

# Environmental Product Declaration



In accordance with ISO 14025 for:

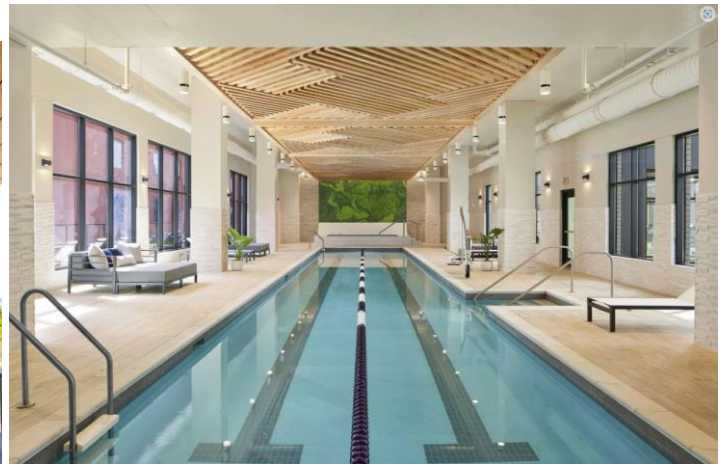
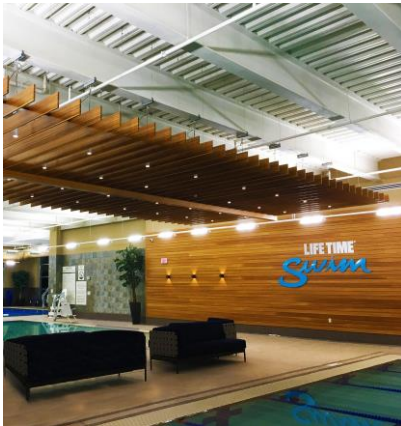
## Lamboo Bamboo Product

from

**Lamboo Technologies, LLC**



Programme:	The International EPD® System, <a href="http://www.environdec.com">www.environdec.com</a>
Programme operator:	EPD International AB
EPD registration number:	S-P-08118
Publication date:	2023-01-16
Valid until:	2028-01-16



## Programme information

<b>Programme:</b>	<p>The International EPD® System</p> <p>EPD International AB Box 210 60 SE-100 31 Stockholm Sweden</p> <p><a href="http://www.environdec.com">www.environdec.com</a> <a href="mailto:info@environdec.com">info@environdec.com</a></p>
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<p>Product category rules (PCR): <i>'Construction Products' Product Category Rules (ISO 14025) 2019:14 Version 1.2.3 - Updated 2022-07-08 and Valid Until 2024-12-20 UN CPC 3145</i></p>
<p>PCR review was conducted by: <i>Martin Erlandsson, IVL Swedish Environmental Research Institute, <a href="mailto:martin.erlandsson@ivl.se">martin.erlandsson@ivl.se</a></i></p>
<p>Independent third-party verification of the declaration and data, according to ISO 14025:2006:</p> <p><input type="checkbox"/> EPD process certification <input checked="" type="checkbox"/> EPD verification</p>
<p>Third party verifier: <i>Brad McAllister, WAP Sustainability; Maggie Wildnauer, WAP Sustainability</i></p> <p><i>In case of recognised individual verifiers:</i> Approved by: The International EPD® System</p>
<p>Procedure for follow-up of data during EPD validity involves third party verifier:</p> <p><input checked="" type="checkbox"/> Yes <input type="checkbox"/> No</p>

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programs may not be comparable. 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](http://www.environdec.com).

EPDs within the same product category but registered in different EPD programmes 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. EPDs of construction products may not be comparable if they do not comply with EN 15804. The EPD is in conformity with EN 15804:2012+A2:2019/AC:2021 and ISO 14025.

## Company information

Owner of the EPD:

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 301 W Edwards Street  
 Litchfield, IL 62056

Description of the organization:

Lamboo® is a US-based manufacturer and supplier of full architectural product solutions utilizing one of the most rapidly renewable resources on the planet, bamboo. Since 2007, Lamboo has taken its initial development of structural and exterior grade products and expanded its technology into a variety of other architectural, building, and OEM product solutions.

Lamboo continues to focus on developing state-of-the art architectural bamboo products and systems for the building industry. For 2022 we have refined our product offerings and developed more turn-key product solutions, making it easier than ever to specify Lamboo. Now separated into 3 categories, you can specify Lamboo within Interiors, Exteriors & Structural Applications. Lamboo also offers services that include: CNC Milling, Molding, Custom Millwork, Finishing, Shop Drawings & Project Consultation.

Name and location of production site:


Lamboo Manufacturing Facility  
 Jingyi RD, North Industry Zone, Huangbu, Shangyou, Ganzhou, Jiangxi, China 341214

## Product information

Product name: Lamboo Bamboo Product

Product description:

Bamboo panel products are made with 100% bamboo materials that are cross laminated to provide excellent stability and strength for any vertical or horizontal application. Our veneer products can be laminated to a variety of cores and substrates. All Lamboo’s interior panel and veneers utilize Low VOC and No Added Urea Formaldehyde (NAUF) adhesives to provide safe products to our customers.

Lamboo Bamboo Product	
	Finish slat ¼” thick x ¾” wide Length of slats vary from 8’ up to 10’ Density: 680 kg/m <sup>3</sup>

UN CPC code: UN CPC 3145

Geographical scope: North America



**Technical Data and General Information**

Total Volatile Organic Compounds (TVOCs) testing completed by SGS in 2017 with reference to ISO 16000-9:2006/COR1-2007 & ISO 16000-6:2011 & ISO 16000-3:2011. Testing was performed by Environmental Chamber (0.05 m<sup>3</sup>), followed by sampling using Tenax-TA and DNPH tube, analysis using Thermodesorption System with Gas Chromatography Mass Spectrometry (TDS-GC/MS) and High-Performance Liquid Chromatography-DAD (HPLC-DAD).

Test Item(s)	CAS No.	Results [mg/m <sup>3</sup> ]
		28 <sup>th</sup> day
TVOC	-	0.036

**Carbonyl Compounds:**

Test Item(s)	CAS No.	Results [mg/m <sup>3</sup> ]
		28 <sup>th</sup> day
Acetaldehyde	75-07-0	0.005

**Lamboo Engineered Bamboo Material Mechanical Properties**

<b>Compression:</b> ASTM-D198-13 SEC 29-36 ASTM 3501-86	PARALLEL TO GRAIN: 8,252 PSI PERPENDICULAR TO GRAIN: 2,880 PSI
<b>Tensile Strength:</b> ASTM-D198-13 SEC 29-36 ASTM 3500-90	PARALLEL TO GRAIN: 8,810 PSI PERPENDICULAR TO GRAIN: 700 PSI
<b>Flexural Strength:</b> ASTM-D198-13 SEC 4-12	11,250 PSI
<b>Shear Strength:</b> ASTM D3048	2,910 PSI
<b>Modulus of Elasticity:</b> ASTM D1037	1.3 x 10 <sup>6</sup> or 1,300 KSI
<b>Thermal Properties</b>	K=.352
Thermal Conductivity:	0.720
R-Value:	1.040
U-Value:	
<b>Specific Gravity:</b>	0.60—0.62
<b>Density:</b>	42-44 lbs/ft <sup>3</sup>
<b>Janka Hardness Test:</b> ASTM 1037	1,900 LBF
<b>Dimensional Stability Coefficient:</b>	0.00144
Volumetric Stability Factor:	-0.04%
Linear Expansion: (ASTM D1037) - 20% RH	-0.10%
Perpendicular Expansion: (ASTM D1037)	-0.13%
Thickness Swell: (ASTM D1037)	
<b>Moisture Content:</b>	9% to 13%
Solid Engineered Lamboo: (ASTM D4442)	
<b>Flammability:</b> ASTM E84 - Surface Burn Test	<b>Stock Products</b> Class "B" - Flame Spread Index: 60 Smoke Index Development: 68
	<b>Pressure Treated Products</b> Class "A" - Flame Spread Index: 20 Smoke Index Development: 65 Passed - (considered termite proof)
<b>Termite Resistance Test:</b> ASTM D3345-17	

## Recommended Storage Procedures

**Minimize Handling** - To reduce potential damage to materials, minimize handling and utilize team lifting procedures.

**Proper Stacking** - Materials should be stored flat on raised blocking of equal thickness and spacing. Recommended spacing for spacers is every 12 to 24 inches.

Do not stack directly on ground or concrete.

**Location and Temperature** - Store materials inside or in a covered shelter between 55° F to 75° F and 45% to 55% Humidity.

**Light** - Avoid long exposure to direct sunlight for unfinished materials.

**Acclimation** - Materials should be allowed to acclimate to the installation environment and humidity prior to installation. Recommended acclimation time is 48 to 72 hours. Finished Materials should be removed from packaging and allowed to acclimate 48 to 72 hours prior to installation.

## Fasteners and Clipping Systems

**Fasteners** - Aluminum (Interior) and Stainless Steel (exterior) bolts, washers, and nuts, or self-tapping screws are recommended. Pre-drilling is recommended if self-tapping screws are not used. Pre-drilling will help prevent cracking and splitting of the materials and offer superior service life and eliminate chemical reaction or staining of the materials.

**Clips and Hidden Fasteners** - Lamboo offers clipping and hidden fastener systems for all types of product applications. Please contact Lamboo directly to speak with a technical product specialist in regard to the best system to utilize for your project.

**Coated Fasteners** - It is **not** recommended to use coated fasteners as coating will leak/seep into bamboo materials.

## Exterior Mounting

**DO NOT GLUE OR ADHERE LAMBOO MATERIALS DIRECTLY TO STEEL, CONCRETE, OR OTHER WOOD SURFACES IN EXTERIOR APPLICATIONS!**

Only Face –Fasten or approved mounting hardware by Lamboo for exterior applications should be used. Contact Lamboo directly with any questions about recommended fastening techniques and hardware. Any cutting, drilling, or alterations made to finished materials must be sealed prior to installation. Failure to do this will cause potential water penetration under coating/finishes.

## Recommended Tooling and Fabrication Methods

**Cutting and Tooling** - Lamboo cuts and tools well with standard woodworking tools. For best results, use sharp high-carbide tipped tooling to help prevent tear-out. When cross-cutting, it is recommended to use high tooth count blades. Lamboo machines very well parallel to the grain. Just as plywood, Lamboo can splinter when crosscutting, coping, and tenoning across the end grain. Due to the linear fibrous nature of Lamboo, do not try to snap off uncut pieces; cut or sand them off. Pulling tear-out or splintered Lamboo could cause a “run” along the length of the grain. Profiles can be easily routed. Use typical woodworking practices when surfacing Lamboo materials. Please see the following table providing recommended saw blades for cutting Lamboo materials.

TYPE OF SAW:	APPLICATION:	DIAMETER:	TEETH:	HOOK:	KERF:	ARBOR:
Table Saw (over 3 HP)	Ripping	10"	24 ATB	20°	.126"	5/8"
			30 TCG	12°	.118"	5/8"
	Cross-cutting	10"	80 ATB	10°	.116"	5/8"
		12"	96ATB	10°	.116"	1"
	Combination (Ripping / Cross-cutting)	10"	50 COMB.	10°	.126"	5/8"
		12"	60 COMB.	10°	.126"	1"
Sliding Compound Miter Saw/Radial Arm Saw	Cross-Ply Materials	10"	80 TCG	-3°	.126"	5/8"
			80 HiATB	2°	.126"	5/8"
	Cross-Cutting	8"	48 ATB	-5°	.090"	5/8"
	General Cutting	10"	60 ATB	-5°	.090"	5/8"
		12"	72 ATB	-5°	.090"	1"
Compound Miter Saw	Extra-Fine Cross-Cutting Cross-Ply Materials	10"	80HiATB	2°	.091"	5/8"
		10"		-5°	.109"	5/8"
		12"		-5°	.109"	1"
	Cross-Cutting	8"	64 ATB	10°	.116"	5/8"
	General Cutting	10"	80 ATB	10°	.116"	5/8"
		12"	96 ATB	10°		1"
		10"	80 ATB	2°	.125"	5/8"
	Cross-Cutting	12"	96 HiATB	2°	.125"	5/8"
	Cross-Ply Materials					

### Stain and Finish Recommendations

Lamboo is constantly experimenting and testing stain and finish systems within the market to ensure the best systems are used on Lamboo materials. Please contact Lamboo directly to speak with a technical product specialist to help determine the best stain/finish system for your project.

### Recommended Waste Management

The Lamboo bamboo product is used for various construction products and the deconstruction and demolition is assumed to be performed manually using hand tools. The preferred end-of-life management process is recycling into mulch by grinding the waste materials for size reduction.

# LCA information

Declared unit: 1 kg Lamboo bamboo product

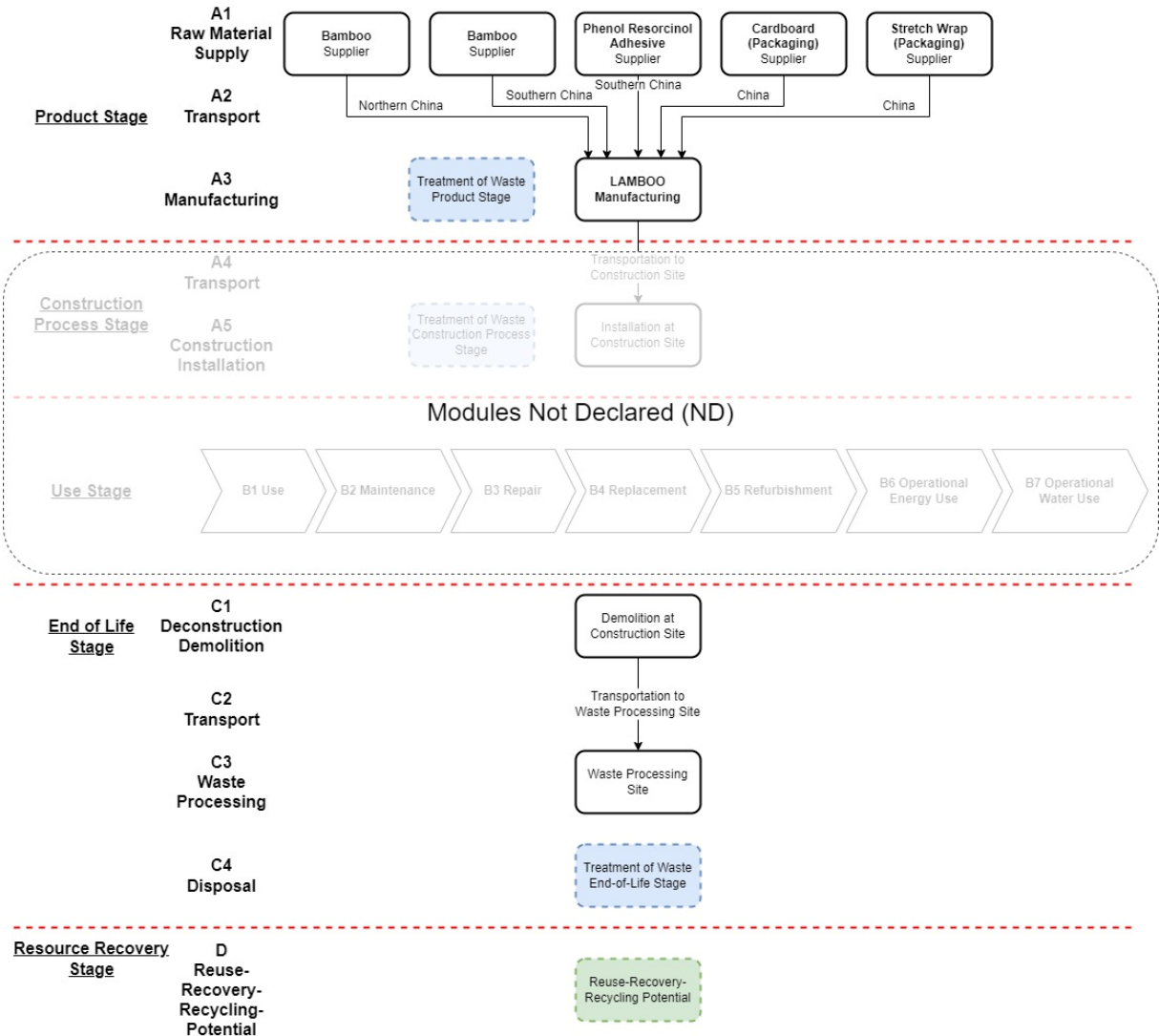
Time representativeness: Primary data provided by Lamboo from 2021-2022.

Database(s) and LCA software used:

GaBi LCA Software Version 8.0

Sphera Database Version 2022

System diagram:



LAMBOO Life Cycle Diagram

Description of system boundaries:

The EPD is type a) from the PCR document, which outlines the system boundaries for the cradle-to-gate LCA to include the product stage (A1-A3), end-of-life stage (C1-C4), and benefits and loads beyond the system boundary stage (D).

EPD Type a) Declared Unit: Cradle-to-gate + modules C1-C4 and D																		
	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	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X	
Geography	CN	CN	CN	-	-	-	-	-	-	-	-	-	US	US	US	US	US	
Specific data used	>90%					-	-	-	-	-	-	-	-	-	-	-	-	
Variation - products	0%					-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - sites	0%					-	-	-	-	-	-	-	-	-	-	-	-	-



**More information:**  
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 LCA Design Corporation  
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[lcaesign.ca](http://lcaesign.ca)

## Additional information

Explanatory material on safe installation, use, and disposal of the Lamboo product can be found online in the Resource Library at <https://www.lamboo.us/resourcelibrary>.

## Content declaration

### Product

Materials / chemical substances	kg	%
Bamboo	0.988	99
Phenol Resorcinol Adhesive	0.012	1

### Packaging

Materials / chemical substances	kg	%
Cardboard	0.015	95
LLDPE	7.56E-4	5

Wood and wood products are manufactured articles and are not considered hazardous under OSHA Hazard Communication Standard 29 CFR 1910.1200. Wood/Bamboo dust, a by-product generated from sawing, sanding, or machining bamboo and bamboo products, may be hazardous. Absence of a material in the product that is considered of environmental significance.

### Packaging

Distribution packaging: Cardboard and LLDPE stretch wrap

### Recycled material

Provenience of recycled materials (pre-consumer or post-consumer) in the product: Cardboard packaging contains 47% post-consumer recycled materials

### Biogenic carbon content

Biogenic carbon content, product	0.47	kg C/kg Lamboo bamboo product
Biogenic carbon content, packaging	6.45E-03	kg C/kg Lamboo bamboo product

For every 1 kg Lamboo bamboo product, 3.35 kg of bamboo is required. The scrap bamboo waste from A3 (2.35 kg) is used on-site for energy, where biogenic carbon is released. The remaining biogenic carbon is released during waste disposal C4 and recycling D. The recycled Lamboo is used for landscaping mulch, where the biogenic carbon is not stored, and will be released during its use.

### End-of-life scenario

Collection specified by type: 1kg collected separately  
 Distance to waste processing facility: 100 km  
 Recovery system specified by type: 0.31 kg for recycling  
 Disposal specified by type: 0.69 kg for final deposition in landfill



## Environmental performance

The environmental performance results include the indicators and disclaimers of EN 15804:2012+A2:2019/AC:2021. The PCR requires that several parameters be reported in the EPD, including resource use, waste categories and output flows. 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.

Indicator name and abbreviation	Unit	Module					
		A1-A3	C1	C2	C3	C4	D
<b>Core environmental impact indicators</b>		<b>A1-A3</b>	<b>C1</b>	<b>C2</b>	<b>C3</b>	<b>C4</b>	<b>D</b>
Climate Change - total	kg CO <sub>2</sub> eq.	3.18	0	2.04E-02	1.06E-02	1.08	8.04E-01
Climate Change - fossil	kg CO <sub>2</sub> eq.	4.74	0	2.04E-02	1.06E-02	5.17E-01	-1.91E-01
Climate Change - biogenic	kg CO <sub>2</sub> eq.	-1.56	0	0	0	5.64E-01	9.95E-01
Climate Change - LULUC	kg CO <sub>2</sub> eq.	8.54E-04	0	0	0	3.96E-06	0
GWP-GHG	kg CO <sub>2</sub> eq.	4.74	0	2.04E-02	1.06E-02	5.17E-01	-1.91E-01
Ozone depletion	kg CFC-11 eq.	1.69E-11	0	5.17E-13	2.98E-13	3.76E-13	-3.33E-12
Acidification	Mole of H <sup>+</sup> eq.	5.27E-02	0	1.38E-04	1.20E-04	1.99E-03	-1.09E-02
Eutrophication, freshwater	kg P eq.	2.33E-04	0	5.68E-09	3.27E-09	5.88E-06	-1.96E-06
Eutrophication, marine	kg N eq.	1.74E-02	0	5.39E-05	5.27E-05	1.29E-03	-4.89E-03
Eutrophication, terrestrial	mol N eq.	1.80E-01	0	5.88E-04	5.76E-04	8.74E-03	-5.35E-02
Photochemical ozone formation	kg NMVOC eq.	4.34E-02	0	1.58E-04	1.71E-04	9.84E-04	-1.30E-02
Abiotic depletion potential, minerals & metals <sup>2</sup>	kg Sb eq.	1.84E-06	0	0	0	5.71E-09	0
Abiotic depletion potential, fossil resources <sup>2</sup>	MJ	59.25	0	5.60E-01	1.47E-01	4.82E-01	-4.1
Water use <sup>2</sup>	m <sup>3</sup> world eq. deprived	3.16E-01	0	0	0	-1.55E-02	-3.04E-02
<b>Additional environmental impact indicators</b>		<b>A1-A3</b>	<b>C1</b>	<b>C2</b>	<b>C3</b>	<b>C4</b>	<b>D</b>
Particulate Matter emissions	Disease incidence	1.18E-06	0	4.41E-10	3.41E-10	3.61E-08	-2.98E-08
Ionizing radiation, human health <sup>1</sup>	kBq U235 eq.	1.38E-02	0	4.49E-21	2.59E-21	4.38E-04	-4.65E-20
Eco-toxicity (freshwater) <sup>2</sup>	CTUe	46.59	0	1.08	6.22E-01	8.88	-8.21
Human toxicity, cancer effects <sup>2</sup>	CTUh	2.56E-09	0	5.38E-12	4.00E-12	1.09E-10	-5.60E-10
Human toxicity, non-cancer effects <sup>2</sup>	CTUh	1.84E-07	0	5.05E-10	8.29E-10	2.57E-09	-1.18E-08
Land use related impacts/ Soil quality <sup>2</sup>	dimensionless	103.01	0	0	0	2.38E-02	0
<b>Indicators describing resource use</b>		<b>A1-A3</b>	<b>C1</b>	<b>C2</b>	<b>C3</b>	<b>C4</b>	<b>D</b>
Use of renewable primary energy as energy carrier	MJ	78.90	0	0	0	2.67E-02	0

Use of renewable primary energy resources used as raw materials	MJ	19.56	0	0	0	9.88E-13	-3.58
Total use of renewable primary energy	MJ	98.46	0	0	0	2.67E-02	-3.58
Use of non-renewable primary energy as energy carrier	MJ	59.33	0	2.56E-01	1.47E-01	4.92E-01	-4.1
Use of non-renewable primary energy resources used as raw materials	MJ	4.10E-01	0	0	0	1.89E-12	0
Total use of non-renewable primary energy resource	MJ	59.74	0	2.56E-01	1.47E-01	4.92E-01	-4.1
Secondary material	kg	0	0	0	0	0	0
Renewable secondary fuels	MJ	46.50	0	0	0	0	0
Non-renewable secondary fuels	MJ	0	0	0	0	0	0
Net use of fresh water	m <sup>3</sup>	1.62E-02	0	0	0	-3.62E-04	-7.08E-04
<b>Environmental information describing waste categories</b>		<b>A1-A3</b>	<b>C1</b>	<b>C2</b>	<b>C3</b>	<b>C4</b>	<b>D</b>
Hazardous waste disposed	kg	8.63E-06	0	0	0	9.50E-08	0
Non-hazardous waste disposed	kg	6.38E-01	0	0	0	4.47E-01	0
Radioactive waste disposed	kg	1.83E-04	0	0	0	5.47E-06	0
<b>Environmental information describing output flows</b>		<b>A1-A3</b>	<b>C1</b>	<b>C2</b>	<b>C3</b>	<b>C4</b>	<b>D</b>
Components for reuse	kg	0	0	0	0	0	0
Material for recycling	kg	0	0	0	0.31	0	0
Materials for energy recovery	kg	0	0	0	0	0	0
Exported energy, electricity	MJ	0	0	0	0	0	0
Exported energy, thermal	MJ	0	0	0	0	0	0
<p>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.</p> <p>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.</p>							

## References

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