



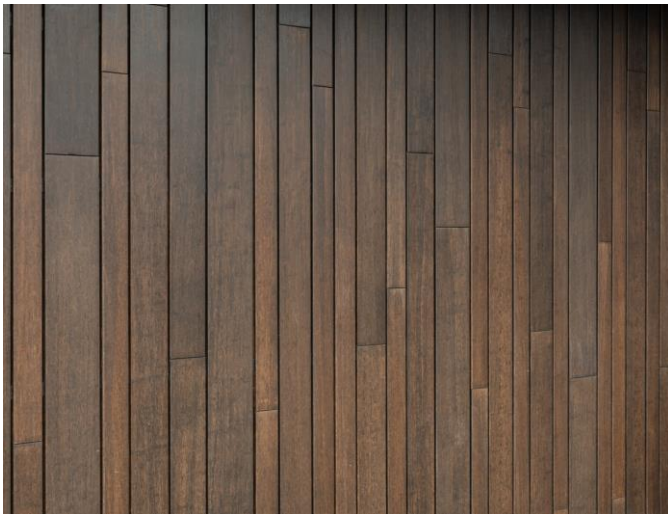
**Environmental
Product
Declaration**

According to EN15804+A2 (+indicators A1)



This declaration is for:
Bamboo façade cladding

Provided by:
Felix Clercx



program operator
Stichting MRPI®
publisher
Stichting MRPI®
www.mrpi.nl

MRPI® registration
1.1.00652.2024
date of first issue
4-8-2024
date of this issue
4-8-2024
expiry date
4-8-2029



COMPANY INFORMATION



Maisdijk 5
5704 RM Helmond
Tel: 0492-531 944
Contact: Sander Kindt
<https://www.felixwood.nl>

MRPI® REGISTRATION

1.1.00652.2024

DATE OF ISSUE

4-8-2024

EXPIRY DATE

4-8-2029

SCOPE OF DECLARATION

This MRPI®-EPD certificate is verified by Jeannette Levels-Vermeer, LBP Sight. The LCA study has been done by Martijn van Hövell, SGS Search. The certificate is based on an LCA-dossier according to EN15804+A2 (+indicators A1). It is verified according to the 'MRPI®-EPD verification protocol November 2020.v4.0'. EPD's of construction products may not be comparable if they do not comply with EN15804+A2. Declaration of SVHC that are listed on the 'Candidate list of Substances of Very High Concern for authorisation' when content exceeds the limits for registration with ECHA.

PROGRAM OPERATOR

Stichting MRPI®
Kingsfordweg 151
1043 GR
Amsterdam

Ing. L. L. Oosterveen MSc. MBA
Managing Director MRPI

PRODUCT

Bamboo façade cladding

DECLARED UNIT/FUNCTIONAL UNIT

1 m3

DESCRIPTION OF PRODUCT

Strand woven bamboo for façade cladding products 'Melody' and 'Symphony'.

VISUAL PRODUCT



MORE INFORMATION

<https://www.felixwood.nl/houten-gevelbekleding>

DEMONSTRATION OF VERIFICATION

CEN standard EN15804 serves as the core PCR(a)

Independent verification of the declaration an data according to

EN15804+A2 (+indicators A1)

internal:

external: x

Third party verifier: Jeannette Levels-Vermeer, LBP Sight

[a] PCR = Product Category Rules

DETAILED PRODUCT DESCRIPTION

Strand woven bamboo façade cladding provides protection for buildings and architectural finishes. Typical applications are in offices, schools, healthcare premises, retail, leisure and transport sectors.

Products are fastened with stainless steel clips and screws. The fastening materials are not considered in this declaration.

The table below shows an overview of physical properties of the product, including: Specific Gravity, Swelling thickness, Flexural stress, Flexural modulus, Light ageing, Slip resistance and Fire classification. These values are based on Based on SGS reports SDHL2008023947HI-01 and SDHL2103004035OT, which are available upon request.

Property	Test method	Parameter/unit	Value
Specific Gravity*	ASTM D2395-07 A		1.14
Swelling thickness	EN 317:1993	%	0.9
Flexural stress	ISO 178-2019	MPa	148.7
Flexural modulus	ISO 178-2019	MPa	14060
Light ageing	ISO 4892-3 c1 & ISO 105-A02:1993:2005	Grey scale	45385
Slip resistance	CEN/TS 15676:2017	SRV "dry"	74
Fire classification	EN13501-1:2018	Classification	B-s1, d0

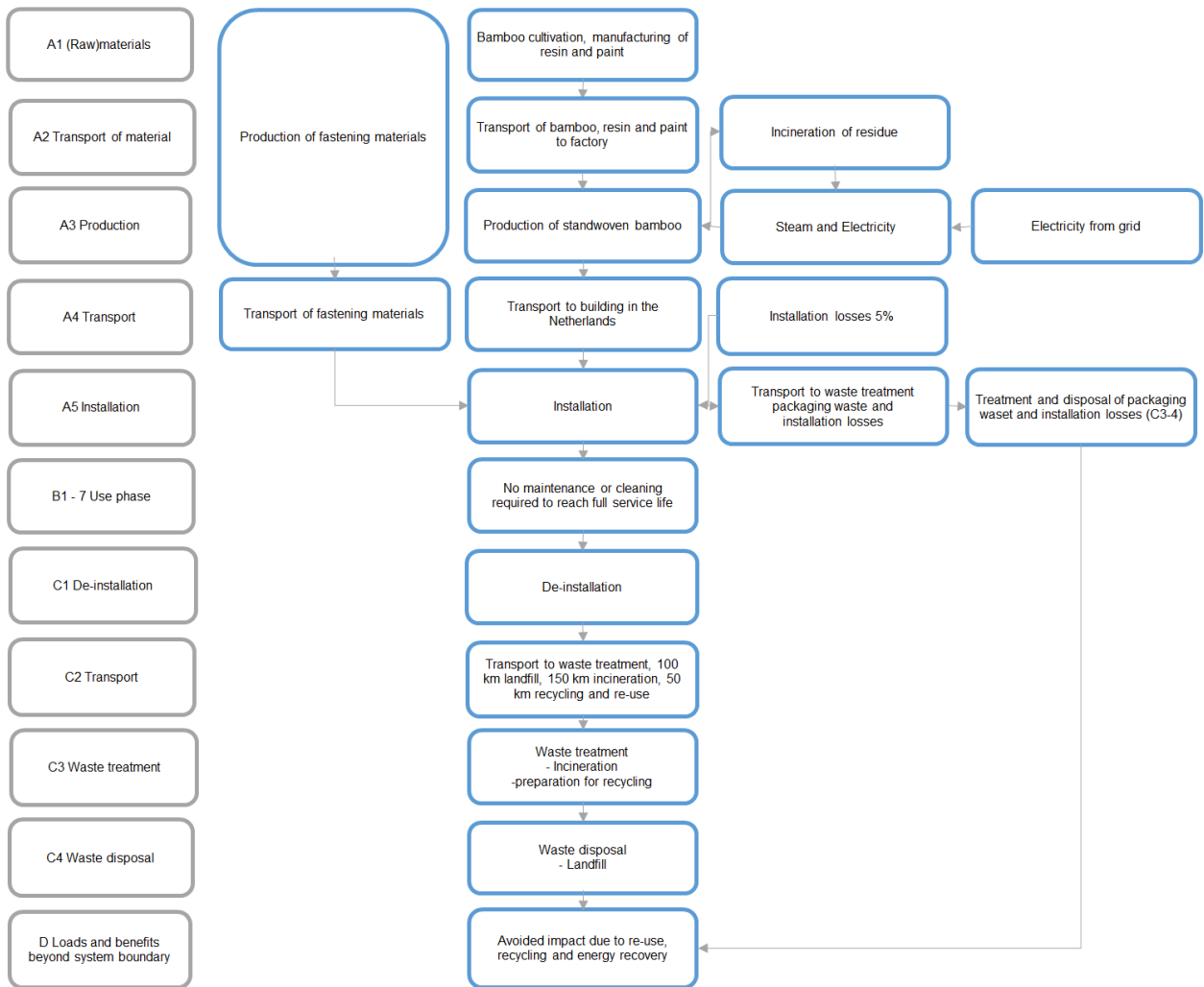
*Despite the measured specific gravity of 1140 kg / m³, generally 1150 kg / m³ is considered as density with a +50 / -50 variation. The calculation used in this EPD consider therefore 1150 kg / m³.

The strand woven bamboo products are manufactured in China. Bamboo is sourced in various regions and transported to the production facility by truck. There the bamboo is split (slicing) in order to produce bamboo filament. After further treatment (sorting, slicing, trimming and drying), these filaments are mixed with resin and hot pressed in the desired shape. The resulting materials is again dried and trimmed for a smooth finish. Bamboo trimmings and dust that are generated in the process are incinerated on site to produce steam for heating the drying facilities.

Product composition	Percentage
Bamboo	80-95%
Resin	5-20%
Finish	< 1%

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USER STAGE								END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport gate to site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery – Recycling-potential	
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	

X= Modules Assessed
ND= Not Declared



REPRESENTATIVENESS

The declaration is an average of two strand woven products, that are except from the sizes in which they are supplied, identical. Deviations in the reported impacts as a result of averaging is therefore considered negligible.

ENVIRONMENT IMPACT per functional unit or declared unit (core indicators A1)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
ADPE	kg Sb eq.	0,00 E+00	0,00 E+00	0,00 E+00	1,47 E-02	2,97 E-03	9,66 E-04	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	5,19 E-04	9,75 E-04	6,52 E-06	-1,88 E-03
ADPF	MJ	0,00 E+00	0,00 E+00	0,00 E+00	2,22 E+04	4,01 E+03	1,33 E+03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	3,04 E+02	3,24 E+02	1,45 E+01	-5,26 E+03
GWP	kg CO2 eq.	0,00 E+00	0,00 E+00	0,00 E+00	1,20 E+03	3,04 E+02	9,06 E+01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,99 E+01	2,72 E+02	4,55 E+00	-3,06 E+02
ODP	Kg CFC11 eq.	0,00 E+00	0,00 E+00	0,00 E+00	6,36 E-05	5,00 E-05	6,86 E-06	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	3,69 E-06	8,96 E-06	1,51 E-07	-4,18 E-05
POCP	Kg ethene eq.	0,00 E+00	0,00 E+00	0,00 E+00	1,30 E+00	3,68 E-01	7,92 E-02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,19 E-02	4,30 E-02	1,37 E-03	-3,00 E-01
AP	kg SO2 eq.	0,00 E+00	0,00 E+00	0,00 E+00	5,13 E+00	6,80 E+00	6,19 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	8,56 E-02	2,74 E-01	4,00 E-03	-1,95 E+00
EP	kg (PO4) 3- eq.	0,00 E+00	0,00 E+00	0,00 E+00	9,89 E-01	7,61 E-01	9,32 E-02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,71 E-02	6,12 E-02	1,55 E-03	-5,06 E-01

Toxicity indicators for Dutch market

HTP	kg DCB-Eq	0,00 E+00	0,00 E+00	0,00 E+00	1,79 E+03	1,65 E+02	1,00 E+02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	8,51 E+00	3,99 E+01	3,71 E-01	-2,17 E+02
FAETP	kg DCB-Eq	0,00 E+00	0,00 E+00	0,00 E+00	8,68 E+01	2,97 E+00	4,56 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	2,49 E-01	1,15 E+00	2,41 E-02	-7,03 E+00
MAETP	kg DCB-Eq	0,00 E+00	0,00 E+00	0,00 E+00	3,60 E+04	1,34 E+04	2,67 E+03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	8,90 E+02	3,31 E+03	4,73 E+01	-6,02 E+03
TETP	kg DCB-Eq	0,00 E+00	0,00 E+00	0,00 E+00	3,02 E+00	4,92 E-01	1,75 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	3,01 E-02	7,31 E-02	1,22 E-03	-8,95 E-01
ECI	euro	0,00 E+00	0,00 E+00	0,00 E+00	2,61 E+02	6,66 E+01	1,75 E+01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	2,40 E+00	1,93 E+01	3,00 E-01	-4,90 E+01
ADPF	kg Sb eq.	0,00 E+00	0,00 E+00	0,00 E+00	1,07 E+01	1,93 E+00	6,38 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,46 E-01	1,56 E-01	6,99 E-03	-2,53 E+00

- ADPE = Abiotic Depletion Potential for non-fossil resources
- ADPF = Abiotic Depletion Potential for fossil resources
- GWP = Global Warming Potential
- ODP = Depletion potential of the stratospheric ozone layer
- POCP = Formation potential of tropospheric ozone photochemical oxidants
- AP = Acidification Potential of land and water
- EP = Eutrophication Potential
- HTP = Human Toxicity Potential
- FAETP = Fresh water aquatic ecotoxicity potential
- MAETP = Marine aquatic ecotoxicity potential
- TETP = Terrestrial ecotoxicity potential
- ECI = Environmental Cost Indicator
- ADPF = Abiotic Depletion Potential for fossil resources expressed in [kg Sb-eq.]

ENVIRONMENT IMPACT per functional unit or declared unit (core indicators A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-total	kg CO2 eq.	0,00 E+00	0,00 E+00	0,00 E+00	-4,12 E+02	3,07 E+02	1,12 E+02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	2,01 E+01	1,86 E+03	8,93 E+01	-3,16 E+02
GWP-fossil	kg CO2 eq.	0,00 E+00	0,00 E+00	0,00 E+00	1,24 E+03	3,06 E+02	9,21 E+01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	2,01 E+01	2,73 E+02	1,49 E+00	-3,11 E+02
GWP-biogenic	kg CO2 eq.	0,00 E+00	0,00 E+00	0,00 E+00	-1,66 E+03	9,12 E-02	1,91 E+01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	8,61 E-03	1,59 E+03	8,78 E+01	-3,72 E+00
GWP-luluc)	kg CO2 eq.	0,00 E+00	0,00 E+00	0,00 E+00	6,18 E+00	1,92 E-01	3,17 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	7,10 E-03	2,58 E-02	2,96 E-04	-1,09 E+00
ODP	kg CFC11 eq.	0,00 E+00	0,00 E+00	0,00 E+00	7,03 E-05	6,29 E-05	7,84 E-06	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	4,62 E-06	9,00 E-06	1,88 E-07	-4,57 E-05
AP	mol H+ eq.	0,00 E+00	0,00 E+00	0,00 E+00	6,48 E+00	8,52 E+00	7,88 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,14 E-01	3,86 E-01	5,27 E-03	-2,83 E+00
EP-freshwater	kg PO4 eq.	0,00 E+00	0,00 E+00	0,00 E+00	3,66 E-02	1,49 E-03	1,91 E-03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,65 E-04	1,03 E-03	1,24 E-05	-8,28 E-03
EP-marine	kg N eq.	0,00 E+00	0,00 E+00	0,00 E+00	1,55 E+00	2,11 E+00	1,90 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	4,09 E-02	1,53 E-01	3,19 E-03	-7,86 E-01
EP-terrestrial	mol N eq.	0,00 E+00	0,00 E+00	0,00 E+00	1,78 E+01	2,35 E+01	2,24 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	4,50 E-01	1,76 E+00	1,95 E-02	-1,17 E+01
POCP	kg NMVOC eq.	0,00 E+00	0,00 E+00	0,00 E+00	6,07 E+00	6,12 E+00	6,27 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,29 E-01	4,58 E-01	6,99 E-03	-2,38 E+00
ADP-minerals & metals	kg Sb eq.	0,00 E+00	0,00 E+00	0,00 E+00	1,47 E-02	2,97 E-03	9,66 E-04	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	5,19 E-04	9,75 E-04	6,52 E-06	-1,88 E-03
ADP-fossil	MJ, net calorific value	0,00 E+00	0,00 E+00	0,00 E+00	1,94 E+04	4,05 E+03	1,19 E+03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	3,08 E+02	2,88 E+02	1,44 E+01	-4,75 E+03
WDP	m3 world eq. Deprived	0,00 E+00	0,00 E+00	0,00 E+00	3,85 E+02	7,43 E+00	2,08 E+01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	9,45 E-01	1,63 E+01	6,18 E-01	-4,11 E+01

- GWP-total = Global Warming Potential total
- 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 Exceedence
- 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 Exceedence
- POCP = Formation potential of tropospheric ozone photochemical oxidants
- ADP-minerals&metals = Abiotic Depletion Potential for non-fossil resources [2]
- ADP-fossil = Abiotic Depletion for fossil resources potential [2]
- WDP = Water (user) deprivation potential, deprivation-weighted water consumption [2]

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 experience with the indicator.

ENVIRONMENT IMPACT per functional unit or declared unit (additional indicators A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PM	Disease incidence	0,00 E+00	0,00 E+00	0,00 E+00	2,80 E-04	1,25 E-05	4,94 E-06	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,81 E-06	3,08 E-06	9,99 E-08	-4,15 E-05
IRP	kBq U235 eq.	0,00 E+00	0,00 E+00	0,00 E+00	2,57 E+01	1,74 E+01	2,23 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,35 E+00	1,08 E+00	5,64 E-02	-6,14 E+00
ETP-fw	CTUe	0,00 E+00	0,00 E+00	0,00 E+00	6,19 E+04	2,76 E+03	3,56 E+03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	2,50 E+02	3,56 E+03	1,41 E+01	-2,29 E+04
HTP-c	CTUh	0,00 E+00	0,00 E+00	0,00 E+00	3,58 E-06	1,63 E-07	2,05 E-07	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	8,90 E-09	2,95 E-07	4,48 E-10	-4,24 E-07
HTP-nc	CTUh	0,00 E+00	0,00 E+00	0,00 E+00	2,33 E-05	2,42 E-06	1,20 E-06	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	2,98 E-07	1,84 E-06	1,47 E-08	-9,17 E-06
SQP	----	0,00 E+00	0,00 E+00	0,00 E+00	3,68 E+04	1,25 E+03	1,92 E+03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	2,63 E+02	1,22 E+02	3,41 E+01	-3,09 E+04

- PM = Potential incidence of disease due to PM emissions
- IRP = Potential Human exposure efficiency relative to U235 [1]
- ETP-fw = Potential Comparative Toxic Unit for ecosystems [2]
- HTP-c = Potential Comparative Toxic Unit for humans [2]
- HTP-nc = Potential Comparative Toxic Unit for humans, non-cancer [2]
- SQP = Potential soil quality index [2]

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.

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 experience with the indicator.

OUTPUT FLOWS AND WASTE CATEGORIES per functional unit or declared unit (A1 / A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	kg	0,00 E+00	0,00 E+00	0,00 E+00	1,22 E-02	4,96 E-03	9,44 E-04	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	7,87 E-04	6,89 E-04	2,22 E-05	-6,94 E-03
NHWD	kg	0,00 E+00	0,00 E+00	0,00 E+00	2,91 E+02	6,81 E+01	2,32 E+01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,91 E+01	1,05 E+01	5,76 E+01	-5,02 E+01
RWD	kg	0,00 E+00	0,00 E+00	0,00 E+00	2,89 E-02	2,80 E-02	2,98 E-03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	2,09 E-03	9,73 E-04	8,57 E-05	-8,85 E-03
CRU	kg	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	5,19 E-02	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,04 E+00	0,00 E+00	0,00 E+00
MFR	kg	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,04 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	2,08 E+00	0,00 E+00	0,00 E+00
MER	kg	0,00 E+00	0,00 E+00	0,00 E+00	5,60 E+02	0,00 E+00	9,93 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,66 E+01	0,00 E+00	0,00 E+00
EEE	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	2,84 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	4,82 E+01	0,00 E+00	0,00 E+00
ETE	MJ	0,00 E+00	0,00 E+00	0,00 E+00	8,61 E+03	0,00 E+00	4,89 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	8,31 E+01	0,00 E+00	0,00 E+00

- HWD = Hazardous Waste Disposed
- NHWD = Non Hazardous Waste Disposed
- RWD = Radioactive Waste Disposed
- CRU = Components for reuse
- MFR = Materials for recycling
- MER = Materials for energy recovery
- EEE = Exported Electrical Energy
- ETE = Exported Thermal Energy

RESOURCE USE per functional unit or declared unit (A1 / A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ	0,00 E+00	0,00 E+00	0,00 E+00	2,73 E+04	3,16 E+01	1,37 E+03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	4,42 E+00	2,81 E+01	2,53 E-01	-1,77 E+04
PERM	MJ	0,00 E+00	0,00 E+00	0,00 E+00	3,10 E+02	0,00 E+00	1,24 E+01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
PERT	MJ	0,00 E+00	0,00 E+00	0,00 E+00	2,77 E+04	3,16 E+01	1,38 E+03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	4,42 E+00	2,81 E+01	2,53 E-01	-1,77 E+04
PENRE	MJ	0,00 E+00	0,00 E+00	0,00 E+00	2,06 E+04	4,30 E+03	1,27 E+03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	3,27 E+02	3,07 E+02	1,53 E+01	-5,18 E+03
PENRM	MJ	0,00 E+00	0,00 E+00	0,00 E+00	8,10 E+01	0,00 E+00	4,34 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
PENRT	MJ	0,00 E+00	0,00 E+00	0,00 E+00	2,07 E+04	4,30 E+03	1,27 E+03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	3,27 E+02	3,07 E+02	1,53 E+01	-5,18 E+03
SM	kg	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
RSF	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
NRSF	MJ	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00
FW	m3	0,00 E+00	0,00 E+00	0,00 E+00	9,89 E+00	2,62 E-01	5,54 E-01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	3,48 E-02	8,04 E-01	1,50 E-02	-9,32 E-01

- PERE = Use of renewable energy excluding renewable primary energy resources
- PERM = Use of renewable energy resources used as raw materials
- PERT = Total use of renewable primary energy resources
- PENRE = Use of non-renewable primary energy resources excluding non-renewable 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 resources
- SM = Use of secondary materials
- RSF = Use of renewable secondary fuels
- NRSF = Use of non-renewable secondary fuels
- FW = Use of net fresh water

BIOGENIC CARBON CONTENT per functional unit or declared unit (A1 / A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
BBCpr	Kg C	0,00 E+00	0,00 E+00	0,00 E+00	-1,67 E+03	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	1,59 E+03	8,36 E+01	0,00 E+00
BCCpa	kg C	0,00 E+00	0,00 E+00	0,00 E+00	-1,49 E+01	0,00 E+00	1,49 E+01	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00	0,00 E+00

- BCCpr = Biogenic carbon content in product
- BCCpa = Biogenic carbon content in packaging

CALCULATION RULES

Data collection and quality:

Input and output data are supplied by Felix Clercx and their suppliers for the following data categories:

- Materials (raw materials and auxiliary materials);
- Energy (electricity and heat);
- Emissions to air, water and soil.
- Processing of production wastes

Cut-off criteria:

All relevant and known processes and materials have been included. The following processes have been excluded from the system boundary:

- Maintenance and operation of support equipment except those included in Ecoinvent background processes;
- Capital goods and infrastructure (except those included in Ecoinvent background processes).

There is no relevant in- or outputs are excluded from this study.

SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

A1-A3 Production

The main raw materials used in the strand woven bamboo are bamboo, phenolic resin and acrylic paint. In the table below these materials are described in more detail, Moreover, the reference processes from the ecoinvent database are added per material.

Data collection was performed by Felix Clercx in cooperation with the manufacturer of the strand woven bamboo. The manufacturer compiled mass and energy balances based on average production figures they gathered in the year 2021.

Packaging material input was also calculated based on measures amount per unit of material.

The production facilities are supplied with electricity from the national power grid and thermal energy from incineration of bamboo residues.

For the cultivation of bamboo no primary data could be obtained as the bamboo is sources at from several suppliers. Ecoinvent 3.6 (which is subscribed by the NMD Assessment method) does not contain data about bamboo cultivation and harvesting. The more recent 3.8 version of the database does contain this data. Hence the relevant data was exported to the 3.6 version for use in this LCA.

A4 Transport

This module includes the transport from the production site in China to the harbour in China, shipping over sea, transport from the port to the warehouse and from the transport to a building in the Netherlands. The following distances are calculated.

Transport	Distance
Truck (manufacturer to harbour)	150 km
Sea freight (harbour to harbour)	23500 km
Truck (harbour to warehouse)	125 km
Truck (warehouse to construction site)	150 km

A5 Installation

The installation of bamboo involves only manual labour, which is not part in the scope of this study. Besides the installation itself, there is 5% installation losses are assumed, according to the default scenarios. Both production and disposal of the 5% waste is declared in this module. Benefits and burdens of recycling and energy recovery are declared in module D. Waste scenarios for the bamboo are described under module C3 and C4.

For the waste packaging the scenarios wood treated via residue (37) and plastics via residue (43) are considered for the pallet and Plastic film respectively.

B1-B5 Use phase

No maintenance, replacements of cleaning are required to reach the declared service of 50 years.

C2 Transport to waste processing:

For the transport to waste processing facilities the default distances from the NMD Assessment method are used, knowing:

Transport	Distance
Recycling	50 km
Incineration	100 km
Landfill	150 km

C3-C4 Waste treatment & final disposal

Default end-of-life scenario from the NMD Assessment method are used. The following waste scenarios are considered 'wood untreated (34)' is used, which assumes the following:

End-of-life scenario	Percentage
Recycling	10%
Re-use	5%
Landfill	5%
Incineration	80%

D Loads and benefits beyond the system boundary:

In module D energy recovery from incineration and avoided production from re-use and recycling are declared.

Energy recovery is calculated based on the amount of material that is incinerated in modules A5 and C3, and their respective Lower Heating Values (LHV). The LHV of Bamboo is based on a literature value, which is 18,3 MJ / kg dry matter.

According to the NMD Assessment 18% electricity and 31% heat is recovered in an average waste incineration plant in the Netherlands. The avoided energy processes are also in conformity with the NMD Assessment method, knowing energy from biomass for energy recovery from renewable materials and natural gas for non-renewable materials.

DECLARATION OF SVHC

None of the substances contained in the product are listed in the "Candidate List of Substances of Very High Concern for authorisation", or they do not exceed the threshold with the European Chemicals Agency.

REFERENCES

- [1] NMD Bepalingsmethode Milieuprestatie Bouwwerken 1.1, NMD March 2022.
- [2] EN 15804:2012+A2:2019 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products.
- [3] ISO, 2006. "Environmental management. Life cycle assessment - Principles and framework". ISO 14040:2006/Amd 1:2020.
- [4] ISO, 2006. "Environmental management. Life cycle assessment – Requirements and Guidelines". ISO 14044:2006/Amd 2:2020.
- [5] ISO, 2006. "Environmental labels and declarations – Type III environmental declarations", ISO 14025:2006.
- [6] Declaration of supplier, LCA Questionnaire Manufacturing Bamboo Strand woven.docx.
- [7] Gielis, J. (2002). Future possibilities for bamboo in European agriculture. Oprins Plant Sint-Lenaartsesteenweg, 91, 1-10.
- [8] Walters R., Hackett S. & Lyon R. (2000) Heats of combustion of high temperature polymers. Fire and materials,24(5), 245-252.

REMARKS

None.