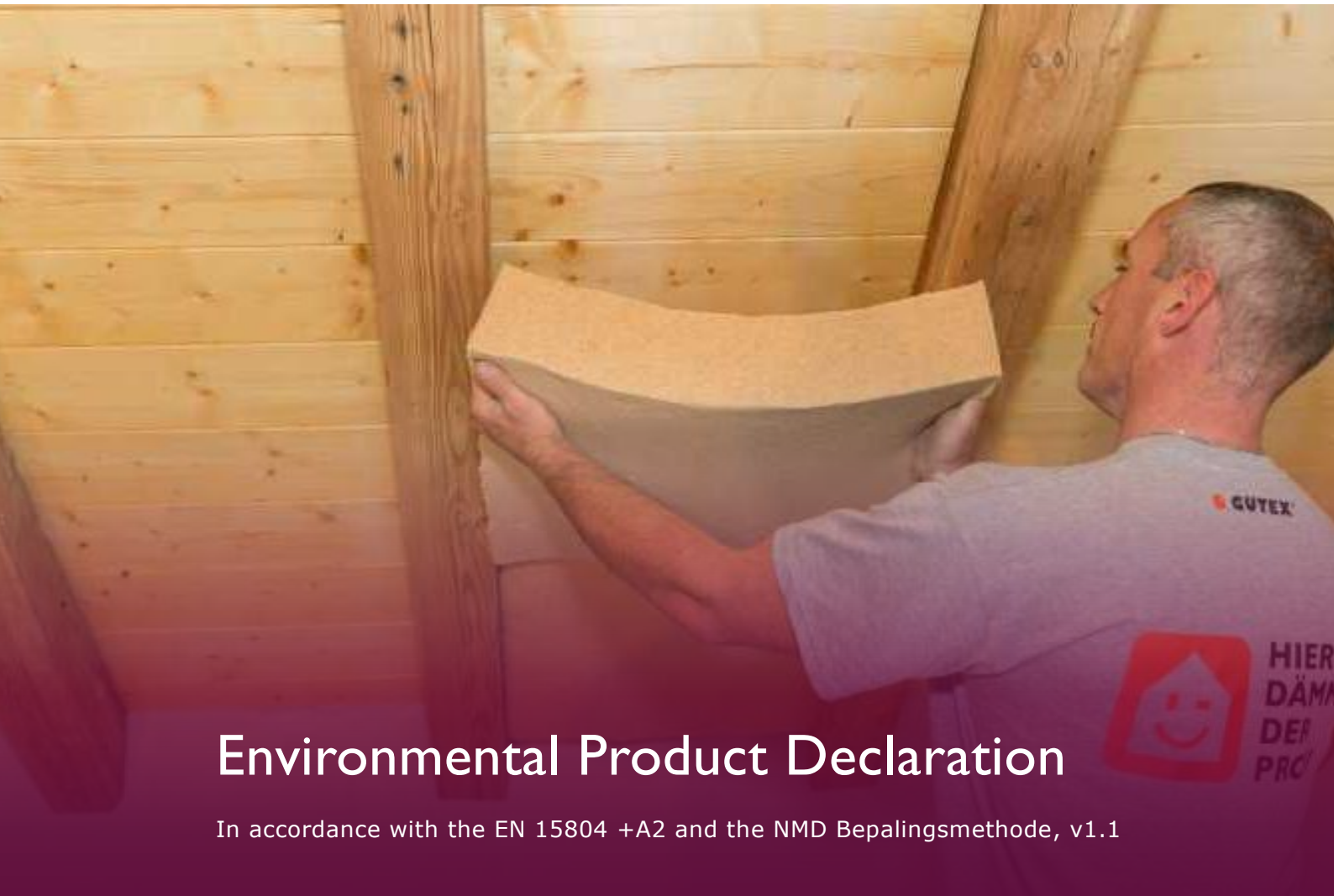
Agrodome
Advice & Development



Environmental Product Declaration

In accordance with the EN 15804 +A2 and the NMD Bepalingsmethode, v1.1

GUTEX wood fibre insulation:
Thermoflex and Thermofibre

Scope of the declaration

Type of the EPD is Cradle to grave, including modules A-D

According to the EN 15804 +A2 and the NMD Bepalingsmethode, version 1.1

The LCA was carried out by Agrodome B.V. (NL)

Based on production data from GUTEX Holzfaserplattenwerk

Release Date: 8 December 2023
Validity for: 5 years

Functional unit: 1 m²

GUTEX

Goal and target group

Goal

The declaration covers the environmental effects throughout the lifetime of the product GUTEX Thermoflex and Thermofibre wood fibre insulation.

Target audience

The EPD can be used for building or building part level assessments by designers, architects, constructors, developers etc. The EPD is made business-to-business communication and can be used for business-to-consumer communication purposes. The background EPD report is third party verified.

Product description

This EPD covers two different wood fibre insulation products:

- GUTEX Thermoflex
- GUTEX Thermofibre

GUTEX Thermoflex is a flexible thermal insulation mat. GUTEX Thermofibre is a blow-in thermal insulation.

Function of the product

Both products can be used:

- Between-stud insulation in timber frame, post and beam interior and exterior wall structures
- Between-rafter insulation
- Ceiling insulation
- Partitions/ drywall structures

Composition of GUTEX wood fibre insulation

Material	Share	
	Thermoflex	Thermofibre
Wood chips from coniferous wood: fir/spruce	89 %	97 %
Ammonium sulfate	6 %	3 %
Polyethylene terephthalate	5 %	–

Table 1: Composition GUTEX wood fibre insulation

Technical data GUTEX wood fibre insulation

Property	Value	
	Thermoflex	Thermofibre
Thickness element at R = 3,5 m^2k/W	127 mm	133 mm
Weight GUTEX wood fibre insulation	5,7 kg/m^2	4,9 kg/m^2
Density	50 kg/m^3	29-45 kg/m^3
Thermal conductivity λ	0,036 W/mK	0,038 W/mK

Vapour diffusion resistance factor µ	2	1/2
Specific heat capacity c	2100 J/kgK	2100 J/kgK
Fire resistance class according to EN 13501-1	E	E

Table 2: Technical data GUTEX wood fibre insulation

Environment and health during use phase

GUTEX Thermoflex and Thermofibre wood fibre insulation do not contain concentrations of substances or materials listed in the "Candidate List of Substances of Very High Concern for authorisation".

Environmental certificates

GUTEX wood fibre insulation has the natureplus seal of approval, license number: **0104-0604-012-2**.

Biogenic carbon storage[1]

Biogenic carbon storage during the lifetime of the products made from GUTEX wood fibre insulation:
Thermoflex, 72,91 kg CO2 eq./m^3 this makes 19,88 kg C/m^3
Thermofibre, 54,66 kg CO2 eq./m^3 this makes 14,91 kg C/m^3.

Biogenic content in Gutex wood fibre insulation, m^2

	Share biogenic carbon per m^2	
Biogenic carbon	**Thermoflex**	**Thermofibre**
Biogenic carbon in product	1,71 kg C	1,98 kg C
Biogenic carbon in packaging	0,26 kg C	0,12 kg C

Table 3: Biogenic content in Gutex wood fibre insulation, m^2

LCA calculation rules

Functional unit

One square meter of wood fibre insulation, with a lifespan of 75 years, with an insulation value, of 3,5 m^2k/W and a thickness and density in the table below.

	Thermoflex	Thermofibre
Insulation value	3,3 m^2k/W	3,5 m^2k/W
Thickness	120 mm	133 mm
Density	50 kg/m^3	29-45 kg/m^3
Weight	5,7 kg/FU	4,9 kg/FU

[1] Calculated according to the calculation method in the norm EN 16449 'Wood and wood based products - Calculation of sequestration of atmospheric carbon dioxide'.

Reference Service Life

The lifespan of the product, as declared by the manufacturer, is 75 years (the life of the building) when correctly applied as an insulation material. No maintenance is needed.

Comparability

A comparison or evaluation of the environmental performance of construction products using the EPD information is only possible if based on the product's use in and its impacts on the building, and if all datasets are made in accordance with EN 15804 and the same product-related standard properties and modules are taken into account.

System boundaries

The LCA study was created for 'Cradle to Grave A1-D' according to the modules below. All declared values relate to the specified functional unit. The functional unit of the European standard EN 15804 +A2 and the NMD - Bepalingsmethode 'Milieuprestatie Bouwwerken'are identical.
The environmental performance of building materials is categorized in four modules corresponding to different lifecycle phases in the building material; Modules A (production of materials and construction), B (use phase), C (end-of-life phase of the building) and D (loads and benefits outside the system boundary); see Figure 1.

Product stage			Construction installation stage		Use stage							End of life stage					Beyond the system boundaries
Raw materials	Transport	Manufacturing	Transport	Construction installation stage	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
☒	☒	☒	☒	☒	☒	☒	☒	☒	☒	☐	☐	☒	☒	☒	☒		☒

Figure 1: Calculated modules GUTEX wood fibre insulation

For this LCA study, all modules A1-3, A4, A5, B, C and D have been examined, except B6 and B7.

Allocations

There are no allocations of co-products from the wood fibre insulation.

Assumptions, omissions and deviations

It is assumed that no maintenance is needed when installed in the building.

No other significant assumptions, omissions or deviations were included in this LCA study.

Production process GUTEX Thermoflex and Thermofibre

The next page shows the flowchart of the production processes of GUTEX Thermoflex and Thermofibre. This flowchart lists the entire production process starting with the wood chips arriving at the factory.

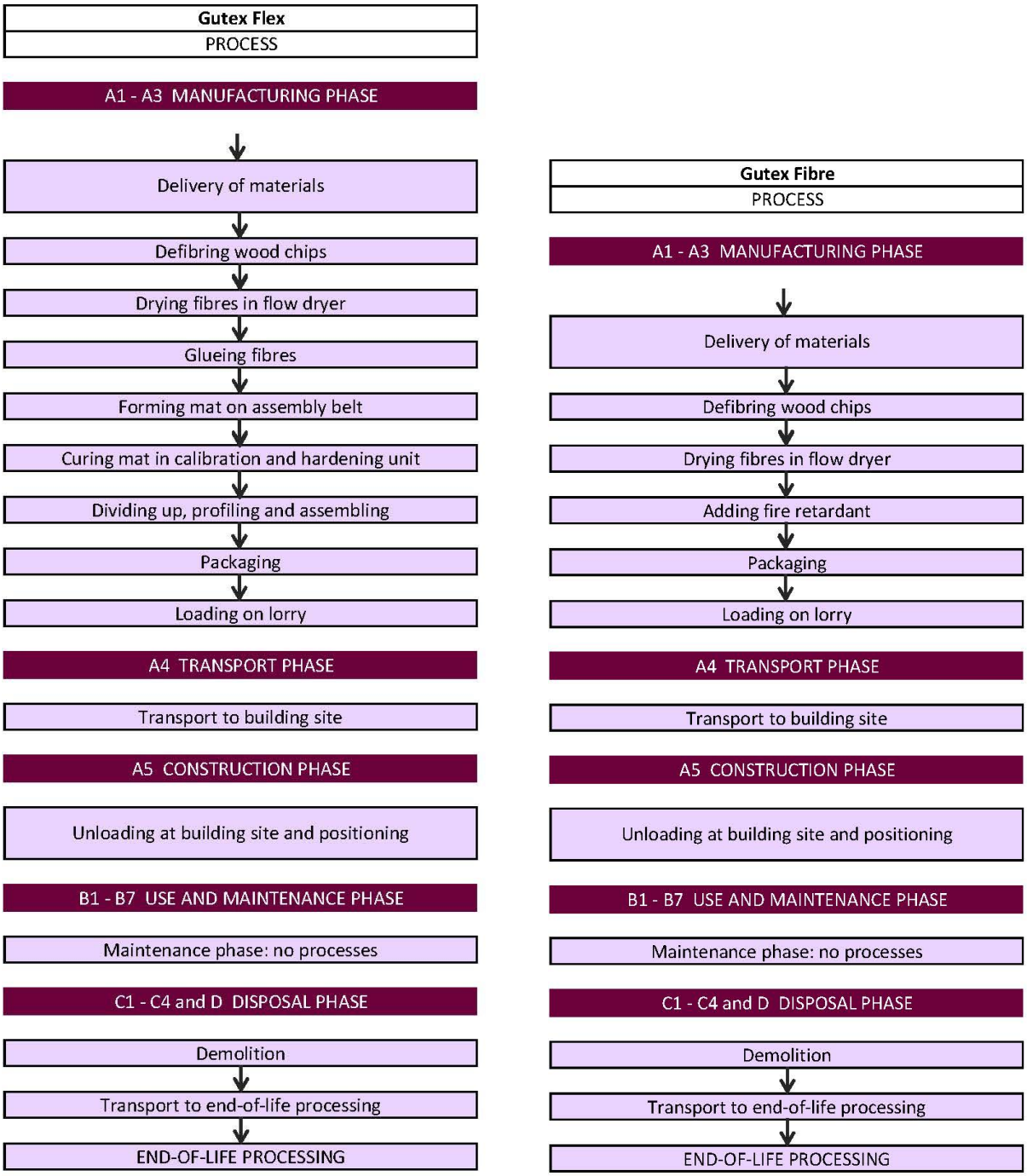


Figure 2: Flowcharts GUTEX Thermoflex (left) and Thermofibre (right)

Explanation Flowcharts and Life Cycle per phase

Production phase (A1-3)

Thermoflex and Thermofibre are produced using a dry process. For this, wood chips from coniferous wood (spruce and fir) are first defibrated and dried.

For Thermoflex, the wood chips are mixed with bicomponent fibres based on polyethylene terephthalate (PET) and copolyolefin as well as fire retardants. The fibre cake is pressed into mats and cut to size.

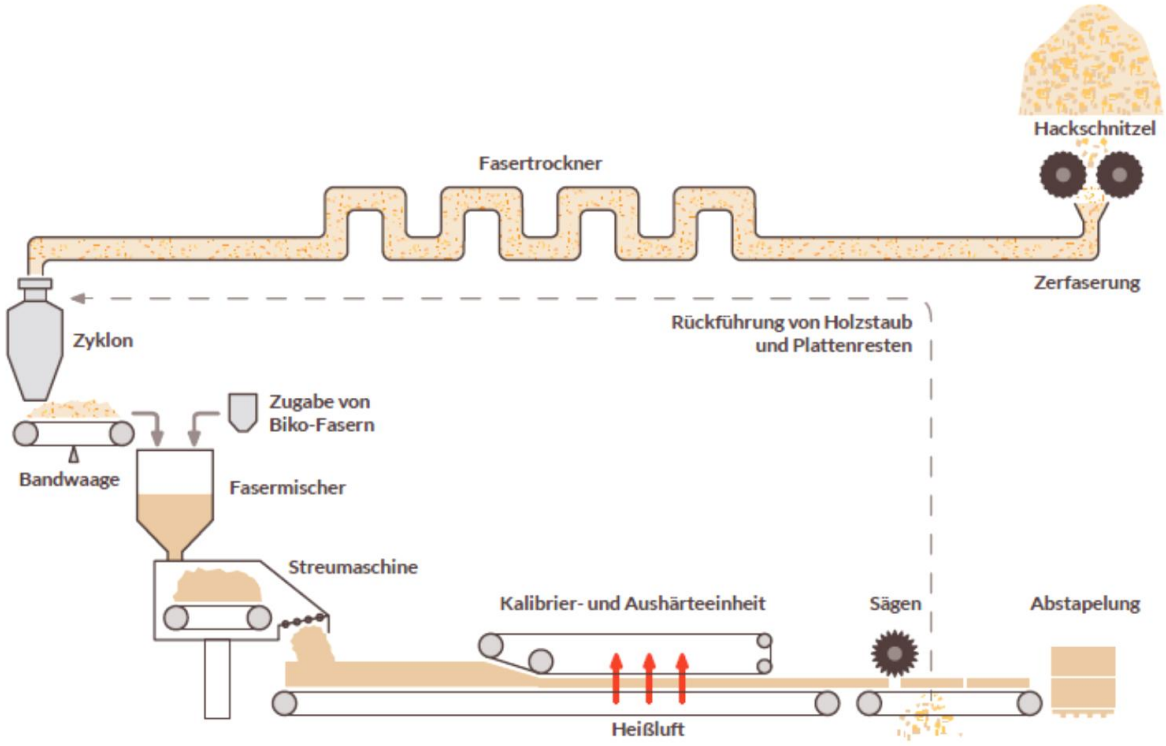


Figure 3: Thermoflex manufacturing process using the dry process

For Thermofibre, flame retardant is added and the loose flakes are compressed and packed into bags.

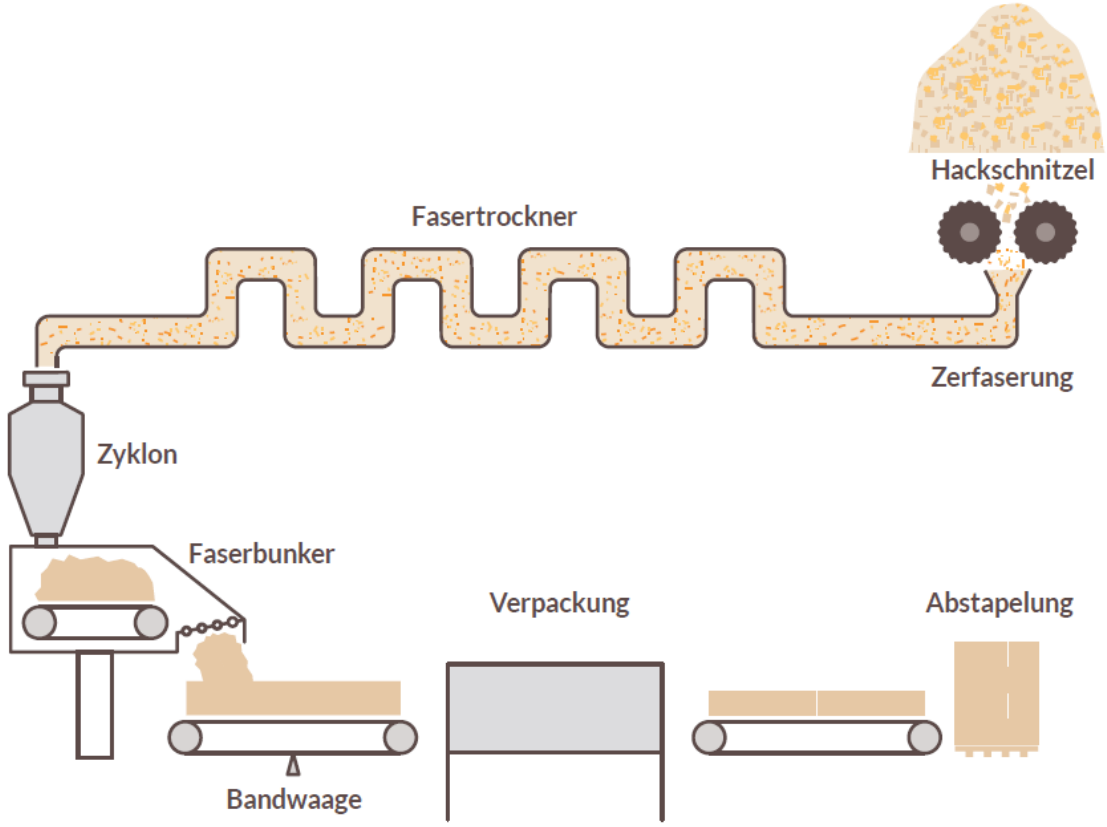


Figure 4: Thermofibre manufacturing process using the dry process

Construction process phase (A4-5)

Transport to the building site (A4)

The finished product is transported from the production site in Germany to the Netherlands. For the transport movement from Germany to the Netherlands, no empty return is applied. The default from the determination method version 1.1 is used for the transport to the building site, in this case Waldshut-Tiengen to Utrecht, the Netherlands.

Processing and construction on the construction site (A5)

At the construction site the insulation is cut to size and fitted; for this only hand tools are used. The wood fibre cut-offs and packaging materials (cardboard and PE foil) are disposed of together with other building materials. For this, the following waste scenario's were taken into account:

- wood fibre board: 5% landfill, 95% incineration
- wooden pallets: 5% landfill, 80% incineration, 15% recycling
- card board: 15% landfill, 85% incineration
- PE foil: 10% landfill, 85% incineration, 5% recycling

Use phase (B1-7)

GUTEX wood fibre insulation has a lifespan of 75 years when correctly applied as insulation material in a building. This period is equal to the Dutch standard for residential buildings. During this period, no additional maintenance is needed.

End-of-life phase (C1-4)

Disassembly and demolition (C1)

Disassembly and demolition takes place together with the demolition of all the building elements. No separate process for the wood fibre is considered.

Transport (C2)

Transport phase assumptions: the default value according to the bepalingsmethode 1.1 is used. This is 50 km to sorting installation and 100 km from demolition or sorting location to processing location. Selection of the means of transport according to the bepalingsmethode version 1.1 (Chapter 2.6.3.7, p. 20).

Waste treatment (C3-C4)

For waste processing, the distribution below and the scenarios chosen have been taken into account:

- 5% landfill, 95% incineration

Benefits and burdens outside the system boundary (D)

The benefits and burdens outside the system boundary relate to combustion in which energy use is avoided. The recycling and reuse of the attachment is also part of the benefits and burdens outside the system boundary. The efficiency of heat and electricity recovery from waste material is 31% for heat and 18% for electricity, according to the fixed values in the NMD bepalingsmethode.

LCA results

LCA results for GUTEX Thermoflex wood fibre insulation

Environmental indicators per FU (m^2) EN 15804 +A1, GUTEX Thermoflex wood fibre insulation

Potential Environmental Impacts	Production	Construction process stage		Use stage					End-of-life stage				D Reuse, recovery, recycling
	A1 Raw material A2 Transport A3 manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
ADPE (kg Sb-eq)	7,91E-05	1,70E-05	3,83E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,35E-06	3,13E-07	3,25E-08	-5,54E-06
ADPF (kg SB-eq)	4,71E-02	4,88E-03	1,60E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,65E-04	2,73E-04	3,49E-05	-3,84E-03
GWP (kg CO2-eq)	5,18E+00	6,63E-01	2,75E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,31E-01	4,91E-02	2,17E-02	-5,41E-01
ODP (kg CFC 11-eq)	4,46E-07	1,18E-07	9,03E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,33E-08	5,83E-09	7,51E-10	-1,25E-07
POCP (kg C2H4-eq)	4,05E-03	4,00E-04	4,17E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,92E-05	2,22E-04	6,77E-06	-1,21E-03
AP (kg SO2-eq)	1,84E-02	2,92E-03	2,61E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,77E-04	1,16E-03	2,00E-05	-7,66E-03
EP (kg (PO4)3-eq)	2,95E-03	5,73E-04	5,88E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,13E-04	3,00E-04	8,21E-06	-2,51E-03
HTP (kg 1,4-DB-eq)	2,35E+00	2,79E-01	3,87E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,53E-02	1,39E-01	1,87E-03	-6,62E-01
FAETP (kg 1,4-DB-eq)	9,40E-02	8,16E-03	1,53E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,61E-03	6,14E-03	3,69E-05	-1,38E-02
MAETP (kg 1,4-DB-eq)	2,07E+02	2,93E+01	3,45E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,80E+00	3,36E+00	1,33E-01	-1,89E+01
TETP (kg 1,4-DB-eq)	8,03E-03	9,87E-04	7,06E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,95E-04	1,40E-04	6,08E-06	-4,21E-03

ADPE = Abiotic Depletion Potential – Elements; ADPF = Abiotic Depletion Potential – Fossil Fuels; GWP = Global warming Potential; ODP = Ozone Depletion Potential; POCP = Photochemical Ozone Creation; AP = Acidification Potential for Soil and Water; EP = Eutrophication Potential; HTP = Human Toxicity Potential : FAETP = Fresh Aquatic Ecotoxicity Potential ; MAETP = Marine Aquatic Ecotoxicity Potential; TETP = Terrestrial Ecotoxicity Potential

Table 4: Environmental indicators per FU (m^2) EN 15804 +A1, GUTEX Thermoflex wood fibre insulation

GUTEX

Core Environmental Indicators per FU (m^2) EN 15804 +A2, GUTEX Thermoflex wood fibre insulation

Potential Environmental Impacts	Production	Construction process stage		Use stage					End-of-life stage				D Reuse, recovery, recycling
	A1 Raw material A2 Transport A3 manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
CC total (kg CO2 eq)	-1,90E+00	6,69E-01	1,23E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,32E-01	6,00E+00	3,17E-01	-5,53E-01
CC fossil (kg CO2 eq)	5,32E+00	6,69E-01	2,73E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,32E-01	4,99E-02	3,41E-03	-5,49E-01
CC biogenic (kg CO2 eq)	-7,22E+00	0,00E+00	9,59E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,95E+00	3,13E-01	0,00E+00
CC luluc (kg CO2 eq)	8,80E-03	2,45E-04	2,54E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,85E-05	1,37E-05	1,49E-06	-4,21E-03
ODP (kg CFC 11 eq)	5,25E-07	1,48E-07	9,12E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,92E-08	6,41E-09	9,39E-10	-1,29E-07
AP (mol H+ eq)	2,29E-02	3,88E-03	3,65E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,68E-04	1,71E-03	2,63E-05	-1,20E-02
EP – freshwater (kg P eq)	1,37E-04	6,75E-06	1,01E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,34E-06	1,02E-06	6,34E-08	-3,79E-05
EP – marine (kg N eq)	5,51E-03	1,37E-03	1,46E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,70E-04	7,93E-04	1,70E-05	-3,51E-03
EP – terrestrial (mol N eq)	5,13E-02	1,51E-02	1,65E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,98E-03	9,09E-03	9,75E-05	-5,74E-02
POCP (kg NMVOC eq)	1,78E-02	4,30E-03	4,36E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,51E-04	2,38E-03	3,48E-05	-1,02E-02
ADP Elements (kg Sb eq)	7,91E-05	1,70E-05	3,83E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,35E-06	3,13E-07	3,25E-08	-5,54E-06
ADP fossil fuels (MJ)	9,14E+01	1,01E+01	3,01E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,00E+00	5,08E-01	7,18E-02	-7,62E+00
WDP (m^3 water eq deprived)	1,80E+00	3,61E-02	1,66E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,14E-03	1,78E-02	3,08E-03	-5,87E-02

CC total = Climate Change total; CC fossil = Climate Change fossil; CC biogenic= Climate Change biogenic; CC-luluc = Climate Change land use and land use change; ODP = Ozone Depletion Potential; AP = Acidification Potential for Soil and Water; EP = Eutrophication Potential; POCP = Photochemical Ozone Creation; ADPE = Abiotic Depletion Potential – Elements; ADPF = Abiotic Depletion Potential – Fossil Fuels; WDP = water use (Water (user) deprivation potential, deprivation-weighted water consumption)

Table 5: Core Environmental Indicators per FU (m^2) EN 15804 +A2, GUTEX Thermoflex wood fibre insulation

GUTEX

Additional Environmental Indicators per FU (m^2) EN 15804 +A2, GUTEX Thermoflex wood fibre insulation

Potential Environmental Impacts	A1 t/m A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4	D
PM (disease incidence)	2,57E-07	6,01E-08	2,99E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,19E-08	1,38E-08	4,99E-10	-1,61E-07
IRHH (kg U235 eq)	1,33E-01	4,23E-02	1,14E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,36E-03	1,32E-03	2,81E-04	-1,99E-02
ETF (CTUe)	1,42E+02	9,00E+00	3,52E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,78E+00	1,48E+00	7,20E-02	-1,15E+02
HTCE (CTUh)	4,04E-09	2,92E-10	1,30E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,78E-11	2,11E-08	2,00E-12	-1,33E-09
HTnCE (CTUh)	5,90E-08	9,84E-09	1,78E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,95E-09	5,20E-09	7,69E-11	-4,81E-08
Land Use Related impacts (dimensionless)	9,54E+02	8,75E+00	1,31E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,73E+00	1,76E-01	1,70E-01	-4,55E+02
PERE (MJ, net calorific value)	1,74E+02	1,26E-01	-1,06E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,50E-02	-7,62E+01	1,26E-03	-9,49E+01
PERM (MJ, net calorific value)	0,00E+00	0,00E+00	1,06E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,62E+01	0,00E+00	0,00E+00
PERT (MJ, net calorific value)	1,74E+02	1,26E-01	2,60E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,50E-02	2,35E-02	1,26E-03	-9,49E+01
PENRE (MJ, net calorific value)	9,91E+01	1,07E+01	-3,85E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,12E+00	5,47E-01	7,64E-02	-8,23E+00
PENRM (MJ, net calorific value)	0,00E+00	0,00E+00	4,17E+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
PENRT (MJ, net calorific value)	9,91E+01	1,07E+01	3,21E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,12E+00	5,47E-01	7,64E-02	-8,23E+00
SM (kg)	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	0,00E+00
RSF (MJ, net calorific value)	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	0,00E+00
NRSF (MJ, net calorific value)	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	0,00E+00
FW (m^3 water eq)	4,69E-02	1,23E-03	7,85E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,43E-04	2,66E-03	7,50E-05	-1,47E-03

PM = Particulate Matter; IRHH = Ionizing Radiation – human health effects; ETF = Ecotoxicity – freshwater; HTCE = Human Toxicity – cancer effects; HTnCE = Human Toxicity – non cancer effects; PERE = use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Net use of fresh water

Table 6: Additional Environmental Indicators per FU (m^2) EN 15804 +A2, GUTEX Thermoflex wood fibre insulation

Environmental information describing output flows and waste categories per FU (m^2) EN 15804 +A2, GUTEX Thermoflex wood fibre insulation

Potential Environmental Impacts	A1 t/m A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4	D
Hazardous waste disposed (kg/FU)	1,37E-04	2,56E-05	7,04E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,06E-06	3,25E-06	1,11E-07	-1,94E-05
Non-hazardous waste disposed (kg)	6,71E-01	6,40E-01	6,67E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,27E-01	4,72E-02	2,87E-01	-1,72E-01
Radioactive waste disposed (kg)	1,54E-04	6,63E-05	1,08E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,31E-05	1,56E-06	4,27E-07	-3,00E-05
Components for reuse (kg)	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	0,00E+00
Materials for recycling (kg)	0,00E+00	0,00E+00	9,42E-02	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
Materials for energy recovery (kg)	0,00E+00	0,00E+00	5,70E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,44E+00	0,00E+00	0,00E+00
Exported energy Heat (MJ)	0,00E+00	0,00E+00	2,66E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,37E+01	0,00E+00	0,00E+00
Exported energy Energy (MJ)	0,00E+00	0,00E+00	4,58E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,36E+01	0,00E+00	0,00E+00

Table 7: Environmental information describing output flows and waste categories per FU (m^2) EN 15804 +A2, GUTEX Thermoflex wood fibre insulation

LCA results for GUTEX Thermofibre wood fibre insulation

Environmental indicators per FU (m²) EN 15804 +A1, GUTEX Thermoflex wood fibre insulation

Potential Environmental Impacts	Production	Construction process stage		Use stage					End-of-life stage				D Reuse, recovery, recycling
	A1 Raw material A2 Transport A3 manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
ADPE (kg Sb-eq)	5,07E-05	1,45E-05	1,59E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,75E-06	2,68E-07	2,79E-08	-4,49E-06
ADPF (kg SB-eq)	1,98E-02	4,18E-03	7,17E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,92E-04	2,34E-04	3,00E-05	-2,42E-03
GWP (kg CO2-eq)	2,35E+00	5,68E-01	1,09E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,08E-01	4,22E-02	1,86E-02	-3,67E-01
ODP (kg CFC 11-eq)	2,44E-07	1,01E-07	3,70E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,91E-08	5,01E-09	6,45E-10	-9,43E-08
POCP (kg C2H4-eq)	1,90E-03	3,43E-04	2,28E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,50E-05	1,90E-04	5,81E-06	-9,81E-04
AP (kg SO2-eq)	1,02E-02	2,50E-03	1,36E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,73E-04	9,93E-04	1,72E-05	-6,27E-03
EP (kg (PO4)3-eq)	1,84E-03	4,91E-04	3,19E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,30E-05	2,58E-04	7,05E-06	-2,07E-03
HTP (kg 1,4-DB-eq)	1,09E+00	2,39E-01	1,91E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,53E-02	1,19E-01	1,61E-03	-5,42E-01
FAETP (kg 1,4-DB-eq)	4,22E-02	6,99E-03	7,42E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,32E-03	5,27E-03	3,16E-05	-1,13E-02
MAETP (kg 1,4-DB-eq)	1,08E+02	2,51E+01	1,44E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,76E+00	2,89E+00	1,14E-01	-1,54E+01
TETP (kg 1,4-DB-eq)	4,03E-03	8,46E-04	3,19E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,60E-04	1,20E-04	5,22E-06	-3,46E-03

ADPE = Abiotic Depletion Potential – Elements; ADPF = Abiotic Depletion Potential – Fossil Fuels; GWP = Global warming Potential; ODP = Ozone Depletion Potential; POCP = Photochemical Ozone Creation; AP = Acidification Potential for Soil and Water; EP = Eutrophication Potential; HTP = Human Toxicity Potential : FAETP = Fresh Aquatic Ecotoxicity Potential ; MAETP = Marine Aquatic Ecotoxicity Potential; TETP = Terrestrial Ecotoxicity Potential

Table 8: Environmental indicators per FU (m²) EN 15804 +A1, GUTEX Thermoflex wood fibre insulation

GUTEX

Core Environmental Indicators per FU (m^2) EN 15804 +A2, GUTEX Thermofibre wood fibre insulation

Potential Environmental Impacts	Production	Construction process stage		Use stage					End-of-life stage				D Reuse, recovery, recycling
	A1 Raw material A2 Transport A3 manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
CC total (kg CO2 eq)	-5,30E+00	5,73E-01	5,49E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,09E-01	6,95E+00	3,66E-01	-3,76E-01
CC fossil (kg CO2 eq)	2,41E+00	5,73E-01	1,08E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,09E-01	4,29E-02	2,92E-03	-3,73E-01
CC biogenic (kg CO2 eq)	-7,71E+00	0,00E+00	4,42E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,91E+00	3,63E-01	0,00E+00
CC luluc (kg CO2 eq)	5,41E-03	2,10E-04	1,05E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,98E-05	1,17E-05	1,28E-06	-3,46E-03
ODP (kg CFC 11 eq)	2,89E-07	1,27E-07	3,76E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,40E-08	5,50E-09	8,07E-10	-9,68E-08
AP (mol H+ eq)	1,27E-02	3,32E-03	1,93E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,30E-04	1,47E-03	2,26E-05	-9,84E-03
EP – freshwater (kg P eq)	6,60E-05	5,78E-06	4,29E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,10E-06	8,78E-07	5,44E-08	-3,10E-05
EP – marine (kg N eq)	3,39E-03	1,17E-03	8,05E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,22E-04	6,81E-04	1,46E-05	-2,88E-03
EP – terrestrial (mol N eq)	2,66E-02	1,29E-02	9,09E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,45E-03	7,81E-03	8,37E-05	-4,72E-02
POCP (kg NMVOC eq)	7,94E-03	3,69E-03	2,40E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,99E-04	2,04E-03	2,99E-05	-8,30E-03
ADP Elements (kg Sb eq)	5,07E-05	1,45E-05	1,59E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,75E-06	2,68E-07	2,79E-08	-4,49E-06
ADP fossil fuels (MJ)	3,83E+01	8,64E+00	1,35E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,64E+00	4,36E-01	6,17E-02	-4,88E+00
WDP (m^3 water eq deprived)	8,56E-01	3,09E-02	7,07E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,86E-03	1,53E-02	2,64E-03	-3,99E-02

CC total = Climate Change total; CC fossil = Climate Change fossil; CC biogenic= Climate Change biogenic; CC-luluc = Climate Change land use and land use change; ODP = Ozone Depletion Potential; AP = Acidification Potential for Soil and Water; EP = Eutrophication Potential; POCP = Photochemical Ozone Creation; ADPE = Abiotic Depletion Potential – Elements; ADPF = Abiotic Depletion Potential – Fossil Fuels; WDP = water use (Water (user) deprivation potential, deprivation-weighted water consumption)

Table 9: Core Environmental Indicators per FU (m^2) EN 15804 +A2, GUTEX Thermofibre wood fibre insulation

Additional Environmental Indicators per FU (m^2) EN 15804 +A2, GUTEX Thermofibre wood fibre insulation

Potential Environmental Impacts	A1 t/m A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4	D
PM (disease incidence)	1,21E-07	5,15E-08	1,58E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,75E-09	1,18E-08	4,28E-10	-1,33E-07
IRHH (kg U235 eq)	6,25E-02	3,62E-02	4,97E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,86E-03	1,13E-03	2,41E-04	-1,57E-02
ETF (CTUe)	1,12E+02	7,71E+00	1,41E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,46E+00	1,27E+00	6,18E-02	-9,49E+01
HTCE (CTUh)	1,69E-09	2,50E-10	9,91E-10	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,74E-11	1,81E-08	1,72E-12	-1,09E-09
HTnCE (CTUh)	3,12E-08	8,43E-09	8,46E-10	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,60E-09	4,46E-09	6,60E-11	-3,96E-08
Land Use Related impacts (dimensionless)	5,82E+02	7,50E+00	6,15E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,42E+00	1,51E-01	1,46E-01	-3,75E+02
PERE (MJ, net calorific value)	1,15E+02	1,08E-01	-6,32E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,05E-02	-6,54E+01	1,08E-03	-7,82E+01
PERM (MJ, net calorific value)	0,00E+00	0,00E+00	6,33E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,54E+01	0,00E+00	0,00E+00
PERT (MJ, net calorific value)	1,15E+02	1,08E-01	1,09E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,05E-02	2,02E-02	1,08E-03	-7,82E+01
PENRE (MJ, net calorific value)	4,17E+01	9,18E+00	-1,48E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,74E+00	4,70E-01	6,56E-02	-5,23E+00
PENRM (MJ, net calorific value)	0,00E+00	0,00E+00	1,62E+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
PENRT (MJ, net calorific value)	4,17E+01	9,18E+00	1,44E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,74E+00	4,70E-01	6,56E-02	-5,23E+00
SM (kg)	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	0,00E+00
RSF (MJ, net calorific value)	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	0,00E+00
NRSF (MJ, net calorific value)	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	0,00E+00
FW (m^3 water eq)	2,20E-02	1,05E-03	3,85E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,99E-04	2,29E-03	6,44E-05	-1,08E-03

PM = Particulate Matter; IRHH = Ionizing Radiation – human health effects; ETF = Ecotoxicity – freshwater; HTCE = Human Toxicity – cancer effects; HTnCE = Human Toxicity – non cancer effects; PERE = use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Net use of fresh water

Table 10: Additional Environmental Indicators per FU (m^2) EN 15804 +A2, GUTEX Thermofibre wood fibre insulation

Environmental information describing output flows and waste categories per FU (m^2) EN 15804 +A2, GUTEX Thermofibre wood fibre insulation

Potential Environmental Impacts	A1 t/m A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4	D
Hazardous waste disposed (kg/FU)	5,93E-05	2,19E-05	3,60E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,15E-06	2,79E-06	9,49E-08	-1,43E-05
Non-hazardous waste disposed (kg)	3,38E-01	5,48E-01	3,59E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,04E-01	4,05E-02	2,47E-01	-1,41E-01
Radioactive waste disposed (kg)	7,80E-05	5,68E-05	4,82E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,08E-05	1,34E-06	3,67E-07	-2,40E-05
Components for reuse (kg)	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	0,00E+00
Materials for recycling (kg)	0,00E+00	0,00E+00	4,31E-02	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
Materials for energy recovery (kg)	0,00E+00	0,00E+00	4,90E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,67E+00	0,00E+00	0,00E+00
Exported energy Heat (MJ)	0,00E+00	0,00E+00	1,43E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,18E+01	0,00E+00	0,00E+00
Exported energy Energy (MJ)	0,00E+00	0,00E+00	2,46E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,03E+01	0,00E+00	0,00E+00

Table 11: Environmental information describing output flows and waste categories per FU (m^2) EN 15804 +A2, GUTEX Thermofibre wood fibre insulation

Representativeness of the production process

Purchase of raw materials

The most important raw material, wood fibres, is coming from sustainable managed forest in Germany (Black Forest).

Data quality

For the collection of the process and product data, information is used provided by the manufacturer, GUTEX Holzfaserplattenwerk. These data were discussed and checked by Agrodome B.V.

Energy and water consumption of equipment required for the manufacture of the products under investigation is based on consumption figures for 2018 and 2019. All data have been checked for topicality with the client in 2022.

For the materials a choice was made from the available data in the Ecoinvent database, version 3.6, and the NMD database version 3.6, based on the main ingredients.

With the exception of the manufacturing phase, standard values have been used where appropriate in accordance with Ecoinvent 3.6. or NMD. This applies in particular to transport distances, processing in the waste phase and the choice of means of transport. Return transports loaded/unloaded are as per the manufacturer's instructions. In the final processing phase, the transports were calculated according to the Bepalingsmethode version 1.1.

Production processes can change over time. The information used in this LCA of the production process of the product is based on measurements and observations from 2022 (energy, waste percentages, quantities net, production volume).

Accountability

The LCA study was conducted by Agrodome B.V. in 2022/2023.

The data provided by GUTEX have been extensively discussed with Agrodome B.V.

The final version of the LCA study has been submitted to LBP|Sight for external peer review.

The LCA is carried out according to EN 15804 +A1 and +A2 in compliance with the standards from the ISO 14000 series: 14025, 14040 and 14044. The LCA report has been tested against the Bepalingsmethode ‘Milieuprestatie Bouwwerken’, version 1.1 March 2022.

When calculating the environmental impact categories, Simapro, version 9.4.0.2 and environmental data from the NMD-basic processes database, version 3.6 October 2022 and in some cases, namely where no NMD-data were available, the Ecoinvent database, version 3.6.

When making calculations in Simapro, the long-term effects (emissions that can occur after 100 years) are not taken into account, in accordance with the Bepalingsmethode version 1.1. The effects of capital goods and infrastructural processes are included.

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

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

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

Nationale Milieudatabase
Bepalingsmethode Milieuprestatie Bouwwerken, versie 1.1 March 2022.

Sphera Solutions GmbH
Hintergrundbericht zu der EPD für GUTEX Holzfaserdämmplatten im Trockenverfahren, 2020.

Sissy Verspeek, Caroline van der Laan and Fred van der Burgh
Background report EPD, Life cycle analysis, GUTEX wood fibre insulation:
Thermoflex and Thermofibre, Agrodome B.V. Wageningen, the Netherlands

Agrodome Advice & Development	**Author of the EPD** Agrodome B.V. Generaal Foulkesweg 42 a 6703 BT Wageningen	E: W:	info@agrodome.nl www.agrodome.nl
GUTEX	**Commissioner of the EPD** GUTEX Holzfaserplattenwerk H. Henselmann GmbH + Co KG Gutenburg 5 79761 Waldshut-Tiengen Germany	E: W:	info@gutex.de www.gutex.de
LBP|SIGHT Bouw | Ruimte | Milieu	**Reviewer van de LCA background report** LBP|SIGHT Kelvinbaan 40 3439 MT Nieuwegein	E: W:	info@lbpsight.nl www.lbpsight.nl
Nationale Milieu DATABASE	**Programma P** St. Nationale Milieudatabase Postbus 1201 2280 CE Rijswijk	E: W:	info@milieudatabase.nl www.milieudatabase.nl

Declaration Agrodome B.V.

LBP|SIGHT has reviewed the LCA background report GUTEX wood fibre insulation, 2023, according to the Bepalingsmethode 'Milieuprestatie Bouwwerken' versie 1.1. as an external reviewer. This EPD is the summary of that LCA background report, to be used for external communication.
The LCA background report is approved by René Kraaijenbrink, LBP|Sight, 12 October 2023.