Environmental Product Declaration

In accordance with ISO 14025:2006 and EN15804:2012+A2:2019/AC:2021 for:

LDTD (Laminated Particle Board), DTD (Particle Board) and Lamination process of DTD

by

Dřevozpracující družstvo

Programme:	Czech Environmental Information Agency (CENIA) www.cenia.cz, "National programme of environmental labeling "- CZ
Programme operator:	CENIA, Czech Environmental Information Agency, Executive Body of NPEZ Agency
EPD owner:	DDL Dřevozpracující družstvo
Author:	Envitrail s.r.o.
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General information

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): *EN 15804:2012+A2:2019+AC:2021*
Life Cycle Assessment (LCA)
LCA accountability: *Ing. Eva-Žofie Bergmannová, Envitrail s.r.o., bergmannova@envitrail.com, Bc. Václav Picka, https://envitrail.com/*
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: *Doc. Ing. Jan Weinzettel, Ph.D.*
The procedure for follow-up of data during EPD validity involves a third-party verifier: ☐ Yes ☒ No
Programme operator: CENIA, Czech Environmental Information Agency, Executive body of the NPEZ Agency, Moskevská 1523/63, Praha 10, 101 00, www.cenia.cz

The EPD owner has the sole ownership, liability, and responsibility for the EPD. Explanatory and supportive documentation can be obtained from the EPD owner. EPD of construction products may not be comparable if they do not comply with EN 15804+A2.

Company information

Owner of the EPD: Dřevozpracující družstvo, Lukavec čp. 9, 394 26 Lukavec, Czech Republic, IČ: 00028631 *(hereinafter referred to as DDL)*
Contact: David Roll, Head of Quality Management, ddl@ddl.cz
Name and location of production site(s):

- DDL - Lukavec 9, 394 26 Lukavec, Czech Republic
- DH Dekor - Lnářská 1602, 396 01 Humpolec, Czech Republic

DDL is a manufacturer of sawn timber and wood-based board materials with more than 70-year history. DDL specializes in the production of a wide range of products from wood and wood-based panels, namely from particle boards and MDF.
DH Dekor, spol. s.r.o. laminates DTD and MDF boards, which are produced by the parent company Dřevozpracucící družstvo, based in Lukavec. The lamination company produces impregnated paper of various decors and sizes.

DDL is not a mere materials supplier, but a journey for customers from materials to semi-products to final products, which we complement with consultancy services.

Fast and reliable deliveries, verified quality, high flexibility, individual customer approach, capability to produce small batches, and a wide range of exclusive decorations. These are the main advantages that our customers have appreciated for dozens of years.

More at: https://www.ddl.cz/en/

Product information

Product name: LDTD – Laminated Particleboard

Product identification and description: Laminated Particle board, hereinafter referred to as LDTD board, is produced by combining the process of manufacturing DTD, transporting DTD to the lamination process and the lamination itself. The papers used in the lamination process are impregnated with aminoplastic resins and the laminated board is therefore intended for indoor use (including furniture) in a dry environment. It is not intended for use in construction as a load-bearing or load-bearing component. The board is not suitable for exterior use. The laminated boards are manufactured according to PN 49 2628.

UN CPC code: 314

Geographical scope: Europe – Czech Republic

Technical parameters of a representative LDTD product:

Parameter	Value					Unit	Source
Average density of DTD	681					kg/m^3	Average data DDL 2023
Density of LDTD	697.7					kg/m^3	Calculation based on representative product
Moisture of DTD	5.6					%	Average data DDL 2023
Moisture of LDTD	5.5					%	Calculation based on representative product
Release of dangerous substances to air during the use stage – formaldehyde emissions	class E1 perforated value ≤ 8					mg/100 g a.s. board	EN 13 986:2004
Thickness class of DTD	>8-13	>13-20	>20-25	>25-32	>32-38		
Bending strength	11	11	10.5	9.5	8.5		
Moduls of elasticity in bending	1800	1600	1500	1350	1200		
Internal bond strength	0.4	0.35	0.30	0.25	0.20		
Surface soudness	0.8	0.8	0.8	0.8	0.8		
Thickness of laminated surface	0.18					mm	DH Dekor 2023 average data

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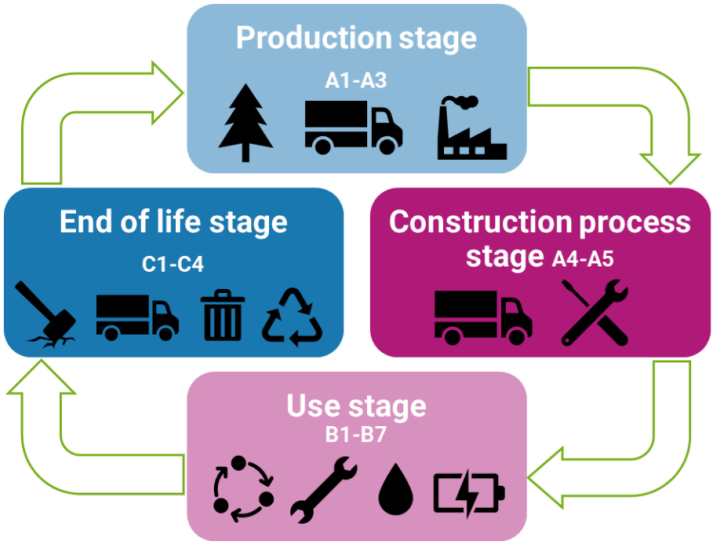
LCA information

Declared unit	1m^3 LDTD laminated board (697.7 kg)
Reference flow	11.7 pieces of specific representative LDTD board (57.4 kg) according to the sample dimensions (2840*1830*16.40 mm) of the declared board
Reference service life	Not applicable
Time representativeness	01/2023 – 12/2023 *The data set will be considered valid until there are significant changes to data in the production, technology, supply chain or operational and end-of-life scenarios.*
Database and LCA software used	OpenLCA ver. 2.3.1., ecoinvent 3.10, cut-off
Methodology	Environmental Footprint 3.1 and its EN 15804 reference package
Description of system boundaries	Cradle-to-gate with modules C1–C4 and module D (A1–A3 + C + D). *Modules C1 and C4 have zero environmental impacts, as C1 is represented by manual labor and C4 is not applicable as the product is completely burned with energy recovery in phase C3.*
Cut-off rules	Ecoinvent cut-off system model is based on the recycled content, or cut-off, approach. In this system model, wastes are the producer's responsibility (PPP), and recycled or secondary products are available burden-free (cut-off). Processes and flows with a predicted resulting impact of less than 1 % have been excluded from the system.
Allocations	Waste allocation uses the selected Polluter Pays Principle (PPP). The allocation of input materials, consumption of energy and output flows was done through a volume allocation based on a reference flow of declared unit. For residual wood, an economic allocation method was used.
Conversion factor	The conversion factor is 0.0014 and 1 kg of LDTD material has a volume of 0.0014 m^3.

Life cycle phases



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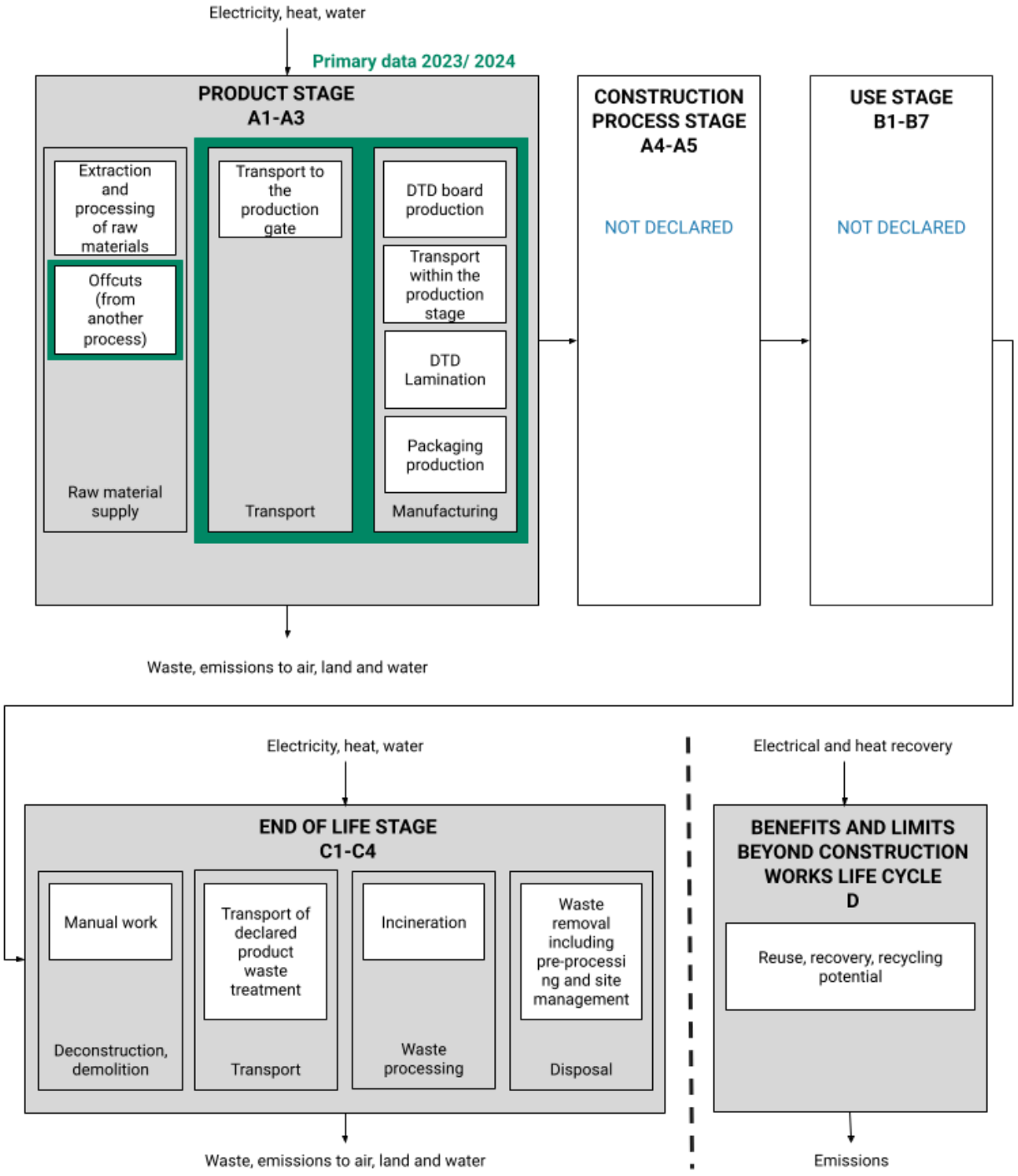
System diagram



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Description of the manufacturing processes

The production of laminated particleboards starts with the preparation of wood residues like chips, sawdust, and shavings, which are crushed, sorted, and dried to an optimal moisture content of 2–3%. The dried particles are mixed with adhesives, such as urea-formaldehyde or melamine resins, and layered into a multi-layer structure, combining fine particles for smooth surfaces and coarser ones for a strong core. The material is pre-pressed to stabilize it and then hot-pressed at high temperatures and pressure to form a dense board.

After cooling, the boards are trimmed and sanded to ensure smoothness and consistent dimensions. The boards are transported from Lukavec to Humpolec where the lamination process takes place. A decorative paper impregnated with melamine resin is then applied during the lamination process, which involves high pressure and temperature to create a durable and aesthetically appealing surface. Excess laminate is trimmed, and the boards undergo quality control before being packaged and prepared for distribution.

Modules declared

	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**

ND = Not Declared, used for voluntary parameters that are not quantified because no data is available.

The production stage includes the following modules:

- A1 – Module A1 includes raw material supply, such as forestry operations, residual wood, urea, slack wax, paraffin emulsion, hardener, antifoaming agent, emulsion paint and glue production. For the lamination process raw material supply for the laminating paper, formaldehyde, urea, melamine, monopropylene glycol, caprolactam, additives for impregnating solutions, natrium hydroxide and ammonium sulfate are included.
- A2 – Stage A2 covers the transportation of the materials to the mill and the fuels necessary for that. The logs and wood are transported by trucks >32 tonnes, fibreline and emulsion paint are transported by trucks with load 3.5 - 7 tonnes. For the laminating materials the EU market processes were used.
- A3 – This stage covers the manufacture of products including impacts connected to the generation of electricity (specific production mix by contractual instrument with GWP indicator of 0.642 kg CO_2 eq./kWh was calculated) and heat (from residual wood and oil), water and diesel (manipulation on the site) consumption, packaging materials and transportation between sites. The specific electricity production mix contains 53.6% fossil, 40.95% nuclear and 5.46% renewable resources. The processing of any waste arising from this stage is also included. For process description please see Description of the manufacturing processes above.

The end-of-life stage includes modules:

- C1 – De-construction by manual labor (zero environmental impacts).
- C2 – Transport to the incineration site.
- C3 – Waste processing. LDTD may be disposed of with various disposal scenarios after construction and demolition as their final fate is related to consumer behavior. For this EPD it is assumed that 100 % of the waste is used as a material for incineration plants with energy recovery due to their high calorific value.
- C4 – Disposal (zero environmental impacts).

The benefits and costs beyond the product system in Module D:

- D – Module D contains benefits for the substitution of thermal energy (heat from treatment of coal gas, in power plant, CZ - default provider) and electricity (production mix, high voltage, Czech Republic) by energy generation from thermal treatment of product (Module C3). The main recyclable waste materials from A3 production - iron and plastic are accounted for as substitution of primary materials (pig iron production | pig iron | Cutoff, S - RER and polypropylene production, granulate | polypropylene, granulate | Cutoff, S - RER).

Excluded stages (not declared):

- *A4-A5 Construction process stage*
- *B1-B7 Use stage*

Content information

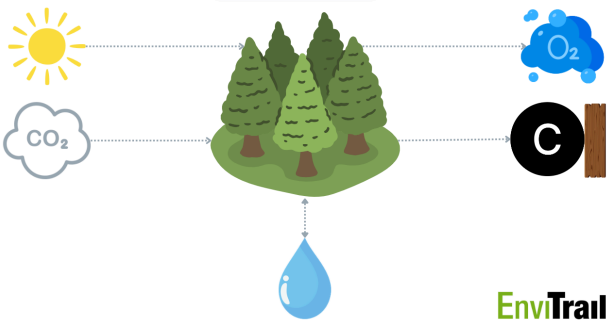
Material distribution

Production and acquisition of raw materials	Amount of kg per 1 m^3	Percentage material distribution [%]	Data source
Primary wood	438.36	53.96%	Allocation from average annual data DDL + DH Dekor
Secondary recycled residual wood	246.75	30.37%	Allocation from average annual data DDL + DH Dekor
Laminated layer	24.14	2.97%	Allocation from average annual data DDL + DH Dekor
Other material in DTD	93.51	11.51%	Allocation from average annual data DDL + DH Dekor
Packaging material	9.61	1.18%	Allocation from average annual data DDL + DH Dekor
Total	**812.36**	**100.00%**	**Allocation from average annual data DDL + DH Dekor**

Biogenic carbon content

The calculation of the biogenic carbon content of wood and the conversion to carbon dioxide was carried out according to the rules of EN 16449 [2] and is based on the distribution of the wood content and other materials per declared unit of the final product – 1m^3 of LDTD. The resulting biogenic carbon content for 1m^3 of LDTD is **306.32 kg C** and 4.45 kg C for accompanying packaging.

Biogenic carbon content	kg C/m^3
Biogenic carbon content in product	**303.34**
Biogenic carbon content in accompanying packaging	**4.50**
NOTE: 1 kg biogenic carbon is equivalent to 44/12 kg of CO_2.	



The carbon sequestration and storage process involves capturing carbon dioxide (CO_2) from the atmosphere, particularly through renewable materials such as trees. During photosynthesis, trees and other plants absorb CO_2 and convert it into sugars, releasing oxygen. This natural mechanism reduces the amount of CO_2 in the atmosphere. Over time, the carbon is stored in the form of biomass, such as wood. The longer carbon remains locked in these materials instead of re-entering the atmosphere, the greater the environmental benefit. The diagram illustrates this cycle, showing how sunlight powers photosynthesis, which leads to the growth of trees that absorb CO_2 and produce oxygen, ultimately storing carbon in wood products. This entire cycle is sustained by the circulation of water and nutrients. At the end of the product's life cycle, the carbon returns to the atmosphere, most likely in the form of CO_2.

Results of the Environmental Performance Indicators

Mandatory impact category indicators according to EN 15804.

Results per declared unit							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-fossil	kg CO_2 eq.	4.95E+02	0	5.42E+00	2.31E+01	0	-5.81E+02
GWP-biogenic	kg CO_2 eq.	-9.84E+02	0	3.20E-03	1.00E+03	0	2.27E-01
GWP-luluc	kg CO_2 eq.	1.05E+00	0	1.84E-03	2.77E-03	0	-5.81E-01
GWP-total	kg CO_2 eq.	-4.89E+02	0	5.43E+00	1.03E+03	0	-5.81E+02
ODP	kg CFC 11 eq.	2.97E-05	0	1.09E-07	1.33E-07	0	-2.20E-06
AP	mol H^+ eq.	2.30E+00	0	2.44E-02	1.16E-01	0	-2.29E+00
EP-freshwater	kg P eq.	2.89E-01	0	3.72E-04	5.62E-03	0	-5.76E-01
EP-marine	kg N eq.	5.29E-01	0	9.57E-03	6.16E-02	0	-5.13E-01
EP-terrestrial	mol N eq.	5.47E+00	0	1.04E-01	5.87E-01	0	-4.31E+00
POCP	kg NMVOC eq.	2.01E+00	0	3.74E-02	1.48E-01	0	-1.22E+00
ADP-minerals &metals*	kg Sb eq.	9.59E-04	0	7.44E-06	1.25E-05	0	-1.10E-04
ADP-fossil*	MJ	8.79E+03	0	7.75E+01	1.01E+02	0	-8.06E+03
WDP*	m^3	4.24E+02	0	3.86E-01	2.36E+01	0	-1.25E+02

***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.*

***General disclaimer:** 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.*

***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*

Additional mandatory and voluntary impact category indicators

Results per declared unit							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
GWP- GHG	kg CO_2 eq.	4.98E+02	0	5.43E+00	2.32E+01	0	-5.81E+02
PM	disease incidence	2.43E-05	0	4.33E-07	1.27E-06	0	-1.70E-05

***Disclaimer:** 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.*

***Acronyms:** GWP-GHG = Global Warming Potential ; PM = Potential incidence of disease due to particulate matter emissions*

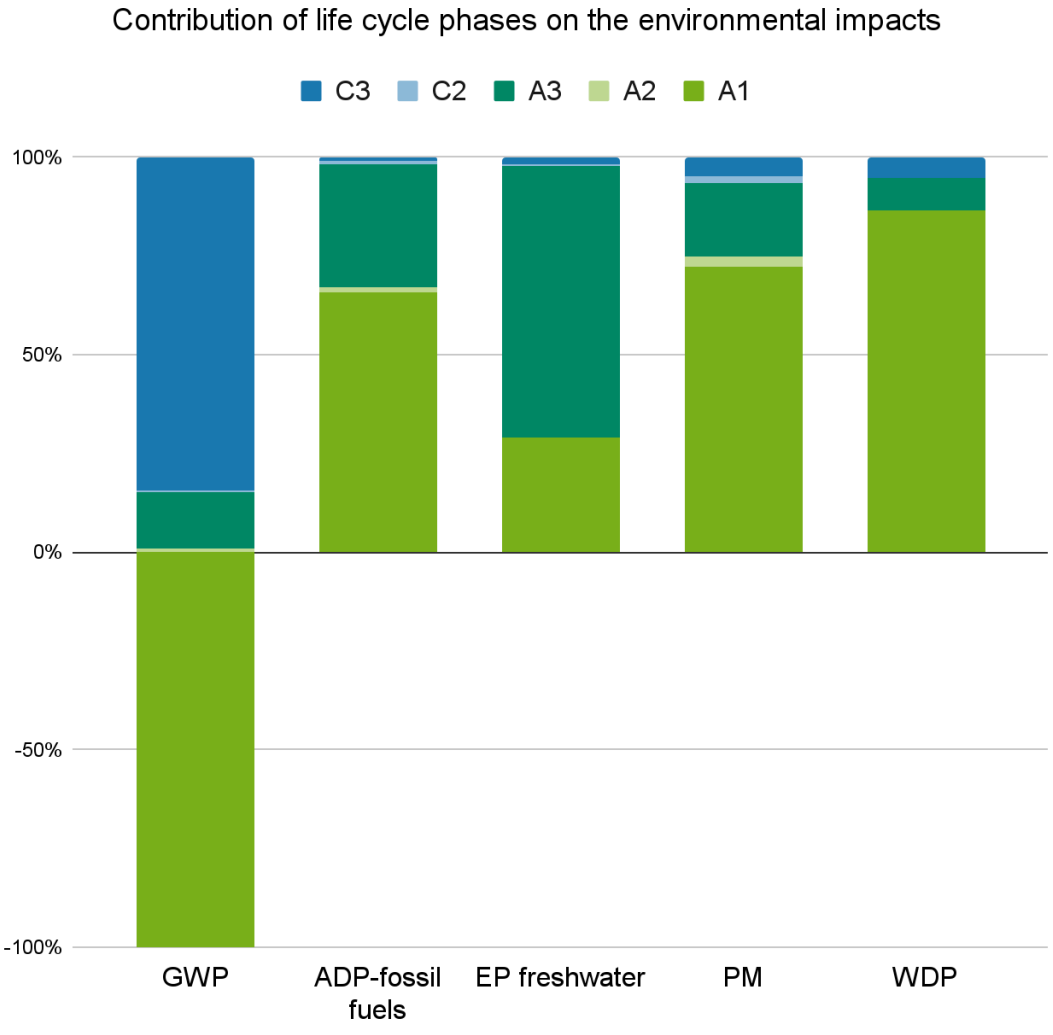
LCA Interpretation

Selected environmental impact results

Based on the results, the three most relevant impact categories (hotspots after normalization and weighting) through EF ver. 3.1 factors are **Climate Change, Resource Depletion – Fossil Fuels, and Eutrophication – freshwater** [5]**.**

The Raw material supply phase (module A1) and the LDTD production phase (module A3) have the highest environmental impacts in all impact categories. The contribution of life cycle phases for the five most important impact categories is shown in the graph. Phase C3 (end-of-life processing of LDTD by incineration with a predicted wood energy recovery efficiency greater than 60 %) in the climate change impact category compensates for the negative values from module A1 (caused by the sequestration), as incineration (i.e. release of sequestered carbon back into the environment) occurs under module C.

Selected environmental impact results per 1 m³ LDTD board



A1 – Raw material supply

The most significant contributor to depletion of raw material resources – fossil fuels (ADP-fossil), and climate change (GWP) in the analyzed system is **melamine urea formaldehyde adhesive production**, which dominates in both categories with a share of 38.4 % (GWP) and 29.4 % (ADP-fossil).

A3 – Production phase

The main contributors for both of the most significant impact categories are the **electricity consumption process for the production of LDTD board**, and the **production of heat from fuel oil** .

Within the climate change impact category, the impacts from electricity consumption (60.9 %) and heat produced from fuel oil (13.6 %) dominate. The processes that have the greatest impact on the category of resource depletion (fossil fuels) have the same ranking as in the case of climate change, with the representation of electricity consumption (68.70 %) and heat production (10.7 %).

Resource use indicators

Results per declared unit.

Indicator	Unit	Total A1-A3	A4-A5	B1-B7	C1	C2	C3	C4	D
PERE	MJ	5.30E+01	0	0	0	1.34E+00	2.61E+00	0	0.00E+00
PERM	MJ	8.57E+03	0	0	0	1.43E-07	3.65E-07	0	-2.32E+02
PERT	MJ	8.63E+03	0	0	0	1.34E+00	2.61E+00	0	-2.32E+02
PENRE	MJ	2.69E+03	0	0	0	7.75E+01	1.01E+02	0	-8.05E+03
PENRM	MJ	6.10E+03	0	0	0	3.64E-06	4.18E-05	0	-4.17E+00
PENRT	MJ	8.79E+03	0	0	0	7.75E+01	1.01E+02	0	-8.06E+03
SM	kg	2.47E+02	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0
FW	m^3	1.14E+01	0	0	0	1.09E-02	1.61E-01	0	-4.21E+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 declared unit.

Environmental information describing waste categories (MANDATORY)	Unit	A1-A3	A4-A5	B1-B7	C1	C2	C3	C4	D
Hazardous waste disposed (HWD)	kg	6.54E+01	ND	ND	0	7.58E-02	4.71E+00	0	-5.40E+00
Non-harzardous waste disposed (NHWD)	kg	1.49E+02	ND	ND	0	8.25E-01	7.16E+02	0	-1.21E+02
Radioactive waste disposed (RWD)	kg	8.55E-03	ND	ND	0	1.33E-05	1.62E-05	0	-2.20E-02

Output flow indicators

Results per declared unit.

Environmental information describing output flows (MANDATORY)	Unit	Total A1-A3	A4-A5	B1-B7	C1	C2	C3	C4	D
Components for re-use (CRU)	kg	0	ND	ND	0	0	0	0	0
Materials for recycling (MFR)	kg	9.16E-01	ND	ND	0	0	0	0	0
Materials for energy recovery (MER)	kg	0	ND	ND	0	0	0	0	0
Exported electrical energy (EEE)	MJ	2.94E+01	ND	ND	0	0	2.01E+03	0	0
Exported thermal energy (EET)	MJ	5.30E+01	ND	ND	0	0	6.02E+03	0	0

Additional data:

The following chapters present technical data and indicator results of LDTD-related (sub)processes, which were used to evaluate the environmental impacts of LDTD. Declared units of 1m^3 raw DTD board and 1m^2 of laminated surface were evaluated and can be further used for recalculation of LDTD board with specific dimensions. However, the sum of the corresponding ratios of the volume of the separate raw board and its area for lamination would not include the inter-process transport of the raw board from DDL to DH Dekor (30 km) and the production, removal, and transport of additional packaging materials (adhesive tape and wrapping paper). The results of 1 m^3 of LDTD board including these data can together form (in the climate change total category), a value of 4.21 kg CO_2 eq. Therefore, this is only 0.78 % of the results of the sample LDTD board in the total impacts of this category and therefore this recalculation can be made with a margin of error < 1 %.

1. Declared unit – 1m^3 raw DTD board

Material distribution of 1m^3 raw DTD board

Production and acquisition of raw materials	Amount of kg per 1 m^3	Percentage material distribution [%]	Data source
Primary wood	443.22	55.63%	Allocation from average annual data DDL
Secondary recycled residual wood	249.49	31.31%	Allocation from average annual data DDL
Other material	94.55	11.87%	Allocation from average annual data DDL
Packaging material	9.46	1.19%	Allocation from average annual data DDL
Total	**796.72**	**100.00%**	**Allocation from average annual data DDL**

Biogenic carbon content per 1m^3 raw DTD board

Biogenic carbon content	kg C/m^3
Biogenic carbon content in product	**300.17**
Biogenic carbon content in accompanying packaging	**4.36**
NOTE: 1 kg biogenic carbon is equivalent to 44/12 kg of CO_2	

Mandatory impact category indicators according to EN 15804 for 1 m^3 of raw DTD board

Results per declared unit							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-fossil	kg CO_2 eq.	3.76E+02	0	5.29E+00	1.06E+01	0	-5.72E+02
GWP-biogenic	kg CO_2 eq.	-9.81E+02	0	3.12E-03	9.96E+02	0	2.24E-01
GWP-luluc	kg CO_2 eq.	9.14E-01	0	1.80E-03	2.59E-03	0	-5.72E-01
GWP-total	kg CO_2 eq.	-6.04E+02	0	5.30E+00	1.01E+03	0	-5.72E+02
ODP	kg CFC 11 eq.	7.38E-06	0	1.06E-07	1.18E-07	0	-2.20E-06
AP	mol H^+ eq.	1.72E+00	0	2.38E-02	1.10E-01	0	-2.26E+00
EP-freshwater	kg P eq.	2.34E-01	0	3.64E-04	4.59E-03	0	-5.68E-01
EP-marine	kg N eq.	4.00E-01	0	9.34E-03	5.83E-02	0	-5.05E-01
EP-terrestrial	mol N eq.	4.05E+00	0	1.02E-01	5.60E-01	0	-4.25E+00
POCP	kg NMVOC eq.	1.55E+00	0	3.65E-02	1.41E-01	0	-1.20E+00
ADP-minerals &metals*	kg Sb eq.	7.86E-04	0	7.26E-06	1.16E-05	0	-1.10E-04
ADP-fossil*	MJ	6.49E+03	0	7.57E+01	9.39E+01	0	-7.94E+03
WDP*	m^3	3.41E+02	0	3.77E-01	2.22E+01	0	-1.23E+02

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***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*

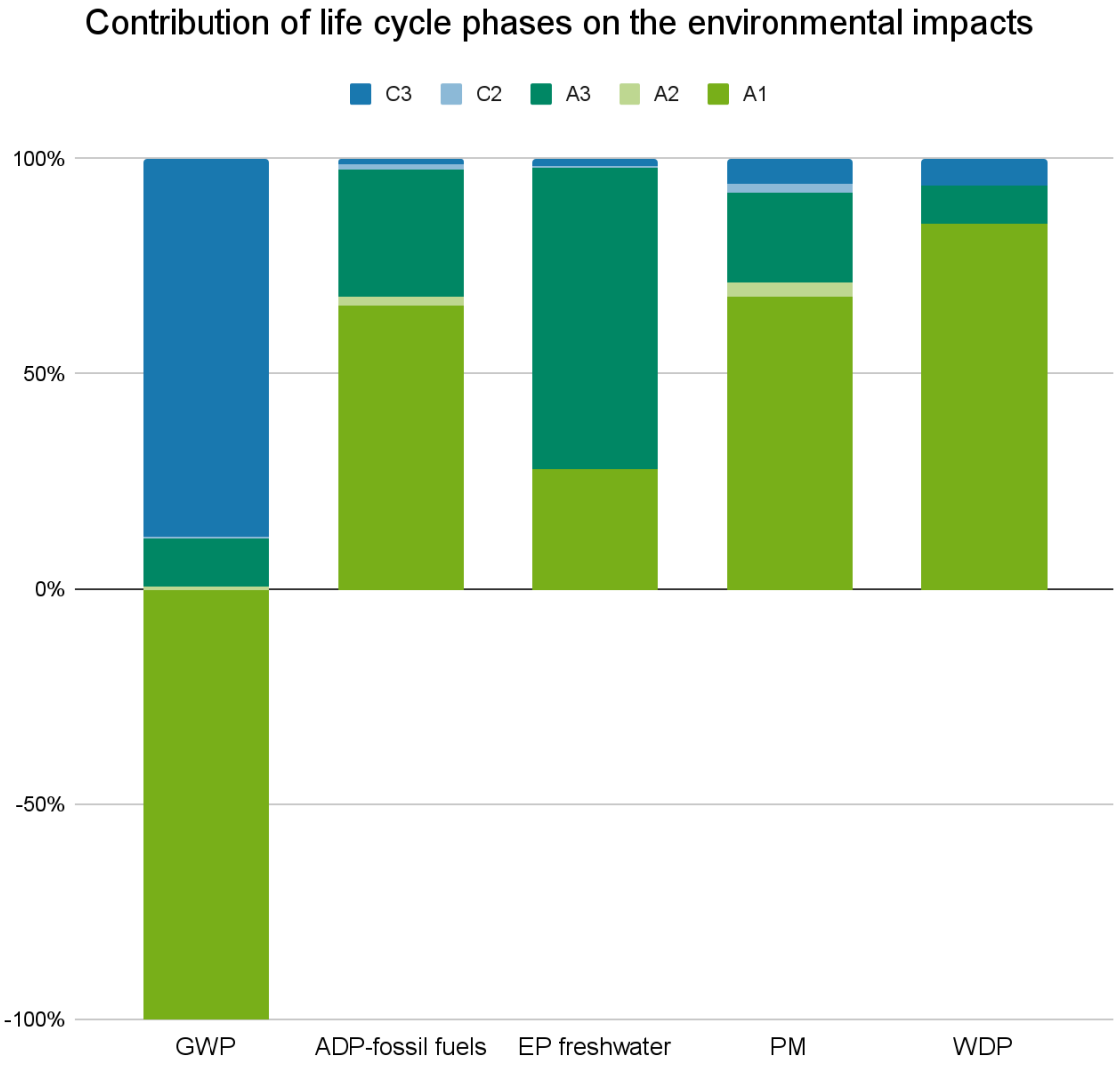
Additional mandatory and voluntary impact category indicators per 1 m^3 DTD board

Results per declared unit							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
GWP- GHG**	kg CO_2 eq.	3.78E+02	0	5.30E+00	1.06E+01	0	-5.73E+02
PM	disease incidence	1.89E-05	0	4.23E-07	1.22E-06	0	-1.60E-05

****Disclaimer:** 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.*

***Acronyms:** GWP-GHG = Global Warming Potential greenhouse gases; PM = Potential incidence of disease due to particulate matter emissions*

Selected environmental impact results per 1 m³ DTD board



Resource use indicators per 1 m³ DTD

Indicator	Unit	Total A1-A3	A4-A5	B1-B7	C1	C2	C3	C4	D
PERE	MJ	4.43E+01	0	0	0	1.31E+00	2.34E+00	0	-2.29E+02
PERM	MJ	8.34E+03	0	0	0	4.61E-07	2.70E-08	0	8.33E-03
PERT	MJ	8.38E+03	0	0	0	1.31E+00	2.34E+00	0	-2.29E+02
PENRE	MJ	1.91E+03	0	0	0	7.57E+01	9.39E+01	0	-7.94E+03
PENRM	MJ	4.58E+03	0	0	0	6.00E-08	-8.00E-08	0	1.10E+00
PENRT	MJ	6.49E+03	0	0	0	7.57E+01	9.39E+01	0	-7.94E+03
SM	kg	2.49E+02	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0
FW	m³	9.34E+00	0	0	0	1.06E-02	1.36E-01	0	-4.15E+00

Waste indicators per 1 m³ DTD

Environmental information describing waste categories (MANDATORY)	Unit	A1-A3	A4-A5	B1-B7	C1	C2	C3	C4	D
Hazardous waste disposed (HWD)	kg	6.30E+01	ND	ND	0	7.40E-02	3.78E+00	0	-5.32E+00
Non-harzardous waste disposed (NHWD)	kg	1.19E+02	ND	ND	0	8.05E-01	6.92E+02	0	-1.20E+02
Radioactive waste disposed (RWD)	kg	6.42E-03	ND	ND	0	1.29E-05	1.37E-05	0	-2.17E-02

Output flow indicators per 1 m³ DTD

Environmental information describing output flows (MANDATORY)	Unit	Total A1-A3	A4-A5	B1-B7	C1	C2	C3	C4	D
Components for re-use (CRU)	kg	0.00E+00	ND	ND	0	0	0	0	0
Materials for recycling (MFR)	kg	3.40E-01	ND	ND	0	0	0	0	0
Materials for energy recovery (MER)	kg	0.00E+00	ND	ND	0	0	0	0	0
Exported electrical energy (EEE)	MJ	2.98E+01	ND	ND	0	0	1.90E+03	0	0
Exported thermal energy (EET)	MJ	5.36E+01	ND	ND	0	0	5.70E+03	0	0

1. Declared unit – 1m² of double-sided laminated surface

Material distribution of 1m² double-sided lamination (0.18 mm thickness)

Production and acquisition of raw materials	Amount of kg per 1 m²	Percentage material distribution [%]	Data source
Paper for impregnation	0.17	43.37%	Allocation from average annual data DH Dekor
Resign	0.22	56.63%	Allocation from average annual data DH Dekor
Total	**0.40**	**100.00%**	**Allocation from average annual data DH Dekor**

Biogenic carbon content per 1m² double-sided lamination

Biogenic carbon content	kg C/m²
Biogenic carbon content in product	**0.39**
Biogenic carbon content in accompanying packaging	**0.11**
NOTE: 1 kg biogenic carbon is equivalent to 44/12 kg of CO_2	

Mandatory impact category indicators according to EN 15804 for 1 m² double-sided lamination

Results per declared unit							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-fossil	kg CO_2 eq.	1.95E+00	0	3.08E-03	2.08E-01	0	-2.49E-01
GWP-biogenic	kg CO_2 eq.	-2.33E-01	0	1.81E-06	2.91E-01	0	9.55E-05
GWP-luluc	kg CO_2 eq.	2.41E-03	0	1.04E-06	3.47E-06	0	-2.50E-04
GWP-total	kg CO_2 eq.	1.72E+00	0	3.08E-03	4.98E-01	0	-2.50E-01
ODP	kg CFC 11 eq.	3.65E-07	0	6.18E-11	2.52E-10	0	-9.40E-10
AP	mol H^+ eq.	9.55E-03	0	1.38E-05	1.15E-04	0	-9.90E-04
EP-freshwater	kg P eq.	9.25E-04	0	2.11E-07	1.77E-05	0	-2.50E-04
EP-marine	kg N eq.	2.08E-03	0	5.43E-06	6.35E-05	0	-2.20E-04
EP-terrestrial	mol N eq.	2.29E-02	0	5.92E-05	5.44E-04	0	-1.85E-03
POCP	kg NMVOC eq.	7.39E-03	0	2.12E-05	1.43E-04	0	-5.20E-04
ADP-minerals &metals*	kg Sb eq.	2.88E-06	0	4.22E-09	1.65E-08	0	-4.90E-08
ADP-fossil*	MJ	3.80E+01	0	4.40E-02	1.38E-01	0	-3.46E+00
WDP*	m^3	1.41E+00	0	2.19E-04	2.73E-02	0	-5.35E-02

***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.*

***General disclaimer:** 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.*

***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*

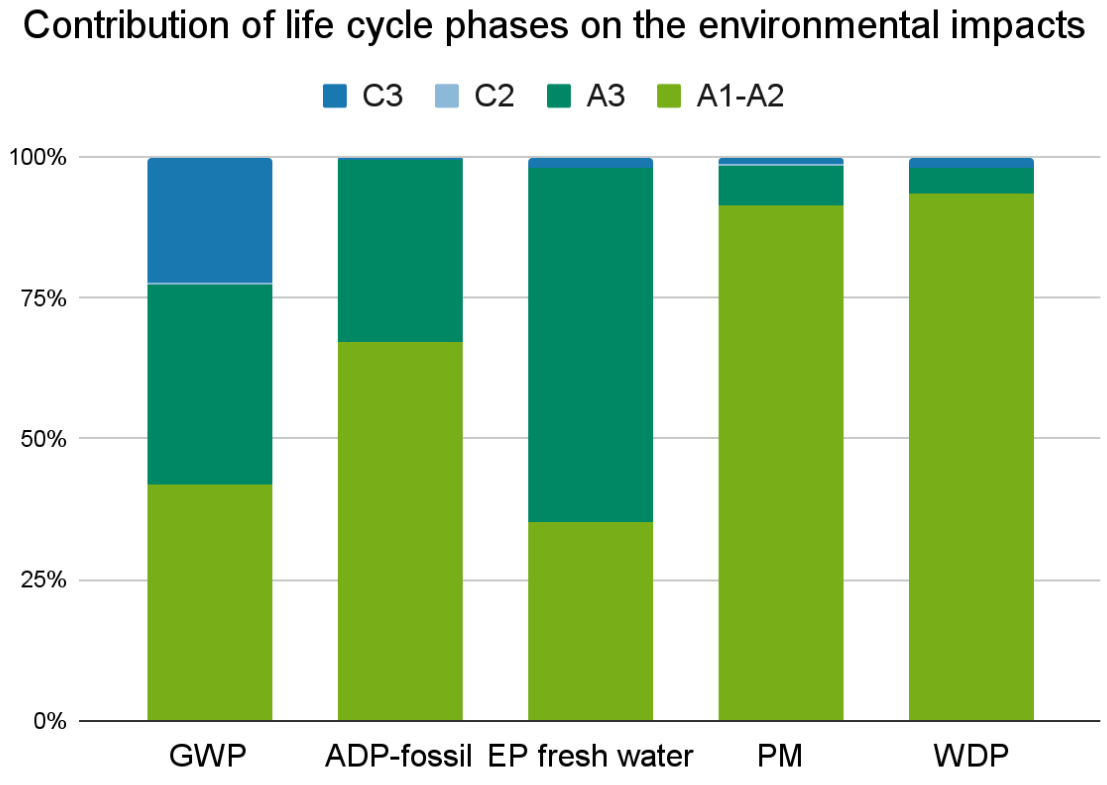
Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of 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

Additional mandatory and voluntary impact category indicators for 1 m^2 double-sided lamination

Results per declared unit							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
GWP- GHG	kg CO_2 eq.	1.96E+00	0	3.08E-03	2.08E-01	0	-2.50E-01
PM	disease incidence	8.68E-08	0	2.46E-10	1.03E-09	0	-7.20E-09

***Disclaimer:** 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.*
***Acronyms:** GWP-GHG = Global Warming Potential greenhouse gases; PM = Potential incidence of disease due to particulate matter emissions*

Selected environmental impact results per 1 m^2 double-sided lamination



Resource use indicators per 1 m² double-sided lamination

Indicator	Unit	Total A1-A3	A4-A5	B1-B7	C1	C2	C3	C4	D
PERE	MJ	1.36E-01	0	0	0	7.60E-04	4.84E-03	0	-9.96E-02
PERM	MJ	5.26E+00	0	0	0	-1.42E-08	3.73E-07	0	-1.39E-17
PERT	MJ	5.39E+00	0	0	0	7.60E-04	4.84E-03	0	-9.96E-02
PENRE	MJ	7.61E+00	0	0	0	4.40E-02	1.38E-01	0	-3.46E+00
PENRM	MJ	3.04E+01	0	0	0	-4.18E-07	4.38E-07	0	0
PENRT	MJ	3.80E+01	0	0	0	4.40E-02	1.38E-01	0	-3.46E+00
SM	kg	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0
FW	m^3	3.50E-02	0	0	0	4.34E-04	6.18E-06	0	-1.81E-03

Waste indicators per 1 m² double-sided lamination

Environmental information describing waste categories (MANDATORY)	Unit	A1-A3	A4-A5	B1-B7	C1	C2	C3	C4	D
Hazardous waste disposed (HWD)	kg	4.94E-02	ND	ND	0	4.30E-05	1.60E-02	0	-2.32E-03
Non-harzardous waste disposed (NHWD)	kg	4.74E-01	ND	ND	0	4.68E-04	5.04E-01	0	-5.20E-02
Radioactive waste disposed (RWD)	kg	3.59E-05	ND	ND	0	7.52E-09	4.30E-08	0	-9.50E-06

Output flow indicators per 1 m² double-sided lamination

Environmental information describing output flows (MANDATORY)	Unit	Total A1-A3	A4-A5	B1-B7	C1	C2	C3	C4	D
Components for re-use (CRU)	kg	0	ND	ND	0	0	0	0	0
Materials for recycling (MFR)	kg	9.50E-03	ND	ND	0	0	0	0	0
Materials for energy recovery (MER)	kg	0	ND	ND	0	0	0	0	0
Exported electrical energy (EEE)	MJ	0	ND	ND	0	0	2.10E+00	0	0
Exported thermal energy (EET)	MJ	0	ND	ND	0	0	6.30E+00	0	0

Environmental performance indicators

Acidification (AP)

Acidification is the process of increasing the acidity of soils, air, or water caused by an elevated concentration of hydrogen ions. An indicator of the impact category of acidification is accumulated exceedance (AE). The result is expressed in mol H^+ eq.

Climate change (GWP)

Climate change is divided into three parts: biogenic, fossil, land use and land use transformation. An indicator called global warming potential (GWP100) is used to measure the amount of greenhouse gases contributing to global warming. The results are quantified in kilograms of CO_2 eq.

Ozone depletion (ODP)

Ozone layer depletion is the result of emissions of ozone-depleting substances, such as long-lived chlorine and bromine-containing gases (e.g., CFCs, HCFCs, Halons). It is quantified in kg CFC-11 eq., with the ozone depletion potential as its indicator.

Water use (WDP)

Water deprivation potential quantifies the potential of water deprivation to humans or ecosystems. It is quantified in m^3 world eq. and helps evaluate the risks associated with water scarcity.

Photochemical oxidant formation (POCP)

The impact category photochemical oxidation formation aggregates substances that contribute to the formation of tropospheric ozone. The category indicator is tropospheric ozone concentration increase expressed in kg NMVOC eq.

Resource use, minerals and metals (ADP)

Resource scarcity and limitations for current and future generations include depletion of abiotic resources - elements (ADPe), quantified in kg Sb eq., and depletion of abiotic resources - fossil fuels (ADPf), quantified in MJ.

Eutrophication (EP)

Eutrophication enriches the environment with nutrients, impacting land, water, and seas leading to excess plankton and algae growth, harming the water quality. It is categorised into terrestrial (accumulated exceedance expressed in mol N eq.), freshwater (nutrient fraction reaching freshwater end expressed in kg P eq.), and marine impacts (nutrient fraction reaching marine end expressed in kg N eq.

Statement on the requirements for comparability of EPDs, adapted from ISO 14025:

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.

The estimated impact results are only relative statements which do not indicate the end points of the impact categories, exceeding threshold values, safety margins or risks. It is not recommended to use the results of modules A1-A3 (A1-A5 for services) without considering the results of module C.

References and standards followed

[1] ČSN EN ISO 16485: Round and sawn timber – Environmental Product Declarations – Product category rules for wood and wood-based products for use in construction, 2014

[2] ČSN EN ISO 16449: Wood and wood-based products – Calculation of the biogenic carbon content of wood and conversion to carbon dioxide, 2014

[3] ČSN ISO 14025: Environmental labels and declarations – Type III environmental declarations – Principles and procedures, 2006

[4] ČSN EN 15804+A2: Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products, 2019

[5] Andreasi Bassi, S., Biganzoli, F., Ferrara, N., Amadei, A., Valente, A., Sala, S. and Ardente, F., Updated characterisation and normalisation factors for the Environmental Footprint 3.1 method, Publications Office of the European Union, Luxembourg, 2023, doi:10.2760/798894, JRC130796. Available at: https://publications.jrc.ec.europa.eu/repository/handle/JRC130796