

Owner: Byggros A/S  
No.: MD-23201-EN  
Issued: 12-12-2023  
Valid to: 12-12-2028

3<sup>rd</sup> PARTY VERIFIED

**EPD**

VERIFIED ENVIRONMENTAL PRODUCT DECLARATION | ISO 14025 & EN 15804



**Owner of declaration**

BG Byggros A/S  
 Østbirkvej 2  
 5240 Odense NE  
 Denmark  
 CVR: 27556183



**Issued:**

12-12-2023

**Valid to:**

12-12-2028

**Programme**

EPD Danmark  
[www.epddanmark.dk](http://www.epddanmark.dk)



- Industry EPD
- Product EPD

**Declared product(s)**

BGreen-it sedum mats

Number of declared datasets/product variations: 1

**Production site**

Hallenslevvej 44,  
 4281 Gørlev  
 Denmark

No certificates for green electricity or biogas is used in A3 (production).

**Product(s) use**

BGreen-it Sedum mats provides a fully established green roof from the start and is carried out in a single work step. The mats are simply laid out directly on the roof membrane.

**Declared/ functional unit**

1m<sup>2</sup>

**Year of production site data (A3)**

2022

**EPD version**

Version no. 1

**Basis of calculation**

This EPD is developed in accordance with the European standard EN 15804+A2.

**Comparability**

EPDs of construction products may not be comparable if they do not comply with the requirements in EN 15804. EPD data may not be comparable if the datasets used are not developed in accordance with EN 15804 and if the background systems are not based on the same database.

**Validity**

This EPD has been verified in accordance with ISO 14025 and is valid for 5 years from the date of issue.

**Use**

The intended use of an EPD is to communicate scientifically based environmental information for construction products, for the purpose of assessing the environmental performance of buildings.

**EPD type**

- Cradle-to-gate with modules C1-C4 and D
- Cradle-to-gate with options, modules C1-C4 and D
- Cradle-to-grave and module D
- Cradle-to-gate
- Cradle-to-gate with options

CEN standard EN 15804 serves as the core PCR

Independent verification of the declaration and data, according to EN ISO 14025

- internal
- external

Third party verifier:

David Althoff Palm, Dalemarken AB

Martha Katrine Sørensen  
 EPD Danmark

**Life cycle stages and modules (MND = module not declared)**

Product			Construction process		Use								End of life				Beyond the system boundary
Raw material supply	Transport	Manufacturing	Transport	Installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Re-use, recovery and recycling potential	
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	MND	MND	MND	MND	MND	MND	MND	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	

# Product information

## Product description

The main product components are shown in the table below.

Material	Weight-% of declared product
Mat	1%
Soil substrate mix	83%
- Pumice stone	
- Compost mix	
Plants/water	16%

Ready-made sedum mats, that can be placed upon surfaces to obtain a finished green roof right after laying.

The mats are produced of polypropylene and polyamide.

## Product packaging:

The composition of the sales- and transport packaging of the product is shown in the table below. The total weight of packaging materials is 1.75 kg.

Material	Weight-% of packaging
Pallet	99.4%
Wrapping	0.6%

## Representativity

This declaration, including data collection and the modeled foreground system including results, represents the production of BGreen-it Sedum mats on the production site located in Gørlev, Denmark. Product specific data are based on average values collected for a one-year period (2022). Background data are based on the GaBi 2023 Professional Database and Ecoinvent version 3.9.1 database and are less than 10 years old. Generally, the used background datasets are of high quality, and the majority of the datasets are only a couple of years old.

## Hazardous substances

BGreen-it Sedum mats does not contain substances listed on the "Candidate List of Substances of Very High Concern for authorisation"

(<http://echa.europa.eu/candidate-list-table>)

## Essential characteristics

The size of one sedum mat is (LxWxH): 1000 x 780 x 30 mm.

Weight of unsaturated mat (dry): ~20 kg/m<sup>2</sup>.

Weight of saturated mat: ~38 kg/m<sup>2</sup>.

Water storage capacity: 45 Vol. %

Retention (System maximum water retention capacity): 17 L/m<sup>2</sup>.

Fire resistance class for growing media-substrate (EN 13501-1): B(roof)t2

Further technical information can be obtained by contacting the manufacturer or on the manufacturer's website: [www.byggros.com](http://www.byggros.com)

## Reference Service Life (RSL)

The reference service life is not included, since the use phase is not part of this EPD.

## Picture of product(s)



# LCA background

## Declared unit

The LCI and LCIA results in this EPD relates to 1 m<sup>2</sup> BGreen-it Sedum mats.

The weight of the mat varies depending on water content.

Name	Value	Unit
Declared unit	1	m <sup>2</sup>
Density (unsaturated)	20	kg/m <sup>2</sup>
Density (Saturated)	38	kg/ m <sup>2</sup>
Conversion factor to 1 kg.	0.03	-

## PCR

This EPD is developed according to the core rules for the product category of construction products in EN 15804.

## Guarantee of Origin – certificates

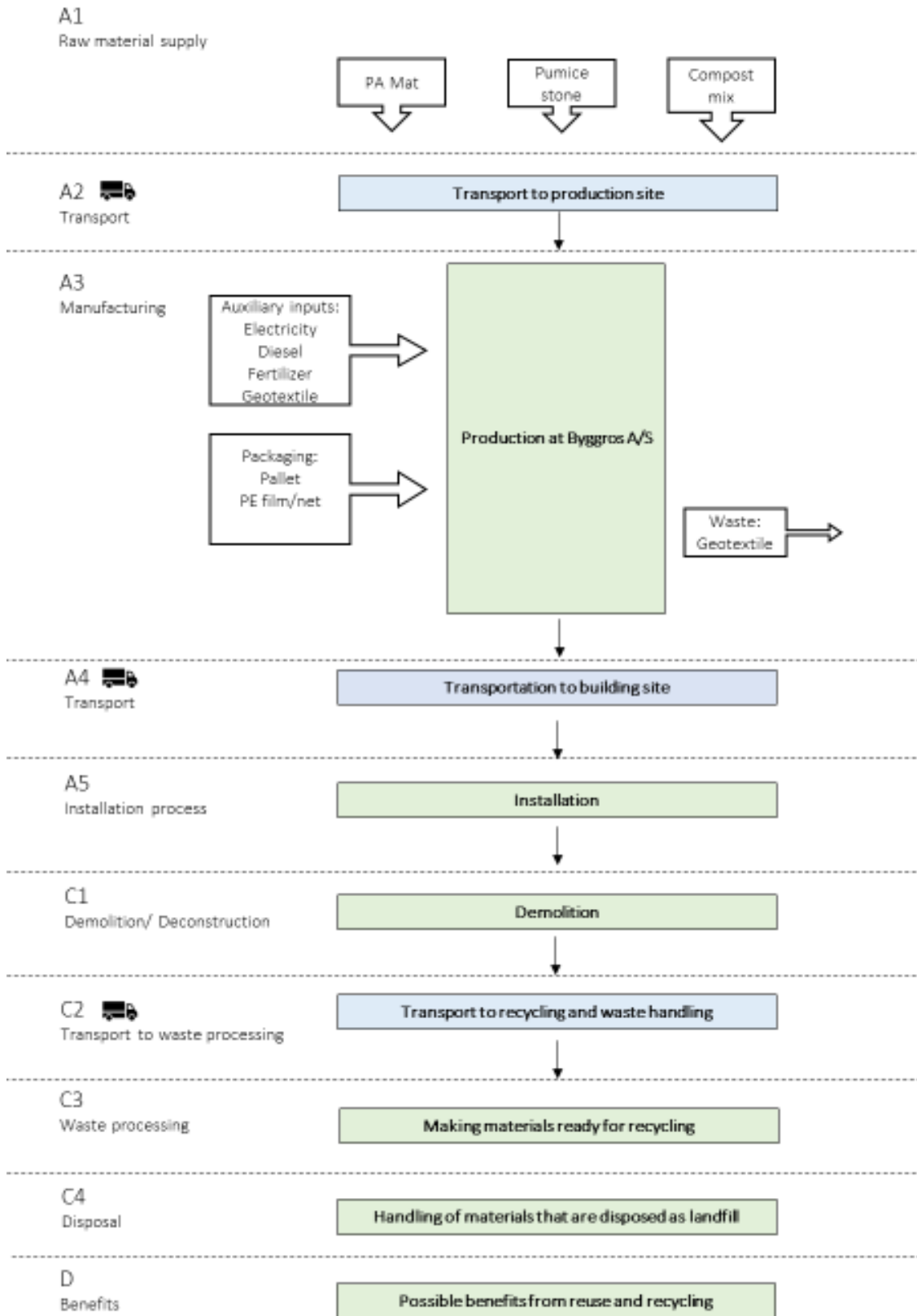
Foreground system:

No GO certificates are used. The electricity production is modelled using electricity residual mix.

Background system:

Upstream and downstream processes are modelled using electricity grid mix.

## FLOW CHART





## System boundary

This EPD is based on a Cradle-to-gate with options LCA, covering A1-A3, A4, A5, C1-C4 and D in which 100 weight-% has been accounted for.

The general rules for the exclusion of inputs and outputs follows the requirements in EN 15804, 6.3.5, where the total of neglected input flows per module shall be a maximum of 5 % of energy usage and mass and 1 % of energy usage and mass for unit processes.

### Product stage (A1-A3) includes:

A1 – Extraction and processing of raw materials

A2 – Transport to the production site

A3 – Manufacturing processes

The product stage comprises the acquisition of all raw materials, products and energy, transport to the production site, packaging and waste processing up to the “end-of-waste” state or final disposal. The LCA results are declared in aggregated form for the product stage, which means, that the sub-modules A1, A2 and A3 are declared as one module A1-A3.

The A1 raw materials are delivered in bulk to the production site.

The soil substrate mix consist of a compost mix delivered by truck from Horsens municipality and

pumice stone delivered from Mt. Hekla on Iceland with ship and truck. The compost is derived from garden and park biowaste. The soil substrate mix is mixed at the production site.

The mats are made of polypropylene and polyamide.

At the production site water is used. The production site gets the water from a nearby lake, so only the electricity used to pump the water is included as well as the impacts associated with the water depletion potential.

Fertilizer production and nutrient supply during the production phase (A3) is included.

Diesel used for machinery at the production site is included.

If there is waste from the bulk material like compost mix, it is recycled at the production site.

The final products are delivered on pallets and wrapped in PE film/net. Inputs for the packaging materials are included in A3.

When the mats are delivered, they have a finished sedum plant cover, which means that the sedum seeds/cuts used have grown, which is included in the input under the input Plant/water to account for the weight during transport. The biogenic carbon uptake during the growth and subsequent re-emission into the atmosphere throughout the life cycle is not included in this EPD.

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**Construction process stage (A4-A5) includes:**

The primary market is Denmark. For the A4 transport, a transport distance of 98 km with truck is used. This corresponds to the transport distance to Copenhagen (DK).

The BGreen-it Sedum mats are manually placed on the roof, so no installation energy is included in this study.

Packaging material is sent for either incineration or recycling according to EUROSTAT data for packaging waste in Denmark.

The credit related to energy recovery from incineration or material credit for recycling are included in module D.

**Use stage (B1-B7) includes:**

Not included.

**End of Life (C1-C4) includes:**

Like the installation, the demolition is done manually. A distance of 60 km with truck is used for C2.

The sedum mat is separated and compostable parts are sent to recycling (composting). The mat is incinerated.

No material is sent for final disposal/landfill (C4).

Material credits from recycling of material are included in module D.

**Re-use, recovery and recycling potential (D) includes:**

For the packaging materials from A5, energy recovery due to incineration of pallets are credited in module D, as well as the part of the plastic packaging sent for incineration. The Plastic packaging sent for recycling is credited with the value of Polyethylene high density granulate.

For the product, the material sent to recycling (composting) is credited. However, the pumice stone is not credited, as it is an inert material. Energy recovery from incineration of PA is credited.

# LCA results

ENVIRONMENTAL IMPACTS PER 1 m <sup>2</sup>									
Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	[kg CO <sub>2</sub> eq.]	7.67E-01	4.82E-01	2.94E+00	0.00E+00	2.27E-01	6.71E+00	0.00E+00	-4.32E+00
GWP-fossil	[kg CO <sub>2</sub> eq.]	7.27E+00	4.77E-01	2.59E-02	0.00E+00	2.25E-01	3.10E+00	0.00E+00	-7.13E-01
GWP-biogenic	[kg CO <sub>2</sub> eq.]	-6.52E+00	0.00E+00	2.91E+00	0.00E+00	0.00E+00	3.61E+00	0.00E+00	-3.61E+00
GWP-luluc	[kg CO <sub>2</sub> eq.]	1.75E-02	4.35E-03	9.83E-05	0.00E+00	2.08E-03	2.95E-03	0.00E+00	-4.84E-04
ODP	[kg CFC 11 eq.]	2.44E-08	6.11E-14	1.52E-14	0.00E+00	2.92E-14	9.51E-14	0.00E+00	-3.04E-12
AP	[mol H <sup>+</sup> eq.]	6.26E-02	6.80E-04	3.66E-05	0.00E+00	3.45E-04	4.65E-02	0.00E+00	-7.47E-03
EP-freshwater	[kg P eq.]	2.89E-04	1.72E-06	4.24E-08	0.00E+00	8.21E-07	3.07E-08	0.00E+00	-1.67E-06
EP-marine	[kg N eq.]	1.31E-02	2.44E-04	1.19E-05	0.00E+00	1.27E-04	2.05E-03	0.00E+00	-4.00E-04
EP-terrestrial	[mol N eq.]	2.82E-01	2.90E-03	1.56E-04	0.00E+00	1.50E-03	2.13E-01	0.00E+00	-3.27E-02
POCP	[kg NMVOC eq.]	4.33E-02	5.96E-04	3.04E-05	0.00E+00	3.04E-04	1.41E-02	0.00E+00	-2.37E-03
ADPm <sup>1</sup>	[kg Sb eq.]	8.67E-06	3.09E-08	8.23E-10	0.00E+00	1.48E-08	9.34E-10	0.00E+00	-3.42E-08
ADPf <sup>1</sup>	[MJ]	1.04E+02	6.40E+00	1.78E-01	0.00E+00	3.06E+00	8.18E-01	0.00E+00	-5.92E+00
WDP <sup>1</sup>	[m <sup>3</sup> world eq. deprived]	1.69E+00	5.68E-03	1.39E-02	0.00E+00	2.71E-03	4.04E-01	0.00E+00	-1.05E-01
Caption	GWP-total = Globale Warming Potential - total; GWP-fossil = Global Warming Potential - fossil fuels; GWP-biogenic = Global Warming Potential - biogenic; GWP-luluc = Global Warming Potential - land use and land use change; ODP = Ozone Depletion; AP = Acidification; EP-freshwater = Eutrophication – aquatic freshwater; EP-marine = Eutrophication – aquatic marine; EP-terrestrial = Eutrophication – terrestrial; POCP = Photochemical zone formation; ADPm = Abiotic Depletion Potential – minerals and metals; ADPf = Abiotic Depletion Potential – fossil fuels; WDP = water depletion potential								
	The numbers are declared in scientific notation, fx 1,95E+02. This number can also be written as: 1,95*10 <sup>2</sup> or 195, while 1,12E-11 is the same as 1,12*10 <sup>-11</sup> or 0,0000000000112.								
Disclaimer	<sup>1</sup> The results of this environmental indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.								

The GWP-biogenic content is balanced out in the LCA study according to the rules in EN 15804. This means that even though the materials are recycled, an emission corresponding to the uptake in A1 is included in C3.

ADDITIONAL ENVIRONMENTAL IMPACTS PER 1 m <sup>2</sup>									
Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	[Disease incidence]	1.20E-06	4.99E-09	2.83E-10	0.00E+00	3.04E-09	3.09E-07	0.00E+00	-5.16E-08
IRP <sup>2</sup>	[kBq U235 eq.]	3.60E-01	1.79E-03	3.27E-04	0.00E+00	8.57E-04	1.56E-03	0.00E+00	-9.14E-02
ETP-fw <sup>1</sup>	[CTUe]	2.47E+02	4.54E+00	1.19E-01	0.00E+00	2.17E+00	3.96E+00	0.00E+00	-2.74E+00
HTP-c <sup>1</sup>	[CTUh]	1.65E-09	9.30E-11	3.50E-12	0.00E+00	4.45E-11	7.38E-12	0.00E+00	-7.90E-11
HTP-nc <sup>1</sup>	[CTUh]	7.09E-08	4.98E-09	2.12E-10	0.00E+00	2.37E-09	2.85E-10	0.00E+00	-3.04E-09
SQP <sup>1</sup>	-	3.79E+01	2.67E+00	7.01E-02	0.00E+00	1.28E+00	5.73E-02	0.00E+00	-5.96E+00
Caption	PM = Particulate Matter emissions; IRP = Ionizing radiation – human health; ETP-fw = Eco toxicity – freshwater; HTP-c = Human toxicity – cancer effects; HTP-nc = Human toxicity – non cancer effects; SQP = Soil Quality (dimensionless)								
	The numbers are declared in scientific notation, fx 1,95E+02. This number can also be written as: 1,95*10 <sup>2</sup> or 195, while 1,12E-11 is the same as 1,12*10 <sup>-11</sup> or 0,0000000000112.								
Disclaimers	<sup>1</sup> The results of this environmental indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.								
	<sup>2</sup> This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.								



RESOURCE USE PER 1 m <sup>2</sup>									
Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	[MJ]	5.79E+00	4.66E-01	1.90E-02	0.00E+00	2.23E-01	5.52E-02	8.02E+00	-3.67E+00
PERM	[MJ]	3.94E+01	0.00E+00	-3.14E+01	0.00E+00	0.00E+00	-8.02E+00	0.00E+00	0.00E+00
PERT	[MJ]	4.52E+01	4.66E-01	-3.14E+01	0.00E+00	2.23E-01	-7.97E+00	0.00E+00	-3.67E+00
PENRE	[MJ]	1.04E+02	6.42E+00	1.79E-01	0.00E+00	3.07E+00	8.27E-01	1.27E+01	-5.92E+00
PENRM	[MJ]	1.30E+01	0.00E+00	-3.00E-01	0.00E+00	0.00E+00	-1.27E+01	0.00E+00	0.00E+00
PENRT	[MJ]	1.17E+02	6.42E+00	-1.22E-01	0.00E+00	3.07E+00	-1.18E+01	0.00E+00	-5.92E+00
SM	[kg]	1.68E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	[m <sup>3</sup> ]	5.80E-01	5.10E-04	3.35E-04	0.00E+00	2.44E-04	5.70E-03	0.00E+00	-2.80E-03
Caption	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non renewable primary energy excluding non renewable primary energy resources used as raw materials; PENRM = Use of non renewable primary energy resources used as raw materials; PENRT = Total use of non renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non renewable secondary fuels; FW = Net use of fresh water								
	The numbers are declared in scientific notation, fx 1,95E+02. This number can also be written as: 1,95*10 <sup>2</sup> or 195, while 1,12E-11 is the same as 1,12*10 <sup>-11</sup> or 0,000000000112.								

WASTE CATEGORIES AND OUTPUT FLOWS PER 1 m <sup>2</sup>									
Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	[kg]	4.99E-09	1.99E-11	1.14E-12	0.00E+00	9.51E-12	6.11E-10	0.00E+00	-3.21E-10
NHWD	[kg]	3.61E-02	9.79E-04	3.46E-03	0.00E+00	4.68E-04	1.52E-02	0.00E+00	-1.26E-02
RWD	[kg]	4.48E-04	1.20E-05	2.09E-06	0.00E+00	5.75E-06	1.03E-05	0.00E+00	-5.50E-04

CRU	[kg]	2.75E-02	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	1.68E+00	0.00E+00	0.00E+00	3.76E+01	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
EEE	[MJ]	0.00E+00	0.00E+00	1.82E-01	0.00E+00	0.00E+00	1.64E+00	0.00E+00	0.00E+00
EET	[MJ]	0.00E+00	0.00E+00	3.28E-01	0.00E+00	0.00E+00	2.92E+00	0.00E+00	0.00E+00
Caption	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; EEE = Exported electrical energy; EET = Exported thermal energy								
	The numbers are declared in scientific notation, fx 1,95E+02. This number can also be written as: 1,95*10 <sup>2</sup> or 195, while 1,12E-11 is the same as 1,12*10 <sup>-11</sup> or 0,000000000112.								

BIOGENIC CARBON CONTENT PER 1 m <sup>2</sup>		
Parameter	Unit	At the factory gate
Biogenic carbon content in product	[kg C]	1.0
Biogenic carbon content in accompanying packaging	[kg C]	0.8
Note	1 kg biogenic carbon is equivalent to 44/12 kg of CO <sub>2</sub>	

# Additional information

## LCA interpretation

The compost mix has the highest impact in four out of the 19 categories, including GWP-biogenic and GWP-total.

The production of PA granulate has the biggest impact on four out of the 19 categories including GWP-fossil.

In general, the environmental impacts stem from varying sources, and it is not one specific material or activity that is the main driver of environmental impact.

## Technical information on scenarios

### Transport to the building site (A4)

Scenario information	Value	Unit
Fuel type	Diesel	-
Vehicle type	GLO: Truck, Euro 6 A-C, 12 - 14t gross weight /9.3t payload capacity	-
Transport distance Copenhagen (DK)	98	km
Capacity utilisation (including empty runs)	51	%
Gross density of products transported	40	kg/m <sup>3</sup>

### Installation of the product in the building (A5)

The BGreen-it Sedum mats are manually placed on the roof, so no installation energy is included. The packaging waste (1.75kg) are sent for recycling/incineration.

### End of life (C1-C4)

The weight at end of life depends on plant growth. However, since the use phase is not included in the EPD, the C1-C4 weight is based on the production weight.

Scenario information	Value	Unit
Collected separately	38	kg
Collected with mixed waste		kg
For reuse		kg
For recycling	37.63	kg
For energy recovery	0.37	kg
For final disposal		kg
Assumptions for scenario development		As appropriate

### Re-use, recovery and recycling potential (D)

Weight related to plant growth during production is not credited in module D.

Scenario information/Materiel	Value	Unit
<b>Product</b>		
Energy recovery from waste incineration, Thermal - Mat	2.92	MJ
Energy recovery from waste incineration, Electrical - Mat	1.64	MJ
Recycled material, Compost	4.7	kg
<b>Product packaging</b>		
Recycled material, Plastic packaging	0.000158	kg
Energy recovery from waste incineration, Thermal - Plastic packaging	0.0431	MJ
Energy recovery from waste incineration, Electrical - Plastic packaging	0.0241	MJ
Energy recovery from waste incineration, Thermal - Pallet	0.285	MJ
Energy recovery from waste incineration, Electrical - Pallet	0.158	MJ

#### Indoor air

*The EPD does not give information on release of dangerous substances to indoor air because the horizontal standards on the relevant measurements are not available. Read more in EN15804+A1 chapter 7.4.1.*

#### Soil and water

*The EPD does not give information on release of dangerous substances to soil and water because the horizontal standards on the relevant measurements are not available. Read more in EN15804+A1 chapter 7.4.2.*

## References

<b>Publisher</b>	 <a href="http://www.epddanmark.dk">www.epddanmark.dk</a> <small>Template version 2023.1</small>
<b>Programme operator</b>	Danish Technological Institute Buildings & Environment Gregersensvej DK-2630 Taastrup <a href="http://www.teknologisk.dk">www.teknologisk.dk</a>
<b>LCA-practitioner</b>	<i>Rikke Zuma Kempf Bernberg, COWI A/S            Parallelvej 2, 2800 Kongens Lyngby</i>
<b>LCA software / background data</b>	<i>GaBi 2023 Professional Database            Ecoinvent version 3.9.1</i>
<b>3<sup>rd</sup> party verifier</b>	David Althoff Palm Dalemarken AB Beryllvägen 25 442 60 Kode Sweden <a href="http://www.dalemarken.dk">www.dalemarken.dk</a>

### General programme instructions

General Programme Instructions, version 2.0, spring 2020  
[www.epddanmark.dk](http://www.epddanmark.dk)

### EN 15804

DS/EN 15804 + A2:2019 - "Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products"

### EN 15942

DS/EN 15942:2011 – " Sustainability of construction works – Environmental product declarations – Communication format business-to-business"

### ISO 14025

DS/EN ISO 14025:2010 – " Environmental labels and declarations – Type III environmental declarations – Principles and procedures"

### ISO 14040

DS/EN ISO 14040:2008 – " Environmental management – Life cycle assessment – Principles and framework"

### ISO 14044

DS/EN ISO 14044:2008 – " Environmental management – Life cycle assessment – Requirements and guidelines"