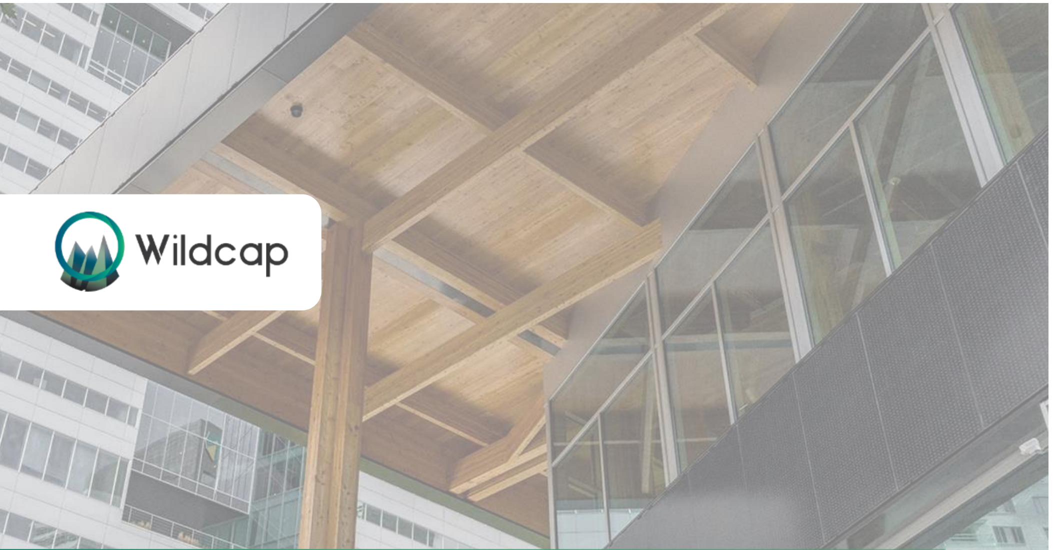

Lifecycle Analysis

Environmental Product Declaration (MRPI)

DERIX-Group

Summary
This report is designed to gain insight in the environmental performance of the DERIX-Group Glulam from the Westerkappeln/Niederkrüchten facilities and X-LAM from the Westerkappeln facility. The results from this assessment can be used as internal and external communication of the environmental impacts and benefits according to the 15804+A2 standard.

Designed for the products: **X-LAM & Glulam for the German market (100% incinerated)**
X-LAM & Glulam additional scenarios in this report: **take-back scenario with 70% being reused at the end of life stage, 100% recycled, 100% incinerated in EU**.

The analysis was carried out by **Wildcap, M. Wildschut**
Commissioned by **DERIX-Group**
Designed for program: **MPRI**
November 1st 2024

Disclaimer

This report can only be used as a whole, if part of the information is used, the user must refer to the entire report. The report is the property of the manufacturer and may not be used by third parties without the written consent of the manufacturer.

The information contained in this document is provided under the responsibility of W. u. J. Derix GmbH & Co. and conducted according to the requirements of:

- Leading PCR: EN 15804+A2:2019
- Support PCR: NMD Determination method Environmental performance Construction works v1.1 March 2022 (National EPD Database of the Netherlands)
- Support PCR: EN16485:2014 Round and sawn timber – Environmental Product Declarations – Product category rules for wood and wood-based products for use in construction
- ISO 14044:2006-10, Environmental management - Life cycle assessment – Requirements and guidelines; EN ISO 14040:2006

Comparisons based on the information from this report are only possible and valid if the starting points of the calculations and data collection are the same and it concerns the same applications, as PCRs and general program instructions of different EPDs programs may differ. Comparability always needs to be evaluated. For further guidance, see EN 15804+A2 (5.3 Comparability of EPD for construction products) and ISO 14025 (6.7.2 Requirements for comparability).

Goal

The purpose of this study is to gain insight, and build knowledge on the environmental performance of the client’s product’s lifecycles in a takeback program. The data emerging from this report is made for business-to-business communication directly and for inclusion in the Eco-platform via MRPI but can be used for business-to-consumer communication purposes. The target group is, in addition to the client, their customers and users of the platform.

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Lifecycle inventory (LCI)

Manufacturing locations:

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Dam 63 | 41372 Niederkrüchten
Phone: +49 (21 63) 89 88 – 0
info@derix.de | www.derix.de

Poppensieker & Derix GmbH & Co. KG
Industriestraße 24 | 49492 Westerkappeln
Phone: +49 (54 56) 93 03 – 0
info@derix.de | www.derix.de

Glulam is produced at both Niederkrüchten and Westerkappeln, for these production processes the weighted averages have been used from both facilities. X-LAM is based on the production facility at Westerkappeln.

Environmental certificates

International certifications can be found on https://derix.de/. PEFC chain of custody was checked at the PEFC certificate holders registry on the date of drafting this report.

Product description

The DERIX-Group is a German company group that specializes in pre-fab X-LAM and Glulam production used for construction. The products under study consists of wood which is glued and finger jointed. The product processes of the two products are almost identical, aside from the orientation of the slats and the used adhesive/hardener. The wood is all sourced sustainable, harvested from European forests and is purchased pre-dried, the wood is untreated. Glulam components are usually columns, beams and girders and X-LAM components are usually structural floors / ceilings and walls. The products is pre-fab produced, the wood is planed, dimensioned and sorted visually and/or mechanically by strength. Then, pressed and glued into larger boards, CNC machined for electrical cut-outs etc. and packaged in a thin PE film before being transported to the customer.

Glulam Dimensions (*based on min-max from both sites*)	min.	max.
length	4,00 m	60,00 m
width	3 cm	32 cm
thickness	6 cm	260 cm

Glulam technical information:
Strength classes: GL 24c for express programme standard
GL 28c / GL 30c for structural components (DIN EN 14080:2013-09)
Wood moisture: 10 ± 2 %
Adhesive: Melamine resin gluing system GripPro-Plus, approved according to DIN EN 301:2018.

X-LAM Dimensions	min.	max.
length	6,00 m	16,10 m
width	200 cm	360 cm
thickness	6 cm	40 cm

X-LAM technical information:
Spruce: C24
Wood moisture: 10 ± 2 %
Adhesive: 1C polyurethane adhesives (PUR), Classification Type I acc. the EN 15425 (2008) standard without addition of solvents and formaldehyde

Takeback Scenario (Only used for scenario B)

In the production of new DERIX components, one of the biggest loss factors is the processing of the raw timber lamellas (capping of defects, planing, finger-jointing) to the final elements. However, this step is skipped when the components are returned for re-use. Following the standard DERIX take-back guarantee (standard on each DERIX glulam or X-LAM offer), if a building featuring DERIX components is to be deconstructed / dismounted, this must be reported to DERIX 12 months in advance. Based on the component data and conditions, the component by default is set to be used for new construction projects providing a second life for the components. The component condition is determined, among other things, by visual evaluations as well as moisture and strength measurements. Only components that meet all requirements are suitable for re-use in new building projects.

Calculation
A total re-use percentage of 70% is expected as a conservative / average scenario for the End-of-Life scenario of DERIX components for structural use. 30% of losses are based on the following conservative / average estimates:

- 20% - Direct waste on site.
- 70% - Reuse scenario Derix into the refurbished product of the same quality. 5% - Incinerated, 5% - Recycled. (thus 80% will be transported to Derix for processing)

Details
Glulam components are usually columns, beams and girders. If the components are suitable for reuse, the necessary processing will be kept to a minimum. If the re-used components are used in a visible application in their second life, they are expected to be planed / sanded to refresh the surface; losses will be minimal as this only applies to a thin surface on the top layer only. If

the reused components are applied in a non-visual application (e.g. behind gypsum board), it depends on their condition whether they are planed, but in general is assumed this won't be needed. Only if necessary, CNC machining is carried out to drill any necessary holes or to adjust the length of the components for the new application. The loss of customization for a subsequent application has been taking into consideration, hence the 5% used for recycling to wood chips (leftovers pieces) and the 20% waste at the site.

X-LAM components are usually structural floors / ceilings and walls. Again depending on the extent to which the ceilings are to be visible in their second life, a decision must be made as to whether surface treatment is necessary or not. If necessary for visual applications, size and shape adjustments, cut-outs and necessary drill holes are then made through CNC machining.

In the case of walls, it is assumed that a significant proportion of the returned elements will no longer be usable due to door and window cut-outs, as long as the planning of a new building project is not based on the removed components from the donor building (i.e. design for re-use is a design paradigm in which 'harvested' elements from donor buildings make up the material / component library to design a new building from). Walls without significant cut-outs or with suitable cut-outs are processed in the same way as floors / ceilings.

For this study we assumed that all wood required some dimensioning and (electricity use of CNC/planing machines)

Declared unit

The final products are presented per m³ and based on finished products. Materials <1% are not included in this calculation. Conversion to m² for wall and flooring (100mm) and/or m^{-1} for beams (100x1000mm) can be achieved by multiplying the end results by 0,10.

Functional unit	Value	Unit
Glulam	1,00	m³
Density	*477,77*	*kg/m³*
X-LAM	1,00	m³
Density	*474,01*	*kg/m³*

Reference service life

The expected service life of construction products is >100 years [SBR, 2011]. The expected life of the construction itself. In practice the product should exceed the service life.

Allocations

Allocation for the utility usage at the factory site have been made based on production volumes. Weighted averages (volume) from the two sites (Glulam) are used for the average glue usage and wood conversion. The transport distances from wood suppliers are also based on annual supplied volumes from the sawmills. No further process specific allocations have been used outside of the build-in processes of the Ecoinvent 3.6 / NMD database.

Collection of process and product data

For this analysis the bill of materials is extracted from the manufacturer and suppliers communicated their product's material composition for which Ecoinvent is used to determine production process burdens. Production process inputs, utilities, emissions and waste quantities are determined by annual supplier invoices to and from Derix internal monitoring programs. All data is from the year 2022, annual values are always used which are most representative.

System boundaries

The LCA includes the cradle to grave (A1-D minus B4-B7) lifecycle. B1-B3 are considered zero due to the lack of maintenance required and B4-B7 are placed outside of the scope of this study. All declared values relate to the specified functional units.

Substantiation factor Q

Substantiation factor (quality loss from reuse/recycling) is set to 1 (no loss), aside from the takeback scenario where 70% is effectively reused.

A1 - A3			A4-A5		B1-B7							C1-C4				D
Product stage			Construction process stage		Use stage							End of life stage				Benefits and loads beyond the system boundary
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw material supply	Transport	Manufacturing	Transport	Construction - Installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal	Reuse, Recovery, recycling, potential
x	x	x	x	x	x	x	x	N	N	N	N	x	x	x	x	x

Figure 1: Included EN15804 modules, N = not declared

Materials and products

Materials in the final product.

Glulam – m³	
Material	% per FU
MUF glue	<1%
MUF harderer	<1%
PU Glue	<1%
Wood (Spruce PEFC)	>98%

X-LAM – m³	
Material	% per FU
PU Glue	<1%
Wood (Spruce PEFC)	>99%

Methodology and calculation methods

The LCA has been carried out in accordance with EN 15804 +A2. Taking into account the standards from the ISO 14000 series: 14025, 14040 and 14044. NEN-EN 16485 is used for general rules for environmental declarations of wood products. EN-16449 is used for calculating the biogenic carbon content in the wood.

Software and databases: SimaPro version 9.5.0.2 and the Ecoinvent database version 3.6 and NMD 3.8.

- <1% of the product by weight has been excluded from this LCA.
- Suppliers are requested to provide EPD data, the PU adhesive is based on a representable EPD.
- Metal parts (saws, drills and mills) are roughly inventoried and concluded to be <1%.

Additional information

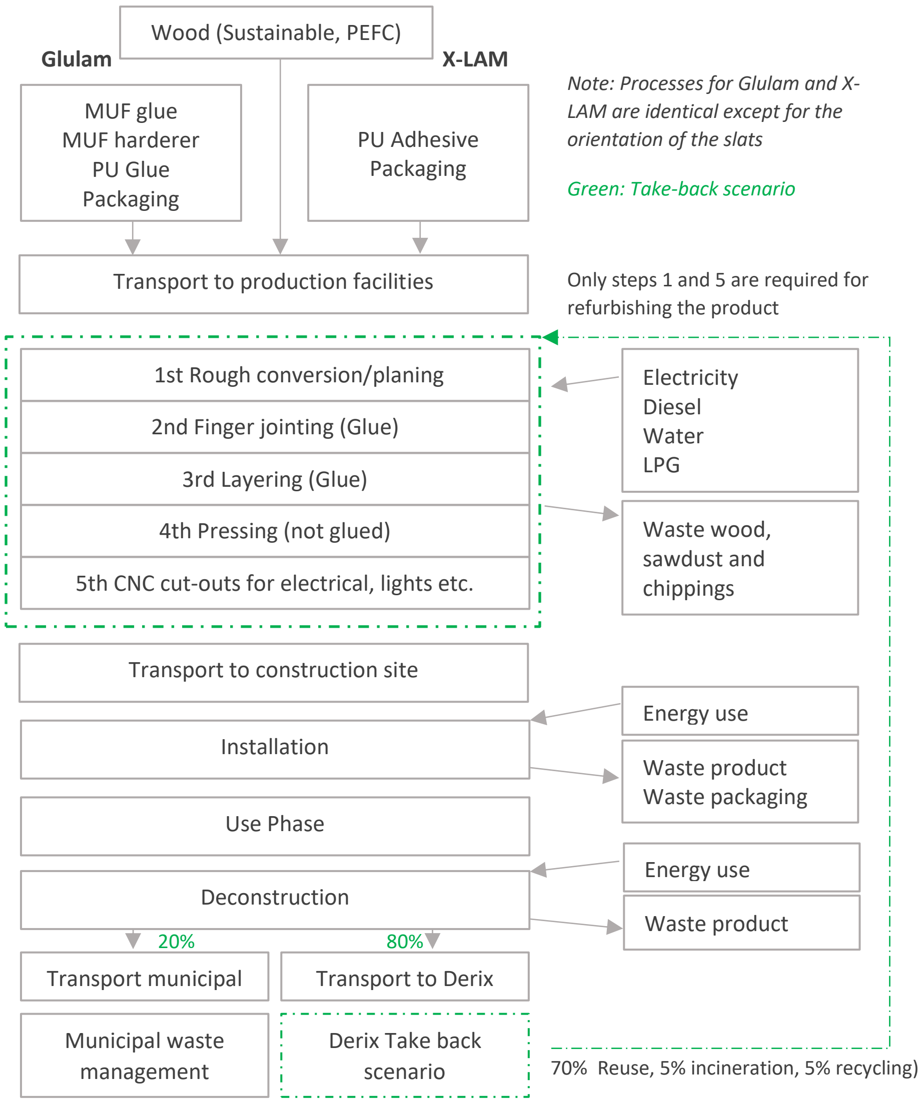
Biogenic carbon storage

Biogenic carbon storage from wood growth is shown in the calculation (A1) but does not impact the final result due to the release of carbon in the waste management phase (C3). Thus, only resulting in temporary carbon storage during the product lifecycle. The carbon content is estimated according to EN 16449. Spruce is used in combination with a moisture content of 12% and set to **770 kg CO2eq per m³,** equivalent to (12/44) = 210 kgC.. For the takeback system the biogenic carbon is set to zero to avoid unwanted (and unreasonable) +1 value due to avoided products biogenic carbon.

Scaling

Scalability per unit, other than the functional unit: The product is scalable within the boundaries described in the LCI, per thickness for flooring, and per width and thickness for columns and beams.

Figure: flowchart Derix Glulam and X-LAM



Life Cycle per phase

As the products under study are produced pre-fab, a lump sum value for waste on the construction site of 3% is assumed in the construction phase (A5).

Note: Biogenic Carbon

Biogenic carbon mass balance is executed to correct for differences input, waste processes and beneficiary energy content processes. A manual adjustment was made to result in a mass balance of +/- zero for both the Wood and linear system in correspondence with the biogenic carbon calculated with EN-16449. Also referred to as the -1/+1 method. The 1,43m3 (Glulam) and 1,23m3 (X-LAM) per FU in A1 results in a higher temporary carbon uptake in A1 in comparison to the 770kg CO2eq mentioned in the biogenic CO2eq information in this report.

Raw material supply (A1)

Production phase quantities include all materials used in the production phase in their gross weight. Product packaging for both Glulam and X-LAM is included in the functional unit, which is a mix of polyethylene (PE) film. The packaging films have been merged into 1 process due to similarities and expected insignificance to the result.

Transport (A2)

Transport movements are based on google maps distances from supplier to the production facility. Distances are from multiple suppliers, a weighted annual average has been used based on the m³ of wood supplied.

Manufacturing (A3)

The wood conversion rate of 1,43m³ input to 1 m³ final product was calculated Glulam and 1,23m³ per m³ product for X-LAM. The conversion factors are based on the annual purchasing numbers for 2022. The wood waste from this conversion is used A) directly for incineration at the site for energy / heating purposes, B) exported as wood waste for incineration/pellets and C) for reusing the wood chips for stables etc. Other waste streams are inventoried based on waste processor documentation and relevant streams have been included. Utility and material usage is described in A1 and the previous chapter. See figure: flowchart Derix Glulam and Glulam for more information on the production process.

Energy consumption

Energy consumption is based on annual invoice data for the final production facility of Derix in Germany. Purchased ‘green certificates’ for renewable electricity are used as evidence for renewable energy use, according to 15804+A2, in combination with an on-site PV installation for which metering is provided from DERIX's internal monitoring system. Biomass from the production process is used for internal heating and LPG and diesel are used for internal transport steps.

Note on a negative value for A3 GWP(fossil): Wood is processed and sawn/profiled to be transformed into the final product. The conversion and thus wood waste as an output of the production process in A3 is used for biomass energy generation, which can be compensated for (benefit) according to the calorific value in the waste product. Using the profiles allowed by 15804+A2, lead to a negative A3 indicator for GWP(fossil) and thus has quite an impact on the final result. For a scenario without processing/conversion, GWP biogenic must be adjusted to a 1 m³ input (770 kgCO2eq provided in this report) in A1 and with +/- no carbon leaving the system in A3 (no +kgCO2eq GWPb in A3), as conversion is not taken into account during manufacturing. Excluding the conversion in the model shows an GWP-fossil sum in A1-A5: Glulam = 132,94 kgCO2eq, X-LAM = 127,94 kgCO2eq.

Construction phase (A4-5)

The product is transported to the construction site. The distance to construction site is set to 1, so the user can multiply the values with their own distances per project. Truck fuel type (EURO type, 86% EURO 6) is divided based on the annual report of the transporting company specified for Derix. 3% losses from prefab waste treatment according to NMD lump sum values and waste profiles are included. Estimated use of an electric crane at 135.2 kWh per day (per 30m3 installed CLT) is used for the installation.

Transport movements A4

Transport to construction site:	km
Distance	1

Use phase (B1-7)

The product does not need additional maintenance, during it's life time, when installed and used correctly.

Disassembly and demolition (C1)

No values for demolition of wooden constructions are available as generic data or via an PCR. Therefore the impact of C1 is assumed to be equal to module A5.

Scenarios

The next stages C2-D are modelled for three different scenarios. **Scenario A**: **100% incineration**, the common scenario for 15804+A2 Glulam/X-LAM LCAs where 100% is being incinerated (as per German market). **Scenario B: The takeback system** where 80% is returned to Derix and 70% is being reused as a new product. Third, **Scenario C: 100% recycling**, showing 'what if' the wood is being recycled into MDF. **Scenario D:** (fictional 'what if' scenario) 100% incineration using EU market energy compensation processes.

Scenario used for 15804+A2 EPDs and results in this report: **Scenario A**: 100% incineration. This scenario is also shown in the results table and the end of the report.

Main results table:

- **Scenario A:** 15804+A2 approved, 100% incineration using German market energy compensation processes

Other scenarios C1-D tables:

- **Scenario B:** 15804+A2 approved, 70% Take-back (15804+A2 approved when option is chosen at the purchase of the product)
- **Scenario C:** (fictional 'what if' scenario) 100% recycled
- **Scenario D:** (fictional 'what if' scenario) 100% incineration using EU market energy compensation processes

Scenario A: 100% Incineration

Transport (C2)

Process used for all transport steps, according to NMD methodology. Lump sum values from NMD have been used for waste processing transport movements. These transport movements are used in A3, A5 and C2. Waste treatment (C3-C4)

Waste treatments per material

	Keep	Landfill	Energy/ AVI	Recycling	Reuse
Wood, untreated (DE)	*0%*	*0%*	*100%*	*0%*	*0%*

Benefits: Reuse, Recovery, recycling, potential (D)

Energy recovery

The income and expenses outside the system boundary relate to combustion in which energy use is avoided. For the estimated efficiency of the energy carrier to output, the electric yield MJ is set to 18.01% and thermal yield to 36.6%.

Scenario B: Takeback system with 70% reuse

Transport (C2)

Process used for all transport steps, according to NMD methodology. Lump sum values from NMD have been used for waste processing transport movements. These transport movements are used in A3, A5 and C2. The transport back to Derix for the take back scenario has been assumed 210km.

Waste treatment (C3-C4)

The following table has been used based on NMD methodology. According to the take-back scenario 20% is of the final product is processed in municipal waste management (100% incineration in table). 80% is transported back to Derix for the take back scenario. Divided as 5%/5%/70% shown in the table below. The wood can be processed as 'clean wood' due to the small percentage of adhesive.

Waste treatments per material (NMD lump sum values, version February_2022-2)

	Keep	Landfill	Energy/ AVI	Recycling	Reuse
Wood, untreated (DE)	*0%*	*0%*	*100%*	*0%*	*0%*
Take-back program - Derix	*0%*	*0%*	*5%*	*5%*	*70%*
polyolefinen (o.a. pe, pp)	*0%*	*10%*	*85%*	*5%*	*0%*

Benefits: Reuse, Recovery, recycling, potential (D)

Energy recovery

The income and expenses outside the system boundary relate to combustion in which energy use is avoided. For the estimated efficiency of the energy carrier to output, the electric yield MJ is set to 18.01% on and thermal yield to 36.6%.

Scenario C: 100% Recycling

Transport (C2)

Process used for all transport steps, according to NMD methodology. Lump sum values from NMD have been used for waste processing transport movements. These transport movements are used in A3, A5 and C2.

Waste treatment (C3-C4)

A fictional 'what if' scenario showing a 100% recycling end of life as a sensitivity/scenario analysis. The wood is processed to be used for board/panel production.

Waste treatments per material

	Keep	Landfill	Energy/ AVI	Recycling	Reuse
Wood, untreated	*0%*	*0%*	*0%*	*100%*	*0%*

Benefits: Reuse, Recovery, recycling, potential (D)

Energy recovery

The income and expenses outside the system boundary relate to combustion in which energy use is avoided. For the estimated efficiency of the energy carrier to output, the electric yield MJ is set to 18.01% on and thermal yield to 36.6%.

Scenario D: 100% incineration {EU} market

A separate analysis to show the differences between the German and European market profiles used for the electrical energy equivalent (benefits from burning biomass in module D). The calculation is identical to Scenario A apart from using the energy market average for the EU instead of Germany.

Data quality

The quality of the data is considered good. With economic flows qualified, quantified and a process mass balance closure of >99%. The company, process and product data is provided by the DERIX-Group. The energy and mass balance at company level could not be verified due to the complexity, but balances are shared in detail: annual energy invoicing, green certificates, materials flows, etc.

Significant waste streams are included. Material input/outputs streams are based on purchasing, waste and sales figures. A check on significance of other waste streams based on the mass balance has been executed and deemed insignificant, these figures are supported by documentation from supply chain partners.

Production processes can change over time. The information used in this LCA of the production process of the element is based on measurements and observations from 2022 (energy, waste percentages, quantities net per element, production volume). All data have been checked for topicality with the client. The most important raw material, wood, for the products described in this LCA comes from sustainably managed forests in middle and northern Europe. The calculation is made based upon the current suppliers. Other products (glue) are not tied to a specific location of raw materials.

All the data are checked on uniformity and consistency. All sources and data used is documented. Ownership: This is a protected process, however, it can be reproduced by external entities with permission.

LCA Results 15804+A2

Results shown in order:

Main results table:

- **Scenario A:** 15804+A2 approved, 100% incineration using German market energy compensation processes

Other scenarios C1-D tables:

- **Scenario B:** 15804+A2 approved, 70% Take-back (15804+A2 approved when option is chosen at the purchase of the product)
- **Scenario C:** (fictional 'what if' scenario) 100% recycled
- **Scenario D:** (fictional 'what if' scenario) 100% incineration using EU market energy compensation processes

Glulam 15804+A2 results (Scenario A: 100% incineration – {DE} Market)

Indicator	Unit	TOT	A1	A2	A3	A4	A5	B1-B7	C1	C2	C3	C4	D
051, Climate change	kg CO2 eq	-3,16E+02	-9,81E+02	4,05E+01	2,37E+02	4,49E-02	5,96E+00	0,00E+00	2,81E+00	9,68E+00	7,74E+02	0,00E+00	-4,05E+02
052, Climate change - Fossil	kg CO2 eq	-3,15E+02	1,20E+02	4,04E+01	-9,32E+01	4,48E-02	5,74E+00	0,00E+00	2,60E+00	9,67E+00	4,20E+00	0,00E+00	-4,05E+02
053, Climate change - Biogenic	kg CO2 eq	-6,92E-01	-1,10E+03	2,94E-02	3,31E+02	3,15E-05	2,02E-01	0,00E+00	2,09E-01	4,47E-03	7,69E+02	0,00E+00	-2,28E-02
054, Climate change - Land use and LU ch	kg CO2 eq	3,18E-01	5,73E-01	1,18E-02	-2,04E-02	1,42E-05	2,02E-02	0,00E+00	3,15E-03	3,54E-03	1,13E-03	0,00E+00	-2,75E-01
055, Ozone depletion	kg CFC11 eq	-2,63E-06	2,04E-05	9,50E-06	-8,97E-06	1,08E-08	8,13E-07	0,00E+00	1,02E-07	2,13E-06	5,37E-07	0,00E+00	-2,72E-05
056, Acidification	mol H+ eq	4,67E-01	8,60E-01	1,70E-01	-3,92E-02	1,66E-04	4,35E-02	0,00E+00	7,54E-03	5,61E-02	1,49E-01	0,00E+00	-7,80E-01
057, Eutrophication, freshwater	kg P eq	-2,64E-02	5,61E-03	3,08E-04	-3,25E-04	3,74E-07	5,67E-04	0,00E+00	3,94E-04	9,76E-05	8,55E-05	0,00E+00	-3,31E-02
058, Eutrophication, marine	kg N eq	3,00E-01	2,67E-01	5,11E-02	8,13E-03	4,31E-05	1,37E-02	0,00E+00	1,17E-03	1,98E-02	6,94E-02	0,00E+00	-1,30E-01
059, Eutrophication, terrestrial	mol N eq	3,31E+00	3,34E+00	5,65E-01	1,00E-01	4,79E-04	1,70E-01	0,00E+00	1,85E-02	2,18E-01	7,96E-01	0,00E+00	-1,90E+00
060, Photochemical ozone formation	kg NMVOC eq	8,91E-01	8,65E-01	1,82E-01	-1,29E-02	1,67E-04	4,28E-02	0,00E+00	3,50E-03	6,22E-02	2,08E-01	0,00E+00	-4,60E-01
061, Resource use, minerals and metals	kg Sb eq	2,54E-03	2,45E-03	6,89E-04	9,98E-05	8,61E-07	1,27E-04	0,00E+00	2,16E-05	2,45E-04	2,55E-05	0,00E+00	-1,13E-03
062, Resource use, fossils	MJ	-3,77E+03	2,26E+03	6,29E+02	-1,35E+03	7,18E-01	8,73E+01	0,00E+00	3,53E+01	1,46E+02	4,33E+01	0,00E+00	-5,62E+03
063, Water use	m3 depriv,	5,98E+01	5,86E+01	2,04E+00	4,09E+00	2,37E-03	2,14E+00	0,00E+00	1,34E-01	5,22E-01	1,53E+00	0,00E+00	-9,27E+00
064, Particulate matter	disease inc,	5,11E-05	4,66E-05	3,65E-06	3,77E-08	3,94E-09	1,60E-06	0,00E+00	2,93E-08	8,69E-07	1,20E-06	0,00E+00	-2,86E-06
065, Ionising radiation	kBq U-235 eq	1,19E+01	1,83E+01	2,75E+00	-4,80E-01	3,11E-03	7,50E-01	0,00E+00	1,11E-01	6,11E-01	1,10E-01	0,00E+00	-1,03E+01
066, Ecotoxicity, freshwater	CTUe	2,48E+03	4,80E+03	5,01E+02	-3,68E+02	5,84E-01	1,85E+02	0,00E+00	2,94E+01	1,30E+02	1,08E+02	0,00E+00	-2,91E+03
067, Human toxicity, cancer	CTUh	3,62E-07	2,32E-07	1,23E-08	3,01E-08	1,51E-11	1,33E-08	0,00E+00	6,75E-10	4,22E-09	1,41E-07	0,00E+00	-7,19E-08
068, Human toxicity, non-cancer	CTUh	2,96E-06	3,67E-06	5,69E-07	2,74E-08	6,40E-10	1,73E-07	0,00E+00	2,66E-08	1,42E-07	4,46E-07	0,00E+00	-2,09E-06
069, Land use	Pt	1,29E+05	1,28E+05	7,20E+02	-2,69E+03	7,86E-01	3,80E+03	0,00E+00	8,50E+00	1,27E+02	1,40E+01	0,00E+00	-6,24E+02
111, Energy, primary, renewable, excludi	MJ	1,34E+04	1,30E+04	0,00E+00	0,00E+00	0,00E+00	3,90E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
113, Energy, primary, renewable, materia	MJ	1,02E+04	9,87E+03	0,00E+00	0,00E+00	0,00E+00	2,96E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
101, Energy, primary, renewable (MJ)	MJ	2,30E+04	2,29E+04	7,91E+00	-1,68E+02	9,02E-03	6,88E+02	0,00E+00	6,43E+00	1,83E+00	1,93E+00	0,00E+00	-3,80E+02
112, Energy, primary, non-renewable, exc	MJ	2,52E+03	2,45E+03	0,00E+00	0,00E+00	0,00E+00	7,35E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
114, Energy, primary, non-renewable, mat	MJ	2,46E+01	2,39E+01	0,00E+00	0,00E+00	0,00E+00	7,16E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
102, Energy, primary, non-renewable (MJ)	MJ	-4,21E+03	2,41E+03	6,67E+02	-1,49E+03	7,62E-01	9,16E+01	0,00E+00	3,79E+01	1,55E+02	4,67E+01	0,00E+00	-6,13E+03
108, Secondary material (kg)	kg	1,08E-01	1,04E-01	0,00E+00	0,00E+00	0,00E+00	3,13E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
109, Secondary fuel, renewable (kg)	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
110, Secondary fuel, non-renewable (kg)	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
104, Water, fresh water use (m3)	m3	1,06E+00	1,83E+00	7,16E-02	1,32E-01	8,27E-05	8,46E-02	0,00E+00	1,61E-02	1,78E-02	2,32E-01	0,00E+00	-1,32E+00
106, Waste, hazardous (kg)	kg	1,79E-03	3,58E-03	1,52E-03	-4,53E-04	1,75E-06	2,00E-04	0,00E+00	4,43E-05	3,70E-04	1,22E-04	0,00E+00	-3,60E-03
105, Waste, non hazardous (kg)	kg	1,05E+02	4,48E+01	5,47E+01	2,42E+00	5,94E-02	3,62E+00	0,00E+00	1,48E-01	9,25E+00	3,13E+00	0,00E+00	-1,30E+01
107, Waste, radioactive (kg)	kg	7,76E-03	1,47E-02	4,29E-03	-3,30E-04	4,87E-06	7,36E-04	0,00E+00	1,42E-04	9,58E-04	1,31E-04	0,00E+00	-1,29E-02
120, Components for re-use (kg)	kg	5,10E+01	0,00E+00	0,00E+00	4,95E+01	0,00E+00	1,48E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
121, Materials for recycling (kg)	kg	1,40E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,40E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
122, Materials for energy recovery (kg)	kg	6,20E+02	0,00E+00	0,00E+00	1,24E+02	0,00E+00	1,83E+01	0,00E+00	0,00E+00	0,00E+00	4,78E+02	0,00E+00	0,00E+00
123, Exported energy, electric (MJ)	MJ	1,25E+03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,84E+01	0,00E+00	0,00E+00	0,00E+00	1,21E+03	0,00E+00	0,00E+00
124, Exported energy, thermal (MJ)	MJ	3,88E+03	0,00E+00	0,00E+00	1,30E+03	0,00E+00	1,17E+02	0,00E+00	0,00E+00	0,00E+00	2,47E+03	0,00E+00	0,00E+00

X-LAM 15804+A2 results (Scenario A: 100% incineration – {DE} Market)

Indicator	Unit	TOT	A1	A2	A3	A4	A5	B1-B7	C1	C2	C3	C4	D
051, Climate change	kg CO2 eq	-2,97E+02	-8,46E+02	3,42E+01	1,25E+02	4,39E-02	8,00E+00	0,00E+00	2,81E+00	9,60E+00	7,74E+02	0,00E+00	-4,05E+02
052, Climate change - Fossil	kg CO2 eq	-2,97E+02	1,01E+02	3,42E+01	-5,21E+01	4,39E-02	8,12E+00	0,00E+00	2,60E+00	9,60E+00	4,17E+00	0,00E+00	-4,05E+02
053, Climate change - Biogenic	kg CO2 eq	-4,87E-01	-9,47E+02	2,48E-02	1,77E+02	3,08E-05	-1,41E-01	0,00E+00	2,09E-01	4,43E-03	7,70E+02	0,00E+00	-5,06E-02
054, Climate change - Land use and LU ch	kg CO2 eq	2,51E-01	5,02E-01	9,97E-03	-1,02E-02	1,39E-05	1,61E-02	0,00E+00	3,15E-03	3,52E-03	1,12E-03	0,00E+00	-2,75E-01
055, Ozone depletion	kg CFC11 eq	-6,08E-06	1,46E-05	8,03E-06	-5,01E-06	1,06E-08	7,57E-07	0,00E+00	1,02E-07	2,12E-06	5,33E-07	0,00E+00	-2,72E-05
056, Acidification	mol H+ eq	2,23E-01	6,28E-01	1,44E-01	-1,55E-02	1,63E-04	3,61E-02	0,00E+00	7,54E-03	5,56E-02	1,48E-01	0,00E+00	-7,80E-01
057, Eutrophication, freshwater	kg P eq	-2,76E-02	4,47E-03	2,60E-04	-1,01E-04	3,67E-07	3,12E-04	0,00E+00	3,94E-04	9,68E-05	8,49E-05	0,00E+00	-3,31E-02
058, Eutrophication, marine	kg N eq	2,44E-01	2,24E-01	4,32E-02	4,77E-03	4,22E-05	1,25E-02	0,00E+00	1,17E-03	1,96E-02	6,89E-02	0,00E+00	-1,30E-01
059, Eutrophication, terrestrial	mol N eq	2,38E+00	2,57E+00	4,77E-01	5,83E-02	4,69E-04	1,43E-01	0,00E+00	1,85E-02	2,16E-01	7,90E-01	0,00E+00	-1,90E+00
060, Photochemical ozone formation	kg NMVOC eq	7,20E-01	7,21E-01	1,54E-01	-6,26E-03	1,64E-04	3,91E-02	0,00E+00	3,50E-03	6,17E-02	2,07E-01	0,00E+00	-4,60E-01
061, Resource use, minerals and metals	kg Sb eq	1,75E-03	1,72E-03	5,83E-04	1,84E-04	8,43E-07	9,55E-05	0,00E+00	2,16E-05	2,43E-04	2,53E-05	0,00E+00	-1,13E-03
062, Resource use, fossils	MJ	-3,58E+03	1,96E+03	5,31E+02	-7,61E+02	7,03E-01	9,66E+01	0,00E+00	3,53E+01	1,45E+02	4,30E+01	0,00E+00	-5,62E+03
063, Water use	m3 depriv,	2,11E+01	2,05E+01	1,73E+00	4,80E+00	2,32E-03	1,18E+00	0,00E+00	1,34E-01	5,18E-01	1,52E+00	0,00E+00	-9,31E+00
064, Particulate matter	disease inc,	4,33E-05	3,96E-05	3,08E-06	6,98E-08	3,86E-09	1,37E-06	0,00E+00	2,93E-08	8,62E-07	1,19E-06	0,00E+00	-2,86E-06
065, Ionising radiation	kBq U-235 eq	8,95E+00	1,57E+01	2,32E+00	-2,14E-01	3,05E-03	6,36E-01	0,00E+00	1,11E-01	6,06E-01	1,09E-01	0,00E+00	-1,03E+01
066, Ecotoxicity, freshwater	CTUe	3,38E+03	5,52E+03	4,23E+02	-1,46E+02	5,71E-01	2,21E+02	0,00E+00	2,94E+01	1,29E+02	1,07E+02	0,00E+00	-2,91E+03
067, Human toxicity, cancer	CTUh	4,26E-07	3,10E-07	1,04E-08	1,68E-08	1,48E-11	1,52E-08	0,00E+00	6,75E-10	4,19E-09	1,40E-07	0,00E+00	-7,19E-08
068, Human toxicity, non-cancer	CTUh	4,45E-06	5,14E-06	4,81E-07	8,51E-08	6,26E-10	2,14E-07	0,00E+00	2,66E-08	1,41E-07	4,42E-07	0,00E+00	-2,09E-06
069, Land use	Pt	1,12E+05	1,10E+05	6,08E+02	-1,59E+03	7,70E-01	3,29E+03	0,00E+00	8,50E+00	1,26E+02	1,39E+01	0,00E+00	-6,24E+02
111, Energy, primary, renewable, excludi	MJ	1,16E+04	1,12E+04	0,00E+00	0,00E+00	0,00E+00	3,37E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
113, Energy, primary, renewable, materia	MJ	8,74E+03	8,49E+03	0,00E+00	0,00E+00	0,00E+00	2,55E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
101, Energy, primary, renewable (MJ)	MJ	1,99E+04	1,97E+04	6,69E+00	-1,27E+01	8,83E-03	5,95E+02	0,00E+00	6,43E+00	1,81E+00	1,91E+00	0,00E+00	-3,80E+02
112, Energy, primary, non-renewable, exc	MJ	2,50E+03	2,43E+03	0,00E+00	0,00E+00	0,00E+00	7,28E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
114, Energy, primary, non-renewable, mat	MJ	1,08E+02	1,05E+02	0,00E+00	0,00E+00	0,00E+00	3,15E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
102, Energy, primary, non-renewable (MJ)	MJ	-4,01E+03	2,05E+03	5,64E+02	-8,44E+02	7,46E-01	1,01E+02	0,00E+00	3,79E+01	1,54E+02	4,63E+01	0,00E+00	-6,13E+03
108, Secondary material (kg)	kg	9,25E-02	8,98E-02	0,00E+00	0,00E+00	0,00E+00	2,69E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
109, Secondary fuel, renewable (kg)	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
110, Secondary fuel, non-renewable (kg)	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
104, Water, fresh water use (m3)	m3	9,46E-02	8,91E-01	6,05E-02	1,37E-01	8,10E-05	6,40E-02	0,00E+00	1,61E-02	1,76E-02	2,30E-01	0,00E+00	-1,32E+00
106, Waste, hazardous (kg)	kg	1,35E-03	2,78E-03	1,29E-03	1,66E-04	1,72E-06	1,75E-04	0,00E+00	4,43E-05	3,67E-04	1,21E-04	0,00E+00	-3,60E-03
105, Waste, non hazardous (kg)	kg	8,83E+01	3,77E+01	4,62E+01	1,72E+00	5,82E-02	3,19E+00	0,00E+00	1,48E-01	9,18E+00	3,10E+00	0,00E+00	-1,30E+01
107, Waste, radioactive (kg)	kg	1,35E-02	2,08E-02	3,63E-03	-1,19E-04	4,77E-06	8,45E-04	0,00E+00	1,42E-04	9,50E-04	1,30E-04	0,00E+00	-1,29E-02
120, Components for re-use (kg)	kg	2,95E+01	0,00E+00	0,00E+00	2,86E+01	0,00E+00	8,58E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
121, Materials for recycling (kg)	kg	4,40E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,40E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
122, Materials for energy recovery (kg)	kg	5,63E+02	0,00E+00	0,00E+00	7,15E+01	0,00E+00	1,71E+01	0,00E+00	0,00E+00	0,00E+00	4,74E+02	0,00E+00	0,00E+00
123, Exported energy, electric (MJ)	MJ	1,24E+03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,17E+01	0,00E+00	0,00E+00	0,00E+00	1,19E+03	0,00E+00	0,00E+00
124, Exported energy, thermal (MJ)	MJ	3,28E+03	0,00E+00	0,00E+00	7,50E+02	0,00E+00	1,07E+02	0,00E+00	0,00E+00	0,00E+00	2,43E+03	0,00E+00	0,00E+00

Results: Scenario Analysis - Glulam

Scenario B: Glulam 15804+A2 70% Take-back (*15804+A2 approved when option is chosen at the purchase of the product)*

Indicator	Unit	C1	C2	C3	C4	D
Climate change	kg CO2 eq	2,81E+00	1,34E+01	7,72E+02	0,00E+00	-1,59E+02
Climate change - Fossil	kg CO2 eq	2,60E+00	1,34E+01	1,38E+00	0,00E+00	-1,58E+02
Climate change - Biogenic	kg CO2 eq	2,09E-01	6,19E-03	7,70E+02	0,00E+00	-3,42E-03
Climate change - Land use and LU ch	kg CO2 eq	3,15E-03	4,91E-03	8,69E-04	0,00E+00	-4,76E-01
Ozone depletion	kg CFC11 eq	1,02E-07	2,96E-06	1,49E-07	0,00E+00	-2,22E-05
Acidification	mol H+ eq	7,54E-03	7,77E-02	3,89E-02	0,00E+00	-9,11E-01
Eutrophication, freshwater	kg P eq	3,94E-04	1,35E-04	4,12E-05	0,00E+00	-1,30E-02
Eutrophication, marine	kg N eq	1,17E-03	2,74E-02	1,76E-02	0,00E+00	-2,66E-01
Eutrophication, terrestrial	mol N eq	1,85E-02	3,02E-01	2,02E-01	0,00E+00	-3,35E+00
Photochemical ozone formation	kg NMVOC eq	3,50E-03	8,62E-02	5,29E-02	0,00E+00	-8,56E-01
Resource use, minerals and metals	kg Sb eq	2,16E-05	3,40E-04	7,18E-06	0,00E+00	-2,55E-03
Resource use, fossils	MJ	3,53E+01	2,02E+02	1,53E+01	0,00E+00	-2,62E+03
Water use	m3 depriv,	1,34E-01	7,23E-01	4,37E-01	0,00E+00	-4,78E+01
Particulate matter	disease inc,	2,93E-08	1,20E-06	3,12E-07	0,00E+00	-3,62E-05
Ionising radiation	kBq U-235 eq	1,11E-01	8,47E-01	5,03E-02	0,00E+00	-1,73E+01
Ecotoxicity, freshwater	CTUe	2,94E+01	1,80E+02	3,28E+01	0,00E+00	-4,25E+03
Human toxicity, cancer	CTUh	6,75E-10	5,85E-09	3,54E-08	0,00E+00	-2,12E-07
Human toxicity, non-cancer	CTUh	2,66E-08	1,97E-07	1,15E-07	0,00E+00	-3,56E-06
Land use	Pt	8,50E+00	1,75E+02	4,30E+00	0,00E+00	-8,98E+04

Scenario C: Glulam 100% recycled (*fictional 'what if' scenario*)

Indicator	Unit	C1	C2	C3	C4	D
Climate change	kg CO2 eq	2,81E+00	9,68E+00	7,77E+02	0,00E+00	-4,00E+01
Climate change - Fossil	kg CO2 eq	2,60E+00	9,67E+00	6,53E+00	0,00E+00	-3,95E+01
Climate change - Biogenic	kg CO2 eq	2,09E-01	4,47E-03	7,70E+02	0,00E+00	-3,46E-01
Climate change - Land use and LU ch	kg CO2 eq	3,15E-03	3,54E-03	1,17E-02	0,00E+00	-1,57E-01
Ozone depletion	kg CFC11 eq	1,02E-07	2,13E-06	2,96E-07	0,00E+00	-4,63E-06
Acidification	mol H+ eq	7,54E-03	5,61E-02	3,31E-02	0,00E+00	-2,13E-01
Eutrophication, freshwater	kg P eq	3,94E-04	9,76E-05	3,97E-04	0,00E+00	-3,00E-03
Eutrophication, marine	kg N eq	1,17E-03	1,98E-02	5,51E-03	0,00E+00	-5,85E-02
Eutrophication, terrestrial	mol N eq	1,85E-02	2,18E-01	6,27E-02	0,00E+00	-6,72E-01
Photochemical ozone formation	kg NMVOC eq	3,50E-03	6,22E-02	1,69E-02	0,00E+00	-2,02E-01
Resource use, minerals and metals	kg Sb eq	2,16E-05	2,45E-04	1,60E-05	0,00E+00	-5,58E-04
Resource use, fossils	MJ	3,53E+01	1,46E+02	8,91E+01	0,00E+00	-6,24E+02
Water use	m3 depriv,	1,34E-01	5,22E-01	1,09E+00	0,00E+00	-5,58E+00
Particulate matter	disease inc,	2,93E-08	8,69E-07	2,32E-07	0,00E+00	-5,92E-06
Ionising radiation	kBq U-235 eq	1,11E-01	6,11E-01	4,56E-01	0,00E+00	-2,91E+00
Ecotoxicity, freshwater	CTUe	2,94E+01	1,30E+02	1,16E+02	0,00E+00	-7,79E+02
Human toxicity, cancer	CTUh	6,75E-10	4,22E-09	2,37E-09	0,00E+00	-2,27E-08
Human toxicity, non-cancer	CTUh	2,66E-08	1,42E-07	6,62E-08	0,00E+00	-6,78E-07
Land use	Pt	8,50E+00	1,27E+02	1,60E+01	0,00E+00	-2,62E+04

Scenario D: Glulam 100% incineration EU market (*fictional 'what if' scenario*)

Indicator	Unit	C1	C2	C3	C4	D
Climate change	kg CO2 eq	2,81E+00	9,68E+00	7,74E+02	0,00E+00	-3,37E+02
Climate change - Fossil	kg CO2 eq	2,60E+00	9,67E+00	4,20E+00	0,00E+00	-3,37E+02
Climate change - Biogenic	kg CO2 eq	2,09E-01	4,47E-03	7,69E+02	0,00E+00	-1,53E-02
Climate change - Land use and LU ch	kg CO2 eq	3,15E-03	3,54E-03	1,13E-03	0,00E+00	-3,56E-01
Ozone depletion	kg CFC11 eq	1,02E-07	2,13E-06	5,37E-07	0,00E+00	-3,14E-05
Acidification	mol H+ eq	7,54E-03	5,61E-02	1,49E-01	0,00E+00	-1,02E+00
Eutrophication, freshwater	kg P eq	3,94E-04	9,76E-05	8,55E-05	0,00E+00	-1,60E-02
Eutrophication, marine	kg N eq	1,17E-03	1,98E-02	6,94E-02	0,00E+00	-1,44E-01
Eutrophication, terrestrial	mol N eq	1,85E-02	2,18E-01	7,96E-01	0,00E+00	-1,72E+00
Photochemical ozone formation	kg NMVOC eq	3,50E-03	6,22E-02	2,08E-01	0,00E+00	-5,16E-01
Resource use, minerals and metals	kg Sb eq	2,16E-05	2,45E-04	2,55E-05	0,00E+00	-8,19E-04
Resource use, fossils	MJ	3,53E+01	1,46E+02	4,33E+01	0,00E+00	-5,72E+03
Water use	m3 depriv,	1,34E-01	5,22E-01	1,53E+00	0,00E+00	-3,43E+01
Particulate matter	disease inc,	2,93E-08	8,69E-07	1,20E-06	0,00E+00	-2,84E-06
Ionising radiation	kBq U-235 eq	1,11E-01	6,11E-01	1,10E-01	0,00E+00	-2,73E+01
Ecotoxicity, freshwater	CTUe	2,94E+01	1,30E+02	1,08E+02	0,00E+00	-2,69E+03
Human toxicity, cancer	CTUh	6,75E-10	4,22E-09	1,41E-07	0,00E+00	-7,37E-08
Human toxicity, non-cancer	CTUh	2,66E-08	1,42E-07	4,46E-07	0,00E+00	-1,87E-06
Land use	Pt	8,50E+00	1,27E+02	1,40E+01	0,00E+00	-7,53E+02

Results: Scenario Analysis – X-LAM

Scenario B: X-LAM 15804+A2 70% Take-back (*15804+A2 approved when option is chosen at the purchase of the product)*

Indicator	Unit	C1	C2	C3	C4	D
Climate change	kg CO2 eq	2,81E+00	1,33E+01	7,72E+02	0,00E+00	-1,70E+02
Climate change - Fossil	kg CO2 eq	2,60E+00	1,33E+01	1,36E+00	0,00E+00	-1,70E+02
Climate change - Biogenic	kg CO2 eq	2,09E-01	6,14E-03	7,70E+02	0,00E+00	1,16E-01
Climate change - Land use and LU ch	kg CO2 eq	3,15E-03	4,87E-03	8,62E-04	0,00E+00	-4,33E-01
Ozone depletion	kg CFC11 eq	1,02E-07	2,93E-06	1,48E-07	0,00E+00	-1,99E-05
Acidification	mol H+ eq	7,54E-03	7,71E-02	3,86E-02	0,00E+00	-7,48E-01
Eutrophication, freshwater	kg P eq	3,94E-04	1,34E-04	4,09E-05	0,00E+00	-1,23E-02
Eutrophication, marine	kg N eq	1,17E-03	2,72E-02	1,75E-02	0,00E+00	-2,28E-01
Eutrophication, terrestrial	mol N eq	1,85E-02	3,00E-01	2,01E-01	0,00E+00	-2,72E+00
Photochemical ozone formation	kg NMVOC eq	3,50E-03	8,55E-02	5,25E-02	0,00E+00	-7,41E-01
Resource use, minerals and metals	kg Sb eq	2,16E-05	3,37E-04	7,12E-06	0,00E+00	-2,02E-03
Resource use, fossils	MJ	3,53E+01	2,01E+02	1,52E+01	0,00E+00	-2,77E+03
Water use	m3 depriv,	1,34E-01	7,17E-01	4,34E-01	0,00E+00	-2,15E+01
Particulate matter	disease inc,	2,93E-08	1,19E-06	3,09E-07	0,00E+00	-3,09E-05
Ionising radiation	kBq U-235 eq	1,11E-01	8,40E-01	4,99E-02	0,00E+00	-1,54E+01
Ecotoxicity, freshwater	CTUe	2,94E+01	1,79E+02	3,25E+01	0,00E+00	-4,86E+03
Human toxicity, cancer	CTUh	6,75E-10	5,80E-09	3,51E-08	0,00E+00	-2,56E-07
Human toxicity, non-cancer	CTUh	2,66E-08	1,96E-07	1,14E-07	0,00E+00	-4,57E-06
Land use	Pt	8,50E+00	1,74E+02	4,26E+00	0,00E+00	-7,79E+04

Scenario C: X-LAM 100% recycled (*fictional 'what if' scenario*)

Indicator	Unit	C1	C2	C3	C4	D
Climate change	kg CO2 eq	2,81E+00	9,60E+00	7,76E+02	0,00E+00	-4,07E+01
Climate change - Fossil	kg CO2 eq	2,60E+00	9,60E+00	6,47E+00	0,00E+00	-4,06E+01
Climate change - Biogenic	kg CO2 eq	2,09E-01	4,43E-03	7,69E+02	0,00E+00	-3,92E-04
Climate change - Land use and LU ch	kg CO2 eq	3,15E-03	3,52E-03	1,16E-02	0,00E+00	-1,57E-01
Ozone depletion	kg CFC11 eq	1,02E-07	2,12E-06	2,93E-07	0,00E+00	-4,68E-06
Acidification	mol H+ eq	7,54E-03	5,56E-02	3,28E-02	0,00E+00	-2,14E-01
Eutrophication, freshwater	kg P eq	3,94E-04	9,68E-05	3,94E-04	0,00E+00	-3,08E-03
Eutrophication, marine	kg N eq	1,17E-03	1,96E-02	5,46E-03	0,00E+00	-5,85E-02
Eutrophication, terrestrial	mol N eq	1,85E-02	2,16E-01	6,22E-02	0,00E+00	-6,73E-01
Photochemical ozone formation	kg NMVOC eq	3,50E-03	6,17E-02	1,67E-02	0,00E+00	-2,02E-01
Resource use, minerals and metals	kg Sb eq	2,16E-05	2,43E-04	1,59E-05	0,00E+00	-5,57E-04
Resource use, fossils	MJ	3,53E+01	1,45E+02	8,84E+01	0,00E+00	-6,39E+02
Water use	m3 depriv,	1,34E-01	5,18E-01	1,08E+00	0,00E+00	-5,61E+00
Particulate matter	disease inc,	2,93E-08	8,62E-07	2,30E-07	0,00E+00	-5,88E-06
Ionising radiation	kBq U-235 eq	1,11E-01	6,06E-01	4,53E-01	0,00E+00	-2,93E+00
Ecotoxicity, freshwater	CTUe	2,94E+01	1,29E+02	1,15E+02	0,00E+00	-7,82E+02
Human toxicity, cancer	CTUh	6,75E-10	4,19E-09	2,35E-09	0,00E+00	-2,28E-08
Human toxicity, non-cancer	CTUh	2,66E-08	1,41E-07	6,57E-08	0,00E+00	-6,80E-07
Land use	Pt	8,50E+00	1,26E+02	1,59E+01	0,00E+00	-2,60E+04

Scenario D: X-LAM 100% incineration using EU market energy compensation (*fictional 'what if' scenario*)

Indicator	Unit	C1	C2	C3	C4	D
Climate change	kg CO2 eq	2,81E+00	9,60E+00	7,74E+02	0,00E+00	-3,37E+02
Climate change - Fossil	kg CO2 eq	2,60E+00	9,60E+00	4,17E+00	0,00E+00	-3,37E+02
Climate change - Biogenic	kg CO2 eq	2,09E-01	4,43E-03	7,70E+02	0,00E+00	1,50E-02
Climate change - Land use and LU ch	kg CO2 eq	3,15E-03	3,52E-03	1,12E-03	0,00E+00	-3,56E-01
Ozone depletion	kg CFC11 eq	1,02E-07	2,12E-06	5,33E-07	0,00E+00	-3,14E-05
Acidification	mol H+ eq	7,54E-03	5,56E-02	1,48E-01	0,00E+00	-1,02E+00
Eutrophication, freshwater	kg P eq	3,94E-04	9,68E-05	8,49E-05	0,00E+00	-1,60E-02
Eutrophication, marine	kg N eq	1,17E-03	1,96E-02	6,89E-02	0,00E+00	-1,44E-01
Eutrophication, terrestrial	mol N eq	1,85E-02	2,16E-01	7,90E-01	0,00E+00	-1,72E+00
Photochemical ozone formation	kg NMVOC eq	3,50E-03	6,17E-02	2,07E-01	0,00E+00	-5,16E-01
Resource use, minerals and metals	kg Sb eq	2,16E-05	2,43E-04	2,53E-05	0,00E+00	-8,20E-04
Resource use, fossils	MJ	3,53E+01	1,45E+02	4,30E+01	0,00E+00	-5,72E+03
Water use	m3 depriv,	1,34E-01	5,18E-01	1,52E+00	0,00E+00	-3,44E+01
Particulate matter	disease inc,	2,93E-08	8,62E-07	1,19E-06	0,00E+00	-2,84E-06
Ionising radiation	kBq U-235 eq	1,11E-01	6,06E-01	1,09E-01	0,00E+00	-2,73E+01
Ecotoxicity, freshwater	CTUe	2,94E+01	1,29E+02	1,07E+02	0,00E+00	-2,69E+03
Human toxicity, cancer	CTUh	6,75E-10	4,19E-09	1,40E-07	0,00E+00	-7,37E-08
Human toxicity, non-cancer	CTUh	2,66E-08	1,41E-07	4,42E-07	0,00E+00	-1,87E-06
Land use	Pt	8,50E+00	1,26E+02	1,39E+01	0,00E+00	-7,53E+02

References

ISO 14040
ISO 14040:2006-10, Environmental management - Life cycle assessment - Principles and framework; EN ISO 14040:2006

ISO 14044
ISO 14044:2006-10, Environmental management - Life cycle assessment - Requirements and guidelines; EN ISO 14040:2006

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

ISO 16485
ISO 16804:2014: Round and sawn timber - Environmental Product Declarations - Product category rules for wood and wood-based products for use in construction

EN 15804+A2
EN 15804+A2: 2019: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products

NMD v1.1
Stichting Nationale Milieudatabase: Bepalingsmethode Milieuprestatie Bouwwerken version 1.1 (March 2022)

SHR
A. Kloppenburg (2024). SHR. Calculator of the used process: wc_Europees Naaldhout, gezaagd, gedroogd, geschaafd, duurzaam bosbeheer, Centrum Hout, 469 kg/m3, A1-A3, cat 2, (05-2028)

IBU
IBU (2022) Products based on polyurethane or silane-modified polymer, group 1. EPD-FEI-20220021-IBG1-EN

DTU
DTU (2007) Performance of old glulam structures in Europe, ISBN 9788778772527

Review statement

ECO INTELLIGENCE

LCA review by Eco Intelligence

Reviewer : Gert-Jan Vroege
Date : 25-okt-2024

I hereby confirm that, following detailed examination as independent 3rd party verifier, I have not been able to trace any relevant deviations by:

The Environmental Product Declaration (MRPI nrs): [Glulam | X-Lam] and by its project report from the requirements outlined in the corresponding product category regulations based on:

The company-specific data have been examined as regards plausibility and consistency; the declaration owner is responsible for its factual integrity.

The project report on the Life Cycle Assessment is filed at W. u. J. Derix GmbH & Co. and the report(s) on features of environmental relevance are filed at Stichting MRPI®

Gert-Jan Vroege

Place: Edam
Date: 25 October 2024

Wildcap

Declaration Wildcap

ECO Intelligence has reviewed the LCA report according to the EN15804 +A2 and therefore also on the underlying standards. This LCA report has been approved by Gert-Jan Vroege on October 25th 2024.

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