with real wood with the strength and durability of concrete.

Material Specification

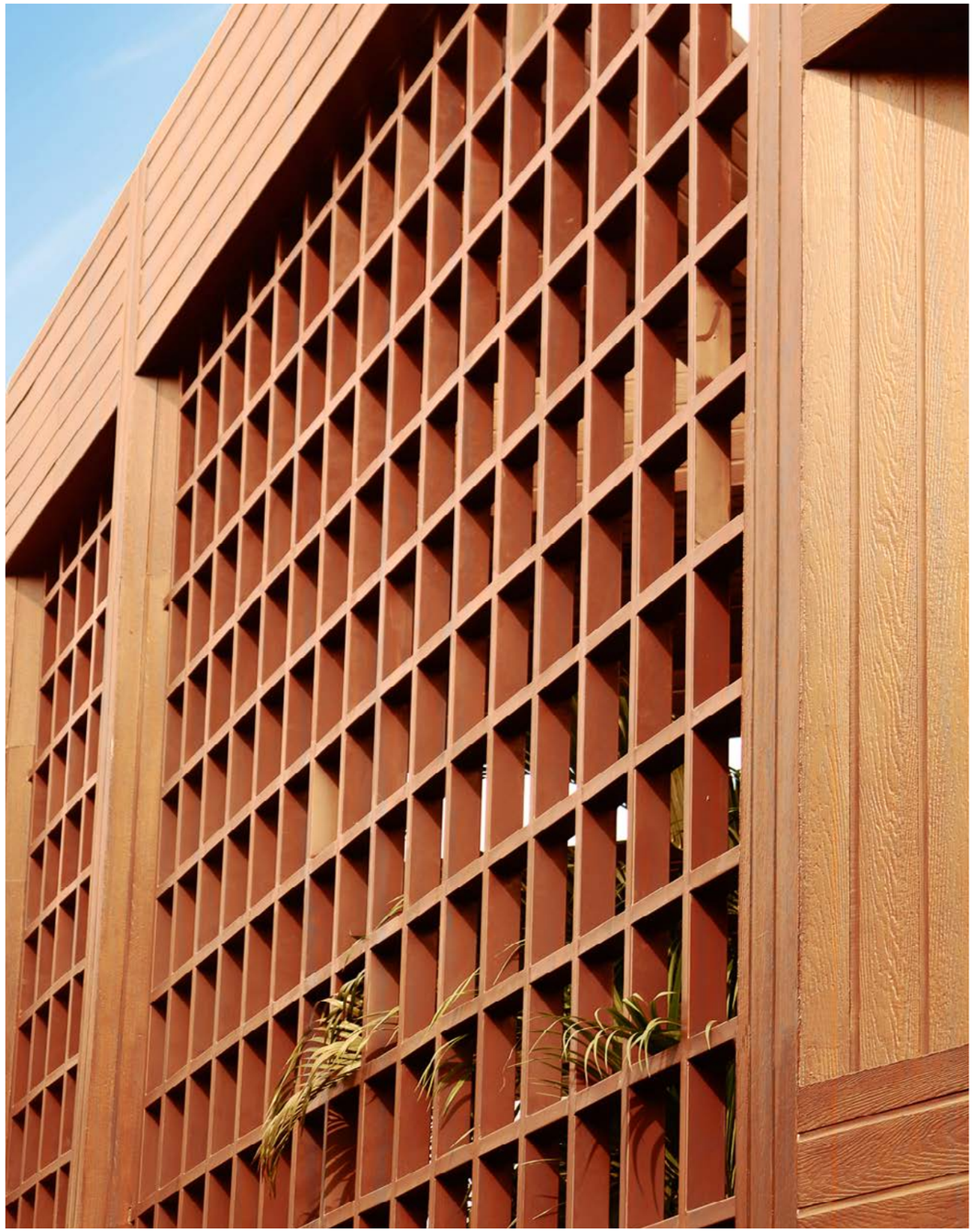
Item	Reference	Description	Specification
Cement	SNI 2049 : 2015 SNI 7064 : 2014	Portland Cement	Standard Product Type I (PCC & OPC)
Cellulose Fibre	-	Waste Paper	-

UN CPC code

UN CPC 37570 - Articles of asbestos-cement, cellulose fibre-cement or the like

Geographical Scope

Indonesia



Technical Specification

Product Type	Thickness (cm)	Width (cm)	Length (cm)	Weight (kg/pcs)	Piece (m²)
Conwood Ceiling Border	1.1	5	305	2.3	-
Conwood Eave	1.4	23.5	305	12.77	-
Conwood Lath 3"	1.1	7.5	305	3.45	4.3
Conwood Lath 4"	1.1	10	305	4.6	3.21
Conwood Lap Siding G-Series (G0)	1.1	20	305	9.04	1.57
Conwood Lap Siding G-Series (G1)	1.1	20	305	8.88	1.57
Conwood Lap Siding G-Series (G2)	1.1	20	305	8.71	1.57
Conwood Lap Siding G-Series (G5)	1.1	20	305	8.71	7.6
Conwood Lap Siding Bg	1.1	15	305	6.89	2.15
Conwood Decorative Panel 1” Stick	2.5	10	305	8.22	-
Conwood Decorative Panel Ecp (60x60)	1.1	60	60	4.9	2.77
Conwood Decorative Panel Ecp (60x120)	1.1	60	120	9.9	1.38
Conwood Decorative Panel Array N	1.1	20	150	3.8	3.3
Conwood Decorative Panel Array W	1.1	20	150	3,6	3.3
Conwood Decorative Panel Rhythm	1.6	20	150	4.9	-
Conwood Mould Louis	1.1	10	305	4.37	-
CONWOOD MOULD CLASSIC	1.1	10	305	4.37	-
CONWOOD DECORATIVE DECK 4"	1.4/2.5	10	305	5.20/9.76	3.22
CONWOOD DECORATIVE DECK 6"	1.4/2.5	15	305	8.20/14.64	2.15
CONWOOD DECORATIVE DECK 8"	1.4/2.5	20	305	10.93/19.52	1.61
CONWOOD DECK 12” D1	2.5	30	305	28.75	1.09
CONWOOD DECK 12” D2	2.5	30	305	28.75	1.09
CONWOOD DECK 12” D3	2.5	30	305	28.75	1.09
CONWOOD DECORATIVE STAIR VERTICAL 8”	1.6	20	120	4.92	-

Product Type	Thickness (cm)	Width (cm)	Length (cm)	Weight (kg/pcs)	Piece (m²)
Conwood Decorative Stair Horizontal 12"	2.5	30	120	11.31	-
Conwood Decorative Stair Handrail	3	8.5	305	9.03	-
Conwood Decorative Stair Bordes	2.5	120	120	45.36	-
Conwood Sunshade	1.4	75	305	4.1	-
Conwood Plank 2”	16/2.5	5	305	3.12/4.88	-
Conwood Fence Botany	1.6	10	100/150	1.99/2.98	-
Conwood Fence Arrow	1.6	10	100/150	1.99/2.98	-
Conwood Fence Standard	1.6	10	150	3.07	-
Conwood Beyond D - Lock	25	250	3050	24.07	1.33
Conwood Beyond C - Lock	11	200	3050	9.0/8.9/8.7	1.66

LCA information

Declared unit

1 kg of Conwood Product

Time representativeness

Specific data for the manufacturing collected from 1 January 2023 - 31 December 2023. The 10-year age requirement for generic data has been met.

Database(s) and LCA software used

Generic data for module A1 and C1-C4 use Ecoinvent 3.10. database and modelled by using SimaPro Developer software version 9.6.0.1. No datasets older than 10 years were used.

Description of system boundaries

The system boundary was chosen based on the goal and scope of the study and in accordance with EN 15804:2012+A2:2019, Product Category Rules (PCR) of Construction Products Product Category Rules 2019-14 PCR Construction products v1.3.4, i.e. “cradle-to-gate” (A1-A3) with options, module A4 (distribution of products), modules C1-C4 (the end of life stages), and module D (benefits and loads beyond the system boundary). The processes below are included in the product system to be studied:

1 Upstream (A1-A2)

a. Production of raw materials (e.g., virgin pulp, double lined kraft (DLK), cement type 1) Production of auxiliary materials (e.g., Polyvinyl Alcohol, silicone water reppelent, etc.)

b. Production of electricity and fuel (i.e. diesel, gas, etc.)

c. Extraction and production of tap water

2 Core (A3)

a. Fiber Preparation: Process of making pulp

b. Final Mix: The process of mixing materials to make the board.

c. Laminating: Process the board to get its form and dimensions.

d. Curing (Primary and Secondary): Process the initial hardening (curing) of the boards.

e. Drying: Process drying of product to obtain water content.

f. Sanding: Process of forming streaks on the surface.

g. Cutting: Process of cutting product

h. Grooving: Process of making grooves on the surface.

i. Impregnation: Process to give water repellence effect.

j. Packing: Process to protect product from dirty, wet and keep product in proper packing.

k. Warehouse: The place where finished products are stored before being shipped

l. Utilities: Water Tank, Maintenance, Electricity and Gas, and Forklift

m. Hazardous and Non-hazardous waste generated (waste sludge, domestic waste, fibre, trim waste, oil, sanding paper and rejected product)

n. Transport to waste processing unit

o. Waste processing including waste treatment process by a third party

p. Direct emission to environment

q. Land Use and Transformation

r. Production of packaging (e.g. wooden pallets, plastic packaging etc.)

s. Production of auxiliary materials (e.g., silica fume, aluminum sulfate, etc.)

3 Transport to Customer (A4)

4 Downstream (C1-C4, D)

a. Deconstruction & Demolition

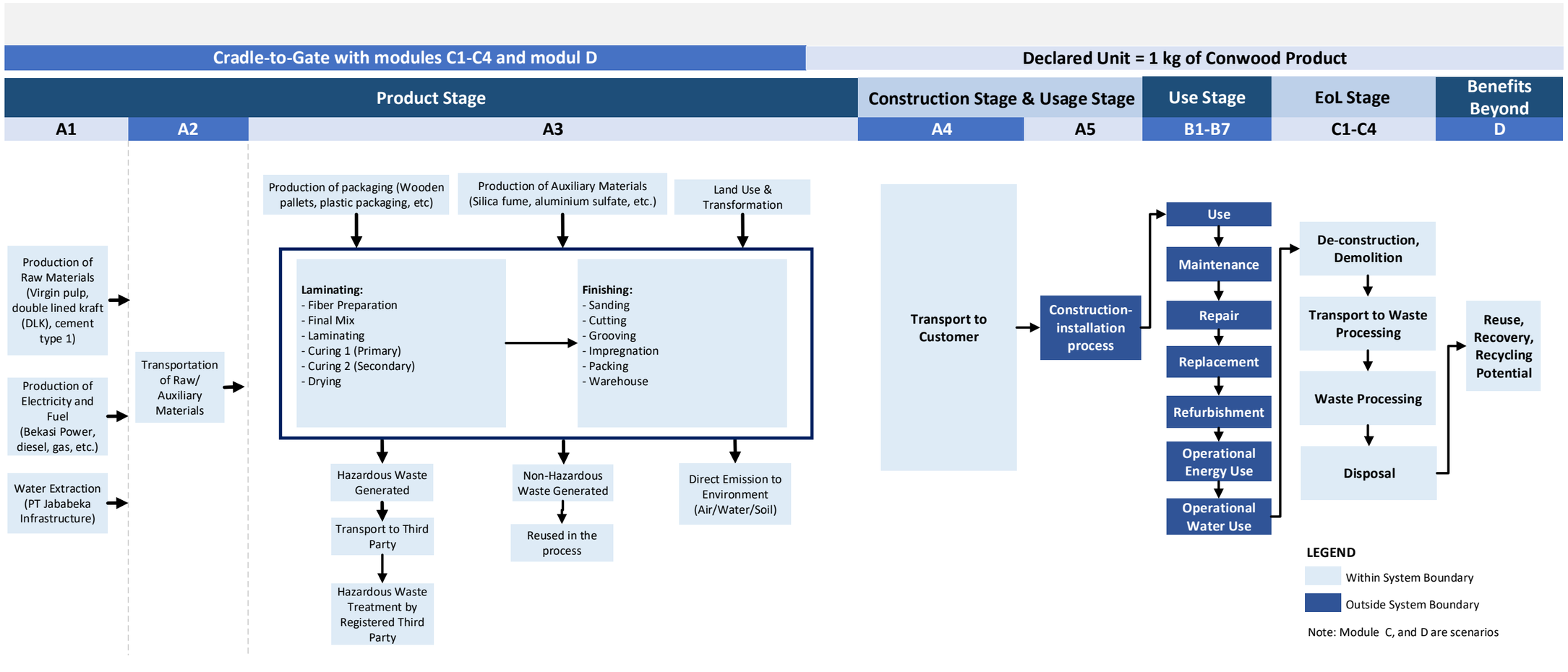
b. Transport to waste processing unit

c. Waste processing including waste treatment process by a registered third party for hazardous waste

d. Disposal

e. Reuse/Recovery/ Recycling of the end of life of the products

System diagram



More information

Relevant website for more information regarding the manufacturing process:
https://conwood.com/id/home-id/

Key Assumptions and Limitations

1. Production process of all raw materials (i.e., virgin pulp, double lined kraft (DLK), cement type 1), auxiliary materials (e.g., material 1, material 2, material 3, etc.), packaging (e.g., silica fume, aluminium sulfate, etc.), use generic data from commercial databases.
2. From 1 Jan 2023 to 31 Dec 2023, the manufacturing process of Conwood Product involved a combination of more than 30 specifications, varying in type, thickness, and size. The calculation of the manufacturing process will be calculated as aggregated total data for all specifications produced.
3. Water used in the final mixing process to dilute cement fiber was not measured specifically for this step. Instead, it was included in the total water consumption for the entire process.
4. Plastic waste in packing process was not measured and neglected (cut off), the amount is insignificant because it is mixed with domestic waste.
5. Reject strapping band in warehouse was not measured and neglected (cut-off) as its amount is insignificant.
6. The amount of water input from third parties is combined with toilet consumption and cannot be separated. However, the consumption of toilets is not very significant, so the water is considered to enter 100% into the production process.
7. Emission to air is only measured on boiler, where the sampling is conducted semi-annually.
8. All the electricity used throughout the entire process is aggregated because there are no separate meters for each machine. Therefore, the electricity consumption is combined for the whole process.
9. The impact of land use changes is considered immaterial and have not been included because the land use change was done more than 10 years ago.
10. The transportation distance for the Philippines is estimated based on the average truck distance in Thailand due to the unavailability of data for the Philippines.
11. The data for wastewater and sludge cannot be separated. Therefore, wastewater data already included in the sludge data.
12. The transportation of products will serve 80% of the Pareto customer countries, specifically Indonesia and Philippines. The estimation for road transportation is based on the average daily distance traveled by rigid trucks.
13. The distribution of Conwood products to Indonesia and the Philippines accounted for 96% of Conwood's customers in 2023. Therefore, the distribution scenario is representative, solely on these two countries based the Pareto rule

Cut-off rules

In case of insufficient input data or data gaps for a unit process, the cut-off criteria shall be 1 % of renewable and non-renewable primary energy usage and 1 % of the total mass input of that unit process. The total of neglected input flows per module, e.g., per module A1-A3 shall be a maximum of 5 % of energy usage and mass. In this study, all data in the product system is included. If there is missing specific data, generic data from the database or literature will be used.

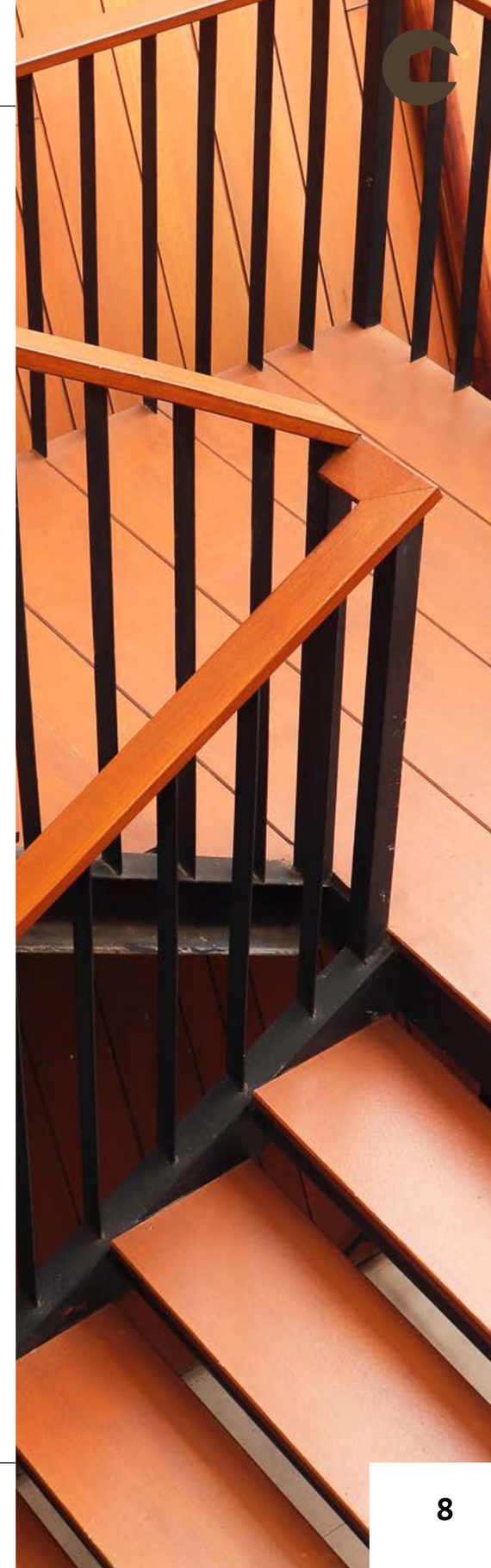
Data Quality

- Time related coverage: specific data were collected from 2023-01-01 to 2023-12-31, and generic data are representative of the year 2023.
- Geographic coverage: specific data were collected from the area under study, i.e., Cikarang, Bekasi, West Java, Indonesia. Another key input is that no specific data was available for raw material production (virgin pulp, double lined kraft (DLK), cement type 1). Therefore, rest-of-world data Ecoinvent databases was used.
- Technological coverage: specific data were collected from current Conwood making process under study. There is no specific data for module A1-A2 and A4, C1-C4 and D; therefore generic data from the global average was used with similar technology aspects to describe the process under study.

Data quality for both specific and generic data were sufficient to conduct life cycle assessment in accordance with the defined goal and scope.

Allocation Rules

In this study, allocation is not applied in the manufacturing phase since no by-products exist.



LCA Scenarios and Additional Technical Information

Data measured for electricity consumption are cumulative from all processes.

Electricity grid in module A3 was based on Ecoinvent database for Indonesia electricity network whic is highly reliant on coal (63%), combined cycle power plant (15%), conventional power plant (11 %), hydro (6%), oil (3%), geothermal (2%), and biogas (1%). The climate impact of the electricity is 1.18 kg CO eq./kWh (GWP-GHG Indicator, IPCC 2021).

Projected lifetime of land for is assumed to be 50 years. Currently the land has been used for 10 years.

Hazardous and non-hazardous wastes generated in the manufacturing phase that are treated by registered waste management services are assumed to be similar to datasets available in the commercial database modified using the following scenario:

- The hazardous waste (i.e., sludge and waste trim) that is landfilled is based on hazardous waste landfill ecoinvent database for rest-of- world (RoW) region.
- The non-hazardous waste (i.e., sanding paper, and waste fiber) at the end of their life is modeled using the general domestic waste treatment scenario in Indonesia, based on data from Puspa (2017).

Local transportation to customers in Indonesia market is calculated based on a weighted average of specific market data.

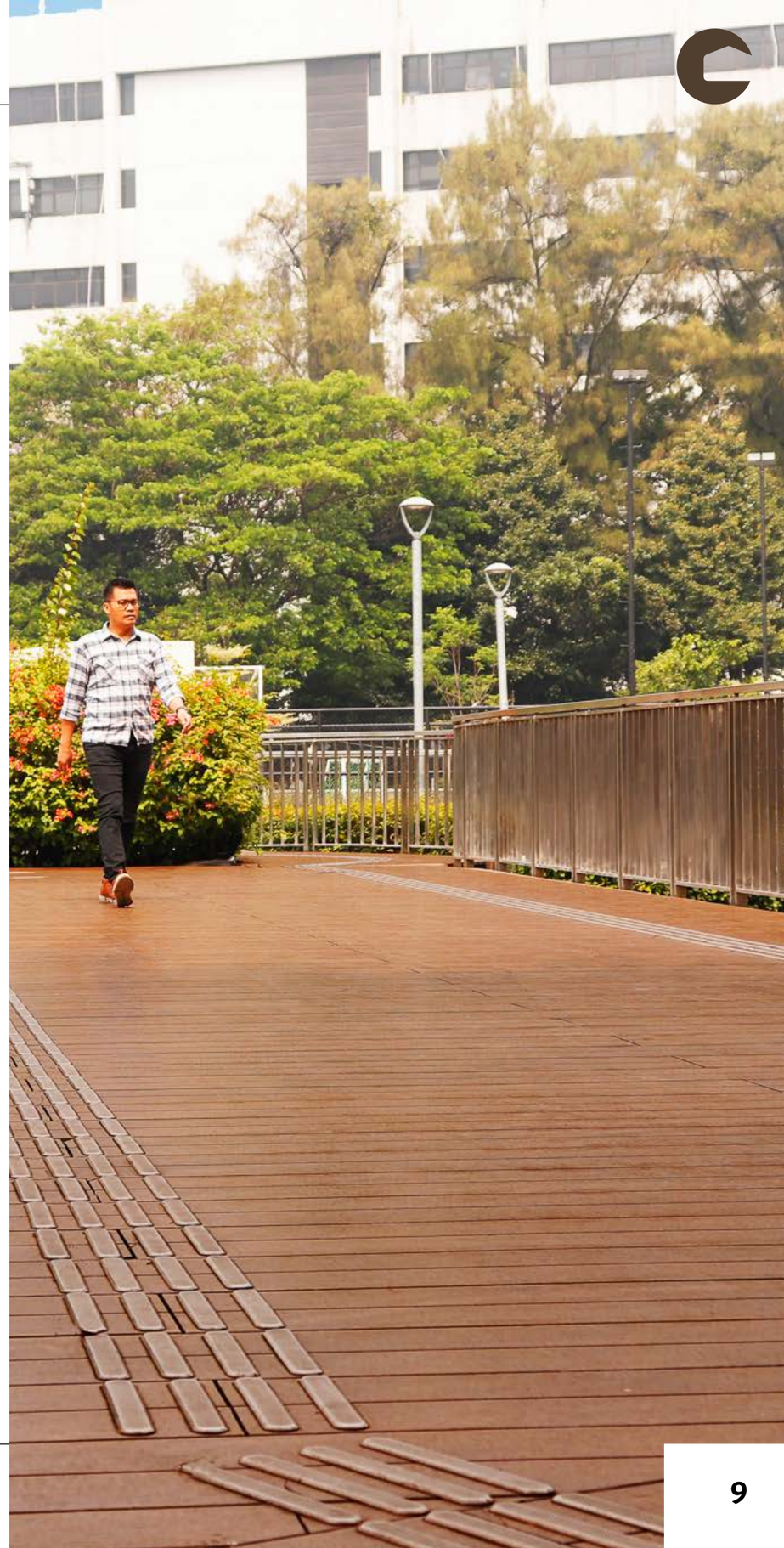
Transportation waste of Conwood Product to waste processing unit is estimated based on average distance traveled by truck in customers' countries. However, it's important to note that this generic data is solely available for countries within the 80% market share of PT Conwood Indonesia, which includes Indonesia and Philippines.

De-construction and demolition processes are modelled using available generic data from the Ecoinvent database.

Waste processing and disposal of conwood product are modelled using available generic data from commercial databases by considering what kind of waste treatment and disposal of conwood product that occurred the most

Chemical data for which there is no specific MSDS available will use general data composition or generic data.

Energy consumption and emissions from the transportation process (suppliers to the manufacturing plant or from manufacturing plant to downstream process including transport to merchant or distribution platform and transport to waste processing) are assumed to be similar to data available in the Ecoinvent database by considering the type of transportation used and the transport distance.



Modules declared, geographical scope, share of specific data (in GWP-GHG results) and data variation (in GWP-GHG results)

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	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	X	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	ID, GLO	ID, GLO	ID	ID, PH	-	-	-	-	-	-	-	-	ID, PH	ID, PH	ID, PH	ID, PH	ID, PH
Specific data used	31%[1]			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	<10%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	Not Relevant			-	-	-	-	-	-	-	-	-	-	-	-	-	-

[1]Based on GWP-GHG of stage A3 divided by GWP-GHG for stages A1-A3. Data for A3 is specific to Conwood, Cikarang Plant

Content declaration

Product content	Weight, kg	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/kg
DLK	0.0779	7.79%	7.79%
Virgin Pulp	0.0221	0 %	2.21%
CaCO3	0.25	0 %	0 %
Cement	0.65	0 %	0 %
Total	1	7.79%	10.00%
Packaging materials	**Weight, kg**	**Weight-% (versus the product)**	**Weight biogenic carbon, kg C/kg**
Pallet	0.00213	0.21%	0.0034
Strapping Band	0.00054	0.05%	0
Label	0.01	0.96%	0.0114
Plastic	0.0019	0.19%	0
TOTAL	0.01	1.42%	0.0148

Results of the environmental performance indicators

- The results of this environmental impact indicator already account for infrastructure impacts in cradle and grave sourced from the generic database.
- The use of the results of modules A1-A3 without considering the results of module C is discouraged.
- 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.

Mandatory impact category indicators according to 15804:2012+A2:2019

Results for 1 kg of Conwood Product								
Impact Indicator	Unit	Total A1-A3	A4	C1	C2	C3	C4	D
GWP-fossil	kg CO_2 eq.	1.20E+00	4.65E-01	3.52E-03	2.58E-02	0.00E+00	8.57E-03	0.00E+00
GWP-biogenic	kg CO_2 eq.	3.35E-02	7.96E-05	3.13E-07	4.42E-06	0.00E+00	1.40E-01	0.00E+00
GWP-luluc	kg CO_2 eq.	1.31E-03	1.87E-04	3.06E-07	1.03E-05	0.00E+00	5.87E-06	0.00E+00
GWP-total	kg CO_2 eq.	1.23E+00	4.65E-01	3.52E-03	2.58E-02	0.00E+00	1.48E-01	0.00E+00
ODP	kg CFC 11 eq.	8.97E-09	6.68E-09	5.39E-11	3.67E-10	0.00E+00	1.90E-10	0.00E+00
AP	mol H^+ eq.	4.41E-03	2.64E-03	3.18E-05	1.39E-04	0.00E+00	6.91E-05	0.00E+00
EP-freshwater [A]	kg P eq.	6.93E-05	4.22E-06	1.24E-08	2.38E-07	0.00E+00	2.63E-07	0.00E+00
EP-marine	kg N eq.	1.09E-03	9.84E-04	1.47E-05	5.54E-05	0.00E+00	1.34E-04	0.00E+00
EP-terrestrial	mol N eq.	1.19E-02	1.08E-02	1.61E-04	6.09E-04	0.00E+00	2.41E-04	0.00E+00
POCP	kg NMVOC eq.	3.63E-03	3.48E-03	4.81E-05	1.95E-04	0.00E+00	1.25E-04	0.00E+00
ADP-minerals & metals [1]	kg Sb eq.	3.82E-06	1.47E-06	1.26E-09	8.28E-08	0.00E+00	1.90E-08	0.00E+00
ADP-fossil [1]	MJ	9.51E+00	6.54E+00	4.61E-02	3.64E-01	0.00E+00	1.69E-01	0.00E+00
WDP [1]	m^3	2.43E-01	2.91E-02	9.99E-05	1.64E-03	0.00E+00	0.00E+00	0.00E+00

[A]The environmental performance results are grouped (annual average) that is representative for all type of the products because the average overall variation is no more than 10%. However, there are difference in variation for EP-freshwater (11.15%) This is due to the variation electricity usage for production.

[1] Disclaimer 1: The results of the impact categories abiotic depletion of minerals and metals, land use, human toxicity (cancer), human toxicity, noncancer and ecotoxicity (freshwater) & water use 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.

[2] Disclaimer 2: 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 random and from some construction materials is also not measured by this indicator.

Potential environmental impact – additional environmental information according to EN 15804:2012+A2:2019/AC:2021

Results for 1 kg of Conwood Product								
Impact Indicator	Unit	Total A1-A3	A4	C1	C2	C3	C4	D
PM	Disease incidence	5.09E-08	4.42E-08	8.19E-09	2.63E-09	0.00E+00	1.23E-09	0.00E+00
IRP [2]	kBq U235 eq.	5.31E-03	2.08E-03	8.02E-06	1.17E-04	0.00E+00	9.07E-05	0.00E+00
ETP-fw [1]	CTUe	4.04E+00	1.72E+00	6.53E-03	9.67E-02	0.00E+00	4.30E+00	0.00E+00
HTP-c [1]	CTUh	1.65E-09	2.46E-09	1.38E-11	1.38E-10	0.00E+00	8.71E-11	0.00E+00
HTP-nc [1]	CTUh	8.60E-09	4.67E-09	5.70E-12	2.76E-10	0.00E+00	8.43E-10	0.00E+00
SQP [1]	dimension-less	1.63E+01	3.81E+00	3.24E-03	2.16E-01	0.00E+00	6.27E-01	0.00E+00

Additional mandatory and voluntary impact category indicators

Results for 1 kg of Conwood Product								
Indicator	Unit	Total A1-A3	A4	C1	C2	C3	C4	D
GWP-GHG [3]	kg CO_2 eq.	1.23E+00	4.65E-01	3.52E-03	2.58E-02	0.00E+00	1.48E-01	0.00E+00

[3] This 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.

- **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
- **PM** : Particulate Matter emissions
- **IRP** : Ionizing radiation - human healt
- **ETP-fw** : Eco-toxicity – freshwater
- **HTP-c** : Human toxicity - cancer effects
- **HTP-nc** : Human toxicity - non-cancer effects
- **SQP** : Land use related impacts / soil quality

Waste production and output flows

Resource use indicators

Results for 1 kg of Conwood Product								
Indicator	Unit	Total A1-A3	A4	C1	C2	C3	C4	D
PERE	MJ	2.91E+00	8.51E-02	2.83E-04	4.77E-03	0.00E+00	3.39E-03	0.00E+00
PERM	MJ	1.37E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	4.28E+00	8.51E-02	2.83E-04	4.77E-03	0.00E+00	3.39E-03	0.00E+00
PENRE	MJ	4.06E+00	6.28E-01	1.87E-03	3.53E-02	0.00E+00	2.01E-02	0.00E+00
PENRM	MJ	1.23E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	4.18E+00	6.28E-01	1.87E-03	3.53E-02	0.00E+00	2.01E-02	0.00E+00
SM	kg	7.04E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	4.12E-02	5.43E-03	2.29E-05	3.05E-04	0.00E+00	4.05E-04	0.00E+00

Waste indicators

Results for 1 kg of Conwood Product								
Indicator	Unit	Total A1-A3	A4	C1	C2	C3	C4	D
Hazardous waste disposed	kg	1.83E-02	0.00E+00	1.83E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-hazardous waste disposed	kg	1.02E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.79E-01	0.00E+00
Radioactive waste disposed	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Output flow indicators

Results for 1 kg of Conwood Product								
Parameter	Unit	Total A1 -A3	A4	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	0.00E+00
Material for recycling	kg	1.84E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	0.00E+00
Exported energy, thermal	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

- **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

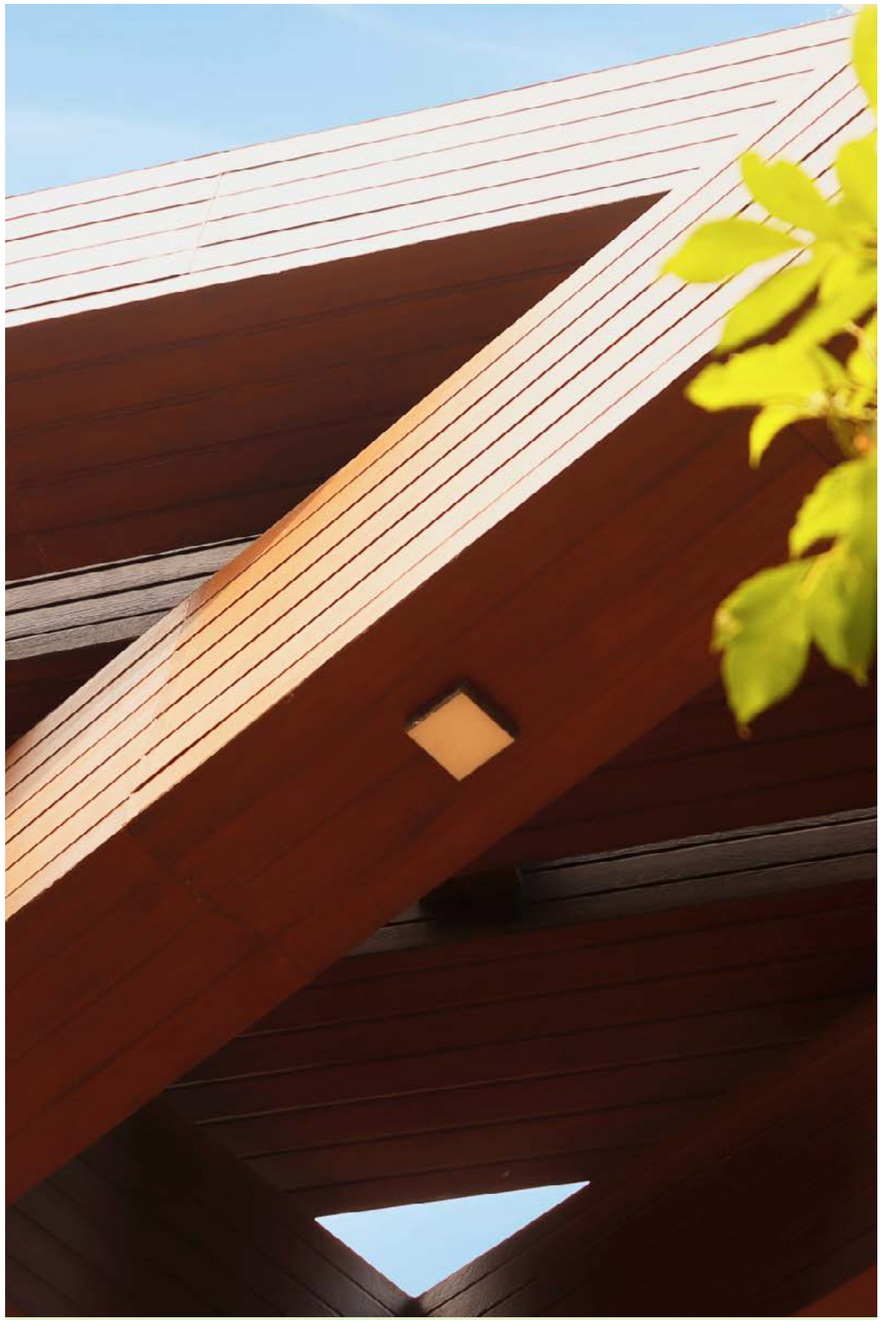
Interpretation of Results

- From overall life cycle stages, module A1 contributes significantly almost to the all impact generated by the whole life cycle. Cement type 1 production process is the largest contributor for 5 all impact categories and contributes to 17 impact categories. Another contributor from module A1 are electricity production process that contributes to 15 impact categories, material for label production process that contributes to 5 impact categories, calcium carbonate production process that contributes to 4 impact categories, compressed natural gas production process, wooden pallet production process, and virgin pulp and sanding Paper production process that contributes to 2 impact categories. Lastly, water production process and plastic packaging and clear plastic production process each contribute to 1 impact categories consecutively.

- From the transportation of raw materials and supporting materials, distributions, and EoL waste transport (module A2, A4, C2), the emission from transportation of Conwood raw material, distribution and EoL waste transport (16-32 metric ton lorries) via land in Indonesia contributes to 17 impact categories while Conwood distribution and EoL waste transport (16-32 metric ton lorries) via land in Philippines contributes to 16 impact categories. However, the contribution of module A2 is only around 3.11%, module A4 contributes 90.04%, and module C2 contributes 6.84% of the total transportation impact.

- From the production activities carried out in the PT Conwood Indonesia area (module A3), there is no significant impact on the conwood production process.

- Activities carried out on the end-of-life of the conwood product life cycle (module C1-C4) did not have a significant impact on the overall life cycle studied. De-construction and demolition process and transport waste to waste processing using truck in customer country are the only processes from module C which contributes to the hotspots.



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