Environmental Product Declaration

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

Wood Plastic Composite (WPC)

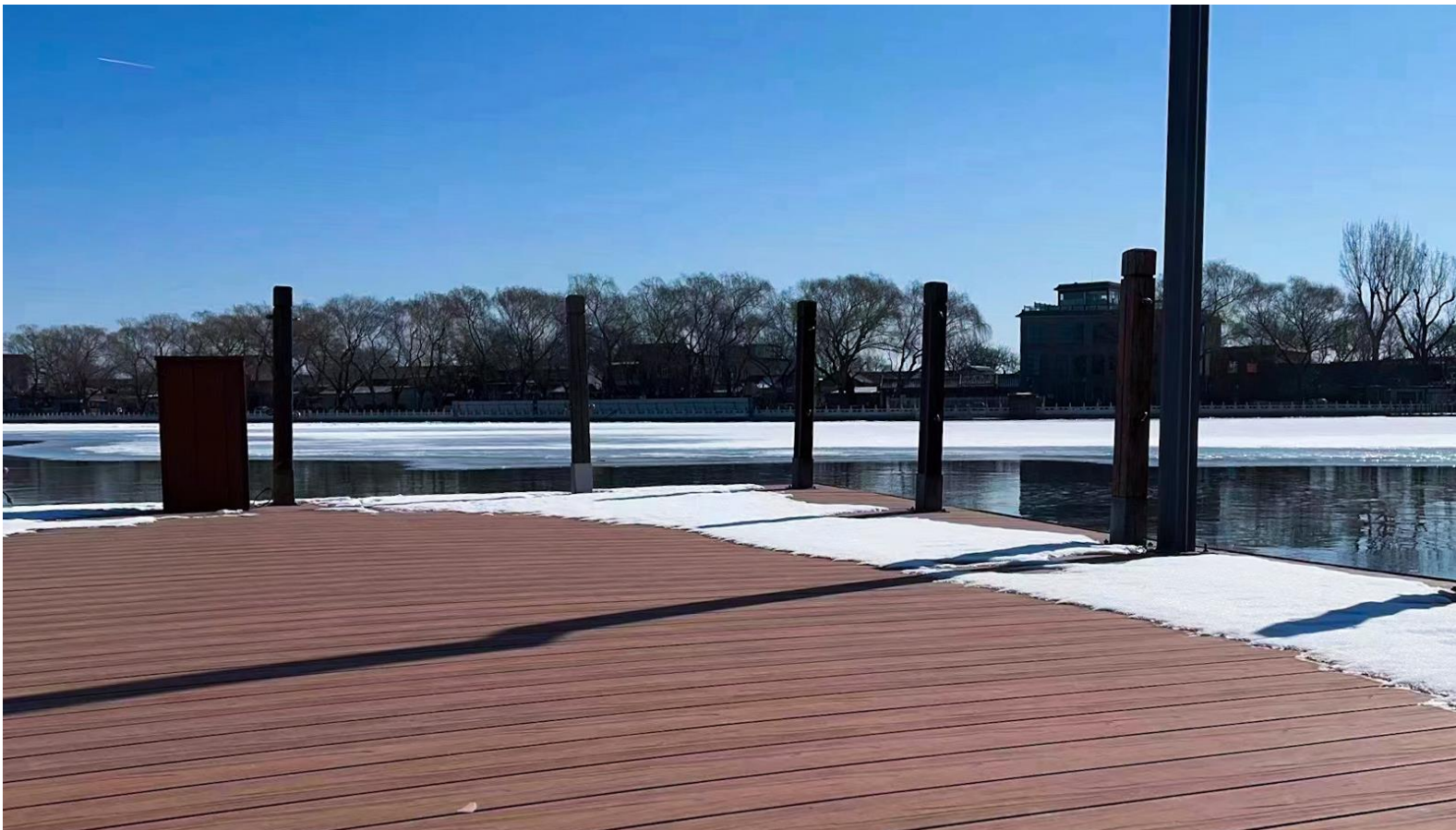
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REDWOODS
HONGSHANLIN NEW MATERIAL TECH

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



General information

Programme information

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
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Accountabilities for PCR, LCA and independent, third-party verification
Product Category Rules (PCR)
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): *PCR 2019:14 Construction products v1.3.0 (2023-06-20)*
PCR review was conducted by: *The Technical Committee of the International EPD® System. A full list of members available on www.environdec.com. The review panel may be contacted via info@environdec.com.*
Life Cycle Assessment (LCA)
LCA accountability: *Jiliu WU, CIRS & Daqi Wang, CIRS*
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: *Vito D'Incognito* Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier: ☒ Yes ☐ No

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

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

Company information

Owner of the EPD: New Material Technology Co., Ltd.
Contact:
Email:

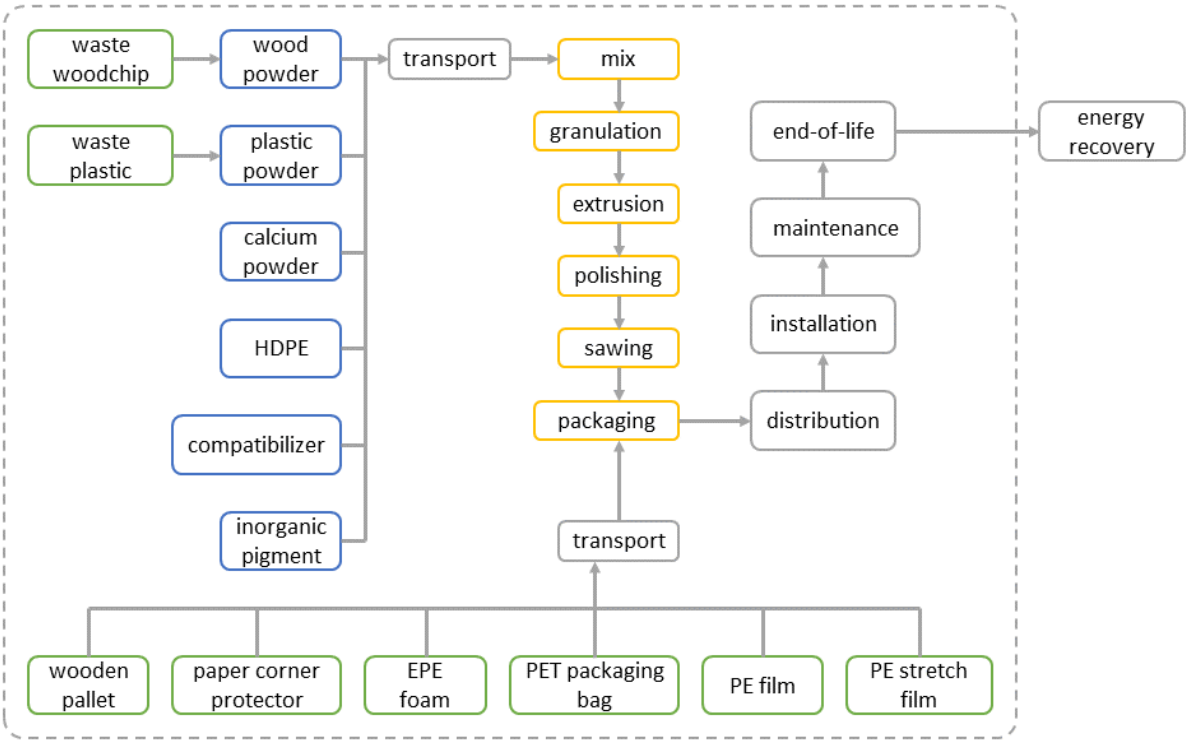
Product information

Product name: Wood Plastic Composite (WPC)
Product description: Wood plastic composite (WPC) is a composite material that constitutes a waste of wood fibres and thermoplastics. They are mixed to form a base material that has a thick consistency. Then it is extruded and moulded to the different shapes and sizes needed. Several different colours and additives can also be added to create materials with better specifications. There is a wide variety of uses and applications for WPC boards on outdoor deck floors, fences, door and window frames, and outdoor landscapes, and so on.
UN CPC code: 36910 Floor coverings of plastics, in rolls or in the form of tiles; wall or ceiling coverings of plastics
Other codes for product classification: N/A
Geographical scope: China for modules A1-A3 (product stage), mainly France, Russia, India, Canada and Denmark for modules A4/A5/B2/C/D

LCA information

Declared unit: 1 t WPC sold overseas and its installation accessories with a reference service life of 20 years
Reference service life: 20 years
Time representativeness: 2022/01/01-2022/12/31
Database(s) and LCA software used: ecoinvent 3.9.1 with SimaPro 9.4.0
Description of system boundaries: b) Cradle to gate with options, modules C1-C4, module D and with optional modules (A1-A3 + C + D and additional modules). The additional modules may be one or more selected from A4-A5 and/or B1-B7.
In this study, the system boundary applied is actually from cradle to grave, including all modules A + B + C + D.

System diagram:



Note: the energy recovery is outside the product system

More information:

Product stage (A1-A3)

- The main raw materials for producing WPC were wood powder and plastic powder ground from waste, calcium powder, HDPE, compatibilizer and inorganic pigment.
- The transport of raw materials (module A2) were considered. EURO5 category diesel vehicles in different lorry sizes and small electric trucks were chosen in this study.
- The energy consumption involved in manufacturing (module A3) included electricity, water, diesel and petrol, related regional emission factors in ecoinvent v3.9.1 were chosen in this study.
- The finished WPCs were packaged with wooden pallet, paper corner protector, EPE foam, PET packaging bag, PE film and PE stretch film listed before sold overseas.
- All the transport of packaging materials (module A2), were considered. EURO5 category small diesel vehicle was chose.

Construction process stage (A4-A5)

- The WPCs for export were transported to ports (Shanghai and Ningbo, China) first, EURO5 category large diesel vehicle was chosen.
- Then WPCs were transported from ports to various destination regions (France, Russia, India, Canada, and Denmark) by sea. Cross border distances were estimated by map tool.
- After unloading, WPCs were transported to retailers and thereafter to clients for installation. In the absence of any primary data in this process, a distance of 300km was assumed and EURO5 category small diesel vehicle was chosen.
- The WPCs were assumed to be installed by hand (module A5) with no connected environmental burden.

- The packaging material of WPC was transported to incineration site for heat production.
- Plastic and steel accessories listed below (plastic buckle, steel buckle, steel start buckle, steel screw, steel expansion screw) were used in installation. All plastic and steel accessories were assumed to be re-used after de-installation.

Use stage (B1-B7)

- The maintenance (module B2) of the WPCs only included tap water for cleaning during the lifetime. Assuming that the boards were cleaned once a quarter, 100kg of tap water was required for 1t (about 50-60m2) WPCs cleaning. The actual maintenance requirements depend upon design and exposure conditions.
- All other modules in use stage are not involved, although all modules are included in the system boundary of this EPD.

End of life stage (C1-C4)

- After the final use, the WPCs were assumed to be removed by hand (module C1) with no connected environmental burden.
- All plastic and steel accessories were assumed to be re-used after de-installation.
- Then the used WPCs and also the components were transported to a waste facility plant (module C2). In the absence of any primary data in this process, a distance of 100km was assumed and EURO5 category small diesel vehicle was chosen. 100km is a reference value in EPDCN-PCR-202204 PCR for construction products and services (version 1.0).
- The used WPCs then assumed to be chipped and combusted for heat production (module C3) with a conversion efficiency higher than 60%.
- No materials were sent to disposal (module C4).

Resource recovery stage beyond the system boundaries (D)

- The loads and benefits related to energy recovery was calculated with an efficiency of 60%, where the heat produced was assumed to substitute a RoW district or industrial heat.

Electricity source

LCI data for the generation of electricity used in the manufacturing process in module A3 is from ecoinvent v3.9.1.

National electricity grid	Unit	Value
market for electricity, low voltage, state Grid Corporation of China (ecoinvent v3.9.1)	kg CO2 eq / kWh	1.13

Cut-off criteria

LCI data shall according to EN 15804 include a minimum of 95% of total inflows (mass and energy) per module. In addition, if less than 100% of the inflows are accounted for, proxy data or extrapolation should be used to achieve 100% completeness. Inflows not included in the LCA shall be documented in the EPD.
All the inflows are included and there is no cut-off used in this study.

Allocation principles

There is no allocation used in this study.

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	X	X	X	X	X	X	X	X	X	X	X	X	X
Geography	CN	CN	CN	FR RU IN CA DK	FR RU IN CA DK	FR RU IN CA DK	FR RU IN CA DK	FR RU IN CA DK	FR RU IN CA DK	FR RU IN CA DK	FR RU IN CA DK	FR RU IN CA DK	FR RU IN CA DK	FR RU IN CA DK	FR RU IN CA DK	FR RU IN CA DK	FR RU IN CA DK
Specific data used	>90%					-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	N/A					-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	N/A					-	-	-	-	-	-	-	-	-	-	-	-

Content information

Product components	Weight, kg per t WPC	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/kg
wood powder	542.3		100% biomass content, 0.5 kg C/kg
plastic powder	233.75	100%	
calcium powder	116.875		
HDPE	65		
compatibilizer	32.725		
inorganic pigment	9.35		
TOTAL	1000		
Packaging materials	**Weight, kg per t WPC**	**Weight-% (versus the product)**	**Weight biogenic carbon, kg C/kg**
wooden pallet	15	1.5%	0.5 kg C/kg
paper corner protector	0.15	0.015%	
EPE foam	0.1	0.01%	
PET packaging bag	0.03	0.003%	
PE film	0.025	0.0025%	
PE stretch film	0.01	0.001%	
TOTAL	15.315	1.5315%	

Dangerous substances from the candidate list of SVHC for Authorisation	EC No.	CAS No.	Weight-% per functional or declared unit
N/A			

The product does not contain any REACH SVHC substances in amounts greater than 0.1 % (1000 ppm).

Results of the environmental performance indicators

Mandatory impact category indicators according to EN 15804

Results per functional or declared unit										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B2**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-fossil	kg CO_2 eq.	1.31E+03	1.46E+02	1.41E+02	6.87E+00	0.00E+00	5.71E+01	8.54E+02	0.00E+00	-1.85E+02
GWP-biogenic	kg CO_2 eq.	-1.05E+03	-1.02E-02	1.44E+01	3.79E-02	0.00E+00	4.04E-02	9.13E+02	0.00E+00	-1.62E+02
GWP-luluc	kg CO_2 eq.	1.09E+00	1.02E-01	1.24E-01	1.10E-02	0.00E+00	3.52E-02	7.65E-03	0.00E+00	-5.85E-01
GWP-total	kg CO_2 eq.	2.58E+02	1.46E+02	1.55E+02	6.91E+00	0.00E+00	5.72E+01	1.77E+03	0.00E+00	-3.48E+02
ODP	kg CFC 11 eq.	1.44E-05	2.22E-06	1.31E-06	1.07E-06	0.00E+00	9.94E-07	5.34E-07	0.00E+00	-2.05E-06
AP	mol H^+ eq.	6.92E+00	3.41E+00	6.88E-01	3.67E-02	0.00E+00	1.87E-01	2.36E-01	0.00E+00	-3.87E+00
EP-freshwater	kg P eq.	3.01E-01	6.54E-03	3.93E-02	3.01E-03	0.00E+00	5.20E-03	1.09E-02	0.00E+00	-6.91E-02
EP-marine	kg N eq.	1.65E+00	8.63E-01	1.52E-01	7.42E-03	0.00E+00	5.79E-02	1.23E-01	0.00E+00	-1.68E+00
EP-terrestrial	mol N eq.	1.65E+01	9.53E+00	1.37E+00	7.49E-02	0.00E+00	6.12E-01	1.18E+00	0.00E+00	-1.87E+01
POCP	kg NMVOC eq.	5.17E+00	2.63E+00	4.56E-01	2.44E-02	0.00E+00	2.49E-01	3.00E-01	0.00E+00	-4.64E+00
ADP-minerals&metals*	kg Sb eq.	6.28E-03	2.02E-04	2.22E-03	3.20E-05	0.00E+00	2.44E-04	4.15E-05	0.00E+00	-7.28E-04
ADP-fossil*	MJ	1.87E+04	1.86E+03	1.63E+03	8.80E+01	0.00E+00	7.90E+02	1.92E+02	0.00E+00	-2.36E+03
WDP*	m^3	3.14E+02	5.66E+00	4.29E+01	3.21E+02	0.00E+00	3.45E+00	1.82E-01	0.00E+00	-1.23E+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 of these results are high or as there is limited experience with the indicator.*

Additional mandatory impact category indicators

Results per functional or declared unit										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B2**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG[1]	kg CO_2 eq.	1.31E+03	1.46E+02	1.41E+02	6.88E+00	0.00E+00	5.72E+01	8.54E+02	0.00E+00	-1.85E+02

Additional voluntary impact category indicators

Results per functional or declared unit										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B2**	**C1**	**C2**	**C3**	**C4**	**D**
PM	Disease incidence	1.18E-04	6.79E-06	9.35E-06	4.35E-07	0.00E+00	3.39E-06	1.93E-06	0.00E+00	-1.21E-04
IRP	kBq U235 eq.	3.59E+01	1.12E+00	7.88E+00	8.63E-01	0.00E+00	1.12E+00	2.54E-01	0.00E+00	-1.48E+01
ETP-fw	CTUe	6.57E+03	9.44E+02	5.70E+02	2.98E+01	0.00E+00	4.48E+02	5.50E+02	0.00E+00	-1.02E+03
ETP-c	CTUh	1.29E-06	6.29E-08	5.60E-07	1.81E-08	0.00E+00	2.89E-08	7.36E-08	0.00E+00	-8.82E-07
HTP-nc	CTUh	1.59E-05	7.64E-07	2.34E-06	2.54E-07	0.00E+00	5.64E-07	3.03E-06	0.00E+00	-7.30E-06
SQP	Dimension less	3.51E+04	6.20E+02	6.15E+02	1.89E+01	0.00E+00	3.31E+02	7.38E+01	0.00E+00	-3.83E+04
Acronyms	PM: Particulate matter emissions; IRP: Ionising radiation, human health; ETP-fw: Ecotoxicity (freshwater); ETP-c: Human toxicity, cancer effects; HTP-nc: Human toxicity, non-cancer effects; SQP: Land use related impacts / soil quality									

[1] 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 CO_2 is set to zero.

Resource use indicators

Results per functional or declared unit										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B2**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	1.72E+02	7.42E+00	2.90E+01	7.76E-09	0.00E+00	7.06E+00	2.42E+00	0.00E+00	-6.11E+03
PERM	MJ	5.29E+03	0.00E+00	4.33E+01	4.02E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	5.46E+03	7.42E+00	7.24E+01	4.02E+00	0.00E+00	7.06E+00	2.42E+00	0.00E+00	-6.11E+03
PENRE	MJ	6.03E+03	1.86E+03	5.48E+02	-1.86E-07	0.00E+00	7.90E+02	1.92E+02	0.00E+00	-2.36E+03
PENRM	MJ	1.27E+04	0.00E+00	1.08E+03	8.80E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	1.87E+04	1.86E+03	1.63E+03	8.80E+01	0.00E+00	7.90E+02	1.92E+02	0.00E+00	-2.36E+03
SM	kg	2.52E+02	0.00E+00	0.00E+00	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	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	0.00E+00	0.00E+00
FW	m^3	9.67E-01	0.00E+00	0.00E+00	8.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+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

Results per functional or declared unit										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B2**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-hazardous waste disposed	kg	3.00E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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	0.00E+00	0.00E+00

Output flow indicators

Results per functional or declared unit										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B2**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.63E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling	kg	5.00E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E+03
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	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	0.00E+00	1.14E+04

Information describing the biogenic carbon content

Biogenic carbon content	**Unit**	**Value**	**Unit**	**Value**
Biogenic carbon content in product	kg C	2.71E+02	Kg CO2 eq	9.94E+02
Biogenic carbon content in the accompanying packaging	kg C	7.58E+00	Kg CO2 eq	2.78E+01

Additional environmental information

Anhui lew Material Technology Co., Ltd. has been assessed by GFA Certification GmbH according to the following standard: FSC-STD-40-004.

Traditional Extruded WPC Decking Board are compliant with the EU REACH regulation (EC) No. 1907/2006. No substances of very high concern (SVHC) exceed 0.1% (w/w) in the articles of the submitted sample from Anhui New Material Technology Co., Ltd.

References

General Programme Instructions of the International EPD® System. Version 4.0.
EN 15804:2012 +A2:2019/AC:2021 Sustainability in construction works - Environmental product declarations - Core rules for the product category of construction products
International EPD System PCR 2019:14 Construction products, version 1.3.0 (2023-06-20)
ecoinvent database version 3.9.1

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