Environmental Product Declaration

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

Mapeplan M Broof t1-t3, Mapeplan B

(PVC – P Waterproofing Membranes)

Programme:	**The International EPD® System; www.environdec.com**
Programme operator:	**EPD International AB**
EPD registration number:	**S-P-00905**
Publication date:	**2016-06-28**
Revision date:	**2021-08-11**
Valid until:	**2026-08-10**
Geographical scope:	***International***

1. Company description / Goal & Scope

The Company's headquarter is located in Ponte di Piave, Treviso (Italy). Over 90.000 m^2 of surface, 25.000 m^2 covered, 4 production lines of polymer-bitumen membranes, one production line of thermal and acoustic insulation systems and two production lines of synthetic PVC-P and TPO/FPO membranes.

In October 2008 Polyglass was taken over by the MAPEI Group, an international Company in the chemical industry for construction, with 73 production plants in 5 continents, in 33 countries.

Polyglass SpA is ISO 14001 certified since 2010 and ISO 9001 since 1995.

The goal of the study is to provide necessary data and documentation to produce an EPD according to the requirements of PCR Environdec (version 1.11, 2021-02-05) under EN 15804:2012+A2:2019 and to have more comprehension about the environmental impacts related to Mapeplan M Broof t1-t3, Mapeplan B manufactured in Polyglass SpA located in Ponte di Piave (TV-Italy), including packaging of the finished products.

Target audiences of the study are customers and other parties with an interest in the environmental impacts of **Mapeplan M Broof t1-t3, Mapeplan B**.

This analysis shall not support comparative assertions intended to be disclosed to the public.

FIGURE 1: POLYGLASS S.P.A. HEAD QUARTER

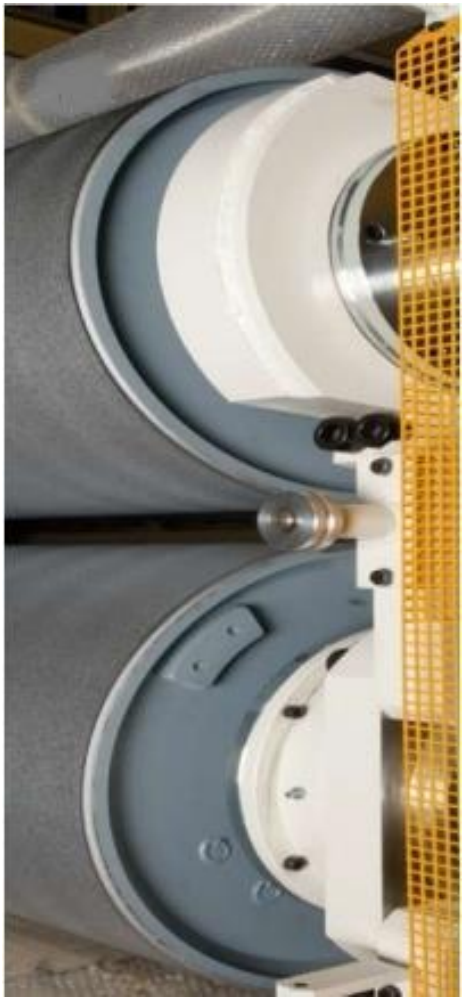


FIGURE 2: PRODUCTION EQUIPMENT

2. Product description

Mapeplan M (Broof t1-t3) is a synthetic roofing waterproofing membrane in PVC-P produced in one multiextrusion coating process, with high quality raw materials, reinforced with polyester net.

Mapeplan B is a synthetic roofing waterproofing membrane in PVC-P produced in one multiextrusion coating process, with high quality raw materials, reinforced with glass mat.

Both Mapeplan are compliant with EN 13956 ("Flexible sheets for waterproofing – Plastic and rubber sheets for roof waterproofing – Definitions and characteristics"), and are sold with different packaging, as follow:

- Pallet: 14 rolls per pallet
- Length of rolls: 25 m, 20 m and 15 m (according to the thickness)
- Width of rolls: 2,10 m, 1,60 m and 1,05 m

FIGURE 3: MAPEPLAN M ON FULLY EXPOSED ROOF

3. Content declaration

The main components and ancillary materials of Mapeplan M and Mapeplan B synthetic waterproofing membranes are the following:

TABLE 1: COMPOSITION

Materials	Percentage (%)
Polyvinyl chloride (PVC)	50 – 70
Plasticizers	30 – 40
Pigments	0 – 5
Reinforcing material	5 – 15
Other additives	0 – 1

The products contain in a concentration higher than 0,1% (by unit weight) neither carcinogenic substances nor substances of very high concern (SVHC) on the REACH Candidate List published by the European Chemicals Agency.

4. Declared Unit and Reference Service Life:

The declared unit is 1m^2 of packaged finished product having a 1,5 mm thickness.

Packaging materials include:

- Wooden pallet
- Cardboard
- LDPE used as wrapping material

The reference service life of the roofing membrane, according to Polyglass experience, is estimated at least 30 years, if professionally installed and properly used."

5. System Boundaries & additional technical information:

The approach is a “cradle to gate” with options, modules A1-A3 + A4-A5 + C + D;

The following modules have been considered:

- A1 – A3 (Product stage): extraction and transport of raw materials, packaging included, production process
- A4 – A5 (Construction process stage): transport of the finished product to final customers and installation into the building
- C1 – C4 (End of life stage): with a collection rate of 100% as C&D waste, the transports are carried out by lorry (EURO 4) over 100 km (C2). In this EPD it is used a conservative approach by considering the 100% of waste to be disposed in landfill (Italian scenario).
- D (Resource recovery stage): due to the absence of specific membrane recycling (module C3), this module is considered zero.

TABLE 2: SYSTEM BOUNDARIES

	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
Geography	EU, IT	EU, IT	IT	EU	EU	-	-	-	-	-	-	-	EU, IT	IT	IT	IT		IT
Specific data	> 90%					-	-	-	-	-	-	-	-	-	-	-		-
Variation – products	Not-relevant					-	-	-	-	-	-	-	-	-	-	-		-
Variation – sites	Not-relevant					-	-	-	-	-	-	-	-	-	-	-		-

A brief description of production process is the following:

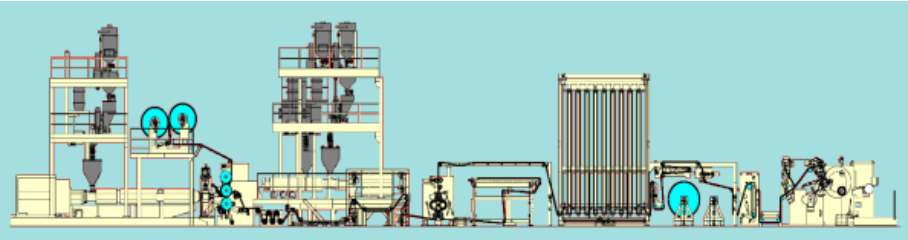


FIGURE 4: PRODUCTION PROCESS DETAIL

The production process of PVC-P roofing membranes is a multi-extrusion coating process. The production plant produces roofing membranes with an internal reinforcing material made of glass matt or polyester net.

PVC powders are mixed inside a turbomixer with other additives and liquid plasticizers. The mixture is stored under mixing, drained inside a hopper by a vacuum equipment, and finally sent to the extruders.

TABLE 3: TRANSPORT TO THE BUILDING SITE (A4)

Scenario information	Value	Unit
Means of transport: truck euro 4 with 27 tons of payload & ship with a 27500 DWT		
Litres of fuel (diesel for truck)	0,002	l/100km
Litres for fuel (HFO for ship)	0,0004	l/100km
Transport distance	1800	km
Capacity utilisation (including empty runs)	85	%
Gross density of products transported	~ 1200	kg/m^3
Capacity utilisation volume factor	100	%

The hot melt compound comes out from the extruders where the reinforced material is combined and totally encapsulated.

The membrane is cooled and finally sent to the packaging area, ready to ship.

TABLE 4: INSTALLATION INTO THE BUILDING (A5)

Scenario information	Value	Unit
Ancillary materials for installation	-	kg
Water use	-	m^3
Other resources use	-	kg
Energy type and consumption	0,019, European Grid Mix	kWh/m^2
Output materials as result of waste processing at the building site	~ 0,06	kg
Overlaps (membrane)	5,5	%
Waste materials on building site before waste processing	0,0507 (Wood) 0,0549 (Cardboard) 0,0031 (Plastics)	kg
Direct emission to ambient (air, soil and water)	-	kg

TABLE 5: END OF LIFE (C1-C4)

Scenario information	Value	Unit
Collected separately	-	kg
Collected with mixed construction waste	~ 2	kg
Reuse/Recycling/Energy recovery	-	kg
Transport to recycling /disposal facility	100	km
Products or materials for final deposition	~ 2	kg

6. Cut-off rules & allocation

Criteria for the exclusion of inputs and outputs (cut-off rules) in the LCA, information modules and any additional information are intended to support an efficient calculation procedure. They are not applied in order to hide data.

The following procedure is followed for the exclusion of inputs and outputs:

- All inputs and outputs to a unit process are included in the calculation, for which data are available.
- Less than 1% of the total mass inputs/outputs of the unit process A3, are cut off (see Table 6).

Input flows are covered for the whole formula.

TABLE 6: CUT-OFF CRITERIA

Process excluded from study	Cut-off criteria	Quantified contribution from process
A3: production (auxiliary materials)	Less than 10^{-5} kg/kg of finished product	Sensitivity study demonstrates a relative contribution lower than 0,5%
A3: production (particle emissions to air)	Less than 10^{-5} kg/kg of finished product	Sensitivity study demonstrates a relative contribution lower than 0,5%

For the allocation procedure and principles, consider the following table (Table 7).

TABLE 7: ALLOCATION PROCEDURE AND PRINCIPLES

Module	Allocation Principle
A1	All data are referred to 1m^2 of product • A1: electricity is allocated to the reference line production
A3	All data are referred to 1m^2 of packaged product. • A3-wastes: the data are allocated to the whole plant production and to the reference production line

7. Environmental performance & interpretation

The following tables show the environmental impacts for the products considered according to the requirements of EN15804:2012+A2:2019.

The results are referred to the declared unit (see § 4). The additional environmental indicators are not declared.

TABLE 8: MAPEPLAN M BROOF T1-T3 – ENVIRONMENTAL CATEGORIES

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP_{TOTAL}	(kg CO_2 eq.)	2,25E+00	1,42E-01	2,04E-01	0,00E+00	2,28E-02	0,00E+00	2,80E-02	0,00E+00
GWP_{FOSSIL}	(kg CO_2 eq.)	2,27E+00	1,41E-01	1,62E-02	0,00E+00	2,26E-02	0,00E+00	2,87E-02	0,00E+00
$GWP_{BIOGENIC}$	(kg CO_2 eq.)	-3,33E-02	-1,46E-04	1,88E-01	0,00E+00	-2,72E-05	0,00E+00	-8,34E-04	0,00E+00
GWP_{LULUC}	(kg CO_2 eq.)	1,66E-02	1,05E-03	1,78E-05	0,00E+00	1,86E-04	0,00E+00	8,44E-05	0,00E+00
ODP	(kg CFC 11 eq.)	1,16E-07	1,78E-17	2,10E-16	0,00E+00	4,50E-18	0,00E+00	1,12E-16	0,00E+00
AP	(mol H^+ eq.)	7,32E-03	1,26E-03	5,94E-05	0,00E+00	1,24E-04	0,00E+00	2,05E-04	0,00E+00
$EP_{FRESHWATER}$	(kg P eq.)	6,81E-04	3,84E-07	6,62E-07	0,00E+00	6,78E-08	0,00E+00	4,82E-08	0,00E+00
$EP_{FRESHWATER}$	(kg $(PO_4)^{3-}$ eq.)	2,09E-03	1,18E-06	2,03E-06	0,00E+00	2,08E-07	0,00E+00	1,48E-07	0,00E+00
EP_{MARINE}	(kg N eq.)	2,15E-03	4,90E-04	2,53E-05	0,00E+00	5,99E-05	0,00E+00	5,31E-05	0,00E+00
$EP_{TERRESTRIAL}$	(mol N eq.)	2,29E-02	5,40E-03	2,01E-04	0,00E+00	6,64E-04	0,00E+00	5,83E-04	0,00E+00
POCP	(kg NMVOC eq.)	6,44E-03	1,06E-03	1,08E-04	0,00E+00	1,16E-04	0,00E+00	1,61E-04	0,00E+00
$ADP_{MINERALS\&METALS}$	(kg Sb eq.)	6,52E-03	1,02E-08	2,89E-09	0,00E+00	2,02E-09	0,00E+00	2,71E-09	0,00E+00
ADP_{FOSSIL}	(MJ)	4,30E+01	1,88E+00	2,56E-01	0,00E+00	3,04E-01	0,00E+00	3,81E-01	0,00E+00
WDP	(m^3 world eq.)	1,32E+00	1,14E-03	1,96E-03	0,00E+00	2,12E-04	0,00E+00	3,08E-03	0,00E+00

GWP_{TOTAL}: Global Warming Potential total; **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; **$EP_{FRESHWATER}$**: Eutrophication Potential, freshwater; **EP_{MARINE}**: Eutrophication Potential, marine; **$EP_{TERRESTRIAL}$**: Eutrophication Potential, terrestrial; **POCP**: Formation potential of tropospheric ozone; **$ADP_{MINERALS\&METALS}$**: Abiotic Depletion Potential for non-fossil resources; **ADP_{FOSSIL}**: Abiotic Depletion Potential for fossil resources; **WDP**: Water Deprivation Potential.

TABLE 9: MAPEPLAN M BROOF T1-T3 – ADDITIONAL ENVIRONMENTAL INDICATORS

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-GHG	(kg CO_2 eq.)	2,23E+00	1,39E-01	1,24E-01	0,00E+00	2,24E-02	0,00E+00	2,83E-02	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. This indicator is thus equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.									

TABLE 10: MAPEPLAN M BROOF T1-T3 – OTHER ENVIRONMENTAL INDICATORS

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	4,77E+00	9,59E-02	7,38E-02	0,00E+00	1,75E-02	0,00E+00	5,13E-02	0,00E+00
PERM	MJ	1,90E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	6,66E+00	9,59E-02	7,38E-02	0,00E+00	1,75E-02	0,00E+00	5,13E-02	0,00E+00
PENRE	MJ	4,29E+01	1,88E+00	2,56E-01	0,00E+00	3,05E-01	0,00E+00	3,81E-01	0,00E+00
PENRM	MJ	1,42E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	4,30E+01	1,88E+00	2,56E-01	0,00E+00	3,05E-01	0,00E+00	3,81E-01	0,00E+00
SM	kg	1,27E+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
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
FW	m3	3,22E-02	1,10E-04	8,29E-05	0,00E+00	2,00E-05	0,00E+00	9,40E-05	0,00E+00
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 (primary energy and primary energy resources used as raw materials); **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 (primary energy and primary energy resources used as raw materials); **SM**: Use of secondary material; **RSF**: Use of renewable secondary fuels; **NRSF**: Use of non-renewable secondary fuels; **FW**: Net use of fresh water.									

TABLE 11: MAPEPLAN M BROOF T1-T3 – WASTE PRODUCTION AND OUTPUT FLOWS

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	kg	2,60E-03	8,75E-11	5,81E-11	0,00E+00	1,61E-11	0,00E+00	4,05E-11	0,00E+00
NHWD	kg	1,75E-01	2,71E-04	7,44E-02	0,00E+00	4,78E-05	0,00E+00	1,90E+00	0,00E+00
RWD	kg	1,34E-03	2,26E-06	2,25E-05	0,00E+00	5,53E-07	0,00E+00	4,00E-06	0,00E+00
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
Materials for recycling	kg	1,57E-01	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
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
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
HWD: Hazardous waste disposed; **NHWD**: Non-Hazardous waste disposed; **RWD**: Radioactive waste disposed									

TABLE 12: MAPEPLAN M BROOF T1-T3 – INFORMATION ON BIOGENIC CARBON CONTENT AT THE FACTORY GATE REFERRED

Indicator	Unit	Quantity
Biogenic Carbon Content in packaging	kg C	4,38E-02
Biogenic carbon content in product	kg C	0,00E+00

TABLE 13: MAPEPLAN B – ENVIRONMENTAL CATEGORIES

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP_{TOTAL}	(kg CO_2 eq.)	2,17E+00	1,42E-01	2,04E-01	0,00E+00	2,28E-02	0,00E+00	2,80E-02	0,00E+00
GWP_{FOSSIL}	(kg CO_2 eq.)	2,18E+00	1,41E-01	1,62E-02	0,00E+00	2,26E-02	0,00E+00	2,87E-02	0,00E+00
$GWP_{BIOGENIC}$	(kg CO_2 eq.)	-2,99E-02	-1,46E-04	1,88E-01	0,00E+00	-2,72E-05	0,00E+00	-8,34E-04	0,00E+00
GWP_{LULUC}	(kg CO_2 eq.)	1,66E-02	1,05E-03	1,78E-05	0,00E+00	1,86E-04	0,00E+00	8,44E-05	0,00E+00
ODP	(kg CFC 11 eq.)	1,13E-07	1,78E-17	2,10E-16	0,00E+00	4,50E-18	0,00E+00	1,12E-16	0,00E+00
AP	(mol H^+ eq.)	6,90E-03	1,25E-03	5,94E-05	0,00E+00	1,24E-04	0,00E+00	2,05E-04	0,00E+00
$EP_{FRESHWATER}$	(kg P eq.)	8,94E-05	3,84E-07	6,62E-07	0,00E+00	6,77E-08	0,00E+00	4,82E-08	0,00E+00
$EP_{FRESHWATER}$	(kg $(PO_4)^{3-}$ eq.)	2,74E-04	1,18E-06	2,03E-06	0,00E+00	2,08E-07	0,00E+00	1,48E-07	0,00E+00
EP_{MARINE}	(kg N eq.)	1,91E-03	4,90E-04	2,53E-05	0,00E+00	5,99E-05	0,00E+00	5,31E-05	0,00E+00
$EP_{TERRESTRIAL}$	(mol N eq.)	1,93E-02	5,40E-03	2,01E-04	0,00E+00	6,64E-04	0,00E+00	5,83E-04	0,00E+00
POCP	(kg NMVOC eq.)	5,53E-03	1,06E-03	1,08E-04	0,00E+00	1,16E-04	0,00E+00	1,61E-04	0,00E+00
$ADP_{MINERALS\&METALS}$	(kg Sb eq.)	2,63E-06	1,02E-08	2,89E-09	0,00E+00	2,02E-09	0,00E+00	2,71E-09	0,00E+00
ADP_{FOSSIL}	(MJ)	4,02E+01	1,88E+00	2,56E-01	0,00E+00	3,04E-01	0,00E+00	3,81E-01	0,00E+00
WDP	(m^3 world eq.)	1,25E+00	1,14E-03	1,96E-03	0,00E+00	2,12E-04	0,00E+00	3,08E-03	0,00E+00

GWP_{TOTAL}: Global Warming Potential total; **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; **$EP_{FRESHWATER}$**: Eutrophication Potential, freshwater; **EP_{MARINE}**: Eutrophication Potential, marine; **$EP_{TERRESTRIAL}$**: Eutrophication Potential, terrestrial; **POCP**: Formation potential of tropospheric ozone; **$ADP_{MINERALS\&METALS}$**: Abiotic Depletion Potential for non-fossil resources; **ADP_{FOSSIL}**: Abiotic Depletion Potential for fossil resources; **WDP**: Water Deprivation Potential.

TABLE 14: MAPEPLAN B – ADDITIONAL ENVIRONMENTAL INDICATORS

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-GHG	(kg CO_2 eq.)	2,14E+00	1,39E-01	1,24E-01	0,00E+00	2,24E-02	0,00E+00	2,83E-02	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. This indicator is thus equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.									

TABLE 15: MAPEPLAN B – OTHER ENVIRONMENTAL INDICATORS

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	4,78E+00	9,59E-02	7,38E-02	0,00E+00	1,75E-02	0,00E+00	5,13E-02	0,00E+00
PERM	MJ	1,90E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	6,68E+00	9,59E-02	7,38E-02	0,00E+00	1,75E-02	0,00E+00	5,13E-02	0,00E+00
PENRE	MJ	4,01E+01	1,88E+00	2,56E-01	0,00E+00	3,05E-01	0,00E+00	3,81E-01	0,00E+00
PENRM	MJ	1,42E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	4,02E+01	1,88E+00	2,56E-01	0,00E+00	3,05E-01	0,00E+00	3,81E-01	0,00E+00
SM	kg	1,29E+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
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
FW	m3	3,08E-02	1,10E-04	8,29E-05	0,00E+00	2,00E-05	0,00E+00	9,40E-05	0,00E+00
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 (primary energy and primary energy resources used as raw materials); **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 (primary energy and primary energy resources used as raw materials); **SM**: Use of secondary material; **RSF**: Use of renewable secondary fuels; **NRSF**: Use of non-renewable secondary fuels; **FW**: Net use of fresh water.									

TABLE 16: MAPEPLAN B – WASTE PRODUCTION AND OUTPUT FLOWS

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	kg	2,69E-03	8,75E-11	5,81E-11	0,00E+00	1,61E-11	0,00E+00	4,05E-11	0,00E+00
NHWD	kg	1,83E-01	2,71E-04	7,44E-02	0,00E+00	4,78E-05	0,00E+00	1,90E+00	0,00E+00
RWD	kg	1,30E-03	2,25E-06	2,25E-05	0,00E+00	5,53E-07	0,00E+00	4,00E-06	0,00E+00
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
Materials for recycling	kg	1,57E-01	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
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
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
HWD: Hazardous waste disposed; **NHWD**: Non-Hazardous waste disposed; **RWD**: Radioactive waste disposed									

TABLE 17: MAPEPLAN B – INFORMATION ON BIOGENIC CARBON CONTENT AT THE FACTORY GATE REFERRED

Indicator	Unit	Quantity
Biogenic Carbon Content in packaging	kg C	4,38E-02
Biogenic carbon content in product	kg C	0,00E+00

To calculate results for different thicknesses (1,2, 1,8, 2,0), please use following multiplicative coefficients for the environmental indicators considered (EI_x):

TABLE 18: CALCULATION RULES FOR ENVIRONMENTAL CATEGORIES OF DIFFERENT THICKNESS

	1,2 mm thickness	1,5 mm thickness	1,8 mm thickness	2,0 mm thickness
Mapeplan M Broof t1-t3	$EI_{1,5}$***0,83**	$EI_{1,5}$***1**	$EI_{1,5}$ ***1,22**	$EI_{1,5}$***1,39**
Mapeplan B	-	$EI_{1,5}$***1**	$EI_{1,5}$***1,22**	$EI_{1,5}$***1,39**

EI_x: Environmental Indicator for Mapeplan with x mm thickness

Tables above show absolute results for each of environmental impact categories. They clearly indicate that product stage (A1 – A3) has the highest contribution for each of them and accounts for up to 99% of the total impact in the whole system boundary.

All environmental impacts show a decreasing of at least 50% if compared with the old data calculated in the past years; this environmental benefit is mainly due to some changes in the formulation.

In particular, PVC compounds, plasticizers and reinforcing materials, which are some of the main components in Mapeplan formulations, carry a significant impact for all environmental categories.

In terms of GWP, module A5 gives a not negligible contribution, considering that during the installation phase it's necessary to take into account a membrane overlap between 5% and 6%. A fundamental contribution in terms of GWPbiogenic, is given by the packaging components.

Transportation modules (A2, A4, C2) have relevant importance in terms of GWP_{luluc}, while the contribution became less relevant in the other environmental categories.

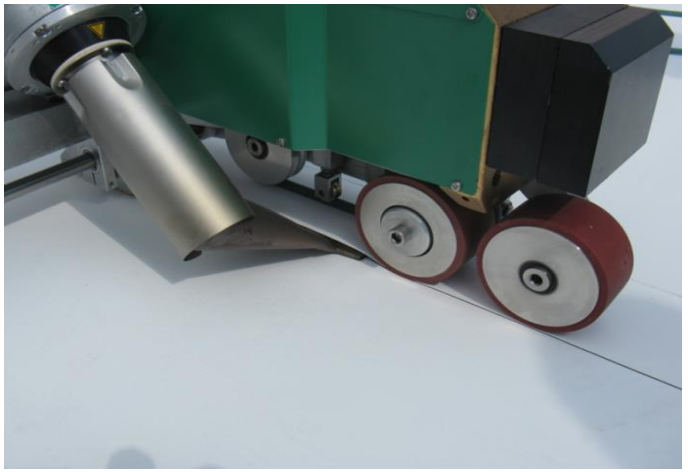


FIGURE 5: SHOWS THE HOT AIR WELDING OF MAPEPLAN BY AN AUTOMATIC MACHINE (REF. LEISTER VARIMAT V2)

FIGURE 6 SHOWS THE MAPEPLAN INSTALLED ON A ROOF WITH GRAVEL BALLAST

Following tables show the relative contributes for all environmental categories considered in this EPD for the different products.

TABLE 19: ENVIRONMENTAL IMPACT AS PERCENTAGE OF MAPEPLAN M BROOF T1-T3

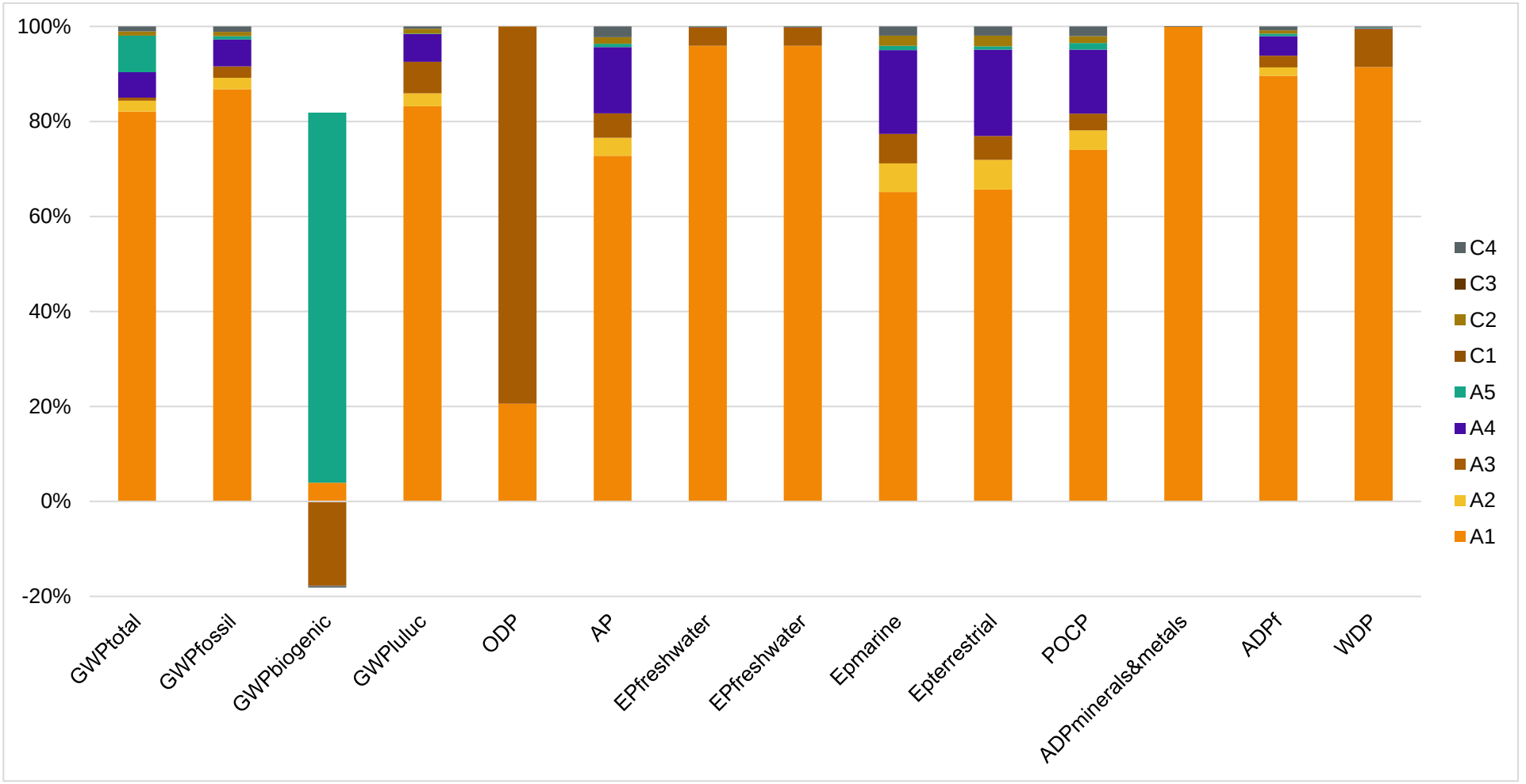
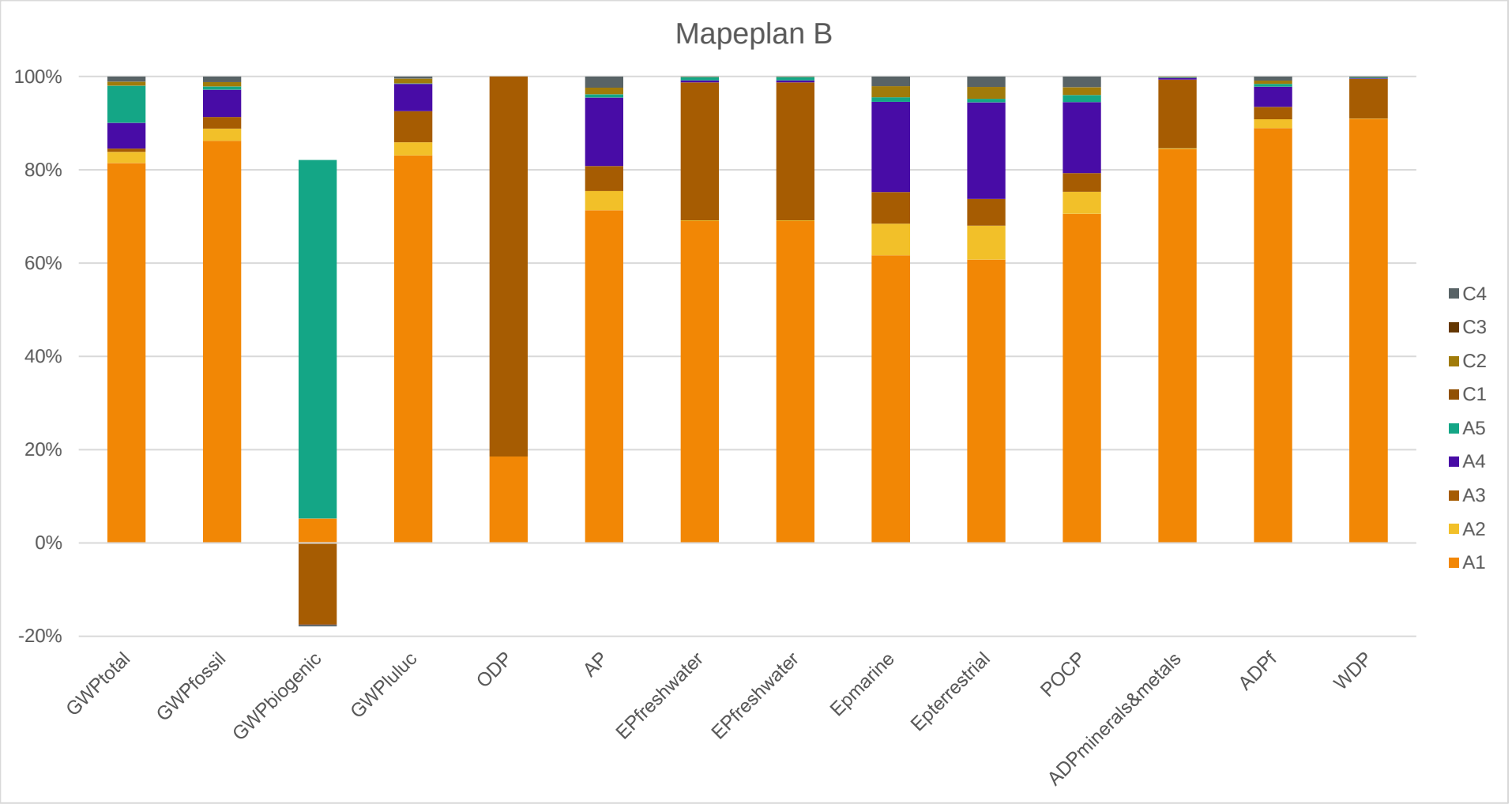


TABLE 20: ENVIRONMENTAL IMPACT AS PERCENTAGE OF MAPEPLAN B



More details about electrical mix used in this EPD is shown below:

Data source	Amount		Unit
Residual electricity grid mix (IT) – 2019	AIB	0,531*	kg CO_2-eqv/kWh

*CML2001 – Apr. 2013

8. Data Quality

Table 21: Data quality

Dataset & Geographical reference	Database (source)	Temporary reference
A1		
PVC compounds	Sphera & Ecoinvent 3.6 Database	2020
Reinforcing materials	Sphera Database	2020
Additives	Sphera & Ecoinvent Database 3.6	2020
Residual electricity grid mix (IT)	AIB	2019
A2 (Transport)		
Truck transport (27 ton payload – GLO)	Sphera Database	2020
Diesel for transport (EU)	Sphera Database	2017
A3 (production)		
Packaging (EU)	Sphera Database & PlasticEurope	2005 – 2013
Diesel mix (EU)	Sphera Database	2017
Wastewater treatment (EU)	Sphera Database	2020
A4 (Transport)		
Truck transport (27ton payload – GLO)	Sphera Database	2020
Diesel for transport (EU)	Sphera Database	2017
Ocean ship (27500 DWT payload – GLO)	Sphera Database	2020
Heavy fuel oil for ship transport (EU)	Sphera Database	2017
A5 (Installation)		
Electricity grid mix (EU)	Sphera Database	2017
Landfill for plastic waste (EU)	Sphera Database	2020
Landfill for wood waste (EU)	Sphera Database	2020
Landfill for paper waste (EU)	Sphera Database	2020
Landfill for metal waste (EU)	Sphera Database	2020
C1-C4 (End of Life)		
Truck transport (9,3 ton payload – GLO)	Sphera Database	2020
Diesel for transport (EU)	Sphera Database	2017
Construction waste dumping (EU)	Sphera Database	2020
Construction waste treatment (EU)	Sphera Database	2020

All data included in table above refer to a period between 2005 and 2020; the most relevant ones are specific from supplier, while the others (i.e. transport and minor contribution dataset), come from European and global databases.

All dataset are not more than 10 years old according to EN 15804 §6.3.8.2 “Data quality requirements”. The only exception is represented by one raw material used for one packaging component production.

Primary data concern the year 2020 and represent the whole annual production.

The Quality level concerning datasets used in the EPD can be considered as ”very good” or ”good” according to Annex E of the EN 15804 (current version); the only exception is represented by a packaging component which has a quality level classified as ”poor” in terms of time representativeness.

9. Differences versus previous versions

Results in the tables include in the chapter 7, shows the differences between the current EPD and the previous version. A1-A3 modules GWP-GHG indicator from current EPD is chosen for the comparison, due to the correspondence with the previous EPD GWP indicator (calculated according to the superseded EN 15804+A1 method).

Current EPD values are found to be generally lower, mainly due to the database update from Ecoinvent 3.3 to Ecoinvent 3.6, changes in formulations and new primary data.

10. Verification and Registration

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

EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804. For further information about comparability, see EN 15804 and ISO 14025.

CEN standard EN15804 served as the Core Product Category Rules (PCR)	
PCR:	PCR 2019:14 Construction products (EN 15804:A2), Version 1.11, 2021-02-05, UN CPC code 54
PCR review was conducted by:	The Technical Committee of the International EPD® System. See www.environdec.com/TC for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact.
Independent third-party verification of the declaration and data, according to ISO 14025:2006:	☒ EPD Process Certification ☐ EPD Verification
Third party verifier:	Certiquality S.r.l. Number of accreditations: 003H rev15
Accredited or approved by:	Accredia
Procedure for follow-up of data during EPD validity involves third-party verifier	☒ Yes ☐ No

11. References

- EN 13956: FLEXIBLE SHEETS FOR WATERPROOFING - PLASTIC AND RUBBER SHEETS FOR ROOF WATERPROOFING - DEFINITIONS AND CHARACTERISTICS
- EN 15804: SUSTAINABILITY OF CONSTRUCTION WORKS - ENVIRONMENTAL PRODUCT DECLARATIONS - CORE RULES FOR THE PRODUCT CATEGORY OF CONSTRUCTION PRODUCTS
- EUROPEAN RESIDUAL MIXES VERSION 1.1, 2020-09-08 (AIB: ASSOCIATION OF ISSUING BODIES)
- GENERAL PROGRAMME INSTRUCTIONS OF THE INTERNATIONAL EPD® SYSTEM. VERSION 3.01
- ISO 14025 ENVIRONMENTAL LABELS AND DECLARATIONS - TYPE III ENVIRONMENTAL DECLARATIONS - PRINCIPLES AND PROCEDURES
- ISO 14044 ENVIRONMENTAL MANAGEMENT – LIFE CYCLE ASSESSMENT – REQUIREMENTS AND GUIDELINES
- PCR 2019:14 CONSTRUCTION PRODUCTS (EN 15804: A2), UN CPC CODE 54; VERSION 1.11

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