

Owner of the declaration: iSOX BELGIUM BVBA

Publisher: Kiwa-Ecobility Experts

Programme operator: Kiwa-Ecobility Experts

Registration number: EPD-Kiwa-EE-000427-EN

Issue date: 12.07.2023

Valid to: 12.07.2028

## iSOX GREEN MEMBRANE 0.2

Waterproofing membrane to be applied under ceramic tiles and natural stones



## 1. General information

### iSOX BELGIUM BVBA

#### Programme operator

Kiwa-Ecobility Experts  
 Kiwa GmbH, Ecobility Experts  
 Wattstraße 11-13  
 13355 Berlin  
 Germany

#### Registration number

EPD-Kiwa-EE-000427-EN

#### This declaration is based on the Product Category Rules

PCR B - Plastic and rubber sheets for roof, wall, and floor waterproofing, 2021-12-28 (draft)

#### Issue date

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#### Valid to

12.07.2028

Raoul Mancke  
 (Head of programme operations, Kiwa-Ecobility Experts)

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 (Verification body, Kiwa-Ecobility Experts)

### iSOX GREEN MEMBRANE 0.2

#### Owner of the declaration

iSOX BELGIUM BVBA  
 Pitantiestraat 120  
 BE-8792 Desselgem - Waregem Zone 7  
 Belgium

#### Declared product / declared unit

1 m<sup>2</sup> of waterproofing membrane

#### Scope

iSOX GREEN MEMBRANE 0.2 is a waterproofing membrane to be applied under ceramic tiles and natural stones. It is distributed by iSOX BELGIUM BVBA, located in Desselgem (Belgium). The EPD refers to the specific product.

EPD type: Cradle to gate with options, and with modules C1-C4 and module D.

Kiwa-Ecobility Experts shall not be liable with respect to manufacturer information, life cycle assessment data and evidence.

#### Verification

The European standard EN 15804+A2:2019 serves as the core PCR.

Independent verification of the declaration and data according to ISO 14025:2006

internal

external

Max Sonnen – Ecomatters  
 (Third party verifier)

## 2. Product

### 2.1 Product description

iSOX GREEN MEMBRANE 0.2 is a 3-ply waterproofing membrane with 56% recycled content (≥44%) made of polyethylene (PE) membrane and two outer layers of polypropylene (PP) fleece.

### 2.2 Application

The sealing membrane should be applied under ceramic tiles and natural stones for perfect waterproofing. The product is suitable for example for the following typical areas: domestic bathrooms, commercial kitchens, public and domestic shower rooms, and wet areas.

### 2.3 Technical data

| Essential characteristics                                    | Unit              | Performance      |
|--|-------------------|------------------|
| Resistance to temperature: min./max.                         | °C                | - 30°C / + 90°C  |
| Physical properties  |                   |                  |
| Total Weight (internal)                                      | gm/m <sup>2</sup> | 200 (+/- 30)     |
| Length per Roll (internal)                                   | m/%               | 30 (0,0m / + 1%) |
| Breaking load longitudinal (DIN EN ISO 527-3)                | N/50mm            | 270 (≥ 100)      |
| Breaking load lateral (DIN EN ISO 527-3)                     | N/50mm            | 170 (≥ 75)       |
| Extension break longitudinal (DIN EN ISO 527-3)              | %                 | 60 (≥ 25)        |
| Extension break lateral (DIN EN ISO 527-3)                   | %                 | 70 (≥ 35)        |
| Resistance to tearing longitudinal (DIN EN 12310-2)          | N                 | 65 (≥ 25)        |
| Resistance to tearing lateral (DIN EN 12310-2)               | N                 | 110 (≥ 45)       |
| Resistance to water pressure (DIN EN 1928 Version B)         | bar               | ≥ 1.5            |
| UV-Resistance (DIN EN ISO 4892-3)                            | h                 | ≥ 450            |
| Moisture vapour resistance air equivalent (sd) (DIN EN 1931) | m                 | ≥ 75             |
| Bonding strength (DIN EN 1348)                               | N/mm <sup>2</sup> | 0.5 (≥ 0.2)      |
| Burst Pressure (Internal)                                    | bar               | ≥ 2.0            |
| Fire Classification (DIN EN 4102 EN 13501-1)                 | -                 | B2               |

### 2.4 Placing on the market/ Application rules

The product is designed to receive ETA 022 for Watertight covering kits for wet room floors and or walls. For the product use the respective national provisions shall apply. In Germany, the product is regulated in accordance with DIN 18534 for waterproofing for indoor applications. The products are packed and transported as rolls, and mainly distributed at the European market.

### 2.5 Base materials / Ancillary materials

iSOX GREEN MEMBRANE 0.2 contains PP fleece, LDPE sealing layer, PE colour batch, printing ink and solvent.

| Raw material   | Unit | Value   |
|--|------|---------|
| Polypropylene (PP) fleece with 20-40% recycled content                     | %    | 36-44   |
| Low-density polyethylene (LDPE) sealing layer with 60-80% recycled content | %    | 54-62   |
| Colour batch polyethylene (PE)   | %    | 1.5-3.5 |
| Printing Ink and solvent   | %    | 0.4-1.5 |

There is no biogenic carbon in the product.

Substances from the “Candidate list of substances of very high concern for authorisation” (SVHC) that the product contains are according to REACH lower than 0.1%.

## **2.6 Manufacturing**

The manufacturing is located in Germany. The top and bottom fleece (PP) are already supplied and delivered as a finished product. The fleeces are laminated to the up and downside during extrusion process of the LDPE sealing layer. Subsequently a logo is printed on the product, and it is cut in size. Finally, the rolls are stacked on reusable pallets and in packed in foil. The manufacturing process is shown in figure 1.

## **2.7 Packaging**

The waterproofing membranes are wrapped on a cardboard winding tube. The rolls are then packed in PE film with recycled content and stacked on reusable pallets, which are also packed in PE plastic film. All packaging materials are recyclable or reusable (pallets).

## **2.8 Reference Service Life (RSL)**

iSOX GREEN MEMBRANE 0.2 sealing membrane is designed to pass the test according to EAD 030436-00-0503 (ETAG 022). Receipt of an EAD confirms a RSL of 25 years.

## **2.9 Other Information**

For further information on ISOX BELGIUM BVBA products please visit the official webpage under the following link <https://www.isox.be/>.

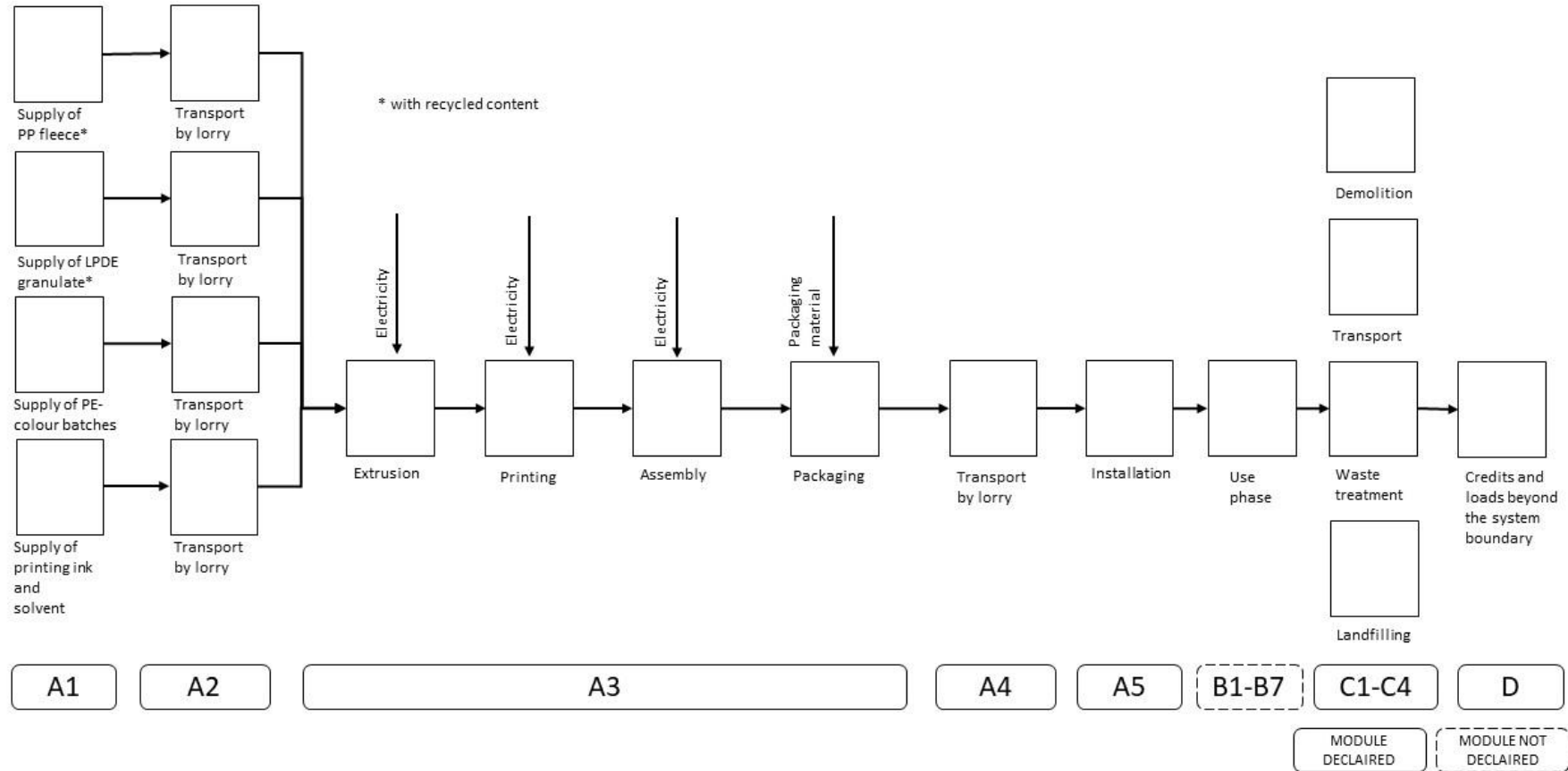


Figure 1: Process flow chart of the production of iSOX GREEN MEMBRANE 0.2

### 3. LCA: Calculation rules

#### 3.1 Declared unit

In accordance with the PCR B 1 m<sup>2</sup> membrane is chosen as the declared unit.

| Product                   | Unit                    | Value |
|---------------------------|-------------------------|-------|
| Declared Unit             | m <sup>2</sup> membrane | 1     |
| Unit weight               | g/m <sup>2</sup>        | 203   |
| Conversion factor to 1 kg | -                       | 4.93  |

#### 3.2 System boundary

The EPD is a complete life cycle with a functional unit. It considers all potential environmental impacts of the product from the cradle to the end of life. The table under LCA: Results provides an overview of the information modules or product life cycle phases considered in the LCA. The manufacturing phase includes the production or extraction and processing of raw materials, the transport to the respective production plant and the production of the waterproofing membrane. All inputs (raw materials, precursors, energy, and auxiliary materials) as well as the by-products and waste are considered for all life cycle phases. Finally, only production-related energy consumption (excluding administration and social rooms) is considered.

The year 2021 represents the time reference for raw materials and electricity consumption. Due to the production location Germany is considered as the geographical reference area. However, environmental effects such as the greenhouse effect can occur with a strong spatial and temporal offset.

The following production steps are considered during the manufacturing phase:

- Extraction and processing of the raw materials (PP fleece, LDPE granulate, PE colour batch, colour, diluent)
- Transport to the production site
- Processing of the products (extrusion, printing, assembly, finishing)
- Packaging (including packaging material)
- End-of-life (including transport)

Secondary fuels are not included in the production process and are therefore not considered. The waste materials and quantities produced are included in the respective modules.

#### 3.3 Estimates and assumptions

All datasets chosen for the LCA refer to the EU as the geographic reference. Transport distances for all raw materials used (raw materials, operating materials, packaging) could be recorded. A payload factor of 50 percent was used for all truck transports (suppliers, disposal transports and internal transports), which corresponds to a full delivery and empty return trip. A data set for a non-specific truck was used for phase A2. For the end-of-life waste scenario 100% landfilling has been assumed. The end-of-life waste scenario per input material has been chosen and for each raw material 100% landfilling has been modeled. No CO<sub>2</sub> certificates were considered.

#### 3.4 Cut-off criteria

All flows that are relevant for the production of the waterproofing membrane were recorded. All process specific data could be determined and modelled using generic data (EcoInvent 3.6).

### **3.5 Period under review**

All process-specific data was collected for the operating year 2021. The quantities of raw materials as well as energy consumption have been recorded and averaged over the entire operating year 2021.

### **3.6 Data quality**

For all processes primary data was collected and provided by the manufacturer. The primary data refers to year 2021. For the data, which is not influenced by the manufacturer, generic data was used. The secondary data was taken from the database EcoInvent (version 3.6, 2019). The database is maintained on a regular basis and thus meets the requirements of EN 15804 (background data not older than 10 years). The power sources were chosen from data for Germany in 2021, in accordance with the geographical and time representativeness. The data quality is very good, because all process specific data could be documented and modelled by using the generic data.

RETHiNK EPD web application from the company NIBE was used to model the life cycle for the production and disposal of the declared product systems. To ensure that the results are comparable, consistent background data from the international database EcoInvent was used in the LCA (e.g. data records on energy, transport, auxiliary materials, and supplies). Almost all consistent data sets contained in the EcoInvent database are documented and can be viewed online.

### **3.7 Allocation**

Allocations were avoided as far as possible. There are no coproducts or byproduct in the manufacturing of the waterproofing membrane. Based on energy consumption measurements, the energy demand was allocated to the individual products. Recyclable production waste is collected and sold to third party.

### **3.8 Comparability**

In principle, a comparison or assessment of the environmental impacts of different products is only possible if they have been prepared in accordance with EN 15804. For the evaluation of the comparability, the following aspects have to be considered in particular: PCR used, functional or declared unit, geographical reference, definition of the system boundary, declared modules, data selection (primary or secondary data, background database, data quality), scenarios used for use and disposal phases, and the life cycle inventory (data collection, calculation methods, allocations, validity period). PCRs and general program instructions of different EPDs programs may differ. A comparability needs to be evaluated. For further guidance see EN 15804+A2 (5.3 Comparability of EPD for construction products) and ISO 14025 (6.7.2 Requirements for comparability).

#### 4. LCA: Scenarios and additional technical information

The distance between the production and the construction site (Module A4) was calculated based on the sales in 2021. Accordingly, it was calculated that the product was partially distributed by road (536 km) and partially by ship. As means of transportation truck (unspecified) and transoceanic freight ship were chosen.

The installation of the waterproofing membrane is usually conducted manually. A reject or unused portion of 7% of the waterproofing membrane is assumed during the installation process (Module A5).

For the Module C1 (demolition) it has been assumed that it can be considered irrelevant, because no significant additional energy is needed for the demolition of waterproofing membrane within an applied system. E.g., if the waterproofing membrane is applied under tiles, the demolition energy for the removal of tiles will not be considerably higher if the waterproofing membrane is applied underneath.

The end-of-life waste scenario per input material has been chosen and for each row material 100% landfilling has been modeled under the consideration of suitable loads and benefits.

Note: The transport distances of the waste are based on the standard waste scenarios of the NMD Determination Method (SBK 2019): incineration 150 km/ recycling 50 km / landfill 100 km; vehicle: truck, unspecified. According the EN 15804, loads are credited in Modules A3 or C3 to C4 and benefits are credited in module D.

For all road transports, the environmental profile of a non-specific truck transport was used (conservative assumption): The vehicle operates with diesel, and it provides a fleet average that includes different lorry classes as well as EURO classes. This environmental profile contains data for transport, which is calculated for an average load factor, including empty return trips (EcoInvent 3.6).

#### 5. LCA: Results

The following tables show the results of the impact assessment indicators, resource use, waste and other output streams. The results presented here refer to the declared specific product.

Disclaimer on ADP-e, ADP-f, WDP, ETP-fw, HTP-c, HTP-nc, SQP: The results of these environmental impact indicators must be used with caution, as the uncertainties in these results are high or as there is limited experience with the indicator.

Disclaimer on IR: This impact category mainly addresses the potential effect of low dose ionizing radiation on human health in the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents and occupational exposures, nor does it consider radioactive waste disposal in underground facilities. Potential ionizing radiation from soil, radon, and some building materials is also not measured by this indicator.

### Description of the system boundary

| Product stage       |           |                | Construction process stage                   |                                   | Use stage |              |        |             |               |                        |                       | End of life stage         |           |                  |          | Benefits and loads beyond the system boundaries |
|---------------------|-----------|----------------|--|-----------------------------------|-----------|--------------|--------|-------------|---------------|------------------------|-----------------------|---------------------------|-----------|------------------|----------|---|
| Raw material supply | Transport | Manu-facturing | Transport from manu-facturer to place of use | Construction-installation process | Use       | Main-tenance | Repair | Replacement | Refur-bishmen | Operational energy use | Operational water use | De-struction / demolition | Transport | Waste processing | Disposal | Reuse-Recovery-Recycling-potential              |
| A1                  | A2        | A3             | A4   | A5                                | B1        | B2           | B3     | B4          | B5            | B6                     | B7                    | C1                        | C2        | C3               | C4       | D   |
| X                   | X         | X              | X  | X                                 | MND       | MND          | MND    | MND         | MND           | MND                    | MND                   | X                         | X         | X                | X        | X   |

X=Module declared | MND=Module not declared

### Results of the LCA – Environmental impact: 1 m<sup>2</sup> iSOX GREEN MEMBRANE 0.2

| Parameter   | Unit                      | A1        | A2       | A3       | A4       | A5       | C1       | C2       | C3       | C4       | D         |
|---|---------------------------|-----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|
| <b>Core environmental impact indicators (EN 15804+A2)</b>       |                           |           |          |          |          |          |          |          |          |          |           |
| ADP-mm  | MJ                        | 2,60E-06  | 2,00E-07 | 1,80E-06 | 4,39E-07 | 3,91E-07 | 0,00E+00 | 6,67E-08 | 0,00E+00 | 2,21E-08 | 2,58E-06  |
| ADP-f   | kg Sb-eqv.                | 7,17E+00  | 1,19E-01 | 2,76E+00 | 2,62E-01 | 7,56E-01 | 0,00E+00 | 3,97E-02 | 0,00E+00 | 4,89E-02 | 8,59E+00  |
| AP  | mol H+ eqv.               | 8,16E-04  | 4,58E-05 | 7,82E-04 | 1,05E-04 | 1,39E-04 | 0,00E+00 | 1,53E-05 | 0,00E+00 | 1,80E-05 | 8,87E-04  |
| EP-fw   | kg PO4 eqv.               | 5,25E-06  | 7,97E-08 | 2,94E-05 | 1,75E-07 | 2,49E-06 | 0,00E+00 | 2,65E-08 | 0,00E+00 | 3,67E-08 | 6,08E-06  |
| EP-m  | kg N eqv.                 | 1,35E-04  | 1,61E-05 | 1,62E-04 | 3,63E-05 | 3,12E-05 | 0,00E+00 | 5,38E-06 | 0,00E+00 | 1,02E-05 | 1,43E-04  |
| EP-t  | mol N eqv.                | 1,50E-03  | 1,78E-04 | 2,11E-03 | 4,00E-04 | 3,65E-04 | 0,00E+00 | 5,93E-05 | 0,00E+00 | 6,62E-05 | 1,51E-03  |
| GWP-b   | kg CO2 eqv.               | -7,06E-05 | 3,65E-06 | 1,30E-02 | 7,90E-06 | 7,49E-02 | 0,00E+00 | 1,21E-06 | 0,00E+00 | 2,21E-05 | 7,47E-04  |
| GWP-f   | kg CO2 eqv.               | 2,21E-01  | 7,90E-03 | 1,99E-01 | 1,74E-02 | 3,68E-02 | 0,00E+00 | 2,63E-03 | 0,00E+00 | 2,55E-02 | 2,50E-01  |
| GWP-luluc   | kg CO2 eqv.               | 1,17E-04  | 2,89E-06 | 7,36E-04 | 6,46E-06 | 6,11E-05 | 0,00E+00 | 9,64E-07 | 0,00E+00 | 1,01E-06 | 1,02E-04  |
| GWP-total   | kg CO2 eqv.               | 2,21E-01  | 7,90E-03 | 1,40E-01 | 1,74E-02 | 1,12E-01 | 0,00E+00 | 2,63E-03 | 0,00E+00 | 2,55E-02 | 2,51E-01  |
| ODP   | kg CFC 11 eqv.            | 6,57E-09  | 1,74E-09 | 1,02E-08 | 3,84E-09 | 1,84E-09 | 0,00E+00 | 5,81E-10 | 0,00E+00 | 6,39E-10 | 5,38E-09  |
| POCP  | kg NMVOC eqv.             | 8,37E-04  | 5,08E-05 | 4,35E-04 | 1,14E-04 | 1,22E-04 | 0,00E+00 | 1,69E-05 | 0,00E+00 | 2,45E-05 | 9,21E-04  |
| WDP   | m <sup>3</sup> world eqv. | 1,98E-01  | 4,26E-04 | 4,23E-02 | 9,35E-04 | 1,79E-02 | 0,00E+00 | 1,42E-04 | 0,00E+00 | 2,10E-03 | 2,59E-01  |
| <b>Additional environmental impact indicators (EN 15804+A2)</b> |                           |           |          |          |          |          |          |          |          |          |           |
| ETP-fw  | CTUe                      | 1,58E+00  | 1,06E-01 | 3,16E+00 | 2,33E-01 | 4,26E-01 | 0,00E+00 | 3,54E-02 | 0,00E+00 | 5,02E-02 | 1,13E+00  |
| HTP-c   | CTUh                      | 5,94E-11  | 3,44E-12 | 8,49E-11 | 7,63E-12 | 2,03E-11 | 0,00E+00 | 1,15E-12 | 0,00E+00 | 1,38E-12 | 5,78E-11  |
| HTP-nc  | CTUh                      | 1,68E-09  | 1,16E-10 | 2,31E-09 | 2,55E-10 | 3,63E-10 | 0,00E+00 | 3,87E-11 | 0,00E+00 | 3,30E-11 | 1,58E-09  |
| IR  | kBq U235 eqv.             | 6,86E-03  | 4,99E-04 | 9,03E-03 | 1,10E-03 | 1,31E-03 | 0,00E+00 | 1,66E-04 | 0,00E+00 | 1,91E-04 | 8,35E-03  |
| PM  | disease incidence         | 6,37E-09  | 7,10E-10 | 5,63E-09 | 1,56E-09 | 1,20E-09 | 0,00E+00 | 2,37E-10 | 0,00E+00 | 3,40E-10 | 6,52E-09  |
| SQP   | Pt                        | 4,33E-01  | 1,03E-01 | 9,17E+00 | 2,26E-01 | 7,07E-01 | 0,00E+00 | 3,44E-02 | 0,00E+00 | 1,16E-01 | -2,82E+00 |

ADP-mm=Depletion of abiotic resources - minerals and metals | ADP-f=Depletion of abiotic resources - fossil fuels | AP=Acidification potential | EP-fw=Eutrophication, freshwater | EP-m=Eutrophication, marine | EP-t=Eutrophication, terrestrial | GWP-b=Global warming potential - biogenic | GWP-f=Global warming potential - fossil | GWP-luluc=Global warming potential - land use and land use change | GWP-total=Global warming potential | ODP=Ozone depletion | POCP=Photochemical ozone formation | WDP=Water use | ETP-fw=Ecotoxicity, freshwater | HTP-c=Human toxicity, cancer effects | HTP-nc=Human toxicity, non-cancer effects | IRP=Ionising radiation, human health | PM= disease in-cidence | SQP=Land use related impacts (Potential Soil quality index)

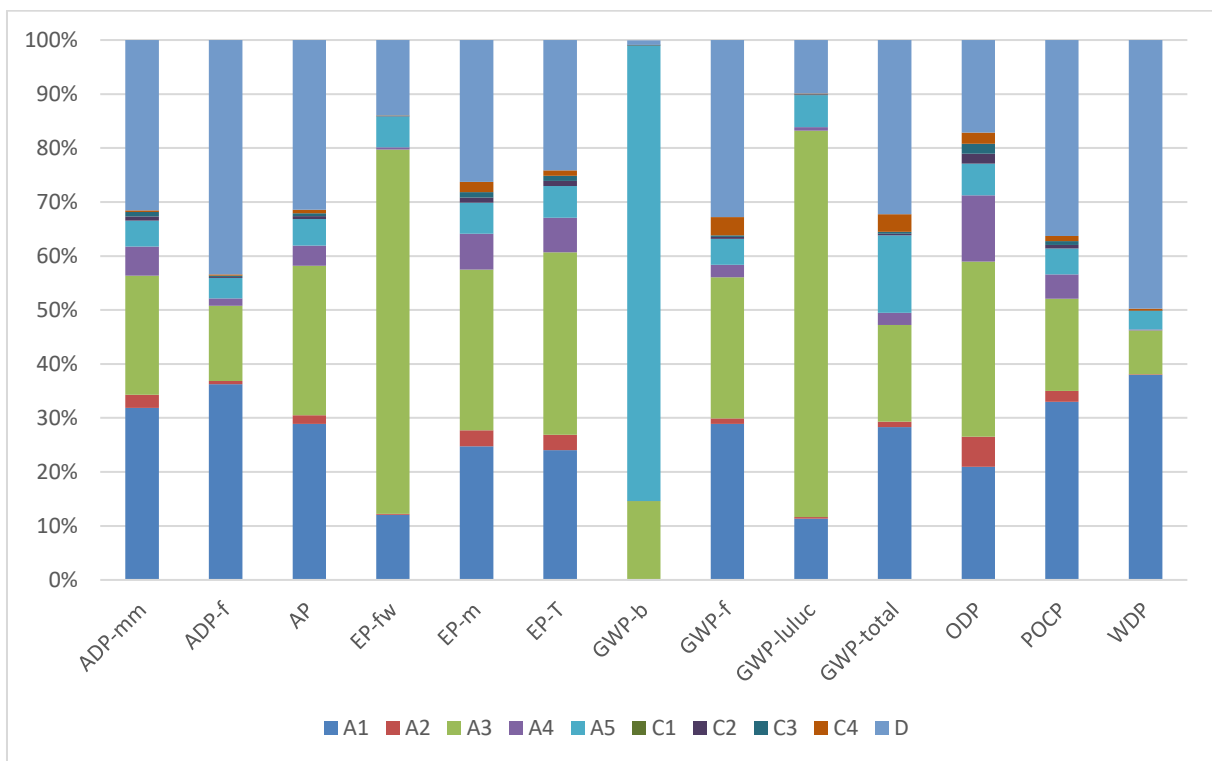
**Results of the LCA – Resource use and environmental information: 1 m<sup>2</sup> ISOX GREEN MEMBRANE 0.2**

| Parameter | Unit | A1       | A2       | A3       | A4       | A5       | C1       | C2       | C3       | C4       | D         |
|-----------|------|----------|----------|----------|----------|----------|----------|----------|----------|----------|-----------|
| PERE      | MJ   | 1,86E-01 | 1,49E-03 | 1,58E+00 | 3,27E-03 | 1,25E-01 | 0,00E+00 | 4,97E-04 | 0,00E+00 | 8,56E-04 | -4,14E-01 |
| PERM      | MJ   | 0,00E+00 | 0,00E+00 | 6,61E-01 | 0,00E+00 | 4,63E-02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00  |
| PERT      | MJ   | 1,86E-01 | 1,49E-03 | 2,24E+00 | 3,27E-03 | 1,72E-01 | 0,00E+00 | 4,97E-04 | 0,00E+00 | 8,56E-04 | -4,14E-01 |
| PENRE     | MJ   | 4,51E+00 | 1,26E-01 | 2,92E+00 | 2,79E-01 | 5,75E-01 | 0,00E+00 | 4,21E-02 | 0,00E+00 | 5,19E-02 | 4,68E+00  |
| PENRM     | MJ   | 7,41E+00 | 0,00E+00 | 2,18E-01 | 0,00E+00 | 5,43E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 4,53E+00  |
| PENRT     | MJ   | 1,19E+01 | 1,26E-01 | 3,14E+00 | 2,79E-01 | 1,12E+00 | 0,00E+00 | 4,21E-02 | 0,00E+00 | 5,19E-02 | 9,21E+00  |
| SM        | Kg   | 1,06E-01 | 0,00E+00 | 4,55E-03 | 0,00E+00 | 7,74E-03 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00  |
| RSF       | MJ   | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00  |
| NRSF      | MJ   | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00  |
| FW        | M3   | 3,31E-03 | 1,45E-05 | 2,19E-03 | 3,18E-05 | 4,19E-04 | 0,00E+00 | 4,83E-06 | 0,00E+00 | 5,10E-05 | 3,90E-03  |
| HWD       | Kg   | 1,13E-06 | 3,02E-07 | 4,09E-06 | 6,62E-07 | 4,74E-07 | 0,00E+00 | 1,01E-07 | 0,00E+00 | 7,43E-08 | 9,75E-07  |
| NHWD      | Kg   | 1,06E-02 | 7,55E-03 | 1,88E-02 | 1,65E-02 | 2,01E-02 | 0,00E+00 | 2,52E-03 | 0,00E+00 | 1,95E-01 | 9,83E-03  |
| RWD       | Kg   | 5,98E-06 | 7,82E-07 | 1,11E-05 | 1,72E-06 | 1,47E-06 | 0,00E+00 | 2,61E-07 | 0,00E+00 | 2,91E-07 | 6,91E-06  |
| CRU       | Kg   | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00  |
| MFR       | Kg   | 0,00E+00 | 0,00E+00 | 7,87E-03 | 0,00E+00 | 2,00E-02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00  |
| MER       | Kg   | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00  |
| EET       | MJ   | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,27E-01  |
| EEE       | MJ   | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 7,39E-02  |

PERE=renewable primary energy ex. raw materials | PERM=renewable primary energy used as raw materials | PERT=renewable primary energy total | PENRE=non-renewable primary energy ex. raw materials | PENRM=non-renewable primary energy used as raw materials | PENRT=non-renewable primary energy total | SM=use of secondary material | RSF=use of renewable secondary fuels | NRSF=use of non-renewable secondary fuels | FW=use of net fresh water | HWD=hazardous waste disposed | NHWD=non-hazardous waste disposed | RWD=radioactive waste disposed | CRU=Components for re-use | MFR=Materials for recycling | MER=Materials for energy recovery | EET=Exported energy thermic | EEE=Exported energy electric

## 6. LCA: Interpretation

As shown in the figure below, A1 (raw material supply), A3 (manufacturing) and D (reuse-recovery-recycling-potential) dominate in most environmental core indicators. The highest impact (app. 42%) on the GWP is attributed to the LDPE granulate, followed by the PP fleece (app. 30%). Among energy inputs the highest contribution to the GWP is caused by the cooling process (12%). Transports A2 and C2 have only a minor impact within all core indicators, whereas the transport to the customers (A4) has a slightly bigger impact compared to other two transports. The installation phase (A5) contributes with around 4-6% to each environmental category except GWP-b with around 80%. However, this phase is strongly dependent on the 7% construction waste assumption. Since the product is completely landfilled after reaching the end-of-life credits beyond the system boundaries (module D) are mainly originating from the packaging material.



**Figure 2: iSOX GREEN MEMBRANE 0.2- Impact of the individual modules on the environmental core indicators**

The data quality can be classified as good overall. All relevant process-specific data could be collected in the operational data collection. Consistent data sets from the EcoInvent database (version 3.6) were available for almost all inputs and outputs. The background data meet the requirements of EN 15804, and the production data were recorded for the 2021 operating year. The quantities of raw materials and supplies used as well as energy consumption were recorded for the entire operating year.

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