

ENVIRONMENTAL-PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A2

Owner of the Declaration	Sika Services AG
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
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Valid to	24/11/2027

Sikaplan VGWT
Sika Services AG

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EPD
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1. General Information

Sika Services AG

Programme holder

IBU – Institut Bauen und Umwelt e.V.
Hegelplatz 1
10117 Berlin
Germany

Declaration number

EPD-SIK-20220221-IBA1-EN

This declaration is based on the product category rules:

Plastic and elastomer roofing and sealing sheet systems,
01/08/2021
(PCR checked and approved by the SVR)

Issue date

25/11/2022

Valid to

24/11/2027



Dipl.-Ing Hans Peters
(chairman of Institut Bauen und Umwelt e.V.)



Florian Pronold
(Managing Director Institut Bauen und Umwelt e.V.)

Sikaplan VGWT

Owner of the declaration

Sika Services AG
Tüffenwies 16-22
8064 Zurich
Switzerland

Declared product / declared unit

1 m² Sikaplan VGWT polymeric waterproofing membrane

Scope:

This document applies to Sikaplan VGWT polymeric waterproofing membrane manufactured by Sika Manufacturing AG in Duedingen, Switzerland. The life cycle assessment data are based on production data from 2021 collected by Sika Services AG.

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 bezeichnet*.

Verification

The standard EN 15804 serves as the core PCR	
Independent verification of the declaration and data according to ISO 14025:2011	
<input type="checkbox"/>	internally
<input checked="" type="checkbox"/>	externally



Mrs Kim Allbury,
(Independent verifier)

2. Product

2.1 Product description/Product definition

Sikaplan VGWT is a multi-layer synthetic roof waterproofing sheet based on polyvinyl chloride (PVC) with embedded polyester scrim reinforcing (DE/E1 PVC-P-NB-V-PG).

Sikaplan VGWT waterproofing sheets are available in these thicknesses: 1.2 mm, 1.5 mm and 1.8 mm.

All values given in the LCIA results section apply to Sikaplan VGWT-12; a formula for individually calculating values for other thicknesses is given in Chapter 5.

Placement of the product on the market in the European Union/European Free Trade Association (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*. Please select one of the following options and delete the header of the selected [alternative]:

[Alternative 1a: Product according to the CPR based on a hEN]:

For the placing on the market of the 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 xyz:date, title and the CE-marking.

For the application and use the respective national provisions apply.

[Alternative 1b: Products according to the CPR based on an ETA]:

For the placing of the product on the market in the European Union/European Free Trade Association (EU/EFTA) (with the exception of Switzerland) the Regulation (EU) No. 305/2011 (CPR) applies. The product needs a declaration of performance taking into consideration ETA no. xyz:date, title and the CE-marking.

For the application and use the respective national provisions apply.

[Alternative 2a: Product not harmonised in accordance with the CPR but in accordance with other provisions for harmonisation of the EU]:

For the placing on the market in the European Union/European Free Trade Association (EU/EFTA) (with the exception of Switzerland) the following legal provisions apply:

- Directive no. xyz: date, title
- Regulation no. xyz: date, title
- and the harmonised standards based on these provisions:
- EN xyz: date, title

The CE-marking takes into account the proof of conformity with the respective harmonized standards based on the legal provisions above.

For the application and use the respective national provisions apply.

[Alternative 2b: Product harmonized as well in accordance with the CPR as with other provisions for harmonisation of the EU]:

For the placing of the product on the market in the European Union/European Free Trade Association (EU/EFTA) (with the exception of Switzerland) the Regulation (EU) No. 305/2011 (CPR) and the following other provisions for harmonisation apply:

- Directive (EU) xyz: date, title
- Regulation (EU) no. xyz: date, title

The product needs a declaration of performance in accordance with the CPR taking into consideration /EN xyz: date/, title or /ETA no. xyz/:date, title respectively and the CE-marking.

The CE-marking for the product takes into account the Declaration of Performance in accordance with the CPR and the proof of conformity with the following harmonised standards or based on the other provisions for harmonisation:

- EN xyz: date, title
- Source, date, title

For the application and use the respective national provisions apply.

[Alternative 3: Product for which no legal provisions for harmonisation of the EU exist]:

For the use and application of the product the respective national provisions at the place of use apply, in Germany for example the building codes of the federal states and the corresponding national specifications.

2.2 Application

Sikaplan VGWT waterproofing sheets are used mainly for waterproofing flat roofs. The sheets can be loosely laid and mechanically fastened to roofs with any slope.

2.3 Technical Data

In the following table, only technical data relevant to Sikaplan VGWT waterproofing sheets are given.

Technical data

Name	Value	Unit
Watertightness as per EN 1928	Passed	
Tensile strain as per EN 12311-2	≥ 15	%
Peel resistance of the seam joint as per EN 12316-2	Passed	-
Shear resistance of the seam joint as per EN 12317-2	≥ 600	N/50mm
Artificial ageing as per EN 1297	Passed (> 5000 h)	-
Dimensional stability as per EN 1107-2	≤ 0.5	%
Folding in the cold as per EN 495-5	≤ -30	°C

Performance data of the product in accordance with the declaration of performance with respect to its essential characteristics according to *EN 13956:2012*, Flexible sheets for waterproofing.

2.4 Delivery status

The products are delivered palletised: 20 m x 2 m or 20 m x 1.54 m, each 21 rolls per pallet.

2.5 Base materials/Ancillary materials

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

- Polyvinyl chloride / PVC: 50 - 70%
- Plasticiser (Phthalate): 34 - 40%
- Stabiliser (UV/Heat): 0 - 2%
- Fire retardant (inorganic): 2 - 4%
- Carrier (Polyester scrim): 1 - 3%
- Pigments: 0 - 8%

This product contains substances listed in the Candidate List of Substances of Very High Concern for Authorisation (SVHC) (date: 04.07.2022) exceeding 0.1 percentage by mass: no

2.6 Manufacture

Sikaplan VGWT polymeric waterproofing sheets are manufactured in the following steps:

- Dosing of the various raw materials and plastification of the mixture in an extruder
- Rolling the melt into sheets by calendar processing
- Cooling and reeling the sheets
- Heat fusing of two sheets (top and bottom layers), embedding a polyester mesh, on a lamination machine
- Trimming the sheets and winding them onto cardboard spools made of recycled paper
- Wrapping the rolls in PE stretch film, palletising

Production waste such as scrap is recycled by feeding it directly back into the manufacturing process.

Sika maintains a quality management system certified in accordance with *ISO 9001*.

2.7 Environment and health during manufacturing

In the production of Sikaplan VGWT polymeric waterproofing membrane, the regulatory standards for exhaust gasses, waste water and solid waste as well as for noise emissions are fully met and the various limits are not exceeded. The health of production personnel is not put at risk during production. Waste gasses from the production process are collected and filtered in exhaust gas scrubbers.

Water used is used exclusively for cooling and does not come into contact with the polymeric waterproofing membrane. There are no hazardous goods according to the *REACH* listing.

In addition to national requirements, there are Sika strategic goals for waste, energy and water reduction, as well as for zero personal accidents at work. There are regular meetings with the neighbourhood for feedback regarding, e.g. noise. Employees receive regular training for process standards, and for safety and hazards.

Sika maintains an environmental management system certified in accordance with *ISO 14001*.

2.8 Product processing/Installation

Sikaplan VGWT polymeric waterproofing sheets are loose laid with mechanical fastening for unballasted roofs with any slope. Seams between sheets are hot-air welded; linear fastening is recommended.

In principle, the current product data sheet should be consulted. Please request further information from your local Sika organisation.

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 VGWT polymeric waterproofing membrane remains unchanged throughout its service life. This was confirmed in 2005 by the internal study *Radar*. Additionally, it was confirmed in the study by the *British Board of Agrément (BBA)*.

2.11 Environment and health during use

During their service life, Sikaplan VGWT synthetic waterproofing sheets have no negative influence on the environment and health of users.

2.12 Reference service life

The reference service life of Sikaplan VGWT synthetic waterproofing sheets is at least 35 years. The *British Board of Agrément (BBA)* certified Sikaplan

VGWT to “under normal service conditions (...) provide a durable roof waterproofing with a service life in excess of 35 years”

This conclusion reflects the high resistance to weathering and aging of the product when properly used. Description of the influences on the ageing of the product when applied in accordance with the rules of technology.

2.13 Extraordinary effects

Fire

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

Fire protection

Name	Value
Building material class	E
Burning droplets	
Smoke gas development	

Water

No environmental impact due to water exposure of the installed Sikaplan VGWT polymeric waterproofing membrane is known.

Mechanical destruction

Sikaplan VGWT 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 VGWT waterproofing sheets can be selectively removed and recycled. This allows for a closed-loop material cycle.

Sika

Services AG is affiliated with Roofcollect, the recycling system for polymeric roofing and waterproofing membranes. This enables increasingly more material recovery from sorted polymeric waterproofing membranes.

2.15 Disposal

Sikaplan VGWT polymeric waterproofing sheets can be recycled at the end of the use stage.

The sheets are completely recycled by Roofcollect in numerous recycling systems and new products are manufactured from the recovered material.

Sikaplan VGWT polymeric waterproofing membrane can be classified under Waste Code 170904 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 your local Sika organisation's website.

3. LCA: Calculation rules

3.1 Declared Unit

This declaration applies to 1 m² of Sikaplan VGWT polymeric waterproofing membrane, thickness 1.2 mm. A formula is given for an independent calculation of the values for other thicknesses.

Declared unit

Name	Value	Unit
Declared unit	1	m ²
Grammage	1.5	kg/m ²
Type of sealing	Hot-air weld	-
Layer thickness	0.0012	m

For IBU core EPDs (where clause 3.6 is part of the EPD): for average EPDs, an estimate of the robustness of the LCA values must be made, e.g. concerning variability of the production process, geographical representativeness and the influence of background data and preliminary products compared to the environmental impacts caused by actual production.

3.2 System boundary

Type of EPD: Cradle-to-gate with options

The system boundaries of the EPD follow the modular construction system described by EN 15804+A2. The LCA takes into account the following modules:

- A1-A3: Manufacturing of pre-products, packaging, ancillary materials, transport to the factory, production including energy supply and waste handling

- A4: Transport to the building site
- A5: Installation into the building (welding energy, disposal of packaging)
- C1: Deconstruction and demolition
- C2/1: Transport to the recycling facility
- C2/2: Transport to the incineration facility
- C3/1: Waste processing for recycling
- C3/2: Waste incineration
- C4: Disposal
- D: Potential for reuse, recovery and/or recycling as net flows and benefits

3.3 Estimates and assumptions

Various stabilisers were approximated with a general chemical dataset or proxies were built. The percentage by mass is < 3 %.

The membrane is assumed to be removed by hand at the end of life, so no inputs/outputs are considered.

3.4 Cut-off criteria

All data were taken into account (recipe constituents, thermal energy used, electricity used). Transport expenses were considered for all inputs and outputs. The manufacturing of the production machines and systems and associated infrastructure was not taken into account in the LCA. Additionally, inputs (solvents, lubricant oils) needed for maintenance of the production line, lighting, hygiene related water use, transportation of employees were considered negligible and excluded

from the analysis.

3.5 Background data

The primary data provided by Sika derive from the plant at Duedingen, Switzerland. The underlying data were collected in the databases of *GaBi software* (version CUP2022.1) and *ecoinvent Version 3.8*. The Swiss Electrical Energy Mix was applied.

3.6 Data quality

To simulate the product stage, data recorded by Sika from the production year 2021 were used. All other relevant background datasets were taken from generic data not older than 10 years, using as many as datasets possible for raw materials and processes with technological and geographical representativeness.

3.7 Period under review

The period under review is the year 2021.

3.8 Geographic Representativeness

Land or region, in which the declared product system is manufactured, used or handled at the end of the product's lifespan: Switzerland

3.9 Allocation

Production waste that was reclaimed and reused internally has been modelled as closed-loop recycling in Modules A1-A3.

Regarding the recycling of the polymeric waterproofingsheets, the amount of recyclable membrane was treated as a corresponding PVC benefit. Benefits for the disposal of packaging (incineration), scrap and roofing membrane are credited in Module D; this also applies to the reuse of wooden pallets.

3.10 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 used background database has to be mentioned.

4. LCA: Scenarios and additional technical information

Characteristic product properties

Information on biogenic carbon

The biogenic carbon content quantifies the amount of biogenic carbon in a construction product leaving the factory gate, and it shall be separately declared for the product and for any accompanying packaging.

If the total mass of biogenic carbon containing materials is less than 5 % of the total mass of the product and accompanying packaging, the declaration of biogenic carbon content may be omitted. The mass of packaging containing biogenic carbon shall always be declared.

Note: 1 kg of biogenic carbon is equivalent to 44/12 kg of CO₂.

Information on describing the biogenic Carbon Content at factory gate

Name	Value	Unit
Biogenic carbon content in product	-	kg C
Biogenic carbon content in accompanying packaging	0.066	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 (truck)	0.004	l/100km
Transport distance (truck)	1600	km
Gross density of products transported	1250	kg/m ³
Transport distance (boat)	160	km
Litres of fuel (boat)	0.0008	l/100km

Installation into the building (A5)

Name	Value	Unit
Electricity consumption	0.016	kWh
Material loss (membrane)	2	%
Overlaps (membrane)	8	%

In case a **reference service life** according to applicable ISO standards is declared then the assumptions and in-use conditions underlying the determined RSL shall be declared. In addition, it shall be stated that the RSL applies for the reference conditions only.

The same holds for a service life declared by the manufacturer. Corresponding information related to in-use conditions needs not be provided if a service life taken from the list on service life by BNB is declared.

Reference service life

Name	Value	Unit
Reference service life	35	a

The *British Board of Agrément (BBA)* certified Sikaplan VGWT to provide a durable roof waterproofing with a service life in excess of 35 years.

End of life (C1-C4)

Name	Value	Unit
Recycling Scenario 1	100	%
Transport to recycling (boat)	160	km
Transport to recycling (truck)	1240	
Recycling Scenario 2	100	%
Transport to incineration (truck)	500	

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

The benefits from the incineration of waste produced during installation are credited in Module D as avoided generation of electricity and thermal energy, since in modern incineration plants the energy of combustion is used to produce power and thermal energy. The membrane material recycled at the end-of-life is credited as avoided production of PVC, while the partial reuse of pallets from packaging is also included in Module D as avoided production of new pallets.

5. LCA: Results

The results displayed below apply to Sikaplan VGWT-12. To calculate results for other thicknesses, please use this formula:

$$I_x = ((x+0.58)/1.78) * I_{1,2}$$

[I_x = the unknown parameter value for Sikaplan VGWT products with a thickness of "x" mm (e.g. 1.5 mm)]

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	MND	MND	MNR	MNR	MNR	MND	MND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 m2 membrane

Parameter	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	4.17E+00	5.49E-02	6.9E-01	0	1.95E-02	6.4E-03	2.34E-01	4.23E+00	0	-2.85E+00	-1.2E+00
GWP-fossil	kg CO ₂ eq	4.35E+00	5.48E-02	5.38E-01	0	2.56E-02	8.86E-03	2.3E-01	4.23E+00	0	-2.82E+00	-1.19E+00
GWP-biogenic	kg CO ₂ eq	-2.51E-01	5.04E-05	1.45E-01	0	-6.95E-03	-2.8E-03	3.69E-03	3.33E-03	0	-2.29E-02	-9.52E-03
GWP-luluc	kg CO ₂ eq	6.33E-02	7.24E-05	6.35E-03	0	8.46E-04	3.41E-04	2.65E-05	3.26E-04	0	-1.71E-03	-2.3E-04
ODP	kg CFC11 eq	4.56E-09	4.79E-15	4.57E-10	0	9.3E-15	3.67E-15	1.65E-12	4.04E-12	0	-2E-10	-1.4E-11
AP	mol H ⁺ eq	4.59E-02	1.37E-03	4.8E-03	0	2.27E-04	3.62E-05	1.83E-04	1.09E-03	0	-3.96E-03	-1.23E-03
EP-freshwater	kg P eq	3.14E-05	4.78E-08	3.19E-06	0	4.54E-07	1.83E-07	3.39E-07	1.03E-06	0	-6.36E-06	-2.86E-06
EP-marine	kg N eq	2.06E-03	3.5E-04	2.63E-04	0	5.24E-05	7.1E-06	6.68E-05	3.63E-04	0	-1.26E-03	-4.39E-04
EP-terrestrial	mol N eq	2.13E-02	3.84E-03	2.78E-03	0	6.16E-04	9.46E-05	7.24E-04	4.51E-03	0	-1.39E-02	-4.66E-03
POCP	kg NMVOC eq	1.35E-02	9.82E-04	1.5E-03	0	1.68E-04	2.82E-05	1.62E-04	1.04E-03	0	-6.99E-03	-1.13E-03
ADPE	kg Sb eq	9.82E+01	6.85E-01	1.02E+01	0	2.07E+00	8.18E-01	9.99E-01	7.48E+00	0	-6.86E+01	-1.69E+01
ADPF	MJ	6.25E-02	3.29E-09	6.25E-03	0	1.28E-08	5.12E-09	3.47E-08	9.89E-08	0	-5.55E-07	-3.24E-07
WDP	m ³ world eq deprived	3.59E-01	1.4E-04	6.32E-02	0	1.37E-03	5.49E-04	1.45E-02	3.25E-01	0	-1.09E-01	-1.62E-02

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 membrane

Parameter	Unit	A1-A3	A4	A5	C1	C2/1	C2/2	C3/1	C3/2	C4	D/1	D/2
PERE	MJ	1.22E+01	1.69E-02	1.78E-01	0	1.15E-01	4.65E-02	7.68E-01	1.99E+00	0	-8.94E+00	-6.53E+00
PERM	MJ	1.75E+00	0	-3.34E-02	0	0	0	0	0	0	0	0
PERT	MJ	1.39E+01	1.69E-02	1.45E-01	0	1.15E-01	4.65E-02	7.68E-01	1.99E+00	0	-8.94E+00	-6.53E+00
PENRE	MJ	5.86E+01	6.86E-01	7.69E+00	0	2.08E+00	8.2E-01	4.26E+01	4.91E+01	0	-6.86E+01	-1.7E+01
PENRM	MJ	4.05E+01	0	7.69E-01	0	0	0	-4.16E+01	-4.16E+01	0	0	0
PENRT	MJ	9.91E+01	6.86E-01	8.46E+00	0	2.08E+00	8.2E-01	1E+00	7.49E+00	0	-6.86E+01	-1.7E+01
SM	kg	5.45E-02	0	5.45E-03	0	0	0	0	0	0	-1.54E+00	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0
FW	m ³	2.55E-02	1.59E-05	3.24E-03	0	1.31E-04	5.26E-05	6.07E-04	8.47E-03	0	-1.18E-02	-2.67E-03

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 membrane

Parameter	Unit	A1-A3	A4	A5	C1	C2/1	C2/2	C3/1	C3/2	C4	D/1	D/2
HWD	kg	7.75E-07	2.94E-12	7.76E-08	0	9.91E-12	3.93E-12	1.04E-10	5.81E-10	0	-1.43E-06	-2.83E-09

NHWD	kg	2.15E-01	8.11E-05	7.19E-02	0	2.95E-04	1.17E-04	1.49E-02	2.58E+00	0	-3.3E-02	-1.06E-02
RWD	kg	2.14E-03	7.47E-07	2.41E-04	0	2.55E-06	1.01E-06	8.6E-05	2.36E-04	0	-1.32E-03	-7.21E-04
CRU	kg	0	0	0	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	1.54E+00	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0	0	0	0
EEE	MJ	0	0	3.49E-01	0	0	0	1.14E-01	4.23E+00	0	0	0
EET	MJ	0	0	6.29E-01	0	0	0	2.13E-01	7.72E+00	0	0	0

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 membrane

Parameter	Unit	A1-A3	A4	A5	C1	C2/1	C2/2	C3/1	C3/2	C4	D/1	D/2
PM	Disease incidence	4.72E+01	5.01E-01	4.97E+00	0	1.44E+00	5.68E-01	3.99E-01	6.29E+00	0	-3.47E+01	-3.25E+00
IR	kBq U235 eq	1.95E-09	9.55E-12	2.03E-10	0	2.89E-11	1.14E-11	1.6E-11	2.5E-10	0	-9.64E-10	-1.87E-10
ETP-fw	CTUe	3.52E-07	4.57E-10	3.58E-08	0	1.47E-09	5.83E-10	7.4E-10	2.67E-08	0	-3.68E-08	-8.29E-09
HTP-c	CTUh	2.65E+01	8.18E-02	2.76E+00	0	6.98E-01	2.81E-01	5.26E-01	1.72E+00	0	-6.57E+00	-4.43E+00
HTP-nc	CTUh	0	0	0	0	0	0	0	0	0	0	0
SQP	SQP	0	0	0	0	0	0	0	0	0	0	0

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

Disclaimer 1 – for the indicator “Potential Human exposure efficiency relative to U235”. 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.

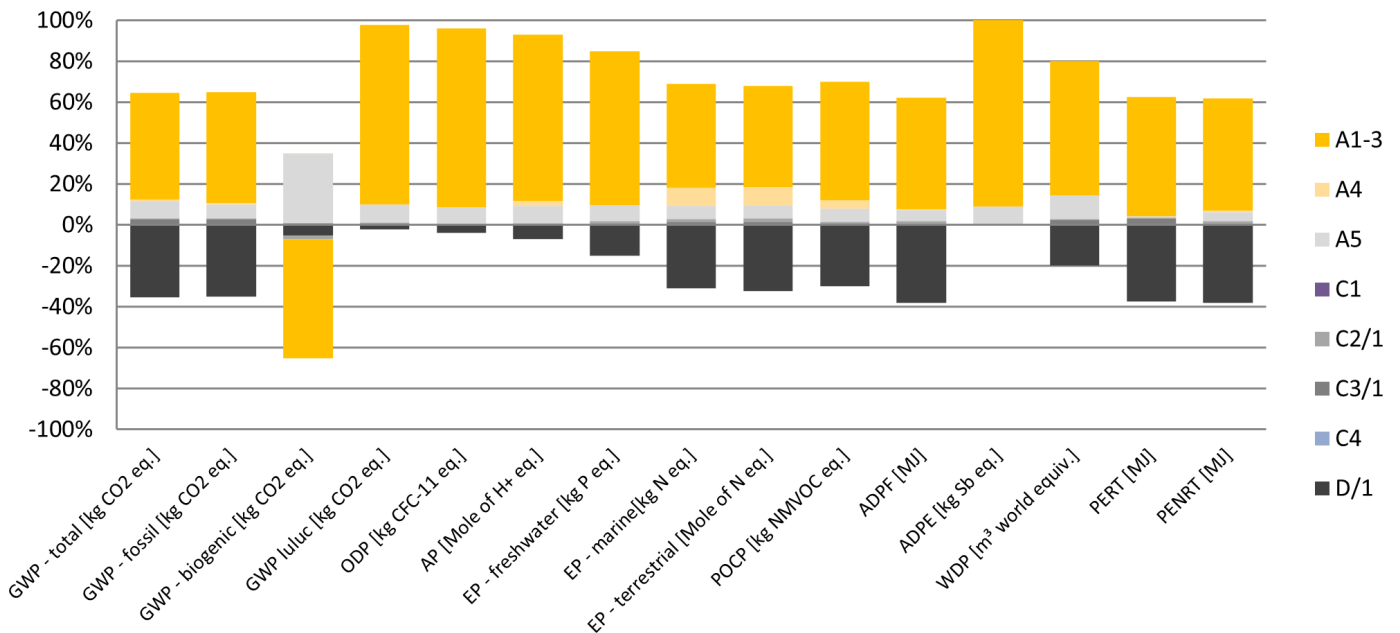
Disclaimer 2 – for the indicators “abiotic depletion potential for non-fossil resources”, “abiotic depletion potential for fossil resources”, “water (user) deprivation potential, deprivation-weighted water consumption”, “potential comparative toxic unit for ecosystems”, “potential comparative toxic unit for humans – cancerogenic”, “Potential comparative toxic unit for humans - not cancerogenic”, “potential soil quality index”. 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.

6. LCA: Interpretation

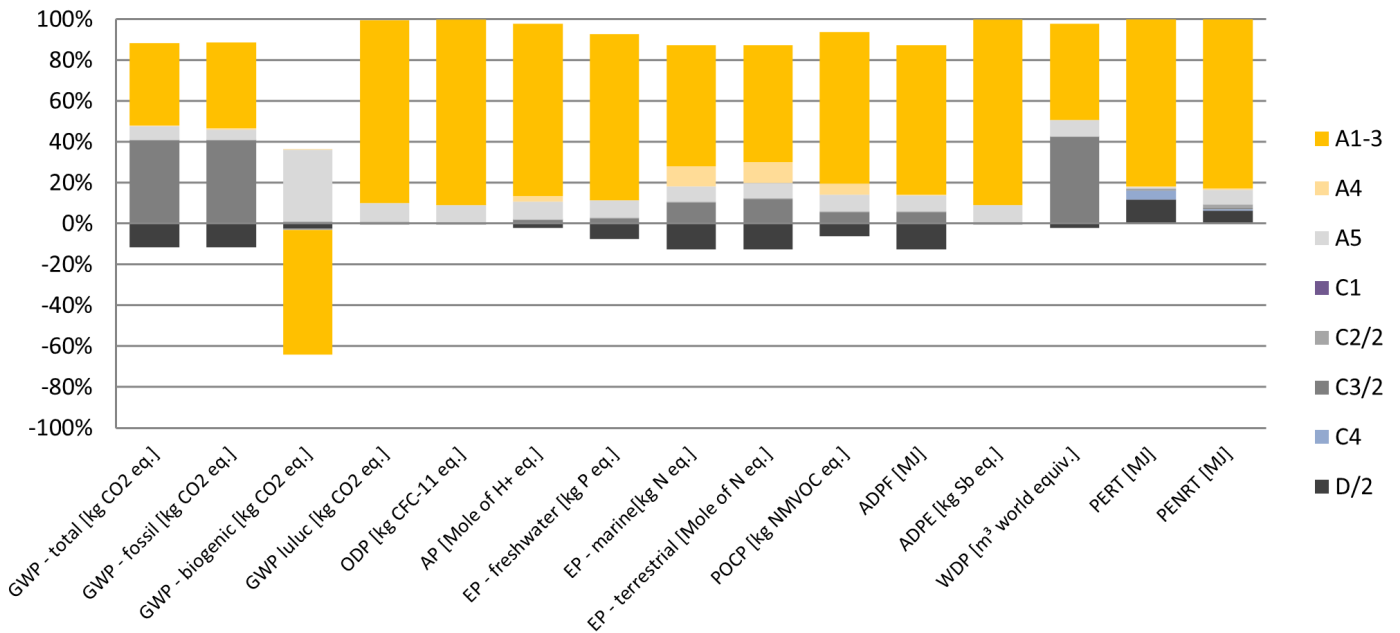
The following chart shows the relative contributions of the different modules to the various LCA categories and to primary

energy use in a dominance analysis.

Relative contribution of the modules to the environmental impacts and primary energy use of 1m² Sikaplan VGWT-12 (100% recycling)



Relative contribution of the modules to the environmental impacts and primary energy use of 1m² Sikaplan VGWT-12 (100% incineration)



Examining the results for Sikaplan® VGWT, it can be concluded that the most significant contributor to the impact categories is the product stage (Module A1-A3). This is true for all impact categories except GWP (total and fossil), where greenhouse gas emissions from the incineration of the membrane in Module C3 of Scenario 2 (100% Incineration) contribute to the results from this impact category. The modules A1-A3 are further investigated in the following paragraphs.

Indicators of the inventory analysis:

Due to electricity and natural gas use, the production process (16%), pre-product manufacturing (67%) and packaging (16%) account for most of the use of renewable primary energy resources (PERT). The manufacturing of polymers and plasticisers in the production stage has the greatest impact (96%) on the use of non-renewable primary energy resources (PENRT), while the impact of the production process (energy) is 3%.

Indicators of the impact assessment:

Examining the results for module A1-3 in further detail, the raw materials involved in the production of Sikaplan® VGWT represent greater than 86% across each of the different impact categories. The exceptions are GWP -

biogenic, ODP, EP - freshwater and PERT. For GWP - biogenic, 12% of the impacts arise from the formulation and 87% of the impacts arise from the packaging. For ODP, 26% of the impacts arise from the formulation and 63% of the impacts arise from the packaging. For EP - freshwater, 66% of the impacts arise from the formulation and 29% of the impacts arise from the packaging. For PERT, 67% of the impacts arise from the formulation and 16% of the impacts arise from the packaging.

Within pre-product manufacturing, polymers play an important role regarding GWP-total and GWP-fossil (38%), EP freshwater, marine and terrestrial (31 - 39%), WDP (21%) and ADPF (41%). Plasticisers significantly influence GWP (33%), EP (21%), POCP (33%), WDP (32%) and ADPF (38%). Flame retardants affect the AP (88%), ADPE (100%), POCP (22%) and WDP (55%), and stabilisers affect the GWP-biogenic at highest contribution (100%), GWP-luluc (96%), ODP (89%) and EP-freshwater (55%). Pigments and fillers make a low contribution to the impacts (below 7%). In addition, the carrier material contributes mostly to GWP-total and GWP-fossil (15%), EP freshwater, marine and terrestrial (12 - 14%) and ADPF (13%). The raw materials with the greatest overall effect on the impacts also show the greatest percentage by mass of the waterproofing membrane: polymers and plasticisers. The manufacturing process (due to electricity use) contributes the most to ODP (11%), WDP (7%) and GWP-total (4%).

7. Requisite evidence

No requisite evidence is required for Sikaplan VGWT polymeric

waterproofing membrane.

8. References

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REACH Candidate List**REACH Candidate**

List: Candidate List of substances of very high concern for Authorisation: 04.07.2022.

Sphera: GaBi 10.6.1.35 and Database CUP 2022.1

Sphera: GaBi 10.6.1.35 and Database CUP 2022.1: Software-System and Databases for Life Cycle Engineering. Copyright, TM. Stuttgart, Echterdingen, 1992-2022.

The literature referred to in the Environmental Product Declaration must be listed in full. Standards already fully quoted in the EPD do not need to be listed here again.

The current version of PCR Part A and PCR Part B of the PCR document on which they are based must be referenced.



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