

Owner: Byggros A/S
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3rd 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:

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Valid to:

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Programme

EPD Danmark
www.epddanmark.dk



- Industry EPD
- Product EPD

Declared product(s)

BGreen-it sedum trays

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

Declared/ functional unit

1m²

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	
X	X	X	X	X	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X	

Product information

Product description

The main product components are shown in the table below.

Material	Weight-% of declared product
PET Tray	4%
Soil substrate mix	86%
- Pumice stone	
- Compost mix	
Plants/water	10%

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

The trays are produced from PET 100% recycled plastic, which is very resistant to heat and cold influences.

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 1.76 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 trays 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 trays 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 tray is (LxWxH): 370 x 570 x 60mm.

Weight of unsaturated tray (dry): ~25 kg/m².

Weight of saturated tray: ~50 kg/m².

Water storage capacity: 50 Vol. %

Retention (System maximum water retention capacity): 25L/m².

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

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 m² BGreen-it Sedum trays.

The weight of the tray varies depending on water content.

Name	Value	Unit
Declared unit	1	m ²
Density (unsaturated)	25	kg/m ²
Density (Saturated)	50	kg/ m ²
Conversion factor to 1 kg.	0.02	-

PCR

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

Guarantee of Origin – certificates

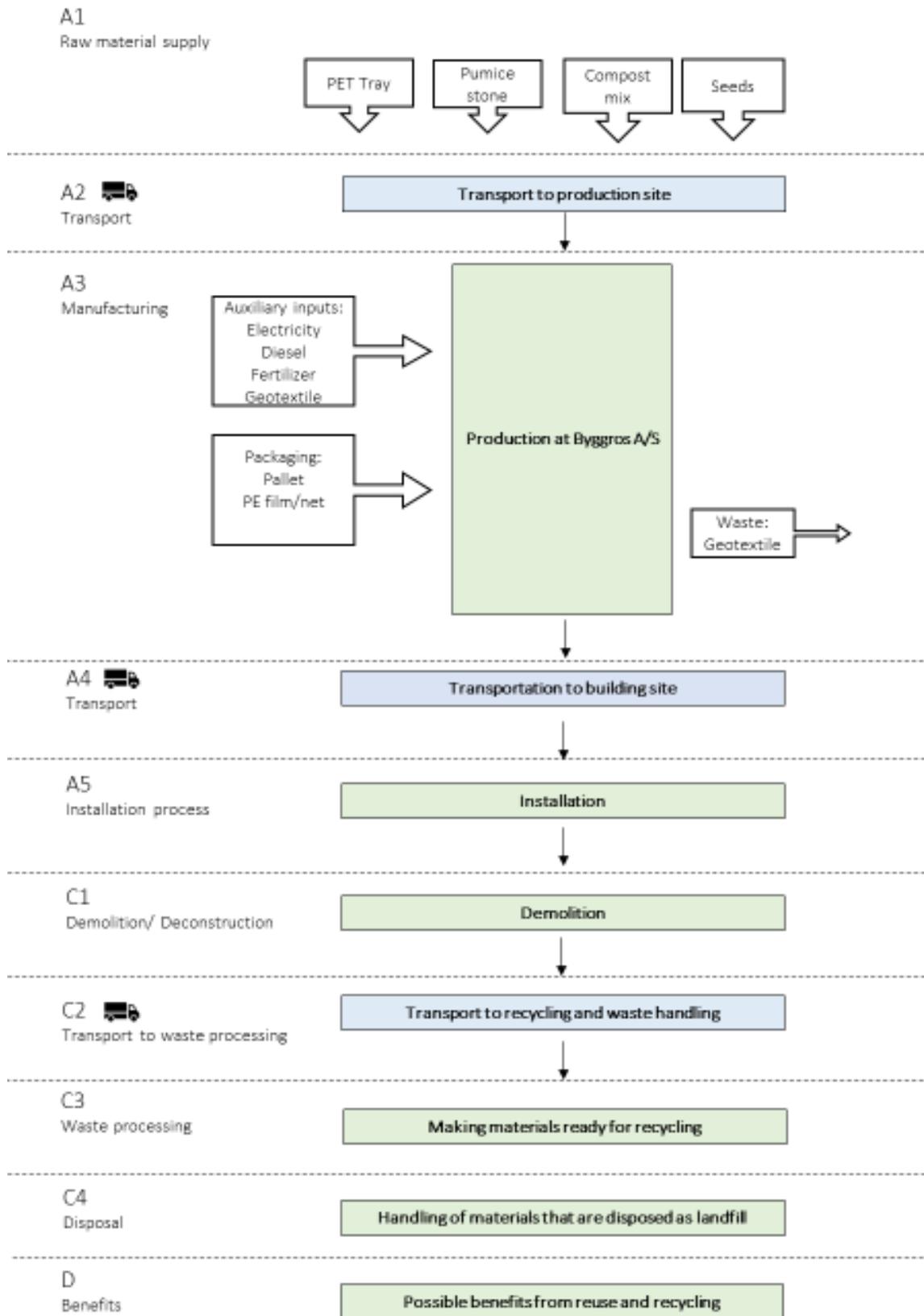
Foreground system:

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 trays are made of secondary PET granulate and delivered by truck from ST Plast in Denmark.

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 trays 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.



Tray with built-in drain and water reservoir.
Mål (LxBxH): 370 x 570 x 60 mm



The tray is filled with a specially mixed lightweight soil substrate



The tray contains selected sedum species.

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 Trays 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 trays can be returned to Byggros A/S through their Takeback system. The trays are collected and transported back to the manufacturing site. Here, the plastic trays are emptied of soil substrate and plant parts, which are reused in the production. The plastic trays are recycled at Recycling DK. The Takeback system ensures that all components of the sedum tray is recycled.



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 sent to recycling in C3, the outputs from trays are credited according to materials. Secondary PET, which enters the system burden-free, is not credited in module D.

LCA results

ENVIRONMENTAL IMPACTS PER 1 m ²									
Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	[kg CO ₂ eq.]	-1.02E+00	6.27E-01	2.94E+00	0.00E+00	2.99E-01	5.46E+00	0.00E+00	-1.19E+01
GWP-fossil	[kg CO ₂ eq.]	6.78E+00	6.22E-01	3.26E-02	0.00E+00	2.96E-01	5.47E-01	0.00E+00	-6.99E+00
GWP-biogenic	[kg CO ₂ eq.]	-7.82E+00	0.00E+00	2.91E+00	0.00E+00	0.00E+00	4.91E+00	0.00E+00	-4.91E+00
GWP-luluc	[kg CO ₂ eq.]	2.02E-02	5.66E-03	9.86E-05	0.00E+00	2.74E-03	4.93E-04	0.00E+00	-5.88E-03
ODP	[kg CFC 11 eq.]	4.82E-08	7.96E-14	1.65E-14	0.00E+00	3.84E-14	7.33E-09	0.00E+00	-1.10E-11
AP	[mol H ⁺ eq.]	7.92E-02	8.86E-04	3.75E-05	0.00E+00	4.54E-04	1.98E-03	0.00E+00	-5.28E-02
EP-freshwater	[kg P eq.]	7.75E-04	2.24E-06	4.29E-08	0.00E+00	1.08E-06	1.01E-04	0.00E+00	-8.83E-06
EP-marine	[kg N eq.]	1.50E-02	3.18E-04	1.21E-05	0.00E+00	1.68E-04	7.43E-04	0.00E+00	-3.71E-03
EP-terrestrial	[mol N eq.]	3.51E-01	3.78E-03	1.60E-04	0.00E+00	1.98E-03	6.34E-03	0.00E+00	-2.31E-01
POCP	[kg NMVOC eq.]	4.95E-02	7.76E-04	3.11E-05	0.00E+00	3.99E-04	2.43E-03	0.00E+00	-2.05E-02
ADPm ¹	[kg Sb eq.]	1.10E-05	4.03E-08	8.36E-10	0.00E+00	1.95E-08	2.59E-06	0.00E+00	-1.90E-07
ADPf ¹	[MJ]	7.77E+01	8.33E+00	1.81E-01	0.00E+00	4.03E+00	7.88E+00	0.00E+00	-1.34E+02
WDP ¹	[m ³ world eq. deprived]	2.87E+00	7.39E-03	1.45E-02	0.00E+00	3.57E-03	1.06E-01	0.00E+00	-2.00E+00
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 ² or 195, while 1,12E-11 is the same as 1,12*10 ⁻¹¹ or 0,0000000000112.								
Disclaimer	¹ 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 ²									
Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	[Disease incidence]	1.54E-06	6.49E-09	2.94E-10	0.00E+00	4.00E-09	3.27E-08	0.00E+00	-9.24E-07
IRP ²	[kBq U235 eq.]	4.48E-01	2.33E-03	3.42E-04	0.00E+00	1.13E-03	2.68E-02	0.00E+00	-3.20E-01
ETP-fw ¹	[CTUe]	2.50E+02	5.92E+00	1.21E-01	0.00E+00	2.86E+00	1.97E+01	0.00E+00	-6.68E+01
HTP-c ¹	[CTUh]	1.30E-09	1.21E-10	3.61E-12	0.00E+00	5.85E-11	8.78E-10	0.00E+00	-1.58E-09
HTP-nc ¹	[CTUh]	5.87E-08	6.49E-09	2.22E-10	0.00E+00	3.12E-09	8.36E-09	0.00E+00	-6.41E-08
SQP ¹	-	4.12E+01	3.48E+00	7.09E-02	0.00E+00	1.68E+00	5.67E+00	0.00E+00	-5.58E+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 ² or 195, while 1,12E-11 is the same as 1,12*10 ⁻¹¹ or 0,0000000000112.								
Disclaimers	¹ 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.								
	² 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 ²									
Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	[MJ]	4.94E+00	6.06E-01	1.97E-02	0.00E+00	2.93E-01	3.62E-01	0.00E+00	-7.92E+00
PERM	[MJ]	4.23E+01	0.00E+00	-3.14E+01	0.00E+00	0.00E+00	-1.09E+01	0.00E+00	0.00E+00
PERT	[MJ]	4.73E+01	6.06E-01	-3.14E+01	0.00E+00	2.93E-01	-1.05E+01	0.00E+00	-7.92E+00
PENRE	[MJ]	7.78E+01	8.36E+00	1.82E-01	0.00E+00	4.04E+00	7.88E+00	0.00E+00	-1.34E+02
PENRM	[MJ]	4.38E+01	0.00E+00	-4.50E-01	0.00E+00	0.00E+00	-4.34E+01	0.00E+00	0.00E+00
PENRT	[MJ]	1.22E+02	8.36E+00	-2.68E-01	0.00E+00	4.04E+00	-3.55E+01	0.00E+00	-1.34E+02
SM	[kg]	3.63E+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 ³]	6.00E-01	6.64E-04	3.50E-04	0.00E+00	3.21E-04	2.46E-03	0.00E+00	-4.61E-02
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 ² or 195, while 1,12E-11 is the same as 1,12*10 ⁻¹¹ or 0,0000000000112.								

WASTE CATEGORIES AND OUTPUT FLOWS PER 1 m ²									
Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	[kg]	6.89E-10	2.59E-11	1.16E-12	0.00E+00	1.25E-11	0.00E+00	0.00E+00	-7.35E-09
NHWD	[kg]	1.73E-02	1.27E-03	4.06E-03	0.00E+00	6.16E-04	0.00E+00	0.00E+00	-5.42E-02
RWD	[kg]	1.56E-04	1.56E-05	2.20E-06	0.00E+00	7.56E-06	0.00E+00	0.00E+00	-1.95E-03

CRU	[kg]	2.75E-02	0.00E+00						
MFR	[kg]	0.00E+00	0.00E+00	1.68E+00	0.00E+00	0.00E+00	5.00E+01	0.00E+00	0.00E+00
MER	[kg]	0.00E+00							
EEE	[MJ]	0.00E+00	0.00E+00	1.94E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EET	[MJ]	0.00E+00	0.00E+00	3.50E-01	0.00E+00	0.00E+00	0.00E+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 ² or 195, while 1,12E-11 is the same as 1,12*10 ⁻¹¹ or 0,0000000000112.								

BIOGENIC CARBON CONTENT PER 1 m ²		
Parameter	Unit	At the factory gate
Biogenic carbon content in product	[kg C]	1.3
Biogenic carbon content in accompanying packaging	[kg C]	0.8
Note	1 kg biogenic carbon is equivalent to 44/12 kg of CO ₂	

Additional information

LCA interpretation

Regarding GWP, the compost mix has the biggest influence. Both regarding uptake of biogenic carbon due to the input of biowaste mainly from park waste, but also regarding emission of fossil CO₂ related to the handling of the biowaste when it is turned into compost. The compost mix has the highest impact in five out of the 19 categories.

Electricity consumption for the production of trays has the highest impact in seven of the categories; ODP, EP-freshwater, ADPm, ADPf, WDP, IRP, and HTP-nc .

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	52	kg/m ³

Installation of the product in the building (A5)

The BGreen-it sedum Trays are manually placed on the roof, so no installation energy is included. The packaging waste (1.76kg) 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	50	kg
Collected with mixed waste		kg
For reuse		kg
For recycling	50	kg
For energy recovery		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
Product		
Recycled material, PET tray	1.9	kg
Recycled material, Pumice stone	37	kg
Recycled material, Compost	6.4	kg
Product packaging		
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

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

General programme instructions

General Programme Instructions, version 2.0, spring 2020
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"