ENVIRONMENTAL PRODUCT DECLARATION
as per /ISO 14025/ and /EN 15804/

Owner of the Declaration	**Fritz EGGER GmbH & Co. OG Holzwerkstoffe**
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
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EGGER OSB-boards
Fritz EGGER GmbH & Co. OG Holzwerkstoffe

Institut Bauen und Umwelt e.V.

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ECO PLATFORM EPD EN 15804 VERIFIED

1. General Information

Fritz EGGER GmbH & Co. OG Holzwerkstoffe	EGGER OSB-boards
Programme holder IBU - Institut Bauen und Umwelt e.V. Panoramastr. 1 10178 Berlin Germany	**Owner of the declaration** Fritz EGGER GmbH & Co. OG Holzwerkstoffe Weiberndorf 20 6380 St. Johann i.T. Österreich
Declaration number EPD-EGG-20180107-IBD1-EN	**Declared product / declared unit** 1 cubic metre OSB board
This declaration is based on the product category rules: Wood based panels, 07.2014 (PCR checked and approved by the SVR)	**Scope:** This document refers to OSB boards for construction purposes, which are manufactured in the following plants of the Group: Egger Holzwerkstoffe Wismar GmbH & Co. KG, Am Haffeld 1, 23970 Wismar, Germany SC Egger Romania SRL, Str. Austriei 2, 725400 Radauti, jud. Suceava, Romania
Issue date 03.09.2018	
Valid to 02.09.2023	The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.
	Verification The standard /EN 15804/ serves as the core PCR Independent verification of the declaration and data according to /ISO 14025:2010/ ☐ internally ☒ externally
Prof. Dr.-Ing. Horst J. Bossenmayer (President of Institut Bauen und Umwelt e.V.)	
Dipl. Ing. Hans Peters (Head of Board IBU)	Dr.-Ing. Wolfram Trinius (Independent verifier appointed by SVR)

2. Product

2.1 Product description / Product definition

EGGER OSB boards (Oriented Strand Boards) are three-layered synthetic resin-bonded wood-based panels made of side-by-side oriented strands (micro-veneers) according to /EN 300/ “Oriented Strand Boards (OSB)”. The orientation of the middle layer is thereby at a 90° angle to the surface layers. Softwood is mainly used (spruce, pine), as well as up to 30% hardwood.
In order to bring the product into circulation in the EU/EFTA (with the exception of Switzerland), the Building Products Regulation (EU) no. 305/2011 must be applied. Regarding the declaration of performance according to
/EN 13986/:2004+ A1:2015:

- EGGER OSB 2 / OSB 3 / OSB 3 E0 / OSB 4 TOP / OSB/3 FSC
- EGGER Ergo Board
- EGGER Roofing Board,

Relevant national regulations apply to use

- EGGER OS’Brace® (H2 / H3.1)
- EGGER OS’Floor™(H2)
- EGGER OSB3 JAS TOP

2.2 Application

EGGER OSB boards are used in the construction industry in non-load-bearing or load-bearing and stiffening components roof, wall, ceiling according to /EN 1995-1-1/ in the utility classes 1 and 2 (humid conditions; under the roof). Furthermore, OSB boards can be used for non-load bearing applications in interior design, drywall constructions, trade fair construction and shop fitting, as well as wood packaging and concrete formwork.

2.3 Technical Data

Declarations of performance (DoP) with relevant data for EGGER OSB boards with CE marking according to /EN 13986/ are available at www.egger.com.
Furthermore, national legislation pursuant to the /JAS Standard/ Structural Panels applies for EGGER OSB 3 JAS TOP and to the /AS/NZS 1604/ for EGGER OS’Brace® H2/H3.1 and EGGER OS’Floor™ H2.

Technical data

Name	Value	Unit
Gross density acc. to /EN 323/	580 - 640	kg/m³
Grammage	3.48 - 25.6	kg/m²
Bending strength (longitudinal) acc. to /EN 789/	14.8 - 25	N/mm²
Bending strength (transverse) acc. to /EN 789/	7.4 - 15	N/mm²
E-module (longitudinal) acc. to /EN 789/	4930 - 7000	N/mm²
E-module (transverse) acc. to /EN 789/	1980 - 3000	N/mm²
Material dampness at delivery acc. to /EN 322/	2 - 12	%
Dimensional change with each 1% change of the humidity content OSB/2 (length/width/thickness) according to /CEN/TR 12872/OSB/2	0,03 / 0,04 / 0,7	%
Dimensional change with each 1% change of the humidity content OSB/2 (length/width/thickness) according to /CEN/TR 12872/ OSB/3, OSB/4	0,02 / 0,03 / 0,5	%
Dimension change on plate level acc. to DIN EN 318	0.015 - 0.04	mm
Tensile strength rectangular acc. to/EN 319/	0.3 - 0.55	N/mm²
Thermal conductivity acc. to /EN 13986/	0.13	W/(mK)
Water vapour diffusion resistance factor acc. to /EN ISO 12572/	200 - 150	-
Sound absorption degree frequence range 250-500 Hz acc. to /EN 13986/	0,10	-
Sound absorption degree frequence range 1000-2000 Hz acc. to /EN 13986/	0,25	-
Room sound improvement	n/a	Sone
24h Thickness swelling acc. to /EN 319/	10 - 15	%

2.4 Delivery status

OSB boards can be delivered in the following main sizes:

Thickness: 6-40 mm
Length: 1800-11500 mm (Wismar plant)
2050-12000 mm (Radauti plant)
Width: 590-2800 mm
Surface: unsanded/sanded

Additional sizes and board thicknesses can be delivered upon request.
Minimum order quantity: 5 t, per package

2.5 Base materials / Ancillary materials

EGGER OSB TOP, EGGER OSB 3 E0, Ergo Board, EGGER OSB3 JAS TOP and EGGER OS'Floor™ from the Wismar plant:

- 85-92% absolutely dry wood weight: untreated, debarked roundwood (mainly softwood of the type pine and spruce, hardwood content up to max. 30 percent)
- 4-6 % water (wood moisture)
- 3-6% PMDI glue in the surface and core layer Polymeric MDI (Diphenyl methane 4,4'– Di isocyanate) is a polyuria pre-product, which is transformed during the OSB production into polyurethane and polyuria.
- ≤1% paraffin wax emulsion for hydrophobising

EGGER OSB 2 E1 und OSB 3 E1, OSB 3 FSC, Roofing Board and OS'Brace boards:

- 85-92% absolutely dry wood weight: untreated, debarked roundwood (mainly softwood of the type pine and spruce, hardwood content up to max. 30 percent)
- 4-6 % water (wood moisture)
- ≥ 8 % melamine urea formaldehyde resin (MUF) or MUF/UF or MUF/PMDI. The aminoplastic glue sets through polycondensation during the hot pressing process.
- 1% ammonium sulphate as hardener

In the case of board types with the additional designation H2 or H3.1 also:

- <1% additive: Biocides according to /AS/NZS 1604/ as insecticide/termite protection (permethrin) or as protection against wood-destroying fungi (tebuconazole / propiconazole)

Wood source according to the EU Timber Regulation EUTR VO(EU) 995/2010; certification according to the FSC CW Standard; FSC CoC upon request and PEFC-CoC for OSB 4 TOP; download additional information concerning the wood origin: www.egger.com/umwelt

Chemicals legal information:

1) The product contains substances of the candidate list (date 15.01.2018) above 0.1 weight %:
- no

2) The product contains additional CMR substances of the category 1A or 1B that are not on the candidate list, above 0.1 weight %:
- no

3) Biocidal products have been added to this building product or it has been treated with biocidal products (this refers to treated goods within the meaning of the Biocidal Products Regulation (EU) No. 528/2012):
- Board types with the additional designation H2 or H3.1: yes (see above)
- all other board types: no (see above)

Download the current certification concerning the use of SVHC substances: www.egger.com/environment

2.6 Manufacture

1) De-barking of the trunks
2) Chipping of the roundwood to "strands" (micro veneers), separately for surface layer and middle layer
3) Drying of the strands to approximately 3-4 % residual moisture
4) Sieving of the strand fraction of surface layer and middle layer
5) Bonding of the surface layer and middle layer with resins
6) Spreading and orienting the strands on the forming machine
7) Compression of the dispersed mat in a continuous through-feed press
8) Division and edging of the OSB strand to raw board formats
9) Cooling of the raw board formats in the star cooler
10) Piling to large stacks
11) Cutting and edge processing of the raw boards, package formation and packaging with cardboard, partially also PE films and steel strips

2.7 Environment and health during manufacturing

Waste resulting from the production process is recycled or used for heat generation in neighbouring production lines so that there is no waste resulting from the core process. Both production plants have a

biomass heating station or a biomass power plant. Waste water from production is treated internally and returned to the production cycle. Noise-intensive plant components such as the chip removal are encapsulated through structural measures. Both production plants are certified with a quality and environmental management system according to /ISO 9001/ and /ISO 14001/.
Current actions are available in the EGGER Sustainability Report at www.egger.com/umwelt.

2.8 Product processing/Installation

EGGER OSB can be sawn, milled and drilled like solid wood using conventional electrical hand tools. Hard metal-tipped tools are recommended.
The safety measures that are usual for solid wood processing must be observed (safety shoes, work gloves). A dust mask must be worn when using manual tools without suction.
Regular clamps, nails, and screws can be used for mechanical fastening.
Construction bonding can be done with approved glues on clean, dust- and oil-free surfaces.

2.9 Packaging

Underlays made of wood-based materials, cardboard, steel are used for transport packaging, as well as PET plastic strips, PE film, and paper labels that are recycled after sorting.

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2.10 Condition of use

The usage condition of EGGER OSB material components correspond to section 2.5 “Basic materials”. The bonding agents are chemically stable and mechanically bonded to the wood under normal conditions.

2.11 Environment and health during use

Environmental protection: There is no risk of water, air or ground contamination given currently available knowledge assuming intended use is observed.
Health aspects: No known health hazards are expected from normal and intended use of EGGER OSB boards. Natural wood constituents may be released in small quantities by all board types. No emissions of hazardous substances can be detected, except for minor amounts of formaldehyde in quantities that are harmless to health for board types that use formaldehyde in their glue system (see section 2.5). For emission values see proofs under section 7.1.

2.12 Reference service life

The lifespan of the OSB boards depends on the application area within the specific construction project in the utility class 1 and 2 according to /EN 1995-1-1/. When used correctly, observing the /DIN 68800-2/ and maintenance, the utilisation duration is of 50 years and longer, according to the /BBSR Table/ of 03.11.2011.

2.13 Extraordinary effects

Fire

Reaction to fire: Fire resistance according to /EN 13986/, Table 8 (CWFT) at a thickness of ≥ 9mm and raw density ≥600 kg/m³ corresponds to the building material class D-s2, d0; other OSB boards correspond to the building material class E.
Smoke development / smoke density: Smoke development according to /EN 13986/, Table 8 (CWFT) at a thickness of ≥ 9mm and raw density ≥ 600 kg/m³ corresponds to the class s2; other OSB boards correspond to the fire resistance class E.
Toxicity of fire gases: When checked by the MFPA Leipzig, the emissions were in the range of solid wood (cf. 7.4 Toxicity of fire gases).
Sulphur dioxide and hydrogen cyanide may be released when burning OSB boards under certain fire conditions, in addition to the usual fire gasses such as carbon monoxide and dioxide. OSB boards waste may only be burned in suitable and legally permitted facilities. Local stipulations are available from the relevant authorities.
Change of the aggregate state: Dripping by combustion does not occur because EGGER OSB boards do not liquefy when hot.

Water

According to the quantitative analysis, no ingredients are washed out that could pose a hazard for water (cf. 7.3.1 Heavy metals; eluate (EOX) and migration test). OSB boards are not resistant against continuous water exposure, however, localised damaged parts can be easily replaced.

Mechanical destruction

Breaking behaviour: The breaking pattern of EGGER OSB displays a relatively brittle behaviour when exposed to high forces, and small smooth breaking surfaces occur on the broken edges of the boards. There is no negative impact on the environment.

2.14 Re-use phase

Reuse: When renovating or discontinuing the utilisation phase of a building, OSB boards can be easily collected separately during demolition, and be reused for the same or a different application. As a rule, exceptions to this are OSB boards that have been bonded full surface.

2.15 Disposal

Waste code: 030104 / 170201 acc. to /AVV/.
Material utilisation: Untreated OSB boards can be used as recycling material for the production of chipboards when collected by type.
Energy utilisation: When neither reuse or material recycling are possible, energy utilisation should be pushed instead of landfilling. With the high average calorific value of approximately 17 MJ/kg an energy utilisation of board residues from the construction site as well as from demolition measures is recommended. They may only be burned in suitable and legally permitted facilities. Local stipulations are available from the relevant authorities.
Packaging: Transport packaging; paper/cardboard and steel strapping can be collected separately and recycled appropriately. The cover boards can be re-used. Retrieval of the packaging material can be arranged with the manufacturer in individual cases.

2.16 Further information

Detailed information and processing recommendations are available under www.egger.com/bauprodukte.

3. LCA: Calculation rules

3.1 Declared Unit
This environmental product declaration is based on a declared unit of 1 m³ EGGER OSB products with an average raw density of 607 kg/m³ and a delivery moisture of approximately 5%.

Specification of the declared unit

Name	Value	Unit
Declared unit	1	m^3
Conversion factor to 1 kg	0.0016482	-
Mass reference	607	kg/m^3

EGGER OSB boards are manufactured in the plants of Wismar (DE) and Radauti (RO). To represent the EGGER OSB products, the average product was calculated according to dimensional weight.

3.2 System boundary
The LCA of the average EGGER OSB boards includes a *cradle-to-gate* consideration of environmental impact with options. The following life cycle phases are taken into account in the analysis:

Module A1-A3 | Product stage
The product stage includes the cost of raw material procurement (roundwood, producing the glue system, additives, etc.), as well as related transport relative to the production plants in Wismar and Radauti. Within the plant premises, the lumberyard, the *strand* preparation, OSB production, board finishing are considered to the plant or to shipping. The preparation of thermal and electric energy takes place in the case of both plants via their own biomass power plant. Furthermore, the Radauti plant produces the glue system used for the OSB boards independently. In this way, the glue production is represented as specifically collected foreground data.

Module C3 | Waste processing
Module C3 declares the biogenic carbon dioxide emissions in energetic utilisation at the end of the product life. Furthermore, chopping after product disassembly is also considered.

Module D | Credits and charges outside the system limits
The energetic utilisation of the product at the end of its life cycle is described in Module D, including energetic substitution potential as a European average scenario.

3.3 Estimates and assumptions
Assumptions and estimates are used in the absence of a representative background data set to represent the environmental impact of certain raw materials. All assumptions are supported with detailed documentation and correspond to the best possible representation of reality given the available data. A generic data set from the /GaBi Database/ for spruce roundwood was used as background data set for roundwood. A large part of the wood processed by EGGER represents coniferous fibrewood. For other wood types used, the data set for spruce roundwood should be considered as an approximation. The regional applicability of the background data sets used refers to a great extent to average data for Europe and Germany. Where European average data are not available, German data sets were used as representative for the Romanian market.

3.4 Cut-off criteria
All inputs and outputs for which data are available are included in the LCA model. Missing data were populated when a data basis was available using conservative assumptions for average data or generic data and are documented accordingly. Only data with a contribution of less than 1% were removed. Neglecting these data can be justified by the lack of background data sets and the limited effect to be expected. The total amount of the neglected input flows is not higher than 5% of the energy and weight input.

3.5 Background data
Secondary data are included to represent the background system in the LCA model. These are taken, on the one hand, from the GaBi database /GaBi 8/ and, on the other hand, from recognised literature sources /Rüter & Diederichs, 2012/.

3.6 Data quality
The data is collected via data collection sheets especially adapted by EGGER. Questions are answered through an iterative process in writing via e-mail, phone, or in person. Given the discussion concerning a representation of material and energy flows that is as close as possible to reality, led by EGGER and Daxner & Merl, the high quality of the collected foreground data can be assumed. A consistent and uniform calculating procedure was applied in line with /ISO 14044/. Within the framework of this LCA, emissions from drying and pressing the strands were based on conservative approximations. When selecting the background data, the technological, geographical, and time-related representativeness of the data basis is taken into consideration. When specific data is missing, generic data sets or a representative average are used. The GaBi background data sets are not older than seven years.

3.7 Period under review
As part of the collection of the foreground data, the life cycle of EGGER OSB products was recorded for the production year 2015. The data are based on the annual volumes used and produced.

3.8 Allocation
The carbon dioxide content and primary energy content of the products have been balanced on the basis of their inherent material characteristics in line with underlying physical relationships. Allocation within the forestry chain is based on the publication of /Hasch 2002/ and its update by /Rüter & Albrecht 2007/.
A price allocation according to /Rüter & Diederichs, 2012/ was applied for purchased, energetically utilised fresh wood. The thermal and electrical energy generated in the combined heat and power systems is allocated according to exergy. Sold by-products (for example, bark) were treated in line with the recommendations of the /EN 16485/ as by-products and allocated on the basis of currently applicable market prices.

3.9 Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to /EN 15804/ and the building context, respectively the product-specific characteristics of performance, are taken into account.

The used background database has to be mentioned. Background data from the GaBi database were taken into account to calculate the LCA.

4. LCA: Scenarios and additional technical information

The *end-of-life* scenario applied in this LCA study is based on the following assumptions:

End of life cycle (C1-C4)

Name	Value	Unit
Energy recovery For energy recovery [balance moisture 12%]	647	kg

Reuse, recuperation and recycling potential (D), relevant scenarios

Name	Value	Unit
Net flow in module D [balance moisture 12 %] [Ausgleichsfeuchte von 12 %]	616	kg
Moisture in the case of therm. utilisation	12	%
Processing rate	100	%
Efficiency of the system	68	%

The product reaches the end of the waste status after removal from the building. Energetic utilisation as secondary fuel is assumed for the EGGER OSB boards end of life. Energetic utilisation takes place in a biomass power plant. System-specific figures correspond to a European average scenario (EU-28), given that the sales market of EGGER OSB products is focussed on Europe. The scenario foresees a processing rate of the OSB board after removal from the building of 100%. This assumption must be adapted accordingly after using the results in the context of the building. A balance moisture of 12% must be assumed at the product’s end of life. This value may fluctuate significantly depending on the storage of the product prior to energetic utilisation.

5. LCA: Results

The following table contains the LCA results for a declared unit of 1 m³ average EGGER OSB board with a thickness of 607 kg/m³ (approximately 5% moisture).

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the 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	MND	MND	MND	MND	MNR	MNR	MNR	MND	MND	MND	MND	X	MND	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 m³ OSB-Platte (607 kg/m³)

Parameter	Unit	A1-A3	C3	D
Global warming potential	[kg CO_2-Eq.]	-7.53E+2	9.67E+2	-5.49E+2
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	9.43E-11	2.37E-11	-1.45E-9
Acidification potential of land and water	[kg SO_2-Eq.]	9.19E-1	1.39E-2	-3.86E-2
Eutrophication potential	[kg $(PO_4)^{3-}$-Eq.]	2.19E-1	1.38E-3	2.41E-3
Formation potential of tropospheric ozone photochemical oxidants	[kg ethene-Eq.]	5.22E-1	9.49E-4	1.09E-1
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	8.25E-5	2.72E-6	-1.75E-4
Abiotic depletion potential for fossil resources	[MJ]	4.28E+3	5.69E+1	-7.22E+3

RESULTS OF THE LCA - RESOURCE USE: 1 m³ OSB-Platte (607 kg/m³)

Parameter	Unit	A1-A3	C3	D
Renewable primary energy as energy carrier	[MJ]	3.30E+3	0.00E+0	-2.24E+3
Renewable primary energy resources as material utilization	[MJ]	9.70E+3	-9.70E+3	0.00E+0
Total use of renewable primary energy resources	[MJ]	1.30E+4	3.66E+1	-2.24E+3
Non-renewable primary energy as energy carrier	[MJ]	3.48E+3	0.00E+0	-9.71E+3
Non-renewable primary energy as material utilization	[MJ]	9.21E+2	-9.21E+2	0.00E+0
Total use of non-renewable primary energy resources	[MJ]	4.40E+3	9.76E+1	-9.71E+3
Use of secondary material	[kg]	0.00E+0	0.00E+0	0.00E+0
Use of renewable secondary fuels	[MJ]	2.79E+1	0.00E+0	9.70E+3
Use of non-renewable secondary fuels	[MJ]	0.00E+0	0.00E+0	9.21E+2
Use of net fresh water	[m³]	6.70E-1	4.99E-2	-2.27E+0

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: 1 m³ OSB-Platte (607 kg/m³)

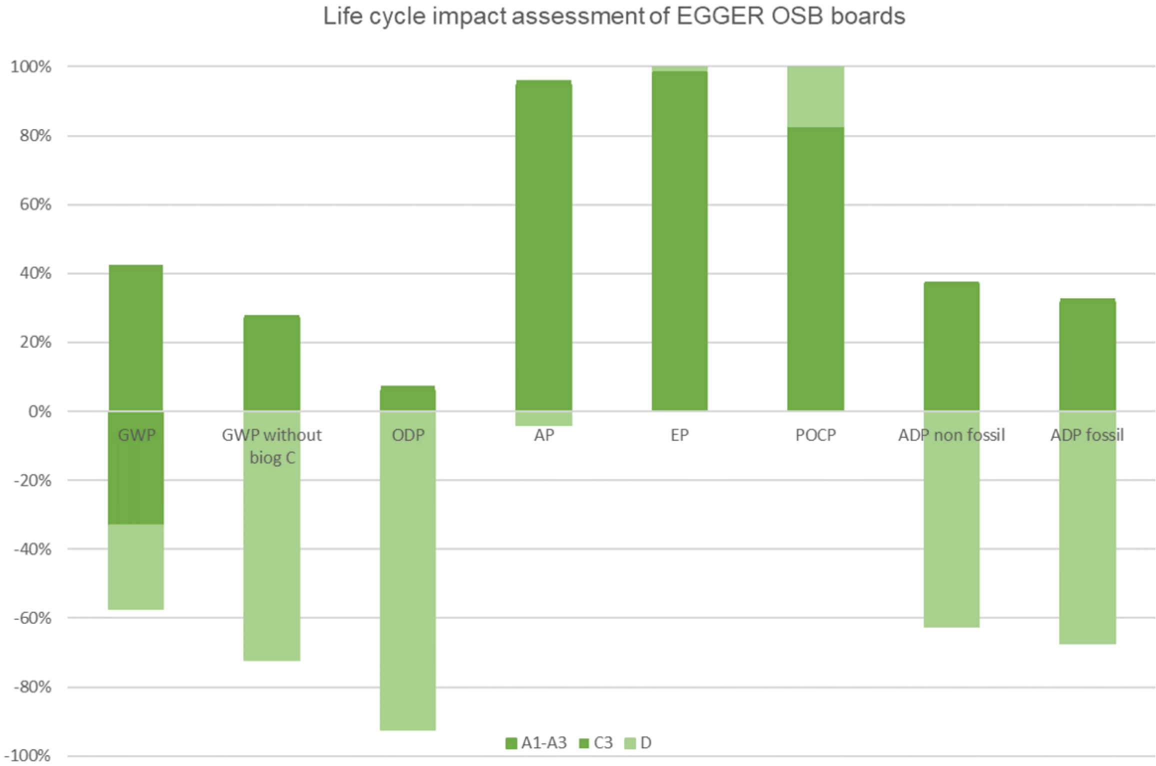
Parameter	Unit	A1-A3	C3	D
Hazardous waste disposed	[kg]	2.02E-4	4.57E-8	-3.50E-6
Non-hazardous waste disposed	[kg]	9.86E-1	6.87E-2	2.25E-1
Radioactive waste disposed	[kg]	4.83E-2	1.61E-2	-9.88E-1
Components for re-use	[kg]	0.00E+0	0.00E+0	0.00E+0
Materials for recycling	[kg]	0.00E+0	0.00E+0	0.00E+0
Materials for energy recovery	[kg]	0.00E+0	6.07E+2	0.00E+0
Exported electrical energy	[MJ]	0.00E+0	0.00E+0	0.00E+0
Exported thermal energy	[MJ]	0.00E+0	0.00E+0	0.00E+0

6. LCA: Interpretation

The following interpretation includes a summary of the LCA results relative to a functional unit of 1 m³ EGGER OSB board with a raw density of 607 kg/m³.

For the global warming potential (GWP) during the production phase (**Module A1-A3**) of OSB products, the total is a negative value. This is due to the material use of wood in the products. While the tree is growing, the wood stores carbon dioxide as biogenic carbon (negative greenhouse potential) and does therefore not have a greenhouse effect as long as it is stored in the product. Only once the product is utilised energetically at the end of its life (**Module C3**), the stored carbon is released into the atmosphere as carbon dioxide emissions and contributes to the global warming potential.

The negative values in **Module D** can be explained through the fact that the energy generated by the energetic utilisation of the product is able to replace the combustion of fossil fuels. In this way, more emissions of (mainly fossil) fuels are avoided than those emitted through the use of the energy stored in the wood. The environmental impact in Module D is due mainly to emissions from the combustion of the biomass.



Environmental impact analysis in the production phase (Module A1-A3)

The global warming potential (**GWP**) due to the production phase (Module A1-A3) of the OSB boards is largely due to the production of the glue system (MUF & MDI). In addition to the glue systems, the greenhouse gas emissions due to the forestry processes for roundwood preparation also represent a potential factor with impact.
The energy generated in the two EGGER plants considered is based on biomass. Given that carbon is stored in the wood, the combustion of the biomass for heat and power production is balanced carbon-neutral. As such, the energy generation in the EGGER production has a comparatively low effect on greenhouse gas emissions.

The main drivers of the acidification potential (**AP**) and eutrophication potential (**EP**) follow a comparative pattern. Direct process emissions at the site as well as the provision of roundwood play an important role. In this case, in addition to the emissions in the forestry sector itself (roundwood), especially the emissions from the dryers and from the energy generation within the plants are decisive. The pre-chains of the MUF glue production particularly contribute to the eutrophication (**EP**), but also to acidification (**AP**).

The potential formation of ground-level ozone (**POCP**) is significantly influenced by the direct emissions from OSB production. VOC emissions from the presses and the drying represent the main drivers. Furthermore, emissions from power and heat production in the biomass boilers also play a role.

The results concerning the potential depletion of the stratospheric ozone layer (“ozone hole”, **ODP**) show a significant contribution of the additives and the glue system. In the case of the additives, this is the pre-chain of the mould release agents used in the production, which is responsible for the majority of the potential depletion of the ozone layer. Following the prohibition of ozone-depleting substances according to the Montreal Protocol, there was a fast decrease in their use. Given the year of the data set (2011) used to represent the mould release system, the relevance of the result is limited.

When it comes to the material resources used (**ADP substances**), the steel strips used for packaging represent a main driver. This is due to the alloying elements contained in it.
The use of fossil resources (**ADP fossil**) is significantly affected by the production of the glue systems. The pre-chain of the MUF glue system used is also to be classified as a driving factor.

The use of renewable primary energy (**PERT**) is mainly due to the material utilisation of the biomass in the product, as well as the use of biomass for the production of electric as well as thermal energy in the plant’s own combined heat and power plants.
If the contribution of non-renewable energy is considered (**PENRT**), it is mainly used in the form of the fossil fuels used for making the glue systems, such as mineral oil and natural gas.

It should be added that the previous EPD for EGGER OSB products (EPD-EHW-2012113-D) cannot be compared directly with this updated version, because the previous version does not include the Radauti plant.

7. Requisite evidence

The following tests are performed for EGGER OSB as part of the on-going external supervision or on request.

7.1 Formaldehyde
Background information: The E1 threshold value is defined at 8.0 mg maximum value or 6.5 mg average value following the perforator method /EN ISO 12460-5/ or at 0.1 ppm according to the chamber method /EN 717-1/. The Japanese F**** threshold value is defined at 0.3mg/L according to the dessicator method /JAS standard/.
Measurement centre: WKI Fraunhofer Wilhelm-Klauditz-Institute, testing, monitoring and certification facility, Braunschweig
Test reports:
OSB 2 E1: QA-2017-0169, QA-2017-0168
OSB 3 E1: QA-2017-0171, QA-2017-0170
OSB 3 E0: QA-2017-0077, QA-2017-0401
OSB 4 TOP: QA-2016-1073; QA-2017-0400
OSB 3 JAS TOP: 16-786 PFS TECO
Results: The determined formaldehyde content (average values converted for 6.5% moisture, measured according to /EN ISO 12460-5/ perforator method):
· OSB 2 E1: 3.4 mg/100 g absolute dry (15 mm)
2.4 mg/100 g absolute dry (9 mm)
· OSB 3 E1: 2.9 mg/100 g absolute dry (18 mm)
2.3 mg/100 g absolute dry (6 mm)
· OSB 3 E0: 0.4 mg/100 g absolute dry (15 mm)
· OSB 4 TOP: 0.1 mg/100 g absolute dry (22 mm)
The emission values of EGGER OSB 4 TOP and OSB 3 E0 are below 0.03 ppm formaldehyde (chamber method according to /EN 717-1/).
The measured values of the OSB 3 JAS TOP are under 0.3 mg/L F**** (dessicator method according to the /JAS-Standard/).

7.2 MDI
Measurement centre: Wessling - Beratende Ingenieure GmbH, Altenberge
Test report: IAL-08-0437 and IAL-09-0524
Result: The testing of PUR glued OSB 4 TOP boards and OSB 3 E0 boards was done according to the specification guidelines /RAL UZ 76/. The emissions of monomeric MDI and other isocyanides were for both board types below the detection limit of the analysis procedure. The requirements of RAL-UZ 76 for monomeric MDI emissions were thereby fulfilled.

7.3 Testing for pre-treatment of the applied materials
7.3.1 Heavy metals/ eluate (EOX) and migration
Measurement centre: WKI Fraunhofer Wilhelm-Klauditz-Institute, testing, monitoring and certification facility, Braunschweig
Test reports: MAIC-2017-526, MAIC-2017-527, MAIC-2017-1995
The analysis was performed using microwave-assisted pressure decomposition with HNO_3 and HCl conc..
OSB 3 E1 (Radauti plant): Arsenic, cadmium, mercury <detection limit; chromium (2 mg/kg), copper (1 mg/kg), lead 1 mg/kg),
OSB 3 E0, OSB 4 TOP (Wismar plant): arsenic, cadmium, chromium, copper, lead, mercury <detection limit.
OSB boards fulfil the requirements of the Waste Wood Ordinance and the increased requirements of the QDF directive.

Measurement centre: MFPA Leipzig GmbH, Leipzig
Test report: PB 1.3/16-248-1 and -2
Result: The OSB 3 E1 and OSB 3 E0 samples were analysed according to /DIN 38414-4/ (Eluate), /DIN 38414-S17/ /EOX) and /EN 71-3/ migration (total breakdown with HNO_3).
The metals and metalloids cadmium, chromium, cobalt, mercury, antimony, arsenic, barium, beryllium, lead, boron, nickel, and zirconium could not be detected (<detection limit). The detected concentrations of copper (2.1 mg/kg, detection limit 1.0 mg/kg), strontium (3.6 mg/kg, detection limit < 1 mg/kg), and zinc (11 mg/kg, detection limit <10 mg/kg) are to be classified as harmless.
The limit values required according to EN 71-3 for all heavy metals were not reached.

7.3.2 PCP and lindane
Measurement site: eph GmbH, Dresden, commissioned by WKI Wilhelm-Klauditz-Institut, Braunschweig
Test report: QA-2017-900, QA-2016-2219
Result: according to the test method /IKEA IOS-MAT-0010/ (GC ECD / GC MS), the pesticides PCP and lindane could not be detected (BG < 0.05 mg/kg).

7.4 Toxicity of the fire gases
Measurement centre: MFPA Leipzig GmbH, Leipzig
Test report: PB 1.3/16-248-1 and -2
Result: The OSB 3 E1 and OSB 3 E0 samples were analysed according to /DIN 53436/ and /DIN 4102-1/ (at 400°C). The CO concentration was at 5000 ppm after 60 minutes, and the CO_2 concentration at 10000 or 15000 ppm. Given the selected test conditions, no chlorine compounds could be detected. The hydrocyanic acid concentration (HCN) with 5 and 10 ppm and the sulphur dioxide concentration with 20 ppm correspond to the concentration that is emitted from wood under the same conditions.

7.5 VOC emissions
Measurement site: eph GmbH, Dresden
Test reports:
PB 2518203/1/1 - EGGER OSB 3 E0 (2018)
PB 2515174/5/A1 - EGGER OSB 3 E1 (2015)
PB 2518203/2/1 - EGGER OSB 4 TOP (2018)
Results: loading 0.4 m^2/m^3

AgBB overview of results (28 days)

Name	Value	Unit
TVOC (C6 - C16)	126 - 157	µg/m³
Sum SVOC (C16 - C22)	0	µg/m³
R (dimensionless)	0.691 - 0.799	-
VOC without NIK	0	µg/m³
Carcinogenic Substances	0	µg/m³

8. References

Institut Bauen und Umwelt e.V., Berlin (publisher): Erstellung von Umweltproduktdeklarationen (EPDs);

/ISO 9001/
Quality Management Systems - Requirements; German version: 2008-11

/ISO 14001/
Environmental Management Systems - Requirements with guidance for use; German version: 2004-11

/ISO 14025/
DIN EN ISO 14025:2011-10, Environmental labels and declarations — Type III environmental declarations — Principles and procedures.

/EN 15804/
EN 15804:2012-04+A1:2013, Sustainability of construction works — Environmental product declarations — Core rules for the product category of construction products.

/EN 16485/
EN 16485:2014; Round and sawn timber - Environmental Product Declarations - Product category rules for wood and wood-based products for use in construction; German version EN 16485:2014 edition 2014-07

/IBU Guidelines 2017/
IBU Guidelines 2017; Part B Requirements for the EPD of wood-based materials: PCR guidelines for building-related products and services of the building products group wood-based materials. Version 1.6

/ISO 14044/
EN ISO 14044:2006-10, Environmental Management – Life Cycle Assessment – Principles and Framework (ISO 14044:2006); German and English Version EN ISO 14044:2006

/CPR (EU) 305/2011/
CPR Regulation (EU) No. 305/2011 of the European Parliament and the Council of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Regulation 89/106/EEC of the Council

/EUTR VO (EU) 995/2010/
Regulation (EU) No. 995/2010 of the European Parliament and of the Council of 20 October 2010 laying down the obligations of operators who place timber and timber products on the market; text with EEA relevance

/GaBi 8/, 2018. thinkstep AG, 1992-2018. GaBi Software-System and Database for Life Cycle Engineering. Available at: http://documentation.gabi-software.com/

/Hasch 2002/, Ökologische Betrachtung von Holzspan und Holzfaserplatten, Diss., Uni Hamburg reviewed 2007: Rueter, S. (BFH HAMBURG; Holztechnologie), Albrecht, S. (Stuttgart University, GaBi)

/Rüter und Diederichs, 2014/. Ökobilanz- Basisdaten für Bauprodukte aus Holz. Arbeitsbericht aus dem Institut für Holztechnologie und Holzbiologie Nr. 2012/1. Hamburg: Johann Heinrich von Thünen-Institut

/BBSR Table/
BBSR Table "Useful lives of components for life cycle analyses according to the BNB rating system" of 03.11.2011

/DIN 68800-2/
DIN 68800:2012**;** Wood preservation - Part 2: Preventive constructional measures in buildings

/EN 1995-1-1/
EN 1995-1-1:2010: Eurocode 5: Design of timber structures - Part 1-1: Common rules and rules for buildings; German version EN 1995-1-1:2010

/Waste Wood Ordinance/
Waste wood ordinance: Regulation laying out the requirements for the recovery and disposal of waste wood; version 12-2016

/AVV/
Regulation on the European Waste Catalogue (Waste Regulation) of 10 December 2001 (Federal Official Journal I p. 3379), modified by article 2 of the Law of 17 July 2017 (Federal Official Journal I p. 2644)

/Federal Emission Protection Ordinance/
Federal Emission Protection Ordinance; First ordinance for the implementation of the Federal Emission Control Act (Ordinance on small and medium combustion plants - 1st Federal Emission Protection Ordinance)
version 2010-01-26

/MAC values/
MAC and BEL values list 2016: Maximale Arbeitsplatzkonzentrationen und Biologische Arbeitsstofftoleranzwerte (Maximal accepted concentration and biological exposure limit values), Deutsche Forschungsgemeinschaft, Wiley-VCH Verlag GmbH & Co. KgaA, 2016

/German Technical Instructions on Air Quality/
German Technical Instructions on Air Quality; First general administrative regulation for the Federal Emission Control Act (Technical instructions for keeping the air clean)
version 2002-07-24

Classification of wood-based materials
/AS/NZS 1604/
AS/NZS 1604.2:2012**:** Specification for preservative treatment - Part 2: Reconstituted wood-based products

/CEN/TR 12872/
Wood-based materials – guideline for the use of load-bearing boards in floors, walls and ceilings; German version CEN/TR 12872:2014

/DIN 4102-1/
DIN 4102-1: Reaction to fire of building materials and building components- Part 1: Building materials; terminology, requirements and tests

/EN 300/
EN 300:2006; Oriented Strand Boards (OSB) – Definitions, classification and specifications, German version DIN EN 300:2006

/EN 13501-1/
EN 13501-1:2010; Fire classification of construction products and building elements - Part 1: Classification with the results of tests on the reaction to fire of building products; German version DIN EN 13501-1:2007+A1:2009

/EN 13986/
EN 13986:2004+A1:2015; Wood material for use in building construction - characteristics, assessment of the conformity and labelling; German Version DIN EN 13986:2015

Testing methods

/IOS-MAT-0010/
IKEA IOS-MAT-0010; Chemical Compounds and Substances; version 05-2011

/RAL-UZ 76/
Testing guidelines of RAL ecolabel - RAL-UZ 76 (wood-based materials) "Determination of the MDI emission according to BIA 7680 - Test chamber method"

/DIN 38414-4 /
DIN 38414-4:1984; Harmonised German procedure for water, waste water and sludge testing; sludge and sediments (group S); determination of extractability with water (page 4); version 10-1984

/DIN 38414-17/
DIN 38414-17:2017; Harmonised German procedure for water, waste water and sludge testing; sludge and sediments (group S) - part 17: Determination of extractable organically bound halogens (EOX) (p. 17); version 01-2017

/DIN 53436/
DIN 53436:2015; Generation of thermal decomposition products from materials for their analytic-toxicological testing - Decomposition apparatus and determination of test temperature; version 12-2015

/EN 71-3/
EN 71-3:2013, Safety of toys - Part 3: Migration of certain elements; German version DIN EN 71-3:2013

/EN 317/
EN 317:1993: Particleboards and fibreboards; determination of swelling in thickness after immersion in water; German version DIN EN 317:2005

/EN 319/
EN 319:1993, Chipboards and fibreboards; Determination of tensile strength perpendicular to board; German version DIN EN 319:1993

/EN 321/
EN 321:2001;Wood-based panels. Determination of moisture resistance under cyclic test conditions; German version DIN EN 321:2001

/EN 323/
EN 323:1993; Wood-based materials; determining the bulk density; German version DIN EN 323:1993

/EN 324/
EN 324:2005 Wood-based panels; determination of dimensions of boards; Part 1: determining the thickness, width and length; German version DIN EN 324-1:2005

/EN 717-1/
EN 717-1:2004, Wood-based materials - determining the formaldehyde emissions - Part 1: Formaldehyde emission by the chamber method; German version DIN EN 717-2:1994

/EN 789/
EN 789:2004; Timber structures. Test methods. Determination of mechanical properties of wood based panels; German version EN 789:2004 edition 2005-01

/ISO 12460-5/
ISO 12460-5:2015-11; Wood-based materials - Determining the formaldehyde content - Extraction method (called the perforator method); German version DIN EN ISO 12460-5:05-2016

/EN ISO 12572/
EN ISO 12572:2001; Hygrothermal performance of building materials and products - Determination of water vapour transmission properties

/JAS-Standard/
Japanese Agricultural Standard (JAS) for Structural Panels; MAFF No. 2904: 18 November 2013

Institut Bauen und Umwelt e.V., Berlin (publisher): Erstellung von Umweltproduktdeklarationen (EPDs);

/ISO 14025/
DIN EN ISO 14025:2011-10/, Environmental labels and declarations — Type III environmental declarations — Principles and procedures.

/EN 15804/
/EN 15804:2012-04+A1 2013/, Sustainability of construction works — Environmental product declarations — Core rules for the product category of construction products.

/IBU 2016/
IBU (2016): General Programme Instructions for the Preparation of EPDs at the Institut Bauen und Umwelt e.V., Version 1.1 Institut Bauen und Umwelt e.V., Berlin.
www.ibu-epd.de

/ISO 14025/
DIN EN /ISO 14025:2011-10/, Environmental labels and declarations — Type III environmental declarations — Principles and procedures

/EN 15804/
/EN 15804:2012-04+A1 2013/, Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products

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