ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A2*

Owner of the Declaration	**Sika Deutschland GmbH**
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-SIK-20210141-IBA1-EN
Issue date	14.09.2021
Valid to	13.09.2026

Sikaplan® SGmA

Sika Deutschland GmbH

Institut Bauen und Umwelt e.V.

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ECO PLATFORM EPD EN 15804 VERIFIED

1. General Information

Sika Deutschland GmbH	Sikaplan® SGmA
Programme holder IBU – Institut Bauen und Umwelt e.V. Panoramastr. 1 10178 Berlin Germany	**Owner of the declaration** Sika Deutschland GmbH Kornwestheimer Straße 103-107 70439 Stuttgart Germany
Declaration number EPD-SIK-20210141-IBA1-EN	**Declared product / declared unit** 1 m² Sikaplan® SGmA polymeric waterproofing membrane
This declaration is based on the product category rules: Plastic and elastomer roofing and sealing sheet systems, 11.2017 (PCR checked and approved by the SVR) **Issue date** 14.09.2021 **Valid to** 13.09.2026	**Scope:** This document applies to Sikaplan® SGmA polymeric waterproofing membrane in the thicknesses 1.5, 1.8, 2.0 and 2.4 mm manufactured by Sika Trocal GmbH in 53840 Troisdorf, Germany. The EPD covers the production of the waterproofing membrane, the transport of the product to the building site, the installation of the waterproofing membrane, disposal, and potentials and loads outside the system boundary. The model was developed on the basis of production data from the year 2020 by Sika Technology AG for the thickness 1.5 mm. The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences. The EPD was created according to the specifications of *EN 15804+A2*. In the following, the standard will be simplified as *EN 15804*.
Dipl. Ing. Hans Peters (chairman of Institut Bauen und Umwelt e.V.)	**Verification** The standard *EN 15804* serves as the core PCR Independent verification of the declaration and data according to *ISO 14025:2010* ☐ internally ☒ externally
Dr. Alexander Röder (Managing Director Institut Bauen und Umwelt e.V.))	Dr.-Ing. Andreas Ciroth (Independent verifier)

2. Product

2.1 Product description/Product definition

Sikaplan® SGmA is multi-layer synthetic waterproofing sheet based on polyvinyl chloride (PVC) with an embedded glass fleece layer (DE/E1 PVC-P-NB-E-GV). Sikaplan® SGmA waterproofing sheets are available in these thicknesses: 1.5 mm (SGmA-15), 1.8 mm (SGmA-18), 2.0 mm (SGmA-20), and 2.4 mm (SGmA-24).

For the calculation of the life cycle assessment no average values were taken for the various thicknesses of Sikaplan® SGmA waterproofing sheets. Rather, all values given apply to Sikaplan® SGmA-15; a formula for individually calculating values for other thicknesses is given in Chapter 5.

Placement of the product on the market in the EU/EFTA (except for Switzerland) is subject to *Regulation (EU) No. 305/2011* (CPR). The product requires a Declaration of Performance in accordance with the harmonised standard *EN 13956:2012* "Flexible sheets for waterproofing" and the CE marking. Application is subject to the regulations of each specific country; in Germany the application standard *DIN SPEC 20000-201*.

2.2 Application

Sikaplan® SGmA waterproofing sheets are used mainly for waterproofing flat roofs. The sheets are loose laid in extensive and intensive green roofs and in roofs with gravel ballast. The roofing membrane must be covered; the ballast or other covering must be applied within 3 months.

2.3 Technical Data

Construction-Relevant Technical Data

Name	Value	Unit
Waterproof as per DIN SPEC 20000-201 / EN 1928	400	-
Waterproof as per EN 1928	passed	-
Tensile strain performance as per EN 12311-2	≥ 200	%
Peel resistance of the seam joint as per EN 12316-2	not required	N/50mm
Shear resistance of the seam joint as per EN 12317-2	≥ 500	N/50mm
Shear resistance of the seam joint as per DIN SPEC 20000-201 / EN 12317-2	Tear outside seam joint	-
Tear propagation resistance as per EN 12310-2	not required	N
Artificial ageing as per EN 1297	not required	-
Dimensional stability as per EN 1107-2	≤ 0,3	%
Folding in the cold as per EN 495-5	≤ -25	°C
Bitumen compatibility as per EN 1548	not required	-
Resistance to root penetration (for green roofs) as per EN 13948 bzw. FLL-Verfahren	FLL passed	

Performance values of the product in accordance with the Declaration of Performance in relation to its essential characteristics as defined by *EN 13956:2012*, Flexible sheets for waterproofing.

2.4 Delivery status

All thicknesses of the product are available in the format 15 m x 2 m and are delivered palletised.

2.5 Base materials/Ancillary materials

The base materials and ancillary materials of Sikaplan® SGmA polymeric waterproofing membrane are:

- Polyvinyl chloride (PVC): 50–70 %
- Plasticiser (Phthalate plasticiser): 36–41 %
- Stabilisers (UV/heat): 0–2 %
- Carrier/reinforcing material, embedded (glass): 1–3 %
- Colorant (pigments): 0–4 %

The product/material/at least one sub-product contains substances on the *Candidate List* (date 03.12.2018) exceeding 0.1 mass-%: no

The product/material/at least one sub-product contains further CMR substances (carcinogenic mutagenic reprotoxic) of Category 1A or 1B that do not appear on the Candidate List exceeding 0.1 mass-% in at least one sub-product: no

Biocidal products have been added to this construction product or it has been treated with biocidal products (the product is a treated product as defined by the *Biocidal Products Regulation (EU) No. 528/2012*): no

2.6 Manufacture

Sikaplan® SGmA polymeric waterproofing sheets are manufactured in the following steps:

- Dosing of the various raw materials and plastifi-cation of the mixture in an extruder
- Rolling the melt into sheets by calendar processing and cooling and reeling the sheets
- Heat fusing the two layers, embedding a glass fleece layer in between, on a lamination machine
- Trimming the sheets and winding them onto cardboard spools made of recycled paper
- Wrapping the rolls in polyethene (PE) stretch film, palletising

The Troisdorf plant maintains *ISO 9001* and *ISO 50001* certified quality and energy management systems.

2.7 Environment and health during manufacturing

The Troisdorf plant maintains an *ISO 14001* certified environmental management system.

2.8 Product processing/Installation

Sikaplan® SGmA polymeric waterproofing sheets are loose laid and ballasted (with e.g. gravel, concrete pavers, green roof build-up). Joints between sheets are hot-air welded or swelling welded.

In principle, the current product data sheet available at **www.sika.com** for each product should be observed.

2.9 Packaging

The rolls of polymeric waterproofing sheets are wrapped in PE stretch foil and shipped on pallets. The cardboard spools are made of recycled paper. The packaging materials can be sorted and collected for recycling.

2.10 Condition of use

Professionally installed and properly used, the condition of Sikaplan® SGmA polymeric waterproofing membrane remains unchanged throughout its service life. This was confirmed in 2019 by the external study *Sika Waterproofing Membranes – Sika-Trocal SGmA Loose-Laid and Ballasted Membranel*.

2.11 Environment and health during use

The product contains no substances that are released during normal use. Neither the environment nor the health of users is negatively affected during the product's service life. No environmental emissions are known to occur.

2.12 Reference service life

The reference service life of Sikaplan® SGmA polymeric waterproofing membrane is at least 35 years.
Based on the study *Sika Waterproofing Membranes – Sika-Trocal SGmA Loose-Laid and Ballasted*

Membrane from 2019, experience to date with Sikaplan® polymeric waterproofing membrane indicates that a service life of over 35 years can be expected, provided the standard requirements and the application and maintenance recommendations are observed.

This conclusion reflects the high resistance to weathering and ageing of the product when properly used.

2.13 Extraordinary effects

Fire
Sikaplan® SGmA polymeric waterproofing membrane is classified in Construction Material Class E, as defined by *EN 13501-1*.

Fire Resistance

Name	Value
Building material class	E
Burning droplets	-
Smoke gas development	-

Water
No environmental impact is known due to water exposure of installed Sikaplan® SGmA polymeric waterproofing membrane.

Mechanical destruction
Sikaplan® SGmA polymeric waterproofing membrane possesses good mechanical strength and is highly robust. No environmental impact is known to result from unexpected mechanical damage.

2.14 Re-use phase

At the end of the service life or when roofing sheets must be replaced, Sikaplan® SGmA waterproofing sheets can be selectively removed and recycled. This allows a closed-loop material cycle and increasingly greater material recovery from used polymeric waterproofing membranes.
Sika Deutschland GmbH is affiliated with Roofcollect, the recycling system for polymeric roofing and waterproofing membranes.

2.15 Disposal

To close the material cycle, Sikaplan® SGmA polymeric waterproofing membranes should be recycled. The used waterproofing sheets can be removed, cleaned, and ground in a shredding plant. The reclaimed material thus obtained can be kept within the material cycle, e.g. by incorporating it into the manufacture of protective membranes. If the waterproofing sheets cannot be recycled, they should be used for their calorific value.

Sikaplan® SGmA polymeric waterproofing membrane can be classified under Waste Code 070213 as defined by the *European Waste Catalogue*.

2.16 Further information

More information about the company and its products is available on the internet at **www.sika.com**. Detailed information on the polymeric waterproofing membranes is available at **www.sika.com/en/construction/roof-systems/single-ply-roof-membrane.html.**

3. LCA: Calculation rules

3.1 Declared Unit

This declaration applies to 1 m2 of Sikaplan® SGmA polymeric waterproofing membrane, thickness 1.5 mm. A formula is given for independent calculation of the values for other thicknesses.

Declared Unit

Name	Value	Unit
Declared unit	1	m^2
Grammage	1.9	kg/m^2
Type of sealing	Hot-air weld	-
conversion factor [Mass/Declared Unit] to 1kg	0.52632	-
Layer thickness	0.0015	m

3.2 System boundary

Type of EPD: Cradle to gate with options

The system boundary of the EPD follows the modular construction system described by *EN 15804*. The LCA takes into account the following modules:

- A1-A3: Extraction, processing, and transport of raw materials (e.g. polymers, pigments, processing aids, stabilisers, fillers, flame retardants, and carrier materials) used for the production of intermediate products and the waterproofing membrane and the packaging materials used to package the waterproofing membranes, such as wooden pallets, cardboard, and PE film, for transport to the plant. Waste processing of production waste (edge trim), which occurs during the production of the waterproofing membrane.
- A4: Transport of the waterproofing membrane to the building site
- A5: Installation of the waterproofing membrane into the building by means of hot-air welding (including welding energy and water consumption), disposal or material recycling of packaging and membrane scrap
- C1: Manual deconstruction and removal of the waterproofing membrane (recovery)
- C2: Transport of the recovered waterproofing membrane to waste-processing facility
- C3: Processing of the recovered waterproofing membrane for material recycling (Scenario 1 - C3/1) or thermal energy recovery (Scenario 2 - C3/2)
- C4: Disposal of the recovered waterproofing membrane in landfill
- D: Benefits for reuse, recovery, and/or recycling (through thermal energy recovery

and material recycling of the polymeric waterproofing membranes and reuse of the wooden pallets)

3.3 Estimates and assumptions

Various stabilisers and pigments were valued with a general chemical data set (conservative approach). The percentage by mass is < 1 %.

In the end-of-life stage, either 100 % material recycling (Scenario 1) or 100 % thermal energy recovery (Scenario 2) is assumed.

3.4 Cut-off criteria

The foreground system was modelled entirely, except for the production machinery, equipment, and other infrastructure.

3.5 Background data

The foreground system was modelled entirely, except for the production machinery, equipment, and other infrastructure.

3.6 Data quality

The overall quality of the data was assessed as good, taking into account the temporal, geographic, and technical coverage as well as completeness and plausibility. The primary data for the accounting of the production processes originate from the year 2020 and were collected directly at the plants. All underlying data sets are less than 10 years old.

3.7 Period under review

The period of study is the year 2020 (1 January – 31 December 2020).

3.8 Allocation

Mass allocation was applied for the production. Production waste that was reclaimed and reused internally and energy gained from incineration of production waste have been simulated as closed-loop recycling in Modules A1–A3. The material used for the manufacturing of the product and the production waste are of the same quality.

Regarding thermal energy recovery of production waste, benefits for electricity and thermal energy were calculated input-specifically, taking into account the elementary composition and the calorific value.

Regarding material recycling of the reclaimed polymeric waterproofing sheets and the installation scrap, the amount of recyclable membrane was treated as a corresponding polypropylene benefit adjusted with a downgrade.

Benefits for the disposal of packaging, scrap, and roofing membrane are credited in Module D. This also applies to the reuse of wooden pallets.

3.9 Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to *EN 15804* and the building context, respectively the product-specific characteristics of performance, are taken into account.

The underlying data were extracted from the databases of *GaBi 10* software and *ecoinvent Version 3.6*.

4. LCA: Scenarios and additional technical information

Characteristic product properties
Information on biogenic Carbon

IInformation describing biogenic carbon content at the plant gate

Name	Value	Unit
Biogenic Carbon Content in product	ND	kg C
Biogenic Carbon Content in accompanying packaging	0.0483	kg C

The following technical information serves as a basis for the declared modules or can be used for the development of specific scenarios in the context of a building assessment.

Transport to the building site (A4)

Name	Value	Unit
Litres of fuel	0.0065	l/100km
Transport distance	400	km
Capacity utilisation (including empty runs)	61	%
Gross density of products transported	1266.67	kg/m³
Volume utilisation factor	100	%

Installation into the building (A5)

Name	Value	Unit
Auxiliary	-	kg
Water consumption	-	m³
Other resources	-	kg
Electricity consumption	0,016	kWh/m²
Other energy carriers	-	MJ
Material loss (membrane)	2	%
Overlaps (membrane)	3	%
Output substances following waste treatment on site	-	kg
Dust in the air	-	kg
VOC in the air	-	kg

End-of-life stage (C1-C4)

For modelling the end-of-life stage, two different scenarios are calculated, each of which represents a 100% scenario but also allows pro rata calculation (e.g. Scenario 1 = 80 % / Scenario 2 = 20 %).

Name	Value	Unit
For material recycling (Scenario 1: C1, C2/1, C3/1, C4)	100	%
Transport to material recycling facility (Scenario 1: C1, C2/1, C3/1, C4)	350	km

For energy recovery (Scenario 2: C1, C2/2, C3/2, C4)	100	%
Transport to energy recovery facility (Scenario 2: C1, C2/2, C3/2, C4)	50	km

5. LCA: Results

The results displayed below apply to Sikaplan® SGmA. To calculate results for other thicknesses, please use this formula:

Ix = ((x+0.41)/1.91) I1.5

[Ix = the unknown parameter value for Sikaplan® SGmA products with a thickness of "x" mm (e.g. 2.0 mm)]

In the end-of-life stage and in Module D two scenarios were calculated:
Scenario 1 (C2/1, C3/1, D/1) describes the impacts with 100 % material recycling, whereas Scenario 2 (C2/2, C3/2, D/2) describes the impacts with 100 % thermal energy recovery.

Important note:
EP-freshwater: This indicator was calculated as "kg P-eq" in accordance with the characterisation model (EUTREND model, Struijs et al., 2009b, as implemented in ReCiPe; http://eplca.jrc.ec.europa.eu/LCDN/developerEF.xhtml).

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; ND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse- Recovery- Recycling- potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	ND	ND	MNR	MNR	MNR	ND	ND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 m² Sikaplan® SGmA-15

Core Indicator	Unit	A1-A3	A4	A5	C1	C2/1	C2/2	C3/1	C3/2	C4	D/1	D/2
GWP-total	[kg CO_2-Eq.]	4.67E+0	6.49E-2	4.90E-1	0.00E+0	5.63E-3	8.04E-4	2.76E-1	5.23E+0	0.00E+0	-3.66E+0	-1.54E+0
GWP-fossil	[kg CO_2-Eq.]	4.87E+0	6.45E-2	3.61E-1	0.00E+0	7.62E-3	1.09E-3	2.72E-1	5.22E+0	0.00E+0	-3.63E+0	-1.52E+0
GWP-biogenic	[kg CO_2-Eq.]	-2.13E-1	3.44E-5	1.27E-1	0.00E+0	-2.43E-3	-3.48E-4	3.60E-3	1.39E-3	0.00E+0	-3.06E-2	-1.26E-2
GWP-luluc	[kg CO_2-Eq.]	1.04E-2	3.97E-4	5.76E-4	0.00E+0	4.38E-4	6.26E-5	2.57E-4	1.17E-3	0.00E+0	-4.71E-3	-2.15E-3
ODP	[kg CFC11-Eq.]	4.77E-9	1.61E-17	2.39E-10	0.00E+0	6.84E-18	9.77E-19	3.41E-15	8.36E-15	0.00E+0	-2.27E-10	-2.84E-14
AP	[mol H^+-Eq.]	8.28E-3	1.63E-4	4.90E-4	0.00E+0	3.15E-5	4.50E-6	2.29E-4	1.42E-3	0.00E+0	-5.49E-3	-1.63E-3
EP-freshwater	[kg PO_4-Eq.]	3.71E-5	1.28E-7	1.91E-6	0.00E+0	1.59E-7	2.27E-8	4.26E-7	1.29E-6	0.00E+0	-7.86E-6	-3.54E-6
EP-marine	[kg N-Eq.]	2.45E-3	4.49E-5	1.47E-4	0.00E+0	6.02E-6	8.59E-7	8.15E-5	4.74E-4	0.00E+0	-1.83E-3	-5.80E-4
EP-terrestrial	[mol N-Eq.]	2.72E-2	5.10E-4	1.66E-3	0.00E+0	8.05E-5	1.15E-5	8.84E-4	5.85E-3	0.00E+0	-2.01E-2	-6.18E-3
POCP	[kg NMVOC-Eq.]	1.39E-2	1.24E-4	7.62E-4	0.00E+0	2.40E-5	3.43E-6	2.01E-4	1.38E-3	0.00E+0	-9.52E-3	-1.51E-3
ADPE	[kg Sb-Eq.]	7.00E-6	5.47E-9	3.55E-7	0.00E+0	4.07E-9	5.82E-10	4.10E-8	1.19E-7	0.00E+0	-6.97E-7	-3.95E-7
ADPF	[MJ]	1.19E+2	8.54E-1	6.33E+0	0.00E+0	7.12E-1	1.02E-1	1.31E+0	9.67E+0	0.00E+0	-8.97E+1	-2.27E+1
WDP	[m^3 world-Eq deprived]	7.85E-2	2.45E-4	2.87E-2	0.00E+0	4.65E-4	6.64E-5	1.80E-2	4.03E-1	0.00E+0	2.25E-1	-1.84E-2

Caption	GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 m² Sikaplan® SGmA-15

Indicator	Unit	A1-A3	A4	A5	C1	C2/1	C2/2	C3/1	C3/2	C4	D/1	D/2
PERE	[MJ]	1.16E+1	4.77E-2	2.06E-1	0.00E+0	3.98E-2	5.68E-3	8.27E-1	2.16E+0	0.00E+0	-9.40E+0	-6.88E+0
PERM	[MJ]	1.50E+0	0.00E+0	-7.48E-2	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]	1.31E+1	4.77E-2	1.31E-1	0.00E+0	3.98E-2	5.68E-3	8.27E-1	2.16E+0	0.00E+0	-9.40E+0	-6.88E+0
PENRE	[MJ]	7.42E+1	8.54E-1	7.41E+0	0.00E+0	7.13E-1	1.02E-1	4.74E+1	5.57E+1	0.00E+0	-8.97E+1	-2.27E+1
PENRM	[MJ]	4.48E+1	0.00E+0	2.23E+0	0.00E+0	0.00E+0	0.00E+0	-4.61E+1	-4.61E+1	0.00E+0	0.00E+0	0.00E+0
PENRT	[MJ]	1.19E+2	8.54E-1	9.64E+0	0.00E+0	7.13E-1	1.02E-1	1.31E+0	9.67E+0	0.00E+0	-8.97E+1	-2.27E+1
SM	[kg]	7.46E-2	0.00E+0	3.73E-3	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	-1.91E+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
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
FW	[m^3]	2.36E-2	4.25E-5	1.81E-3	0.00E+0	4.55E-5	6.50E-6	7.59E-4	1.05E-2	0.00E+0	-1.44E-2	-3.27E-3

Caption	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 = Use of net fresh water

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 m² Sikaplan® SGmA-15

Indicator	Unit	A1-A3	A4	A5	C1	C2/1	C2/2	C3/1	C3/2	C4	D/1	D/2
HWD	[kg]	1.13E-6	3.46E-11	5.67E-8	0.00E+0	3.59E-11	5.13E-12	4.66E-10	1.73E-9	0.00E+0	-1.79E-6	-7.28E-9
NHWD	[kg]	6.10E-2	1.36E-4	6.60E-2	0.00E+0	1.06E-4	1.51E-5	1.83E-2	3.20E+0	0.00E+0	-4.09E-2	-1.20E-2
RWD	[kg]	1.59E-3	8.25E-7	1.03E-4	0.00E+0	8.63E-7	1.23E-7	1.03E-4	2.84E-4	0.00E+0	-1.63E-3	-8.45E-4
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
MFR	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.91E+0	0.00E+0	0.00E+0	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
EEE	[MJ]	0.00E+0	0.00E+0	3.20E-1	0.00E+0	0.00E+0	0.00E+0	1.41E-1	5.26E+0	0.00E+0	0.00E+0	0.00E+0
EET	[MJ]	0.00E+0	0.00E+0	5.78E-1	0.00E+0	0.00E+0	0.00E+0	2.65E-1	9.60E+0	0.00E+0	0.00E+0	0.00E+0

Caption	HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy

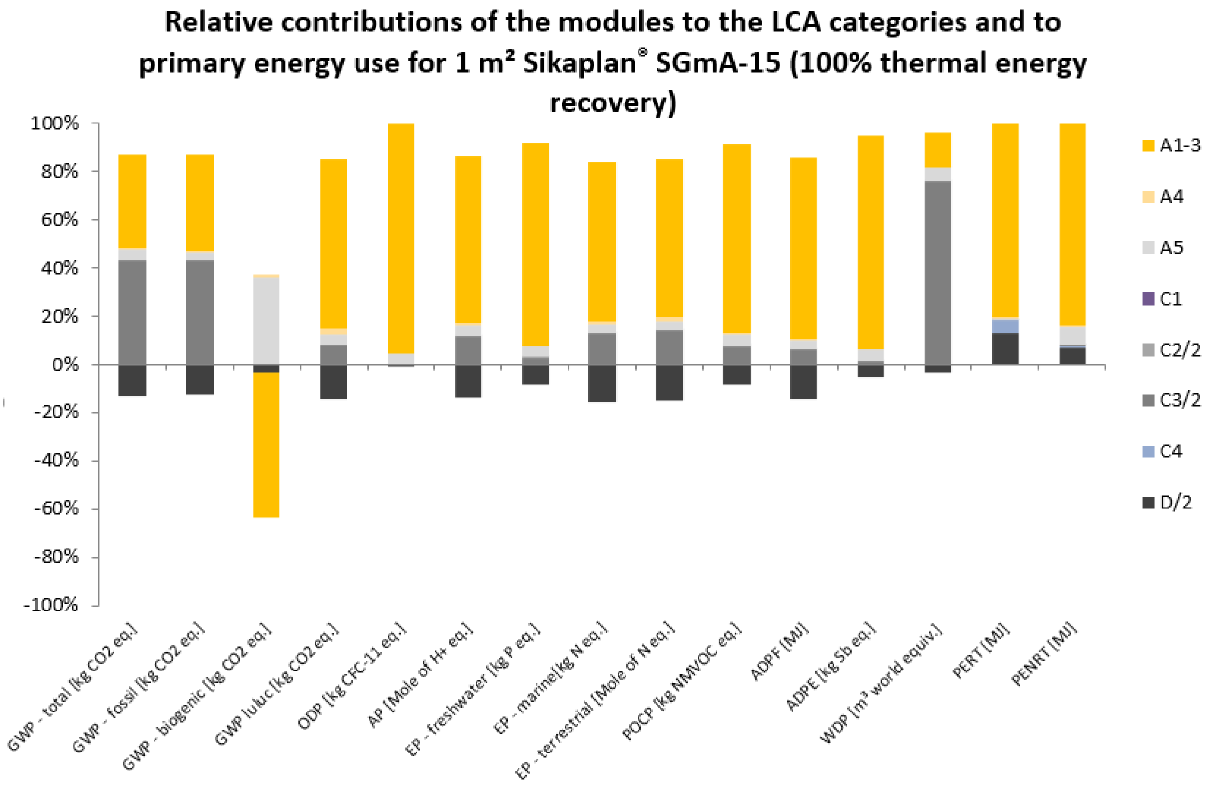
RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1 m² Sikaplan® SGmA-15

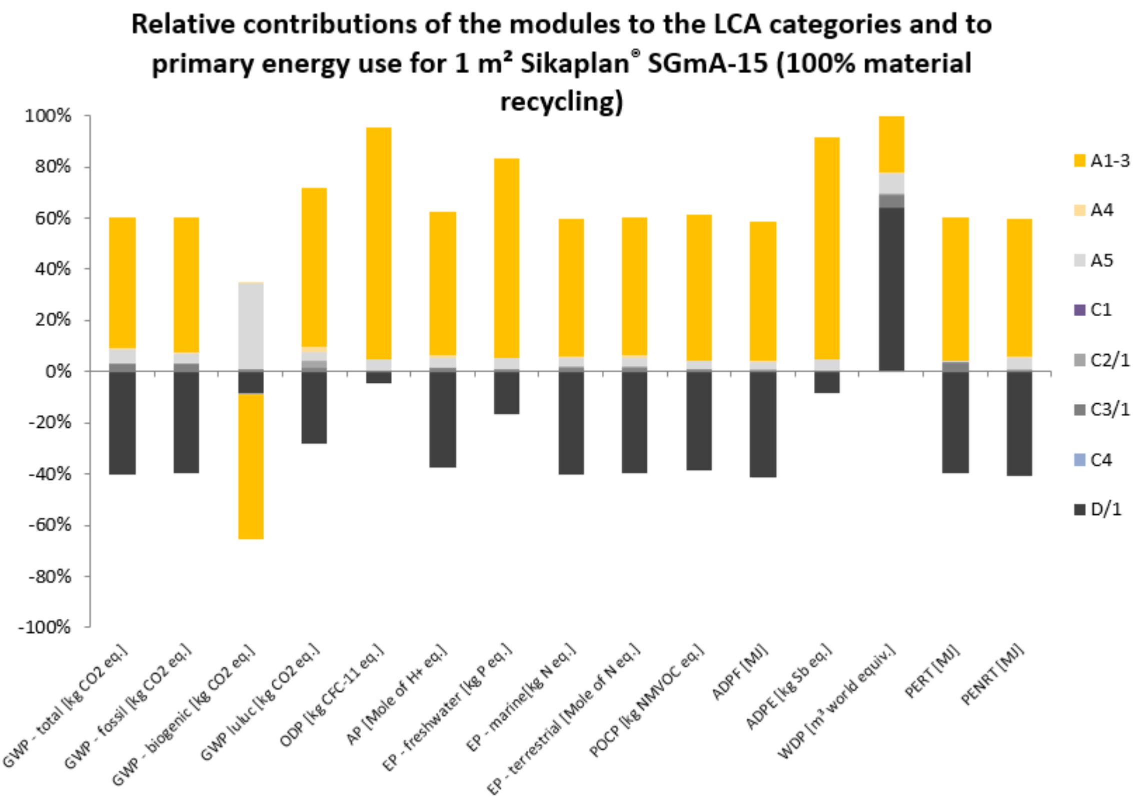
Indicator	Unit	A1-A3	A4	A5	C1	C2/1	C2/2	C3/1	C3/2	C4	D/1	D/2
PM	[Disease Incidence]	5.04E+1	7.06E-1	2.77E+0	0.00E+0	5.15E-1	7.35E-2	5.08E-1	7.92E+0	0.00E+0	-4.45E+1	-4.07E+0
IRP	[kBq U235-Eq.]	1.69E-9	1.39E-11	9.34E-11	0.00E+0	1.04E-11	1.48E-12	2.12E-11	3.18E-10	0.00E+0	-1.28E-9	-2.59E-10
ETP-fw	[CTUe]	1.07E-7	6.88E-10	6.10E-9	0.00E+0	5.29E-10	7.56E-11	9.80E-10	3.37E-8	0.00E+0	-5.34E-8	-1.30E-8
HTP-c	[CTUh]	3.07E+1	2.57E-1	1.63E+0	0.00E+0	2.45E-1	3.49E-2	6.53E-1	2.13E+0	0.00E+0	-7.94E+0	-5.39E+0
HTP-nc	[CTUh]	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
SQP	[-]	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

Caption	PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index

6. LCA: Interpretation

The following charts show the relative contributions of the different modules to the various LCA categories and to primary energy use in a dominance analysis.





The product stage (Modules A1–A3) has by far the greatest impact on nearly all of the indicators. Only Global Warming Potential (GWP-total) in Scenario 2 is also significantly affected by the greenhouse gases from thermal energy recovery (C3). For this reason, the following interpretation examines the product stage more closely.

Indicators of the inventory analysis:
The largest contributor to Use of Renewable Primary Energy Resources (PERT) is production of the pre-product (70 %), followed by packaging (17 %) and the manufacturing process (13 %). Regarding the raw materials, the production of polymers and plasticisers (96 %) has the greatest impact on the Use of Non-Renewable Primary Energy Resources (PENRT), whereas the influence of the production process (electrical energy) amounts to 4 %.

Indicators of the impact assessment:
The dominant influence of pre-product manufacturing is evident in all impact categories and accounts for more than 91 % across all impact categories. The exceptions are Biogenic Global Warming Potential (GWP-biogenic), Ozone Depletion Potential (ODP), and Eutrophication Potential (EP-freshwater). For GWP-biogenic, the main contributors are packaging (78 %) and pre-product manufacturing (22 %). For ODP, the main contributors are pre-product production (60 %) and packaging (40 %). For EP-freshwater, the main contributors are pre-product production (76%) and packaging (21%).

Within pre-product production, PVC polymers play a dominant role with regard to the GWP-total (49 %), Acidification Potential (AP) (43 %), EP-marine (49 %), EP-terrestrial (48 %), Formation Potential of Tropospheric Ozone (POCP) (43 %), and Abiotic Depletion Potential for Fossil Resources (ADPF) (48 %). Plasticisers play a dominant role with regard to GWP-total (46 %), POCP (49 %), and ADPF (48 %). The stabilisers play a dominant role in terms of ODP (66 %), EP-freshwater (63 %), and Abiotic Depletion Potential for Non-Fossil Resources (ADPE) (75 %). The pigments mainly influence Water Depletion Potential (ODP) (29 %).

The raw materials with the greatest impact also have the largest mass percentages in the polymeric membrane: PVC polymers and plasticisers. Stabilisers and pigments also contribute to the impact in some categories, although they are present in smaller percentages in the product.

Electricity consumption has the greatest impact in the production process of the waterproofing membrane. The production process is the largest contributor to GWP-total (7 %), AP (4 %), EP-marine / -terrestrial (5 %), and Water Depletion Potential (user) (WDP) (6%).

7. Requisite evidence

No requisite evidence is required for Sikaplan® SGmA polymeric proofing membrane.

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