

Environmental Product Declaration



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

Wood Plastic Composite Products

from

GAUDIAHOME, s.r.o



Programme:

The International EPD® System, www.environdec.com

Programme operator:

EPD International AB

EPD registration number:

S-P-10276

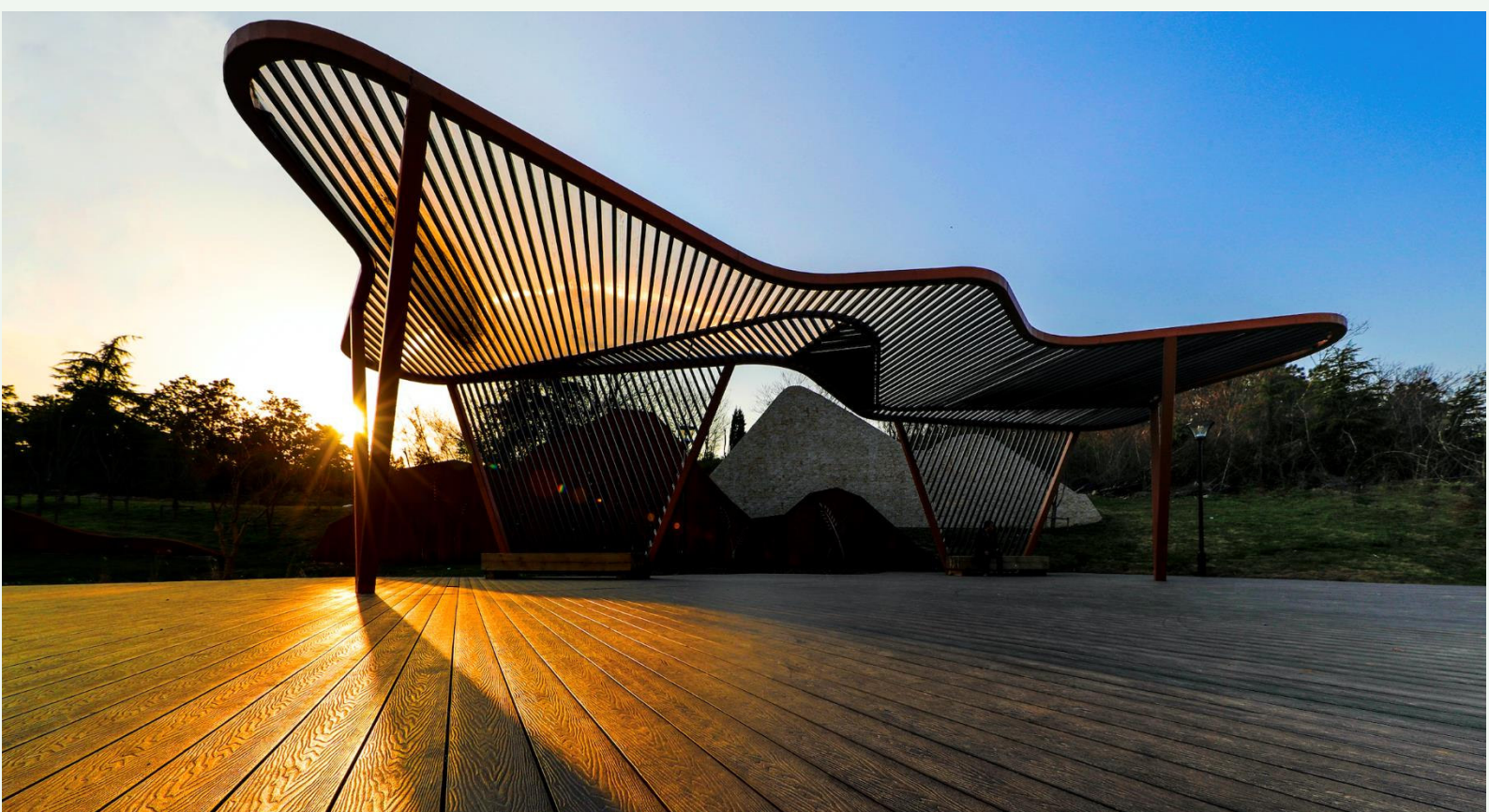
Publication date:

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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



1. 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 (EPD International), version 1.2.5

UNCPC Code –36910 (Floor coverings of plastics, in rolls or in the form of tiles; wall or ceiling coverings of plastics)

PCR review was conducted by: *Claudia A. Peña*

Life Cycle Assessment (LCA)

LCA accountability: Intertek Deutschland GmbH

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: *Dr Hüdai Kara, Managing Director of Metsims Sustainability Consulting*

Approved by: The International EPD[®] System

Procedure for follow-up of data during EPD validity involves third party verifier:

☐ Yes ☒ No

[Procedure for follow-up the validity of the EPD is at minimum required once a year with the aim of confirming whether the information in the EPD remains valid or if the EPD needs to be updated during its validity period. The follow-up can be organized entirely by the EPD owner or together with the original verifier via an agreement between the two parties. In both approaches, the EPD owner is responsible for the procedure being carried out. If a change that requires an update is identified, the EPD shall be re-verified by a verifier]

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.

2. Company information

Owner of the EPD: GAUDIAHOME, s.r.o. SLOVAKIA

WPC products are applied for decking, railing, wall & roof panel, pavilion, bridge, outdoor furniture and constructions, etc. We export to world-wide markets, Europe is our main market, including UK, France, USA, Australia, Spain, Germany, Denmark, Norway, Russia, Holland, Finland, Japan, India, Korea, Malaysia, Vietnam, etc.

Product-related or management system-related certifications: We have gotten the authentication of ISO9001:2008, ISO14001:2004 and CE Certification, ASTM and REACH test report.

Name and location of production site(s): China

3. Product information

Product name: Wood Plastic Composite Product

Product description: Wood Plastic Composites (WPCs) are composite materials made of wood fiber/wood flour and thermoplastic(s) such as polythene (PE), polypropylene (PP), polyvinyl chloride (PVC), or polylactic acid (PLA). WPCs are still new materials relative to the long history of natural lumber as a building material.

Product Application: The most widespread use of WPCs is in outdoor deck floors, but it is also used for railings, fences, landscaping timbers, cladding and siding, park benches, molding and trim, prefab houses, window and door frames, and indoor furniture.

UN CPC code: UNCPC Code –36910 (Floor coverings of plastics, in rolls or in the form of tiles; wall or ceiling coverings of plastics)

Geographical scope: Geographical scope is China for Module A1-A3, i.e. all the raw materials are sourced locally in China & the manufacturing site is also located in China. Module A4 represents the distribution to three geographies - Europe, Australia, & Asia. The end-of-life module is representative of a global scenario.

Product technical properties:

No.	Property	Test Method	Test results
1	Density	ASTM D792-13	1.32g/cm ³
2	Coefficient Linear Thermal Expansion	EN15534	37.4×10 ⁻⁶ K ⁻¹
3	Creep behaviour	EN15534	Δ S:2.11mm, Δ Sr:1.75mm
4	Falling Mass Impact Resistance	EN15534	Max Crack length(mm): No crack. Max Residual Indentation(mm): 0.13
5	Flexural properties	EN15534	Mean: 4371N
6	Moisture resistance under cyclic test conditions	EN15534	Original MOR: 30.7Mpa After exposure, MOR:28.1Mpa, Decrease:8.5%.
7	Resistance to indentation	EN15534	Apply 2000N load Brinell hardness: 83Mpa, Rate of elastic recovery: 73%
8	Resistance to artificial weathering	EN1554 ISO4892-2	After 2000h exposure Δ E*=1.45, Grey Scale=4
9	Slipperiness (Pendulum test)	EN15534-1	Longitudinal:96; Horizontal: 92
10	Swelling and water absorption (28days immersion)	EN15534	① Swelling: 0.89% in thickness, 0.07% in width, 0.07% in length. ② Water absorption: 1.09%

4. LCA information

Functional unit / declared unit: 1 kg of the Wood Plastic Composite Product

Time representativeness: 1st July 2021 to 30th June 2022 (12 months)

Description of system boundaries:

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

System diagram:

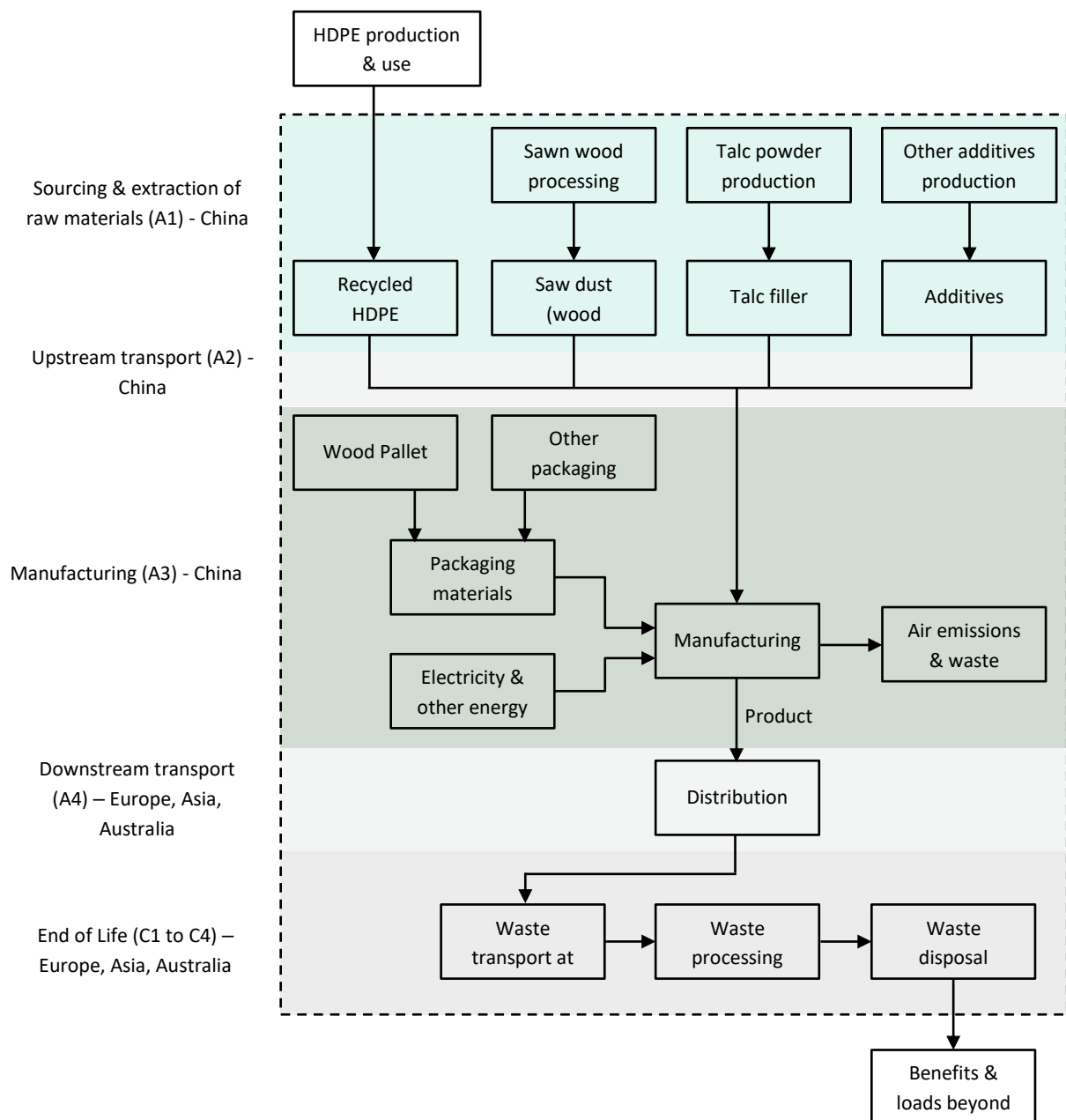


Figure 1: System boundary description for Wood Plastic Composite Product

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	CN	CN	CN	EU, AU, Asia	-	-	-	-	-	-	-	-	GLO	GLO	GLO	GLO	GLO
Specific data used	>90%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	NA			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	NA			-	-	-	-	-	-	-	-	-	-	-	-	-	-

Downstream transport scenario (A4):

Downstream transport scenario was considered as mix of three major shipping destination data as below -

Shipping location	Average Shipping distance (km)	Mode of transport
Europe (40%)	450	Lorry
	21,000	Ship
Australia (30%)	450	Lorry
	20,000	Ship
Asia (30%)	450	Lorry
	4,000	Ship

End of Life Module (C1-C4 & D):

Module C1 - Demounting and demolition are assumed to be conducted manually, so there is no energy and material input involved in de-construction.

Module C2 - It is assumed that waste products will be transported in a lorry to the waste processing/disposal site located at 100 km distance (C2).

Module C3 - Waste WPC products can be melted and recycled through granulating and extrusion to make new WPC products. In this analysis it is assumed that the waste WPC products are recycled at the end of life, therefore a waste Sorting process is considered which segregates the recyclable WPC products from the mixed construction waste. It is assumed that 95% of the waste WPC products are recovered and sent for recycling. As the study uses cut-off approach, the subsequent burdens for melting, recycling, and the benefits from recycling of waste products are not included in the study.

The waste WPC product contains biogenic carbon, which was stored temporarily into the product due to sequestration of biogenic carbon dioxide. As the biogenic carbon associated with waste WPC products leaves the product system for reuse or recycling into a new product, a virtual emission of biogenic CO₂ is added to module C3 as per the PCR requirements.

Module C4 - The remaining 5% of the waste WPC products from Module C3 are sent for waste disposal. As per the waste scenario this remaining 5% of the waste is treated as 50% to the landfill and 50% as incineration, this means 2.5% of the total product waste is landfilled and the remaining 2.5% of the total waste is incinerated at the end of life. As the waste contains biogenic carbon, it was adjusted manually by showing virtual biogenic CO₂ emissions as per PCR requirements.

Module D - In the product system studied, the main raw materials i.e., HDPE & wood powder are 100% recycled and together constitutes about 85% of the weight as input in a WPC product system. As 95% of the product is recycled at the end of life, there is a net 10% of benefit achieved from the recycling of the product. However, this recycled WPC powder is not functionally equivalent to the HDPE & wood powder as it contains additives. Therefore, no credits from recycling are accounted in Module D.

Further the incineration of 2.5% of the waste WPC products may generate electricity which can be recovered and replace the fossil-based electricity generation. However, the PCR states that only if the thermal efficiency of the incineration/combustion of such an output flow always is above 60%, then it can be considered as “material for energy recovery” and accounted for in module D. As the incineration efficiency of > 60% is not guaranteed with this product, it is treated as waste disposal practice in Module C4 & not as an energy recovery process in Module C3 & Module D. Therefore, no benefits are accounted in Module D and the values are set to zero.

Data Sources

The majority of the data used in the modeling is of primary data from manufacturing site in China, in cases where it was necessary supplemental datasets from an LCA database (Ecoinvent v3.8) were used.

Allocation

In terms of the specific data, all the data is specific to wood plastic composite product. Therefore, no allocation procedures were adopted.

In terms of generic data, the main database used, Ecoinvent v3.8 (cut-off), defaults to an economic allocation for most processes. However, in some cases a mass-based allocation is used, where there is a direct physical relationship (e.g. biomass related flows). The allocation approach of specific Ecoinvent modules is documented on their website and method reports (see www.Ecoinvent.org).

In the case of end-of-life allocation of generic data, the Ecoinvent v3.8 with a cut-off by classification end-of-life allocation method (100:0) was used.

5. Content information

Product components	Weight, kg	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/kg
Polyethylene (HDPE)	0.300	100.00%	-
Wood powder	0.550	100.00%	100%, 0.494 kg C/kg
Compatibilizers	0.025	-	-
Fillers (Talc powder)	0.080	-	-
Lubricates	0.020	-	-
Pigment	0.021	-	-
Antioxidants	0.002	-	-
Light stabilizers	0.002	-	-
TOTAL	1.000	85.00%	55.00%, 0.272 kg C/kg
Packaging materials	Weight, kg	Weight-% (versus the product)	Weight biogenic carbon, kg C/kg
Waterproof cushion (PE)	9.95E-04	0.099%	-
Wooden Pallet	9.15E-03	0.915%	0.471 kg C/kg
Corrugated board	1.36E-03	0.136%	0.450 kg C/kg
Packing Belt (PET)	8.95E-04	0.090%	-

6. Results of the environmental performance indicators

6.1 Mandatory impact category indicators according to EN 15804

Results per declared unit for 1 kg of Wood Plastic Composite								
Indicator	Unit	A1-A3	A4	C1	C2	C3	C4	D
GWP-fossil	kg CO ₂ eq.	1.40E+00	2.22E-01	0.00E+00	1.69E-02	2.66E-01	4.64E-03	0.00E+00
GWP-biogenic	kg CO ₂ eq.	-9.91E-01	3.90E-05	0.00E+00	1.12E-05	9.61E-01	4.98E-02	0.00E+00
GWP- luluc	kg CO ₂ eq.	7.71E-04	1.37E-04	0.00E+00	6.85E-06	2.71E-04	1.17E-08	0.00E+00
GWP- total	kg CO ₂ eq.	4.08E-01	2.22E-01	0.00E+00	1.70E-02	1.23E+00	5.44E-02	0.00E+00
ODP	kg CFC 11 eq.	7.85E-08	4.62E-08	0.00E+00	3.81E-09	2.56E-08	2.40E-11	0.00E+00
AP	mol H ⁺ eq.	6.46E-03	5.01E-03	0.00E+00	6.16E-05	1.15E-03	1.23E-06	0.00E+00
EP-freshwater	kg P eq.	2.71E-04	9.93E-06	0.00E+00	1.21E-06	4.69E-05	3.65E-09	0.00E+00
EP- marine	kg N eq.	1.41E-03	1.23E-03	0.00E+00	1.65E-05	4.85E-04	2.41E-06	0.00E+00
EP-terrestrial	mol N eq.	1.40E-02	1.37E-02	0.00E+00	1.80E-04	3.50E-03	2.19E-04	0.00E+00
POCP	kg NMVOC eq.	4.12E-03	3.60E-03	0.00E+00	5.80E-05	1.14E-03	2.73E-06	0.00E+00
ADP-fossil*	MJ	1.65E+01	3.00E+00	0.00E+00	2.52E-01	3.68E+00	1.54E-03	0.00E+00
ADP-minerals&metals*	kg Sb eq.	6.33E-06	4.63E-07	0.00E+00	5.86E-08	1.83E-06	6.18E-11	0.00E+00
WDP*	m ³	3.04E-01	6.80E-03	0.00E+00	8.32E-04	6.96E-02	5.22E-06	0.00E+00
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals & metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption							

* 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.

6.2 Additional mandatory and voluntary impact category indicators

Results per declared unit for 1 kg of Wood Plastic Composite								
Indicator	Unit	A1-A3	A4	C1	C2	C3	C4	D
GWP - GHG	kg CO ₂ eq.	1.38E+00	2.20E-01	0.00E+00	1.68E-02	2.71E-01	3.91E-03	0.00E+00
Particulate matter	disease inc.	9.49E-08	1.07E-08	0.00E+00	1.41E-09	5.96E-08	1.38E-07	0.00E+00
Ionizing radiation ¹	kBq U-235 eq	3.99E-02	1.41E-02	0.00E+00	1.21E-03	1.34E-02	6.93E-06	0.00E+00
Ecotoxicity, freshwater ²	CTUe	2.97E+01	2.06E+00	0.00E+00	2.11E-01	5.19E+00	2.42E+00	0.00E+00
Human toxicity, non-cancer ²	CTUh	1.92E-08	1.65E-09	0.00E+00	2.07E-10	4.67E-09	5.74E-10	0.00E+00
Human toxicity, cancer ²	CTUh	9.90E-10	1.17E-10	0.00E+00	6.41E-12	6.51E-10	5.49E-12	0.00E+00
Land use ²	Pt	1.58E+01	1.03E+00	0.00E+00	1.73E-01	2.92E+00	6.34E-03	0.00E+00

Disclaimer 1 – This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

Disclaimer 2 - The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

6.3 Resource use indicators

Results per declared unit for 1 kg of Wood Plastic Composite								
Indicator	Unit	A1-A3	A4	C1	C2	C3	C4	D
PERE	MJ	2.94E+00	2.78E-02	0.00E+00	3.18E-03	1.67E-01	9.07E-06	0.00E+00
PERM	MJ	4.28E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	7.22E+00	2.78E-02	0.00E+00	3.18E-03	1.67E-01	9.07E-06	0.00E+00
PENRE	MJ	1.77E+01	3.19E+00	0.00E+00	2.68E-01	3.93E+00	1.64E-03	0.00E+00
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	1.77E+01	3.19E+00	0.00E+00	2.68E-01	3.93E+00	1.64E-03	0.00E+00
SM	kg	3.00E-01	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	7.85E-03	2.36E-04	0.00E+00	2.83E-05	1.80E-03	1.76E-07	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							

6.4 Waste indicators

Results per declared unit for 1 kg of Wood Plastic Composite								
Indicator	Unit	A1-A3	A4	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
Non-hazardous waste disposed	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.00E-02	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

6.5 Output flow indicators

Results per declared unit for 1 kg of Wood Plastic Composite								
Indicator	Unit	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	1.01E-04	0.00E+00	0.00E+00	0.00E+00	9.50E-01	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	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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