# Statement of Verification

BREG EN EPD No.: 000551 Issue 01

This is to verify that the

**Environmental Product Declaration**

provided by:

Barrisol Normalu SAS

BRE Global Verified EPD

is in accordance with the requirements of:

EN 15804:2012+A2:2019

and

BRE Global Scheme Document SD207

This declaration is for:

1 m2 Biosourcé BOS01 biopolymer

## Company Address

Barrisol Normalu SAS
Kembs Site
Routes du Sipes,
68680 Kembs,
France

BARRISOL®
WORLD N°1 MONDIAL

| | | |
|---|---|---|
| Signed for BRE Global Ltd | Emma Baker<br>Operator | 29 January 2024<br>Date of this Issue |
| 29 January 2024<br>Date of First Issue | | 29 January 2029<br>Expiry Date |

BRE Global Verified EPD



ECO PLATFORM EPD VERIFIED

# Environmental Product Declaration

## EPD Number: 000551

## General Information

| EPD Programme Operator | Applicable Product Category Rules |
|---|---|
| BRE Global<br>Watford, Herts<br>WD25 9XX<br>United Kingdom | BRE Environmental Profiles 2022 Product Category Rules for Type III environmental product declaration of construction products to EN 15804+A2 PN 514 Rev 3.0 |
| **Commissioner of LCA study** | **LCA consultant/Tool** |
| Barrisol Normalu SAS<br>Kembs Site<br>Routes du Sipes, 68680 Kembs, France | Flavie Lowres, BRE/Simapro |
| **Declared Unit** | **Applicability/Coverage** |
| 1 $m^2$ Biosourcé BOS01 biopolymer | Product Specific. |
| **EPD Type** | **Background database** |
| Cradle to Gate with options | Ecoinvent 3.8 |

| Demonstration of Verification |
|---|
| CEN standard EN 15804 serves as the core PCR [a] |
| Independent verification of the declaration and data according to EN ISO 14025:2010<br>☐Internal ☒ External |
| (Where appropriate [b])Third party verifier:<br>Roger Connick |
| a: Product category rules<br>b: Optional for business-to-business communication; mandatory for business-to-consumer communication (see EN ISO 14025:2010, 9.4) |

| Comparability |
|---|
| Environmental product declarations from different programmes may not be comparable if not compliant with EN 15804:2012+A2:2019. Comparability is further dependent on the specific product category rules, system boundaries and allocations, and background data sources. See Clause 5.3 of EN 15804:2012+A2:2019 for further guidance |

## Information modules covered

| Product | | | Construction | | Use stage | | | | | | | End-of-life | | | | | Benefits and loads beyond the system boundary |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Related to the building fabric | | | | | Related to the building | | | | | | | |
| A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | | D |
| Raw materials supply | Transport | Manufacturing | Transport to site | Construction – Installation | Use | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | Deconstruction demolition | Transport | Waste processing | Disposal | | Reuse, Recovery and/or Recycling potential |
| ☑ | ☑ | ☑ | ☑ | ☑ | ☑ | ☐ | ☐ | ☐ | ☐ | ☐ | ☐ | ☑ | ☑ | ☑ | ☑ | | ☑ |

Note: Ticks indicate the Information Modules declared.

## Manufacturing site(s)

The Biosourcé product is manufactured at the following site:

Barrisol Normalu SAS
Kembs Site
Routes du Sipes, 68680 Kembs, France

# Construction Product:

## Product Description

Barrisol Normalu SAS manufactures stretched ceiling. Biosourcé BOS01 is made using a biopolymer film. Each stretched ceiling is cut to size for the specific project where the product will be installed.

This EPD concerns installation of 1m$^2$ Barrisol stretched ceiling, Biosourcé BOS01 biopolymer– which can be backlit, printed or perforated for acoustic. The biopolymer film is without phthalate and contains no lead or cadmium.

All Biosourcé ceilings produced in Normalu Barrisol have CE mark. Barrisol's stretched ceiling can be installed in all building types (public and private including housing) and events. Barrisol's products are also IMO certified for use in boats if requested by the customer.

Biosourcé BOS01 biopolymer is 100% recyclable.

The product service life is 40 years according to the supplier's information.

## Technical Information

| | Property | Standard | Value, Unit |
|---|---|---|---|
| Biosourcé BOS01 Biopolymer film | Thickness | N/A | 0.18 mm +/- 10% |
| | Density | N/A | 250 g/m$^2$ +/- 10% |
| | VOC classified | NF EN ISO 16000-11<br>NF EN ISO 16000-9<br>NF ISO 16000-6<br>NF ISO 16000-3 | A+ |
| | Moisture resistance | N/A | 100% |
| | REACH compliant | | RoHS compliant, REACH |
| | Phtalate free | NF EN ISO 14389 | <0.1% |
| | CE marking | EN 14716: 2004 | Certificate N°0071-CPR-14627 |
| Biosourcé BOS01 installed system | Acoustic performances | ISO 354<br>DIN EN ISO 11654<br>ASTM C 423 | αw = 0.65 (membrane without insulation) up to αw = 1.0 (with adapted acoustic insulation, insulation not considered in this EPD |
| | Reaction to fire | NF EN 11925-2<br>NF EN 13823 | B-s1, d0 – Class 1 |
| | IMO certification | Regulation 2018/773 – certificate of conformity (module B+ module F)<br><br>IMO res MSC.61 (67) -(FTP code), Annex 1 part 5, and annex 2<br>IMO MSC / Circ 1120<br>IMO Res. MSC.307(88)-(2010 FTP Code) Section 8 | IMO |
| | GREENGUARD GOLD | Certificate number : 307209-420 | GREENGUARD GOLD |
| Origine France warranty | Certificate N° 6039707 . | This label confirm geographical origin of labelled products : “stretch ceilings and walls solutions” | ORIGINE FRANCE GARANTIE<br>BVCert. 6039707<br>Plafond tendu |
| WWF | | Member of France's Club Entreprendre pour la Planète. Barrisol has been protecting the environment for over 50 years by promoting 100% recyclable solutions and some made of recycled materials. See: https://barrisol.com/fr/actualites/2021/barrisol-membre-du-club-entreprendre-pour-la-planete-du-wwf-france | WWF ENTREPRENDRE POUR LA PLANÈTE<br>Le Club PME du WWF France |

Further information on the technical performance of Biosourcé BOS01 can be found on Barrisol's website: Barrisol The bio-based - Details or on demand to the manufacturer.

## Main Product Contents

The ceiling film Biosourcé BOS01 film is made of:

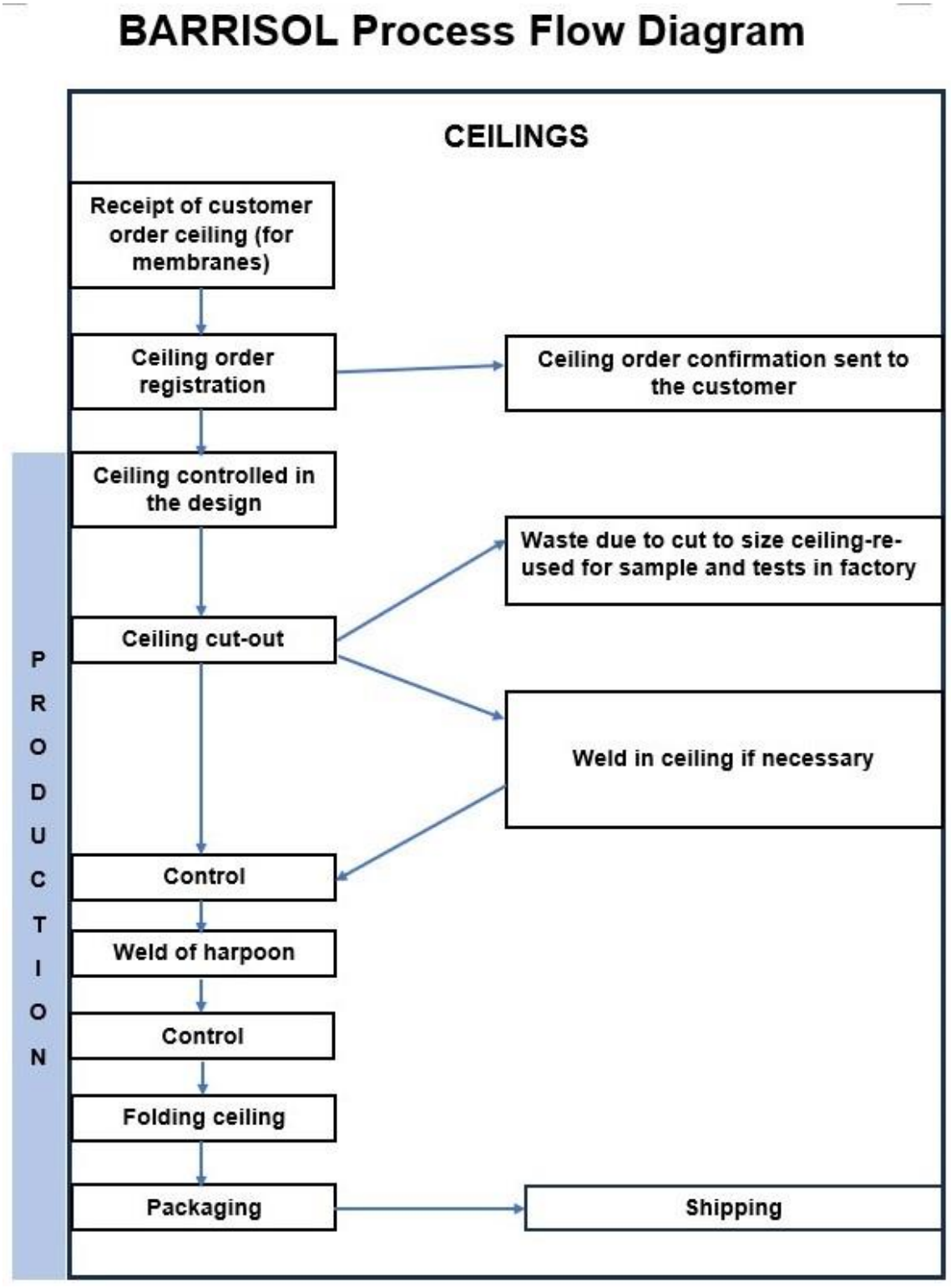
| Material/Chemical Input | % |
|---|---|
| Polymer | 40-60% |
| Bio-Plasticizer | 20-30% |
| Stabilizer | <3% |
| Fire retardant | 10-20% |
| Pigment | 8-12% |

## Manufacturing Process

Rolls of Biosourcé BOS01 biopolymer film are brought to site where the fabric is measured, sometimes printed, cut to size and welded with perimeter harpoon.

The required amount of Biosourcé BOS01 stretched ceiling is packaged for installation on site.

## Process flow diagram




## Construction Installation

Products are manufactured in France. 40% is used in France and the rest is mostly installed in buildings in Europe.

The installation of Biosourcé BOS01 biopolymer requires the use of heat to ensure the ceiling system is stretched appropriately. There is no waste from the biopolymer film which is cut to size in the factory.

### Use Information

B1: the Biosourcé BOS01 biopolymer stretched ceiling system has an A+ rating for indoor air quality. There are no emissions during its life.

### End of Life

C1: the Biosourcé BOS01 biopolymer stretched ceiling system is taken down manually
C2: all elements of the system can be disassembled and recycled through commonly available waste management processing plant
C3: no processing is required
C4: the Biosourcé BOS01 biopolymer stretched ceiling film can be recycled although this is not yet common practice. Barrisol includes a clause in their contract with distributors that requires that any Barrisol ceiling should be recycled at end of life. For the purpose of this EPD, it was assumed that 27% of the biopolymer film was recycled as this is a generic value provided by Vinyl Plus's report.

## Life Cycle Assessment Calculation Rules

### Declared unit description

1 $m^2$ Biosourcé BOS01 biopolymer

### System boundary

In accordance with the modular approach as defined in EN15804:2012+A2:2019, this cradle-to-grave EPD includes the processes covered in the manufacturing site and product stage A1 to A3, A4, A5, B1, C1 to C4 and D.

### Data sources, quality and allocation

Specific primary data derived from the Biosourcé BOS01 production process in the Kembs, Routes du Sipes, 68680 Kembs (France) factory, have been modelled using Simapro v9.4 LCA software and the ecoinvent 3.8 database for the period (01/01/2021 to 31/12/2021). In accordance with the requirements of EN15804, the most current available data has been used. Specific primary data from the supplier of the biopolymer film were also used. The manufacturer-specific data for the biopolymer film covers a period of one year (30/11/2021 – 30/11/2022). Benzoic acid (from plant resin) was used as a proxy for the bio-plasticizer. Secondary data has been obtained for all remaining upstream and downstream processes that are beyond the control of the manufacturer from the ecoinvent 3.8 database. All ecoinvent datasets are complete within the context used and conform to the system boundary and the criteria for the exclusion of inputs and outputs, according to the requirements specified in EN15804. Biosourcé BOS01 is not the only product to processed at the Kembs factory. All input data provided for Barrisol's factory have been allocated by $m^2$ to Biosourcé BOS01.

*Quality Level Geographical*
Specific French datasets have been selected from the ecoinvent LCI for French hydro electricity. The quality level of geographical and technical representativeness is therefore good. The quality level of time representativeness is good as the background LCI datasets are based on ecoinvent v3.8 which was compiled in 2021. Therefore, the most appropriate LCA data have been used.

Barrisol's factory is in proximity of a hydro electricity plant. The GWP of the dataset used for this EPD is: 1 kWh hydro electricity (Electricity, high voltage {FR} electricity production, hydro, reservoir, alpine region EN15804, U) = 6.51E-03 $kgCO_2eq$

In order to meet the requirements of BRE's PCR, the A1-A3 data have also been modelled using the French electricity dataset; 1 kWh French electricity (Electricity, medium voltage {FR} market for electricity, medium voltage EN15804, U) = 8.66E-02 $kgCO_2eq$

## Cut-off criteria

The study includes the manufacturing of the biopolymer film and fabrication of the stretched ceiling film in Barrisol's factory in Kembs. This EPD does not include the fixings that would be required to install the stretched ceiling.

## LCA Results – 1 m² Biosourcé BOS01 Biopolymer film – hydro electricity

| Parameters describing environmental impacts | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | GWP-total | GWP-fossil | GWP-biogenic | GWP-luluc | ODP | AP | EP-freshwater |
| | | | kg $CO_2$ eq | kg $CO_2$ eq | kg $CO_2$ eq | kg $CO_2$ eq | kg CFC11 eq | mol $H^+$ eq | kg $(PO_4)^{3-}$ eq |
| Product stage | Raw material supply | A1 | 9.49E-01 | 9.33E-01 | 1.41E-02 | 9.70E-04 | 2.12E-07 | 1.10E-02 | 3.31E-03 |
| | Transport | A2 | 2.45E-02 | 2.45E-02 | 8.24E-05 | 9.60E-06 | 5.66E-09 | 9.93E-05 | 1.64E-06 |
| | Manufacturing | A3 | 2.65E-01 | 3.22E-01 | -5.87E-02 | 1.03E-03 | 2.15E-08 | 1.05E-03 | 9.43E-05 |
| | Total | A1-3 | 1.24E+00 | 1.28E+00 | -4.45E-02 | 2.01E-03 | 2.39E-07 | 1.21E-02 | 3.41E-03 |
| Construction process stage | Transport | A4 | 6.26E-02 | 6.23E-02 | 2.10E-04 | 2.45E-05 | 1.44E-08 | 2.53E-04 | 4.19E-06 |
| | Construction | A5 | 1.39E-01 | 1.38E-01 | 4.15E-04 | 5.84E-05 | 1.34E-08 | 4.55E-04 | 2.58E-05 |
| Use stage | Use | B1 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| **Market Scenario – 27% recycled at end of life. Barrisol has a program to recycle biopolymer film** | | | | | | | | | |
| End of life | Deconstruction, demolition | C1 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| | Transport | C2 | 2.09E-03 | 2.08E-03 | 7.00E-06 | 8.16E-07 | 4.81E-10 | 8.44E-06 | 1.40E-07 |
| | Waste processing | C3 | 9.62E-03 | 4.21E-03 | 5.20E-03 | 6.91E-06 | 2.21E-10 | 1.74E-05 | 1.54E-06 |
| | Disposal | C4 | 4.24E-01 | 4.21E-01 | 1.95E-03 | 2.00E-04 | 6.79E-08 | 7.14E-04 | 5.42E-05 |
| Potential benefits and loads beyond the system boundaries | Reuse, recovery, recycling potential | D | -1.69E-01 | -1.67E-01 | -1.70E-03 | -1.63E-04 | -7.74E-08 | -7.75E-04 | -4.91E-05 |

GWP-total = Global warming potential, total;
GWP-fossil = Global warming potential, fossil;
GWP-biogenic = Global warming potential, biogenic;
GWP-luluc = Global warming potential, land use and land use change;

ODP = Depletion potential of the stratospheric ozone layer;
AP = Acidification potential, accumulated exceedance; and
EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment

### For info: LCA Results – 1 m² Biosourcé BOS01 Biopolymer film if Barrisol used the French electricity mix

| Parameters describing environmental impacts | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | GWP-total | GWP-fossil | GWP-biogenic | GWP-luluc | ODP | AP | EP-freshwater |
| | | | kg $CO_2$ eq | kg $CO_2$ eq | kg $CO_2$ | kg $CO_2$ eq | kg CFC11 | mol $H^+$ eq | kg $(PO_4)^{3-}$ |
| Product stage | Raw material supply | A1 | 9.49E-01 | 9.33E-01 | 1.41E-02 | 9.70E-04 | 2.12E-07 | 1.10E-02 | 3.31E-03 |
| | Transport | A2 | 2.45E-02 | 2.45E-02 | 8.24E-05 | 9.60E-06 | 5.66E-09 | 9.93E-05 | 1.64E-06 |
| | Manufacturing | A3 | 3.82E-01 | 4.31E-01 | -5.09E-02 | 1.09E-03 | 3.33E-08 | 1.60E-03 | 1.28E-04 |
| | Total | A1-A3 | 1.36E+00 | 1.39E+00 | -3.67E-02 | 2.07E-03 | 2.51E-07 | 1.27E-02 | 3.44E-03 |

## LCA Results (continued) – 1 m² Biosourcé BOS01 Biopolymer film – hydro electricity

| Parameters describing environmental impacts | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | EP-marine | EP-terrestrial | POCP | ADP-mineral& metals | ADP-fossil | WDP | PM |
| | | | kg N eq | mol N eq | kg NMVOC eq | kg Sb eq | MJ, net calorific value | $m^3$ world eq deprived | disease incidence |
| Product stage | Raw material supply | A1 | 1.92E-03 | 2.49E-02 | 5.84E-03 | 3.43E-02 | 2.08E+01 | 9.82E-01 | 7.36E-08 |
| | Transport | A2 | 2.99E-05 | 3.27E-04 | 1.00E-04 | 8.47E-08 | 3.70E-01 | 1.11E-03 | 2.11E-09 |
| | Manufacturing | A3 | 4.89E-04 | 3.16E-03 | 8.92E-04 | 1.05E-06 | 3.61E+00 | 4.43E-01 | 1.53E-08 |
| | Total | A1-3 | 2.44E-03 | 2.84E-02 | 6.83E-03 | 3.43E-02 | 2.48E+01 | 1.43E+00 | 9.10E-08 |
| Construction process stage | Transport | A4 | 7.63E-05 | 8.33E-04 | 2.55E-04 | 2.16E-07 | 9.42E-01 | 2.82E-03 | 5.38E-09 |
| | Construction | A5 | 1.24E-04 | 1.29E-03 | 4.68E-04 | 8.28E-07 | 1.59E+00 | 1.34E-02 | 7.96E-09 |
| Use stage | Use | B1 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| **Market Scenario – 27% recycled at end of life. Barrisol has a program to recycle biopolymer film** | | | | | | | | | |
| End of life | Deconstruction, demolition | C1 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| | Transport | C2 | 2.54E-06 | 2.78E-05 | 8.50E-06 | 7.20E-09 | 3.14E-02 | 9.41E-05 | 1.79E-10 |
| | Waste processing | C3 | 8.88E-06 | 5.02E-05 | 1.63E-05 | 6.47E-08 | 3.27E-02 | 9.62E-04 | 3.51E-10 |
| | Disposal | C4 | 1.62E-04 | 1.64E-03 | 4.43E-04 | 1.58E-06 | 1.49E+00 | 1.12E-01 | 5.88E-09 |
| Potential benefits and loads beyond the system | Reuse, recovery, recycling potential | D | -1.53E-04 | -1.52E-03 | -5.00E-04 | -2.53E-06 | -3.61E+00 | -1.16E-01 | -7.09E-09 |

EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment;
EP-terrestrial = Eutrophication potential, accumulated exceedance;
POCP = Formation potential of tropospheric ozone;
ADP-mineral&metals = Abiotic depletion potential for non-fossil resources;
ADP-fossil = Depletion potential of the stratospheric ozone layer;
WDP = Water (user) deprivation potential, deprivation-weighted water consumption; and
PM = Particulate matter.

### For info: LCA Results – 1 m² Biosourcé BOS01 Biopolymer film if Barrisol used the French electricity mix

| | | | EP-marine | EP-terrestrial | POCP | ADP-mineral &metals | ADP-fossil | WDP | PM |
|---|---|---|---|---|---|---|---|---|---|
| | | | kg N eq | mol N eq | kg NMVOC eq | kg Sb eq | MJ, net calorific value | m3 world eq deprived | disease incidence |
| Product stage | Raw material supply | A1 | 1.92E-03 | 2.49E-02 | 5.84E-03 | 3.43E-02 | 2.08E+01 | 9.82E-01 | 7.36E-08 |
| | Transport | A2 | 2.99E-05 | 3.27E-04 | 1.00E-04 | 8.47E-08 | 3.70E-01 | 1.11E-03 | 2.11E-09 |
| | Manufacturing | A3 | 6.33E-04 | 4.20E-03 | 1.17E-03 | 2.17E-06 | 2.04E+01 | 1.84E-01 | 2.09E-08 |
| | Total | A1-A3 | 2.59E-03 | 2.94E-02 | 7.11E-03 | 3.43E-02 | 4.16E+01 | 1.17E+00 | 9.66E-08 |

## LCA Results (continued) – 1 m² Biosourcé BOS01 Biopolymer film – hydro electricity

| Parameters describing environmental impacts | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | IRP | ETP-fw | HTP-c | HTP-nc | SQP |
| | | | kBq $U^{235}$ eq | CTUe | CTUh | CTUh | dimensionless |
| Product stage | Raw material supply | A1 | 2.59E-01 | 2.80E+02 | 2.20E-09 | 9.37E-08 | 6.11E+00 |
| | Transport | A2 | 1.90E-03 | 2.88E-01 | 9.36E-12 | 3.03E-10 | 2.54E-01 |
| | Manufacturing | A3 | 2.42E-02 | 3.95E+00 | 1.43E-10 | 2.64E-09 | 7.30E+00 |
| | Total | A1-3 | 2.85E-01 | 2.84E+02 | 2.35E-09 | 9.67E-08 | 1.37E+01 |
| Construction process stage | Transport | A4 | 4.84E-03 | 7.35E-01 | 2.39E-11 | 7.72E-10 | 6.47E-01 |
| | Construction | A5 | 4.94E-03 | 2.13E+00 | 3.64E-10 | 2.40E-09 | 4.94E-01 |
| Use stage | Use | B1 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| **Market Scenario - 27% recycled at end of life. Barrisol has a program to recycle biopolymer film** | | | | | | | |
| End of life | Deconstruction, demolition | C1 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| | Transport | C2 | 1.61E-04 | 2.45E-02 | 7.96E-13 | 2.57E-11 | 2.16E-02 |
| | Waste processing | C3 | 3.67E-04 | 4.22E-01 | 1.47E-11 | 1.14E-10 | 6.40E-02 |
| | Disposal | C4 | 1.54E-02 | 2.85E+01 | 1.57E-10 | 7.01E-09 | 4.32E-01 |
| Potential benefits and loads beyond the system boundaries | Reuse, recovery, recycling potential | D | -1.14E-02 | -3.29E+00 | -1.06E-10 | -2.91E-09 | -4.37E-01 |

IRP = Potential human exposure efficiency relative to U235;
ETP-fw = Potential comparative toxic unit for ecosystems;
HTP-c = Potential comparative toxic unit for humans;
HTP-nc = Potential comparative toxic unit for humans; and
SQP = Potential soil quality index.

### For info: LCA Results – 1 m² Biosourcé BOS01 Biopolymer film if Barrisol used the French electricity mix

| | | | IRP | ETP-fw | HTP-c | HTP-nc | SQP |
|---|---|---|---|---|---|---|---|
| | | | kBq $U^{235}$ eq | CTUe | CTUh | CTUh | dimensionless |
| Product stage | Raw material supply | A1 | 2.59E-01 | 2.80E+02 | 2.20E-09 | 9.37E-08 | 6.11E+00 |
| | Transport | A2 | 1.90E-03 | 2.88E-01 | 9.36E-12 | 3.03E-10 | 2.54E-01 |
| | Manufacturing | A3 | 7.98E-01 | 7.53E+00 | 1.93E-10 | 3.99E-09 | 7.88E+00 |
| | Total | A1-A3 | 1.06E+00 | 2.87E+02 | 2.40E-09 | 9.80E-08 | 1.43E+01 |

## LCA Results (continued) – 1 m² Biosourcé BOS01 Biopolymer film – hydro electricity

| Parameters describing resource use, primary energy | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | PERE | PERM | PERT | PENRE | PENRM | PENRT |
| | | | MJ | MJ | MJ | MJ | MJ | MJ |
| Product stage | Raw material supply | A1 | 1.21E+00 | 1.90E-01 | 1.40E+00 | 1.60E+01 | 4.75E+00 | 2.07E+01 |
| | Transport | A2 | 5.21E-03 | 0.00E+00 | 5.21E-03 | 3.63E-01 | 0.00E+00 | 3.63E-01 |
| | Manufacturing | A3 | 4.79E+00 | 2.33E+00 | 7.12E+00 | 9.56E-01 | 2.66E+00 | 3.62E+00 |
| | Total | A1-3 | 6.01E+00 | 2.52E+00 | 8.52E+00 | 1.73E+01 | 7.42E+00 | 2.47E+01 |
| Construction process stage | Transport | A4 | 1.33E-02 | 0.00E+00 | 1.33E-02 | 9.25E-01 | 0.00E+00 | 9.25E-01 |
| | Construction | A5 | 5.54E-02 | 0.00E+00 | 5.54E-02 | 1.38E+00 | 0.00E+00 | 1.38E+00 |
| Use stage | Use | B1 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| **Market Scenario - 27% recycled at end of life. Barrisol has a program to recycle biopolymer film** | | | | | | | | |
| End of life | Deconstruction, demolition | C1 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| | Transport | C2 | 4.42E-04 | 0.00E+00 | 4.42E-04 | 3.08E-02 | 0.00E+00 | 3.08E-02 |
| | Waste processing | C3 | 4.03E-03 | 0.00E+00 | 4.03E-03 | -1.52E+00 | 1.55E+00 | 3.25E-02 |
| | Disposal | C4 | 1.73E-01 | 0.00E+00 | 1.73E-01 | -2.44E+00 | 3.93E+00 | 1.49E+00 |
| Potential benefits and loads beyond the system | Reuse, recovery, recycling potential | D | -1.68E-01 | 0.00E+00 | -1.68E-01 | -1.96E+00 | -1.45E+00 | -3.42E+00 |

PERE = Use of renewable primary energy excluding renewable primary energy used as raw materials;
PERM = Use of renewable primary energy resources used as raw materials;
PERT = Total use of renewable primary energy resources;
PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials;
PENRM = Use of non-renewable primary energy resources used as raw materials;
PENRT = Total use of non-renewable primary energy resource

### For info: LCA Results – 1 m² Biosourcé BOS01 Biopolymer film if Barrisol used the French electricity mix

| | | | PERE | PERM | PERT | PENRE | PENRM | PENRT |
|---|---|---|---|---|---|---|---|---|
| | | | MJ | MJ | MJ | MJ | MJ | MJ |
| Product stage | Raw material supply | A1 | 1.21E+00 | 1.90E-01 | 1.40E+00 | 1.60E+01 | 4.75E+00 | 2.07E+01 |
| | Transport | A2 | 5.21E-03 | 0.00E+00 | 5.21E-03 | 3.63E-01 | 0.00E+00 | 3.63E-01 |
| | Manufacturing | A3 | 4.12E-01 | 2.33E+00 | 2.74E+00 | 1.78E+01 | 2.66E+00 | 2.04E+01 |
| | Total | A1-A3 | 1.62E+00 | 2.52E+00 | 4.14E+00 | 3.41E+01 | 7.42E+00 | 4.15E+01 |

## LCA Results (continued) – 1 m² Biosourcé BOS01 Biopolymer film – hydro electricity

| Parameters describing resource use, secondary materials and fuels, use of water | | | | | | |
|---|---|---|---|---|---|---|
| | | | SM | RSF | NRSF | FW |
| | | | kg | MJ net calorific value | MJ net calorific value | m³ |
| Product stage | Raw material supply | A1 | 1.57E-02 | 5.87E-04 | 0.00E+00 | 1.88E-02 |
| | Transport | A2 | 1.22E-04 | 1.34E-06 | 0.00E+00 | 4.12E-05 |
| | Manufacturing | A3 | 1.63E-01 | 1.17E-02 | 0.00E+00 | 4.60E-02 |
| | Total | A1-3 | 1.79E-01 | 1.23E-02 | 0.00E+00 | 6.48E-02 |
| Construction process stage | Transport | A4 | 3.10E-04 | 3.42E-06 | 0.00E+00 | 1.05E-04 |
| | Construction | A5 | 7.88E-03 | 8.74E-06 | 0.00E+00 | 4.64E-04 |
| Use stage | Use | B1 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| **Market Scenario - 27% recycled at end of life. Barrisol has a program to recycle biopolymer film** | | | | | | |
| End of life | Deconstruction, demolition | C1 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| | Transport | C2 | 1.03E-05 | 1.14E-07 | 0.00E+00 | 3.50E-06 |
| | Waste processing | C3 | 2.24E-04 | 1.77E-06 | 0.00E+00 | 3.32E-05 |
| | Disposal | C4 | 4.63E-04 | 2.64E-05 | 0.00E+00 | 3.03E-03 |
| Potential benefits and loads beyond the system boundaries | Reuse, recovery, recycling potential | D | -6.01E-04 | -6.28E-06 | 0.00E+00 | -2.30E-03 |

SM = Use of secondary material;
RSF = Use of renewable secondary fuels;
NRSF = Use of non-renewable secondary fuels;
FW = Net use of fresh water

### For info: LCA Results – 1 m² Biosourcé BOS01 Biopolymer film if Barrisol used the French electricity mix

| | | | SM | RSF | NRSF | FW |
|---|---|---|---|---|---|---|
| | | | kg | MJ net calorific value | MJ net calorific value | m³ |
| Product stage | Raw material supply | A1 | 1.57E-02 | 5.87E-04 | 0.00E+00 | 1.88E-02 |
| | Transport | A2 | 1.22E-04 | 1.34E-06 | 0.00E+00 | 4.12E-05 |
| | Manufacturing | A3 | 1.63E-01 | 1.17E-02 | 0.00E+00 | 7.95E-03 |
| | Total | A1-A3 | 1.79E-01 | 1.23E-02 | 0.00E+00 | 2.68E-02 |

## LCA Results (continued) – 1 m² Biosourcé BOS01 Biopolymer film – hydro electricity

| Other environmental information describing waste categories | | | | | |
|---|---|---|---|---|---|
| | | | HWD | NHWD | RWD |
| | | | kg | kg | kg |
| Product stage | Raw material supply | A1 | 1.30E-01 | 1.53E+01 | 8.20E-05 |
| | Transport | A2 | 4.07E-04 | 7.23E-03 | 2.50E-06 |
| | Manufacturing | A3 | 1.17E-02 | 3.56E-01 | 9.59E-06 |
| | Total | A1-3 | 1.42E-01 | 1.57E+01 | 9.41E-05 |
| Construction process stage | Transport | A4 | 1.04E-03 | 1.84E-02 | 6.37E-06 |
| | Construction | A5 | 1.82E-02 | 1.00E-01 | 4.17E-06 |
| Use stage | Use | B1 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| **Market Scenario - 27% recycled at end of life. Barrisol has a program to recycle biopolymer film** | | | | | |
| End of life | Deconstruction, demolition | C1 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| | Transport | C2 | 3.46E-05 | 6.14E-04 | 2.12E-07 |
| | Waste processing | C3 | 7.47E-04 | 1.06E-02 | 1.55E-07 |
| | Disposal | C4 | 1.84E-02 | 4.34E-01 | 5.91E-06 |
| Potential benefits and loads beyond the system boundaries | Reuse, recovery, recycling potential | D | -1.20E-02 | -2.13E-01 | -4.49E-06 |

HWD = Hazardous waste disposed;
NHWD = Non-hazardous waste disposed;
RWD = Radioactive waste disposed

### For info: LCA Results – 1 m² Biosourcé BOS01 Biopolymer film if Barrisol used the French electricity mix

| | | | HWD | NHWD | RWD |
|---|---|---|---|---|---|
| | | | kg | kg | kg |
| Product stage | Raw material supply | A1 | 1.30E-01 | 1.53E+01 | 8.20E-05 |
| | Transport | A2 | 4.07E-04 | 7.23E-03 | 2.50E-06 |
| | Manufacturing | A3 | 2.04E-02 | 4.71E-01 | 2.34E-04 |
| | Total | A1-A3 | 1.51E-01 | 1.58E+01 | 3.18E-04 |

## LCA Results (continued) – 1 m² Biosourcé BOS01 Biopolymer film – hydro electricity

| Other environmental information describing output flows – at end of life | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | CRU | MFR | MER | EE | Biogenic carbon (product) | Biogenic carbon (packagin |
| | | | kg | kg | kg | MJ per energy carrier | kg C | kg C |
| Product stage | Raw material supply | A1 | 0.00E+00 | 8.15E-04 | 9.44E-07 | 1.76E-02 | 0.00E+00 | -5.42E-03 |
| | Transport | A2 | 0.00E+00 | 1.12E-06 | 9.09E-09 | 7.79E-05 | 0.00E+00 | 0.00E+00 |
| | Manufacturing | A3 | 0.00E+00 | 3.92E-02 | 4.77E-07 | 2.88E-02 | 0.00E+00 | -7.84E-02 |
| | Total | A1-3 | 0.00E+00 | 4.00E-02 | 1.43E-06 | 4.65E-02 | 0.00E+00 | 8.32E-02 |
| Construction process stage | Transport | A4 | 0.00E+00 | 2.86E-06 | 2.32E-08 | 1.99E-04 | 0.00E+00 | 0.00E+00 |
| | Construction | A5 | 0.00E+00 | 6.45E-06 | 2.82E-07 | 6.06E-04 | 0.00E+00 | 0.00E+00 |
| Use stage | Use | B1 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| **Market Scenario - 27% recycled at end of life. Barrisol has a program to recycle biopolymer film** | | | | | | | | |
| End of life | Deconstruction, demolition | C1 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| | Transport | C2 | 0.00E+00 | 9.55E-08 | 7.72E-10 | 6.62E-06 | 0.00E+00 | 9.14E-10 |
| | Waste processing | C3 | 0.00E+00 | 6.17E-02 | 2.34E-08 | 4.24E-03 | 0.00E+00 | 6.17E-02 |
| | Disposal | C4 | 0.00E+00 | 1.31E-05 | 1.56E-07 | 1.34E-03 | 0.00E+00 | 7.87E-07 |
| Potential benefits and loads beyond the system | Reuse, recovery, recycling potential | D | 0.00E+00 | -1.63E-05 | -1.19E-07 | -1.60E-03 | 0.00E+00 | 0.00E+00 |

CRU = Components for reuse;
MFR = Materials for recycling
MER = Materials for energy recovery;
EE = Exported Energy

### For info: LCA Results – 1 m² Biosourcé BOS01 Biopolymer film if Barrisol used the French electricity mix

| | | | CRU | MFR | MER | EE | Biogenic carbon (product) | Biogenic carbon (packaging) |
|---|---|---|---|---|---|---|---|---|
| | | | kg | kg | kg | MJ per energy | kg C | kg C |
| Product stage | Raw material supply | A1 | 0.00E+00 | 8.15E-04 | 9.44E-07 | 1.76E-02 | 0.00E+00 | -5.42E-03 |
| | Transport | A2 | 0.00E+00 | 1.12E-06 | 9.09E-09 | 7.79E-05 | 0.00E+00 | 0.00E+00 |
| | Manufacturing | A3 | 0.00E+00 | 3.93E-02 | 5.16E-07 | 3.19E-02 | 0.00E+00 | -7.84E-02 |
| | Total | A1-A3 | 0.00E+00 | 4.01E-02 | 1.47E-06 | 4.96E-02 | 0.00E+00 | -8.38E-02 |

## Scenarios and additional technical information

| Scenarios and additional technical information | | | |
|---|---|---|---|
| Scenario | Parameter | Units | Results |
| A4 – Transport to the building site | 40% of the Barrisol Biosourcé BOS01 is used in France and the majority of the rest is used in Europe. For the purpose of this EPD, we have assumed the worst case scenario of 1500 km by road | | |
| | Fuel type / Vehicle type | Litre of diesel for the distance | 340 |
| | Distance: | km | 1500 |
| | Capacity utilisation (incl. empty returns) | % | 26% |
| | Bulk density of transported products – Biosourcé BOS01 | kg/m$^2$ | 0.25 |
| A5 – Installation in the building | The installation of Biosourcé BOS01 requires the use of heat (propane or electric heater depending on the project requirements) to ensure the ceiling system is stretched appropriately. For the purpose of this study, it was assumed that propane was used. There is no waste from the biopolymer film which is cut to size in the factory. | | |
| | Use of heat for the installation, for a 10 m$^2$ system | | |
| | Propane. | kg | 0.8 |
| | screws | kg | 0.021 |
| B1 – Use | The Biosourcé BOS01 ceiling system has an A+ rating for indoor air quality | | |
| C1 - Deconstruction | The Biosourcé BOS01 ceiling system is taken down manually | | |
| C2 - Transport from site to pre-processing facility or landfill | All elements of the system can be disassembled and recycled through commonly available waste management processing plant | | |
| | Transport by lorry to recycling plant | km | 50 |
| C3 - Pre-processing of uninstalled product (if relevant) | Processing of biopolymer through waste management facilities | | |
| C4 – Disposal | The biopolymer film can be recycled. Barrisol includes a clause in their contract with distributors that requires that any Barrisol ceiling should be recycled at end of life. For the purpose of this EPD, it was assumed that 27% of polymer was recycled as this was a generic value provided by Vinyl Plus' report. | | |
| | Recycling rate of Biosourcé BOS01 | % | 27 |
| Module D - Benefits and loads beyond the system | The Biosourcé BOS01 biopolymer film can be recycled at the Barrisol factory to make further biopolymer film | | |

## References


BSI. Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products. BS EN 15804:2012+A2:2019. London, BSI, 2019.

BSI. Environmental labels and declarations – Type III Environmental declarations – Principles and procedures. BS EN ISO 14025:2010 (exactly identical to ISO 14025:2006). London, BSI, 2010.

BSI. Environmental management – Life cycle assessment – Principles and framework.
BS EN ISO 14040:2006. London, BSI, 2006.

BSI. Environmental management – Life cycle assessment – requirements and guidelines.
BS EN ISO 14044:2006. London, BSI, 2006.

NF EN ISO 16000-11:2006 - Indoor air - Determination of the emission of volatile organic compounds from building products and furnishing. Sampling, storage of samples and preparation of test specimens

NF EN ISO 16000-9:2006 - Indoor air - Determination of the emission of volatile organic compounds from building products and furnishing. Emission test chamber method

NF EN ISO 16000-6. Indoor air - Part 6. Determination of organic compounds (VVOC, VOC, SVOC) in indoor and test chamber air by active sampling on sorbent tubes, thermal desorption and gas chromatography using MS or MS FID

NF EN 13999-3:2007+A1:2009 – Adhesives. Short term method for measuring the emission properties of low-solvent or solvent-free adhesives after application - Determination of volatile aldehydes

NF EN ISO 14389 :2022 – TC – Textiles. Determination of the phthalate content. Tetrahydrofuran method

NF EN 14716:2004 - Stretched ceilings. Requirements and test methods

NF EN ISO 354:2003 - Acoustics. Measurement of sound absorption in a reverberation room

DIN EN ISO 11654:1997 - Acoustics. Sound absorbers for use in buildings. Rating of sound absorption

ASTM C423 – 23 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method

NF EN ISO 11925-2:2020 – TC - Reaction to fire tests. Ignitability of products subjected to direct impingement of flame - Single-flame source test

NF EN 13823:2020+A1:2022 - Reaction to fire tests for building products. Building products excluding floorings exposed to the thermal attack by a single burning item

Vinyl plus report – Progress Report 2022 – reporting on 2021 activities – Vinyl Plus Progress Report 2022 – VinylPlus

## Appendix - interpretation of results and further analysis

40-60% of the input by mass is the biopolymer, 20-30% is the platicizer, 10-20% is from the fire retardant and 8-12% from the pigment. 28% of the impact in GWP total is associated with the biopolymer, 24% is from the flame retardant and 15% is from the pigment and from the plasticizer respectively. Less than 10% of the impact is GWP are associated with the use of energy to make the biopolymer film. 77% of the impact of the stretched ceiling (A1 to A3) is from the manufacturing of the biopolymer film

Graphical representation of the results