

Environmental Product Declaration



In accordance with ISO 14025 and EN 15804:2012+A2:2019 for:

Extensive Green Roof System: Veg Tech Sedumtak 1-27 (without or with extra drainage)

from Veg Tech AB



Veg Tech

Programme:	The International EPD® System, www.environdec.com
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An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com





General information

Programme information

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
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CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product category rules (PCR): PCR: 2019:14 Construction products and construction services, version 1.1
PCR review was conducted by: PCR: The Technical Committee of the International EPD® System
Independent third-party verification of the declaration and data, according to ISO 14025:2006: <input type="checkbox"/> EPD process certification <input checked="" type="checkbox"/> EPD verification
Third party verifier: Mats Zackrisson, Research Institutes of Sweden AB Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804. For further information about comparability, see EN 15804 and ISO 14025.



Company information

Owner of the EPD: Veg Tech AB

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Description of the organisation: Veg Tech is the leading supplier of vegetation technology in the Nordic region and is a part of Nordic Waterproofing Group. We grow, develop and supply buildings and cities with multifunctional plant systems, that contribute to stormwater management, improve water quality and benefit biodiversity.

Name and location of production site(s): Vislanda, southern Sweden.

Product information

Product name: Veg Tech Extensive Green Roof System: Sedum 1-27 (without or with extra drainage)

Application:

A green roof can be installed for different purposes, it provides many different benefits. For example, green roofs delays and reduces the amount of stormwater, counteract urban heat islands, benefits biodiversity and adds value to residents since greenery has a positive effect on the well-being.

The system Veg Tech Sedumtak 1-27 is designed for roofs with a slope of 1 to 27 degrees and is installed directly on top of the waterproofing membrane that is a part of the underlying roof construction. If properly installed and maintained the sedum roof can last as long as the life of the building.

Product description:

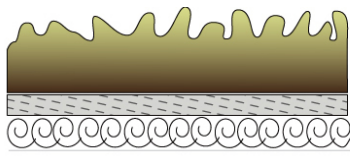
Only a brief product description is included in this EPD. For further information and detailed product documentation, please visit www.vegtech.se.

Veg Tech Sedumtak 1-27 is an extensive green roof system that is light weight, have high water retention capacity and is easy to install. The system includes up to three main components, Veg Tech pre vegetated sedum mat with biochar (*Veg Tech Sedummatta med biokol*), a water holding needled felt (VT-filt) and a drainage layer (Xerodrän VT17) used where additional drainage is required (e.g in low points where there is a risk of accumulation of standing water and in long roof slopes).

The sedum mat consists of vegetation, a mineral growing media (substrate) containing biochar and a load-bearing structure (carrier) that reinforces the substrate and protects against erosion. The shrink-free carrier consists of a three-dimensional loop network with a non-woven geotextile thermally bound on the underside and is stable over time. The growing media is optimized for the conditions that prevail on roofs. The use of biochar in the substrate entails soil-improving properties that are especially important for greenery in urban environments. Biochar is also a potential carbon sink. (See further information in section "Additional information"). The vegetation consists of drought-resistant sedum species adapted to the Nordic climate. The sedum mat is cultivated in open fields by Veg Tech in Sweden.

The felt is manufactured from textile fibres.

The drainage layer consists of a three-dimensional synthetic loop network with a non-woven, stable and air permeable geotextile on the top. The components are thermally bonded over the entire contact surface. Xerodrän VT17 is CE-marked according to hEN 13252:2016.



30 mm Veg Tech Sedummatta

10 mm VT-filt

17 mm Xerodrän VT17 (when needed)

Constructional data

Name	Without extra drainage	With 30% extra drainage	Unit
System height	40	57	mm
System weight unsaturated (dry)	~30	~30	kg/m ²
System weight saturated	~50	~50	kg/m ²
Retention (System maximum water retention capacity)*	~20	~20	l/m ²
Runoff coefficient C**	C _s = 0,6/0,7	C _s = 0,6/0,7	-
Fire resistance class for growing media (EN 13501-5:2016)	B _{ROOF} (t2)	B _{ROOF} (t2)	-

* Roof slope 1-2°

** According to the FLL Green Roof Guidelines edition 2018 (roof pitch up to/greater than 5°, 4-6 cm substrate)

LCA information

Declared unit:

1 m² Veg Tech Sedumtak 1-27, in two varieties:

- 1 m² Veg Tech Sedumtak 1-27 without extra drainage, consisting of a 30 mm sedum mat and 10 mm VT-filt.
- 1 m² Veg Tech Sedumtak 1-27 with extra drainage, consisting of a 30 mm sedum mat, 10 mm VT-filt, and 17 mm Xerodrän VT17 under 30% of the surface.

Veg Tech Sedumtak 1-27 without extra drainage	Value	Unit
Grammage (dry)	31,2	kg/m ²
Conversion factor from 1 m ² to 1 kg	0,0321	-
Declared unit	1	m ²

Veg Tech Sedumtak 1-27 with extra drainage under 30% of the surface	Value	Unit
Grammage (dry)	31,3	kg/m ²
Conversion factor from 1 m ² to 1 kg	0,0320	-
Declared unit	1	m ²

Reference service life:

If properly mounted and maintained the vegetation is gradually rejuvenated and Veg Tech green roof systems can have the same service life as the building. Thus, a set reference service life cannot be determined.

Time representativeness:

The year under study for this EPD is 2020.

Database(s) and LCA software used:

Gabi professional database 2021.2 and Ecoinvent 3.7.1, with LCA software GaBi (version 10.6.0.110).

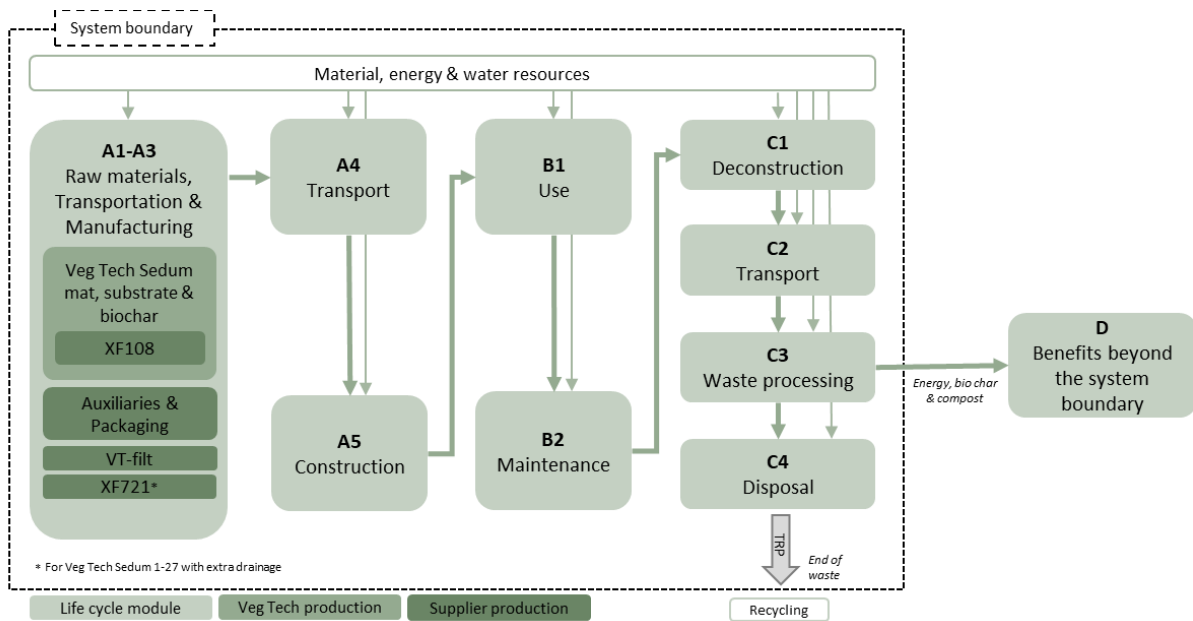


System boundary:

The system boundary is in line with the EPD type cradle-to-gate with options, modules A1-A5, modules B1-B2, modules C1–C4, and module D.

The cultivation of the vegetation at Veg Tech manufacturing site is included, along with the fertilization and watering in the Use stage. The carbon sequestration and release the vegetation has during growth and withering in the Use stage, along with its end-of-life management, is however not part of this EPD.

System diagram:



More information:

LCA Practitioner: Agnes Rönnblom, Ramboll



LCA Practitioner: Axel Cullberg, Ramboll





Modules declared, geographical scope, share of specific data (in GWP-GHG indicator) and data variation:

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	A1-A3			A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	X			X	X	X	X	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	EU/ CN	EU	SE	SE	SE	SE	SE	ND	ND	ND	ND	ND	SE	SE	SE	SE	SE
Specific data used	99,5%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	Veg Tech Sedumtak 1-27 without or with extra drainage results in a variation of <10% in GWP-GHG			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	Not relevant			-	-	-	-	-	-	-	-	-	-	-	-	-	-



LCA: Scenarios and additional technical information

The following information describe the scenarios of the different modules of the EPD.

Production stage (A1-A3)

The VT-filt contains textile fibres that are post-industrial recycled. Since information on the full supply chain's production processes could not be provided, datasets for virgin production have been applied for conservative measures.

Transport to user (A4)

The transport scenario is based on an average distance between Veg Tech's manufacturing facility in Vislanda to customers in Malmö, Gothenburg, and Stockholm.

Vehicle	Capacity utilisation [%]	Vehicle specifications	Distance [km]	Fuel consumption
Truck	61	Truck, Euro 6, 28 - 32t gw	280	0,025 l/tkm

Installation (A5)

Module A5 covers the installation of the product at a construction site. The product is lifted to installation altitude using either a crane-truck or an electrical tower crane depending on the installation site, thus a scenario where half of each installation method was used. The A5 module also includes waste from packaging and installation, assumed to be incinerated.

Resource	Amount	Unit/m ²
Diesel	0,025	l
Electricity	0,156	kWh
Water	5	l
Incinerable waste	0,211	kg

Use (B1)/Maintenance (B2)

The results presented for modules B1-B2 refer to one year of usage. This due to the full B module not being declared and that no reference service life has been determined. For calculating the full life cycle impact, the results in B1-B2 hence need to be multiplied with the assessed time period of interest.

There are no impacts from module B1 for the product.

The maintenance module B2 is calculated for one year. Veg Tech sedum mat with biochar only needs to be fertilized every second year, the amount of fertilizer in the table below is the yearly average.

Resource	Amount per year	Unit/m ²
Fertilizer	0,015	kg
Water	2,5	l

End of life (C1-C4)

Deconstruction of the green roof system is done manually, where crane can be used to bring the waste to ground level if the altitude is high. Materials are separated and sent to composting for compostable material and the rest is assumed to be sent for incineration, with an assumed transport distance of 100km.



Resource	Sedumtak 1-27 without extra drainage	Sedumtak 1-27 with extra drainage	Unit/m ²
Diesel	11,5	11,5	ml
Waste for composting	12,3	12,3	kg
Inert waste for composting	18,1	18,1	kg
Waste for incineration	1,6	1,7	kg

Benefits beyond the system boundary (D)

Module D includes recovery and recycling potential, expressed as net impact and benefits. At the end of life, most of the product is composted. The net benefit consists of the compost output replacing alternative material production. For the waste that is incinerated, heat and electricity is recovered and is assumed to replace energy that would have been produced from other sources.

Resource	Amount	Unit/m ²
Material replacing compost production	2	kg
Heat replacing Swedish district heating	10	MJ
Electricity replacing Swedish electricity grid mix	5	MJ

Biogenic carbon in biochar

In accordance with EN 15804:2012+A2:2019 the biogenic carbon balance must be zero from module A to C. For calculation purposes, the biogenic carbon is booked as an emission in module C, and a corresponding uptake in module D. In reality the biogenic carbon remains stored in the biochar during the service life of the roof, and in ensuing product life cycles. The total amount of biochar carbon in the sedum mat is 0,31 kg C/m², corresponding to -1,14 kg CO₂/m².

Content information

System components	Sedumtak 1-27 without extra drainage		Sedumtak 1-27 with extra drainage	
	Weight, kg	Weight-% (versus the product)	Weight, kg	Weight-% (versus the product)
Substrate	26,90	86%	26,90	86%
Plastics	0,95	3%	1,07	3%
Textiles	0,62	2%	0,62	2%
Others	2,72	9%	3,78	12%
TOTAL	31,2	100%	31,3	100%
Packaging materials	Weight, kg	Weight-% (versus the product)	Weight, kg	Weight-% (versus the product)
Pallet	0,13	0,38%	0,13	0,38%
Plastic film	0,01	0,03%	0,01	0,03%
TOTAL	0,13	0,41%	0,13	0,41%

Dangerous substances from the candidate list of SVHC for Authorization are not present in the product, including all other associated materials covered by this EPD.

Environmental Information: Veg Tech Sedumtak 1-27 without extra drainage

Potential environmental impact – mandatory indicators according to EN 15804

Results per m ² Sedumtak 1-27 without extra drainage												
Indicator	Unit	A1-A3	A4	A5	B1	B2**	B3-B7	C1	C2	C3	C4	D
GWP-total	kg CO ₂ eq.	9,94E+00	7,95E-01	3,55E-01	0	1,12E-02	ND	3,44E-02	2,48E-01	1,04E+01	0	-1,60E+00
GWP-fossil	kg CO ₂ eq.	1,08E+01	7,81E-01	2,45E-01	0	1,11E-02	ND	3,37E-02	2,43E-01	2,83E+00	0	-5,16E-01
GWP-biogenic	kg CO ₂ eq.	-1,18E+00	8,43E-03	1,09E-01	0	5,75E-05	ND	3,68E-04	2,62E-03	7,52E+00	0	-1,08E+00
GWP-luluc	kg CO ₂ eq.	3,21E-01	6,46E-03	1,27E-03	0	7,18E-06	ND	2,83E-04	2,01E-03	1,71E-04	0	-8,71E-04
ODP	kg CFC 11 eq.	6,93E-07	1,56E-16	2,81E-16	0	3,16E-17	ND	4,41E-18	4,86E-17	1,58E-15	0	-1,62E-09
AP	mol H ⁺ eq.	1,05E-01	8,56E-04	9,88E-04	0	2,72E-05	ND	1,96E-04	2,67E-04	4,64E-03	0	-1,33E-03
EP-freshwater	kg PO ₄ ³⁻ eq.	3,16E-03	7,21E-06	2,02E-06	0	8,66E-07	ND	3,13E-07	2,25E-06	2,33E-05	0	-2,43E-05
EP-freshwater	[kg P eq.]	1,03E-03	2,35E-06	6,59E-07	0	2,82E-07	ND	1,02E-07	7,32E-07	7,58E-06	0	-7,91E-06
EP-marine	kg N eq.	2,47E-02	2,77E-04	4,70E-04	0	9,53E-06	ND	9,59E-05	8,63E-05	1,09E-03	0	-5,07E-04
EP-terrestrial	mol N eq.	4,35E-01	3,28E-03	5,25E-03	0	1,19E-04	ND	1,06E-03	1,02E-03	2,34E-02	0	-4,97E-03
POCP	kg NMVO C eq.	3,50E-02	7,47E-04	9,37E-04	0	1,05E-05	ND	1,85E-04	2,33E-04	3,58E-03	0	-1,17E-03
ADP-minerals&metals*	kg Sb eq.	1,39E-05	7,01E-08	1,96E-08	0	7,95E-10	ND	2,63E-09	2,18E-08	1,87E-08	0	-1,17E-07
ADP-fossil*	MJ	1,73E+02	1,05E+01	2,77E+00	0	1,62E-01	ND	4,60E-01	3,28E+00	2,73E+00	0	-6,86E+00
WDP	m ³	1,03E+01	7,34E-03	6,16E-02	0	1,13E-02	ND	3,00E-04	2,29E-03	4,46E-01	0	-2,29E-01
Acronyms	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 = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption											

* Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

** Refers to one year of usage as the full B module is not declared and no reference service life is determined.

**Potential environmental impact – additional mandatory and voluntary indicators**

Results per m ² Sedumtak 1-27 without extra drainage												
Indicator	Unit	A1-A3	A4	A5	B1	B2*	B3-B7	C1	C2	C3	C4	D
GWP-GHG ¹	kg CO ₂ eq.	1,27E+01	7,74E-01	2,43E-01	0	1,09E-02	ND	3,34E-02	2,41E-01	2,74E+00	0	-5,11E-01

* Refers to one year of usage as the full B module is not declared and no reference service life is determined.

Use of resources

Results per m ² Sedumtak 1-27 without extra drainage												
Indicator	Unit	A1-A3	A4	A5	B1	B2*	B3-B7	C1	C2	C3	C4	D
PERE	MJ	9,63E+01	6,06E-01	6,96E-01	0	1,15E-02	ND	2,56E-02	1,89E-01	5,95E+00	0	-9,20E+00
PERM	MJ	1,82E+02	0	0	0	0	ND	0	0	0	0	0
PERT	MJ	2,79E+02	6,06E-01	6,96E-01	0	1,15E-02	ND	2,56E-02	1,89E-01	5,95E+00	0	-9,20E+00
PENRE	MJ	1,75E+02	1,06E+01	2,78E+00	0	1,62E-01	ND	4,60E-01	3,29E+00	2,73E+00	0	-6,86E+00
PENRM	MJ.	2,56E+01	0	0	0	0	ND	0	0	0	0	0
PENRT	MJ	2,01E+02	1,06E+01	2,78E+00	0	1,62E-01	ND	4,60E-01	3,29E+00	2,73E+00	0	-6,86E+00
SM	kg	0	0	0	0	0	ND	0	0	0	0	0
RSF	MJ	0	0	0	0	0	ND	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	ND	0	0	0	0	0
FW	m ³	5,15E-01	6,94E-04	6,86E-03	0	2,52E-03	ND	2,94E-05	2,16E-04	1,06E-02	0	-1,33E-02
Acronyms	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 re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water											

* Refers to one year of usage as the full B module is not declared and no reference service life is determined.

¹ The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus almost equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.



Waste production and output flows

Waste production

Results per m ² Sedumtak 1-27 without extra drainage												
Indicator	Unit	A1-A3	A4	A5	B1	B2*	B3-B7	C1	C2	C3	C4	D
Hazardous waste disposed	kg	1,52E-06	5,57E-10	3,06E-10	0	2,94E-11	ND	2,32E-11	1,73E-10	9,09E-09	0	-1,02E-08
Non-hazardous waste disposed	kg	8,35E-01	1,66E-03	2,67E-02	0	7,51E-04	ND	6,84E-05	5,16E-04	4,31E-02	0	-5,91E-02
Radioactive waste disposed	kg	2,63E-03	1,92E-05	2,55E-04	0	3,48E-06	ND	5,57E-07	5,97E-06	7,03E-05	0	-2,29E-03

* Refers to one year of usage as the full B module is not declared and no reference service life is determined.

Output flows

Results per m ² Sedumtak 1-27 without extra drainage												
Indicator	Unit	A1-A3	A4	A5	B1	B2*	B3-B7	C1	C2	C3	C4	D
Components for reuse	kg	0	0	0	0	0	ND	0	0	0	0	0
Material for recycling	kg	1,79E-02	0	0	0	0	ND	0	0	2,49E+00	0	0
Materials for energy recovery	kg	0	0	0	0	0	ND	0	0	0	0	0
Exported energy, electricity	MJ	5,63E-02	0	2,56E-01	0	0	ND	0	0	4,94E+00	0	0
Exported energy, thermal	MJ	1,28E-01	0	5,84E-01	0	0	ND	0	0	8,88E+00	0	0

* Refers to one year of usage as the full B module is not declared and no reference service life is determined.

Information on biogenic carbon content

Results per m ² Sedumtak 1-27 without extra drainage		
BIOGENIC CARBON CONTENT	Unit	QUANTITY
Biogenic carbon content in product	kg C	1,30E+00
Biogenic carbon content in packaging	kg C	6,60E-02

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO₂.

Environmental Information: Veg Tech Sedumtak 1-27 with extra drainage under 30% of the surface

Potential environmental impact – mandatory indicators according to EN 15804

Results per m ² Sedumtak 1-27 with extra drainage												
Indicator	Unit	A1-A3	A4	A5	B1	B2**	B3-B7	C1	C2	C3	C4	D
GWP-total	kg CO ₂ eq.	1,08E+01	7,98E-01	3,58E-01	0	1,12E-02	ND	3,44E-02	2,49E-01	1,06E+01	0	-1,63E+00
GWP-fossil	kg CO ₂ eq.	1,16E+01	7,83E-01	2,46E-01	0	1,11E-02	ND	3,37E-02	2,44E-01	3,05E+00	0	-5,52E-01
GWP-biogenic	kg CO ₂ eq.	-1,17E+00	8,45E-03	1,11E-01	0	5,75E-05	ND	3,68E-04	2,63E-03	7,52E+00	0	-1,08E+00
GWP-luluc	kg CO ₂ eq.	3,21E-01	6,48E-03	1,27E-03	0	7,18E-06	ND	2,83E-04	2,02E-03	1,73E-04	0	-9,31E-04
ODP	kg CFC 11 eq.	8,70E-07	1,57E-16	2,82E-16	0	3,16E-17	ND	4,41E-18	4,88E-17	1,61E-15	0	-1,62E-09
AP	mol H ⁺ eq.	1,07E-01	8,59E-04	9,89E-04	0	2,72E-05	ND	1,96E-04	2,68E-04	4,81E-03	0	-1,42E-03
EP-freshwater	kg PO ₄ ³⁻ eq.	3,22E-03	7,25E-06	2,03E-06	0	8,66E-07	ND	3,13E-07	2,25E-06	2,33E-05	0	-2,58E-05
EP-freshwater	[kg P eq.]	1,05E-03	2,36E-06	6,60E-07	0	2,82E-07	ND	1,02E-07	7,34E-07	7,59E-06	0	-8,41E-06
EP-marine	kg N eq.	2,51E-02	2,78E-04	4,71E-04	0	9,53E-06	ND	9,59E-05	8,66E-05	1,17E-03	0	-5,41E-04
EP-terrestrial	mol N eq.	4,39E-01	3,29E-03	5,26E-03	0	1,19E-04	ND	1,06E-03	1,03E-03	2,43E-02	0	-5,30E-03
POCP	kg NMVOC eq.	3,66E-02	7,49E-04	9,38E-04	0	1,05E-05	ND	1,85E-04	2,33E-04	3,78E-03	0	-1,25E-03
ADP-minerals&metals*	kg Sb eq.	1,45E-05	7,03E-08	1,96E-08	0	7,95E-10	ND	2,63E-09	2,19E-08	1,93E-08	0	-1,23E-07
ADP-fossil*	MJ	1,89E+02	1,06E+01	2,77E+00	0	1,62E-01	ND	4,60E-01	3,29E+00	2,81E+00	0	-7,34E+00
WDP	m ³	1,04E+01	7,36E-03	6,20E-02	0	1,13E-02	ND	3,00E-04	2,29E-03	4,69E-01	0	-2,45E-01
Acronyms	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 = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption											

* Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

** Refers to one year of usage as the full B module is not declared and no reference service life is determined.

Potential environmental impact – additional mandatory and voluntary indicators

Results per m ² Sedumtak 1-27 with extra drainage												
Indicator	Unit	A1-A3	A4	A5	B1	B2*	B3-B7	C1	C2	C3	C4	D
GWP-GHG ²	kg CO ₂ eq.	1,35E+01	7,77E-01	2,44E-01	0	1,09E-02	ND	3,34E-02	2,42E-01	2,96E+00	0	-5,46E-01

* Refers to one year of usage as the full B module is not declared and no reference service life is determined.

Use of resources

Results per m ² Sedumtak 1-27 with extra drainage												
Indicator	Unit	A1-A3	A4	A5	B1	B2*	B3-B7	C1	C2	C3	C4	D
PERE	MJ	9,69E+01	6,08E-01	6,96E-01	0	1,15E-02	ND	2,56E-02	1,89E-01	5,96E+00	0	-9,85E+00
PERM	MJ	1,82E+02	0	0	0	0	ND	0	0	0	0	0
PERT	MJ	2,79E+02	6,08E-01	6,96E-01	0	1,15E-02	ND	2,56E-02	1,89E-01	5,96E+00	0	-9,85E+00
PENRE	MJ	1,91E+02	1,06E+01	2,78E+00	0	1,62E-01	ND	4,60E-01	3,30E+00	2,81E+00	0	-7,34E+00
PENRM	MJ.	2,82E+01	0	0	0	0	ND	0	0	0	0	0
PENRT	MJ	2,19E+02	1,06E+01	2,78E+00	0	1,62E-01	ND	4,60E-01	3,30E+00	2,81E+00	0	-7,34E+00
SM	kg	0	0	0	0	0	ND	0	0	0	0	0
RSF	MJ	0	0	0	0	0	ND	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	ND	0	0	0	0	0
FW	m ³	5,18E-01	6,96E-04	6,87E-03	0	2,52E-03	ND	2,94E-05	2,17E-04	1,11E-02	0	-1,42E-02
Acronyms	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 re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water											

* Refers to one year of usage as the full B module is not declared and no reference service life is determined.

² The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus almost equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.



Waste production and output flows

Waste production

Results per m ² Sedumtak 1-27 with extra drainage												
Indicator	Unit	A1-A3	A4	A5	B1	B2*	B3-B7	C1	C2	C3	C4	D
Hazardous waste disposed	kg	1,52E-06	5,59E-10	3,07E-10	0	2,94E-11	ND	2,32E-11	1,74E-10	9,11E-09	0	-1,09E-08
Non-hazardous waste disposed	kg	8,43E-01	1,66E-03	2,71E-02	0	7,51E-04	ND	6,84E-05	5,18E-04	4,58E-02	0	-6,33E-02
Radioactive waste disposed	kg	2,74E-03	1,92E-05	2,55E-04	0	3,48E-06	ND	5,57E-07	5,99E-06	7,31E-05	0	-2,46E-03

* Refers to one year of usage as the full B module is not declared and no reference service life is determined.

Output flows

Results per m ² Sedumtak 1-27 with extra drainage												
Indicator	Unit	A1-A3	A4	A5	B1	B2*	B3-B7	C1	C2	C3	C4	D
Components for re-use	kg	0	0	0	0	0	ND	0	0	0	0	0
Material for recycling	kg	1,86E-02	0	0	0	0	ND	0	0	2,49E+00	0	0
Materials for energy recovery	kg	0	0	0	0	0	ND	0	0	0	0	0
Exported energy, electricity	MJ	7,01E-02	0	2,60E-01	0	0	ND	0	0	5,30E+00	0	0
Exported energy, thermal	MJ	1,60E-01	0	5,93E-01	0	0	ND	0	0	9,54E+00	0	0

* Refers to one year of usage as the full B module is not declared and no reference service life is determined.

Information on biogenic carbon content

Results per m ² Sedumtak 1-27 with extra drainage		
BIOGENIC CARBON CONTENT	Unit	QUANTITY
Biogenic carbon content in product	kg C	1,30E+00
Biogenic carbon content in packaging	kg C	6,60E-02

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO₂.



Additional information

General information about biochar

Biochar is a porous, carbonaceous material produced by pyrolysis of plant biomass. If applied in such a way that the contained carbon remains stored long-term it is a carbon sink. Since 2018 IPCC has recognized biochar as a CDR-method (Carbon Dioxide Removal) that can achieve negative emissions (Schmidt H.-P., 2018).

Biochar entails many benefits when used in a plant bed; it enhances the water and nutrient retention ability, improves soil structure, increases microbial activity and counteracts compaction.

For further information, please visit www.biokol.org and www.european-biochar.org/en.

Biochar in Veg Tech Sedum mat

The main part of the biochar in the sedum mat is produced by Veg Tech in Vislanda. Analysis performed in accordance with the EBC Guidelines for sustainable production of biochar shows that Veg Tech's biochar is very clean, high in carbon content and stable (Eurofins Umwelt Ost GmbH, 2020).

Biochar contributes to a more efficient use of fertilizers (Hao Xia et. al., 2022). The nutrients can be captured and retained in the growing medium until the plants have had time to absorb them. This minimizes the risk of nutrient leakage. Since Veg Tech introduced biochar in the sedum mat, fertilization is recommended only every two years after establishment.

For information about how biogenic carbon in the biochar has been handled in the LCA see the earlier section with information about LCA scenarios.



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