ENVIRONMENTAL PRODUCT DECLARATIONS

GRAPHENSTONE®

NATURAL PAINT

GRAPHENSTONE® ECOSPHERE PREMIUM DE IEDISA

EPD®
ENVIRONMENTAL PRODUCT DECLARATION

Register Number EPD®: S-P-01050

Release date: 2017/06/21

EPD® Validity: International

EPD® based in PCR 2012:01
Construction products and construction services v 2.2

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Code UN CPC 3511

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ENVIRONMENTAL PRODUCT DECLARATION

ECOSPHERE PREMIUM

1. Programme related information

Name of the programme and Operator's programme name	The international EPD® System, operated by EPD® International AB
Reference PCR document	PCR based on ISO 14025:2006 and EN 15804. Construction products and construction services. 2012:01. version 2.01
EPD® register number	S-P-01050
Publication date	2017/06/21
Revision date	2017/12/01
EPD® valid until	5 years (2022/05/31)
Geographical scope of EPD®	International
For more information	www.environdec.com

2. Product related information

2.1. Specification of manufacturing company

2.1.1. Company related information

Company responsible of EPD® publication	INDUSTRIA ESPAÑOLA PARA EL DESARROLLO E INVESTIGACIÓN 2100, S.A. (IEdiSA) Polígono industrial Poliviso. c/ Carpinteros, 25 41520 El Viso del Alcor, Sevilla - SPAIN
Contact	Patricia Silva +34 955 292 068 productmanager@graphenstone.com www.graphenstone.com

2.1.2. Company description

IEdiSA is a company located in El Viso del Alcor (Sevilla). It is the world's leading manufacturer of eco-friendly products such as paints, coatings, mortars, adhesives and insulation with graphene technology under brand Graphenstone®. Its formulations improve in properties exponentially, mainly in the saving of the material consumption, since it is worked at nanoscales, achieving hardness, resistance and elasticity superior to any common coating.

2.1.3. Environmental management systems information

IEdiSA, as a result of its constant concern for the continuous environmental improvement, has the next certifications: ISO 9001 Quality management systems from 2013 (register nº: ES-0610/2013), ISO 14001 Environmental systems management from 2014 (register nº: ES-2013/0248), ISO 50001 Energy management systems (register nº: GE-2014/0040) and Cradle to Gate GOLD certification received in 2016 (certification nº: 2788).

2.1.4. Environmental policy of the Company

IEdiSA believes that personal and business honesty is a core value of its internal relationships, with its suppliers, its customers, and the environment, so it is committed to complying with the laws, regulations and normative that competes both for quality and environment and with other internal commitments subscribed by the company itself.

IEdiSA manufactures products respecting the declared specifications and minimizing the environmental impacts associated to their activities, reducing waste, reusing water as a raw material, and manufacturing lime through an artisanal system, among other measures.

IEdiSA particularly considers suppliers and subcontractors to achieve Quality and Environment objectives, encouraging them to develop best environmental practice by creating a mutually cooperative relationship.

IEdiSA is committed to the continuous improvement of the productivity of its facilities through the rational use of natural resources and energy, reducing, whenever possible, waste generated in all operations and facilitating their recycling.

IEdiSA consumes in its installations electricity 100% renewable certified.

2.1.5. Comany's logotype

IEdiSA is defined under two logos, the own one of the company and a second that represents the range of products Graphenstone®.

IEdiSA
desarrollando el Futuro

GRAPHENSTONE®

2.2. Product specification

2.2.1. CPC code

UN CPC 3511

2.2.2. Trade name

The current EPD® represents *Graphenstone® Ecosphere Premium* product and it is also representative for the following products[1]: *Biosphere Premium*, *AmbientPro+ Premium*, *Filler F10 Premium*, *Filler F20 Premium*, *GCS Interior Premium* y *GCS Exterior Premium*. In Annex I the results of the next products are presented: *Stuki Premium*, *Kratzputz Premium* and *Füllmasse Premium*.

[1] Products with a variation in their impacts lower than 10% compared with Ecosphere Premium

2.2.3. Product and productive process description

Graphenstone® Ecosphere Premium is a natural interior paint, it contains graphene and is available in a white matte or eggshell finish. It is characterized by its high resistance and flexibility, being a mineral paint and free of emissions of volatile organic compounds (VOCs). Creates healthier spaces inside your home, guaranteeing the breathability and health of the building.

The production process for obtaining these products is a "batch" process and consists of a tank where the mixture is made, a pump and two mechanical filters, these parts are common for all the mentioned products. In addition, for colour paints a dosing machine is used for adding pigments. Finally, the products go to the packaging area. All described parts of the production process are illustrated in Figure 1.

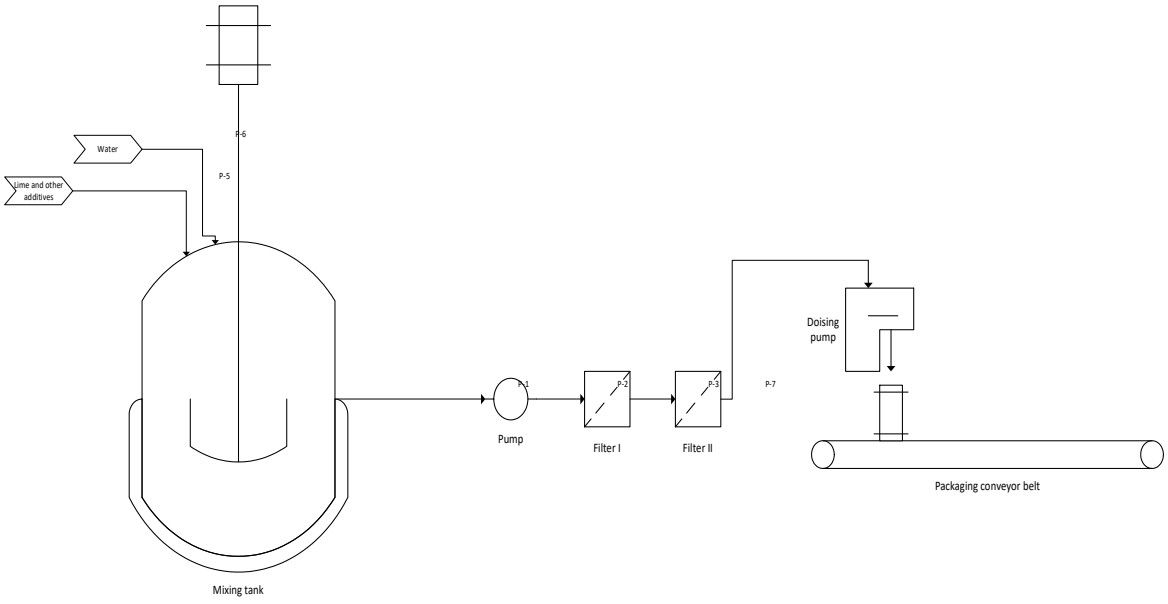

Figure 1. Manufacturing process.

2.2.4. Content declaration

During the life cycle of the product, hazardous substances listed in "Candidate List of Substances of Very High Concern (SVHC) for authorization" is not used in excess of 0.1% of the product weight.

The verifier and the operator of the program do not make any affirmation nor present any legality about the product.

The product has the next composition:

Raw material	Percentage
Calcium hydroxide	[40-70] %
Water	[10-30] %
Calcium carbonate	[5-20] %
Additives	[1-5] %

Table 1. Raw material.

2.2.5. Data quality and assignment of loads

Specific data have been taken on the quantities of materials and energy used during the product life cycle. These data have been supplied by IEdiSA for the year 2015 and come from factory direct data. The results presented in this document are valid for the EPD® until there are no substantial modifications that affect the impact produced. Substantial modifications are considered to be the increase of more than 10% in environmental impact per functional unit.

Generic data have been taken for the impact per unit of matter or energy. These data have been obtained from the Life Cycle Assessment database Ecoinvent version 3.2, of recognized international prestige. This database has been selected as a reference database due to its coincidence with the flows of matter and energy on the following aspects:

- Geographic representativeness: the data come from areas with the same legislative framework and electric mix (see 2.4 for details of electric mix)
- Technological equivalence: the data derive from the same physical and chemical processes, or at least the same technological coverage.
- Limits to nature: the data contains all the quantitative information needed for EPD®
- Limits towards technical systems: the stages considered in the life cycle are equivalent.

2.3. Declared unit

Extraction of raw materials, transportation, manufacturing, transport to the customer, installation, use, transportation to the distributor and end of life of the quantity of product needed to cover 1 m^2 of surface. This amount corresponds to 0.186 kg of paint, with two layers. The Reference Service Life of the paint once applied on the wall is 10 years.

2.4. Differences versus previous versions of the EPD®

The CO2 fixation due to carbonatation of Calcium hydroxide during the use phase has been introduced. Also, in the LCA model an Ecoinvent process better representing the use of additives has been chosen.

2.5. Methodology and hypothesis

Life Cycle Analysis study of the product has been conducted, including all stages of the life cycle (from cradle to gate with options). This EPD® has been performed following the indications marked by the Product Category Rules (PCR): Construction products and construction services. 2012:01, version 2.2. The impact method CML 4.1, EDIP 2003 (for the calculation of waste production) and USEtox 1.4 (for human toxicity and ecotoxicity) has been used. In reference to the assignment of charges, the polluter pays principle has been followed. At the same time, in those processes where it has been necessary to make an allocation of charges has followed a criterion mass.

Specific data (also called site-specific data) have been used for all raw material and auxiliary material usage data, energy consumption, waste production and emissions to air, water and soil (non-existent). These data correspond to the year 2015. The impact of the additives has not been taken into account because data is not available on Ecoinvent database and its use represents less than 5% of the materials used.

The electricity consumed is 100% renewable certified. In order to represent the electricity production mix it has been used the Swiss consumption mix of certified renewable energy, adapting it to the type of renewable energy produced in Spain, respecting the type of renewable energy used in Spain and its percentages of use (12% hydraulics and 18% wind), data collected by Red Eléctrica Española[2] (see Figure 2). The consumption of 1 MJ of electricity represents the emission of 9 g of CO2-eq.

[2] The Spanish electricity system 2015.

To determine the emissions per kg of material, energy KWh or transported Tnkm, the Ecoinvent v database was used. 3.2, database of Life Cycle Analysis of internationally recognized prestige.

Distance of transport of the waste from the factory to the manager, and from the site to the manager: 50 km.

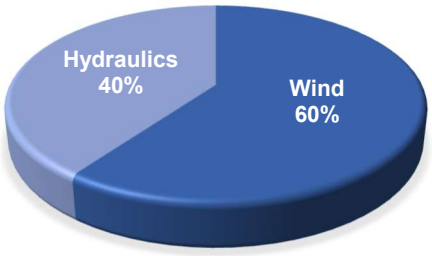

Figure 2. Electricity production mix consumed in the factory.

2.6. Process description and system boundaries

The presented EPD® is structured by the stages of the life cycle established according to the reference standard PCR: Construction products and construction services, based on EN 15804 standard. This EPD® is a cradle to gate with options EPD®.

SYSTEM BOUNDARIES

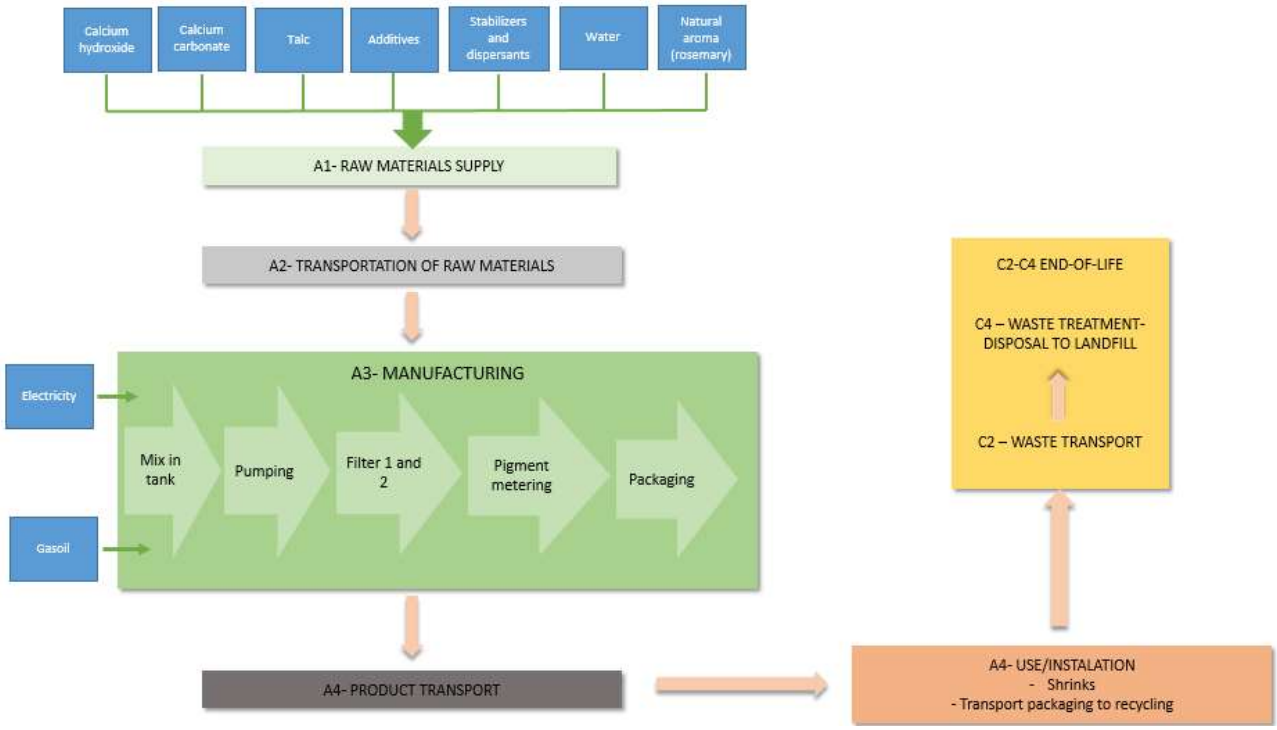

Figure 3. System boundaries and description of main processes.

2.6.1. Product stage A1-A3

The product stage is composed by the stages of supply of raw materials (A1), transport of raw materials (A2) and manufacturing (A3). As allowed by UNE-EN 15804, the results of steps A1-A3 have been grouped into a single product step (A).

A1- RAW MATERIAL SUPPLY

This module takes into account the extraction and processing of the raw materials and energy that is produced prior to the manufacturing process under study.

As we can observe in figure 4 Calcium hydroxide production generates CO_2 in the step where $CaCO_3$ becomes Calcium oxide. The same released emitted to the atmosphere by decarbonation is then fixed when Calcium hydroxide is formed during the use phase of the product. As a consequence, the only CO2 released during the process has its origin in the production of electricity and heat (low CO2 emissions due to the use of biomass).

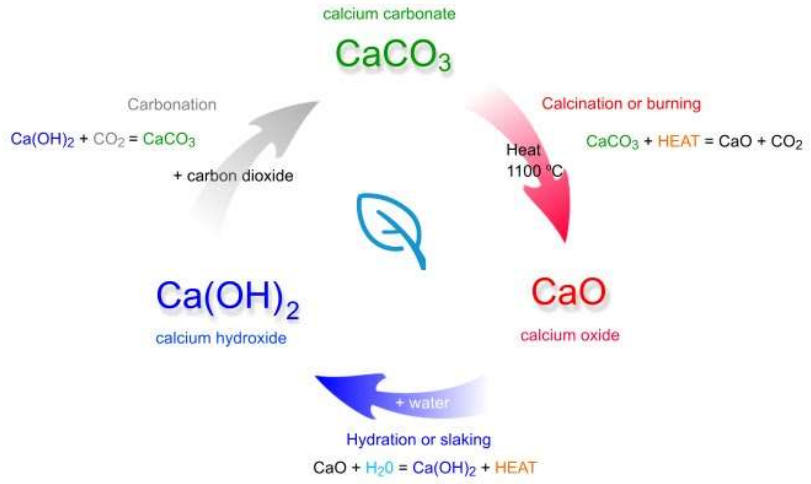

Figure 4 Cycle of Calcium carbonate-Calcium oxide-Calcium hydroxide.

A2- TRANSPORTATION OF RAW MATERIALS

This module includes the transportation of the different raw materials from the manufacturer to the factory. Same kind of lorry has been used for all raw materials transportation but with the specific transport distance for each raw material.

A3-MANUFACTURING

This module includes the consumption of energy, additives and packaging materials used during the manufacturing process. At the same time, it analyses the non-originated emissions from the combustion of fossil fuels (nonexistent) as well as the transportation and management of factory-originated waste.

2.6.2. Construction Process Stage A4-A5

The Construction Process stage comprises the A4 Transport modules and A5 Construction-Installation Process.

A4-TRANSPORT

The A4 Transport module includes the transport of the finished product from the factory door to the distributor site. The main parameters that affect the result of this stage are described below.

Type	Parameter	Unit (expressed by functional unit)
Lorry	Type and fuel consumption of vehicle, type of vehicles used for transport	>32 Ton lorry. Gasoil consumption 31,1 L/100 Km
	Distance	1000 km lorry 9.000 km freight ship
	Capacity utilization (including returning empty)	% assumed in Ecoinvent
	Packaging	8,3 g (polypropylene + steel) 1,37 ± 0,05 g/cm^3

Table 2. Transport specifications.

A5- CONSTRUCTION – INSTALLATION PROCESS

Module A5 Construction and installation process includes all materials and energy used for installation. At the same time, the transport and management of the waste produced is taken into account. The most common scenario for the analysed product is the application by brush or roller, so that, it does not require construction or installation prior to use.

Parameter	Value/Description
Auxiliary materials for installation	None
Water use	28 ml
Other resources use	No other resource use

Quantitative description of energy type (regional mix) and consumption during the installation process	No energy consumption
Direct emissions to ambient air, soil and water	None
Waste of materials at place, before the processing of waste, generated during the installation of the product (specified by type)	Product waste/losses: 2%
Output flow of materials (specified by type) resulting from the processing of waste at the site, i.e. during collection for recycling, recovery (recovery) or discharge (specifying the route)	The waste from the packaging of the product is 100% collected and transformed into recovered material.

Table 3. Parameters, value and description.

2.6.3. Use Stage B1-B7

B1-USE

It includes environmental aspects and impacts in the normal use of the product, not including water and energy consumption. The impact of the product at this stage is negative since no material is consumed or there is no emission to environment during its lifetime. In addition, as indicated in section A1, the products fixes CO2 due to the own Calcium oxide cycle. It is not required neither adding solvents nor curing the product for its use.

B2-MAINTENANCE

The product does not require any type of maintenance during the 10 years of life of the product.

B3- REPAIR

The product does not require any type of repair during the 10 years of life of the product.

B4-REPLACEMENT

The product does not require any replacement during the 10 years of the product's life.

B5- REHABILITATION

The product does not require any rehabilitation during the 10 year life of the product.

B6- OPERATIONAL ENERGY USE

The product does not require any energy consumption during the 10-year product life.

B7- OPERATIONAL WATER USE

The product does not require any water consumption during the 10-year product life.

2.6.4. End-of-life Stage C1-C4

This stage includes the transportation and management of waste produced after the study reference time has elapsed. The end-of-life stage is composed by modules C1 Deconstruction, C2 Transport, C3 Waste treatment and C4 Waste disposal. Landfill has been assumed as end of life scenario. The impact of building demolition has been considered negligible compared to other impacts of a building's life cycle.

Product	Graphenstone® Ecosphere Premium
Collection process specified by type	0,186 kg (mixed with the rest of building waste)
Recovery system specified by type	No reuse, recycling or energy recovery
Disposal specified by type	0,186 kg to landfill
Assumptions for the development of the scenario (e.g. transportation)	Truck with trailer with an average load of 16-32 Tn and diesel consumption of 25 litres per 100 km 50 km of average distance to the landfill

Table 4. Specifications for End-of-life stage.

2.6.5. Supplementary information

BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY:

The potential benefits of the recycling of factory waste and the recycling of the product after the end of its useful life have not been taken into account.

Based on the system boundaries indicated in the reference standard PCR Construction products and construction services the following processes have not been taken into account:

- Manufacturing of the production of capital goods with an expected lifetime of over three years, buildings and other capital goods.
- The maintenance activities of the production plant.
- Transport carried out by workers on the home-factory-home journey.

2.7. Comparations between EPD within this product category

“EPD of construction products may not be comparable if they do not comply with EN 15804”
“Environmental product declarations within the same product category from different programs may not be comparable”

2.8. EPD® validity

The EPD® presented here is valid for five years from the date of its publication. In case of changes that lead to a deterioration in any of the environmental impact indicators of the product life cycle of more than 10% over the current declaration, the EPD® must be updated.

3. Environmental performance-related information

3.1. Potential impact on the environment

This section indicates the potential impact on the environment of the life cycle based on what is indicated in the PCR: Construction products and construction services.

Indicator	Upstream Processes	Core Processes		Downstream Processes							Module D	Total
	A1	*A2*	*A3*	*A4*	*A5*	*B1-B7*	*C1*	*C2*	*C3*	*C4*		
Abiotic depletion (elements) (Kg Sb-eq)	1,49E-08	1,32E-09	9,68E-08	3,48E-08	4,83E-09	0	0	4,57E-09	0	1,10E-09	MND[3]	1,58E-07
Abiotic depletion (fossil fuels) (MJ)	4,34E-01	1,17E-02	6,54E-01	4,24E-01	5,57E-02	0	0	2,48E-02	0	2,96E-02	MND	1,63E+00
Ozone layer depletion (Kg CFC 11-eq)	5,07E-09	1,35E-10	1,12E-09	4,82E-09	3,66E-10	0	0	2,85E-10	0	3,31E-10	MND	1,21E-08
Global Warming (kg CO_2-eq /m^2)	9,30E-02	7,17E-04	2,34E-02	2,69E-02	5,04E-03	-4,32E-02	0	1,57E-03	0	9,83E-04	MND	1,09E-01
Acidification Potential (kg SO_2-eq/m^2)	1,08E-04	2,44E-06	1,03E-04	2,91E-04	2,18E-05	0	0	5,19E-06	0	7,39E-06	MND	5,40E-04
Eutrophication (kg PO_4^{3-} eq/m^2)	1,69E-05	5,41E-07	2,15E-05	3,71E-05	6,57E-06	0	0	1,15E-06	0	1,58E-06	MND	8,53E-05
Photochemical oxidation (kg C2H4-eq/m^2)	1,52E-05	1,21E-07	5,46E-06	1,17E-05	1,24E-06	0	0	2,65E-07	0	3,63E-07	MND	3,43E-05

Table 5. Potential environmental impact of the life cycle of one m^2 of Ecosphere Premium.

[3] MND=Module Not Declared

3.2. Resources use

Indicator		Upstream Processes	Core Processes		Downstream Processes							Module D	Total
		A1	*A2*	*A3*	*A4*	*A5*	*B1-B7*	*C1*	*C2*	*C3*	*C4*		
Non-renewable resources (MJ)	*Material resources*	0	0	0	0	0	0	0	0	0	0	MND	0
	Energy resources	4,34E-01	1,17E-02	6,54E-01	4,24E-01	5,57E-02	0	0	2,48E-02	0	2,96E-02	MND	1,63E+00
	Total	4,34E-01	1,17E-02	6,54E-01	4,24E-01	5,57E-02	0	0	2,48E-02	0	2,96E-02	MND	1,63E+00
Renewable resources (MJ)	*Material resources*	0	0	0	0	0	0	0	0	0	0	MND	0
	Energy resources	3,28E-02	1,62E-04	4,61E-02	7,64E-03	2,20E-03	0	0	3,00E-04	0	7,06E-04	MND	8,99E-02
	Total	3,28E-02	1,62E-04	4,61E-02	7,64E-03	2,20E-03	0	0	3,00E-04	0	7,06E-04	MND	8,99E-02
Secondary resources (MJ)	*Material resources*	0	0	0	0	0	0	0	0	0	0	MND	0
	Energy resources (renewable and non-renewable)	0	0	0	0	0	0	0	0	0	0	MND	0
Recovered energy (MJ)		0	0	0	0	0	0	0	0	0	0	MND	0
Total amount of water (water footprint) (m3)		1,95E-04	2,70E-06	6,26E-05	8,57E-05	1,65E-05	0	0	4,55E-06	0	3,08E-05	MND	3,98E-04
Amount of water used in core process (m3)		0	0	4,65E-05	0	0	0	0	0	0	0	MND	4,65E-05

Table 6. Use of resources, renewable and non-renewable of the life-cycle of one m^2 of Ecosphere Premium.

3.3. Waste production

Indicator	Upstream Processes	Core Processes		Downstream Processes							Module D	Total
	A1	*A2*	*A3*	*A4*	*A5*	*B1-B7*	*C1*	*C2*	*C3*	*C4*		
Hazardous waste (kg)	3,13E-07	6,40E-09	1,86E-07	2,39E-07	2,91E-08	0	0	1,44E-08	0	1,94E-08	MND	8,07E-07
Radioactive waste (kg)	2,91E-06	7,70E-08	6,22E-07	2,78E-06	2,03E-07	0	0	1,62E-07	0	1,88E-07	MND	6,95E-06
Non-hazardous waste (kg)	2,58E-03	9,51E-04	4,45E-03	2,28E-02	5,46E-03	0	0	1,10E-03	0	1,85E-01	MND	2,22E-01

Table 7. Waste production of the life-cycle of one m2 of Ecosphere Premium.

3.4. Other environmental indicators

Indicator		Upstream Processes	Core Processes		Downstream Processes							Módulo D	Total
		A1	*A2*	*A3*	*A4*	*A5*	*B1-B7*	*C1*	*C2*	*C3*	*C4*		
Emission to air	*CO_2 (fossil) (kg)*	9,22E-02	6,89E-04	2,07E-02	2,59E-02	4,75E-03	-4,32E-02	0	1,51E-03	0	9,27E-04	MND	1,03E-01
	SO_2 (kg)	6,08E-05	1,09E-06	4,81E-05	1,93E-04	1,33E-05	0	0	2,34E-06	0	2,75E-06	MND	3,21E-04
	CH_4 (fossil) (kg)	1,91E-05	6,74E-07	1,04E-04	2,71E-05	7,88E-06	0	0	1,45E-06	0	1,80E-06	MND	1,62E-04
	NO_X (kg)	6,68E-05	2,25E-06	9,02E-05	1,16E-04	1,14E-05	0	0	4,72E-06	0	8,10E-06	MND	3,00E-04
	VOC (kg)	5,21E-16	0	0	0	6,64E-18	0	0	0	0	0	MND	5,27E-16
	NMVOC (kg)	1,51E-05	7,05E-07	3,79E-05	2,23E-05	2,21E-06	0	0	1,13E-06	0	1,50E-06	MND	8,08E-05
Materials for recycling (kg)		0	0	0	0	8,30E-03	0	0	0	0	0	0	8,30E-03
Human toxicity, cancer (CTUh)[4]		3,26E-10	1,81E-11	1,13E-09	7,09E-10	3,64E-10	0	0	4,47E-11	0	3,47E-11	MND	2,63E-09
Human toxicity, non-cancer (CTUh)		2,12E-09	1,51E-10	2,15E-09	4,38E-09	8,00E-10	0	0	4,62E-10	0	1,15E-10	MND	1,02E-08
Ecotoxicity (CTUe)		4,87E-02	4,74E-03	9,77E-02	1,33E-01	2,94E-02	0	0	9,72E-03	0	3,05E-03	MND	3,27E-01

Table 8. Other environmental indicators of Ecosphere Premium.

[4] CTUh: increase of morbidity cases in the total human population. Morbidity: proportion of people that gets sick in a determinated place and time.

4. Results interpretation

As we can see in figure 4 and table 9, the impact of the life cycle of Ecosphere Premium paint for covering 1 m2 surface it is mainly due to Product stage (A1-A3) and A4 Transport to customer, for all the impact indicators under study. Hence, excepting for Global warming the Product stage represents between 71,5% (Abiotic depletion, elements) and 39,5% (Acidification) of the life cycle impact. A4 Transport stage represents between 53,9% (Acidification) and 22,0% (Abiotic depletion, elements) of the life cycle impact. Installation stage (A5) contributes at most 7,7% (Eutrophication) of the total life cycle impact for all impact indicators. The transport to end-of-life manager (C2) as well as Waste treatment (C4) represents at most 2,9% of the whole impact.

Impact category	A1/A2/A3	A4 Transport	A5 Installation	B Use	C2 Transport	C4 Waste treatment
Abiotic depletion (elements)	71,5%	22,0%	3,1%	0%	2,9%	0,7%
Abiotic depletion (fossil fuels)	67,5%	26,0%	3,4%	0%	1,5%	1,8%
Ozone layer depletion	52,3%	39,8%	3,0%	0%	2,4%	2,7%
Global Warming	107,4%	24,7%	4,6%	-39,6%	1,4%	0,9%
Acidification	39,5%	53,9%	4,0%	0%	1,0%	1,4%
Eutrophication	45,7%	43,5%	7,7%	0%	1,3%	1,9%
Photochemical oxidation	60,6%	34,1%	3,6%	0%	0,8%	1,1%

Table 9. Potential environmental impact of each life cycle phase for Ecosphere Premium.

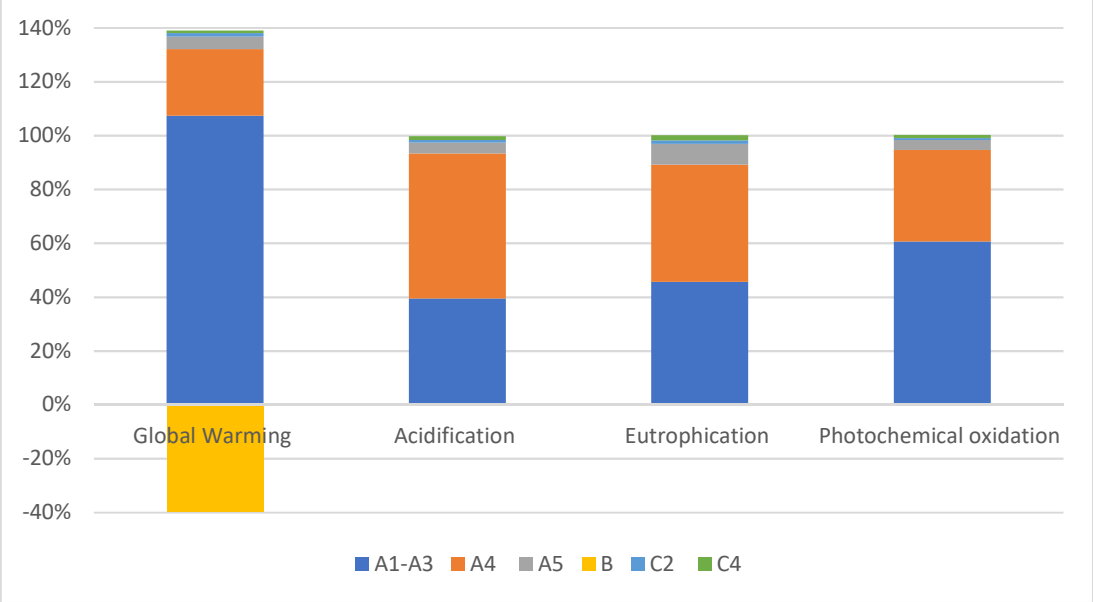

Figure 4. Potential environmental impact of each life cycle phase for Ecosphere Premium.

5. Differences versus previous versions of the EPD®

See point 2.4.

6. Verification

CEN standard EN 15804 served as the core PCR	
Product Category Rule	2012:01. Construction products and construction services v 2.2
Product Category Rule (CPR) has been verified by	The Technical Committee of the International EPD® System. Chair: Massimo Marino. Contact through info@environdec.com
Independent verification of EPD® and data according to ISO 14025: 2010	External verification of EPD®
Third part verifier	Marcel Gómez Ferrer Marcel Gómez Consultoria Ambiental Tlf 0034630643593 Email: info@marcelgomez.com
Accredited or approved by:	The International EPD® System®, Operated by EPD® International AB www.environdec.com Sweden

7. References

The bibliographical references consulted for this EPD® have been the following:

- GENERAL PROGRAMME INSTRUCTIONS for Environmental Product Declarations, EPD®. Version 2.01 updated at 2013-09-18
- ISO 14025: Environmental labels and declarations-Type III Environmental Declarations-Principles and procedures (2006)
- ISO 14040: Environmental management-Life Cycle Assessment-Principles and framework (2006)
- ISO 14044: Environmental management-Life Cycle Assessment-Requirements and guidelines (2006)
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- Requirements for Environmental Product Declarations. MSR 1992:2 Rev 2009). Swedish Environmental Management Council
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ANNEX I. Environmental performance of other Graphenstone's coating

A1. Stuki Premium

- **Potential impact on the environment**

Indicator	Upstream Processes	Core Processes		Downstream Processes							Module D	Total
	A1	*A2*	*A3*	*A4*	*A5*	*B1-B7*	*C1*	*C2*	*C3*	*C4*		
Abiotic depletion (elements) (Kg Sb-eq)	1,74E-08	2,67E-09	1,44E-07	5,18E-08	4,48E-09	0	0	6,78E-09	0	1,64E-09	MND	2,28E-07
Abiotic depletion (fossil fuels) (MJ)	4,73E-01	2,37E-02	9,70E-01	6,30E-01	4,36E-02	0	0	3,69E-02	0	4,41E-02	MND	2,22E+00
Ozone layer depletion (Kg CFC 11-eq)	5,46E-09	2,73E-10	1,67E-09	7,15E-09	3,10E-10	0	0	4,23E-10	0	4,93E-10	MND	1,58E-08
Global Warming (kg CO_2-eq /m^2)	9,87E-02	1,45E-3	3,48E-02	4,01E-02	3,58E-03	-6,40E-02	0	2,32E-03	0	1,47E-03	MND	1,18E-01
Acidification Potential (kg SO_2-eq/m^2)	1,25E-04	4,93E-06	1,53E-04	4,34E-04	1,47E-05	0	0	7,71E-06	0	1,10E-05	MND	7,51E-04
Eutrophication (kg PO_4^{3-}eq/m^2)	2,28E-05	1,09E-06	3,19E-05	5,52E-05	2,30E-06	0	0	1,71E-06	0	2,35E-06	MND	1,17E-04
Photochemical oxidation (kg C2H4-eq/m^2)	1,63E-05	2,44E-07	8,11E-06	1,74E-05	8,59E-07	0	0	3,93E-07	0	5,41E-07	MND	4,38E-05

Table 10. Potential environmental impact of the life cycle of one m^2 of Stuki Premium.

♦ Resources use

Indicator		Upstream Processes	Core Processes		Downstream Processes							Module D	Total
		A1	*A2*	*A3*	*A4*	*A5*	*B1-B7*	*C1*	*C2*	*C3*	*C4*		
Non-renewable resources (MJ)	*Material resources*	0	0	0	0	0	0	0	0	0	0	MND	0
	Energy resources	4,73E-01	2,37E-02	9,70E-01	6,30E-01	4,36E-02	0	0	3,69E-02	0	4,41E-02	MND	2,22E+00
	Total	4,73E-01	2,37E-02	9,70E-01	6,30E-01	4,36E-02	0	0	3,69E-02	0	4,41E-02	MND	2,22E+00
Renewable resources (MJ)	*Material resources*	0	0	0	0	0	0	0	0	0	0	MND	0
	Energy resources	3,99E-02	3,27E-04	6,83E-02	1,14E-02	2,43E-03	0	0	4,46E-04	0	1,05E-03	MND	1,24E-01
	Total	3,99E-02	3,27E-04	6,83E-02	1,14E-02	2,43E-03	0	0	4,46E-04	0	1,05E-03	MND	1,24E-01
Secondary resources (MJ)	*Material resources*	0	0	0	0	0	0	0	0	0	0	MND	0
	Energy resources (renewable and non-renewable)	0	0	0	0	0	0	0	0	0	0	MND	0
Recovered energy (MJ)		0	0	0	0	0	0	0	0	0	0	MND	0
Total amount of water (water footprint) (m3)		2,14E-04	5,46E-06	9,29E-05	1,27E-04	9,85E-06	0	0	6,76E-06	0	4,60E-05	MND	5,02E-04
Amount of water used in core process (m3)		4,83E-05	0	0	0	0	0	0	0	0	0	MND	4,83E-05

Table 11. Use of resources, renewable and non-renewable of the life-cycle of one m^2 of Stuki Premium.

♦ Waste production

Indicator	Upstream Processes	Core Processes		Downstream Processes							Module D	Total
	A1	*A2*	*A3*	*A4*	*A5*	*B1-B7*	*C1*	*C2*	*C3*	*C4*		
Hazardous waste (kg)	3,61E-07	1,29E-08	2,76-07	3,56E-07	2,11E-08	0	0	2,14E-08	0	2,89E-08	MND	1,08E-06
Radioactive waste (kg)	3,22E-06	1,55E-07	9,26E-07	4,14E-06	1,79-07	0	0	2,40E-07	0	2,80E-07	MND	9,14E-06
Non-hazardous waste (kg)	2,75E-03	1,92E-03	6,65E-03	3,38E-02	6,45E-03	0	0	1,64E-03	0	2,76E-01	MND	3,29E-01

Table 12. Waste production of the life-cycle of one m2 of Stuki Premium.

♦ Other environmental indicator

Indicator		Upstream Processes	Core Processes		Downstream Processes							Módulo D	Total
		A1	*A2*	*A3*	*A4*	*A5*	*B1-B7*	*C1*	*C2*	*C3*	*C4*		
Emission to air	*CO_2 (fossil) (kg)*	9,76E-02	1,39E-03	3,07E-02	3,86E-02	3,44E-03	-6,40E-02	0	2,23E-03	0	1,38E-03	MND	1,11E-01
	SO_2 (kg)	7,01E-05	2,20E-06	7,15E-05	2,87E-04	8,77E-06	0	0	3,47E-06	0	4,11E-06	MND	4,47E-04
	CH_4 (fossil) (kg)	2,47E-05	1,36E-06	1,55E-04	4,03E-05	4,52E-06	0	0	2,15E-06	0	2,69E-06	MND	2,31E-04
	NO_X (kg)	7,65E-05	4,54E-06	1,34E-04	1,73E-04	8,14E-06	0	0	7,01E-06	0	1,21E-05	MND	4,15E-04
	VOC (kg)	5,41E-16	0	0	0	1,08E-17	0	0	0	0	0	MND	5,52E-16
	NMVOC (kg)	1,66E-05	1,42E-06	5,63E-05	3,32E-05	2,23E-06	0	0	1,67E-06	0	2,24E-06	MND	1,14E-04
Materials for recycling (kg)		0	0	0	0	1,23E-01	0	0	0	0	0	MND	8,30E-02
Human toxicity, cancer (CTUh)[5]		4,88E-10	3,65E-11	1,68E-09	1,05E-09	6,76E-11	0	0	6,63E-11	0	5,18E-11	MND	3,45E-09
Human toxicity, non-cancer (CTUh)		2,74E-09	3,06E-10	3,19E-09	6,51E-09	2,72E-10	0	0	6,86E-10	0	1,72E-10	MND	1,39E-08
Ecotoxicity (CTUe)		6,62E-02	9,57E-03	1,45E-01	1,98E-01	8,76E-03	0	0	1,44E-02	0	4,55E-03	MND	4,47E-01

Table 13. Other environmental indicators of Stuki Premium.

[5] CTUh: increase of morbidity cases in the total human population. Morbidity: proportion of people that gets sick in a determined place and time.

A2. Kratzputz Premium

- **Potential impact on the environment**

Indicador	Upstream Processes	Core Processes		Downstream Processes							Module D	Total
	A1	*A2*	*A3*	*A4*	*A5*	*B1-B7*	*C1*	*C2*	*C3*	*C4*		
Abiotic depletion (elements) (Kg Sb-eq)	1,87E-07	5,86E-08	2,60E-06	9,15E-07	7,83E-08	0	0	1,23E-07	0	2,97E-08	MND	3,99E-06
Abiotic depletion (fossil fuels) (MJ)	7,23E+00	5,22E-01	1,76E+01	1,14E+01	7,64E-01	0	0	6,68E-01	0	8,00E-01	MND	3,90E+01
Ozone layer depletion (Kg CFC 11-eq)	7,10E-08	6,00E-09	3,03E-08	1,30E-07	5,07E-09	0	0	7,67E-09	0	8,94E-09	MND	2,59E-07
Global Warming (kg CO_2-eq /m^2)	1,27E+00	3,18E-02	6,30E-01	7,26E-01	5,45E-02	-9,14E-01	0	4,21E-02	0	2,66E-02	MND	1,86E+00
Acidification Potential (kg SO_2-eq/m^2)	1,44E-03	1,08E-04	2,78E-03	7,86E-03	2,50E-04	0	0	1,40E-04	0	2,00E-04	MND	1,28E-02
Eutrophication (kg PO_4^{3-} eq/m^2)	2,34E-04	2,40E-05	5,77E-04	1,00E-03	3,82E-05	0	0	3,10E-05	0	4,26E-05	MND	1,95E-03
Photochemical oxidation (kg C2H4-eq/m^2)	7,77E-04	5,11E-06	1,47E-04	3,15E-04	2,55E-05	0	0	7,12E-06	0	9,80E-06	MND	1,29E-03

Table 14. Potential environmental impact of the life cycle of one m^2 of Kratzputz Premium.

♦ Resources use

Indicator		Upstream Processes	Core Processes		Downstream Processes							Module D	Total
		A1	*A2*	*A3*	*A4*	*A5*	*B1-B7*	*C1*	*C2*	*C3*	*C4*		
Non-renewable resources (MJ)	*Material resources*	0	0	0	0	0	0	0	0	0	0	MND	0
	Energy resources	7,23E+00	5,22E-01	1,76E+01	1,14E+01	7,64E-01	0	0	6,68E-01	0	8,00E-01	MND	3,90E+01
	Total	7,23E+00	5,22E-01	1,76E+01	1,14E+01	7,64E-01	0	0	6,68E-01	0	8,00E-01	MND	3,90E+01
Renewable resources (MJ)	*Material resources*	0	0	0	0	0	0	0	0	0	0	MND	0
	Energy resources	4,09E-01	7,19E-03	1,24E+00	1,96E-01	3,76E-02	0	0	8,07E-03	0	1,91E-02	MND	1,92E+00
	Total	4,09E-01	7,19E-03	1,24E+00	1,96E-01	3,76E-02	0	0	8,07E-03	0	1,91E-02	MND	1,92E+00
Secondary resources (MJ)	*Material resources*	0	0	0	0	0	0	0	0	0	0	MND	0
	Energy resources (renewable and non-renewable)	0	0	0	0	0	0	0	0	0	0	MND	0
Recovered energy (MJ)		0	0	0	0	0	0	0	0	0	0	MND	0
Total amount of water (water footprint) (m3)		2,44E-03	1,20E-04	1,68E-03	2,29E-03	1,50E-04	0	0	1,22E-04	0	8,33E-04	MND	7,63E-03
Amount of water used in core process (m3)		5,80E-04	0	0	0	0	0	0	0	0	0	MND	5,80E-04

Table 15. Use of resources, renewable and non-renewable of the life-cycle of one m^2 of Kratzputz Premium.

♦ Waste production

Indicator	Upstream Processes	Core Processes		Downstream Processes							Module D	Total
	A1	*A2*	*A3*	*A4*	*A5*	*B1-B7*	*C1*	*C2*	*C3*	*C4*		
Hazardous waste (kg)	4,37E-06	2,84E-07	5,00E-06	6,44E-06	3,40E-07	0	0	3,88E-07	0	5,24E-07	MND	1,73E-05
Radioactive waste (kg)	3,63E-05	3,42E-06	1,68E-05	7,50E-05	2,82E-06	0	0	4,35E-06	0	5,08E-06	MND	1,44E-04
Non-hazardous waste (kg)	3,22E-02	4,22E-02	1,20E-01	6,13E-01	1,17E-01	0	0	2,97E-02	0	5,00E+00	MND	5,95E+00

Table 16. Waste production of the life-cycle of one m2 of Kratzputz Premium.

♦ Other environmental indicator

Indicator		Upstream Processes	Core Processes		Downstream Processes							Module D	Total
		A1	*A2*	*A3*	*A4*	*A5*	*B1-B7*	*C1*	*C2*	*C3*	*C4*		
Emission to air	*CO_2 (fossil) (kg)*	1,25E+00	3,06E-02	5,57E-01	6,99E-01	5,21E-02	-9,14E-01	0	4,05E-02	0	2,51E-02	MND	1,74E+00
	SO_2 (kg)	7,59E-04	4,82E-05	1,29E-03	5,20E-03	1,49E-04	0	0	6,28E-05	0	7,45E-05	MND	7,59E-03
	CH_4 (fossil) (kg)	2,39E-04	2,99E-05	2,81E-03	7,34E-04	7,79E-05	0	0	3,89E-05	0	4,87E-05	MND	3,97E-03
	NO_X (kg)	8,33E-04	9,98E-05	2,43E-03	3,13E-03	1,37E-04	0	0	1,27E-04	0	2,19E-04	MND	6,98E-03
	VOC (kg)	8,15E-14	0	0	0	1,63E-15	0	0	0	0	0	MND	8,32E-14
	NMVOC (kg)	1,88E-04	3,13E-05	1,02E-03	6,04E-04	3,83E-05	0	0	3,03E-05	0	4,06E-05	MND	1,95E-03
Materials for recycling (kg)		0	0	0	0	2,23E+00	0	0	0	0	0	MND	2,23E+00
Human toxicity, cancer (CTUh)[6]		4,08E-09	8,02E-10	3,04E-08	1,91E-08	1,13E-09	0	0	1,20E-09	0	9,39E-10	MND	5,77E-08
Human toxicity, non-cancer (CTUh)		3,11E-08	6,72E-09	5,79E-08	1,18E-07	4,58E-09	0	0	1,24E-08	0	3,11E-09	MND	2,33E-07
Ecotoxicity (CTUe)		6,20E-01	2,10E-01	2,63E+00	3,58E+00	1,48E-01	0	0	2,62E-01	0	8,24E-02	MND	7,53E+00

Table 17. Other environmental indicators of Kratzputz Premium.

[6] CTUh: increase of morbidity cases in the total human population. Morbidity: proportion of people that gets sick in a determined place and time.

A3. Füllmasse Premium

- **Potential impact on the environment**

Indicator	Upstream Processes	Core Processes		Downstream Processes							Module D	Total
	A1	*A2*	*A3*	*A4*	*A5*	*B1-B7*	*C1*	*C2*	*C3*	*C4*		
Abiotic depletion (elements) (Kg Sb-eq)	3,02E-07	5,82E-08	2,60E-06	9,38E-07	8,65E-08	0	0	1,23E-07	0	2,97E-08	MND	4,14E-06
Abiotic depletion (fossil fuels) (MJ)	8,07E+00	5,18E-01	1,76E+01	1,14E+01	8,11E-01	0	0	6,68E-01	0	8,00E-01	MND	3,99E+01
Ozone layer depletion (Kg CFC 11-eq)	9,26E-078	5,97E-09	3,03E-08	1,30E-07	5,85E-09	0	0	7,67E-09	0	8,94E-09	MND	2,81E-07
Global Warming (kg CO_2-eq /m^2)	1,67E+00	3,16E-02	6,30E-01	7,26E-01	6,44E-02	-1,07E+00	0	4,21E-02	0	2,66E-02	MND	2,12E+00
Acidification Potential (kg SO_2-eq/m^2)	2,16E-03	1,08E-04	2,78E-03	7,86E-03	2,71E-04	0	0	1,40E-04	0	2,00E-04	MND	1,35E-02
Eutrophication (kg PO_4^{3-} eq/m^2)	4,07E-04	2,38E-05	5,77E-04	1,00E-03	4,30E-05	0	0	3,10E-05	0	4,26E-05	MND	2,13E-03
Photochemical oxidation (kg C2H4-eq/m^2)	2,76E-04	5,32E-06	1,47E-04	3,15E-04	1,55E-05	0	0	7,12E-06	0	9,80E-06	MND	7,76E-04

Table 18. Potential environmental impact of the life cycle of one m^2 of Füllmasse Premium.

♦ Resources use

Indicator		Upstream Processes	Core Processes		Downstream Processes							Module D	Total
		A1	*A2*	*A3*	*A4*	*A5*	*B1-B7*	*C1*	*C2*	*C3*	*C4*		
Non-renewable resources (MJ)	*Material resources*	0	0	0	0	0	0	0	0	0	0	MND	0
	Energy resources	8,07E+00	5,18E-01	1,76E+01	1,14E+01	8,11E-01	0	0	6,68E-01	0	8,00E-01	MND	3,99E+01
	Total	8,07E+00	5,18E-01	1,76E+01	1,14E+01	8,11E-01	0	0	6,68E-01	0	8,00E-01	MND	3,99E+01
Renewable resources (MJ)	*Material resources*	0	0	0	0	0	0	0	0	0	0	MND	0
	Energy resources	6,97E-01	7,15E-03	1,24E+00	2,06E-01	4,39E-02	0	0	8,07E-03	0	1,91E-02	MND	2,22E+00
	Total	6,97E-01	7,15E-03	1,24E+00	2,06E-01	4,39E-02	0	0	8,07E-03	0	1,91E-02	MND	2,22E+00
Secondary resources (MJ)	*Material resources*	0	0	0	0	0	0	0	0	0	0	MND	0
	Energy resources (renewable and non-renewable)	0	0	0	0	0	0	0	0	0	0	MND	0
Recovered energy (MJ)		0	0	0	0	0	0	0	0	0	0	MND	0
Total amount of water (water footprint) (m3)		3,65E-03	1,19E-04	1,68E-03	2,31E-03	1,80E-04	0	0	1,22E-04	0	8,33E-04	MND	8,90E-03
Amount of water used in core process (m3)		8,13E-04	0	0	0	0	0	0	0	0	0	MND	8,13E-04

Table 19. Use of resources, renewable and non-renewable of the life-cycle of one m^2 of Füllmasse Premium.

- **Waste production**

Indicator	Upstream Processes	Core Processes		Downstream Processes							Module D	Total
	A1	*A2*	*A3*	*A4*	*A5*	*B1-B7*	*C1*	*C2*	*C3*	*C4*		
Hazardous waste	6,23E-06	2,83E-07	5,00E-06	6,45E-06	3,95E-07	0	0	3,88E-07	0	5,24E-07	MND	1,93E-05
Radioactive waste	5,50E-05	3,40E-06	1,68E-05	7,50E-05	3,39E-06	0	0	4,35E-06	0	5,08E-06	MND	1,63E-04
Non-hazardous waste (kg)	4,66E-02	4,19E-02	1,20E-01	6,13E-01	1,18E-01	0	0	2,97E-02	0	5,00E+00	MND	5,97E+00

Table 20. Waste production of the life-cycle of one m2 of Füllmasse Premium.

♦ Other environmental indicator

Indicator		Upstream Processes	Core Processes		Downstream Processes							Module D	Total
		A1	*A2*	*A3*	*A4*	*A5*	*B1-B7*	*C1*	*C2*	*C3*	*C4*		
Emission to air	*CO_2 (fossil) (kg)*	1,65E+00	3,04E-02	5,57E-01	6,98E-01	6,18E-02	-1,07E+00	0	4,05E-02	0	2,51E-02	MND	2,00E+00
	SO_2 (kg)	1,21E-03	4,79E-05	1,29E-03	5,20E-03	1,61E-04	0	0	6,28E-05	0	7,45E-05	MND	8,05E-03
	CH_4 (fossil) (kg)	4,37E-04	2,97E-05	2,81E-03	7,30E-04	8,36E-05	0	0	3,89E-05	0	4,87E-05	MND	4,17E-03
	NO_X (kg)	1,32E-03	9,92E-05	2,43E-03	3,14E-03	1,52E-04	0	0	1,27E-04	0	2,19E-04	MND	7,48E-03
	VOC (kg)	9,10E-15	0	0	0	1,82E-16	0	0	0	0	0	MND	9,28E-15
	NMVOC (kg)	2,82E-04	3,11E-05	1,02E-03	6,01E-04	4,14E-05	0	0	3,03E-05	0	4,06E-05	MND	2,05E-03
Materials for recycling (kg)		0	0	0	0	2,23E+00	0	0	0	0	0	MND	2,23E+00
Human toxicity, cancer (CTUh)[7]		8,87E-09	7,97E-10	3,04E-08	1,91E-08	1,28E-09	0	0	1,20E-09	0	9,39E-10	MND	6,26E-08
Human toxicity, non-cancer (CTUh)		4,84E-08	6,68E-09	5,79E-08	1,18E-07	5,48E-09	0	0	1,24E-08	0	3,11E-09	MND	2,52E-07
Ecotoxicity (CTUe)		1,18E+00	2,09E-01	2,63E+00	3,59E+00	1,71E-01	0	0	2,62E-01	0	8,24E-02	MND	8,13E+00

Table 21. Other environmental indicators of Füllmasse Premium.

[7] CTUh: increase of morbidity cases in the total human population. Morbidity: proportion of people that gets sick in a determined place and time.