Environmental Product Declaration

Kooltherm® K120

Kooltherm® K120 comprises a fiber–free rigid thermoset phenolic insulation core, faced on both sides with a glass tissue. It is designed for use as thermal insulation in several applications.

Kingspan Insulation LLC, headquartered in Atlanta, GA is a leading manufacturer of energy efficiency and moisture management products, offering optimum-, premium- and high-performance rigid insulation, building wraps, and pre-insulated HVAC ductwork.

Kingspan Insulation LLC products are suitable for both new-build and renovation in a variety of applications in both residential and non-residential buildings.

UL CERTIFIED ENVIRONMENTAL PRODUCT DECLARATION UL.COM/EPD

ENVIRONMENTAL PRODUCT DECLARATION

Kooltherm® K120
Rigid Thermoset Phenolic Insulation

According to ISO 14025 and ISO 21930:2017

EPD PROGRAM AND PROGRAM OPERATOR NAME, ADDRESS, LOGO, AND WEBSITE	UL Solutions www.ul.com 333 Pfingsten Rd, Northbrook, IL, 60062 www.spot.ul.com
GENERAL PROGRAM INSTRUCTIONS AND VERSION NUMBER	Program Operator Rules v.2.7 2022
MANUFACTURER NAME AND ADDRESS	Kingspan Insulation Limited Pembridge, Leominster Herefordshire, UK
IMPORTER NAME AND ADDRESS	Kingspan Insulation LCC 2100 Riveredge Parkway, Suite 175 Atlanta, Georgia, USA 30328
DECLARATION NUMBER	4792024208.102.1
DECLARED PRODUCT & FUNCTIONAL UNIT OR DECLARED UNIT	1m² of insulation with a thermal resistance (RSI) = 1m²K/W (thickness = 18mm)
REFERENCE PCR AND VERSION NUMBER	Part A: Life Cycle Assessment Calculation Rules and Report Requirements, UL 10010, Version 4.0, 2022 Part B: Building Envelope Thermal Insulation EPD Requirements, UL 10010-1, Edition 3.0, 2024 ISO 21930:2017 Sustainability in buildings and civil engineering works — Core rules for environmental product declarations of construction products and services
DESCRIPTION OF PRODUCT APPLICATION/USE	Kooltherm phenolic thermal insulation
PRODUCT RSL DESCRIPTION (IF APPL.)	Dictated by the estimated life of the building in which installed, 75 years
MARKETS OF APPLICABILITY	Residential and non-residential applications
DATE OF ISSUE	December 15th, 2025
PERIOD OF VALIDITY	5 Years
EPD TYPE	Product-specific
RANGE OF DATASET VARIABILITY	n/a
EPD SCOPE	Cradle to gate with options (A1-A3, A4-A5, C1-C4, D)
YEAR(S) OF REPORTED PRIMARY DATA	2022
LCA SOFTWARE & VERSION NUMBER	One Click LCA, Version: 0.45.0
LCI DATABASE(S) & VERSION NUMBER	Ecoinvent v3.10.1
LCIA METHODOLOGY & VERSION NUMBER	IPCC AR5, TRACI 2.1, EN15804+A2 (EF3.1)
The PCR review was conducted by:	UL Solutions PCR Review Panel epd@ul.com
This declaration was independently verified in accordance with ISO 14025: 2010. ☐ INTERNAL ☒ EXTERNAL	Cooper McCollum, UL Solutions
This life cycle assessment was conducted in accordance with ISO 14044:2006 and the reference PCR by:	One Click LCA
This life cycle assessment was independently verified in accordance with ISO 14044:2006 and the reference PCR by:	Maggie Wildnauer, WAP Sustainability

LIMITATIONS

Exclusions: EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds – e.g. Type 1 certifications, health assessments and declarations, environmental impact assessments, etc.

Accuracy of Results: EPDs regularly rely on estimations of impacts; the level of accuracy in estimation of effect differs for any particular product line and reported impact.

Comparability: EPDs from different programs may not be comparable. Full conformance with a PCR allows EPD comparability only when all stages of a life cycle have been considered. However, variations and deviations are possible". Example of variations: Different LCA software and background LCI datasets may lead to differences results for upstream or downstream of the life cycle stages declared.

1. Product Definition and Information

1.1. Description of Company/Organization

Kingspan Insulation LLC, headquartered in Atlanta, GA is a leading manufacturer of energy efficiency and moisture management products, offering optimum-, premium- and high-performance rigid insulation, building wraps, and pre-insulated HVAC ductwork.

Kingspan Insulation LLC products are suitable for both new-build and renovation in a variety of applications in both residential and non-residential buildings.

1.2. Product Description

Kooltherm® K120 is a premium performance insulation product manufactured at Kingspan Insulation Limited's production facility in Pembridge, United Kingdom. It is distributed in North America by Kingspan Insulation LLC. Kingspan Insulation LLC and Kingspan Insulation Limited are both part of the Kingspan Group plc. The product comprises a fiber–free rigid thermoset phenolic insulation core, faced on both sides with a glass tissue. It is used for thermal insulation in a number of applications.

The product is manufactured to tightly controlled specifications. The functional and technical performance of the product, as stated in the relevant product literature, will remain the same throughout the reference service life of 75 years, on the assumption that it has been properly installed as per Kingspan's guidance, and has remained clean and dry.

Kooltherm® K120 is available in several thicknesses, each with a different R-value.

Thickness (mm)	Thickness (in)	Thermal Resistance R (ft²·°F·h/BTU)
40	1.57	13.1
50	1.97	16.3
60	2.36	19.6
63.5	2.50	20.8
70	2.76	22.9
75	2.95	24.5
80	3.15	26.1
90	3.54	29.4
100	3.94	32.7

The results in this declaration are for the reference product with a functional unit of 1m² of insulation with a thermal resistance (RSI) = 1m²K/W. This is a hypothetical product thickness (18mm) and is not manufactured or offered for sale. In order to calculate the impact data for the thicknesses of the product that are manufactured and offered for sale, a scaling methodology is provided.

A full explanation of the scaling methodology and a summary of the impact data for the thicknesses of the product which are manufactured and offered for sale can be found in Appendices 1 and 2.

1.3. Application

Kooltherm® K120 is used for thermal insulation in several applications, for example in pre-cast concrete sandwich walls and internal insulation of walls, in both residential and non-residential buildings.

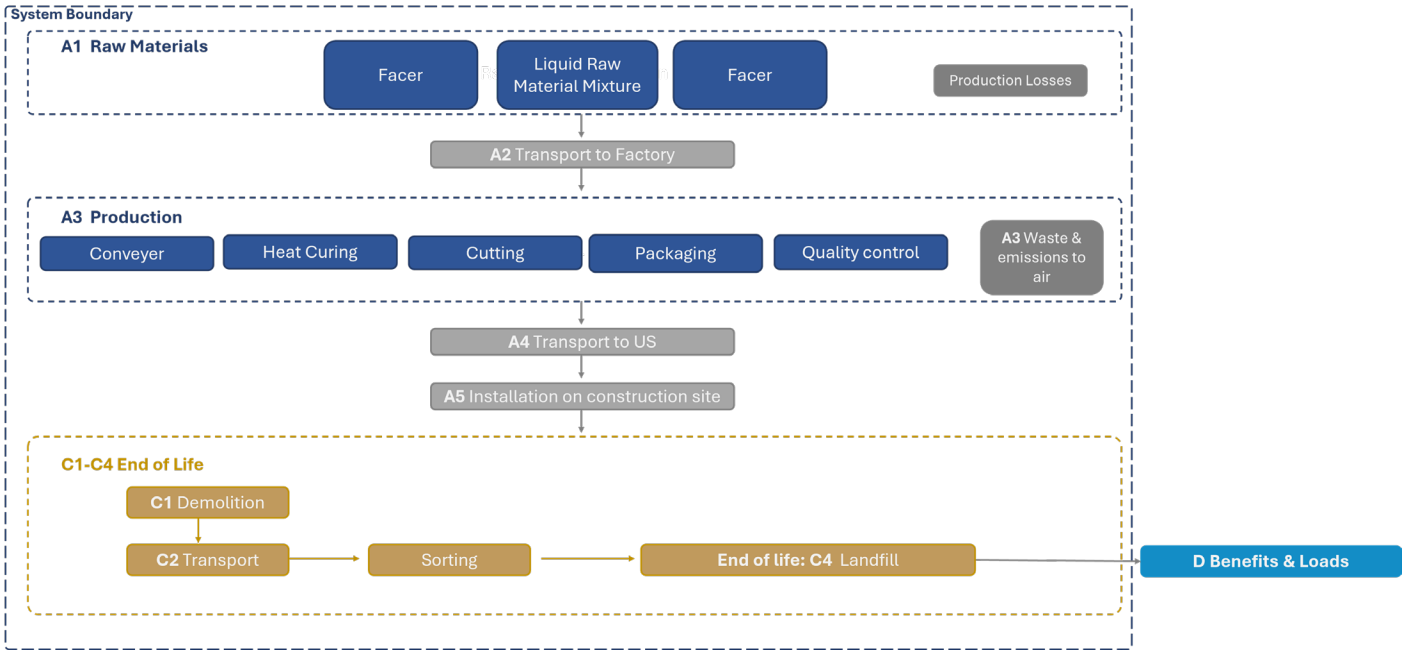
1.4. Declaration of Methodological Framework

This EPD is a Cradle-to-Gate with options assessment, covering the following life cycle stages: product manufacturing (A1-A3), construction stage (A4-A5), end-of-life stage (C1-C4) and potential loads and benefits outside of the system boundaries (D). The use phase is excluded as no environmental impacts are expected to occur during normal use of the product throughout its RSL.

This Life Cycle Assessment (LCA) is conducted using an attributional approach, and the system boundaries are defined according to the modularity principle specified in ISO 21930. The underlying Life Cycle Assessment was performed in accordance with ISO 14040:2006 and ISO 14044:2006. It conforms with ISO 21930:2017. No known flows are deliberately excluded from this EPD.

The declared functional and technical characteristics of the product are anticipated to remain stable over the 75-year reference service life (RSL). This assumes the product is correctly installed as per Kingspan's guidelines and recommendations and is maintained in a clean, dry condition.

Flow Diagram



1.5. Technical requirements

ASTM D1621: Standard Test Method for Compressive Properties of Rigid Cellular Plastics.

ASTM C209: Standard Test Methods for Cellulosic Fiber Insulating Board.

ASTM D1622: Standard Test Method for Apparent Density of Rigid Cellular Plastics.

ASTM D6226: Standard Test Method for Open Cell Content of Rigid Cellular Plastics.

ASTM E2178: Standard Test Method for Air Permeance of Building Materials.

ASTM E96: Standard Test Methods for Water Vapor Transmission of Materials.

ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials.

1.6. Properties of Declared Product as Delivered

Koolterm® K120 is available in various thicknesses. Properties of the product are listed below:

PROPERTY	TEST METHOD	RESULT
Compressive Strength, Min. (psi)	ASTM D1621	16
Water Absorption, Max (% by volume)	ASTM C209	1.5
Nominal Density, Min. (lb/ft^3)	ASTM D1622	2.4
Closed Cell Content (% of cells closed)	ASTM D6226	95
Air Permeance (L/(s·m^2) @ 75Pa) (cfm/ft^2 @1.57psf)	ASTM E2178	0.004 0.000
Water Vapor Permeance (perm)[1]	ASTM E96	0.8
Flame Spread	ASTM E84	≤ 25
Smoke Developed	ASTM E84	≤ 450

[1] *Permeance shown is for 25mm thick board. Permeance typically decreases as board thickness increases.*

The declared product is a hypothetical product thickness of Koolterm® K120 and is not manufactured or offered for sale. For properties of the thicknesses of Koolterm® K120 that are manufactured, please refer to section 1.2 of this EPD

No substances required to be reported as hazardous under Regulation (EC) No 1272/2008 (CLP Regulation) are associated with the production of this product.

1.7. Material Composition

The primary components of Koolterm® K120 include an inert thermoset polymer matrix, blowing agents, a catalyst and facing materials (a non-woven glass-fibre mat facer on both sides).

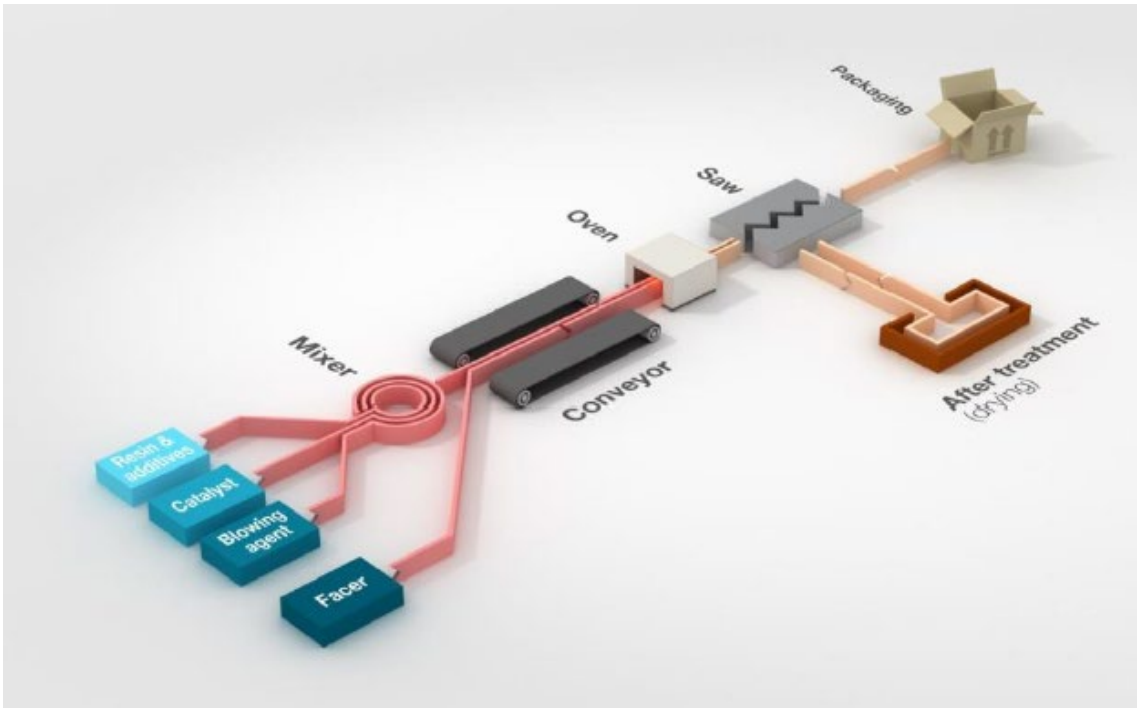
The table below provides an overview of the composition of the product.

RAW MATERIAL	QUANTITY, KG
Resin	50-85%
Catalyst	10-50%
Blowing Agent A	0-10%
Blowing Agent B	0-10%
Neutralizer	0-10%
Toughener	0-10%

1.8. Manufacturing

Kooltherm® K120 comprises an insulating core between two facers. At the start of the manufacturing process a mix of chemicals is deposited directly onto its bottom facer. The chemicals form a foam, which expands to meet the top facer. The foam autohesively attaches itself to the facers. Once it has reached the necessary thickness the foam is restrained under pressure. It is then moved into a secondary oven to fully cure. The insulation board is then cut to size as necessary and packaged.

Figure 1. Manufacturing process for Kooltherm® K120.



1.9. Packaging

Koolterm® K120 is packaged for shipment using a paper label, polyethylene wrap and timber pallets. All packaging inputs are modelled as being sourced entirely from primary (virgin) raw materials; no recycled content has been assumed. Composition of packaging materials is presented below.

MATERIAL TYPE	WEIGHT, KG
Plastics	0.0208
Timber pallet	0.0194
Paper	0.000071

Packaging disposal scenarios are based on regional statistics by US EPA. The disposal pathways (recycling, landfill, and incineration) are assigned specific percentages for each material type to represent the average US waste management practice as shown below:

MATERIAL TYPE	RECYCLING RATE	LANDFILL RATE	INCINERATION RATE
Plastics	14%	69%	17%
Wood	27%	59%	14%
Paper	81%	15%	4%

Source: https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/containers-and-packaging-product-specific

Materials sent to recycling and incineration (with energy recovery) are further calculated to derive benefits and loads declared in Module D, while the landfilled fraction is modeled as final disposal.

1.10. Transportation

Koolterm® K120 is manufactured in the UK and shipped by road (diesel fueled truck) and sea to a point of entry in the USA market (Baltimore port). These transportation methods are covered by this declaration. Impacts associated with road infrastructure and maintenance are included in the LCA, based on the modeling within the ecoinvent database.

	ROAD TRANSPORT	SEA TRANSPORT
Distance	181 km (112 m)	6288 km (3395 nm)

1.11. Product Installation

Koolterm® K120 is used in a number of applications. Installation of the product and the requirement for fasteners/fixings will depend on the application, loads and requirements of the project. The installation process would usually require the use of certain small electrical tools. This energy consumption is considered to be very small and insignificant in terms of impact emissions; therefore, it is considered as zero. More information can be found on www.kingspaninsulation.us.

Packaging waste during installation is considered within the system boundary of this declaration. See section 1.9 for disposal scenarios. A product installation loss of 2% has been modelled for the phenolic insulation boards to account for on-site cutting, fitting, and general wastage. To represent a conservative disposal scenario for construction site waste, this material loss is assumed to be sent 100% to landfill.

1.12. Use

Once installed Koolterm® K120 does not require any maintenance, repair, replacement, refurbishment or use any utilities or resources. During the use phase, the insulation product is a passive measure that helps to reduce operational energy consumption for the lifetime of the building. Any operational carbon emission savings arising from the use of thermal insulation are not accounted for in this declaration, and considered as falling outside of the system boundary. They should be accounted for in any whole building life cycle assessment.

1.13. Reference Service Life and Estimated Building Service Life

Koolterm® K120 is expected to have a reference service life equal to the estimated life of the building in which it is installed, 75 years.

1.14. Reuse, Recycling, and Energy Recovery

Koolterm® K120 can be re-used, recycled or incinerated with energy recovery at the end-of-life, but no such end-of-life destination is readily available in the North American market.

1.15. Disposal

Koolterm® K120 is not considered a hazardous waste product. Disposal of installation and end-of-building-life demolition waste is considered within the system boundary of this declaration. An installation waste rate of 2% is assumed, and the assumed disposal scenario is 100% landfill. Disposal scenarios for packaging materials are outlined in Section 1.9.

2. Life Cycle Assessment Background Information

2.1. Functional or Declared Unit

The functional unit is 1m² of the thickness of Kooltherm® K120 that has a thermal resistance (RSI) = 1m²K/W. The relevant thickness is 18mm.

Table 1 Thickness needed for Kooltherm® K120 product to achieve RSI = 1m²K/W

NAME	VALUE	UNIT
Functional Unit	1m² of insulation with a thickness required for an average thermal resistance RSI = 1m²K/W	
Mass	0.847	kg
Thickness to achieve Functional Unit	0.018	m

2.2. System Boundary

This EPD is a Cradle-to-Gate with options assessment, covering the following life cycle stages: product manufacturing (A1-A3), construction stage (A4-A5), end-of-life stage (C1-C4) and potential loads and benefits outside of the system boundaries (D). The use phase is excluded.

2.3. Estimates and Assumptions

The data is representative of the production at the Kingspan Insulation plant in Pembridge, Leominster, UK. Raw materials used in the manufacturing process are modelled in full. The calculations use background data from the ecoinvent database, and some materials are modelled with specific environmental data provided by suppliers. Energy and utility used as well as waste generated during the manufacturing of the insulation boards are calculated using allocation by mass.

Other estimates and assumptions related to LCA scenarios and calculations can be found in Section 3 and/or relevant sections.

2.4. Cut-off Criteria

All energy and material inputs, as well as outputs have been considered in this EPD. No known flows have been deliberately excluded from the study.

2.5. Data Sources

Primary data was collected from Kingspan's manufacturing facility and is representative for 2022. Secondary data was selected from ecoinvent 3.10.1 and suppliers' data for certain raw materials.

2.6. Data Quality

All primary and secondary data used in this assessment were evaluated for quality, including temporal, geographical, technological representativeness, and completeness. The data was determined to accurately reflect the production of Kooltherm® K120 phenolic insulation in the relevant manufacturing facility. Secondary data was selected to align with the regional context of the production site considered in this declaration. Where specific data was not available, generic or proxy data was used for upstream and downstream processes, following best practices for environmental product declarations as given in CEN/TR 15941:2021-07.

2.7. Period under Review

The declaration is representative of production for the 2022 calendar year.

2.8. Allocation

All allocations were carried out per the reference standards and the applied PCR. Raw materials, electrical energy and manufacturing waste were allocated based on mass, as this provides a direct and physically representative link between material inputs and the product output. Energy consumption from natural gas and biomass used for space heating and curing is allocated by volume and according to machine operation data, as this reflects the nature of the manufacturing process in which the primary energy-consuming stages, such as foam expansion and thermal curing, are directly related to the volume of material being processed and the duration (machine operation time) the equipment is running.

2.9. Comparability (Optional)

Environmental declarations from different programs based upon differing PCRs may not be comparable. Comparison of the environmental performance of thermal insulation products using EPD information shall be based on the product's use and impacts at the construction works level. In general, EPDs may not be used for comparability purposes when not considered in a construction works context. When comparing EPDs created using the PCR referred to in this EPD, variations and deviations are possible. Example of variations: different LCA software and background LCI datasets may lead to different results for upstream or downstream of the life cycle stages declared.

3. Life Cycle Assessment Scenarios

Table 2. Transport to the building site (A4)

NAME	VALUE	UNIT	VALUE	UNIT
Fuel type	Truck: Diesel		Ship: Diesel	
Liters of fuel	40	l/100km	0.0102	kg CO2e / tkm
Vehicle type	Truck		Ship	
Transport distance	181	km	6288	km
Capacity utilization (including empty runs, mass based	100	%	100	%
Gross density of products transported	47.06	kg/m^3	47.06	kg/m^3
Weight of products transported (if gross density not reported)	-	kg	-	kg
Volume of products transported (if gross density not reported)	-	m^3	-	m^3
Capacity utilization volume factor (factor: =1 or <1 or ≥ 1 for compressed or nested packaging products)	<1	-	<1	-

Table 3. Installation into the building (A5)

NAME	VALUE	UNIT
Installation waste from cut-offs: 2%. Disposal scenario: 100% landfill		
Ancillary materials	0	kg
Net freshwater consumption specified by water source and fate (amount evaporated, amount disposed to sewer)	0	m^3
Other resources	0	kg
Electricity consumption	0	kWh
Other energy carriers	0	MJ
Product loss per functional unit	0.017	kg
Waste materials at the construction site before waste processing, generated by product installation	0.0572	kg
Output materials resulting from on-site waste processing (specified by route; e.g. for recycling, energy recovery and/or disposal)	0	kg
Biogenic carbon contained in packaging	0.0280	kg CO_2
Direct emissions to ambient air, soil and water	0	kg
VOC content	N/A[1]	$\mu g/m^3$

[1] *The data for VOC content is not available and it is designated with a symbol N/A.*

Table 4. Reference Service Life

NAME	VALUE	UNIT
RSL	**75**	years
Declared product properties (at the gate) and finishes, etc.	See Section 1.2	Units as appropriate
Design application parameters (if instructed by the manufacturer), including references to the appropriate practices and application codes)	Kingspan guidelines	Units as appropriate
An assumed quality of work, when installed in accordance with the manufacturer's instructions	See product brochure	Units as appropriate
Outdoor environment, (if relevant for outdoor applications), e.g. weathering, pollutants, UV and wind exposure, building orientation, shading, temperature	Kingspan guidelines	Units as appropriate
Indoor environment, (if relevant for indoor applications), e.g. temperature, moisture, chemical exposure)	Kingspan guidelines	Units as appropriate
Use conditions, e.g. frequency of use, mechanical exposure.	N/A	Units as appropriate
Maintenance, e.g. required frequency, type and quality of replacement components	N/A	Units as appropriate

Table 5. End of life (C1-C4)

NAME		VALUE	UNIT
At the end of its service life, the product can be removed during the demolition or renovation of the building. Removal of Insulation boards is considered to happen manually, No additional energy is required for dismantling or demolition, as removal of the insulation typically occurs alongside general building deconstruction activities. If any energy is used specifically for insulation removal, it is considered negligible at the building level and has not been accounted for in this assessment. In the context of the United States, a 100% landfill scenario is assumed for the end-of-life treatment of the product. This assumption reflects current waste management practices for rigid thermoset foam insulation materials in the U.S., where dedicated recycling or energy recovery infrastructure is limited or not widely available.			
Collection process (specified by type)	Collected separately	0	kg
	Collected with mixed construction waste	0.847	kg
Recovery (specified by type)	Reuse	0	kg
	Recycling	0	kg
	Landfill	0.847	kg
	Incineration	0	kg
	Incineration with energy recovery	0	kg
	Energy conversion efficiency rate	N/A	
Disposal (specified by type)	Product or material for final deposition	0.847	kg
Removals of biogenic carbon (excluding packaging)		N/A	kg CO_2
Distance to landfill		100	km

Table 6. Reuse, recovery and/or recycling potentials (D), relevant scenario information

NAME	VALUE	UNIT
Net energy benefit from energy recovery from waste treatment declared as exported energy in A5 and C3 (R>0.6)	-	MJ
Net energy benefit from thermal energy due to treatment of waste declared as exported energy in A5 and C4 (R<0.6)	0.244	MJ
Net energy benefit from material flow declared in C3 for energy recovery	0	MJ
Process and conversion efficiencies	22%	
Further assumptions for scenario development (e.g. further processing technologies, assumptions on correction factors);	-	

4. Life Cycle Assessment Results

LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks. The six impact categories are globally deemed mature enough to be included in Type III environmental declarations. Other categories are being developed and defined and LCA should continue making advances in their development. However, the EPD users shall not use additional measures for comparative purposes.

Table 7. Description of the system boundary modules

	PRODUCT STAGE			CONSTRUCT-ION 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 from gate to site	Assembly/Install	Use	Maintenance	Repair	Replacement	Refurbishment	Building Operational Energy Use During Product Use	Building Operational Water Use During Product Use	Deconstruction	Transport	Waste processing	Disposal	Reuse, Recovery, Recycling Potential
EPD Type	X	X	X	X	X	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X

4.1. Life Cycle Impact Assessment Results

Table 8. North American Life Cycle Impact Assessment Results – ISO 21930:2017 (IPCC AR5 for GWP, TRACI 2.1 for the other impacts)

IMPACT CATEGORY	A1	A2	A3	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
GWP 100 [kg CO_2 eq]	2.80E+00	4.67E-02	3.98E-01	3.24E+00	7.43E-02	8.33E-02	MND	0.00E+00	9.11E-03	0.00E+00	8.38E-02	-3.98E-02
ODP [kg CFC-11 eq]	3.25E-05	7.33E-10	1.28E-08	3.25E-05	1.52E-09	6.49E-07	MND	0.00E+00	1.42E-10	0.00E+00	2.84E-10	-4.73E-10
AP [kg SO_2 eq]	1.13E-02	2.54E-04	8.06E-04	1.24E-02	1.51E-03	2.25E-04	MND	0.00E+00	2.77E-05	0.00E+00	9.25E-05	-1.06E-04
EP [kg N eq]	1.00E-01	1.82E-05	5.28E-04	1.01E-01	6.30E-05	8.17E-05	MND	0.00E+00	2.92E-06	0.00E+00	1.26E-03	-6.52E-05
POCP [kg O_3 eq]	1.47E-01	5.64E-03	7.12E-02	2.24E-01	2.93E-02	4.35E-03	MND	0.00E+00	7.06E-04	0.00E+00	2.02E-03	-1.41E-03
ADP_{fossil} [MJ, LHV]	4.19E+01	6.74E-01	4.83E+00	4.74E+01	1.14E+00	-8.95E-01	MND	0.00E+00	1.33E-01	0.00E+00	-2.67E+01	-8.17E-01

Table 9. EU Life Cycle Impact Assessment Results – EN 15804:2012 + A2:2019 (EF 3.1)

IMPACT CATEGORY	A1	A2	A3	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
GWP – total [kg CO_2e]	2.77E+00	4.72E-02	2.96E-01	3.12E+00	8.82E-02	1.12E-01	MND	0.00E+00	9.15E-03	0.00E+00	8.37E-02	-2.31E-01
GWP – fossil [kg CO_2e]	2.75E+00	4.72E-02	3.90E-01	3.19E+00	8.81E-02	8.37E-02	MND	0.00E+00	9.15E-03	0.00E+00	8.38E-02	-4.07E-02
GWP – biogenic [kg CO_2e]	-2.59E-02	1.02E-05	-9.39E-02	-1.20E-01	1.51E-05	2.78E-02	MND	0.00E+00	2.07E-06	0.00E+00	8.86E-05	-1.90E-01
GWP – LULUC [kg CO_2e]	4.14E-02	2.16E-05	1.96E-04	4.16E-02	4.19E-05	8.36E-04	MND	0.00E+00	4.09E-06	0.00E+00	1.14E-05	-2.14E-05
Ozone depletion pot. [kg CFC-11 eq]	3.20E-05	6.95E-10	1.21E-08	3.20E-05	1.44E-09	6.41E-07	MND	0.00E+00	1.35E-10	0.00E+00	2.69E-10	-4.37E-10
Acidification pot. [mol H+eq]	1.34E-02	2.92E-04	9.30E-04	1.46E-02	1.78E-03	3.75E-04	MND	0.00E+00	3.12E-05	0.00E+00	1.01E-04	-1.21E-04
EP-freshwater [kg Peq]	6.59E-04	3.44E-06	4.47E-05	7.08E-04	3.85E-06	1.47E-05	MND	0.00E+00	7.12E-07	0.00E+00	2.00E-06	-2.10E-05
EP-marine [kg Neq]	2.44E-03	8.42E-05	2.13E-04	2.74E-03	4.51E-04	3.83E-04	MND	0.00E+00	1.02E-05	0.00E+00	1.50E-02	-2.42E-05
EP-terrestrial [mol Neq]	2.30E-02	9.24E-04	2.29E-03	2.63E-02	5.00E-03	7.72E-04	MND	0.00E+00	1.12E-04	0.00E+00	4.02E-04	-2.23E-04
POCP ("smog") [kg NMVOCeq]	1.22E-02	3.23E-04	1.71E-02	2.96E-02	1.41E-03	6.65E-04	MND	0.00E+00	4.60E-05	0.00E+00	1.28E-04	-1.06E-04
ADP-min.& metals [kg Sbeq]	6.02E-05	1.22E-07	1.52E-06	6.19E-05	1.57E-07	1.25E-06	MND	0.00E+00	2.55E-08	0.00E+00	2.56E-08	-9.46E-08
ADP-fossil resources [MJ]	5.78E+01	6.73E-01	6.34E+00	6.50E+01	1.13E+00	1.38E+00	MND	0.00E+00	1.33E-01	0.00E+00	2.47E-01	-8.16E-01
Water use [m^3 depr.]	8.59E-01	3.19E-03	7.92E-02	9.41E-01	4.09E-03	1.96E-02	MND	0.00E+00	6.56E-04	0.00E+00	1.98E-03	-9.97E-03

4.2. Life Cycle Inventory Results

Table 10. Life Cycle Inventory Results - Resource Use

IMPACT CATEGORY	A1	A2	A3	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
RPR_E [MJ, LHV]	3.05E+00	8.85E-03	-2.05E-01	2.82E+00	1.29E-02	-2.46E-01	MND	0.00E+00	1.82E-03	0.00E+00	7.15E-03	-1.80E-02
RPR_M [MJ, LHV]	0.00E+00	0.00E+00	2.45E-01	2.45E-01	0.00E+00	-2.45E-01	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.67E+00
RPR_T [MJ, LHV]	3.05E+00	8.85E-03	4.02E-02	3.06E+00	1.29E-02	-4.91E-01	MND	0.00E+00	1.82E-03	0.00E+00	7.15E-03	1.65E+00
$NRPR_E$ [MJ, LHV]	4.18E+01	6.73E-01	4.82E+00	4.74E+01	1.13E+00	-3.53E-01	MND	0.00E+00	1.33E-01	0.00E+00	-2.67E+01	-8.16E-01
$NRPR_M$ [MJ, LHV]	1.61E+01	0.00E+00	8.90E-01	1.70E+01	0.00E+00	-8.90E-01	MND	0.00E+00	0.00E+00	0.00E+00	-1.60E+01	2.33E-01
$NRPR_T$ [MJ, LHV]	5.79E+01	6.73E-01	5.71E+00	6.44E+01	1.13E+00	-1.24E+00	MND	0.00E+00	1.33E-01	0.00E+00	-4.26E+01	-5.83E-01
SM [kg]	1.29E-02	2.90E-04	2.56E-03	1.58E-02	5.33E-04	3.61E-04	MND	0.00E+00	5.65E-05	0.00E+00	8.33E-05	3.08E-03
RSF [MJ, LHV]	1.26E-04	3.37E-06	8.90E-03	9.03E-03	3.24E-06	1.81E-04	MND	0.00E+00	7.18E-07	0.00E+00	1.48E-06	-5.03E-07
NRSF [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE [MJ, LHV]	4.03E-02	1.15E-04	1.08E-02	5.23E-02	2.36E-04	1.05E-03	MND	0.00E+00	2.40E-05	0.00E+00	2.00E-04	-9.89E-04
FW [m^3]	2.18E-02	9.46E-05	1.79E-03	2.37E-02	1.06E-04	3.24E-04	MND	0.00E+00	1.96E-05	0.00E+00	-3.14E-03	-2.85E-04

Table 11. Life Cycle Inventory Results - Output Flows and Waste Categories

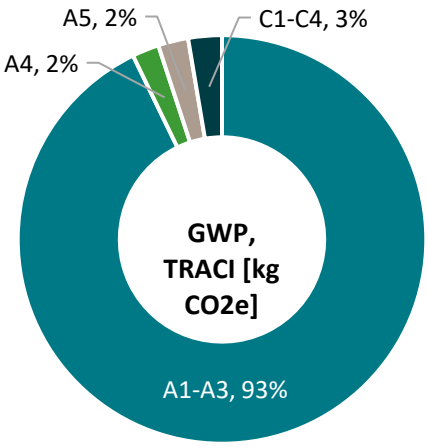
IMPACT CATEGORY	A1	A2	A3	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
HWD [kg]	2.11E-01	1.12E-03	1.19E-02	2.24E-01	1.55E-03	4.73E-03	MND	0.00E+00	2.25E-04	0.00E+00	5.77E-04	-2.63E-03
NHWD [kg]	4.24E+00	2.03E-02	6.00E-01	4.86E+00	2.57E-02	3.24E-01	MND	0.00E+00	4.16E-03	0.00E+00	4.25E+00	-1.23E-01
HLRW [kg]	5.44E-06	4.02E-08	2.35E-06	8.05E-06	5.66E-08	1.63E-07	MND	0.00E+00	8.30E-09	0.00E+00	3.57E-08	-6.30E-07
ILLRW [kg]	1.58E-05	9.69E-08	9.90E-06	2.69E-05	1.58E-07	5.34E-07	MND	0.00E+00	2.00E-08	0.00E+00	8.99E-08	-2.21E-06
CRU [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR [kg]	1.28E-01	0.00E+00	0.00E+00	1.28E-01	0.00E+00	1.09E-02	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE (electricity) [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.44E-01	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE (thermal) [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 12. Life Cycle Inventory Results - Carbon Emissions and Removals

IMPACT CATEGORY	A1	A2	A3	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
BCRP [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEP [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCRK [kg CO_2]	0.00E+00	0.00E+00	-2.44E-01	-2.44E-01	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEK [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.44E-01	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEW [kg CO_2]	0.00E+00	0.00E+00	1.38E+00	1.38E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCE [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCR [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCRP [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

5. LCA Interpretation

The environmental impact associated with the product's life cycle is primarily concentrated in the A1–A3 (cradle-to-gate) stages. Among these, A1 (raw material supply) is the dominant contributor, reflecting the carbon intensity of material extraction and production. According to the GWP (TRACI) results, the "Cradle-to-Gate" (A1-A3) phase is responsible for 92% of the total life cycle emissions. This impact is overwhelmingly driven by the A1 (Raw Material Supply) stage, which alone accounts for 77% of the total emissions. Impacts from the installation stage (A4-A5) have smaller impacts, where transport to the market (A4) contributes by 3% of the total emissions, and A5, 2%. End-of-life processing of the product (C1-C4) has a very small impact, around 3% combined for C1-C4. The product allows for significant savings of energy use in buildings during the use stage. However, these savings are not considered in this study.



The interpretation of these results is subject to specific methodological choices and limitations.

The impacts of the installation stage rely on the exclusion of mechanical fixings and blowing agent off-gassing. In applications where fixings are used, their mass and environmental impact contribution relative to the functional unit is deemed negligible. Off-gassing was excluded based on the product's closed-cell structure (which traps the blowing agents) and the use of blowing agents which have negligible global warming potential (≤5) and zero ozone depletion potential. Including these flows would not significantly alter the GWP results.

Manufacturing data was allocated based on physical flows. This method was selected as the most representative for material throughput.

The low impact in the disposal phase reflects the assumption that the phenolic board is chemically inert in a landfill environment. No specific degradation emissions (e.g., methane generation) were modeled, as the material is not expected to release emissions during landfill.

While the product's primary function is to reduce building energy consumption, these operational energy savings (module B6) are excluded from the scope of this study. Therefore, the results present the embodied carbon cost of the product without offsetting it against its lifetime operational carbon benefits.

6. Additional Environmental Information

6.1. Environment and Health During Manufacturing

Koolterm® K120 is manufactured to the highest standards under a management system certified to ISO 9001:2015 (Quality Management Systems. Requirements), ISO 14001:2015 (Environmental Management Systems. Requirements), BS / I.S. OHSAS 18001:2007 (Occupational Health & Safety Management Systems. Requirements) and ISO 50001:2011 (Energy Management Systems. Requirements with guidance for use).

6.2. Environment and Health During Installation

Please refer to the Koolterm® K100-Series Safety Data Sheet at www.kingspaninsulation.us.

6.3. Extraordinary Effects

Fire

Koolterm® K120 has a flame spread index of 25 or less and a smoke developed index of 450 or less when tested in accordance with ASTM E84 (Standard Test Method for Surface Burning Characteristics of Building Materials).

Water

Koolterm® K120 has a water uptake of ≤1.0% by volume when tested in accordance with ASTM C209 (Standard Test Methods for Cellulosic Fiber Insulating Board).

Mechanical destruction

Mechanical stability of Koolterm® K120 insulation boards is adequate for typical applications of rigid insulation boards. No mechanical destruction is expected during normal conditions of use

6.4. Delayed Emissions

No delayed emissions are considered in this EPD.

6.5. Energy Savings During Use

Throughout its service life, insulation contributes to a reduction in building energy consumption by improving thermal performance and air sealing. These attributes help lower the demand for heating and cooling, thereby reducing associated environmental impacts during the building's operational phase. As such, the use-stage environmental benefits of insulation can be substantial. Any operational carbon emission savings arising from the use of thermal insulation are not accounted for in this declaration, and considered as falling outside of the system boundary. They should be accounted for in any whole building life cycle assessment.

6.6. Further Information

For more information visit www.kingspaninsulation.us.

7. References

ISO 9001:2015 - Quality Management Systems. Requirements.

ISO 14001:2015 - Environmental Management Systems. Requirements.

ISO 14025:2010 - Environmental labels and declarations — Type III environmental declarations — Principles and procedures.

ISO 14040:2006 - Environmental management — Life cycle assessment — Principles and framework.

ISO 14044:2006 - Environmental management — Life cycle assessment — Requirements and guidelines.

ISO 21930:2017 - Sustainability in building construction -- Environmental declaration of building products.

ISO 50001:2011 - Energy Management Systems. Requirements with guidance for use.

BS / I.S. OHSAS 18001:2007 - Occupational Health & Safety Management Systems. Requirements.

EN 15804:2012 + A2:2019 Sustainability of construction works. Environmental product declarations. Core rules for the product category of construction products.

CEN/TR 15941:2021-07: Sustainability of construction works — Environmental Product Declarations — Methodology for selection and use of generic data.

Product Category Rules for Building-Related Products and Services, Part A: Life Cycle Assessment Calculation Rules and Report Requirements, UL Environment Standard 10010, Version 4.0, 2022.

Product Category Rule (PCR) Guidance for Building-Related Products and Services, Part B: Building Envelope Thermal Insulation EPD Requirements, UL 10010-1, Edition 3.0, 2024.

Life Cycle Assessment (LCA) Background Report for Kooltherm® K110 and K120 Insulation Boards manufactured by Kingspan Insulation Ltd., December 2025.

ASTM D1621: Standard Test Method for Compressive Properties of Rigid Cellular Plastics.

ASTM C209: Standard Test Methods for Cellulosic Fiber Insulating Board.

ASTM D1622: Standard Test Method for Apparent Density of Rigid Cellular Plastics.

ASTM D6226: Standard Test Method for Open Cell Content of Rigid Cellular Plastics.

ASTM E2178: Standard Test Method for Air Permeance of Building Materials.

ASTM E96: Standard Test Methods for Water Vapor Transmission of Materials.

ASTM E84: Standard Test Method for Surface Burning Characteristics of Building Materials.

https://www.epa.gov/facts-and-figures-about-materials-waste-and-recycling/containers-and-packaging-product-specific

Ecoinvent 3.10.1 database

U.S. Environmental Protection Agency. (2012). Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI): TRACI version 2.1

Appendix 1. Scaling Methodology

Methodology

This Appendix provides a detailed overview of the scaling methodology applied in the Environmental Product Declaration (EPD) for Kooltherm® K120. It outlines the approach used to scale environmental impact data for different product thicknesses, thus ensuring transparency and reproducibility of the calculations to support the validity of the EPD.

Kooltherm® K120 comprises a phenolic insulation core with facing materials on either side. For each thickness of the product, the facing materials are the same and only the thickness of the phenolic insulation core of the product varies. The reference product for this EPD is a hypothetical thickness (18mm) of the product that is not manufactured or offered for sale, but the product is manufactured and offered for sale in a range of other thicknesses. In order to calculate the impact data for the manufactured thicknesses of the product, a scaling methodology is provided. This methodology utilizes an algorithm and scaling factors, which are given immediately below.

The tables on the following pages of this Appendix give the impact data for insulation core and facing materials, that are required for the scaling methodology.

The results of this scaling methodology, as applied to a range of thicknesses of Kooltherm® K120 are given in Appendix 2. They comprise summary impact data for cradle-to-gate (A1-A3), for core indicators based on both ISO 21930:2017 (IPCC AR5 for GWP, TRACI 2.1 for the other impacts) and EN 15804:2012 + A2:2019 (EF 3.1).

Scaling methodology algorithm

Impact of insulation (see Tables 14 - 19, below) x Scaling factor (see Table 13, below)
+
Impact of facing materials (see Tables 20 - 24, below)
=
Total environmental impact per m^2 of defined thickness of the product

Table 13. Scaling factors

THICKNESS (MM)	THICKNESS (IN)	SCALING FACTOR
40	1.57	1.620
50	1.97	2.025
60	2.36	2.430
63.5	2.50	2.461
70	2.76	2.713
75	2.95	2.906
80	3.15	3.100
90	3.54	3.488
100	3.94	3.875

Phenolic Insulation Impact Data

Table 14. North American Life Cycle Impact Assessment Results for 1kg of Phenolic Foam – TRACI 2.1 (AR 5) / ISO 21930:2017 (IPCC AR5 for GWP, TRACI 2.1 for the other impacts)

IMPACT CATEGORY	A1	A2	A3	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
GWP 100 [kg CO_2 eq]	3.17E+00	5.83E-02	5.61E-01	3.79E+00	8.86E-02	1.01E-01	MND	0.00E+00	1.07E-02	0.00E+00	9.97E-02	-5.68E-02
ODP [kg CFC-11 eq]	4.67E-05	9.15E-10	1.80E-08	4.67E-05	1.81E-09	9.33E-07	MND	0.00E+00	1.68E-10	0.00E+00	3.40E-10	-6.76E-10
AP [kg SO_2 eq]	1.24E-02	3.36E-04	1.14E-03	1.39E-02	1.80E-03	2.30E-04	MND	0.00E+00	3.26E-05	0.00E+00	1.14E-04	-1.52E-04
EP [kg N eq]	1.39E-01	2.33E-05	7.48E-04	1.40E-01	7.51E-05	7.18E-05	MND	0.00E+00	3.44E-06	0.00E+00	1.73E-03	-9.29E-05
POCP [kg O_3 eq]	1.54E-01	7.38E-03	9.84E-02	2.60E-01	3.49E-02	4.71E-03	MND	0.00E+00	8.31E-04	0.00E+00	2.44E-03	-2.01E-03
ADP_{fossil} [MJ, LHV]	4.57E+01	8.41E-01	6.81E+00	5.34E+01	1.35E+00	-1.44E+00	MND	0.00E+00	1.56E-01	0.00E+00	-3.04E+01	-1.17E+00

Table 15. EU Life Cycle Impact Assessment Results for 1kg of Phenolic Foam – EN 15804:2012 + A2:2019 (EF 3.1)

IMPACT CATEGORY	A1	A2	A3	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
GWP – total [kg CO_2e]	3.13E+00	5.90E-02	4.17E-01	3.61E+00	1.05E-01	1.42E-01	MND	0.00E+00	1.08E-02	0.00E+00	9.97E-02	-3.18E-01
GWP – fossil [kg CO_2e]	3.11E+00	5.90E-02	5.49E-01	3.72E+00	1.05E-01	1.01E-01	MND	0.00E+00	1.08E-02	0.00E+00	9.96E-02	-5.82E-02
GWP – biogenic [kg CO_2e]	-3.74E-02	1.27E-05	-1.32E-01	-1.70E-01	1.79E-05	3.94E-02	MND	0.00E+00	2.44E-06	0.00E+00	1.07E-04	-2.60E-01
GWP – LULUC [kg CO_2e]	5.80E-02	2.71E-05	2.76E-04	5.83E-02	4.99E-05	1.17E-03	MND	0.00E+00	4.82E-06	0.00E+00	1.46E-05	-3.06E-05
Ozone depletion pot. [kg CFC-11 eq]	4.61E-05	8.68E-10	1.70E-08	4.61E-05	1.71E-09	9.23E-07	MND	0.00E+00	1.59E-10	0.00E+00	3.22E-10	-6.24E-10
Acidification pot. [mol H+eq]	1.47E-02	3.87E-04	1.31E-03	1.64E-02	2.12E-03	4.28E-04	MND	0.00E+00	3.67E-05	0.00E+00	1.25E-04	-1.73E-04
EP-freshwater [kg Peq]	7.34E-04	4.26E-06	6.32E-05	8.02E-04	4.59E-06	1.67E-05	MND	0.00E+00	8.38E-07	0.00E+00	2.56E-06	-3.00E-05
EP-marine [kg Neq]	2.63E-03	1.10E-04	3.00E-04	3.04E-03	5.37E-04	5.13E-04	MND	0.00E+00	1.21E-05	0.00E+00	2.07E-02	-3.47E-05
EP-terrestrial [mol Neq]	2.39E-02	1.21E-03	3.22E-03	2.84E-02	5.95E-03	8.69E-04	MND	0.00E+00	1.31E-04	0.00E+00	5.00E-04	-3.19E-04
POCP ("smog") [kg NMVOCeq]	1.36E-02	4.18E-04	2.35E-02	3.75E-02	1.68E-03	8.40E-04	MND	0.00E+00	5.41E-05	0.00E+00	1.54E-04	-1.52E-04
ADP-min.& metals [kg Sbeq]	4.44E-05	1.51E-07	2.14E-06	4.67E-05	1.87E-07	9.51E-07	MND	0.00E+00	3.00E-08	0.00E+00	3.11E-08	-1.35E-07
ADP-fossil resources [MJ]	6.84E+01	8.39E-01	8.94E+00	7.84E+01	1.35E+00	1.66E+00	MND	0.00E+00	1.56E-01	0.00E+00	2.98E-01	-1.17E+00
Water use [m^3 depr.]	9.84E-01	3.96E-03	1.12E-01	1.10E+00	4.87E-03	2.30E-02	MND	0.00E+00	7.72E-04	0.00E+00	2.53E-03	-1.43E-02

Table 16. Life Cycle Inventory Results - Resource Use for 1kg of Phenolic Foam

IMPACT CATEGORY	A1	A2	A3	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
RPR_E [MJ, LHV]	3.53E+00	1.10E-02	-3.02E-01	3.18E+00	1.53E-02	-3.49E-01	MND	0.00E+00	2.14E-03	0.00E+00	9.24E-03	-2.66E-02
RPR_M [MJ, LHV]	0.00E+00	0.00E+00	3.47E-01	3.47E-01	0.00E+00	-3.47E-01	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.36E+00
RPR_T [MJ, LHV]	3.53E+00	1.10E-02	4.51E-02	3.53E+00	1.53E-02	-6.96E-01	MND	0.00E+00	2.14E-03	0.00E+00	9.24E-03	2.33E+00
$NRPR_E$ [MJ, LHV]	4.56E+01	8.39E-01	6.79E+00	5.34E+01	1.35E+00	-6.68E-01	MND	0.00E+00	1.56E-01	0.00E+00	-3.04E+01	-1.17E+00
$NRPR_M$ [MJ, LHV]	2.29E+01	0.00E+00	1.26E+00	2.42E+01	0.00E+00	-1.26E+00	MND	0.00E+00	0.00E+00	0.00E+00	-2.27E+01	3.28E-01
$NRPR_T$ [MJ, LHV]	6.85E+01	8.39E-01	8.05E+00	7.76E+01	1.35E+00	-1.93E+00	MND	0.00E+00	1.56E-01	0.00E+00	-5.31E+01	-8.39E-01
SM [kg]	1.55E-02	3.62E-04	3.62E-03	1.94E-02	6.35E-04	4.47E-04	MND	0.00E+00	6.65E-05	0.00E+00	9.95E-05	4.38E-03
RSF [MJ, LHV]	1.36E-04	4.16E-06	1.26E-02	1.27E-02	3.86E-06	2.55E-04	MND	0.00E+00	8.45E-07	0.00E+00	1.75E-06	-7.17E-07
NRSF [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE [MJ, LHV]	1.85E-02	1.43E-04	1.52E-02	3.52E-02	2.81E-04	7.10E-04	MND	0.00E+00	2.83E-05	0.00E+00	2.71E-04	-1.42E-03
FW [m^3]	2.50E-02	1.17E-04	2.53E-03	2.76E-02	1.26E-04	3.55E-04	MND	0.00E+00	2.31E-05	0.00E+00	-3.69E-03	-4.07E-04

Table 17. Life Cycle Inventory Results - Output Flows and Waste Categories for 1kg of Phenolic Foam

IMPACT CATEGORY	A1	A2	A3	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
HWD [kg]	2.57E-01	1.39E-03	1.68E-02	2.76E-01	1.85E-03	5.85E-03	MND	0.00E+00	2.65E-04	0.00E+00	7.23E-04	-3.76E-03
NHWD [kg]	4.47E+00	2.51E-02	8.48E-01	5.34E+00	3.06E-02	4.06E-01	MND	0.00E+00	4.90E-03	0.00E+00	5.01E+00	-1.77E-01
HLRW [kg]	3.77E-06	4.98E-08	3.30E-06	7.43E-06	6.74E-08	1.51E-07	MND	0.00E+00	9.77E-09	0.00E+00	4.66E-08	-9.03E-07
ILLRW [kg]	1.06E-05	1.20E-07	1.39E-05	3.17E-05	1.88E-07	5.14E-07	MND	0.00E+00	2.35E-08	0.00E+00	1.17E-07	-3.17E-06
CRU [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR [kg]	1.82E-01	0.00E+00	0.00E+00	1.82E-01	0.00E+00	1.54E-02	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE (electricity) [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.48E-01	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE (electricity) [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 18. Life Cycle Inventory Results - Carbon Emissions and Removals for 1kg of Phenolic Foam

IMPACT CATEGORY	A1	A2	A3	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
BCRP [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEP [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCRK [kg CO_2]	0.00E+00	0.00E+00	-3.44E-01	-3.44E-01	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEK [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.44E-01	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEW [kg CO_2]	0.00E+00	0.00E+00	1.95E+00	1.95E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCE [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCR [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCRP [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Facing Material Impact Data

Table 19. North American Life Cycle Impact Assessment Results for 1m² of Facings – TRACI 2.1 (AR 5) / ISO 21930:2017 (IPCC AR5 for GWP, TRACI 2.1 for the other impacts)

IMPACT CATEGORY	A1	A2	A3	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
GWP 100 [kg CO_2 eq]	5.69E-01	5.93E-03	0.00E+00	5.75E-01	1.17E-02	1.19E-02	MND	0.00E+00	1.50E-03	0.00E+00	1.31E-02	0.00E+00
ODP [kg CFC-11 eq]	1.29E-08	9.27E-11	0.00E+00	1.30E-08	2.39E-10	2.72E-10	MND	0.00E+00	2.35E-11	0.00E+00	4.30E-11	0.00E+00
AP [kg SO_2 eq]	2.64E-03	2.12E-05	0.00E+00	2.66E-03	2.39E-04	6.30E-05	MND	0.00E+00	4.57E-06	0.00E+00	1.14E-05	0.00E+00
EP [kg N eq]	1.50E-03	1.99E-06	0.00E+00	1.50E-03	9.95E-06	3.10E-05	MND	0.00E+00	4.81E-07	0.00E+00	2.85E-05	0.00E+00
POCP [kg O_3 eq]	3.91E-02	5.16E-04	0.00E+00	3.96E-02	4.62E-03	9.87E-04	MND	0.00E+00	1.16E-04	0.00E+00	2.86E-04	0.00E+00
ADP_{fossil} [MJ, LHV]	9.64E+00	8.63E-02	0.00E+00	9.73E+00	1.79E-01	1.01E-01	MND	0.00E+00	2.19E-02	0.00E+00	-5.05E+00	0.00E+00

Table 20. EU Life Cycle Impact Assessment Results for 1m² of Facings – EN 15804:2012 + A2:2019 (EF 3.1)

IMPACT CATEGORY	A1	A2	A3	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
GWP – total [kg CO_2e]	5.69E-01	5.96E-03	0.00E+00	5.75E-01	1.39E-02	1.24E-02	MND	0.00E+00	1.51E-03	0.00E+00	1.31E-02	0.00E+00
GWP – fossil [kg CO_2e]	5.68E-01	5.96E-03	0.00E+00	5.74E-01	1.39E-02	1.24E-02	MND	0.00E+00	1.51E-03	0.00E+00	1.31E-02	0.00E+00
GWP – biogenic [kg CO_2e]	4.77E-04	1.34E-06	0.00E+00	4.78E-04	2.38E-06	2.53E-07	MND	0.00E+00	3.41E-07	0.00E+00	1.31E-05	0.00E+00
GWP – LULUC [kg CO_2e]	4.78E-04	2.68E-06	0.00E+00	4.80E-04	6.61E-06	9.91E-06	MND	0.00E+00	6.74E-07	0.00E+00	1.08E-06	0.00E+00
Ozone depletion pot. [kg CFC-11 eq]	1.22E-08	8.79E-11	0.00E+00	1.23E-08	2.27E-10	2.57E-10	MND	0.00E+00	2.22E-11	0.00E+00	4.08E-11	0.00E+00
Acidification pot. [mol H+eq]	3.12E-03	2.40E-05	0.00E+00	3.14E-03	2.80E-04	7.45E-05	MND	0.00E+00	5.14E-06	0.00E+00	1.19E-05	0.00E+00
EP-freshwater [kg Peq]	1.45E-04	4.57E-07	0.00E+00	1.45E-04	6.07E-07	2.93E-06	MND	0.00E+00	1.17E-07	0.00E+00	1.75E-07	0.00E+00
EP-marine [kg Neq]	5.90E-04	7.55E-06	0.00E+00	5.97E-04	7.11E-05	2.07E-05	MND	0.00E+00	1.69E-06	0.00E+00	2.94E-04	0.00E+00
EP-terrestrial [mol Neq]	6.19E-03	8.24E-05	0.00E+00	6.27E-03	7.89E-04	1.59E-04	MND	0.00E+00	1.84E-05	0.00E+00	4.74E-05	0.00E+00
POCP (“smog”) [kg NMVOCeq]	2.63E-03	3.24E-05	0.00E+00	2.66E-03	2.22E-04	6.28E-05	MND	0.00E+00	7.57E-06	0.00E+00	1.89E-05	0.00E+00
ADP-min.& metals [kg Sbeq]	2.94E-05	1.64E-08	0.00E+00	2.94E-05	2.48E-08	5.89E-07	MND	0.00E+00	4.20E-09	0.00E+00	3.58E-09	0.00E+00
ADP-fossil resources [MJ]	9.60E+00	8.61E-02	0.00E+00	9.69E+00	1.79E-01	2.02E-01	MND	0.00E+00	2.19E-02	0.00E+00	3.52E-02	0.00E+00
Water use [m^3 depr.]	1.69E-01	4.22E-04	0.00E+00	1.69E-01	6.45E-04	3.42E-03	MND	0.00E+00	1.08E-04	0.00E+00	1.80E-04	0.00E+00

Table 21. Life Cycle Inventory Results - Resource Use for 1m² of Facings

IMPACT CATEGORY	A1	A2	A3	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
RPR_E [MJ, LHV]	5.71E-01	1.17E-03	0.00E+00	5.73E-01	2.03E-03	1.16E-02	MND	0.00E+00	3.00E-04	0.00E+00	5.84E-04	0.00E+00
RPR_M [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RPR_T [MJ, LHV]	5.71E-01	1.17E-03	0.00E+00	5.73E-01	2.03E-03	1.16E-02	MND	0.00E+00	3.00E-04	0.00E+00	5.84E-04	0.00E+00
$NRPR_E$ [MJ, LHV]	9.60E+00	8.61E-02	0.00E+00	9.69E+00	1.79E-01	1.01E-01	MND	0.00E+00	2.19E-02	0.00E+00	-5.05E+00	0.00E+00
$NRPR_M$ [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
$NRPR_T$ [MJ, LHV]	9.60E+00	8.61E-02	0.00E+00	9.69E+00	1.79E-01	1.01E-01	MND	0.00E+00	2.19E-02	0.00E+00	-5.05E+00	0.00E+00
SM [kg]	2.06E-03	3.68E-05	0.00E+00	2.09E-03	8.41E-05	4.58E-05	MND	0.00E+00	9.31E-06	0.00E+00	1.27E-05	0.00E+00
RSF [MJ, LHV]	3.10E-05	4.58E-07	0.00E+00	3.14E-05	5.12E-07	6.58E-07	MND	0.00E+00	1.18E-07	0.00E+00	2.37E-07	0.00E+00
NRSF [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE [MJ, LHV]	2.73E-02	1.54E-05	0.00E+00	2.74E-02	6.61E-05	5.50E-04	MND	0.00E+00	3.96E-06	0.00E+00	7.62E-06	0.00E+00
FW [m^3]	4.30E-03	1.26E-05	0.00E+00	4.31E-03	1.67E-05	7.66E-05	MND	0.00E+00	3.23E-06	0.00E+00	-5.18E-04	0.00E+00

Table 22. Life Cycle Inventory Results - Output Flows and Waste Categories for 1m² of Facings

IMPACT CATEGORY	A1	A2	A3	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
HWD [kg]	3.00E-02	1.45E-04	0.00E+00	3.01E-02	2.45E-04	6.14E-04	MND	0.00E+00	3.70E-05	0.00E+00	6.32E-05	3.00E-02
NHWD [kg]	1.10E+00	2.68E-03	0.00E+00	1.11E+00	4.05E-03	3.62E-02	MND	0.00E+00	6.86E-04	0.00E+00	6.96E-01	1.10E+00
HLRW [kg]	2.81E-06	5.34E-09	0.00E+00	2.81E-06	1.44E-08	5.70E-08	MND	0.00E+00	1.37E-09	0.00E+00	2.64E-09	2.81E-06
ILLRW [kg]	8.45E-06	1.29E-08	0.00E+00	8.46E-06	4.15E-08	1.71E-07	MND	0.00E+00	3.29E-09	0.00E+00	6.59E-09	8.45E-06
CRU [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE (electricity) [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE (thermal) [MJ, LHV]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 2423. Life Cycle Inventory Results - Carbon Emissions and Removals for 1m² of Facings

Impact category	A1	A2	A3	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
BCRP [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEP [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCRK [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEK [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEW [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCE [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCR [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCRP [kg CO_2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Appendix 2. Summary Results

The reference product for this EPD is a hypothetical thickness (18mm) of Kooltherm® K120 that is not manufactured or offered for sale, but the product is manufactured and offered for sale in a range of other thicknesses.

The data shown in the tables on the following pages, for all thicknesses other than 18mm, have been calculated according to the scaling methodology outlined in Appendix 1 of this EPD.

The tables on the following pages give summary impact data for cradle-to-gate (A1-A3), for core indicators based on both ISO 21930 (IPCC AR5 for GWP, TRACI 2.1 for the other impacts) and EN 15804+A2 (EF 3.1).

Detailed results for the 18mm product are given in Section 4 of this EPD. If results at the same level of detail are required for thicknesses other than 18mm (e.g. for building LCA purposes), these can be derived using the scaling methodology outlined in Appendix 1 of this EPD.

Table 24. Summary A1-A3 North American Life Cycle Impact Assessment Results for 1m² of Finished Product – ISO 21930:2017 (IPCC AR5 for GWP, TRACI 2.1 for the other impacts)

Thickness	40	50	60	63.5	70	75	80	90	100
Impact category	A1-A3								
GWP 100 [kg CO_2 eq]	6.71E+00	8.24E+00	9.78E+00	9.89E+00	1.08E+01	1.16E+01	1.23E+01	1.38E+01	1.52E+01
ODP [kg CFC-11 eq]	7.57E-05	9.46E-05	1.14E-04	1.15E-04	1.27E-04	1.36E-04	1.45E-04	1.63E-04	1.81E-04
AP [kg SO_2 eq]	2.52E-02	3.08E-02	3.64E-02	3.69E-02	4.04E-02	4.31E-02	4.58E-02	5.11E-02	5.65E-02
EP [kg N eq]	2.29E-01	2.85E-01	3.42E-01	3.46E-01	3.82E-01	4.09E-01	4.36E-01	4.90E-01	5.45E-01
POCP [kg O_3 eq]	4.60E-01	5.65E-01	6.70E-01	6.78E-01	7.44E-01	7.94E-01	8.44E-01	9.45E-01	1.05E+00
ADPfossil [MJ, LHV]	9.62E+01	1.18E+02	1.39E+02	1.41E+02	1.54E+02	1.65E+02	1.75E+02	1.96E+02	2.17E+02

Table 25. Summary A1-A3 EU Life Cycle Impact Assessment Results for 1m² of Finished Product – EN 15804:2012 + A2:2019 (EF 3.1)

Thickness	40	50	60	63.5	70	75	80	90	100
Impact category	A1-A3								
GWP – total [kg CO_2e]	6.42E+00	7.89E+00	9.35E+00	9.46E+00	1.04E+01	1.11E+01	1.18E+01	1.32E+01	1.46E+01
GWP – fossil [kg CO_2e]	6.60E+00	8.11E+00	9.61E+00	9.73E+00	1.07E+01	1.14E+01	1.21E+01	1.35E+01	1.50E+01
GWP – biogenic [kg CO_2e]	-2.75E-01	-3.44E-01	-4.13E-01	-4.18E-01	-4.61E-01	-4.94E-01	-5.27E-01	-5.92E-01	-6.58E-01
GWP – LULUC [kg CO_2e]	9.49E-02	1.19E-01	1.42E-01	1.44E-01	1.59E-01	1.70E-01	1.81E-01	2.04E-01	2.26E-01
Ozone depletion pot. [kg CFC-11 eq]	7.47E-05	9.34E-05	1.12E-04	1.13E-04	1.25E-04	1.34E-04	1.43E-04	1.61E-04	1.79E-04
Acidification pot. [mol H+eq]	2.97E-02	3.64E-02	4.30E-02	4.35E-02	4.76E-02	5.08E-02	5.40E-02	6.03E-02	6.67E-02
EP-freshwater [kg Peq]	1.44E-03	1.77E-03	2.09E-03	2.12E-03	2.32E-03	2.48E-03	2.63E-03	2.94E-03	3.25E-03
EP-marine [kg Neq]	5.52E-03	6.75E-03	7.98E-03	8.08E-03	8.84E-03	9.43E-03	1.00E-02	1.12E-02	1.24E-02
EP-terrestrial [mol Neq]	5.23E-02	6.38E-02	7.53E-02	7.62E-02	8.33E-02	8.88E-02	9.43E-02	1.05E-01	1.16E-01
POCP (“smog”) [kg NMVOCeq]	6.34E-02	7.86E-02	9.38E-02	9.49E-02	1.04E-01	1.12E-01	1.19E-01	1.33E-01	1.48E-01
ADP-min.& metals [kg Sbeq]	1.05E-04	1.24E-04	1.43E-04	1.44E-04	1.56E-04	1.65E-04	1.74E-04	1.92E-04	2.10E-04
ADP-fossil resources [MJ]	1.37E+02	1.68E+02	2.00E+02	2.03E+02	2.22E+02	2.38E+02	2.53E+02	2.83E+02	3.13E+02
Water use [m^3 depr.]	1.95E+00	2.40E+00	2.84E+00	2.88E+00	3.15E+00	3.37E+00	3.58E+00	4.01E+00	4.43E+00