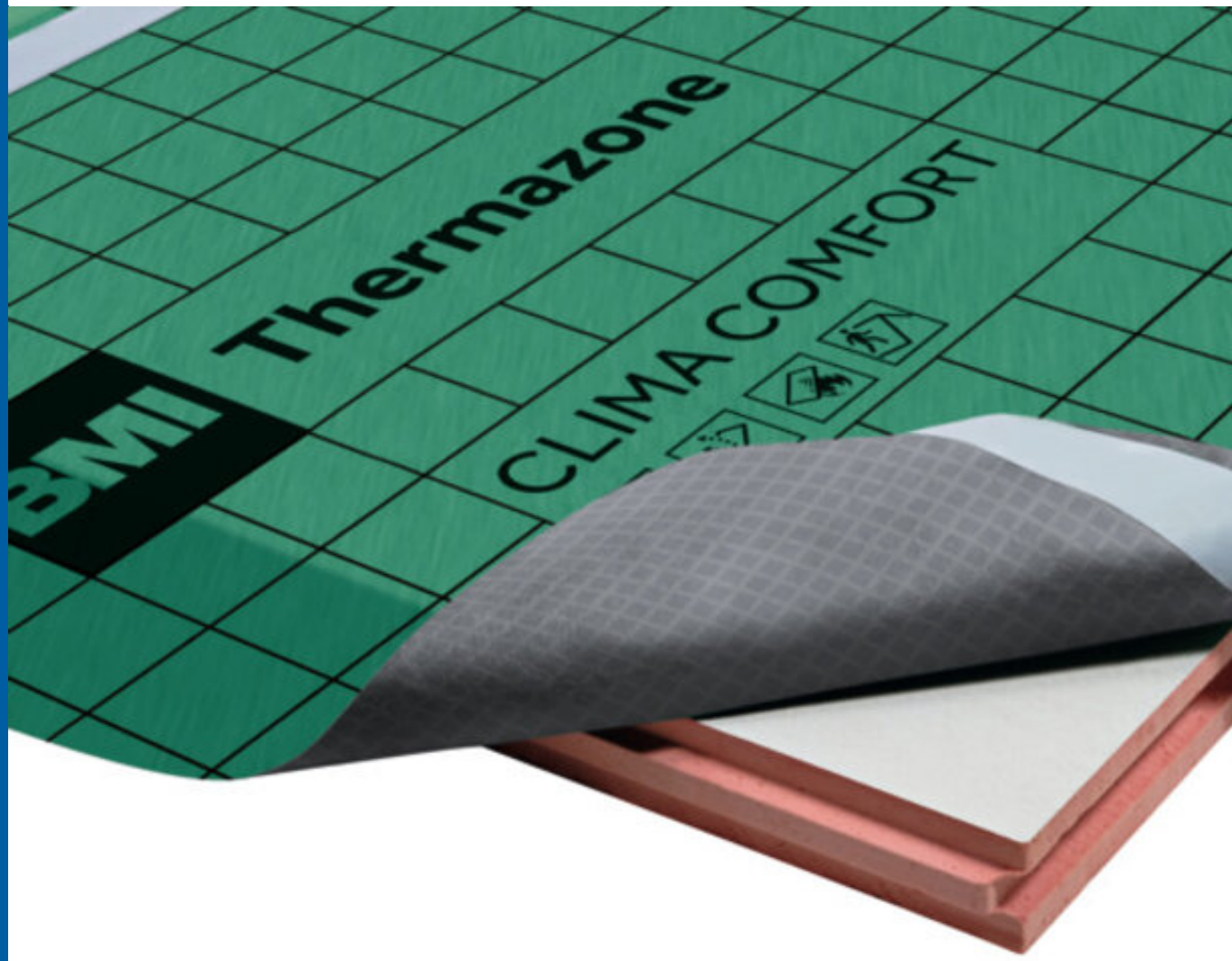
Environmental Product Declaration (EPD)
According to ISO 14025 and EN 15804+A2:2019

Clima Comfort 160 mm



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Issue date:	21-11-2025
Valid until:	21-11-2030
Declaration owner:	BMI Group Holdings UK Limited
Publisher:	Kiwa-Ecobility Experts
Programme operator:	Kiwa-Ecobility Experts
Status:	verified

1 General information

1.1 PRODUCT

Clima Comfort 160 mm

1.2 REGISTRATION NUMBER

EPD-Kiwa-EE-221368-EN

1.3 VALIDITY

Issue date: 21-11-2025

Valid until: 21-11-2030

1.4 PROGRAMME OPERATOR

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(Verification body, Kiwa-Ecobility Experts)

1.5 OWNER OF THE DECLARATION

Declaration owner: BMI Group Holdings UK Limited

Address: Thames Tower, Station Road, UK, RG1 1LX Reading

E-mail: kundservice@bmigroup.com

Website: https://bmisverige.se/

Production location: Kingspan NL

Address production location: Lingewei 8, 4004 LL Tiel, NL

1.6 VERIFICATION OF THE DECLARATION

The independent verification is in accordance with the ISO 14025:2011. The LCA is in compliance with ISO 14040:2006 and ISO 14044:2006. The EN 15804+A2:2019 serves as the core PCR.

☐ Internal ☒ External

Anne Kees Jeeninga, Advieslab

1.7 STATEMENTS

The owner of this EPD shall be liable for the underlying information and evidence. The programme operator Kiwa-Ecobility Experts shall not be liable with respect to manufacturer data, life cycle assessment data and evidence.

1.8 PRODUCT CATEGORY RULES

Kiwa-Ecobility Experts (Kiwa-EE) – General Product Category Rules (2022-02-14).

Product category rules EN 15804 +A2 NPCR 022 Part B for roof waterproofing version 2.0 Issue date: 31.03.2022 Valid to: 06.06.2023 validity extended to 31.12.2024 (PCR EPD Norge)

1.9 COMPARABILITY

In principle, a comparison or assessment of the environmental impacts of different products is only possible if they have been prepared in accordance with EN 15804+A2:2019. For the evaluation of the comparability, the following aspects have to be considered in particular: PCR used, functional or declared unit, geographical reference, the definition of the system boundary, declared modules, data selection (primary or secondary data,

1 General information

background database, data quality), scenarios used for use and disposal phases, and the life cycle inventory (data collection, calculation methods, allocations, validity period). PCRs and general program instructions of different EPD program operators may differ. Comparability needs to be evaluated. For further guidance, see EN 15804+A2:2019 and ISO 14025.

1.10 CALCULATION BASIS

LCA method R<THINK: Ecobility Experts | EN15804+A2

LCA software*: Simapro 9.6

Characterization method: RETHINK characterization method (see references for more details)

LCA database profiles: ecoinvent (for version see references)

Version database: v3.20b (2025-11-18)

** Simapro is used for calculating the characterized results of the Environmental profiles within R<THINK.*

1.11 LCA BACKGROUND REPORT

This EPD is generated on the basis of the LCA background report 'Clima Comfort 160 mm ' with the calculation identifier ReTHiNK-121368.

2 Product

2.1 PRODUCT DESCRIPTION

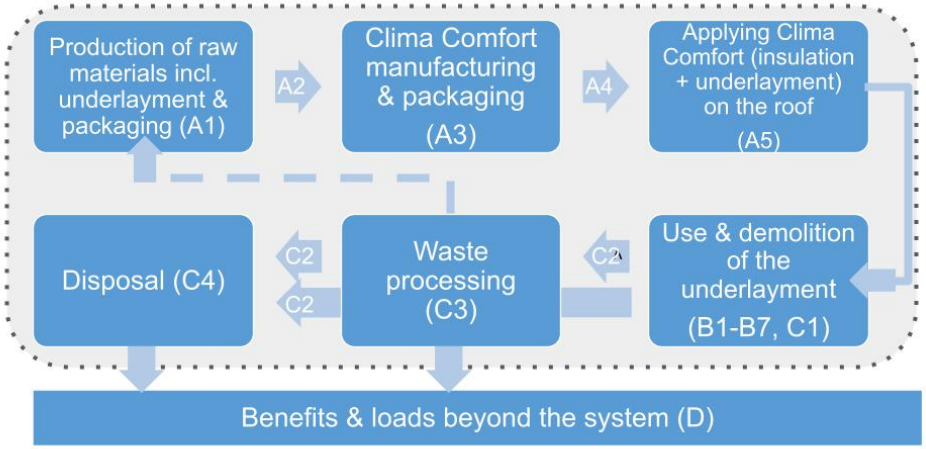
Clima Comfort insulation material utilizes a 4-layer underlayment, manufactured in the BMI factory in Ennepetal, Germany, and controlled within the laboratory facilities, to provide essential additional rain protection under the roof covering. Glued directly onto this underlayment is the insulation material, which is Kingspan's Kooltherm® K7 / Kooltherm® S7. This rigid thermoset cellular insulation is reinforced with glass fibre mesh fabrics and protected on both sides by a glass tissue-based facing. The final composite product is available in variable insulation thicknesses ranging from 60 mm up to 160 mm.

Material composition of the product:

- Insulation (Kooltherm K7) ≈ 97.7%
- Polypropylene Film ≈ 0.4%
- Polypropylene Grid ≈ 0.4%
- Polypropylene Non-woven Fabric ≈ 1.3%
- Glue ≈ 0.2%

Material composition of the Kooltherm S7 insulation:

- phenolic (PF) resin (63-73%)
- catalyst and additives (15-20%)
- blowing agent (5-7%)
- glass fleece facings and reinforcement (7-15%)



2.2 APPLICATION (INTENDED USE OF THE PRODUCT)

Kooltherm® K7 / Kooltherm® S7 is suitable for use as thermal insulation for tiled or slated pitched warm roofs. Depending on the requirements of the roof, underlay membranes are installed on a dimensionally stable base (formwork or insulation) or freely stretched underlay membranes as additional protection for the building against penetrating moisture, drifting snow and dust. They also improve the windproofness of the construction. The respective national regulations apply to their use. These include the generally recognized rules of technology, such as the technical regulations of the Central Association of German Roofing Trades, which normally guarantee flawless technical execution.

2 Product

2.3 REFERENCE SERVICE LIFE

RSL PRODUCT

Under normal conditions and when installed professionally, BMI underlayments have the same life expectancy as the product that goes on top of it being the pitched roofing.

The minimum RSL for pitched roofing is 60 years, based on the PCR of EPD Norge: 'Product category rules EN 15804 +A2 NPCR 022 Part B for roof waterproofing version 2.0 Issue date: 31.03.2022 Valid to: 06.06.2023 validity extended to 31.12.2024'. In this document expected life times are mentioned of
- 30 years for plastic and rubber sheets (like PP based underlays)
- 60 years for concrete and clay tiles

So, according to this document, the *minimum* expected lifetime for PP based underlays is 30 years. This is in line for instance with the BBA certificate valid for two Divoroll underlays https://tinyurl.com/aktzxfrz where it is stated that 'The products will be virtually unaffected by the normal conditions found in a roof space and will have a life comparable with that of a traditional roof tile underlay, provided they are not exposed to sunlight for long periods' . NB: the BBA certificate is about guarantees not about RSLs.

However, it is more logical to use an expected lifetime of 60 years for PP based underlays from BMI, like the one covered by this EPD, based on the lifetime of the product that goes on top of it, being the pitched roofing.

We assume the same life expectancy for the combination of underlay and insulation (which is glued on the back side of the underlayment, so not only protected by the tiles but also by the underlayment). This is substantiated by Katalog der Referenz-Nutzungsdauern für die Deklaration von Bauprodukten (BAU-EPD-M-DOKUMENT-20) and BNB_Nutzungsdauern_von_Bauteilen_2017-02-24 which substantiate a RSL of 50 years or more for (uncovered) insulation.

USED RSL (YR) IN THIS LCA CALCULATION:

60

RSL PARTS

same as product

2.4 TECHNICAL DATA

For the placing on the market of the insulation product in the European Union/European Free Trade Association (EU/EFTA) (with the exception of Switzerland) Regulation (EU) No. 305/2011 (CPR) applies. The product needs a declaration of performance taking into consideration EN 13166 - Thermal insulation products for buildings - Factory made phenolic foam (PF) products - Specification and the CE-marking. For the application and use the respective national provisions apply.

BMI underlay and roofing membranes are manufactured exclusively in the BMI factory in Ennepetal, Germany and subjected to controls in the BMI laboratory facilities. Generally all permeables must comply with the EN 13859-1:2010 and most non permeables with the EN 13984:2013. There are a lot of other requirements, but this is both product and country specific. More information (in German): https://www.bmigroup.com/de/unterdeckbahnen-und-zubehor/

2.5 SUBSTANCES OF VERY HIGH CONCERN

None of the substances contained in the product are listed in the "Candidate List of Substances of Very High Concern for authorisation", or they do not exceed the threshold with the European Chemicals Agency.

The main materials of the insulation product are phenolic (PF) resin (between 63-73%), a catalyst and additives (between 15-20%), a blowing agent (between 5-7%) and glass fleece facings and reinforcement (depending on the product thickness between 7-15%). Due to the closed cell structure (conform EN 13166), the blowing agent is permanent. In the current REACH regulations, phenolic foam insulation products are considered 'articles' and are exempt from the requirements of Article 57 and 59(1) of REACH Regulation (EC) No 1907/2006. These products are not classified as 'hazardous products' according to any current legislation, and can hence be declared as follows:

- This article contains no substances listed in the candidate list (date: 12.07.2024) exceeding 0.1 percentage by mass
- This article contains no other carcinogenic, mutagenic, reprotoxic (CMR) substances in categories 1A or 1B which are not on the candidate list, exceeding 0.1 percentage by mass
- No biocide products were added to this construction product or it has been treated with biocide products (this then concerns a treated product as defined by the (EU) Biocidal Products Regulation No. 528/2012 (BPR).'

The chemical functional group of the additives used in the resin is that of non-ionic surfactants.

2.6 DESCRIPTION PRODUCTION PROCESS

The product comprises an insulation core between two flexible facing layers with a roofing membrane (underlayment) attached to it.

The insulation product comprises a insulation core between two flexible facing layers. In order to manufacture the product, a mixture of liquid raw materials is poured onto the one facing layer which sits on a conveyor. The liquid raw material mixture creates a foam structure, which expands to meet the top layer of facing, which is constrained by another

2 Product

conveyor directly above it. As it expands, the foam autohesively adheres to the facing materials. Once it has reached the necessary thickness the foam is cured. The insulation boards are then cut into the necessary sizes. In a second step the roofing membrane is bonded to the insulation products. They are then packaged.

Underlayment: The preliminary products of the upper and lower fleece are already being manufactured delivered as a finished product. The upper fleece differs from the base fleece in the thickness of the fleece. The fleeces are delivered via unwinding systems supplied to the laminating station. The adhesive for lamination is melted in extruders and applied to the fleeces via wide slot nozzles in order to bond the functional membrane and the reinforcing grid. A special coating is also applied to the surface. During assembly, the tracks are made with a Logo printed and tailored. If necessary self-adhesive adhesive strips on the side edges of the strips applied lengthwise (These strips are not included in the calculation, they hardly contribute to the environmental load). To conclude the web rolls are stacked on reusable pallets and packed in foil. All raw materials/auxiliary materials used are introduced into the production facility without any harmful effects on the environment. Contamination of the environment through exhaust air, wastewater or waste is excluded when the system is operating properly. There are no dust emissions that need to be cleaned during production and packaging. The production personnel are not exposed to any health risks at any time during the production of the tracks. Residual production materials that arise, such as start-up goods or production transitions, are disposed of professionally. During the entire manufacturing process, no measures beyond the legally stipulated occupational safety and environmental protection measures for commercial operations are required. The whole production of underlays is without solvents. Even in the printing of the underlays water based colours are used.

2.7 CONSTRUCTION DESCRIPTION

the insulation panel (with underlayment) is fixed with battens and special screws to the rafter. The size and type of screws are linked to the area where the panels are installed (mountain, sea, windy area). The materials used are excluded from the calculation since these are normally included in the calculation of the pitched roofing (clay or concrete tiles). Therefore, the A5 emissions are only concerning the construction waste.

3 Calculation rules

3.1 FUNCTIONAL UNIT

m2

1 m2 average breathable underlay, 4 layers, with overlaps, glued to the insulation. The insulation is Kooltherm® K7 / Kooltherm® S7, Pitched Roof Board 1m², 100 mm thickness, RD = 4,75 m²·K/W. Application materials and processes are excluded (since these are normally included in the calculation of the product that goes on top of it, being the pitched roofing).

Reference unit: square meter (m2)

3.2 CONVERSION FACTORS

Description	Value	Unit
Reference unit	1	m2
Weight per reference unit	7.457	kg
Conversion factor to 1 kg	0.134107	m2

3.3 SCOPE OF DECLARATION AND SYSTEM BOUNDARIES

This is a Cradle to gate with options, modules C1-C4 and module D EPD. The life cycle stages included are as shown below:

(X = module included, ND = module not declared)

A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	X	X	X	ND	ND	X	X	X	X	X	X	X

The modules of the EN 15804 contain the following:

Module A1 = Raw material supply	Module B5 = Refurbishment
Module A2 = Transport	Module B6 = Operational energy use
Module A3 = Manufacturing	Module B7 = Operational water use
Module A4 = Transport	Module C1 = De-construction / Demolition
Module A5 = Construction - Installation process	Module C2 = Transport
Module B1 = Use	Module C3 = Waste Processing
Module B2 = Maintenance	Module C4 = Disposal
Module B3 = Repair	Module D = Benefits and loads beyond the product system boundaries
Module B4 = Replacement	

3.4 REPRESENTATIVENESS

This EPD is representative for {{productName}}, a product of {{owner}}. The geographical reference area for this EPD is the European Union.

3.5 CUT-OFF CRITERIA

Product stage (A1-A3)
All input flows (e.g. raw materials, transportation, energy use, packaging, etc.) and output flows (e.g. production waste) are considered in this LCA. The total neglected input flows do therefore not exceed the limit of 5% of energy use and mass. Capital goods were excluded (packaging box factory: 0,008 kg GWP. Stretching: 0,4 GWP, both less than 5%). The

3 Calculation rules

Kooltherm insulation EPD that has been used in the LCA calculation is based on the GaBi database (version CUP 2022.1.), generating an offset in the EPD.

Construction process stage (A4-A5)
All input flows (e.g. transportation to the construction site, additional raw material use for construction, installation energy (use)of energy use for assembly , etc.) and output flows (e.g. construction waste, packaging waste, etc.) are considered in this LCA. The total neglected input flows do therefore not exceed the limit of 5% of energy use and mass.

Use stage (B1-B3)
All (known) input flows (e.g. raw materials, transportation, energy use, packaging, etc.) and output flows (e.g. emissions to soil, air and water, construction waste, packaging waste, end-of-life waste, etc.) related to the building fabric are considered in this LCA. The total neglected input flows do therefore not exceed the limit of 5% of energy use and mass.

Operational energy & water use (B6-B7)
There is no operational energy or water use involved (so no effects, zero score in B6 and B7)

End of life stage (C1-C4)
All input flows (e.g. energy use for demolition or disassembly, transport to waste processing, etc.) and output flows (e.g. end-of-life waste processing of the product, etc.) are considered in this LCA. The total neglected input flows do therefore not exceed the limit of 5% of energy use and mass.

Benefits and loads beyond the system boundary (Module D)
All benefits and loads beyond the system boundary resulting from reusable products, recyclable materials and/or useful energy carriers leaving the product system are considered in this LCA.

3.6 ALLOCATION

Allocation has not been applied in this LCA.

3.7 DATA COLLECTION & REFERENCE PERIOD

Data gathering: From 2nd of November, 2024 till 14th of December 2024. Reference period underlayment: 2023

The input data for insulation production and the consumption of process energy on the manufacturing facility of the insulation was measured data during January 1st 2022 to December 31st 2022, i.e. collected over a 12 month period.

3.8 ESTIMATES AND ASSUMPTIONS

For areas where accurate data was not available, such as transport or end-of-life scenarios, default values like for transport Lorry (Truck), unspecified (default) | market group for (GLO), EcoInvent 3.9.1 and for eol polyolefines (i.a. pe,pp) (i.a. pipes, foils) (NMD ID 57) for the main product and different eols for the packaging have been used. . For waste in A5 the European PCR for thermal insulation products EN 16783 was used, in which a standard percentage of construction waste of 2% is given under paragraph 6.3.5.3.

Kooltherm insulation EPD that has been used in the LCA calculation is based on the GaBi database (version CUP 2022.1.), generating an offset in the EPD.

3.9 DATA QUALITY

The data quality is based on the principle that the data quality of the data of the processes that take place at the producer of the product must be higher than that of the other processes. For the processes at the producer, so at the factory in Ennepetal and Tiel, average product data have been used, retrieved from/ based on the ERP system. In addition to that as much as possible specific data from suppliers has been used. Every supplier was contacted. If no data were submitted background data was used.

The production process of the insulation does not deliver any coproducts. The applied software model does not contain any allocation. Production waste is sent to a waste incineration plant. Resulting electrical and thermal energy is looped inside module A1-A3 as the quality of the recovered energy is assumed to be comparable to the input energy. Environmental burden of the incineration of packaging and the product in the end of life scenario are assigned to the system (A5 or C3); resulting potential credits for thermal and electrical energy are declared in module D. Waste incineration with energy recuperation is assumed as end-of-life scenario.

3.10 POWER MIX

For energy use in the production of the underlayment, the following profile was used: Electricity (DE) - low voltage (max 1kV), residual mix, with a GWP factor of 0.575 kg CO2 per kWh.

3 Calculation rules

For energy use in the production of the insulation, the following profile was used: Electricity (NL) - low voltage (max 1kV), residual mix, with a GWP factor of 0.480 kg CO2 per kWh.

4 Scenarios and additional technical information

4.1 TRANSPORT TO CONSTRUCTION SITE (A4)

For the transport from production place to assembly/user, the following scenario is assumed for module A4 of this EPD.

	Value and unit
Vehicle type used for transport	(ei3.9.1) Lorry (Truck) >32t, EURO6 | market for (EU)
Fuel type and consumption of vehicle	not available
Distance	200 km
Capacity utilisation (including empty returns)	50 % (loaded up and return empty)
Bulk density of transported products	inapplicable
Volume capacity utilisation factor	1

4.2 ASSEMBLY (A5)

The following information describes the scenarios for flows entering the system and flows leaving the system at module A5.

FLOWS ENTERING THE SYSTEM

There are no significant environment impacts as a result of materials or energy used in the construction stage (A5).

FLOWS LEAVING THE SYSTEM

The following output flows leaving the system at module A5 are assumed.

Description	Value	Unit
Output materials as result of loss during construction	2	%
Output materials as result of waste processing of materials used for installation/assembly at the building site	0.000	kg
Output materials as result of waste processing of used packaging	0.010	kg

4.3 USE STAGE (B1)

No significant environment impact in the use stage modules, because there is no (significant) emission to air, soil or water.

4.4 MAINTENANCE (B2)

For maintenance no input or output flows are modelled.

4 Scenarios and additional technical information

4.5 REPAIR (B3)

Repairs are not applicable within the functional unit and to achieve the reference service life.

4.6 OPERATIONAL ENERGY USE (B6)

Description	Service cycle (yr)	Number of cycles (n)	Amount per cycle	Total Amount	Unit

4.7 OPERATIONAL WATER USE (B7)

Description	Service cycle (yr)	Number of cycles (n)	Amount per cycle	Total Amount	Unit

4.8 DE-CONSTRUCTION, DEMOLITION (C1)

No inputs are needed for the product at the de-construction / demolition phase

4.9 TRANSPORT END-OF-LIFE (C2)

The following distances and transport conveyance are assumed for transportation during end of life for the different types of waste processing.

Waste Scenario	Transport conveyance	Not removed (stays in work) [km]	Landfill [km]	Incineration [km]	Recycling [km]	Re-use [km]
(ei3.9.1) finishes (adhered to wood, plastic, metal) (NMD ID 2)	(ei3.9.1) Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	50
(ei3.9.1) polyolefines (i.a. pe,pp) (i.a. pipes, foils) (NMD ID 57)	(ei3.9.1) Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	50

The transport conveyance(s) used in the scenario(s) for transport during end of life has the following characteristics.

	Value and unit
Vehicle type used for transport	(ei3.9.1) Lorry (Truck), unspecified (default) | market group for (GLO)

4 Scenarios and additional technical information

Fuel type and consumption of vehicle	not available
Capacity utilisation (including empty returns)	50 % (loaded up and return empty)
Bulk density of transported products	inapplicable
Volume capacity utilisation factor	1

4.10 END OF LIFE (C3, C4)

The scenario(s) assumed for end of life of the product are given in the following tables. First the assumed percentages per type of waste processing are displayed, followed by the assumed amounts.

Waste Scenario	Region	Not removed (stays in work) [%]	Landfill [%]	Incineration [%]	Recycling [%]	Re-use [%]
(ei3.9.1) finishes (adhered to wood, plastic, metal) (NMD ID 2)	NL	0	0	100	0	0
(ei3.9.1) polyolefines (i.a. pe,pp) (i.a. pipes, foils) (NMD ID 57)	NL	0	10	85	5	0

Waste Scenario	Not removed (stays in work) [kg]	Landfill [kg]	Incineration [kg]	Recycling [kg]	Re-use [kg]
(ei3.9.1) finishes (adhered to wood, plastic, metal) (NMD ID 2)	0.000	0.000	7.288	0.000	0.000
(ei3.9.1) polyolefines (i.a. pe,pp) (i.a. pipes, foils) (NMD ID 57)	0.000	0.017	0.144	0.008	0.000
Total	**0.000**	**0.017**	**7.431**	**0.008**	**0.000**

4.11 BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY (D)

The presented Benefits and loads beyond the system boundary in this EPD are based on the following calculated Net output flows in kilograms and Energy recovery displayed in MJ Lower Heating Value.

Waste Scenario	Net output flow [kg]	Energy recovery [MJ]
(ei3.9.1) finishes (adhered to wood, plastic, metal) (NMD ID 2)	0.000	189.166
(ei3.9.1) polyolefines (i.a. pe,pp) (i.a. pipes, foils) (NMD ID 57)	0.008	4.704
Total	**0.008**	**193.870**

5 Results

For the impact assessment long-term emissions (>100 years) are not considered. The results of the impact assessment are only relative statements that do not make any statements about end-points of the impact categories, exceedance of threshold values, safety margins or risks. The following tables show the results of the indicators of the impact assessment, of the use of resources as well as of waste and other output flows.

5.1 ENVIRONMENTAL IMPACT INDICATORS PER SQUARE METER

CORE ENVIRONMENTAL IMPACT INDICATORS EN 15804+A2

Abbr.	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B6	B7	C1	C2	C3	C4	D
GWP-total	kg CO_2 eq.	1.53E+1	1.64E-1	8.10E-1	1.62E+1	1.50E-1	7.11E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.66E-1	1.78E+1	2.15E-3	-8.58E+0
GWP-f	kg CO_2 eq.	1.52E+1	1.63E-1	8.21E-1	1.62E+1	1.50E-1	6.97E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.66E-1	1.78E+1	2.15E-3	-8.58E+0
GWP-b	kg CO_2 eq.	-1.09E-1	5.36E-5	-1.53E-2	-1.24E-1	5.01E-5	1.10E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	5.40E-5	3.47E-4	1.19E-6	-8.15E-4
GWP-luluc	kg CO_2 eq.	1.78E-1	8.48E-5	4.30E-3	1.83E-1	7.30E-5	3.67E-3	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	5.91E-4	8.50E-5	1.53E-7	-6.09E-4
ODP	kg CFC 11 eq.	3.85E-8	3.63E-9	-2.62E-9	3.95E-8	3.39E-9	1.57E-9	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.95E-9	1.55E-8	4.67E-12	-4.53E-7
AP	mol H+ eq.	3.40E-2	6.65E-4	1.51E-3	3.62E-2	3.70E-4	7.88E-4	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	7.94E-4	1.67E-3	1.45E-6	-5.66E-3
EP-fw	kg P eq.	6.55E-5	1.33E-6	1.20E-5	7.88E-5	1.25E-6	1.73E-6	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.65E-6	3.26E-6	3.06E-9	-1.58E-5
EP-m	kg N eq.	8.97E-3	1.67E-4	3.61E-4	9.50E-3	9.88E-5	2.15E-4	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	3.02E-4	7.33E-4	9.54E-7	-2.14E-3
EP-T	mol N eq.	8.96E-2	1.79E-3	3.96E-3	9.54E-2	1.04E-3	2.19E-3	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	3.22E-3	8.11E-3	5.71E-6	-2.35E-2
POCP	kg NMVOC eq.	4.30E-2	8.19E-4	1.40E-3	4.52E-2	6.05E-4	9.93E-4	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.10E-3	2.10E-3	2.47E-6	-1.28E-2
ADP-mm	kg Sb-eq.	1.73E-5	4.40E-7	2.78E-6	2.05E-5	4.18E-7	4.45E-7	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	5.19E-7	5.20E-7	4.22E-10	-2.14E-6
ADP-f	MJ	4.53E+2	2.45E+0	1.10E+1	4.67E+2	2.27E+0	9.53E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.37E+0	1.82E+0	4.34E-3	-1.33E+2
WDP	m3 world eq.	2.87E+0	1.14E-2	8.55E-2	2.97E+0	1.08E-2	5.91E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.30E-2	-6.31E-2	1.82E-4	-6.66E-1

GWP-total=Global Warming Potential total (GWP-total) | **GWP-f**=Global Warming Potential fossil fuels (GWP-fossil) | **GWP-b**=Global Warming Potential biogenic (GWP-biogenic) | **GWP-luluc**=Global Warming Potential land use and land use change (GWP-luluc) | **ODP**=Depletion potential of the stratosperic ozon layer (ODP) | **AP**=Acidification potential, Accumulated Exceedance (AP) | **EP-fw**=Eutrophication potential, fraction of nutrients reaching freshwater end compartment (EP-freshwater) | **EP-m**=Eutrophication potential, fraction of nutrients reaching marine end compartment (EP-marine) | **EP-T**=Eutrophication potential, Accumulated Exceedance (EP-terrestrial) | **POCP**=Formation potential of tropospheric ozone (POCP) | **ADP-mm**=Abiotic depletion potential for non fossil resources (ADP mm) | **ADP-f**=Abiotic depletion for fossil resources potential (ADP fossil) | **WDP**=Water (user) deprication potential, deprivation-weighted water consumption (WDP)

5 Results

ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS EN 15804+A2

Abbr.	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B6	B7	C1	C2	C3	C4	D
PM	disease incidence	3.42E-7	1.54E-8	1.30E-8	3.70E-7	1.48E-8	8.39E-9	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.64E-8	1.40E-8	3.06E-11	-2.87E-8
IR	kBq U235 eq.	7.58E-1	1.15E-3	2.10E-2	7.80E-1	1.09E-3	1.57E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	9.26E-4	2.40E-3	2.39E-6	-1.23E-2
ETP-fw	CTUe	1.66E+2	1.18E+0	4.84E+0	1.73E+2	1.09E+0	3.77E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.75E+0	1.02E+1	3.24E-3	-3.61E+0
HTP-c	CTUh	8.33E-9	7.32E-11	7.73E-10	9.18E-9	6.65E-11	6.28E-10	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	8.78E-11	2.19E-8	1.19E-13	-1.01E-9
HTP-nc	CTUh	2.40E-7	1.70E-9	1.06E-8	2.52E-7	1.62E-9	6.49E-9	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.91E-9	6.73E-8	4.66E-12	-8.92E-9
SQP	Pt	3.08E+1	2.36E+0	4.76E+0	3.79E+1	2.30E+0	8.59E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.87E+0	6.70E-1	9.80E-3	-1.97E+0

PM=Potential incidence of disease due to PM emissions (PM) | **IR**=Potential Human exposure efficiency relative to U235 (IRP) | **ETP-fw**=Potential Comparative Toxic Unit for ecosystems (ETP-fw) | **HTP-c**=Potential Comparative Toxic Unit for humans (HTP-c) | **HTP-nc**=Potential Comparative Toxic Unit for humans (HTP-nc) | **SQP**=Potential soil quality index (SQP)

CLASSIFICATION OF DISCLAIMERS TO THE DECLARATION OF CORE AND ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS

ILCD classification	Indicator	Disclaimer
ILCD type / level 1	Global warming potential (GWP)	None
	Depletion potential of the stratospheric ozone layer (ODP)	None
	Potential incidence of disease due to PM emissions (PM)	None
ILCD type / level 2	Acidification potential, Accumulated Exceedance (AP)	None
	Eutrophication potential, Fraction of nutrients reaching freshwater end compartment (EP-freshwater)	None
	Eutrophication potential, Fraction of nutrients reaching marine end compartment (EP-marine)	None
	Eutrophication potential, Accumulated Exceedance (EP-terrestrial)	None
	Formation potential of tropospheric ozone (POCP)	None
	Potential Human exposure efficiency relative to U235 (IRP)	1
ILCD type / level 3	Abiotic depletion potential for non-fossil resources (ADP-minerals&metals)	2
	Abiotic depletion potential for fossil resources (ADP-fossil)	2
	Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	2
	Potential Comparative Toxic Unit for ecosystems (ETP-fw)	2

5 Results

ILCD classification	Indicator	Disclaimer
	Potential Comparative Toxic Unit for humans (HTP-c)	2
	Potential Comparative Toxic Unit for humans (HTP-nc)	2
	Potential Soil quality index (SQP)	2

Disclaimer 1 – This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

Disclaimer 2 – The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

5.2 INDICATORS DESCRIBING RESOURCE USE AND ENVIRONMENTAL INFORMATION BASED ON LIFE CYCLE INVENTORY (LCI)

PARAMETERS DESCRIBING RESOURCE USE

Abbr.	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B6	B7	C1	C2	C3	C4	D
PERE	MJ	4.82E+1	3.50E-2	2.24E+0	5.05E+1	3.32E-2	1.01E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	3.36E-2	8.37E-2	8.03E-5	-5.84E-1
PERM	MJ	0.00E+0	0.00E+0	1.12E-1	1.12E-1	0.00E+0	2.24E-3	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PERT	MJ	4.82E+1	3.50E-2	2.35E+0	5.06E+1	3.32E-2	1.02E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	3.36E-2	8.37E-2	8.03E-5	-5.84E-1
PENRE	MJ	2.33E+2	2.45E+0	5.76E+0	2.41E+2	2.27E+0	5.02E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.38E+0	1.82E+0	4.34E-3	-1.33E+2
PENRM	MJ	2.21E+2	0.00E+0	5.23E+0	2.26E+2	0.00E+0	4.52E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	-2.47E-1
PENRT	MJ	4.54E+2	2.45E+0	1.10E+1	4.67E+2	2.27E+0	9.54E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.38E+0	1.82E+0	4.34E-3	-1.33E+2
SM	Kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
RSF	MJ	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
NRSF	MJ	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
FW	m^3	1.03E-1	3.75E-4	4.57E-3	1.08E-1	3.56E-4	2.23E-3	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	5.74E-4	1.77E-3	4.45E-6	-1.02E-2

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

5 Results

OTHER ENVIRONMENTAL INFORMATION DESCRIBING WASTE CATEGORIES

Abbr.	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B6	B7	C1	C2	C3	C4	D
HWD	Kg	2.22E-4	1.51E-5	7.84E-6	2.45E-4	1.41E-5	6.39E-6	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.51E-5	2.94E-5	2.14E-8	-5.68E-4
NHWD	Kg	2.86E-1	2.03E-1	2.08E-1	6.98E-1	1.99E-1	1.81E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.57E-1	7.73E+0	1.69E-2	-1.50E-1
RWD	Kg	4.61E-3	7.23E-7	1.12E-4	4.72E-3	6.92E-7	9.45E-5	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	5.43E-7	1.75E-6	1.46E-9	-8.69E-6

HWD=Hazardous waste disposed | **NHWD**=Non-hazardous waste disposed | **RWD**=Radioactive waste disposed

ENVIRONMENTAL INFORMATION DESCRIBING OUTPUT FLOWS

Abbr.	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B6	B7	C1	C2	C3	C4	D
CRU	Kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
MFR	Kg	0.00E+0	0.00E+0	1.60E-4	1.60E-4	0.00E+0	6.42E-3	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	8.44E-3	0.00E+0	0.00E+0
MER	Kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
EET	MJ	0.00E+0	0.00E+0	1.41E+0	1.41E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	6.14E+1
EEE	MJ	0.00E+0	0.00E+0	8.16E-1	8.16E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	3.56E+1

CRU=Components for re-use | **MFR**=Materials for recycling | **MER**=Materials for energy recovery | **EET**=Exported Energy, Thermic | **EEE**=Exported Energy, Electric

5 Results

5.3 INFORMATION ON BIOGENIC CARBON CONTENT PER SQUARE METER

BIOGENIC CARBON CONTENT

The following Information describes the biogenic carbon content in (the main parts of) the product at the factory gate per square meter:

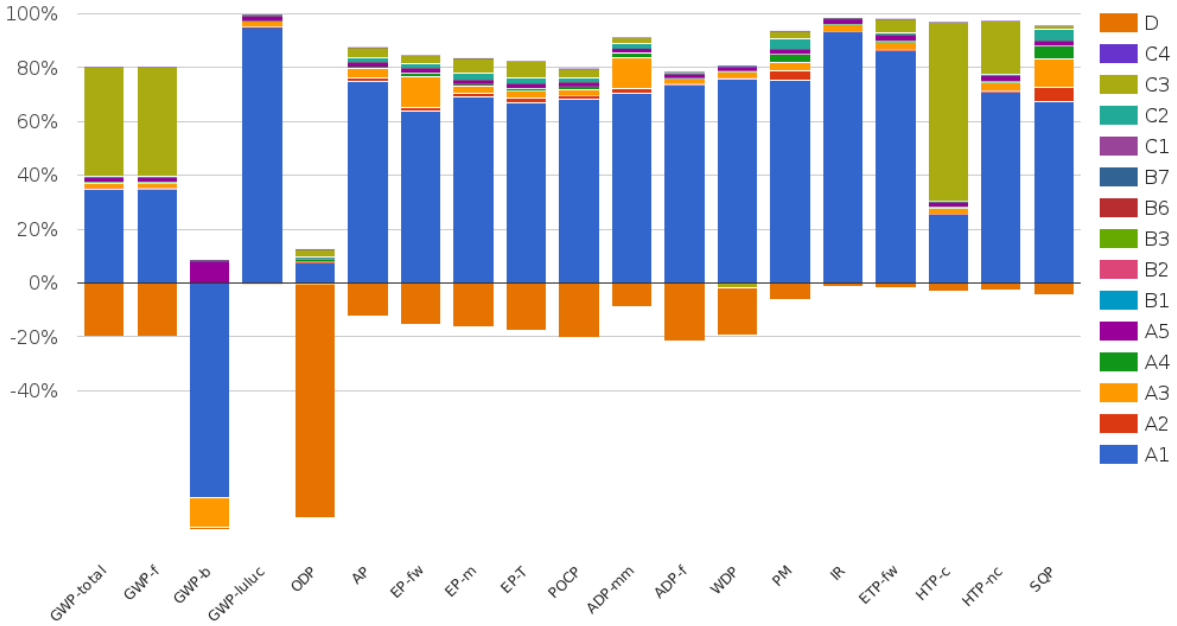
Biogenic carbon content	Amount	Unit
Biogenic carbon content in the product	0	kg C
Biogenic carbon content in accompanying packaging	0.003595	kg C

UPTAKE OF BIOGENIC CARBON DIOXIDE

The following amount of carbon dioxide uptake is taken into account. Related uptake and release of carbon dioxide in downstream processes are not taken into account in this number although they do appear in the presented results. One kilogram of biogenic Carbon content is equivalent to 44/12 kg of biogenic carbon dioxide uptake.

Uptake Biogenic Carbon dioxide	Amount	Unit
Packaging	0.01318	kg CO2 (biogenic)

6 Interpretation of results



It has been analysed what the contribution is of the modules to the total GWP per functional unit. In the next table it is shown which phase(s) contribute(s) most and how much (the (high) contribution of module A1-A3 is mainly due to module A1 (raw materials):

Phase/ module	GWP/ m2	share
A1-A3 Production	16.25	61%
A4-5 Construction	0.86	33%
C1-C4 + D End-of-life	9.42	36%
Total	**26.52**	**100%**

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

General PCR Ecobility Experts
Kiwa-Ecobility Experts (Kiwa-EE) – General Product Category Rules (2022-02-14)

Specific PCR
Product category rules EN 15804 +A2 NPCR 022 Part B for roof waterproofing version 2.0
Issue date: 31.03.2022 Valid to: 06.06.2023 validity extended to 31.12.2024 (PCR EPD Norge)

RSL substantiation insulation
BAU-EPD-M-DOKUMENT-20-Referenznutzungsdauern-Stand-20150810-Deutsch
BNB_Nutzungsdauern_von_Bauteilen_2017-02-24

Backgrounddatabase
Ecoinvent 3.9.1

BMI Catalogue
BMI Group. "Unterdeckbahnen und Zubehör." *BMI Deutschland*

8 Contact information

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