SHR

ENVIRONMENTAL PRODUCT DECLARATION

10 oktober 2024

Laminated Veneer Lumber (LVL)

CLIENT

CENTRUM HOUT

Centrum Hout
Westeinde 8
1334 BK, Almere

GOAL AND SCOPE

Norm:	EN 15804:2012+A2:2019 and ISO 14025
PCR:	Bepalingsmethode, version 1.1 (Dutch Environmental Performance Assessment Method for Construction Works)
Scope:	Modules A1-A5, B1-B5, C1-C4 and D
Practitioner:	A.M. Kloppenburg MSc.(SHR)
Report:	SHR-rapport 21.0283-11, in the context of project: LIFE20/GIE/NL/001073 –LIFE timber in housing project
Verification:	Third party, Mr. F. van der Burgh (Agrodome B.V.)
Product:	1 m^3 laminated veneer lumber (LVL) market average
Functional unit:	1 m^3 LVL, panel and beams, consisting of thin veneer layers, glued together. used in all types of construction works
Reference service life:	100 years
Composition:	Main components: wood 95% and glue 5%
Goal:	Entering environmental data in the National Environmental Database (NMD) to enable calculations on environmental impact on building level as well as informing relevant parties on the environmental performance of the product.
Allocation:	economic allocation is used
Representativity:	the companies that provided data and were inventoried represent over 80% of the Dutch market in volume. The technological differences are very small
Validity:	10 October 2024 – 10 October 2029
Dangerous substances, REACH:	The product does not contain REACH SVHC substances exceeding 0,1 % (1000 ppm)
Software en databases:	SimaPro version 9.5, EcoInvent 3.6 and NMD proces database version 3.7
General:	EPD's of different programs do not need to be comparable. The EPD owner is responsible and liable for the content of the EPD

LIFECYCLE INVENTORY

Laminated Veneer Lumber (LVL) is a product in which softwood veneers in different orientations are glued together to form a panel. Veneer logs are delivered to the factory, debarked and then soaked. After soaking, the logs are peeled into veneers of 3 mm thick, the by-products are cutting waste and the core. The veneers are sorted by strength, errors are removed and thereafter the veneers are dried. The dried veneers are glued, laid down and pressed after which the LVL is ready. The LVL is then sawn to size, packaged and transported.

Technical properties	
Thickness	21 – 90 mm
Panelsize	Up to 2,5 x 20 [m]
Volumic mass	492 kg/m3 at approx. 11% moisture content

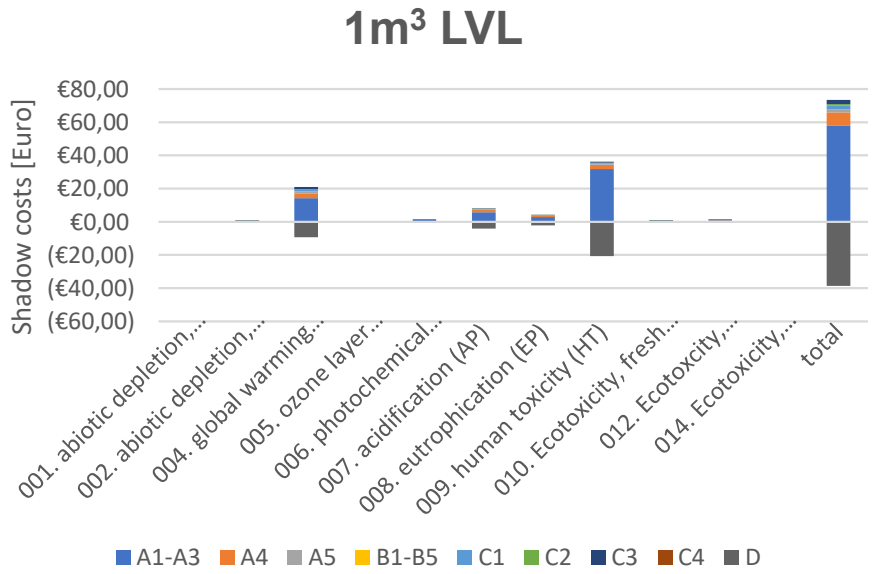
Modules A1-A3 consider the extraction of raw materials, transport to the production location, packaging materials and production. In modules A4 and A5, transport to the construction site 50% or location for prefab production (50%) and installation on the construction site or in prefab production are considered, and the end of life of the packaging materials is also considered. There is no maintenance or replacement in modules B1-B5, which is why these modules are empty. In modules C1-C4, the end-of-life scenario was considered based on incineration 28% and reuse 72%. A quality factor of 0.85 has been applied for reuse and additional energy consumption due to reprocessing has been assumed. In module D, the benefits are considered outside the system boundaries.

LIFECYCLE ANALYSIS AND INTERPRETATION

The shadow cost of the Environmental Impact expressed in MKI (Environmental Cost Indicator) of 1 m3 LVL is expressed in graph 1 for the different impact categories. The MKI per m³ LVL is € 34,78.

In 1 m³ LVL, 210,5 kg biogenic carbon is stored, equivalent to 772 kg CO2 eq.
In the packaging 1,1 kg biogenic carbon is stored

The results are scalable (linear) with the thickness of the product.



Graph 1. Environmental Impact expressed in shadow costs per impact category (set 1) per m3 LVL

LIFECYCLE ANALYSIS AND INTERPRETATION

CENTRUM HOUT

(Modules B1-B5 are "0" as no maintenance is needed)

1m^3 LVL, Set 1 according to the ''Bepalingsmethode''

EFFECT CATEGORY	UNIT	A1 – A3	A4	A5	B1 – B5	C1	C2	C3	C4	D	Total	factor NL	MKI
001. abiotic depletion, non fuel (AD)	kg Sb eq	4,1E-03	7,1E-04	1,6E-05	0,0E+00	2,6E-05	1,7E-04	1,1E-04	0,0E+00	-2,6E-03	2,5E-03	€ 0,16	€ 0,00
002. abiotic depletion, fuel (AD)	kg Sb eq	2,8E+00	4,1E-01	5,8E-02	0,0E+00	1,1E-01	4,8E-02	8,2E-02	0,0E+00	-1,8E+00	1,7E+00	€ 0,16	€ 0,27
004. global warming (GWP)	kg CO2 eq	2,9E+02	5,8E+01	2,0E+01	0,0E+00	2,3E+01	6,6E+00	2,8E+01	0,0E+00	-1,9E+02	2,3E+02	€ 0,05	€ 11,66
005. ozone layer depletion (ODP)	kg CFC-11 eq	3,1E-05	1,1E-05	1,5E-06	0,0E+00	3,0E-06	1,2E-06	1,5E-06	0,0E+00	-2,2E-05	2,7E-05	€ 30,-	€ 0,00
006. photochemical oxidation (POCP)	kg C2H4	5,5E-01	3,8E-02	6,1E-03	0,0E+00	1,0E-02	4,0E-03	9,4E-03	0,0E+00	-3,6E-01	2,5E-01	€ 2,-	€ 0,50
007. acidification (AP)	kg SO2 eq	1,4E+00	3,5E-01	6,3E-02	0,0E+00	1,2E-01	2,9E-02	8,2E-02	0,0E+00	-1,1E+00	1,0E+00	€ 4,-	€ 4,09
008. eutrophication (EP)	kg PO4--- eq	3,2E-01	7,6E-02	1,5E-02	0,0E+00	2,7E-02	5,7E-03	1,5E-02	0,0E+00	-2,5E-01	2,1E-01	€ 9,-	€ 1,86
009. human toxicity (HT)	kg 1,4-DB eq	3,5E+02	2,9E+01	4,0E+00	0,0E+00	6,3E+00	2,8E+00	6,5E+00	0,0E+00	-2,3E+02	1,7E+02	€ 0,09	€ 15,35
010. Ecotoxicity, fresh water (FAETP)	kg 1,4-DB eq	2,0E+01	6,5E-01	9,4E-02	0,0E+00	8,8E-02	8,1E-02	1,5E-01	0,0E+00	-1,3E+01	8,6E+00	€ 0,03	€ 0,26
012. Ecotoxcity, marine water (MAETP)	kg 1,4-DB eq	9,3E+03	2,7E+03	2,7E+02	0,0E+00	3,1E+02	2,9E+02	5,9E+02	0,0E+00	-6,1E+03	7,4E+03	€ 0,0001	€ 0,74
014. Ecotoxicity, terrestric (TETP)	kg 1,4-DB eq	2,3E+00	8,9E-02	7,4E-03	0,0E+00	1,0E-02	9,8E-03	3,2E-02	0,0E+00	-1,5E+00	9,3E-01	€ 0,06	€ 0,06
Total													€ 34,78

LIFECYCLE ANALYSIS AND INTERPRETATION

CENTRUM HOUT

(Modules B1-B5 are "0" as no maintenance is needed) Factor NL is under subject of changes

1m^3 LVL, Set 2 according to the ''Bepalingsmethode''

EFFECT CATEGORY	UNIT	A1 – A3	A4	A5	B1 – B5	C1	C2	C3	C4	D	Total	Factor NL	MKI
051. Climate change	kg CO2 eq	-5,2E+02	5,8E+01	5,9E+01	0,0E+00	2,3E+01	6,6E+00	8,0E+02	0,0E+00	-1,9E+02	2,4E+02	€ 0,00	€ 0,00
052. Climate change - Fossil	kg CO2 eq	2,9E+02	5,8E+01	2,0E+01	0,0E+00	2,3E+01	6,6E+00	2,8E+01	0,0E+00	-1,9E+02	2,4E+02	€ 0,12	€ 27,37
053. Climate change - Biogenic	kg CO2 eq	-8,1E+02	1,9E-02	3,9E+01	0,0E+00	5,3E-03	3,1E-03	7,7E+02	0,0E+00	6,7E-02	-2,9E-02	€ 0,12	€ 0,00
054. Climate change - Land use and LU ch	kg CO2 eq	1,5E+00	2,4E-02	7,6E-04	0,0E+00	1,3E-03	2,4E-03	1,8E-02	0,0E+00	-1,0E+00	5,4E-01	€ 0,12	€ 0,06
055. Ozone depletion	kg CFC11 eq	3,1E-05	1,3E-05	1,9E-06	0,0E+00	3,7E-06	1,5E-06	1,4E-06	0,0E+00	-2,2E-05	3,1E-05	€ 32,00	€ 0,00
056. Acidification	mol H+ eq	1,8E+00	4,8E-01	9,0E-02	0,0E+00	1,6E-01	3,9E-02	1,1E-01	0,0E+00	-1,4E+00	1,3E+00	€ 0,39	€ 0,51
057. Eutrophication, freshwater	kg P eq	2,3E-02	3,3E-04	3,7E-05	0,0E+00	6,3E-05	6,7E-05	8,8E-04	0,0E+00	-1,5E-02	9,6E-03	€ 1,96	€ 0,02
058. Eutrophication, marine	kg N eq	4,2E-01	1,9E-01	4,1E-02	0,0E+00	7,4E-02	1,4E-02	3,2E-02	0,0E+00	-3,3E-01	4,4E-01	€ 3,28	€ 1,43
059. Eutrophication, terrestrial	mol N eq	4,8E+00	2,2E+00	4,5E-01	0,0E+00	8,1E-01	1,5E-01	3,6E-01	0,0E+00	-4,2E+00	4,5E+00	€ 0,36	€ 1,62
060. Photochemical ozone formation	kg NMVOC eq	1,9E+00	5,8E-01	1,2E-01	0,0E+00	2,1E-01	4,3E-02	9,7E-02	0,0E+00	-1,4E+00	1,6E+00	€ 1,22	€ 1,91
061. Resource use, minerals and metals	kg Sb eq	4,1E-03	7,1E-04	1,6E-05	0,0E+00	2,6E-05	1,7E-04	1,1E-04	0,0E+00	-2,6E-03	2,5E-03	€ 0,30	€ 0,00
062. Resource use, fossils	MJ	6,1E+03	8,6E+02	1,2E+02	0,0E+00	2,4E+02	1,0E+02	2,2E+02	0,0E+00	-3,9E+03	3,7E+03	€ 0,00	€ 1,23
063. Water use	m3 depriv.	1,5E+02	2,0E+00	2,3E-01	0,0E+00	3,2E-01	3,6E-01	2,3E+00	0,0E+00	-9,3E+01	6,2E+01	€ 0,01	€ 0,31
064. Particulate matter	disease inc.	2,6E-05	3,4E-06	3,4E-07	0,0E+00	5,6E-07	6,0E-07	7,3E-07	0,0E+00	-1,9E-05	1,2E-05	€ 549.750,00	€ 6,64
065. Ionising radiation	kBq U-235 eq	4,4E+01	3,7E+00	5,2E-01	0,0E+00	1,0E+00	4,2E-01	3,6E+00	0,0E+00	-2,8E+01	2,6E+01	€ 0,05	€ 1,28
066. Ecotoxicity, freshwater	CTUe	1,0E+04	6,2E+02	7,9E+01	0,0E+00	1,4E+02	8,9E+01	1,8E+02	0,0E+00	-8,7E+03	2,4E+03	€ 0,00	€ 0,32
067. Human toxicity, cancer	CTUh	1,1E-06	2,3E-08	1,6E-08	0,0E+00	5,0E-09	2,9E-09	6,4E-08	0,0E+00	-6,8E-07	4,9E-07	€ 1.096.368,00	€ 0,54
068. Human toxicity, non-cancer	CTUh	6,2E-06	6,1E-07	1,1E-07	0,0E+00	1,3E-07	9,8E-08	3,3E-07	0,0E+00	-4,9E-06	2,6E-06	€ 147.588,00	€ 0,38
069. Land use	Pt	1,1E+05	6,1E+02	1,7E+01	0,0E+00	3,0E+01	8,7E+01	9,4E+01	0,0E+00	-7,7E+04	3,3E+04	€ 0,00	€ 2,88
Total													€ 46,51

LIFECYCLE ANALYSIS AND INTERPRETATION

CENTRUM HOUT

1m^3 LVL, parameters

(Modules B1-B5 are "0" as no maintenance is needed)

EFFECT CATEGORY	UNIT	A1 – A3	A4	A5	B1 – B5	C1	C2	C3	C4
111. Energy, primary, renewable, excludi	MJ	1,4E+04	0,0E+00	3,4E+02	0,0E+00	0,0E+00	0,0E+00	6,9E+03	0,0E+00
113. Energy, primary, renewable, materia	MJ	7,2E+03	0,0E+00	-3,4E+02	0,0E+00	0,0E+00	0,0E+00	-6,9E+03	0,0E+00
101. Energy, primary, renewable (MJ)	MJ	2,1E+04	8,2E+00	7,8E-01	0,0E+00	1,3E+00	1,3E+00	3,4E+01	0,0E+00
112. Energy, primary, non-renewable, exc	MJ	5,6E+03	0,0E+00	2,9E+02	0,0E+00	0,0E+00	0,0E+00	3,5E+03	0,0E+00
114. Energy, primary, non-renewable, mat	MJ	3,4E+03	0,0E+00	-1,6E+02	0,0E+00	0,0E+00	0,0E+00	-3,2E+03	0,0E+00
102. Energy, primary, non-renewable (MJ)	MJ	9,1E+03	8,6E+02	1,3E+02	0,0E+00	2,5E+02	1,1E+02	2,3E+02	0,0E+00
108. Secondary material (kg)	kg	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00
109. Secondary fuel, renewable (kg)	MJ	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00
110. Secondary fuel, non-renewable (kg)	MJ	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00
104. Water, fresh water use (m3)	m3	5,9E+00	7,1E-02	1,8E-02	0,0E+00	1,2E-02	1,2E-02	2,9E-01	0,0E+00
106. Waste, hazardous (kg)	kg	5,8E-03	1,5E-03	3,4E-04	0,0E+00	6,5E-04	2,5E-04	2,1E-04	0,0E+00
105. Waste, non hazardous (kg)	kg	6,2E+01	4,4E+01	1,9E+00	0,0E+00	2,8E-01	6,4E+00	4,8E+00	0,0E+00
107. Waste, radioactive (kg)	kg	2,6E-02	5,6E-03	8,4E-04	0,0E+00	1,7E-03	6,6E-04	1,8E-03	0,0E+00
120. Components for re-use (kg)	kg	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	3,5E+02	0,0E+00
121. Materials for recycling (kg)	kg	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00
122. Materials for energy recovery (kg)	kg	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00	0,0E+00
123. Exported energy, electric (MJ)	MJ	0,0E+00	0,0E+00	6,2E+01	0,0E+00	0,0E+00	0,0E+00	3,5E+02	0,0E+00
124. Exported energy, thermal (MJ)	MJ	0,0E+00	0,0E+00	1,1E+02	0,0E+00	0,0E+00	0,0E+00	6,0E+02	0,0E+00

SIGNATURE

SHR is not responsible for the information submitted by the client, which can be of influence on the validity of the results in this EPD.

A.M. Kloppenburg MSc.
Projectmanager