PLASTFOIL®
RELIABLE WATERPROOFING

EPD®

ECO PLATFORM
EPD
VERIFIED

ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025:2006 and BS EN 15804:2012+A2:2019 for

PVC MEMBRANE PLASTFOIL®

EN 13956; EN 13967

Programme	The International EPD® System, www.environdec.com
The declaration is registered under the regional programme	EPD Russia, www.epdrussia.org
Programme operator	EPD International AB
EPD registration number	S-P-07626
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Valid until	2028-01-24

LLC "PENOPLEX SPb"
Address: Saperny lane, 1, letter "A",
Saint-Petersburg, Russia, 191014
Manufacturer address: Shosse Enthusiastov, 36,
Leningrad region, Kirishi, Russia, 187110
www.plastfoil.com

CONTENT

GENERAL INFORMATION

Programme	Address	Website, e-mail
The International EPD® System	EPD International AB Box 210 60 SE-100 31 Stockholm, Sweden	www.environdec.com info@environdec.com

CEN standard EN 15804 serves as the Core Product Category Rules (PCR)

Product category rules (PCR):	PCR 2019:14 Construction products (EN 15804:A2) (1.11) от 2021-02-05 Product code according to the main UN product classifier: 369
PCR review was conducted by:	Claudia A. Peña info@environdec.com
Independent third-party verification of the declaration and data, according to ISO 14025:	☐ EPD process certification ☒ EPD verification
Third party verifier:	Marcel Gomez Ferrer Tel. +34 630 64 35 93 Marcel Gómez Consultoria Ambiental info@marcelgomez.com
Approved by:	The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier:	☒ Yes ☐ No
Owner of the declaration:	LLC "PENOPLEX SPb" Saperny lane, 1, letter "A", Saint-Petersburg, Russia, 191014 www.plastfoil.com
The life cycle assessment (LCA) was carried out with the participation of:	EcoStandard Group Perevedenovsky Lane, 13/16, Moscow, Russia, 105082 www.ecostandardgroup.ru
LCA Expert:	Elizaveta Andreeva andreeva.e@ecostandard.ru
Geographical scope of validity of the declaration:	in all countries

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but from different programs may not be comparable.

EPDs of construction products may not be comparable if they do not comply with BS EN 15804:2012+A2:2019.

COMPANY INFORMATION

LLC "PENOPLEX SPb" is one of the largest manufacturers of building materials in Europe. To date, the company has 13 factories, one of which produces high-quality PVC membrane PLASTFOIL®.

For more than 20 years, the company has been producing high-quality construction and decorative finishing materials. The company's portfolio contains materials that can fully provide technical solutions for various structures of buildings and structures. Throughout its history, the company has received more than 10 patents for inventions in the construction field and modernization of the production process.

Today the company employs more than 1000 people who contribute to the development of the company daily.

The company is a responsible manufacturer that annually undergoes audits according to the ISO 9001 quality management system.

Comprehensive tests and certificates of different European technical institutes confirm the quality of PLASTFOIL® products.

REACH INFORMATION

The production of PVC membrane PLASTFOIL® does not use chemicals restricted by the provisions of the European REACH Regulation (EC) No.1907/2006 "Registration, assessment, authorization and restriction of the production and use of chemicals":

- Annex XVII – list of substances with restricted access, including plasticizers of the orthophthalate group;
- Annex XIV – list of substances for which authorization is required;
- SHVC-list – list of substances of very high concern.

CONTACTS

Head organization

LLC "PENOPLEX SPb"

Saperny lane, 1, letter "A", Saint-Petersburg, Russia, 191014

Website: www.plastfoil.com
E-mail: plastfoil@plastfoil.com

Manufacturing enterprises where the declared products are manufactured

Branch of LLC “PENOPLEX SPb” in Kirishi

Shosse Enthusiastov, 36, Leningrad region, Kirishi, Russia, 187110

PRODUCT INFORMATION

Product code according to the main UN product classifier: 369

Product name and application:

PVC membrane PLASTFOIL® CLASSIC

Thickness: 1,2/1,5/1,8/2,0 mm
Length: 25/20/15 m
Width: 1,05/2,10 m

Designed for waterproofing roofs with mechanical fastening (waterproofing of ballast roofs is possible).

PVC membrane PLASTFOIL® POLAR

Thickness: 1,2/1,5/1,8/2,0 mm
Length: 25/20/15 m
Width: 1,05/2,10 m

Designed for waterproofing roofs with mechanical fastening in northern regions. It can be successfully used for waterproofing roofs of industrial and residential buildings, exhibition, warehouse and shopping complexes.

PVC membrane PLASTFOIL® ECO

Thickness: 1,2/1,5/1,8/2,0 mm
Length: 25/20/15 m
Width: 1,05/2,10 m

Successfully used for waterproofing roofs with a mechanical method of fixing industrial buildings, exhibition, warehouse and shopping complexes.

PVC membrane PLASTFOIL® LAY

Thickness: 1,5 mm
Length: 20 m
Width: 1,05/2,10 m

Successfully used for waterproofing roofs with a mechanical method of fixing industrial buildings, exhibition, warehouse and shopping complexes. It can be used as walkways due to the anti-slip surface.

PVC membrane PLASTFOIL® ART

Thickness: 1,5/1,8 mm
Length: 10/20 m
Width: 1,05/2,0 m

Designed for waterproofing of the roof, including in the places of abutments. It can be used on any objects: on the roofs of industrial and residential buildings, exhibition, warehouse and shopping complexes.

PVC membrane PLASTFOIL® GEO

Thickness: 1,5/2,0 mm
Length: 20 m
Width: 2,0 m

Used for waterproofing the foundations of buildings and structures, bridges, tunnels, parking lots, tanks, operated roofs. The waterproofing membrane made of high-quality PVC guarantees the durability of the elements of the structure under the influence of water pressure.

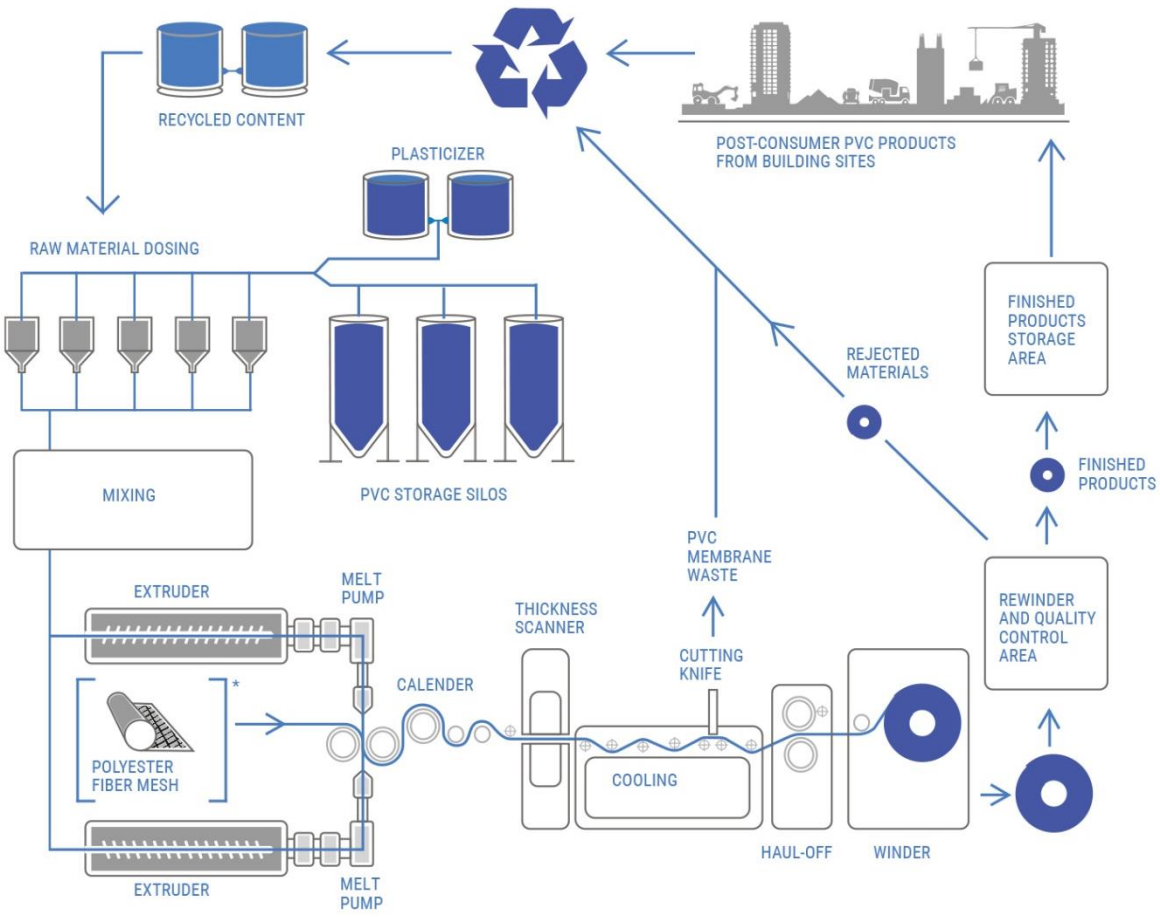
PLASTFOIL® PVC membrane is a durable and reliable waterproofing material, which is made on the basis of high-quality elastic polyvinyl chloride (PVC). PVC membrane is used for waterproofing roofs and foundations; waterproofing of underground structures, including tunnels; as a covering layer of pipelines and an impervious layer of ponds.

PLASTFOIL® PVC membrane is made with reinforcement and without reinforcement.

The surface of the PVC membrane can be embossed and smooth.

The main colors of the front side of the PVC membrane: RAL 7035; RAL 9001; RAL 1016.

PRODUCTION PROCESS



* Polyester fiber mesh is used in the production of PLASTFOIL® PVC membrane with reinforcement.

The PLASTFOIL® material is extruded and subsequently calendering from suspended polyvinyl chloride, with the addition of plasticizer, fillers and processing additives.

Production of PLASTFOIL® polymer waterproofing material consists of three modern installations of European manufacturers:

1. Dryblend preparation unit (mixing unit).
2. Installation for the production of polyester fiber mesh.
3. Extrusion unit for the production of PVC membranes.

PVC membrane production is based on melting and homogenization of polyvinyl chloride dryblend in extrusion unit in the presence of a series of stabilizing, plasticizing and processing additives and further forming on special calender equipment directly two-layer membrane with a reinforcing layer of polyester mesh or without reinforcement.

In this process, the polyvinyl chloride tape is heated in the extruder in the form of a sheet and sent to a system consisting of a number of ironing rolls, where the sheet is smoothed, polished and pre-cooled by passing from one roller to the next. This creates an endless belt whose thickness and width can be adjusted. The strip is retracted by means of special pulling and cutting devices and wound into a coil.

TECHNICAL CHARACTERISTICS

Table 1 shows essential characteristics for PLASTFOIL® PVC membrane.

TABLE 1. TECHNICAL CHARACTERISTICS

Characteristics	Test methods	PLASTFOIL®					
		CLASSIC	POLAR	ECO	LAY	ART	GEO
Tensile strength, MPa, no less than: - longitudinal - transversal	EN 12311-2 (B)	–				15 15	17 17
Elongation at break, %, no less than: - longitudinal - transversal	EN 12311-2 (B)	–				250 250	300 300
Tensile strength, N/50 mm, no less than: - longitudinal - transversal	EN 12311-2 (A)	1100 900				–	
Elongation at maximum tensile force, %, no less than: - longitudinal - transversal	EN 12311-2 (A)	17 19		15 15		–	
Foldability at low temperature, °C, no more than	EN 495-5	−35	−40	−30	−30	−40	−35
Watertightness, 1 MPa, 24 hours	EN 1928 (B)	–				pass	
Watertightness, 10 kPa, 24 hours	EN 1928 (B)	pass				–	
Reaction to fire	EN 13501-1	Class E					

CONTENT INFORMATION

PRODUCT COMPOSITION

The approximate composition of the declared products is given in Table 2. During the life cycle of the product any hazardous substance listed in the "Candidate List of Substances of Very High Concern (SVHC) for authorization" has not been used in a percentage higher than 0,1% of the weight of the product.

TABLE 2. COMPONENT COMPOSITION OF PVC MEMBRANE PLASTFOIL®

Product	Weight per 1m^2 , kg	Components	Content, % weight	Post-consumer material, weight - %	Renewable material, weight-%
PLASTFOIL ECO / CLASSIC / POLAR / LAY	1.62	PVC	50–60	7	0
		Plasticizer (DOTP)	35–39	0	0
		Dyes, fire retardant, etc.	4,85–6,25	0	0
		Polyester fiber mesh	1,05–1,06	0	0
PLASTFOIL ART	1.59	PVC	50–60	7	0
		Plasticizer (DOTP)	35–41	0	0
		Dyes, etc.	4,05–5,15	0	0
PLASTFOIL GEO	1.54	PVC	50–60	7	0
		Plasticizer (DOTP)	35–41	0	0
		Dyes, etc.	4,55–6,15	0	0

PACKAGE COMPOSITION

The packaging for protection against damage to finished products during transportation includes cardboard sleeves and LDPE foil. Indicative composition of the product package is represented in Table 3.

TABLE 3. INDICATIVE COMPOSITION OF THE PACKAGE OF PVC MEMBRANE PLASTFOIL®

Product	Weight per 1m2 of product, kg	Packaging materials	Weight-%(versus the product)
PLASTFOIL ECO / CLASSIC / POLAR / LAY	0.00667338	Polyethylene	0. 41%
	0.00237	Wooden pallets	0.146%
	0.00000051	Cardboard	0.000032%
PLASTFOIL ART	0.00667338	Polyethylene	0. 42%
	0.00237	Wooden pallets	0.149%
	0.00000051	Cardboard	0.000032%
PLASTFOIL GEO	0.00667338	Polyethylene	0. 43%
	0.00237	Wooden pallets	0.153%
	0.00000051	Cardboard	0.00033%

LCA INFORMATION

Life Cycle Assessment information:

Period for data: 2021

The study did not use data older than 10 years.

Declared unit:

1 m^2 of PVC membrane.

The useful life of a properly installed PLASTFOIL® PVC membrane corresponds to the useful life of building and amounts 50 years. The service life of PLASTFOIL® PVC GEO membrane reaches 100 years.

Database(s) and LCA software used:

The LCA was carried out using openLCA 1.11.0 software and ecoinvent 3.8 databases (Cut-Off System Model).

Description of system boundaries:

The boundaries of the declaration system according to the BS EN 15804:2012+A2:2019:

“Cradle to gate” with options: modules C1–C4, module D (A1–A3 + A4–A5 + C + D).

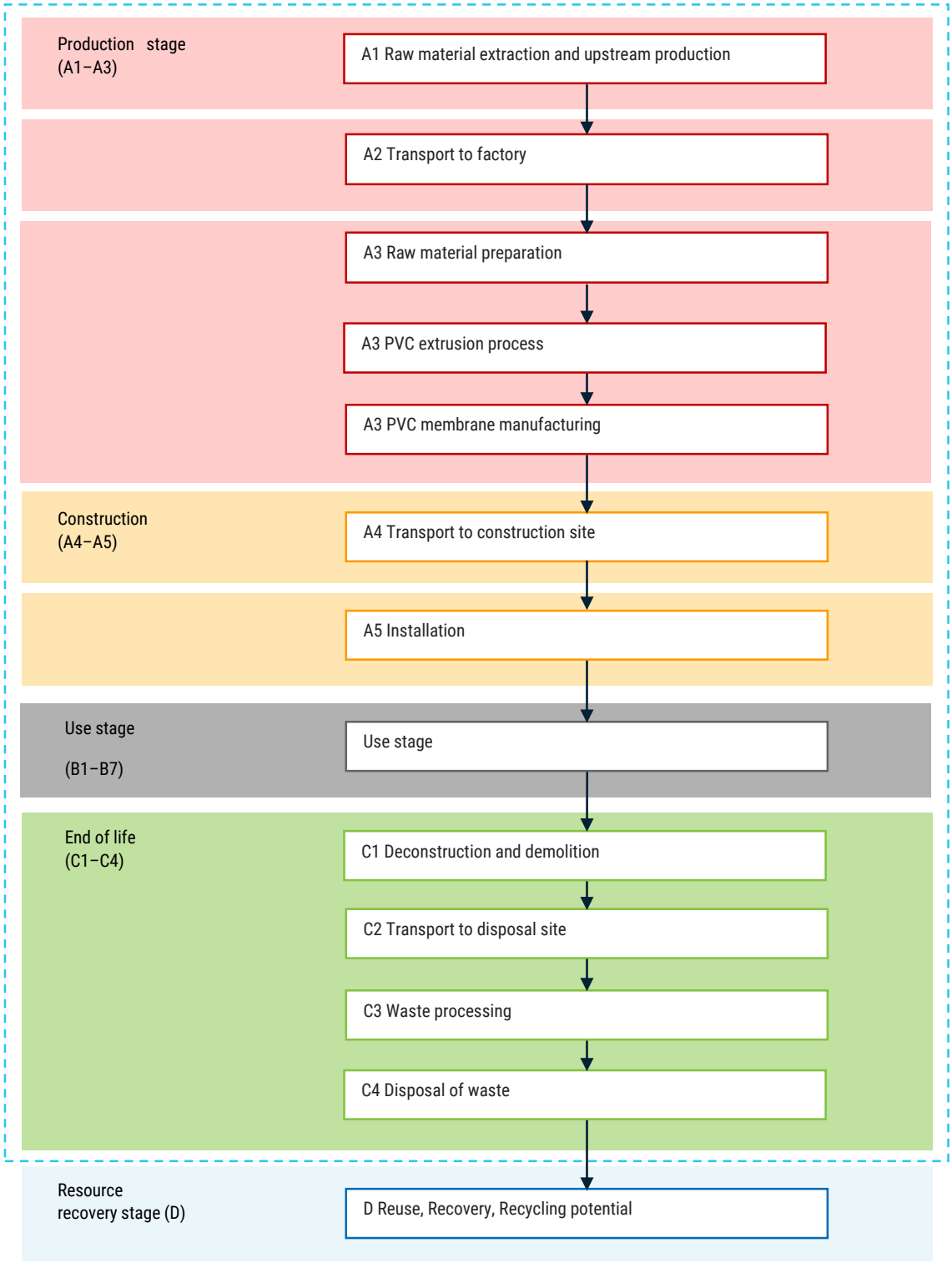
The EPD is valid in all countries.

The target audience of the environmental declaration is customers (mainly B2B) and other parties interested in the results of the environmental impact of the 1 m^2 PVC membrane PLASTFOIL® produced by LLC "PENOPLEX SPb".

The EPD with the completed life cycle assessment can be used for B2B communication purposes in the environmental assessment of buildings.

SYSTEM DIAGRAM:

Life cycle information within the System Boundary:



(grey) Excluded

(color) Included

SYSTEM BOUNDARY

This study used the principle that the party responsible for pollution is responsible for paying for the damage caused to the environment, as well as a modular approach to life cycle assessment.

This EPD covers the "cradle to gate" scope with following modules:

- A1 (Raw material supply), A2 (Transport) and A3 (Manufacturing), A4 (Transportation), A5 (Installation of products).
- C1 (De-construction), C2 (Transport at end-of life), C3 (Waste processing) and C4 (Disposal).

In addition, module D - benefits and loads beyond the system boundary is included.

Table 4. System boundary

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction, demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Modules declared	X	X	X	X	X	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X
Location	GLO		RU	GLO	GLO	-	-	-	-	-	-	-	GLO	GLO	GLO	GLO	GLO
Specific data used	>90% GWP-GHG			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Varieties of products	-			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Varieties of sites	-			-	-	-	-	-	-	-	-	-	-	-	-	-	-

X = declared modules; MND = the module is not declared; GLO = Global; RU = Russia

Cut-off criteria:

The study includes all modules and processes which are stated mandatory in EN 15804:2012+A2:2019 and the applied PCR.

The study does not exclude any hazardous materials or substances.

It can be assumed that the processes ignored would each have contributed less than 1% to the impact categories under review. Omitted products shall not have a relevant contribution to the selected impact categories of the constructions studied in this EPD.

Total neglected input flows per module is less than 5% of energy usage and mass.

The production of capital equipment, construction activities, and infrastructure, maintenance and operation of capital equipment, personnel-related activities, energy and water use related to office activities are excluded.

Data sources and data quality:

The quality of data used in this study satisfies the requirements, provided in BS EN 15804:2012+A2:2019, chapter 6.3.8.

- Generic data (ecoinvent database v3.8, Cut-Off System Model), used for calculations is no older than 10 years. Producer specific data is no older than 5 years.
- The inventory for this LCA study is based on 2021 production figures for PVC membrane PLASTFOIL® manufactured by LLC "PENOPLEX SPb".
- Technological coverage reflects the physical reality for the declared products.

TABLE 5. INDICATORS OF REPRESENTATIVENESS OF DATA QUALITY

Technological representativeness	Time representativeness	Geographical representativeness	Total rating
4.01	3.94	3.77	3.90

Allocation:

Allocation is required, because some materials, energy, and waste or emissions data cannot be measured separately for the product under study.

Allocation of inputs and outputs of the system is based on a physical property – area.

Allocation used in Ecoinvent 3.8 environmental data sources follows the methodology 'allocation, cut-off by classification'. This methodology is in line with the requirements of the BS EN 15804:2012+A2:2019.

LCA SCENARIOS

MODULES A1–A3

A1 module includes raw materials production and the consumption of electricity.

PVC membranes consist mainly of PVC and plasticizer with small amounts of fillers and technical additives. These additives change the chemical and physical properties of the membrane, such as strength, durability and fire resistance.

A2 module includes transportation of raw materials from the places of production, as well as transport of packaging materials, to the manufacturing sites.

A3 module includes water consumption, packaging, consumption of auxiliary materials, consumption of diesel, consumption of natural gas, coal, and oxygen, waste generation and waste management processes (landfill and recycling), air emissions, emissions to water, transport of waste to the treatment and final disposal site.

Electricity production

Description of the process (as per Ecoinvent v3.8):

This is a market activity. Each market represents the consumption mix of a product in a given geography, connecting suppliers with consumers of the same product in the same geographical area. Markets group the producers and also the imports of the product (if relevant) within the same geographical area. They also account for transport to the consumer and for the losses during that process, when relevant. This dataset describes the electricity available on the high voltage level in Russia. This is done by showing the transmission of 1kW·h electricity at high voltage. The shares of electricity technologies on this market are valid for the year 2018. They have been calculated by the data provider and don't correspond with the production volumes entered in the undefined datasets of the different electricity supplying technologies. The shares have been calculated based on statistics from 2018: IEA World Energy Statistics and Balances.

Type of information	Description
Location	Russian Federation
Geographical representativeness description	Split of energy sources in kW·h Hydro: 19.39% Nuclear: 19.63% Hard coal and lignite: 15.27% Natural gas: 45.52% Other:0.19%
Reference year	2020
Type of data set	Cradle to gate
Source	IEA

MODULES A4–A5

A4 module includes transportation from the production gate to the construction site.

The product is directly transferred from the truck to the construction site. Mainly trucks of EURO5 class carry out transportation.

Parameter	Value/Description
Fuel type and consumption of vehicle or vehicle type used for transport e.g. long distance truck, boat, etc	a) Truck of 16-32 tn. Fuel consumption: 51L/100 km b) Freight train

Distance PLASTFOIL® (CLASSIC, ECO, POLAR, LAY)	Lorry 1364 km Rail 280 km
Distance PLASTFOIL® ART	Lorry 1371 km Rail 280 km
Distance PLASTFOIL® GEO	Lorry 1385 km Rail 280 km
Capacity utilization (including empty returns)	100%
Bulk density of transported products PLASTFOIL® (CLASSIC, ECO, POLAR, LAY)	1.62 kg/ m²
Bulk density of transported products PLASTFOIL® ART	1.59 kg/ m²
Bulk density of transported products PLASTFOIL® GEO	1.54 kg/ m²
Volume capacity utilization factor	1

The distances mentioned above are average values, weighted on the quantity transported.

A5 module provides information about construction Installation. The PLASTFOIL® PVC membrane is installed by hot air welding.

Parameter	Value/Description
Energy for hot air welding	0,020 kWh/m²
Use of water	Not used
Use of other resources	No other resources consumption
Material loss during installation	1%

Information about material loss is based on experience. Other information is not relevant to the installation.

MODULES C1–C4

Description of scenarios and additional technical information for the final stage of the product LCA:

Parameter	Quantity and unit of measurement, description
Module C1. De-construction	
The process of de-construction and demolition	The impact of demolition of PVC membrane is considered negligible compared to the impact of demolition of the building as a whole. The impact is therefore considered to be 0.
Module C2. Transport at end-of life	
Transportation to processing plants	It is assumed that 100% of the waste is collected and transported to the processing plants.
Distance to the processing plant	50 km
Type of vehicle	Lorry
Vehicle load capacity	16-32 Metric ton; EURO5, fuel consumption: 51 L/100km
Module C3. Waste processing	
Waste processing	Impacts from waste treatment are considered to be 0 as a consequence of the polluter pays principle
Module C4. Disposal	
Waste disposal	70% of PVC membrane's waste are sent to landfill. 30% of PVC membranes' waste are sent back to the manufacturer for recycling

MODULE D

This product has no significant recycling and/or reuse benefits. Therefore, the impact of module D is considered to be 0.

ENVIRONMENTAL INFORMATION

REINFORCED PVC MEMBRANE PLASTFOIL® (CLASSIC, ECO, POLAR, LAY)

Potential environmental impact – mandatory indicators according to EN 15804

Results per declared unit											
Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
GWP-total	kg CO_2 eq.	3,54E+00	4,43E-01	1.02E+00	3.84E-01	6.83E-02	0.00E+00	1.33E-02	0.00E+00	4.67E-03	0.00E+00
GWP-fossil	kg CO_2 eq.	3,51E+00	4,44E-01	1.03E+00	3.85E-01	6.83E-02	0.00E+00	1.34E-02	0.00E+00	4.67E-03	0.00E+00
GWP-biogenic	kg CO_2 eq.	2,62E-02	4,00E-04	1.10E-04	5.10E-04	1.83E-07	0.00E+00	1.21E-05	0.00E+00	1.96E-06	0.00E+00
GWP-luluc	kg CO_2 eq.	2,66E-03	1,70E-04	2.45E-03	1.70E-04	4.14E-05	0.00E+00	5.22E-06	0.00E+00	4.85E-07	0.00E+00
ODP	kg CFC 11 eq.	1,44E-06	1,03E-07	7.37E-08	8.74E-08	1.10E-09	0.00E+00	3.11E-09	0.00E+00	9.29E-10	0.00E+00
AP	mol H^+ eq.	3,41E-02	2,30E-03	1.32E-03	4.51E-03	6.53E-05	0.00E+00	1.20E-04	0.00E+00	4.65E-05	0.00E+00
EP-freshwater	kg P eq.	3,90E-03	2,88E-05	4.50E-04	3.18E-05	7.60E-06	0.00E+00	8.66E-07	0.00E+00	2.41E-07	0.00E+00
EP-marine	kg N eq.	3,96E-03	7,70E-04	2.46E-03	7.00E-04	1.03E-05	0.00E+00	2.33E-05	0.00E+00	2.00E-05	0.00E+00
EP-terrestrial	mol N eq.	4,49E-02	8,45E-03	5.27E-03	7.53E-03	9.50E-05	0.00E+00	2.50E-04	0.00E+00	2.20E-04	0.00E+00
POCP	kg NMVOC eq.	1,42E-02	2,41E-03	2.49E-02	2.16E-03	3.01E-05	0.00E+00	7.25E-05	0.00E+00	6.13E-05	0.00E+00
ADP-minerals&metals*	kg Sb eq.	3,26E-02	1,55E-06	7.05E-07	1.28E-06	1.01E-08	0.00E+00	4.68E-08	0.00E+00	2.39E-09	0.00E+00
ADP-fossil*	MJ	8,86E+01	6,76E+00	1.56E+01	5.85E+00	2.43E-01	0.00E+00	2.03E-01	0.00E+00	6.18E-02	0.00E+00
WDP*	m^3	2,73E+00	3,02E-02	2.03E-01	2.21E-02	9.53E-03	0.00E+00	6.80E-04	0.00E+00	1.50E-04	0.00E+00

Acronyms:

GWP-fossil = Global Warming Potential fossil fuels;
GWP-biogenic = Global Warming Potential biogenic;
GWP-luluc = Global Warming Potential land use and land use change;
ODP = Depletion potential of the stratospheric ozone layer;
AP = Acidification potential, Accumulated Exceedance;
EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment;
EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment;
EP-terrestrial = Eutrophication potential, Accumulated Exceedance;
POCP = Formation potential of tropospheric ozone;
ADP-minerals&metals = Abiotic depletion potential for non-fossil resources;
ADP-fossil = Abiotic depletion for fossil resources potential;
WDP = Water (user) deprivation potential, deprivation-weighted water consumption.

* Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

Potential environmental impact – additional mandatory and voluntary

Indicators

Results per declared unit											
Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
GWP-GHG	kg CO_2 eq.	3,39E+00	4,40E-01	9.92E-01	3.81E-01	1.40E-02	0.00E+00	1.32E-02	0.00E+00	4.59E-03	0.00E+00

GWP-GHG: The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product.

Use of resources

Results per functional or declared unit											
Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	3,51E+00	9,53E-02	9.53E-01	1.06E-01	1.59E-02	0.00E+00	2.87E-03	0.00E+00	4.40E-04	0.00E+00
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	3,51E+00	9,53E-02	9.53E-01	1.06E-01	1.59E-02	0.00E+00	2.87E-03	0.00E+00	4.40E-04	0.00E+00
PENRE	MJ	9,39E+01	7,17E+00	1.69E+01	6.21E+00	2.62E-01	0.00E+00	2.16E-01	0.00E+00	6.56E-02	0.00E+00
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	9,39E+01	7,17E+00	1.69E+01	6.21E+00	2.62E-01	0.00E+00	2.16E-01	0.00E+00	6.56E-02	0.00E+00
SM	kg	6.17E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	6,54E-02	7,50E-04	1.43E-02	8.10E-04	2.40E-04	0.00E+00	2.266E-05	0.00E+00	3.72E-06	0.00E+00

Acronyms:

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 re-sources;
SM = Use of secondary material;
RSF = Use of renewable secondary fuels;
NRSF = Use of non-renewable secondary fuels;
FW = Use of net fresh water.

Waste production and output flows

Waste production

Results per functional or declared unit											
Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste disposed	kg	1,40E-04	1,76E-05	1.67E-05	1.51E-05	2.60E-07	0.00E+00	5.31E-07	0.00E+00	1.63E-07	0.00E+00
Non-hazardous waste disposed	kg	5,11E-01	3,48E-01	1.26E-02	2.90E-01	4.90E-04	0.00E+00	1.05E-02	0.00E+00	1.74E+00	0.00E+00
Radioactive waste disposed	kg	1,40E-04	4,57E-05	5.46E-05	3.94E-05	8.93E-07	0.00E+00	1.37E-08	0.00E+00	4.12E-07	0.00E+00

Output flows

Results per functional or declared unit											
Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling	kg	0.00E+00	0.00E+00	5.10-E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Information on biogenic carbon content

Results per functional or declared unit		
BIOGENIC CARBON CONTENT	Unit	Quantity
Biogenic carbon content in product	kg C	0.00E+00
Biogenic carbon content in packaging	kg C	2.73E-02

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

UNREINFORCED PVC MEMBRANE PLASTFOIL® ART

Potential environmental impact – mandatory indicators according to EN 15804

Results per declared unit											
Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
GWP-total	kg CO_2 eq.	3,44E+00	4,45E-01	1.03E+00	4.54E-01	6.84E-02	0.00E+00	1.31E-02	0.00E+00	4.28E-03	0.00E+00
GWP-fossil	kg CO_2 eq.	3,42E+00	4,45E-01	1.03E+00	4.54E-01	6.83E-02	0.00E+00	1.31E-02	0.00E+00	4.28E-03	0.00E+00
GWP-biogenic	kg CO_2 eq.	2,44E-02	4,00E-04	8.14E-05	5.70E-04	1.83E-07	0.00E+00	1.19E-05	0.00E+00	1.80E-06	0.00E+00
GWP-luluc	kg CO_2 eq.	1,99E-03	1,70E-04	2.46E-03	2.00E-04	4.14E-05	0.00E+00	5.14E-06	0.00E+00	4.45E-07	0.00E+00
ODP	kg CFC 11 eq.	1,08E-06	1,04E-07	7.38E-08	1.04E-07	1.10E-09	0.00E+00	3.06E-09	0.00E+00	8.52E-10	0.00E+00
AP	mol H^+ eq.	3,25E-02	3,31E-03	4.18E-03	5.13E-03	1.57E-05	0.00E+00	1.20E-04	0.00E+00	4.56E-05	0.00E+00
EP-freshwater	kg P eq.	9,20E-04	2,89E-05	4.50E-04	3.61E-05	7.60E-06	0.00E+00	8.52E-07	0.00E+00	2.21E-07	0.00E+00
EP-marine	kg N eq.	2,75E-03	7,80E-04	2.46E-03	8.20E-04	1.03E-05	0.00E+00	2.29E-05	0.00E+00	1.83E-05	0.00E+00
EP-terrestrial	mol N eq.	2,72E-02	8,45E-03	9.36E-03	8.84E-03	2.66E-05	0.00E+00	2.50E-04	0.00E+00	2.00E-04	0.00E+00
POCP	kg NMVOC eq.	1,09E-02	2,42E-03	2.49E-02	2.53E-03	3.01E-05	0.00E+00	7.14E-05	0.00E+00	5.62E-05	0.00E+00
ADP-minerals&metals*	kg Sb eq.	4,00E-05	1,56E-06	7.10E-07	1.62E-06	1.01E-08	0.00E+00	4.60E-08	0.00E+00	2.19E-09	0.00E+00
ADP-fossil*	MJ	8,60E+01	6,78E+00	1.57E+01	6.90E+00	2.43E-01	0.00E+00	2.00E-01	0.00E+00	5.67E-02	0.00E+00
WDP*	m^3	2,54E+00	2,61E-02	5.71E-01	2.56E-02	3.30E-03	0.00E+00	6.70E-04	0.00E+00	1.00E-04	0.00E+00

Acronyms:

GWP-fossil = Global Warming Potential fossil fuels;
GWP-biogenic = Global Warming Potential biogenic;
GWP-luluc = Global Warming Potential land use and land use change;
ODP = Depletion potential of the stratospheric ozone layer;
AP = Acidification potential, Accumulated Exceedance;
EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment;
EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment;
EP-terrestrial = Eutrophication potential, Accumulated Exceedance;
POCP = Formation potential of tropospheric ozone;
ADP-minerals&metals = Abiotic depletion potential for non-fossil resources;
ADP-fossil = Abiotic depletion for fossil resources potential;
WDP = Water (user) deprivation potential, deprivation-weighted water consumption.

* Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

Potential environmental impact – additional mandatory and voluntary

Indicators

Results per declared unit											
Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
GWP-GHG	kg CO_2 eq.	3,32E+00	4,41E-01	9.95E-01	4.50E-01	1.40E-02	0.00E+00	1.30E-02	0.00E+00	4.20E-03	0.00E+00

GWP-GHG: The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product.

Use of resources

Results per functional or declared unit											
Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	2,96E+00	9,55E-02	9.52E-01	1.20E-01	1.59E-02	0.00E+00	2.82E-03	0.00E+00	4.65E-04	0.00E+00
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	2,96E+00	9,55E-02	9.52E-01	1.20E-01	1.59E-02	0.00E+00	2.82E-03	0.00E+00	4.65E-04	0.00E+00
PENRE	MJ	9,23E+01	7,19E+00	1.69E+01	7.33E+00	2.62E-01	0.00E+00	2.12E-01	0.00E+00	6.02E-02	0.00E+00
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	9,23E+01	7,19E+00	1.69E+01	7.33E+00	2.62E-01	0.00E+00	2.12E-01	0.00E+00	6.02E-02	0.00E+00
SM	kg	6.17E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	6,07E-02	7,60E-04	1.43E-02	8.90E-04	2.40E-04	0.00E+00	2.23E-05	0.00E+00	3.41E-06	0.00E+00

Acronyms:

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 re-sources;
SM = Use of secondary material;
RSF = Use of renewable secondary fuels;
NRSF = Use of non-renewable secondary fuels;
FW = Use of net fresh water.

Waste production and output flows

Waste production

Results per functional or declared unit											
Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste disposed	kg	4,80E-05	1,77E-05	1.67E-05	1.78E-05	2.60E-07	0.00E+00	5.22E-07	0.00E+00	1.50E-07	0.00E+00
Non-hazardous waste disposed	kg	4,18E-01	3,49E-01	1.27E-01	3.44E-01	4.93E-04	0.00E+00	1.03E-02	0.00E+00	1.59E+00	0.00E+00
Radioactive waste disposed	kg	1,20E-04	4,58E-05	5.45E-05	4.65E-05	8.93E-07	0.00E+00	1.35E-06	0.00E+00	3.78E-07	0.00E+00

Output flows

Results per functional or declared unit											
Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling	kg	0.00E+00	0.00E+00	5.10-E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Information on biogenic carbon content

Results per functional or declared unit		
BIOGENIC CARBON CONTENT	Unit	Quantity
Biogenic carbon content in product	kg C	0.00E+00
Biogenic carbon content in packaging	kg C	2.73E-02

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

UNREINFORCED PVC MEMBRANE PLASTFOIL® GEO

Potential environmental impact – mandatory indicators according to EN 15804

Results per declared unit											
Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
GWP-total	kg CO_2 eq.	2,96E+00	4,27E-01	1.03E+00	3,72E-01	6.25E-02	0.00E+00	1.27E-02	0.00E+00	4.15E-03	0.00E+00
GWP-fossil	kg CO_2 eq.	2,93E+00	4,27E-01	1.03E+00	3,72E-01	123456	0.00E+00	1.27E-02	0.00E+00	4.14E-03	0.00E+00
GWP-biogenic	kg CO_2 eq.	2,15E-02	3,90E-04	8.14E-05	4,90E-04	1.83E-07	0.00E+00	1.15E-05	0.00E+00	1.74E-06	0.00E+00
GWP-luluc	kg CO_2 eq.	1,89E-03	1,70E-04	2.46E-03	1,70E-04	4.14E-05	0.00E+00	4.98E-06	0.00E+00	4.30E-07	0.00E+00
ODP	kg CFC 11 eq.	1,08E-06	9,95E-08	7.38E-08	8,46E-08	1.10E-09	0.00E+00	2.96E-09	0.00E+00	8.25E-10	0.00E+00
AP	mol H^+ eq.	1,86E-02	2,16E-02	4.24E-03	4,35E-03	1.57E-05	0.00E+00	1.20E-04	0.00E+00	4.41E-05	0.00E+00
EP-freshwater	kg P eq.	8,40E-04	2,77E-05	4.50E-04	3,06E-05	7.60E-06	0.00E+00	8.25E-07	0.00E+00	2.14E-07	0.00E+00
EP-marine	kg N eq.	2,32E-03	7,40E-04	2.46E-03	6,70E-04	1.03E-05	0.00E+00	2.16E-05	0.00E+00	1.98E-05	0.00E+00
EP-terrestrial	mol N eq.	2,31E-02	8,14E-03	9.36E-03	7,28E-03	2.66E-05	0.00E+00	2.40E-04	0.00E+00	1.90E-04	0.00E+00
POCP	kg NMVOC eq.	9,17E-03	2,32E-03	2.15E-02	2,09E-03	3.01E-05	0.00E+00	6.91E-04	0.00E+00	5.44E-05	0.00E+00
ADP-minerals&metals*	kg Sb eq.	3,97E-05	1,50E-06	8.45E-07	1,33E-07	1.01E-08	0.00E+00	4.46E-08	0.00E+00	2.12E-09	0.00E+00
ADP-fossil*	MJ	7,92E+01	6,50E+00	1.57E+01	5,66E+00	2.43E-01	0.00E+00	1.94E-01	0.00E+00	5.49E-02	0.00E+00
WDP*	m^3	2,14E+00	2,93E-02	5.72E-01	2,14E-02	3.30E-03	0.00E+00	6.50E-04	0.00E+00	1.00E-04	0.00E+00

Acronyms:

GWP-fossil = Global Warming Potential fossil fuels;
GWP-biogenic = Global Warming Potential biogenic;
GWP-luluc = Global Warming Potential land use and land use change;
ODP = Depletion potential of the stratospheric ozone layer;
AP = Acidification potential, Accumulated Exceedance;
EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment;
EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment;
EP-terrestrial = Eutrophication potential, Accumulated Exceedance;
POCP = Formation potential of tropospheric ozone;
ADP-minerals&metals = Abiotic depletion potential for non-fossil resources;
ADP-fossil = Abiotic depletion for fossil resources potential;
WDP = Water (user) deprivation potential, deprivation-weighted water consumption.

* Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

Potential environmental impact – additional mandatory and voluntary

Indicators

Results per declared unit											
Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
GWP-GHG	kg CO_2 eq.	2,85E+00	4,24E-01	9.95E-01	3,69E-01	1.40E-02	0.00E+00	1.26E-02	0.00E+00	4.07E-03	0.00E+00

GWP-GHG: The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product.

Use of resources

Results per functional or declared unit											
Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	2,66E+00	9,17E-02	9.51E-01	1.02E-01	1.59E-02	0.00E+00	2.73E-03	0.00E+00	4.53E-04	0.00E+00
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	2,66E+00	9,17E-02	9.51E-01	1.02E-01	1.59E-02	0.00E+00	2.73E-03	0.00E+00	4.53E-04	0.00E+00
PENRE	MJ	8,51E+01	6,90E+00	1.69E+01	6.00E+00	2.62E-01	0.00E+00	2.06E-01	0.00E+00	5.83E-02	0.00E+00
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	8,51E+01	6,90E+00	1.69E+01	6.00E+00	2.62E-01	0.00E+00	2.06E-01	0.00E+00	5.83E-02	0.00E+00
SM	kg	5.85E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	5,12E-02	7,30E-04	1.43E-02	7.50E-04	2.40E-04	0.00E+00	2.16E-05	0.00E+00	3.30E-06	0.00E+00

Acronyms:

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 re-sources;
SM = Use of secondary material;
RSF = Use of renewable secondary fuels;
NRSF = Use of non-renewable secondary fuels;
FW = Use of net fresh water.

Waste production and output flows

Waste production

Results per functional or declared unit											
Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste disposed	kg	4,54E-05	1,82E-05	1.67E-05	1,46E-05	2.60E-07	0.00E+00	5.06E-07	0.00E+00	1.45E-07	0.00E+00
Non-hazardous waste disposed	kg	2,34E-01	3,59E-01	1.27E-01	2,80E-01	4.90E-04	0.00E+00	9.96E-03	0.00E+00	1.54E+00	0.00E+00
Radioactive waste disposed	kg	1,10E-04	4,71E-05	5.45E-05	3,81E-05	8.93E-07	0.00E+00	1.31E-06	0.00E+00	3.66E-07	0.00E+00

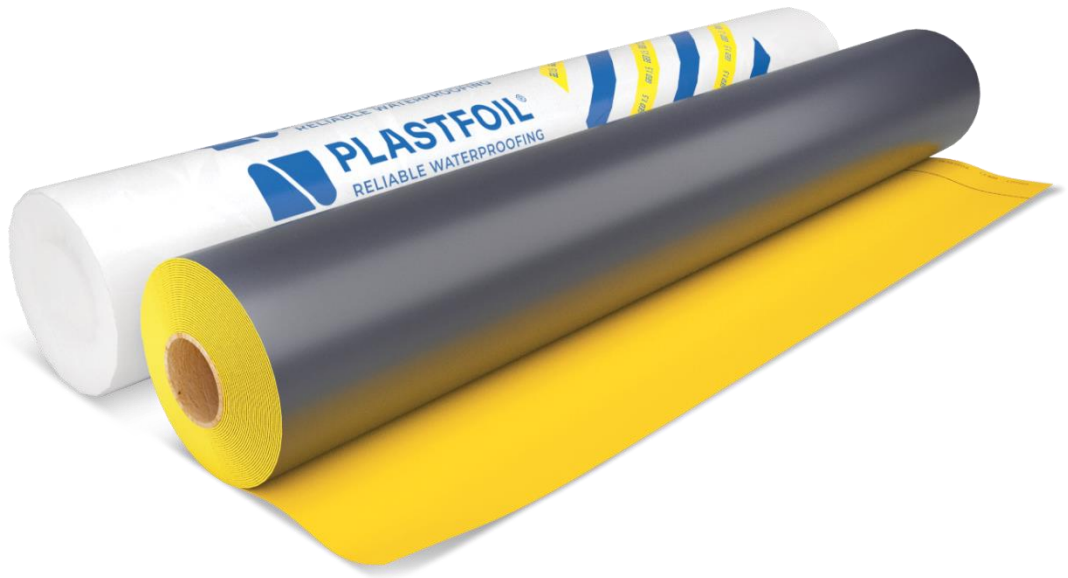
Output flows

Results per functional or declared unit											
Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling	kg	0.00E+00	0.00E+00	5.10-E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Information on biogenic carbon content

Results per functional or declared unit		
BIOGENIC CARBON CONTENT	Unit	Quantity
Biogenic carbon content in product	kg C	0.00E+00
Biogenic carbon content in packaging	kg C	2.73E-02

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



LCA INTERPRETATION

The following charts show the LCA results of each type of PVC membrane. The individual columns represent the impact categories in the following order:

- GWP-fossil = Global Warming Potential fossil fuels;
- GWP-biogenic = Global Warming Potential biogenic;
- GWP-luluc = Global Warming Potential land use and land use change;
- GWP-total = Total Global Warming Potential;
- ODP = Depletion potential of the stratospheric ozone layer;
- AP = Acidification Potential;
- EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment;
- EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment;
- EP-terrestrial = Eutrophication potential, Accumulated Exceedance;
- POCP = Formation potential of tropospheric ozone;
- ADP-minerals&metals = Abiotic depletion potential for non-fossil resources;
- ADP-fossil = Abiotic Depletion Potential-fossil resources;
- WDP = Water (user) deprivation potential, deprivation-weighted water consumption.

The following modules and stages were considered in the analysis:

- **Product stage:** A1 (Raw material supply), A2 (Transport) и A3 (Manufacturing);

- **Construction stage:** A4 (Transportation), A5 (Installation of products);

- **End-of-life stage**: C1 (De-construction), C2 (Transport at end-of life), C3 (Waste processing) и C4 (Disposal)

- **Module D** (Benefits and loads beyond the system boundary)

A1-A4 are modules of the life cycle with the greatest environmental impact. The A1 module has mostly the greater impact through the modules under study. The figures below show how impacts are distributed between the modules

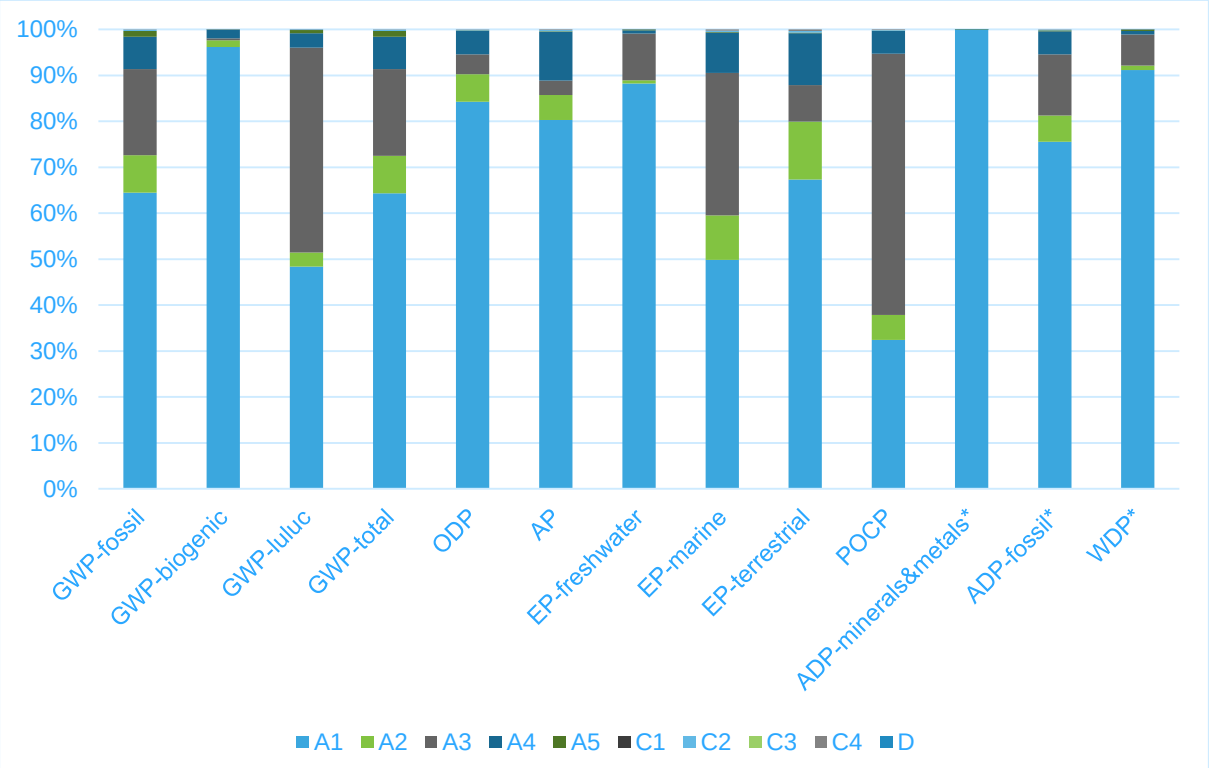
A1-A3, A4-A5, C1-C4, D considered in this EPD:

As it can be seen from the graph (Figures 1), the stages A1-A3 are the Life Cycle Stages with the highest impact for all analysed categories. A1 demonstrates the major influence, representing between 32.4% (Photochemical Ozone Formation) and almost 99% for Abiotic Depletion Potential (ADP) for non-fossil materials for Reinforced PVC membrane. Besides, according to the graph influence of A2 and A4 is comparable. Terrestrial Eutrophication has the major influence for both of the stages around 12%, and the least impact of water use during transportation (both A2 and A4) – around 1%.

Module A5 also has almost no impact on the environment compared to the production stage (about 1%). Approximately the entire effect of the module A5 is caused by GWP-fossil.

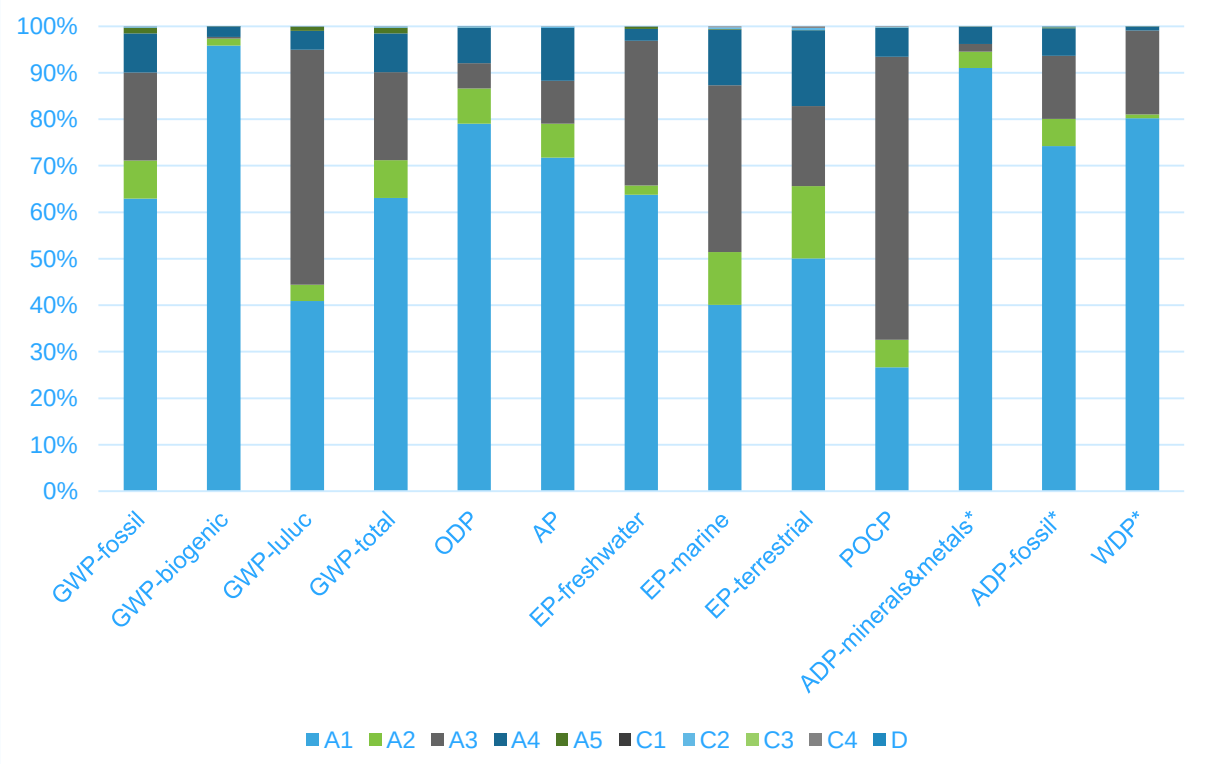
End of life stages (C2, C4) have almost negligible influence on the total life cycle results. All the parameters have less than 1% impact for Reinforced PVC membrane.

Figure 1. Reinforced PVC membrane PLASTFOIL® (CLASSIC, ECO, POLAR, LAY)



* The result of the environmental impact indicator should be used with caution since the uncertainty of the results is high and experience with this indicator is limited.

Figure 2. Unreinforced PVC membrane PLASTFOIL® ART



* The result of the environmental impact indicator should be used with caution since the uncertainty of the results is high and experience with this indicator is limited.

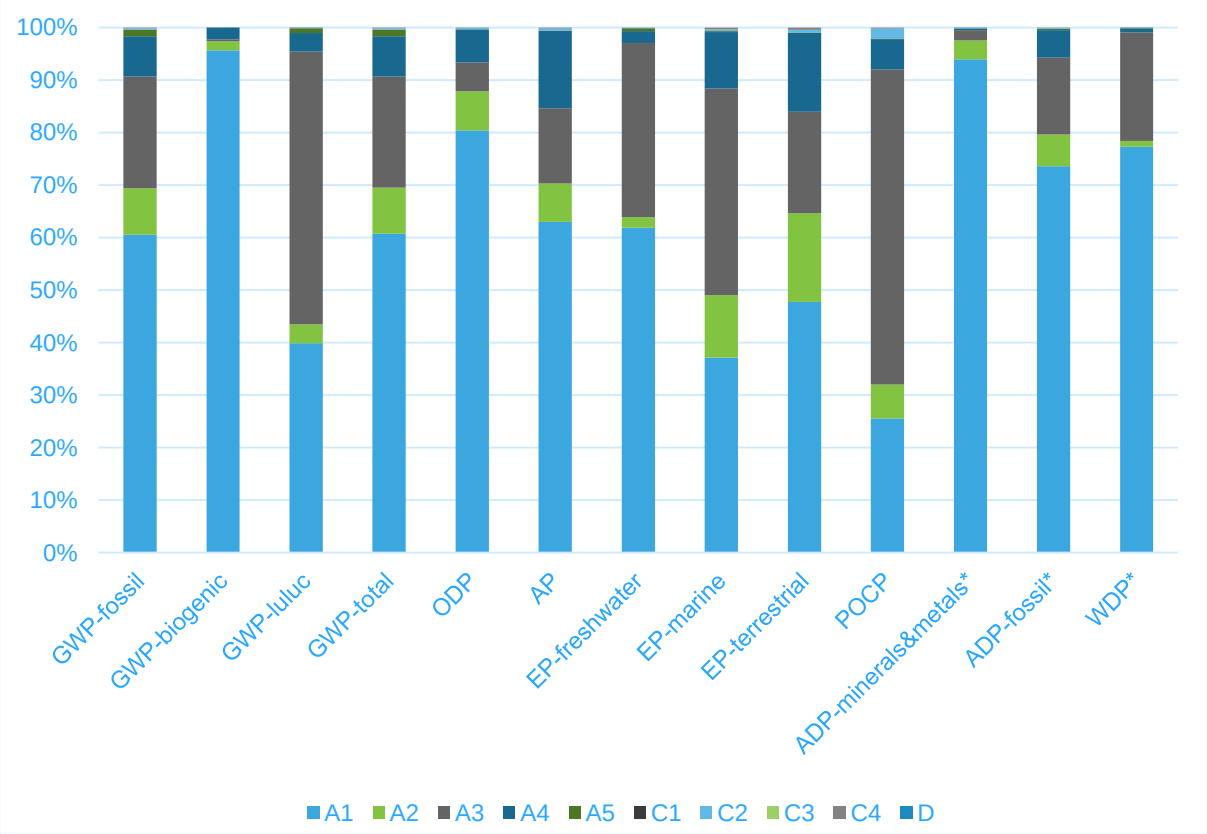
As it follows from the graph (Figures 2), the stages A1-A3 are the Life Cycle Stages with the highest impact for all analysed categories for ART PVC-membrane as well. A1 demonstrates the vital influence again, however for this product type GWP-biogenic has the highest impact in A1 stage, accounting for almost 96%, while the Photochemical Ozone Formation takes the least influence. In the same time, POCP is the major influence category for the A3 production stage.

The graph illustrates that the influence of A2 and A4 is comparable for all analysed categories. Terrestrial Eutrophication has the vast effect for both of the stages around 16%, and the least impact of water use (WDP) during transportation (both A2 and A4) – around 1%.

Module A5 has almost no impact on the environment compared to the production stage (about 1%) as well. Approximately the entire effect of the module A5 is caused by GWP-fossil.

End of life stages (C2, C4) have almost negligible influence on the total life cycle results. All the parameters have less than 1% impact for PVC membrane PLASTFOIL® ART.

Figure 3. Unreinforced PVC membrane PLASTFOIL® GEO



* The result of the environmental impact indicator should be used with caution since the uncertainty of the results is high and experience with this indicator is limited.

Figure 3 demonstrates, that for PVC membrane PLASTFOIL® GEO the stages A1-A3 are the Life Cycle Stages with the highest impact for all analysed categories as well. This product type shows the same trend as another PVC-membrane types and shows the huge influence of A1 stage, representing between 25.6% for Photochemical Ozone Formation and around 96% for Biogenic GWP.

The graph illustrates that the influence of A2 and A4 is comparable as well. Terrestrial Eutrophication has the major influence for both of the stages around 16%, and the least impact of water use during transportation (both A2 and A4) – around 1%.

Module A5 has almost no impact on the environment compared to the production stage (about 1%) as well. Approximately the entire effect of the module A5 is caused by GWP-fossil.

End of life stages (C2, C4) have almost negligible influence on the total life cycle results. All the parameters have less than 1% impact for PLASTFOIL® GEO membrane.

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