Environmental Product Declaration

according to ISO 14025

EGGER Timber

Declaration number
EPD-EHW-2011811-E

Institut Bauen und Umwelt e.V.

Institut Bauen und Umwelt e.V.
www.bau-umwelt.de

Summary

Environmental Product Declaration

Programme holder

Institut Bauen und Umwelt e.V.

www.bau-umwelt.com

Declaration holder

Fritz EGGER GmbH & Co. OG
Holzwerkstoffe
Weiberndorf 20
A – 6380 St. Johann in Tirol

Declaration number

EPD-EHW-2011811-E

Declared building products

EGGER timber for construction

This declaration is an environmental product declaration in accordance with ISO 14025 and describes the environmental performance of the construction products listed here. It is intended to promote the development of environmentally and health-friendly construction.
All relevant environmental data are disclosed in this validated declaration.
The declaration is based on the PCR document 'Solid Wood Products', base year 2010-04.

Validity

This validated document entitles the declaration holder to use the logo of the Institut Bauen und Umwelt e.V. (Institute Construction and Environment).
It is valid exclusively for the declared products for a period of one year from the issue date.
The declaration holder guarantees the accuracy of the underlying information and certificates.

Content of the declaration

This **declaration** is complete and contains the following in detailed form:

- Product definition and structural-physical specifications
- Information on base materials and material origins
- Description of the product production process
- Information on product processing
- Information on the state of use, unusual influences and the post-usage phase
- Life Cycle Assessment results
- Evidence

Issue date

14th January 2014

Signatures

Prof. Dr.-Ing. Horst J. Bossenmayer (President, Institut Bauen und Umwelt e.V. (Institute Construction and Environment))

Verification of the declaration

This declaration and the underlying rules were verified by an independent expert committee in accordance with ISO 14025.

Signatures

Prof. Dr.-Ing. Hans-Wolf Reinhardt (Chairman of the Expert Committee)

Dr. Frank Werner (Auditor appointed by the Expert Committee)

Summary

Environmental Product Declaration

EGGER timber is produced exclusively from fresh spruce logs (Picea abies (L.) [Karst]). Spruce logs are sawn in the direction of the wood fibres, producing rectangular wood cross-sections with a thickness of at least 6 mm (0.24”). Kiln dried (KD) product ranges may be visually and / or mechanically graded by strength. The timber surfaces are left sawn or may be planed with square, rounded or chamfered edges.

Product description

EGGER timber is used for decorative as well as structural applications. Strength graded timber is used for the construction of load-bearing components, e.g. in building construction. The timber can be used as individual elements, or as components in glue laminated elements such as glue-laminated timber, x-lam and construction timber.

Application

The **Life Cycle Assessment (LCA)** was conducted according to DIN ISO 14040 f. in keeping with the requirements of the IBU guidelines for type III declarations. Specific data for the products that were examined as well as data from the “GaBi 4.3” database were used in the assessment. The life cycle assessment includes the processes for obtaining raw materials and energy, the transportation of raw materials, the production phase itself including the production and disposal of packaging as well as the End of Life in a biomass power plant with energy recovery. One cubic meter of EGGER timber is declared respectively.

Scope of the LCA

Results of the LCA

Fresh Timber (per m^3)				
Evaluated Parameter	**Unit Per m³**	**Production**	**End of Life**	**Total**
Primary energy, renewable	[MJ]	8.32E+03	-2.23E+02	8.09E+03
Secondary energy	[MJ]	2.93E+01	-	2.93E+01
Primary energy, fossil	[MJ]	4.79E+02	-7.38E+03	-6.90E+03
Eutrophication potential (EP)	[kg PO_4 equiv.]	3.19E-02	-9.55E-03	2.24E-02
Ozone depletion potential (ODP)	[kg R11 equiv.]	2.39E-06	-3.48E-05	-3.24E-05
Photochemical oxidant creation potential (POCP)	[kg C_2H_4 equiv.]	1.86E-02	-3.01E-02	-1.15E-02
Globalwarming potential (GWP)	[kg CO_2 equiv.]	3.23E+01	-4.40E+02	-4.08E+02
Acidification potential (AP)	[kg SO_2 equiv.]	1.54E-01	-3.18E-01	-1.64E-01
Kiln Dried (KD) Timber (per m^3)				
Evaluated Parameter	**Unit Per m³**	**Production**	**End of Life**	**Total**
Primary energy, renewable	[MJ]	8.86E+03	-2.23E+02	8.64E+03
Secondary energy	[MJ]	6.94E+02	-	6.94E+02
Primary energy, fossil	[MJ]	3.39E+02	-7.38E+03	-7.04E+03
Eutrophication potential (EP)	[kg PO_4 equiv.]	3.72E-02	-9.55E-03	2.76E-02
Ozone depletion potential (ODP)	[kg R11 equiv.]	1.11E-06	-3.48E-05	-3.37E-05
Photochemical oxidant creation potential (POCP)	[kg C_2H_4 equiv.]	2.54E-02	-3.01E-02	-4.66E-03
Global warming potential (GWP)	[kg CO_2 equiv.]	2.58E+01	-4.40E+02	-4.14E+02
Acidification potential (AP)	[kg SO_2 equiv.]	1.83E-01	-3.18E-01	-1.34E-01
Planed Wood (per m^3)				
Evaluated Parameter	**Unit Per m³**	**Production**	**End of Life**	**Total**
Primary energy, renewable	[MJ]	8.95E+03	-2.23E+02	8.72E+03
Secondary energy	[MJ]	7.76E+02	-	7.76E+02
Primary energy, fossil	[MJ]	7.56E+02	-7.38E+03	-6.62E+03
Eutrophication potential (EP)	[kg PO_4 equiv.]	4.16E-02	-9.55E-03	3.20E-02
Ozone depletion potential (ODP)	[kg R11 equiv.]	5.90E-06	-3.48E-05	-2.89E-05
Photochemical oxidant creation potential (POCP)	[kg C_2H_4 equiv.]	2.91E-02	-3.01E-02	-1.01E-03
Global warming potential (GWP)	[kg CO_2 equiv.]	4.98E+01	-4.40E+02	-3.90E+02
Acidification potential (AP)	[kg SO_2 equiv.]	2.27E-01	-3.18E-01	-9.09E-02

Prepared by:

Johann Heinrich von Thünen Institute (vTI), Bundesforschungsinstitut für Ländliche Räume, Wald und Fischerei, Hamburg in cooperation with **Fritz EGGER GmbH & Co. OG**

The following certificates and tests are also documented in the environmental product declaration:
No certificates and tests are required for unglued timber.

Evidence and verifications

Product group:	Solid Wood Products	Preparation date:
Declaration holder:	Fritz EGGER GmbH & Co. OG	14/01/2011
Declaration number:	EPD-EHW-2010811-E	

Field of application

This document applies to timber for the building trade, which is produced in the following plants of the EGGER Group:

EGGER Sägewerk Brilon GmbH
Im Kissen 19
59929 Brilon
Germany

1 Product Definition

Product definition

EGGER timber is produced exclusively from fresh spruce logs (*Picea abies* (L.) [Karst]). Spruce logs are longitudinally sawn, producing rectangular wood cross-sections with a thickness of at least 6 mm (0.24”). Subsequent additional formatting options depend on the upgrading depth:

Product	Kiln Dried	Surface / Edge
Timber – fresh cut	No	sawn
Timber – kiln dried	Yes	sawn
Planed timber	Yes	planed

The product ranges are differentiated according to defined grading criteria. The main grading methods consist of grading by strength, both visually and mechanically, and grading by visual / aesthetic criteria.

Applications

EGGER timber is used for both decorative and constructive applications in the construction segment. Stress graded timber can be used for the construction of load-bearing components, e.g. in building construction, both as individual elements or as components in glue laminated elements such as glue-laminated timber, x-lam and construction timber.

Bringing into circulation / application rules

EGGER timber is produced, monitored and identified for use as construction timber in load-bearing applications (EU) according to the requirements of DIN EN 14081-1.

Visual stress grading is done according to the requirements of DIN 4074-1 “Stress grading of wood”. The assignment of grading classes according to DIN 4074-1 to the European strength classes pursuant to EN 338 is done according to EN 1912. Mechanical stress grading is done according to DIN EN 14081 Part 2 through Part 4.

Additional product certifications are based on national regulations / application rules and are available for EGGER timber for the Australian and North American markets, among others.

Quality assurance

Quality assurance is based on the target markets for EGGER timber:

CE marking according to DIN EN 14081- Notified Body HFA – Vienna, A

AS/NZS 1748 – HFA – Vienna, A

PS 20-05 – WCLIB

EN ISO 9001:2000 – ÖQS Vienna, A

IPPC / ISPM 15 – State Office for Forestry and Wood of North-Rhine Westphalia, D

PEFC: Chain of Custody HCA-CoC-0183, Holz Cert Austria, A

FSC: Chain of Custody HCA-CoC-100017;

Controlled Wood HCA-CW-100017, Holz Cert Austria, A

Delivery condition, characteristics

EGGER timber is produced according to customer-specific requirements in regards to grade and format.

Delivery sizes

	Minimum [mm]	Maximum [mm]
Length	2000	5400
Thickness	12	150
Width	30	350

Surface / edges

Product	Surface	Edges
Timber – fresh cut	sawn	sharp-edged
Timber – kiln dried	sawn	sharp-edged
Planed timber	dressed	Sharp-edged; planed; chamfered edged

Structural engineering data

Table 1 – Delivery condition and dimension tolerances (mechanical stress graded timber)

Criteria	Standard	Characteristic
Species	DIN EN 13556	Spruce [PCAB EU]
Wood moisture content u	-	10 – 18% (customer-specific)
Surface quality	-	sawn / dressed, chamfered edged, in visual or industrial grade
Dimension tolerances	EN 336	class 2

Note: The values shown in Table 2 for the characteristic tensile strength rectangular to the direction of the fibres $f_{t,90,k}$ and for the characteristic shear and torsion resistance $f_{v,k}$ deviate from the values according to the DIN EN 338:2003-09 standard. The calculation value for proof of strength is derived from building authority regulations.

Table 2 – Calculation values for the characteristic strength and stiffness values (european whitewood)

Characteristic	C24	C30	C35	C40	C45
Strength Values in N/mm²					
Deflection $f_{m,k}$ [a]	24	30	35	40	45
Tensile force, parallel $f_{t,0,k}$ [a]	14	18	21	24	27
Tensile force, perpendicular $f_{t,90,k}$	0.4				
Pressure, parallel $f_{c,0,k}$ [a]	21	23	25	26	27
Pressure, perpendicular $f_{c,90,k}$	2.5	2.7	2.8	2.9	3.1
Shear and torsion $f_{v,k}$ [c]	2.0				
Mean stiffness Values in N/mm²					
E-module parallel $E_{0,mean}$ [a,b]	11000	12000	13000	14000	15000
E-module perpendicular $E_{90,mean}$ [b]	370	400	430	470	500
Shear module G_{mean} [b,c]	690	750	810	880	940

[a] In case of coniferous roundwood that is free of bark and bast, values increased by 20% may be used in areas without weakening of the edge zone.

[c] The characteristic rolling shear resistance $f_{R,k}$ may be used for all strength classes at 1.0 N/mm². The shear module that is part of the rolling shear load may be assumed at $G_{R,mean} = 0.10 * G_{mean}$.

[b] The following calculation values apply to the characteristic Mean Stiffness values $E_{0.05}$, $E_{90.05}$ and G_{05}: $E_{0.05} = 2/3 * E_{0,mean}$, $E_{90.05} = 2/3 * E_{90,mean}$, $G_{05} = 2/3 * G_{mean}$,

Table 3 – Structural engineering data

Criteria	Standard	Characteristic
Rated value, thermal conductivity λ_R	EN 12524	0.13 W/(mK)
Specific heat capacity	EN 12524	1600 J/(kgK)
µ - value (dry / wet cup)	EN 12524	50 / 20
Reaction to fire	DIN EN 14081-1	D-s2, d0 (>22mm (0.87"))
Building material class	DIN 4102-4	B2 - normal flammability
Natural durability	DIN EN 350-2	4
Usage class	DIN EN 1052	1, 2
Application class	DIN 68800	0[a]
Raw density ρ_k	DIN EN 338 / DIN 1052	according to Table 1 according to Table F 5

[a] Kiln dried, no wood preservation agents required

2 Raw Materials

Raw materials / Preliminary products

EGGER timber is made of spruce roundwood (*Picea abies* (L.) [Karst]).

Auxiliary materials / additives

– Not applicable –

Substance information

EGGER timber is made exclusively of fresh spruce roundwood from regional forest thinnings and stands ready for harvesting.

Raw material production and material origin

The spruce roundwood used in production comes from domestic woodlots that are managed using sustainable practices, mainly in North Rhine-Westphalia, Hesse and Lower Saxony.

Product ranges with sustainability certification are preferred, e.g. PEFC[1] / FSC[2]. Roundwood is obtained from woodlots in an average radius of 200 km around the plant location.

[1] PEFC – Program for the Endorsement of Forest Certification (www.pefc.org)
[2] FSC – Forest Stewardship Council (www.fsc.org)

Regional and general availability of the raw materials

Spruce roundwood used for the production of EGGER timber is a renewable resource. The product ranges that are used come exclusively from regional forests managed according to sustainable practices.

3 Product Production Process

Product production process

Spruce roundwood with bark is delivered to the Brilon production site and visually inspected for quality. Then the roundwood is decorticated and scanned for metallic content. Long roundwood is cut to length following optimisation. In the subsequent log grading process, the debarked logs are pre-sorted.

On the sawing line, the debarked logs are chipped, moulded and cut into the center and side boards using circular saws. Side boards come from the edge, center boards from the centre of the log. After cutting, the timber pieces are visually graded and piled. Drying the product ranges to a defined residual moisture content in a kiln is available as an option. Visual and mechanical stress grading, as well as planing after kiln drying, are also possible.

The production process consists of the following steps:

1. Roundwood receiving
2. Visual quality inspection
3. Debarking
4. Optional: Long log trimming
5. Log grading
6. Chipping, moulding, sawing
7. Grading
8. A) Piling / packaging or B) Piling / preparation for kiln drying
9. Optional: Kiln drying
10. Optional: Visual / mechanical stress grading
11. Optional: Planing
12. Piling / packaging

Occupational safety in production

Due to the production conditions, no occupational safety measures beyond compliance with the applicable legal and other regulations are required. Values in all areas of the plant are significantly below the workplace concentration limits (MAK-values, Germany).

Environmental protection during production

- **Air:** Exhaust air from the production process is cleaned in accordance with the applicable legal regulations. Emissions are significantly below TA Luft (Technical instructions on Air Quality Control).
- **Water / ground:** There is no contamination of water or the ground.
- **Noise control:** Noise level measurements have shown that all values recorded within and outside the production plant are far below the applicable requirements for Germany. Sections of the plant where high noise levels are produced have been shielded by suitable construction measures.

4 Working with the building product

Processing recommendations

EGGER timber can be sawn, milled, planed and drilled using all conventional wood processing equipment, stationary machines and (electric) handheld machines.

Breathing protection should be worn when using handheld equipment without an extraction system.

Occupational safety and environmental protection

Conventional safety equipment, suitable work clothing, safety goggles, and a dust mask (during tasks that generate dust) must be used when processing / installing EGGER timber. The Employer's Liability Insurance Association provisions should be observed for commercial processing.

Residual material

Residual material, trimmings and packaging materials must be sorted by waste classes and collected. The provisions of the local waste management authorities and the information under point 7. “Post-Usage Phase” must be observed for disposal.

Packaging

Upon request, the packages are equipped with solid wood stringers (EAK 15 01 03). Synthetic bands are used for strapping (EAK 15 01 02). Kiln dried product ranges are also covered in a recyclable PE film (EAK 15 01 02).

5 State of Use

Substances of content

Substances of content in the state of use:

EGGER timber is a natural product. The substances of content correspond to the type of wood described under point 2 and its specific natural composition (cellulose, hemicelluloses, lignin, extractives, and ash).

Impact relationships

Environment - health

Environmental protection:

When the described products are used properly in accordance with the area of application, there is no risk of water, air or ground contamination according to the current state of knowledge.

Health protection:

No impairment of or damage to health is to be expected when the product is used normally and in accordance with the intended purpose.

Period of use

The use of untreated timber is subject to the provisions of DIN EN 1052, DIN 68800 and DIN EN 1995-1-1.

6 Unusual Influences

Fire

Reaction to fire:

- Building materials class: B2 “normal flammability” according to DIN 4102-4
- Reaction to fire class: D-s2, d0 according to DIN EN 14081-1
  Euro-class D, smoke class s2, dripping class d0

Change of aggregate state (dripping / dropping while burning):

- Not possible, since the products described do not liquefy when heated.

Water effects

No substances of content that could be hazardous to water are washed out. EGGER timber is not resistant against long-term exposure to water (standing water).

Mechanical destruction

The fracture pattern of spruce timber is typical of solid wood. The deformation behaviour is segmented into an elastic and a plastic range. Failure / fracturing is indicated by tearing and splitting of the fibres. Brittle behaviour is typical under tensile load.

7 End of lifephase

Reuse / continued use

Upon conversion or removal, e.g. at the end of the usage phase of a building, timber can be selectively collected and used again for the same application or reused for an application other than its original use.

Reclamation

Due to the high heating value of approximately 16 MJ/kg, reclamation for the generation of process energy and electricity in approved facilities (cogeneration plants) in terms of cascade use is expedient.

Disposal

Residual material accumulated at the construction site or in case of removal measures should initially be used as construction material. If this is not possible, it must be used for energy generation. Disposal in a landfill is not permitted. (Waste code according to the European waste catalogue: 170201).

8 Life Cycle Assessment

8.1 Production of EGGER timber

Declared unit

The declared unit for the environmental performance assessment is 1 m³ (35.31 cubic feet) of EGGER timber, respectively – fresh / kiln dried (KD) / planed timber. The average raw density (absolutely dry) is 430 kg/m³.

System limits

The chosen system limits encompass the production of the products under consideration, including the production of raw materials, all the way to the finished product packaged and at the plant gates (“cradle to gate”). Using the packaging for energy generation is included as part of the assessment of production.

Recycling the product at the end of its lifecycle is also included in the assessment. A scenario of thermal use including energy recovery in a biomass power plant typical for processing used-wood is assumed. Here the calculation is based on a system extension with the substitution of thermal energy and electricity. The results of this scenario can be viewed as the energy recovery potential.

The usage phase is not taken into account.

Performance criteria

The relevance of the substance flows for timber production was evaluated based on existing publications on timber production. All processes for which the total contribution to the final result in all effect categories under consideration is greater than 1% were taken into account.

Plausibility tests based on existing key figures were conducted in order to verify the integrity of the operating data that were collected.

Transportation

The relevant transportation of the raw materials and auxiliary materials used was taken into account in all cases.

Period under review

The quantities of raw materials, energy, auxiliary materials and supplies were calculated as mean annual values for the EGGER sawmill in Brilon. The data that were used were collected from the actual production processes in the year 2009.

Background data

The production database was provided by the EGGER sawmill in Brilon which was involved in the collection of data. The entire harvesting-timber chain was taken from studies (Rüter 2007, Frühwald 2000, Schweinle & Thoroe 2001). The GaBi database was used for energy generation, additives and transportation.

Assumptions

The results of the life cycle assessment are based on the following assumptions:

- After the end of the usage phase, 100% of the product mass is used in a thermal recovery application.
- The average transportation distance for additives is 50 km. The average distance for waste disposal is 20 km.
- Electricity is supplied to the public network via cogeneration during production. 100% of the produced electricity substitutes the conventional electricity mix.

Data quality

The age of the primary data that were used is less than 2 years.

Primary data sources were used to compile all relevant information for the life cycle assessment. All input and output data of the company EGGER were made available as a basis for the lifecycle inventory analysis. Data were collected by means of questionnaires and individual plant inspections. Plausibility tests were also conducted. The data quality can therefore be classified as very good and 100% representative for the products in question.

Secondary data were used to calculate the environmental impact of all other substance and energy flows that fall within the system limits. Here data from the GaBi database and other sources described in the background data section were used.

Allocation

Allocation refers to the assignment of the input and output streams of an environmental performance assessment module to the product system under review /ISO 14040/.

For the system of production and disposal under review, all inputs that could be clearly assigned from a physical perspective were correspondingly allocated to the products. Inputs that could not be clearly assigned from a physical perspective were allocated on the basis of product prices or product mass.

Allocations in the harvesting chain and at the sawmill were done on the basis of product prices. In order to maintain consistency of mass, the allocation of log wood was conducted on the basis of the absolutely dry mass of the products.

Information on the usage phase

The state of use and any possible unusual influences during this phase were not investigated as part of the life cycle assessment. For system comparisons, the durability of the timber depending on stress and strain aspects must be taken into account.

8.2 Thermal utilisation of Timber

Selection of the disposal process

For the disposal phase, a system extension with the use of thermal energy in a biomass generating plant was conducted. Hereby 100% of the timber is used for thermal applications after the usage phase. The incineration of one ton of timber with a residual moisture content of 15% generates 9216 MJ of steam and 640 kWh of electricity.

Credits

The substitution approach is applied in regards to the generation of energy. Suitable methods are applied in order to assign credits to the products – electricity and thermal energy – that are produced. These credits would result from reductions in fossil fuel consumption and the resulting emissions from conventional energy generation. Steam generated using natural gas and the German electricity mix for 2009 are replaced.

8.3 Presentation of the Assessments and Evaluation

Lifecycle inventory analysis

The lifecycle inventory analysis is presented in the following section based on primary energy consumption and waste, followed by the lifecycle impact assessment.

Primary energy

For the assessment of the consumption of renewable and non-renewable primary energy, the lower heating value was used consistently. Table 4 depicts the consumption of primary energy for the production of one cubic metre of timber. The consumption of non-renewable primary energy for timber production (Cradle to Gate) is between 339 and 756 MJ. Production accounts for approximately 26 – 67%, providing raw materials for approximately 28 – 62% and transportation and packaging together for approximately 5 – 19%.

Table 4 – Primary energy consumption for the production of one cubic metre, respectively, of EGGER timber (planed wood), timber (kiln dried) and timber (fresh)

Evaluated Parameter	Unit	Production	End of Life	Total
Timber - Planed				
Primary energy, renewable	[MJ/m³]	8.95E+03	-2.23E+02	8.72E+03
Secondary fuels	[MJ/m³]	7.76E+02	-	7.76E+02
Primary energy, non-renewable	[MJ/m³]	7.56E+02	-7.38E+03	-6.62E+03
Timber – Kiln Dried				
Primary energy, renewable	[MJ/m³]	8.86E+03	-2.23E+02	8.64E+03
Secondary fuels	[MJ/m³]	6.94E+02	-	6.94E+02
Primary energy, non-renewable	[MJ/m³]	3.39E+02	-7.38E+03	-7.04E+03
Timber – Fresh				
Primary energy, renewable	[MJ/m³]	8.32E+03	-2.23E+02	8.09E+03
Secondary fuels	[MJ/m³]	2.93E+01	-	2.93E+01
Primary energy, non-renewable	[MJ/m³]	4.79E+02	-7.38E+03	-6.90E+03

Between 8320 MJ and 8950 MJ of renewable energy is also used for the production of one cubic metre of EGGER timber. This is the energy stored in the wood that remains in the product, and the energy stored in wood that is burned during the production process in the form of sawmill by-products. The mass of used wood that is burned is included as the consumption of secondary energy.

A more detailed evaluation of the distribution of primary energy consumption from renewable resources shows that energy which is mainly stored in the renewable raw materials during the process of photosynthesis is retained in the EGGER timber products up to the end of their life (End of Life). 1 cubic metre of EGGER timber with a moisture content of 15% has a lower calorific value of approximately 8400 MJ.

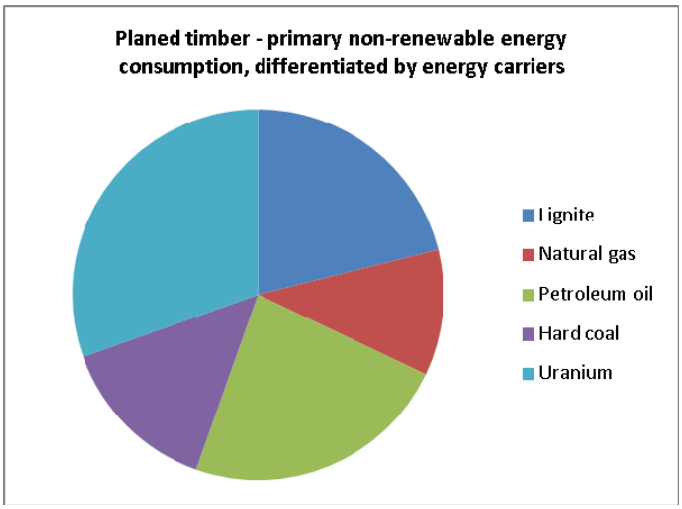

Figure 1 – Distribution of non-renewable primary energy consumption by energy carriers in the production of 1 m³ (35.31 cubic feet) of EGGER timber – planed timber

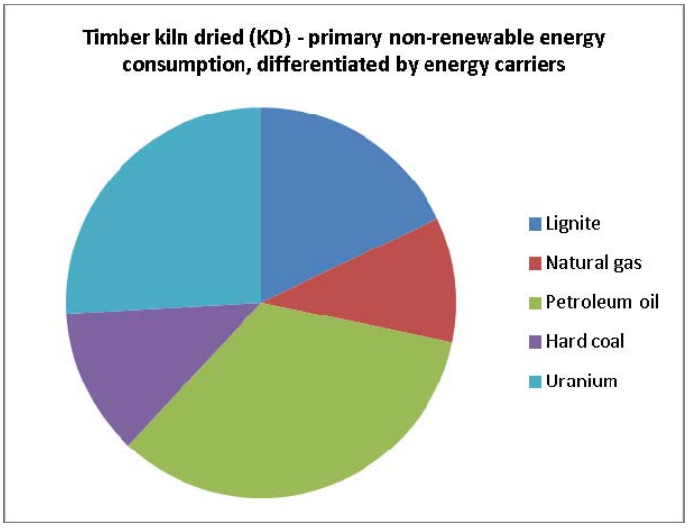

Figure 2 – Distribution of non-renewable primary energy consumption by energy carriers in the production of 1 m³ (35.31 cubic feet) of EGGER timber – kiln dried (KD)

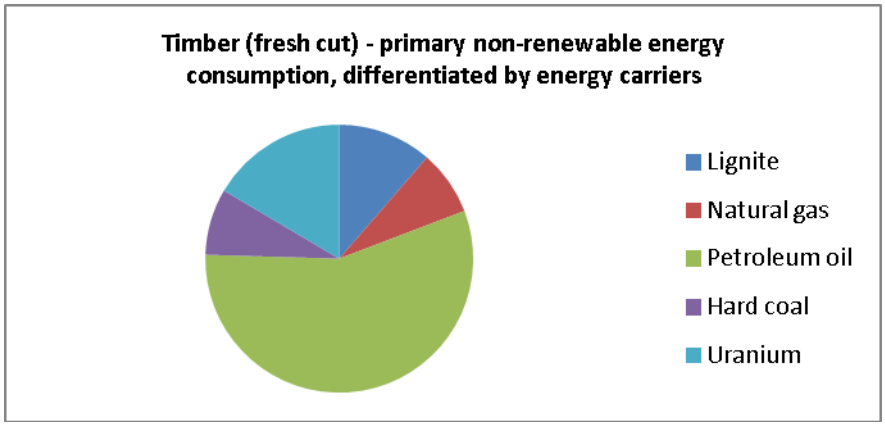

Figure 3 - Distribution of non-renewable primary energy consumption by energy carriers in the production of 1 m³ (35.31 cubic feet) of EGGER timber – fresh

A closer look at the consumption of non-renewable primary energy for the production of one cubic metre (35.31 cubic feet) of EGGER timber shows that petroleum oil is used as the main energy carrier for the production of fresh timber. This is due to the relatively high share of transportation in relation to total consumption. The increasing consumption of electricity for product upgrading moves the energy mix in the direction of the conventional electricity mix while the proportion of petroleum oil is reduced.

The share of non-renewable energy carriers corresponds to Figure 1 through 3. The distribution of the non-renewable energy carriers to the individual processes is shown in Figure 4 to 6. Production accounts for approximately 447/ 30 / 205 MJ, providing raw materials for 259 / 258 / 227 MJ and transportation for around 51 / 50 / 47 MJ.

These values are partly offset by a credit at the end of life of 7379 MJ.

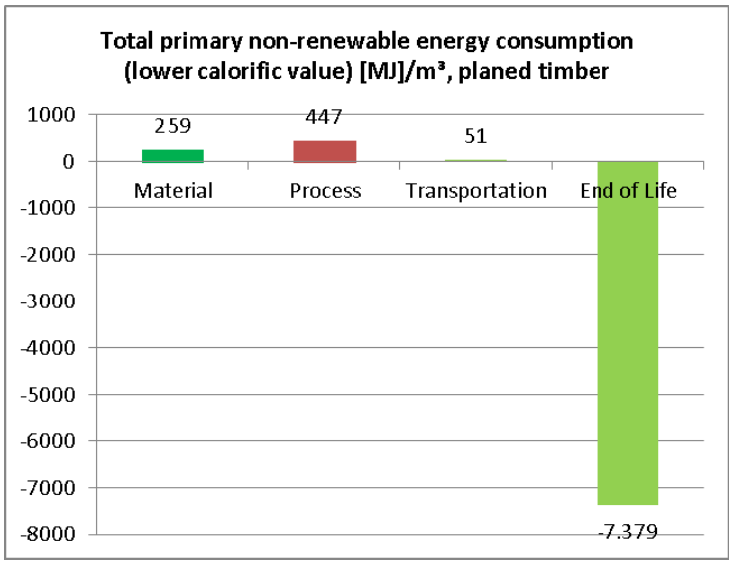

Figure 4 – Distribution of non-renewable primary energy consumption by energy carriers in the production of 1 m³ (35.31 cubic feet) of EGGER timber – planed timber

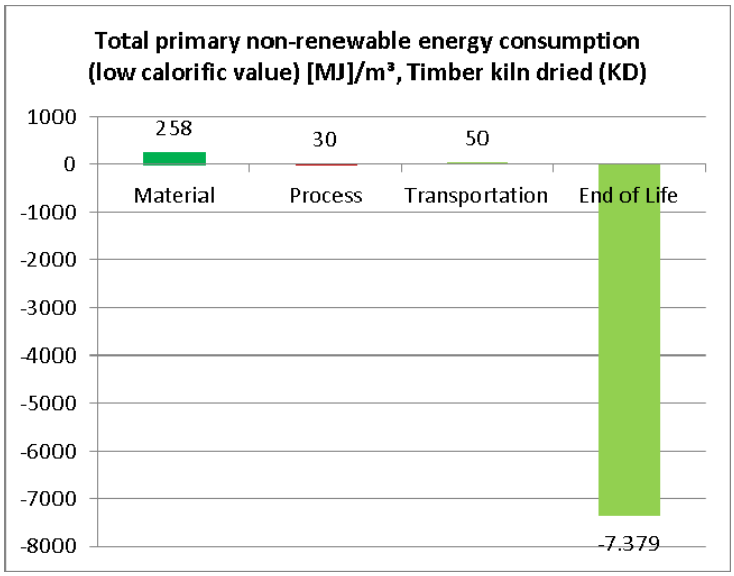

Figure 5 – Distribution of non-renewable primary energy consumption by energy carriers in the production of 1 m³ (35.31 cubic feet) of EGGER timber – kiln dried (KD)

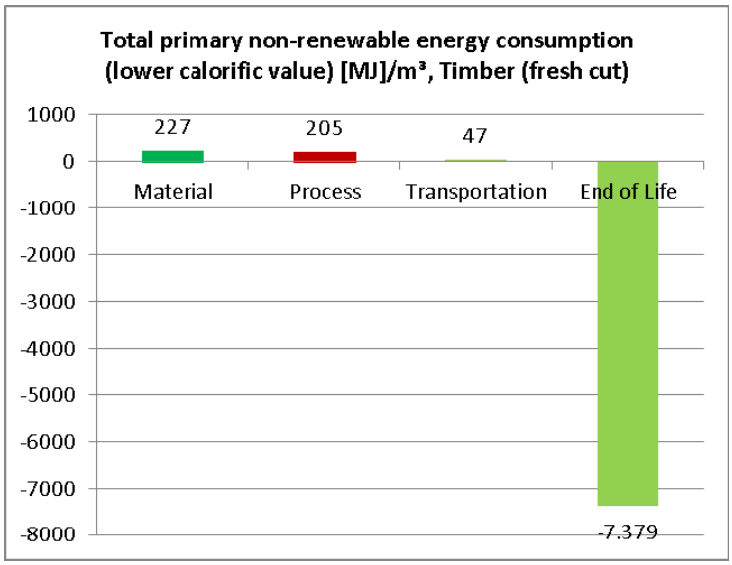

Figure 6 – Distribution of non-renewable primary energy consumption by energy carriers in the production of 1 m³ (35.31 cubic feet) of EGGER timber – fresh

CO_2 assessment

The CO_2 assessment describes the carbon mass flow as a result of the production and disposal of the products. In order to achieve a direct relationship to the effect indicator GWP 100, carbon mass has been converted into carbon dioxide mass even though carbon is not presented in this oxidised form in all phases of the lifecycle.

Approximately 927/914/801 kg of CO_2 go into the production of planed / kiln dried/ fresh timber in the form of wood. Approximately 796 kg of CO_2 remains in the product, while 56/51/2 kg of CO_2 in the form of by-products and 75/67/3 kg of CO_2 in the form of used wood are used to generate heat and therefore generate emissions during production. During the production process, the fossil energy carriers in the form of diesel fuel, fossil resources for energy generation and synthetic materials and their disposal result in CO_2 emissions of 77/50/32 kg. Since waste heat from the drying of raw materials, planed timber and dried timber is used to generate electricity, 27/24/0 kg of CO_2 is deducted for the substitution of fossil energy carriers in other systems. This means a total of 50/25/32 kg of CO_2 emissions are generated during production.

When the products are used at the end of their lifecycle, the carbon contained in them is oxidised to form approximately 796 kg of CO_2. 10 kg of CO_2 is also emitted for transportation to the recycler and to operate the facility. 450 kg of CO_2 is deducted as substitution potential, since the energy generated in the form of heat and electricity during recovery is available to other production systems and potentially replaces energy from fossil sources.

This means a total of 390/414/408 kg of fossil CO_2 emissions are avoided. (Figure 7 through 9 – details for all three products.)

(Small deviations due to rounding may occur when all figures are taken into account.)

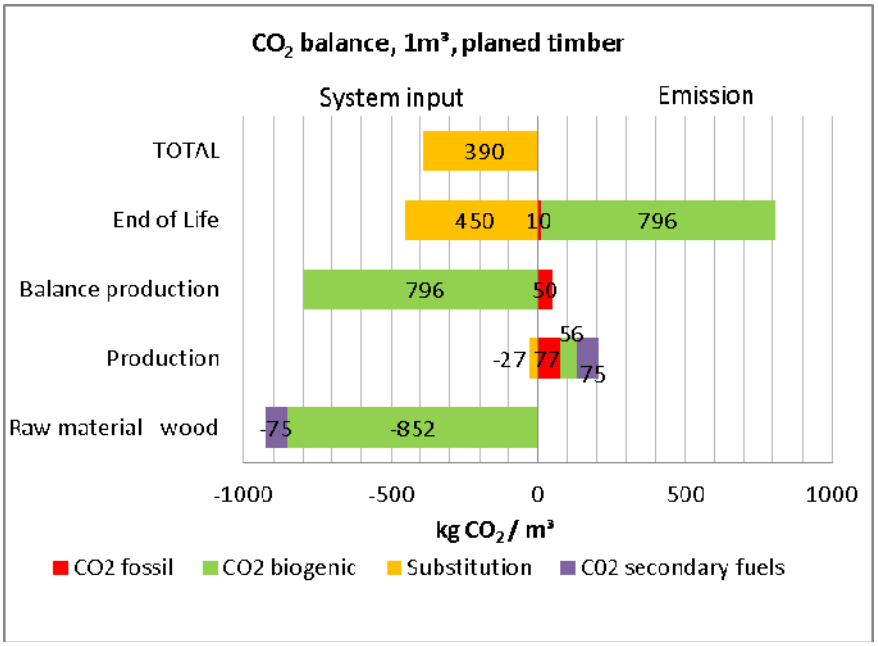

Figure 7 – CO_2 balance for the production and end of life, 1 m³ (35.31 cubic feet) of EGGER timber – planed

Product group:	Solid Wood Products	Preparation date:
Declaration holder:	Fritz EGGER GmbH & Co. OG	14/01/2011
Declaration number:	EPD-EHW-2010811-E	

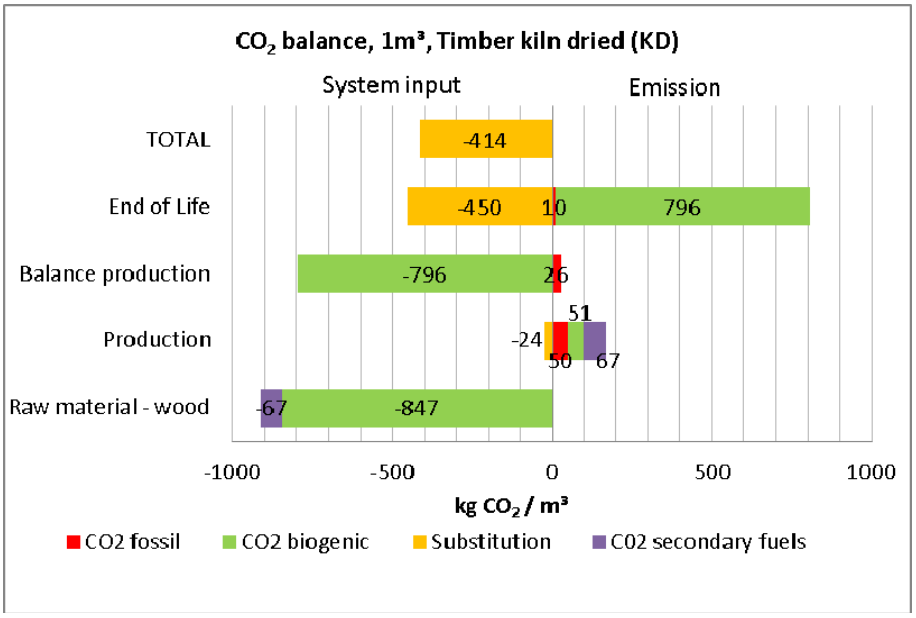

Figure 8 – CO_2 balance for the production and end of life, 1 m³ (35.31 cubic feet) of EGGER timber – kiln dried (KD)

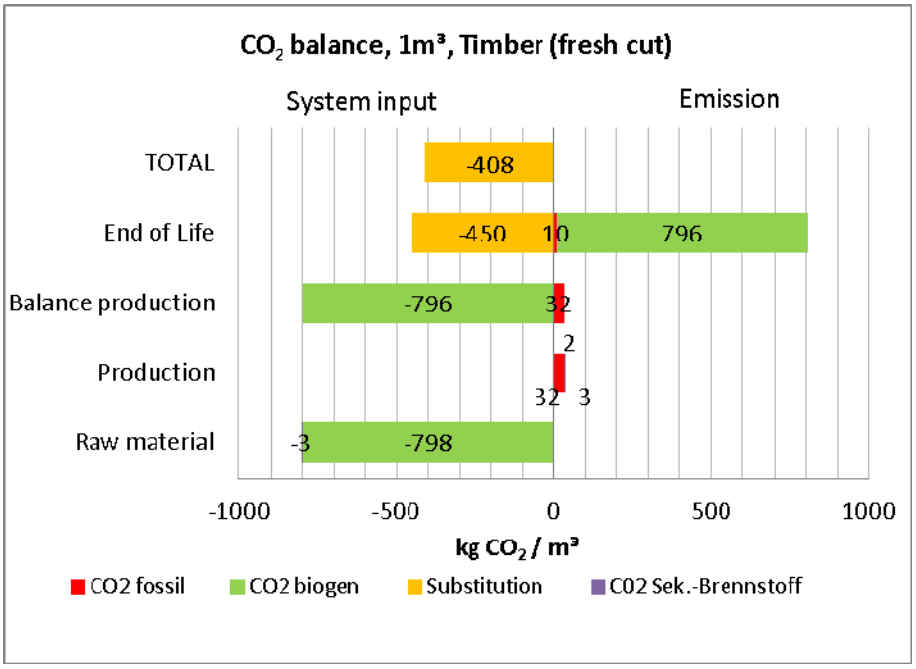

Figure 9 – CO_2 balance for the production and end of life, 1 m³ (35.31 cubic feet) of EGGER timber – fresh

Waste

Waste generated during the production and at the end of life of 1 m^3 (35.31 cubic feet) of EGGER timber is presented separately for the three segments of rubble / debris (including ore processing residues), municipal waste (including household garbage and commercial waste) and special wastes including radioactive waste (Table 5).

Table 5 – Waste generated by the production and incineration of 1 m^3 (35.31 cubic feet) of EGGER timber

	Waste [kg / m^3]		
Evaluated Parameter	**Production**	**End of Life**	**Total**
Timber - Planed			
Rubble / debris	1.79E+02	-1.11E+03	-9.32E+02
Special wastes	7.71E-02	-4.37E-01	-3.60E-01
Thereof radioactive	7.09E-02	-4.37E-01	-3.66E-01
Municipal waste	6.38E-02	1.48E+00	1.54E+00
Timber - Kiln Dried			
Rubble / debris	3.03E+01	-1.11E+03	-1.08E+03
Special wastes	1.66E-02	-4.37E-01	-4.20E-01
Thereof radioactive	1.17E-02	-4.37E-01	-4.25E-01
Municipal waste	5.64E-02	1.48E+00	1.54E+00
Timber - Fresh			
Rubble / debris	7.26E+01	-1.11E+03	-1.04E+03
Special wastes	3.09E-02	-4.37E-01	-4.06E-01
Thereof radioactive	2.85E-02	-4.37E-01	-4.08E-01
Municipal waste	2.58E-02	1.48E+00	1.51E+00

Table 5 shows the amount of waste generated. While rubble / debris are mainly the result of extracting fossil energy carriers, radioactive waste is created during nuclear energy generation. Commercial waste similar household garbage and special wastes are generated along the entire production chain.

Estimated impact

The following Table 6 shows the individual contributions from the production and incineration of 1 m^3 (35.31 cubic feet) of EGGER timber to the impact categories of global **warming potential** (**GWP 100**), **ozone depletion potential** (**ODP**), **acidification potential** (**AP**), **eutrophication potential** (**EP**) and **photochemical oxidant creation potential** (summer smog potential **POCP**).

In the evaluation of the **system limit for production including the end of life** in a biomass power plant, the significance of the type of recovery and / or disposal on the environmental impact over the entire life cycle is revealed. The resulting additional emissions and / or related substitution effects in the energy supply system are illustrated graphically in Figure 10 through 12. The end of life share that is shown is the result of offsetting the emissions from the incineration process against the emissions that are avoided for the generation of electricity and thermal energy. Therefore this is the difference between the emissions from timber incineration and the average energy generation emissions avoided as a result (credits). Additional credits are already obtained in production, since cogeneration utilises residual heat from incineration to generate electricity which replaces fossil energy carriers (assigned to the “Process” category).

Table 6 – Absolute contribution of production and the end of life per cubic metre of EGGER timber to the impact categories under consideration

Timber - Planed				
Evaluated Parameter	**Unit Per m³**	**Production**	**End of Life**	**Total**
Eutrophication potential (**EP**)	[kg PO_4 equiv.]	4.16E-02	-9.55E-03	3.20E-02
Ozone depletion potential (**ODP**)	[kg R11 equiv.]	5.90E-06	-3.48E-05	-2.89E-05
Photochemical oxidant creation potential (**POCP**)	[kg C_2H_4 equiv.]	2.91E-02	-3.01E-02	-1.01E-03
Global warming potential (**GWP**)	[kg CO_2 equiv.]	4.98E+01	-4.40E+02	-3.90E+02
Acidification potential (**AP**)	[kg SO_2 equiv.]	2.27E-01	-3.18E-01	-9.09E-02
Timber – Kiln Dried (KD)				
Evaluated Parameter	**Unit Per m³**	**Production**	**End of Life**	**Total**
Eutrophication potential (**EP**)	[kg PO_4 equiv.]	3.72E-02	-9.55E-03	2.76E-02
Ozone depletion potential (**ODP**)	[kg R11 equiv.]	1.11E-06	-3.48E-05	-3.37E-05
Photochemical oxidant creation potential (**POCP**)	[kg C_2H_4 equiv.]	2.54E-02	-3.01E-02	-4.66E-03
Global warming potential (**GWP**)	[kg CO_2 equiv.]	2.58E+01	-4.40E+02	-4.14E+02
Acidification potential (**AP**)	[kg SO_2 equiv.]	1.83E-01	-3.18E-01	-1.34E-01
Timber - Fresh				
Evaluated Parameter	**Unit Per m³**	**Production**	**End of Life**	**Total**
Eutrophication potential (**EP**)	[kg PO_4 equiv.]	3.19E-02	-9.55E-03	2.24E-02
Ozone depletion potential (**ODP**)	[kg R11 equiv.]	2.39E-06	-3.48E-05	-3.24E-05
Photochemical oxidant creation potential (**POCP**)	[kg C_2H_4 equiv.]	1.86E-02	-3.01E-02	-1.15E-02
Global warming potential (**GWP**)	[kg CO_2 equiv.]	3.23E+01	-4.40E+02	-4.08E+02
Acidification potential (**AP**)	[kg SO_2 equiv.]	1.54E-01	-3.18E-01	-1.64E-01

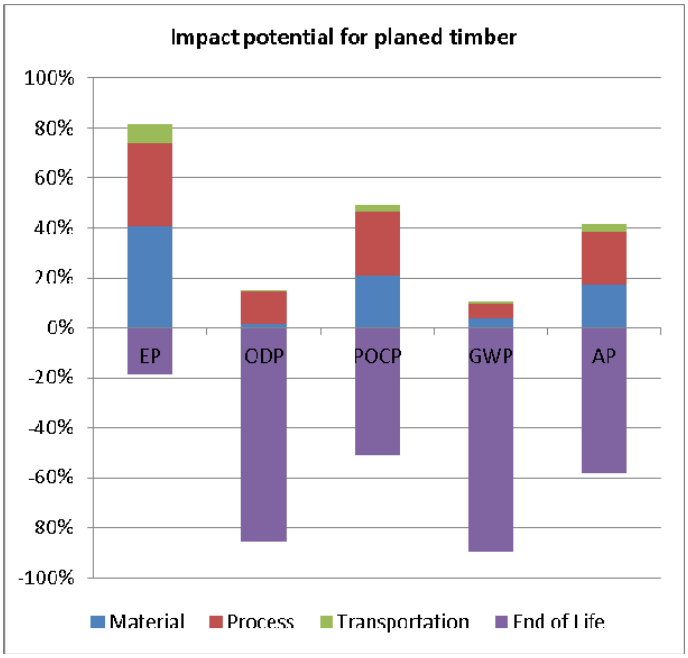

Figure 10 – Share of the processes in the impact categories – system limit plant gates and incineration of EGGER timber – planed at the end of life

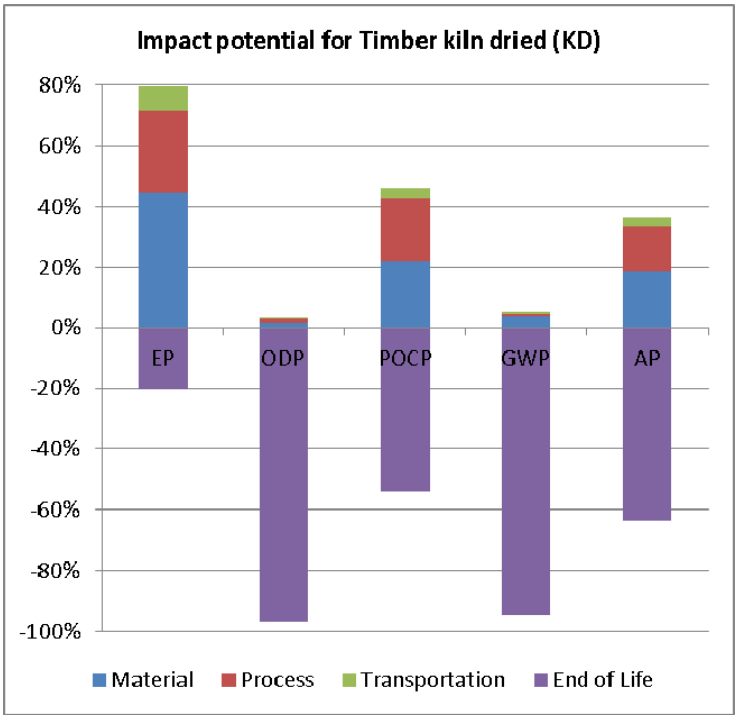

Figure 11 – Share of the processes in the impact categories – system limit plant gates and incineration of EGGER timber – kiln dried (KD) at the end of life

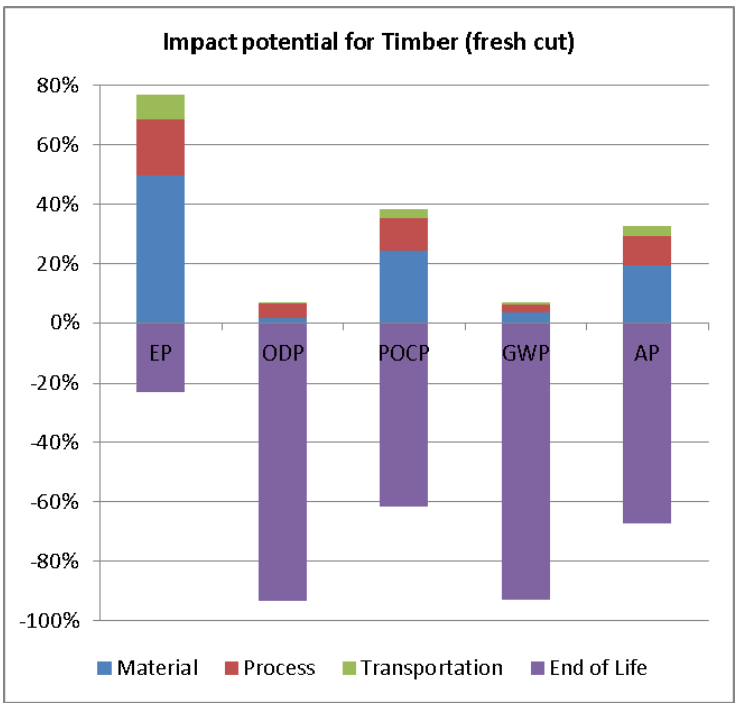

Figure 12 – Share of the processes in the impact categories – system limit plant gates and incineration of EGGER timber – fresh at the end of life

Eutrophication potential (EP)

The main source of this indicator for all products is harvesting at approximately 50% - 65%. Another 10% applies to log wood transportation and 15% to plant logistics. Electricity accounts for 4% for fresh timber, 13% for dried rough timber and 21% for planed timber. Another 15% applies to the incineration of wood to generate electricity and heat for those products that have to be dried.

Ozone depletion potential (ODP, catalytic)

For all products, nearly 100% of the ozone depletion potential comes from the generation of electricity. Insofar as electricity is produced during production, the results for this indicator are already in the negative range. This is because the production of electricity using biomass has lower indicator results than the generation of electricity under conventional conditions.

Photochemical oxidant creation potential (POCP)

For fresh timber, approximately 60% applies to harvesting, 10% to roundwood transportation and another 20% to plant logistics. Packaging and electricity each contribute 5%.

For kiln dried timber, 44% comes from harvesting, 30% from wood incineration and 15% from plant logistics. Transportation and packaging account for 5%. Thanks to energy generation at the plant, the indicator for electricity consumption is a mere 2%.

The situation is similar for planed timber. However, electricity consumption accounts for 13% while the other indicators are all somewhat lower.

Acidification potential (AP)

The acidification potential is similar to the eutrophication potential in terms of its distribution.

Global warming potential (GWP 100 years)

For the production of fresh timber, approximately 50% of the indicator value applies to harvesting, 27% to electricity consumption and 10% each to roundwood transportation and plant logistics.

When electricity consumption is offset against electricity generation, approximately 74% for dried rough sawn goods applies to harvesting, 7% respectively to roundwood transportation and plant logistics, 4% to electricity consumption and 9% to waste disposal. For planed wood only 34% applies to harvesting, 7% each to log wood transportation and plant logistics, 46% to electricity consumption and 6% to waste disposal.

9 Certificates

9.1 Formaldehyde

No adhesives containing formaldehyde are used. As a result, no corresponding certificate is required.

9.2 MDI

No adhesives containing MDI are used. As a result, no corresponding certificate is required.

10 PCR Document and Verification

The declaration is based on the PCR document "Solid Wood Products", base year 2010-04.

Review of the PCR document by the expert committee. Chairman of the expert committee: Prof. Dr.-Ing. Hans-Wolf Reinhardt (Stuttgart University, IWB)
Independent audit of the declaration pursuant to ISO 14025: ☐ Internal ☒ External
Validation of the declaration: Dr. Frank Werner

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Standards and laws

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