EPD®

THE INTERNATIONAL EPD® SYSTEM

ECO PLATFORM EPD VERIFIED

maris SAINT-GOBAIN

ENVIRONMENTAL PRODUCT DECLARATION

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

MARISEAL® 250

EPD VERIFIED

Date of issue: 2023-01-11
Validity: 5 years
Valid until: 2028-01-10
Version: 1
Scope of the EPD®: Global

The environmental impacts of this product have been assessed over its whole life cycle. Its Environmental Product Declaration has been verified by an independent third party.

Registration number
The International EPD® System:
S-P-07976

General information

Manufacturer: MARIS POLYMERS S.M.S.A.

Programme used: International EPD System **http://www.environdec.com/**

EPD registration number: S-P-07976

PCR identification: PCR 2019:14 Construction products version 1.11.

Site of manufacture: Thesi Roumani Inofyta Viotia, 32011, Greece.

Owner of the declaration: MARIS POLYMERS S.M.S.A.

Product / product family name and manufacturer represented: Mariseal® 250 manufactured by Maris Saint-Gobain.

UN CPC code: 35110 - Paints and varnishes and related products.

EPD Prepared by: LCA Central Team, Saint-Gobain.

Contact: Loukia Bousia (Loukia.Bousia@saint-gobain.com)

Declaration issued: 2023/01/11**, valid until:** 2028/01/10.

Declared Unit: 1 kg of product installed and with a service life of 25 years.

All inventory data, as well as all indicator results expressed in this report are declared for 1 kg of materials. Additionally, based on the standard product application, **as additional information** the equivalent results from the LCA study may be applicable to:

- 1 m^2 of covered surface with the product applied in two or three coats of 1.40 to 2.50 kg/m2 and with an estimated lifespan of 25 years.

Declaration of Hazardous substances: 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 been used in a percentage higher than 0.1% of the weight of the product.

Geographical scope of the EPD®: Global

The intended use of this EPD is for B2B communication.

Demonstration of verification: an independent verification of the declaration was made, according to ISO 14025:2010. This verification was external and conducted by the following third party based on the PCR mentioned above.

ISO standard ISO 21930 and CEN standard EN 15804 serves as the core Product Category Rules (PCR)	
EPD program operator	The International EPD® System
Adress:	EPD® International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
E-mail:	info@environdec.com
Product Category Rules (PCR)	PCR 2019:14 Construction products (version 1.11)
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:
☒ External ☐ Internal
☐ EPD process certification ☒ EPD verification

Third party verifier: Marcel Gómez
Marcel Gómez Consultoría Ambiental, Tlf: 0034 630 64 35 93 - email: info@marcelgomez.com
Approved by: The International EPD® System

Procedure for follow-up of data during EPD validity involves third part verifier:
☒ Yes ☐ No

Product description

Product's name:

MARISEAL® 250.

Product description and use:

MARISEAL® 250 is a one-component, permanent elastic, liquid applied, polyurethane waterproofing membrane used on roofs, balconies, terraces, pedestrian and vehicular decks, green roofs, protection over PUR-spray foam based on pure elastomeric hydrophobic polyurethane resins, which result in excellent mechanical, chemical, thermal, UV and natural element resistance properties.

Certified for up to 25 years expected life span (EOTA) & EN 1504-2, EN 14891.

Consumption: 1.40 – 2.50 kg/m^2 applied in two or three layers.

Technical data/physical characteristics:

Property	Results	Test Method
Elongation at Break	600%	ASTM D412
Tensile Strength	>4N/mm 2	ASTM D412
Tear Strength	40 N/mm	ASTM D624(type B)
Puncture Resistance	350 N	ASTM E154M(0.8 mm Film)
Crack Bridging Ability (23 C)	4.4 mm	EN 14891
Crack Bridging Ability (-5 C)	3.7 mm	EN 14891
Crack Bridging Ability (-20 C)	3.6 mm	EN 14891
Water Vapour Permeability	12 g/m^2/day	DIN EN 1931
Adhesion to Concrete	>1.9N/mm^2(concrete Surface failure)	En 1542
Hardness(Shore A Scale)	>65	ASTM D 2240 (15")
Resistance to Roost Penetration	Resistant	UNE CEN/TS 14416
Solar Reflectance (SR)	0.87(mariseal 250 white)	ASTM E903-96
Solar Emittance	0.87(mariseal 250 white)	ASTM E408-71
Hydrolysis (5% KOH, 7days Cycle)	No significant elastometric change	Inhouse Lab
Service Temperature	-30 C to +90 C	Inhouse Lab
Shock Temperature(20mm)	200 C	Inhouse Lab
Rain Stability Time	3-4 hours	Conditions: 20 C, 50% RH
Light Pedestrian Traffic Time	18-24 hours	
Final Curing time	7 days	
Chemical Properties	Good Resistance to alkali solutions, detergents, Seawater, Oils, Weak acidic Solution.	

Advantages:

- Simple application (roller or airless spray).
- Seamless membrane without joints when applied.
- Resistant to stagnating water.
- Resistant to frost and high temperatures (maintains its mechanical properties over a temperature span of -30°C to +90°C).
- Resistant to root penetration, so it can be used in green roofs.
- Crack-bridging up to 3mm, even at -20°C.
- Provides water vapor permeability, so the surface can breathe.
- Provides excellent weather and UV resistance.
- Waterproofs old bitumen felts without the need to remove them prior to application.
- Provides high sun reflectivity, contributing to thermal insulation.
- Resistant to detergents, oils, seawater and domestic chemicals.
- Even if the membrane gets mechanically damaged, it can be easily repaired locally within minutes.

Main Uses

- Roofs, Terraces and Verandas.
- Green Roofs.
- Old Bitumen felts, Asphalt felts, TPO, PP, EPDM and PVC membranes and old Acrylic coatings.
- Protection of Polyurethane Foam Insulation.

Description of the main product components and/or materials:

The composition range of the product is shown below. For its representation in the calculation model, an average product has been represented at the composition level, based on the contribution to the environmental impact of the different raw materials.

Product components	Weight (%)	Post-consumer material weight (%)	Renewable material weight (%)
PU Prepolymer	25 – 40	0%	0%
Solvents	10 - 25	0%	0%
Fillers	30 - 45	0%	0%
Additives	5 -10	0%	0%
TOTAL	100	0%	0%

Packaging materials	Weight (Kg)	Weight-% (versus the product)
Metal packaging	6.46E-02	6.46%
Plastic wrap	4.30E-04	0.04%
EURO Wood-pallet	1.12E-03	0.11%

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. The verifier and the program operator do not make any claim nor have any responsibility of the legality of the product.

LCA calculation interpretation

EPD TYPE DECLARED	Cradle to grave and module D Product-specific (one product, one manufacturing site)
DECLARED UNIT	1 kg of product installed and with a service life of 25 years
SYSTEM BOUNDARIES	Cradle to grave + Module D = (A + B + C) +D
REFERENCE SERVICE LIFE (RSL)	The RSL is considered to be up to 25 years, due to its nature and composition, this material is of high quality and proven durability.
CUT-OFF RULES	In general, the cut-off criteria are 1% of the consumption of renewable and non-renewable primary energy and 1% of the total input mass of the manufacturing process (according to the EN 15804 standard). In the evaluation, all available data of the production process is considered, i.e., all raw materials used, auxiliary materials used and energy consumption using the best available data sets in the reference database. The following processes have been excluded: • Manufacture of equipment used in production, infrastructure, or any other capital goods. • Transportation of personnel to the plant or from the production site. • Research and development activities. • Long-term emissions.
ALLOCATIONS	In general, whenever possible, allocation was avoided. Materials production was divided into families, and input and output data related to each were collected, when the data could not be directly attributed to a specific product, they were generally assigned to the total production of materials without differentiation. The allocation of the consumption of common inputs such as water consumption, as well as common production outputs, such as solid waste generation, was made based on the total annual production of materials. The consumption reported for fuels and electricity was made at plant level, the allocation was assumed by total production (by mass). The modularity principle as well as the polluter-payer principle have been followed. The waste management data corresponds to all the waste generated in the facilities of the production plant. Therefore, the reported data includes all the products made in the production plant.
GEOGRAPHICAL COVERAGE AND TIME PERIOD	Production site location: Greece. Use and end-of-life location: Global. Data is collected from one production site in Thesi Roumani Inofyta Viotia, 32011, Greece. Background data: Ecoinvent 3.8 and SimaPro 9.3.
PRODUCT UN CPC CODE	35110 - Paints and varnishes and related products.

According to EN 15804:2012+A2:2019, EPDs of construction products may not be comparable if they do not comply with this standard. According to ISO 21930, EPDs might not be comparable if they are from different programmes.

Life Cycle stages

Flow diagram of the Life Cycle

Product stage, A1-A3

Description of the stage: the product stage of plaster products is subdivided into 3 modules A1, A2 and A3 respectively “Raw material supply”, “transport to manufacturer” and “manufacturing”.

A1: Raw material supply

For each product, a model was made and then an average of the models was calculated, per kilogram of product. The specific consumption per kg of product is calculated in kg/m^2.

For the quantification of impacts associated with raw materials, 100% of the components reported in the production of materials have been used, including main and secondary raw materials.

A2: Transport to the manufacturer

To determine the transport of raw materials, the data recorded by the production plant regarding their raw materials and data referring to their supply have been used. Additionally, the production plant has also reported the road transport distance for each of the secondary materials (consumables) used in the production activities of the year.

Consumable materials include fuels (diesel), oils and others. For each of these, the total quantity transported and the weighted average distance according to the quantity registered by each production center have been determined, to calculate the kg*kilometer ratio, which has been consolidated for each product family.

Greece production center of Maris has reported the average distance and means of transport used for the mobilization of raw materials from their production site.

A3: Manufacturing

Based on the internal records of the production plant, the amount of materials produced per year, by nature of the product, has been reported.

The general manufacturing processes within the operational limits of MARISEAL® 250 production are presented in the following figure and listed below:

1) Reception of the raw material
2) Quality control
3) Storage
4) Mix with resins and pigments
5) Mass distribution
6) Quality control

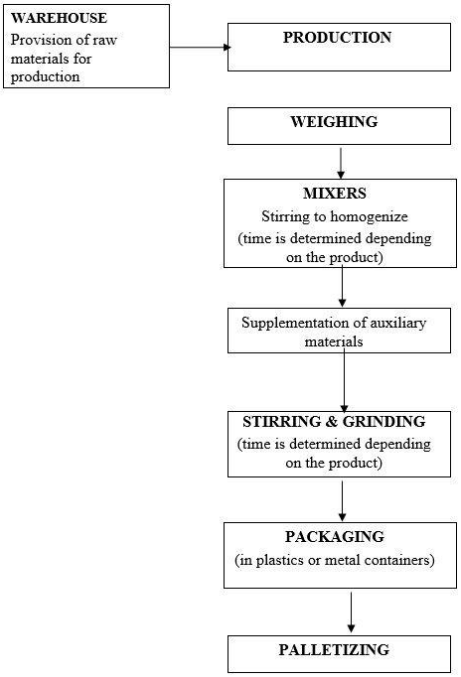


Figure 1. Manufacturing process for Maris Products

The main inputs of the manufacturing system are:

- Energy: Electricity and Fuels.
- Water: Well intake or network consumption.
- Consumables: External raw materials, Waste to be processed and/or recovered.
- Transports: Packaging and waste.

The main outputs of the production system are:

- Waste generated: Hazardous, Non-hazardous.
- **Emissions to: air, water or soil (none).**

Construction process stage, A4-A5

Description of the stage: the construction process is divided into 2 modules: A4, transport to the building site and A5, installation in the building

A4: Transport to the building site.

Considering the wide distribution of products at an international and regional level, based on the sales distribution report, the total production sold by family and by country of destination is considered. For each of the destinations, according to information for internal use, the export ports in the country of origin and import ports in the destination countries are determined. An average transportation distance to the construction site is determined in each destination country.

For each case, the transport distances are determined and associated with a mode of transport: land freight vehicle, and maritime container ship. The detail of the technical parameters for the transport model is obtained from the Ecoinvent 3.8 database and its reference technical studies. The assumptions of this modeling are summarized below.

PARAMETER	VALUE (expressed per declared unit)	
Type and fuel consumption of the vehicle, type of vehicles used for the transport; for example, trucks for long distance, boat, etc.	Transport, freight, lorry 16-32 metric ton, EURO6 {RER}| transport, freight, lorry 16-32 metric ton, EURO6 | Cut-off, U	Transport, freight, sea, container ship {GLO}| transport, freight, sea, container ship | Cut-off, U
Distance	Km by truck: 308 km	Km by ship: 265 km
Capacity utilization (including empty return trip)	Percentage assumed by Ecoinvent database	Percentage assumed by Ecoinvent database
Apparent density	kg/m^3: 1.40	
Volume capacity factor	1	1

A5: Construction-Installation process.

Considering the uses and installation, it can be reported that more than 99 % of the cases require a manual installation that does not imply the use of extra resources, neither energy, nor water nor application machines, only spreading on the surfaces where the product is applied and it remains. It is considered that it does not generate extra waste not previously considered, apart from that referring to the packaging in which the product is stored and the packaging in which it is transported from the country of origin to the destination.

There is an estimation of 0.3 % of material loss during the installation process. Regarding waste management, plastic waste (container pots), pallets, metal waste and mixed packaging are considered, which are assumed to be 100 % recycled considering at an average distance scenario of 50 km.

Use stage, B1-B7

The use stage, related to the application of the product in the building includes:

B1: Use or application of the installed product;
B2: Maintenance;
B3: Repair;
B4: Replacement;
B5: Refurbishment;
B6: Operational energy use;
B7: Operational water use.

Description of scenarios and additional technical information:
Based on their design features and components, Maris products have a service life of 25 years. Regardless of the installation conditions and multiple applications for final finishing, the maintenance needs are none. As a consequence, the impact of these stages is 0.

End-of-life stage C1-C4

This stage includes the next modules:

C1: Deconstruction, demolition;
C2: Transport to waste processing;
C3: Waste processing for reuse, recovery and/or recycling;
C4: Disposal.
Description of the scenarios and additional technical information for the end-of-life:

MODULE	PARAMETER	UNIT (PER DECLARED UNIT)	VALUE
C1 Deconstruction	Process of collection specified by type	Kg collected in a separate way	0
		Kg collected mixed with waste from construction	1
C2 **Transport**	Type and fuel consumption of the vehicle, type of vehicles used for transport	Transport, freight, lorry 16-32 metric ton, EURO6	Diesel consumption: 0.0366 tkm
	Distance	km	50
	Use of the capacity (including empty returns)	%	Percentage assumed by Ecoinvent data base
	Apparent density of transported products	kg / m^3	1400
	Useful capacity factor		1
C3 Treatment of waste	System recovery specified by type	kg for reuse	0
		kg for recycle	0
C4 Disposal	Disposal specified by type	kg for energy recovery	0
		kg of product for final deposition	1

Reuse/recovery/recycling potential, D

100 % of wastes are landfilled. There is no reuse nor recovery nor recycling of this product. Hence, no recycling benefits are reported on Module D.

LCA results

As specified in EN 15804:2012+A2:2019 and also the Product-Category Rules, the environmental impacts are declared and reported using the baseline characterization factors from ILCD. Specific data has been supplied by the plant, and generic data comes from Ecoinvent v3.8 databases. All emissions to air, water, and soil, and all materials and energy used have been included.

The estimated impact results are only relative statements which do not indicate the end points of the impact categories, exceeding threshold values, safety margins or risks.

The following results corresponds to a single product manufactured in a single plant:

System boundaries (X=included, MND=module not declared)

	PRODUCT STAGE			CONSTRUCTION STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY
	Raw material supply	**Transport**	**Manufacturing**	**Transport**	**Construction-Installation**	**Use**	**Maintenance**	**Repair**	**Replacement**	**Refurbishment**	**Operational energy use**	**Operational water use**	**Deconstruction demolition**	**Transport**	**Waste processing**	**Disposal**	**Reuse-recovery**
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	X	X	X	X	X	X	X	X	X	X	X	X
Geography	GR	GR	GR	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO
Specific data used	>90% GWP- GHG																
Variation products	Only one product is reported in this EPD																
Variation sites	Only one site is reported for this product																

Environmental impacts

All data results are representative for 1 kg of MARISEAL® 250 surface coating, as declared unit.
Estimated impact results are only relative statements that do not indicate impact category endpoints, exceeding threshold values, safety margins, or risks.

		Product stage	Construction stage		Use stage							End of life stage				Reuse, Recovery Recycling
	Environmental indicators	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
	Climate Change [kg CO_2 eq.]	3.71E+00	1.16E-01	1.17E-02	0	0	0	0	0	0	0	0	8.15E-03	0	5.35E-03	0
	Climate Change (fossil) [kg CO_2 eq.]	3.67E+00	1.16E-01	1.16E-02	0	0	0	0	0	0	0	0	8.14E-03	0	5.27E-03	0
	Climate Change (biogenic) [kg CO_2 eq.]	3.07E-02	1.21E-04	9.26E-05	0	0	0	0	0	0	0	0	7.42E-06	0	7.97E-05	0
	Climate Change (land use change) [kg CO_2 eq.]	2.04E-03	4.45E-05	6.34E-06	0	0	0	0	0	0	0	0	3.26E-06	0	1.91E-06	0
	Ozone depletion [kg CFC-11 eq.]	2.08E-07	2.89E-08	7.48E-10	0	0	0	0	0	0	0	0	1.89E-09	0	9.36E-10	0
	Acidification terrestrial and freshwater [Mole of H+ eq.]	5.05E-02	4.43E-04	1.53E-04	0	0	0	0	0	0	0	0	2.31E-05	0	4.91E-05	0
	Eutrophication freshwater [kg P eq.]	2.31E-04	8.21E-07	6.97E-07	0	0	0	0	0	0	0	0	5.81E-08	0	6.33E-08	0
	Eutrophication marine [kg N eq.]	6.26E-03	9.97E-05	1.91E-05	0	0	0	0	0	0	0	0	4.59E-06	0	2.03E-05	0
	Eutrophication terrestrial [Mole of N eq.]	7.63E-02	1.11E-03	2.32E-04	0	0	0	0	0	0	0	0	5.12E-05	0	2.23E-04	0
	Photochemical ozone formation - human health [kg NMVOC eq.]	2.02E-02	4.07E-04	6.20E-05	0	0	0	0	0	0	0	0	1.97E-05	0	6.16E-05	0
	Resource use, mineral and metals [kg Sb eq.]	1.24E-03	2.76E-07	3.72E-06	0	0	0	0	0	0	0	0	2.89E-08	0	2.40E-10	0
	Resource use, energy carriers [MJ]	6.82E+01	1.88E+00	2.13E-01	0	0	0	0	0	0	0	0	1.23E-01	0	7.01E-02	0
	Water deprivation potential [m^3 world equiv.]	3.07E+00	6.42E-03	9.24E-03	0	0	0	0	0	0	0	0	3.76E-04	0	1.75E-04	0

The results of this environmental impact indicator should be used with caution, as the uncertainties of the results are high and experience with this parameter is limited.

Potential environmental impact – additional mandatory and voluntary indicators

	Product stage	Construction stage		Use stage							End of life stage				Reuse, recovery, recycling
	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction /	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
GWP-GHG[1] [kg CO_2 eq.]	3.54E+00	1.15E-01	1.11E-02	0	0	0	0	0	0	0	0	8.07E-03	0	5.20E-03	0

[1] 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 almost equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

Resources Use

	Resources Use indicators	Product stage	Construction stage		Use stage							End of life stage				Reuse, recovery, recycling
		A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
	Use of renewable primary energy (PERE) [MJ]	4.61E+00	2.38E-02	1.40E-02	0	0	0	0	0	0	0	0	1.76E-03	0	1.,65E-03	0
	Primary energy resources used as raw materials (PERM) [MJ]	2.07E-02	0.00E+00	0.00E+00	0	0	0	0	0	0	0	0	0.00E+00	0	0.00E+00	0
	Total use of renewable primary energy resources (PERT) [MJ]	4.64E+00	2.38E-02	1.40E-02	0	0	0	0	0	0	0	0	1.76E-03	0	1.65E-03	0
	Use of non-renewable primary energy (PENRE) [MJ]	7.29E+01	2.00E+00	2.27E-01	0	0	0	0	0	0	0	0	1.31E-01	0	7.45E-02	0
	Non-renewable primary energy resources used as raw materials (PENRM) [MJ]	1.75E-02	0.00E+00	0.00E+00	0	0	0	0	0	0	0	0	0.00E+00	0	0.00E+00	0
	Total use of non-renewable primary energy resources (PENRT) [MJ]	7.29E+01	2.00E+00	2.27E-01	0	0	0	0	0	0	0	0	1.31E-01	0	7.45E-02	0
	Input of secondary material (SM) [kg]	0.00E+00	0.00E+00	0.00E+00	0	0	0	0	0	0	0	0	0.00E+00	0	0.00E+00	0
	Use of renewable secondary fuels (RSF) [MJ]	0.00E+00	0.00E+00	0.00E+00	0	0	0	0	0	0	0	0	0.00E+00	0	0.00E+00	0
	Use of non-renewable secondary fuels (NRSF) [MJ]	0.00E+00	0.00E+00	0.00E+00	0	0	0	0	0	0	0	0	0.00E+00	0	0.00E+00	0
	Use of net fresh water (FW) [m^3]	7.80E-02	2.22E-04	2,35E-04	0	0	0	0	0	0	0	0	1.40E-05	0	8.42E-06	0

*For this study, both the product and its packaging are reported in the indicators "Use of renewable primary energy resources used as raw materials" ("PERM") and "Use of non-renewable primary energy resources used as raw materials" ("PENRM"). PERM and PENRM are reported as negative values were materials are recycled or recovered, but not when landfilled.

Waste Category & Output flows

	Waste Category & Output Flows	Product stage	Construction stage		Use stage							End of life stage				Reuse, recovery, recycling
		A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
	Hazardous waste disposed (HWD) [kg]	3.44E-05	4.51E-06	1.24E-07	0	0	0	0	0	0	0	0	3.22E-07	0	1.50E-07	0
	Non-hazardous waste disposed (NHWD) [kg]	4.32E-01	1.73E-01	1.72E-03	0	0	0	0	0	0	0	0	6.46E-03	0	1.00E+00	0
	Radioactive waste disposed (RWD) [kg]	1.50E-04	1.28E-05	5.05E-07	0	0	0	0	0	0	0	0	8.34E-07	0	4.42E-07	0
	Components for re-use (CRU) [kg]	0	0	1.12E-03	0	0	0	0	0	0	0	0	0	0	0	0
	Materials for Recycling (MFR) [kg]	0	0	6.51E-02	0	0	0	0	0	0	0	0	0	0	0	0
	Material for Energy Recovery (MER) [kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exported electrical energy (EEE) [MJ]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Exported thermal energy (EET) [MJ]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

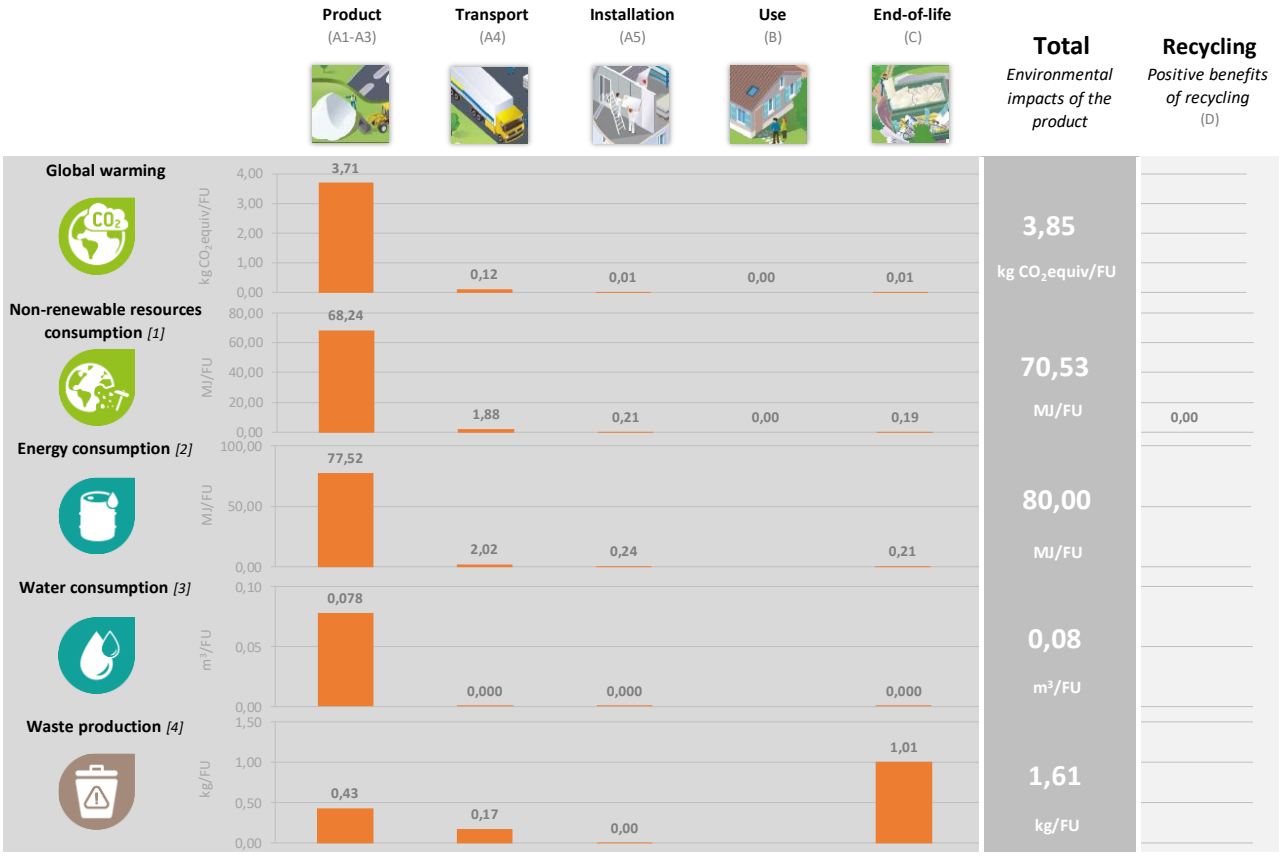
Information on biogenic carbon content

		Product stage
	Biogenic Carbon Content	A1 / A2 / A3
	Biogenic carbon content in product [kg]	0
	Biogenic carbon content in packaging [kg]	2.06E-03

Note: 1 kg biogenic carbon is equivalent to 44/12 (approx. 3.67) kg CO_2.

LCA results interpretation

The following figure refers to a functional unit of 1 kg of product expected to have average service life of 25 years.



[1] This indicator corresponds to the abiotic depletion potential of fossil resources.
[2] This indicator corresponds to the total use of primary energy.
[3] This indicator corresponds to the use of net fresh water.
[4] This indicator corresponds to the sum of hazardous, non-hazardous and radioactive waste disposed.

Global Warming Potential (Climate Change - GWP)

For GWP, the majority of contribution to this environmental impact is from the production modules (A1 – A3). This is primarily because the sources of greenhouse gas emissions are predominant in this part of the life cycle. CO_2 is generated upstream from the production of raw materials and production of electricity and is also released on site by the combustion of coke, diesel and natural gas. We can see that other sections of the life cycle also contribute to the GWP. However, the production modules contribute to over 96% to the impact. Impacts from A4 (transport to clients), waste disposal transportation in A5 (disposal after installation) and C (transport and disposal at the end of life) are much lower than A1-A3.

Non-renewable resources consumptions
The consumption of non-renewable resources has the highest value in the production modules, due to the consumption of diesel within the factory.
The contribution to this impact of the other modules is very small and is mainly due to the non-renewable resources consumed during installation.

Energy Consumptions
Modules A1-A3 have the highest contribution to total energy consumption. Energy is consumed in the form of electricity, and diesel during the manufacturing of the product.

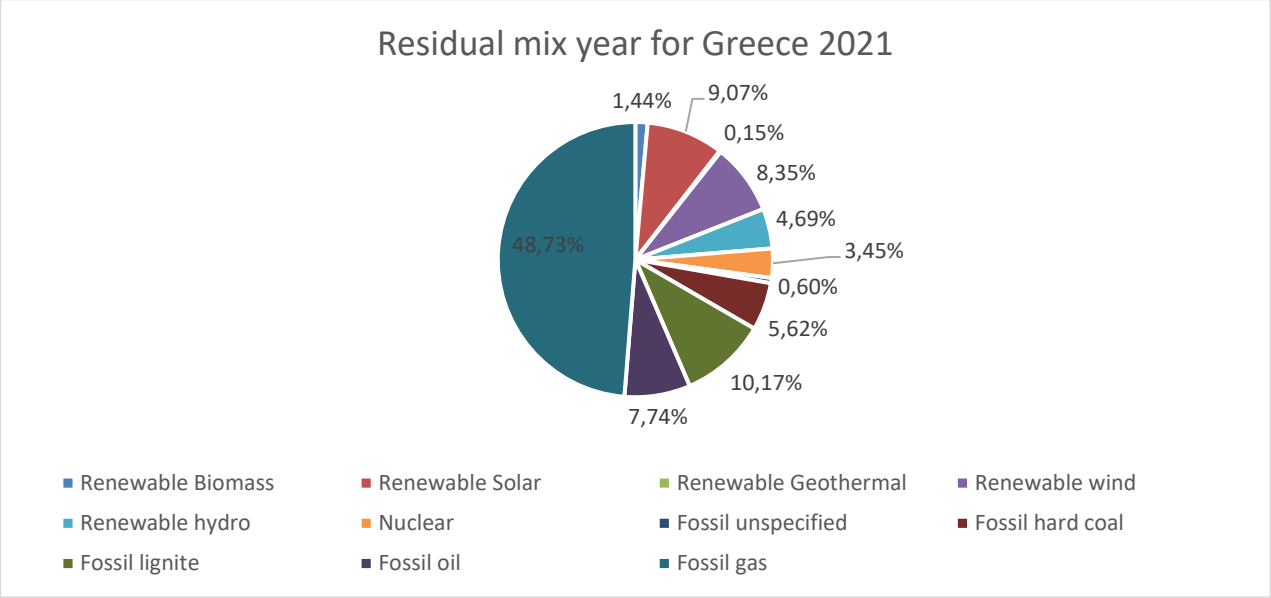
Water Consumption
Water is used within the manufacturing facility and therefore we see that almost all the impact is produced in the production phase. The second highest contribution occurs in the installation site.

Waste Production
The largest contributor is the end of life module, with a contribution to the impact around 63 % the second contributor to the impact is the production stage (A1-A3) with a contribution to the impact around 27 %. This is because the 100 % of the product is assumed to be sent to landfill once it reaches the end of life state, however some residues are produced during the production phase.

LCA Additional information

Electricity description

TYPE OF INFORMATION	DESCRIPTION
Location	Greece
Production mix	Renewable Biomass- 1.44 % Renewable Solar-9.07 % Renewable Geothermal-0.15 % Renewable wind-8.35 % Renewable hydro-4.69 % Nuclear-3.45 % Fossil unspecified-0.60 % Fossil hard coal-5.62 % Fossil Oil-7.74 % Fossil lignite-10.17 % Fossil gas-48.73 %
Reference year	2021
Type of data set	Cradle to gate from Ecoinvent 3.8 database
Source	European Residual Mixes 2021
CO_2 emissions	444.63 (g/kWh)



Global warming potential for market application

Based on technical product properties all environmental impact indicators may be quantifyied for usual market product applications. **As additional information**, the following results present the GWP indicator for a typical aplication of MARISEAL® 250 on surfaces.

Parameter	Unit	A1	A2	A3	A1+A2+A3	A4	A5	C2	C4	Total
Density	kg/m^3	1.40 E+00	1.40 E+00	1.40 E+00	1.40 E+00	1.40 E+00	1.40 E+00	1.40 E+00	1.40 E+00	1.40 E+00
Average weight application	kg/m^3	1.85 E+00	1.85 E+00	1.85 E+00	1.85 E+00	1.85 E+00	1.85 E+00	1.85 E+00	1.85 E+00	1.85 E+00
Minimum weight application	kg/m^2	1.20 E+00	1.20 E+00	1.20 E+00	1.20 E+00	1.20 E+00	1.20 E+00	1.20 E+00	1.20 E+00	1.20 E+00
Maximum weight application	kg/m^2	2.50 E+00	2.50 E+00	2.50 E+00	2.50 E+00	2.50 E+00	2.50 E+00	2.50 E+00	2.50 E+00	2.50 E+00
GWP – total	kg CO_2 eq. / kg	2.61 E+00	7.78 E-02	1.02 E+00	3.71 E+00	1.16 E-01	1.17 E-02	8.15 E-03	5.35 E-03	3.85 E+00
GWP – average	kg CO_2 eq. / kg	4.83 E+00	1.44 E-01	1.89 E+00	6.86 E+00	2.15 E-01	2.16 E-02	1.51 E-02	9.90 E-03	7,12 E+00
GWP – min	kg CO_2 eq. / m^2	3.13 E+00	9.34 E-02	1.22 E+00	4.45 E+00	1.40 E-01	1.40 E-02	9.78 E-03	6.42 E-03	4.62 E+00
GWP – max	kg CO_2 eq. / m^2	6.52 E+00	1.95 E-01	2.55 E+00	9.27E+00	2.91 E-01	2.91 E-02	2.04 E-02	1.34E-02	9.62 E+00

Data quality

Inventory data quality is judged by geographical, temporal, and technological representativeness. To cover these requirements and to ensure reliable results, first-hand industry data crossed with LCA background datasets were used. The data was collected from internal records and reporting documents from Maris Saint-Gobain. After evaluating the inventory, according to the defined ranking in the LCA report, the assessment reflects good inventory data quality.

Information related to sector EPDs

Individual EPD.

Differences versus previous versions of the EPD

This is the first version of this EPD.

References

1. EPD International (2019) General Programme Instructions for the International EPD® System. Version 3.01, dated 2019-09-18.
2. The International EPD System PCR 2019:14 Construction products, Version 1.11.
3. EN 15804:2012+A2:2019 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.
4. ISO 21930:2007 Sustainability in building construction – Environmental declaration of building products.
5. ISO 14025:2006 Environmental labels and declarations – Type III environmental declarations – Principles and procedures.
6. ISO 14040:2006 Environmental management. Life cycle assessment. Principles and framework.
7. ISO 14044:2006 Environmental management. Life cycle assessment. Requirements and guidelines.
8. LCA report of Maris Saint-Gobain products (2022).

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