

StoCarrier Helio (10 mm) – calculation of the environmental impact

Regarding the Use of this calculation

This sheet provides a calculation by Sto SE & Co. KGaA regarding the environmental impact of StoCarrier Helio (10 mm) on basis of the third party verified EPD “EPD-Kiwa-EE-000429-EN”, which calculates the environmental impact of StoCarrier Aero (12 mm) on basis of weight per m².

Due to the similarities between the two products, it is possible to recalculate the environmental impact on a linear scale, on basis of weight per m². Only the following scaling factor ought to be used for recalculation.

Product	kg/m ²
StoCarrier Helio (10 mm)	5.1
StoCarrier Aero (12 mm)	6.2

Therefore, the scaling factor to calculate 1 m² of StoCarrier Helio is equal to 0.823.

The following table shows the recalculated impact of 1 m² StoCarrier Helio for the environmental impact indicator GWP-total.

	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	4.23	0.087	0.456	0.006	0.068	0	0.333	-0.012

Additional indicators may be calculated on this basis. Recalculation of other product variations will not yield correct results.

Owner of the declaration:	Sto SE & Co. KGaA
Publisher:	Kiwa-Ecobility Experts
Programme operator:	Kiwa-Ecobility Experts
Registration number:	EPD-Kiwa-EE-000429-EN
Issue date:	19.03.2025
Valid to:	19.03.2030



StoCarrier Aero



1. General information

Sto SE & Co. KGaA

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

Registration number:
EPD-Kiwa-EE-000429-EN

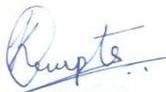
This declaration is based on the Product Category Rules:
Kiwa-Ecobility Experts (Kiwa-EE) – General Product Category Rules (2022-02-14)

Issue date:
19.03.2025

Valid to:
19.03.2030



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



Kripanshi Gupta
(Verification body, Kiwa-Ecobility Experts)

StoCarrier Aero

Owner of the declaration:
Sto SE & Co. KGaA
Ehrenbachstraße 1
D-79780 Stühlingen, Germany

Declared product / declared unit:
1 m² of carrier board with a thickness of 12 mm.

Scope:
StoCarrier Aero (12 mm) is a lightweight render carrier board made of expanded glass granulate produced in Lauingen, Germany, by Verotec GmbH which is part of the Sto Group. The following board types and their environmental effects are described in the Annex:
StoCarrier Aero (20 mm)
StoCarrier Hydro (15 mm)
StoCarrier Reno (8 mm)

Kiwa-Ecobility Experts assumes no liability for manufacturer's information, LCA data and evidence.

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

Independent verification of the declaration and data, according to EN ISO 14025:2010.

internal

external



Lucas Pedro Berman, Senda
(Third party verifier)

2. Product

2.1 Product description

StoCarrier Aero (12 mm) is made of lightweight fillers (expanded glass granulate) and reactive resins with glass fibre mesh reinforcement on both sides. The expanded glass granulate consists mainly of recycled glass. StoCarrier Aero is made with formulation in the quality (class) in accordance with EN 13501-1.

Raw material	Weight (%)
Expanded glass granulate	< 85
Filler material	< 20
Reactive polymer resin	< 10
Hardener	< 2
Glass fibre mesh	< 5
Additives	~ 1

1. This product does not contain substances listed in the candidate list (17 January 2023) exceeding 0.1 % by mass.
2. This product does not contain other CMR substances in categories 1A or 1B which are not on the candidate list, exceeding 0.1 % by mass.
3. There are no Biocide products added to this construction product or has it been treated with biocide products (in accordance with the (EU) Ordinance on Biocide Products No. 528/2012.)
4. This product contains fire retardants in form of aluminum hydroxide.

2.2 Application (Intended Use of the product)

StoCarrier Aero (12 mm) is suitable for being used in rainscreen cladding systems or for ceiling claddings in outdoor areas. The product can also be used in combination with external wall insulation systems and in interior applications.

2.3 Reference Service Life (RSL)

According to the Bewertungssystem Nachhaltiges Bauen (BNB) Sustainable Building assessment system of 24 February 2017, StoCarrier Aero approximately corresponds to Code Nr. 335.915 (BNB) wall coverings with a service life of 40 years in exterior application. The board structure of recycled glass granulate and binding agent is extremely stable and can therefore be synonymous with the service life of the structure/building element which can be equivalent to 50 years and more.

2.4 Technical Data

Additional information regarding the technical properties of StoCarrier Aero can be found on the Technical Data Sheet on www.sto.de.

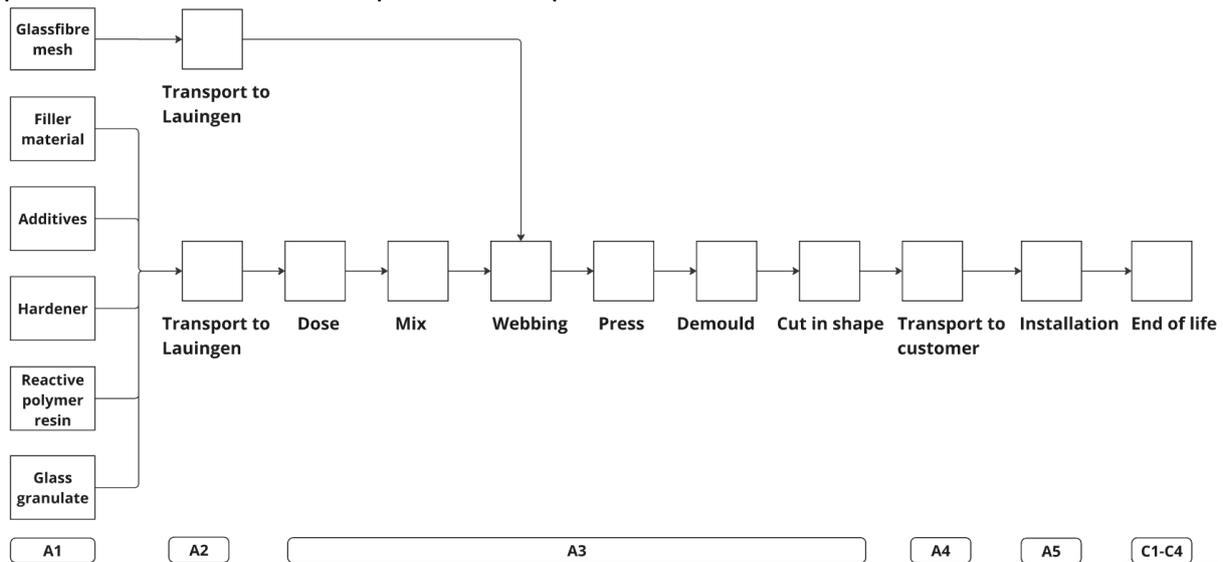
Name	Value	Unit
Gross density TIAP 120 (internal value)	ca. 500	kg/m ³
Thermal conductivity DIN 52612	0.12	W/(mK)
Modulus of elasticity EN ISO 178	1800 - 2000	N/mm ²
Thermal expansion TIAP 650 (internal value)	0.000011	1/K
Water vapour diffusion-equivalent air layer thickness EN ISO 7783-2	15	μ

2.5 Substances of very high concern

The product does not contain substances of very high concern (SVHC) on the REACH Candidate List published by the European Chemicals Agency in a concentration more than 0.1 % (by unit weight).

2.6 Description production process

StoCarrier Aero is produced in a plant in Lauingen, Germany. The raw materials are produced by and transported from suppliers located in Europe. The product components are dosed and mixed. Glass fibre mesh is laid out in the press mould and the mixture is thereafter distributed on top. Then, a second layer of glass fibre mesh is placed on top of the mixture. After being pressed at an increased temperature, the product is demoulded and cut to size.



3. LCA: Calculation rules

3.1 Declared unit

The declared unit is 1 m² of StoCarrier Aero with a thickness of 12 mm and a RSL of 40 years. The scope of this LCA is cradle to gate with options, modules C1-C4 and module D. Technical life span of the products raw materials is the same as for the whole product.

Reference unit: m²

3.2 Conversion factors

Product	Unit	Value
Declared Unit	1	m ²
Weight per reference unit	6.2	kg/m ²
Conversion factor to 1 kg	0.161	m ²
Layer thickness	0.012	m
Gross density	517	kg/m ³

3.3 Scope of declaration and system boundaries

This is a Cradle to gate with options, modules C1-C4 and module D EPD. The life cycle stages included are as shown below: (X = module included, ND = module not declared)

Description of the system boundary																
Product stage			Construction process stage			Use stage						End of life stage			Benefits and loads beyond the system boundaries	
Raw material supply	Transport	Manufacturing	Transport to construction site	Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
X=Module declared ND= Module not declared																

The modules of the EN15804 contain the following:

- A1 = Raw material supply Module
- A2 = Transport Module
- A3 = Manufacturing Module
- A4 = Transport Module
- A5 = Construction - Installation process Module
- B1 = Use Module
- B2 = Maintenance Module
- B3 = Repair Module
- B4 = Replacement Module
- B5 = Refurbishment Module
- B6 = Operational energy use Module
- B7 = Operational water use Module
- C1 = Deconstruction / Demolition Module
- C2 = Transport Module
- C3 = Waste Processing Module
- C4 = Disposal Module
- D = Benefits and loads beyond the product system boundaries

3.4 Representativeness

This EPD is representative for StoCarrier Aero, a product of Sto SE & Co. KGaA. The data is representative for the European Union. The scenarios included in this life cycle analysis are currently in use and are representative for one of the most likely scenario alternatives.

3.5 Cut-off Criteria

Product Stage (A1-A3)

The production stage consists of the extraction of raw materials, transportation of the raw materials, processing the raw materials into materials and the production of the product. The required energy for production, ancillary materials, packaging materials and production emissions are included. All substantial raw materials and types of energy during production are included. Raw materials added to the product in very small amounts (less than 1%) are not included. These cut-off limits do not apply to hazardous materials or substances.

Construction process stage (A4-A5)

All input flows (e.g. transportation to the construction site, additional raw material use for construction, installation energy (use) of energy use for assembly, etc.) and output flows (e.g. construction waste, packaging waste, etc.) are considered in this LCA. The total neglected input flows do therefore not exceed the limit of 5% of energy use and mass.

End of life stage (C1-C4)

All input flows (e.g. energy use for demolition or disassembly, transport to waste processing, etc.) and output flows (e.g. end-of-life waste processing of the product, etc.) are considered in this LCA. The total neglected input flows do therefore not exceed the limit of 5% of energy use and mass. The degree of landfill is assumed to be 100%.

Benefits and Loads beyond the system boundary (Module D)

All benefits and loads beyond the system boundary resulting from reusable products, recyclable materials and/or useful energy carriers leaving the product system are considered in this LCA.

Excluded processes

Following processes has not been taken into account in this life cycle analysis:

- The manufacture of equipment used in production, buildings or any other capital goods;
- The transportation of personnel to the production plant;
- The transportation of personnel within the production plant;
- Research and development activities;

3.6 Allocation

The amount of electricity and natural gas at the production site for StoCarrier Aero derives from figures concerning the total amount of electricity being used at the production line and is then recalculated into the amount only used for the production of StoCarrier Aero (12 mm). The amount of electricity and natural gas is then shown per declared unit.

Modularity principle has been taken into account. There are no co-products that have to be taken into account.

The producer of StoCarrier Aero is under regulation from national authorities and follows the polluter pays principle.

3.7 Data collection and reference time period

This EPD project has been performed from September to December 2024. Production data is from January to December 2023.

3.8 Estimates and assumptions

1% cut off criteria has been applied for formulation and production data when applicable according to DIN EN 15804+A2.

StoCarrier Aero is categorized under the European Waste Catalogue (EWC), category 17.09 "Other Construction and Demolition Waste" and is categorized as non-hazardous waste.

A payload factor of 50 % was used for all truck transports, which in fact corresponds to a full delivery and empty return trip. A data set for a non-specific truck was used.

0.013 kWh/m² has been assumed for construction and deconstruction purpose.

3.9 Data Quality

Datasets from Ecoinvent 3.6 from 2019, as well as third party verified EPDs, have been used for calculation with R<think. The Ecoinvent data complies with the requirements of EN 15804 (background data not older than 10 years) and is therefore considered good quality. Data concerning production has been gathered from the Production Management System used at the production site, therefore the data quality is considered good in terms of accuracy for the calculation period. The quality level of geographical representativeness as well as the quality level of technical representativeness can be considered good. The time representativeness can also be regarded as good and therefore the overall data quality of this EPD. All relevant process specific data was gathered during data collection. The data and scenarios used are representative for the European Union. The figures shown in this report are from January to December 2023. The data from the production site as well as the used scenarios are chosen in accordance with EN 15804.

3.10 Power mix

Data has been collected at the production site in Lauingen. The energy used consists of 100% hydropower (market based approach) and covers the foreground processes in Lauingen. The electricity supplier is bound by state regulations in Germany for electricity labelling. The electricity labelling indicates 100 % renewable energy from hydropower. Hydropower is calculated with an environmental impact of 0.042 kg CO₂-eq./kWh.

For the installation and deconstruction process, a residual mix, low voltage is assumed.

3.11 Comparability

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

4. LCA: Scenarios and additional technical information

4.1 Transport to construction site (A4)

For the transport from production place to assembly/user, the following scenario is assumed for module A4 of this EPD. The distance of 100 km to the production site has specifically been chosen to allow simple scaling for individual projects.

	Value and unit
Vehicle type used for transport	Lorry (Truck) 16-32t, EURO4 market for (EU)
Fuel type and consumption of vehicle	not available
Distance	100 km
Capacity utilisation (including empty returns)	50 % (loaded up and return empty)
Bulk density of transported products	inapplicable
Volume capacity utilisation factor	1

4.2 Assembly (A5)

The following information describes the scenarios for flows entering the system and flows leaving the system at module .

Flows entering the system

For flows entering the system at A5 the following scenario is assumed for module A5.

	Value	Unit
Energy consumption for installation/assembly		
Electricity (DE) - low voltage (max 1kV)	0.013	kWh

Flows leaving the system

The following output flows leaving the system at module A5 are assumed.

	Value	Unit
Output materials as result of loss during construction	3	%
Output materials as result of waste processing of materials used for installation/assembly at the building site	0	kg
Output materials as result of waste processing of used packaging	0.220	kg

4.3 De-construction/Demolition (C1)

The following information describes the scenario for demolition at end of life.

Description	Amount	Unit
Electricity (DE) – low voltage (max 1kV)	0.013	kWh

4.4 Transport end-of-life (C2)

The following distances and transport conveyance are assumed for transportation during end of life for the different types of waste processing.

Waste scenario	Transport conveyance	Not removed (stays in work) [km]	Land-fill [km]	Incineration [km]	Recycling [km]	Reuse [km]
Debris - STO mixed with 100% landfill	Lorry (Truck), unspecified (default) market group for (GLO)	0	100	150	50	0

The transport conveyance(s) used in the scenario(s) for transport during end of life has the following characteristics.

	Value and unit
Vehicle type used for transport	Lorry (Truck), unspecified (default) market group for (GLO)
Fuel type and consumption of vehicle	not available
Capacity utilisation (including empty returns)	50 % (loaded up and return empty)
Bulk density of transported products	inapplicable
Volume capacity utilisation factor	1

4.5 End of life (C3, C4)

The scenario(s) assumed for end of life of the product are given in the following tables. First the assumed percentages per type of waste processing are displayed, followed by the assumed amounts.

Waste Scenario	Region	Not removed (stays in work) [%]	Landfill [%]	Incineration [%]	Recycling [%]	Reuse [%]
Debris - STO mixed with 100% landfill	DE	0	100	0	0	0

Waste Scenario	Not removed (stays in work) [kg]	Landfill [kg]	Incineration [kg]	Recycling [kg]	Reuse [kg]
Debris - STO mixed with 100% landfill	0	6.2	0	0	0
Total	0	6.2	0	0	0

4.6 BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY (D)

The presented Benefits and loads beyond the system boundary in this EPD are based on the following calculated Net output flows in kilograms and Energy recovery displayed in MJ Lower Heating Value.

Waste scenario	Avoided primary material, recycling [kg]	Avoided primary material, reuse [kg]	Secondary material lost [kg]	Net output flow [kg]	Energy recovery [MJ]
Debris - STO mixed with 100% landfill	0	0	0	0	0
Total	0	0	0	0	0

5. LCA: Results

For the impact assessment, the characterization factors of the LCIA method EN 15804 +A2 Method v1.0 are used. Long-term emissions (>100 years) are not considered in the impact assessment. The results of the impact assessment are only relative statements that do not make any statements about end-points of the impact categories, exceedance of threshold values, safety margins or risks. The following tables show the results of the indicators of the impact assessment, of the use of resources as well as of waste and other output flows. Disclaimer on ADP-e, ADP-f, WDP, ETP-fw, HTP-c, HTP-nc, SQP: The results of these environmental impact indicators must be used with caution, as the uncertainties in these results are high or as there is limited experience with the indicator.

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

LCA results – Indicators describing environmental impacts based on the impact assessment (LCIA): 1m ² StoCarrier Aero (12 mm) (EN 15804+A2)											
Parameter	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
Core environmental impact indicators (EN 15804+A2)											
GWP-total	kg CO2 eqv.	4.44E+00	4.04E-01	2.99E-01	1.06E-01	5.55E-01	7.62E-03	8.37E-02	0.00E+00	4.05E-01	-1.48E-02
GWP-f	kg CO2 eqv.	4.77E+00	4.04E-01	6.59E-01	1.06E-01	2.00E-01	7.48E-03	8.37E-02	0.00E+00	3.26E-02	-1.45E-02
GWP-b	kg CO2 eqv.	-3.73E-01	1.62E-04	-3.61E-01	4.21E-05	3.54E-01	1.25E-04	3.37E-05	0.00E+00	3.73E-01	-1.48E-04
GWP-luluc	kg CO2 eqv.	4.02E-02	1.46E-04	6.44E-04	3.74E-05	1.24E-03	9.06E-06	3.07E-05	0.00E+00	9.10E-06	-1.32E-04
ODP	kg CFC 11 eqv.	1.49E-07	9.00E-08	8.49E-08	2.43E-08	1.32E-08	2.94E-10	1.85E-08	0.00E+00	1.34E-08	-3.61E-09
AP	mol H+ eqv	1.96E-02	2.26E-03	1.26E-03	5.40E-04	8.46E-04	2.17E-05	4.85E-04	0.00E+00	3.10E-04	-3.52E-04
EP-fw	kg P eqv.	7.90E-05	3.81E-06	1.08E-05	8.41E-07	4.12E-06	1.13E-06	8.43E-07	0.00E+00	3.66E-07	-1.18E-06
EP-m	kg N eqv.	4.29E-03	7.88E-04	3.01E-04	1.84E-04	2.17E-04	3.37E-06	1.71E-04	0.00E+00	1.07E-04	-1.03E-04
EP-T	mol N eqv.	4.61E-02	8.69E-03	3.43E-03	2.03E-03	2.38E-03	5.32E-05	1.89E-03	0.00E+00	1.18E-03	-1.68E-03
POCP	kg NMVOC eqv.	1.24E-02	2.48E-03	1.19E-03	5.78E-04	6.51E-04	1.01E-05	5.38E-04	0.00E+00	3.41E-04	-3.01E-04
ADP-mm	kg Sb-eqv.	5.27E-05	1.05E-05	3.60E-06	2.90E-06	2.37E-06	6.21E-08	2.12E-06	0.00E+00	2.99E-07	-1.74E-07
ADP-f	MJ	7.66E+01	6.10E+00	1.05E+01	1.61E+00	3.11E+00	1.02E-01	1.26E+00	0.00E+00	9.13E-01	-1.95E-01
WDP	m3 world eqv.	5.00E-01	2.04E-2	4.01E-2	4.49E-3	2.01E-2	3.88E-4	4.51E-3	0.00E+00	4.09E-2	-1.60E-3

CLASSIFICATION OF DISCLAIMERS TO THE DECLARATION OF CORE AND ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS

ILCD classification	Indicator	Disclaimer
ILCD type / level 1	Global warming potential (GWP) Depletion potential of the stratospheric ozone layer (ODP) Potential incidence of disease due to PM emissions (PM)	None None None
ILCD type / level 2	Acidification potential, Accumulated Exceedance (AP) Eutrophication potential, Fraction of nutrients reaching freshwater end compartment (EP-freshwater) Eutrophication potential, Fraction of nutrients reaching marine end compartment (EP-marine) Eutrophication potential, Accumulated Exceedance (EP-terrestrial) Formation potential of tropospheric ozone (POCP) Potential Human exposure efficiency relative to U235 (IRP)	None None None None None 1
ILCD type / level 3	Abiotic depletion potential for non-fossil resources (ADP-minerals&metals) Abiotic depletion potential for fossil resources (ADP-fossil) Water (user) deprivation potential, deprivation-weighted water consumption (WDP) Potential Comparative Toxic Unit for ecosystems (ETP-fw) Potential Comparative Toxic Unit for humans (HTP-c) Potential Comparative Toxic Unit for humans (HTP-nc) Potential Soil quality index (SQP)	2 2 2 2 2 2 2

LCA results - Indicators describing resource use and environmental information derived from life cycle inventory (LCI): StoCarrier Aero (12 mm) (EN 15804+A2)

Parameter	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	1.17E+01	7.92E-02	6.98E+00	2.28E-02	5.84E-01	1.85E-02	1.58E-02	0.00E+00	7.38E-03	-2.98E+00
PERM	MJ	7.10E-01	0.00E+00	3.08E+00	0.00E+00	1.14E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	1.24E+01	7.92E-02	1.01E+01	2.28E-02	6.98E-01	1.85E-02	1.58E-02	0.00E+00	7.38E-03	-2.98E+00
PENRE	MJ	6.74E+01	6.48E+00	1.15E+01	1.71E+00	2.89E+00	1.09E-01	1.34E+00	0.00E+00	9.70E-01	-2.07E-01
PENRM	MJ	1.05E+01	0.00E+00	1.20E-01	0.00E+00	3.19E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-2.78E-03
PENRT	MJ	7.79E+01	6.48E+00	1.16E+01	1.71E+00	3.21E+00	1.09E-01	1.34E+00	0.00E+00	9.70E-01	-2.10E-01
SM	Kg	5.70E+00	0.00E+00	1.82E-02	0.00E+00	1.71E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00									
NRSF	MJ	0.00E+00									
FW	M3	2.53E-02	7.14E-04	1.43E-03	1.70E-04	1.02E-03	4.63E-05	1.54E-04	0.00E+00	9.75E-04	-4.48E-05
HWD	Kg	2.14E-05	1.56E-05	1.46E-05	4.22E-06	2.18E-06	1.28E-07	3.20E-06	0.00E+00	1.36E-06	-5.60E-07
NHWD	Kg	8.13E-01	3.59E-01	5.95E-02	7.71E-02	4.36E-01	4.28E-04	8.00E-02	0.00E+00	6.20E+00	-5.25E-03
RWD	Kg	1.02E-03	4.06E-05	1.55E-05	1.10E-05	3.39E-05	4.11E-07	8.31E-06	0.00E+00	5.99E-06	-9.27E-07
CRU	Kg	0.00E+00									
MFR	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.43E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	Kg	0.00E+00									
EET	MJ	0.00E+00	8.04E-01								
EEE	MJ	0.00E+00	4.67E-01								

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**=Use of fresh water | **HWD**=Hazardous waste disposed | **NHWD**=Non-hazardous waste disposed | **RWD**=Radioactive waste disposed | **CRU**=Components for re-use | **MFR**=Materials for recycling | **MER**=Materials for energy recovery | **EET**=Exported energy, thermal | **EE**=Exported energy, electrical

LCA results - information on biogenic carbon content at the factory gate: 1m² StoCarrier Aero (12 mm) (EN 15804+A2)		
Parameter	Unit	Value
biogenic carbon content in product	kg C	0.02054
biogenic carbon content in accompanying packaging	kg C	0.09893
NOTE 1 kg biogenic carbon is equivalent to 44/12 kg CO ₂		

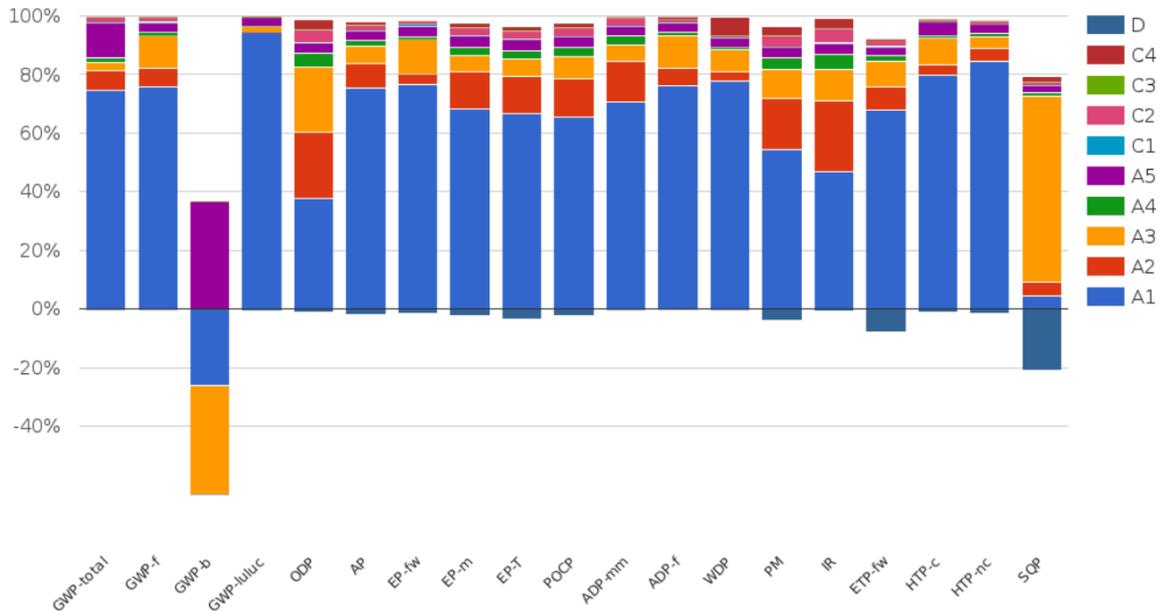
Uptake of biogenic carbon dioxide

The following amount of carbon dioxide uptake is taken into account. Related uptake and release of carbon dioxide in downstream processes are not taken into account in this number although they do appear in the presented results. One kilogram of biogenic Carbon content is equivalent to 44/12 kg of biogenic carbon dioxide uptake

Uptake of biogenic carbon dioxide	Unit	Amount
Product	kg CO ₂ (biogenic)	0.07533
Packaging	kg CO ₂ (biogenic)	0.3627

6. LCA: Interpretation

6.1 Dominance analysis



The figure above shows the impact of different life stages on the LCA results in accordance to their respective environmental impact indicator. The impact of the raw materials (A1) for Sto-Carrier Aero (12 mm) dominate every indicator but Soil quality potential (SQP) which is influenced to a higher degree by the transport of the raw materials (A2). The manufacturing module (A3) is, in comparison to modules A1 and A2, only responsible for a relatively small impact. This can, at least partly, assigned to the use of hydropower during production. The four GWP indicators are dominated by the raw materials. The results vary from 80 % of GWP-total and GWP-fossil to almost 100 % of GWP-luluc. The negative value for GWP-biogenic is caused by the carbon intake of organic matter in the product and packaging.

7. Annex

This Annex applies to

1. StoCarrier Aero (20 mm)
2. StoCarrier Hydro (15 mm)
3. StoCarrier Reno (8 mm)

The declared unit is 1 m² with various weights. The LCA data were based on production data from the year 2023.

7.1 Technical Data

The technical data stated below are valid for the glass granulate based boards

1. StoCarrier Aero (20 mm)
2. StoCarrier Reno (8 mm)

Name	Value	Unit
Gross density (internal value)	ca. 500	kg/m ³
Thermal conductivity DIN 52612	0.12	W/(mK)
Modulus of elasticity EN ISO 178	1800 - 2000	N/mm ²
Thermal expansion TIAP 650 (internal value)	0.000011	1/K
Water vapour diffusion-equivalent air layer thickness EN ISO 7783-2 (internal value)	15	μ

The technical data stated below is valid for the perlite granulate based board.

3. StoCarrier Hydro (15 mm)

Name	Value	Unit
Gross density (internal value)	650	kg/m ³
Thermal conductivity DIN 52612	0,17	W/(mK)
Modulus of elasticity EN ISO 178	2200 - 2800	N/mm ²
Thermal expansion TIAP 650 (internal value)	0.000011	1/K
Water vapour diffusion-equivalent air layer thickness EN ISO 7783-2 (internal value)	7 – 9	μ

7.2 Base materials

The base materials stated below is valid for the glass granulate based boards.

1. StoCarrier Aero (20 mm)
2. StoCarrier Reno (8 mm)

Raw material	Weight (%)
Expanded glass granulate	< 85
Filler material	< 20
Reactive polymer resin	< 10
Hardener	< 2
Glass fibre mesh	< 5

The base material stated below is valid for the perlite granulate based board.

3. StoCarrier Hydro

Raw material	Weight (%)
Expanded perlite granulate	< 95
Reactive polymer resin	< 6
Hardener	< 2
Glass fibre mesh	< 5

7.3 Declared unit

The declared unit is 1 m².

Name	Value	Unit
Declared unit	1	m ²
StoCarrier Aero (20 mm)	10.1	kg/m ²
StoCarrier Reno (8 mm)	4.3	kg/m ²
StoCarrier Hydro (15 mm)	9.75	kg/m ²

7.4 LCA Scenarios

Carbon Content of product and packaging

Information on biogenic carbon content at the factory gate		
Parameter	Unit	Value
Biogenic carbon content in product StoCarrier Aero (20 mm)	kg C	0.0336
Biogenic carbon content in accompanying packaging StoCarrier Aero (20 mm)	kg C	0.2353
Biogenic carbon content in product StoCarrier Reno (8 mm)	kg C	0.01858
Biogenic carbon content in accompanying packaging StoCarrier Reno (8 mm)	kg C	0.06847
Biogenic carbon content in product StoCarrier Hydro (15 mm)	kg C	0.0001242
Biogenic carbon content in accompanying packaging StoCarrier Hydro (15 mm)	kg C	0.1898
NOTE 1 kg biogenic carbon is equivalent to 44/12 kg CO ₂		

Transport to construction side (A4)

For the transport from production place to assembly/user, the following scenario is assumed for module A4 of this EPD. The distance of 100 km to the construction side has been chosen to allow simple scaling of the LCA results for individual projects.

	Value and unit
Vehicle type used for transport	Lorry (Truck) 16-32t, EURO4 market for (EU)
Fuel type and consumption of vehicle	not available
Distance	100 km
Capacity utilisation (including empty returns)	50 % (loaded up and return empty)
Bulk density of transported products	inapplicable
Volume capacity utilisation factor	1

Construction (A5)

Flows entering the system

For flows entering the system at A5 the following scenario is assumed for module A5.

	Value	Unit
Materials used for installation/assembly		
Electricity (DE) - low voltage (max 1kV)	0.013	kWh

Flows leaving the system

The following output flows leaving the system at module A5 are assumed.

	Value	Unit
Output materials as result of loss during construction	3	%

De-construction/Demolition (C1)

The following information describes the scenario for demolition at end of life.

Description	Amount	Unit
Electricity (DE) – low voltage (max 1kV)	0.013	kWh

Transport end-of-life (C2)

Transport to waste treatment: 50 km by truck

End of life (C4)

Name	Value	Unit
Landfilling StoCarrier Aero (20 mm)	10.1	kg
Landfill StoCarrier Reno (8 mm)	4.3	kg
Landfill StoCarrier Hydro (15 mm)	9.75	kg

Benefits and loads beyond the system boundary (D)

The presented Benefits and loads beyond the system boundary in this EPD are based on the following calculated Net output flows in kilograms and Energy recovery displayed in MJ Lower Heating Value.

Waste scenario	Avoided primary material, recycling [kg]	Avoided primary material, reuse [kg]	Secondary material lost [kg]	Net output flow [kg]	Energy recovery [MJ]
Landfill StoCarrier Aero (20 mm)	0	0	0	0	0
Landfill StoCarrier Reno (8 mm)	0	0	0	0	0
Landfill StoCarrier Hydro (15 mm)	0	0	0	0	0
Total	0	0	0	0	0

8. Results

The following tables show the results of the impact assessment indicators, resource use, waste and other output streams. The results presented here refer to the declared average product. Disclaimer on ADP-e, ADP-f, WDP, ETP-fw, HTP-c, HTP-nc, SQP: The results of these environmental impact indicators must be used with caution, as the uncertainties in these results are high or as there is limited experience with the indicator.

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

8.1 StoCarrier Aero (20 mm)

LCA results – Indicators describing environmental impacts based on the impact assessment (LCIA): 1m² StoCarrier Aero (20 mm) (EN 15804+A2)											
Parameter	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
Core environmental impact indicators (EN 15804+A2)											
GWP-total	kg CO2 eqv.	7.26E+00	6.60E-01	2.78E-01	1.43E-01	1.18E+00	7.62E-03	1.36E-01	0.00E+00	6.59E-01	-3.14E-02
GWP-f	kg CO2 eqv.	7.80E+00	6.60E-01	1.14E+00	1.43E-01	3.25E-01	7.48E-03	1.36E-01	0.00E+00	5.32E-02	-3.07E-02
GWP-b	kg CO2 eqv.	-6.06E-01	2.65E-04	-8.61E-01	5.78E-05	8.49E-01	1.25E-04	5.49E-05	0.00E+00	6.06E-01	-3.60E-04
GWP-luluc	kg CO2 eqv.	6.58E-02	2.39E-04	1.29E-03	5.26E-05	2.04E-03	9.06E-06	5.00E-05	0.00E+00	1.48E-05	-3.14E-04
ODP	kg CFC 11 eqv.	2.45E-07	1.47E-07	1.44E-07	3.16E-08	2.20E-08	2.94E-10	3.01E-08	0.00E+00	2.19E-08	-8.22E-09
AP	mol H+ eqv	3.22E-02	3.69E-03	2.44E-03	8.32E-04	1.44E-03	2.17E-05	7.91E-04	0.00E+00	5.05E-04	-8.58E-04
EP-fw	kg P eqv.	1.29E-04	6.23E-06	2.00E-05	1.44E-06	6.15E-06	1.13E-06	1.37E-06	0.00E+00	5.96E-07	-2.81E-06
EP-m	kg N eqv.	7.03E-03	1.29E-03	5.94E-04	2.93E-04	3.83E-04	3.37E-06	2.79E-04	0.00E+00	1.74E-04	-2.51E-04
EP-T	mol N eqv.	7.54E-02	1.42E-02	6.75E-03	3.23E-03	4.20E-03	5.32E-05	3.07E-03	0.00E+00	1.91E-03	-4.10E-03
POCP	kg NMVOC eqv.	2.03E-02	4.05E-03	2.41E-03	9.22E-04	1.16E-03	1.01E-05	8.77E-04	0.00E+00	5.56E-04	-7.29E-04
ADP-mm	kg Sb-eqv.	8.68E-05	1.71E-05	7.17E-06	3.63E-06	3.93E-06	6.21E-08	3.45E-06	0.00E+00	4.87E-07	-4.16E-07
ADP-f	MJ	1.25E+02	9.97E+00	1.82E+01	2.16E+00	5.09E+00	1.02E-01	2.06E+00	0.00E+00	1.49E+00	-3.94E-01
WDP	m3 world eqv.	8.20E-01	3.33E-02	7.94E-02	7.73E-03	3.37E-02	3.88E-04	7.35E-03	0.00E+00	6.67E-02	-3.42E-03

LCA results - Indicators describing resource use and environmental information derived from life cycle inventory (LCI): StoCarrier Aero (20mm) (EN 15804+A2)

Parameter	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	1.90E+01	1.30E-01	1.40E+01	2.71E-02	1.02E+00	1.85E-02	2.57E-02	0.00E+00	1.20E-02	-7.09E+00
PERM	MJ	1.16E+00	0.00E+00	7.28E+00	0.00E+00	2.53E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	2.01E+01	1.30E-01	2.13E+01	2.71E-02	1.27E+00	1.85E-02	2.57E-02	0.00E+00	1.20E-02	-7.09E+00
PENRE	MJ	1.10E+02	1.06E+01	1.98E+01	2.29E+00	4.74E+00	1.09E-01	2.18E+00	0.00E+00	1.58E+00	-4.18E-01
PENRM	MJ	1.72E+01	0.00E+00	1.79E-01	0.00E+00	5.22E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-2.78E-03
PENRT	MJ	1.27E+02	1.06E+01	2.00E+01	2.29E+00	5.26E+00	1.09E-01	2.18E+00	0.00E+00	1.58E+00	-4.21E-01
SM	Kg	9.25E+00	0.00E+00	4.99E-02	0.00E+00	2.79E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00									
NRSF	MJ	0.00E+00									
FW	M3	4.15E-02	1.17E-03	2.81E-03	2.63E-04	1.73E-03	4.63E-05	2.50E-04	0.00E+00	1.59E-03	-1.02E-04
HWD	Kg	3.52E-05	2.55E-05	2.61E-05	5.48E-06	3.66E-06	1.28E-07	5.21E-06	0.00E+00	2.22E-06	-1.26E-06
NHWD	Kg	1.34E+00	5.86E-01	1.40E-01	1.37E-01	8.82E-01	4.28E-04	1.30E-01	0.00E+00	1.01E+01	-1.27E-02
RWD	Kg	1.66E-03	6.63E-05	3.18E-05	1.42E-05	5.56E-05	4.11E-07	1.35E-05	0.00E+00	9.76E-06	-2.20E-06
CRU	Kg	0.00E+00									
MFR	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.98E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	Kg	0.00E+00									
EET	MJ	0.00E+00	1.94E+00								
EEE	MJ	0.00E+00	1.13E+00								

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**=Use of fresh water | **HWD**=Hazardous waste disposed | **NHWD**=Non-hazardous waste disposed | **RWD**=Radioactive waste disposed | **CRU**=Components for re-use | **MFR**=Materials for recycling | **MER**=Materials for energy recovery | **EET**=Exported energy, thermal | **EE**=Exported energy, electrical

8.2 StoCarrier Reno (8 mm)

LCA results – Indicators describing environmental impacts based on the impact assessment (LCIA): 1m ² StoCarrier Reno (8 mm) (EN 15804+A2)											
Parameter	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
Core environmental impact indicators (EN 15804+A2)											
GWP-total	kg CO2 eqv.	3.45E+00	2.50E-01	2.10E-01	7.36E-02	3.99E-01	7.62E-03	5.81E-02	0.00E+00	3.12E-01	-1.11E-02
GWP-f	kg CO2 eqv.	3.70E+00	2.49E-01	4.59E-01	7.36E-02	1.54E-01	7.48E-03	5.80E-02	0.00E+00	2.26E-02	-1.09E-02
GWP-b	kg CO2 eqv.	-2.90E-01	1.00E-04	-2.50E-01	2.92E-05	2.44E-01	1.25E-04	2.34E-05	0.00E+00	2.90E-01	-1.00E-04
GWP-luluc	kg CO2 eqv.	3.61E-02	9.06E-05	4.95E-04	2.60E-05	1.11E-03	9.06E-06	2.13E-05	0.00E+00	6.31E-06	-9.16E-05
ODP	kg CFC 11 eqv.	8.70E-08	5.56E-08	5.91E-08	1.68E-08	8.60E-09	2.94E-10	1.28E-08	0.00E+00	9.32E-09	-2.59E-09
AP	mol H+ eqv	1.42E-02	1.40E-03	8.81E-04	3.74E-04	6.07E-04	2.17E-05	3.37E-04	0.00E+00	2.15E-04	-2.39E-04
EP-fw	kg P eqv.	5.71E-05	2.38E-06	7.72E-06	5.83E-07	3.28E-06	1.13E-06	5.85E-07	0.00E+00	2.54E-07	-8.10E-07
EP-m	kg N eqv.	3.34E-03	4.91E-04	2.11E-04	1.27E-04	1.61E-04	3.37E-06	1.19E-04	0.00E+00	7.39E-05	-7.00E-05
EP-T	mol N eqv.	3.58E-02	5.41E-03	2.40E-03	1.41E-03	1.76E-03	5.32E-05	1.31E-03	0.00E+00	8.15E-04	-1.14E-03
POCP	kg NMVOC eqv.	9.79E-03	1.54E-03	8.31E-04	4.01E-04	4.86E-04	1.01E-05	3.73E-04	0.00E+00	2.37E-04	-2.05E-04
ADP-mm	kg Sb-eqv.	5.25E-05	6.44E-06	2.47E-06	2.01E-06	2.13E-06	6.21E-08	1.47E-06	0.00E+00	2.07E-07	-1.20E-07
ADP-f	MJ	6.20E+01	3.77E+00	7.37E+00	1.12E+00	2.45E+00	1.02E-01	8.75E-01	0.00E+00	6.33E-01	-1.50E-01
WDP	m3 world eqv.	3.45E-01	1.27E-02	2.99E-02	3.12E-03	1.41E-02	3.88E-04	3.13E-03	0.00E+00	2.84E-02	-1.20E-03

LCA results - Indicators describing resource use and environmental information derived from life cycle inventory (LCI): StoCarrier Reno (8 mm) (EN 15804+A2)

Parameter	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	9.30E+00	4.87E-02	4.80E+00	1.58E-02	4.46E-01	1.85E-02	1.10E-02	0.00E+00	5.12E-03	-2.06E+00
PERM	MJ	6.42E-01	0.00E+00	2.14E+00	0.00E+00	8.36E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	9.92E+00	4.87E-02	6.94E+00	1.58E-02	5.29E-01	1.85E-02	1.10E-02	0.00E+00	5.12E-03	-2.06E+00
PENRE	MJ	5.34E+01	4.00E+00	7.99E+00	1.19E+00	2.23E+00	1.09E-01	9.29E-01	0.00E+00	6.72E-01	-1.59E-01
PENRM	MJ	9.52E+00	0.00E+00	1.08E-01	0.00E+00	2.89E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-2.78E-03
PENRT	MJ	6.30E+01	4.00E+00	8.10E+00	1.19E+00	2.52E+00	1.09E-01	9.29E-01	0.00E+00	6.72E-01	-1.62E-01
SM	Kg	4.17E+00	0.00E+00	9.60E-03	0.00E+00	1.26E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00									
NRSF	MJ	0.00E+00									
FW	M3	1.97E-02	4.44E-04	1.05E-03	1.18E-04	7.87E-04	4.63E-05	1.07E-04	0.00E+00	6.76E-04	-3.21E-05
HWD	Kg	1.65E-05	9.64E-06	1.01E-05	2.93E-06	1.58E-06	1.28E-07	2.22E-06	0.00E+00	9.46E-07	-4.04E-07
NHWD	Kg	4.15E-01	2.25E-01	3.62E-02	5.35E-02	2.93E-01	4.28E-04	5.55E-02	0.00E+00	4.30E+00	-3.60E-03
RWD	Kg	8.59E-04	2.50E-05	1.07E-05	7.61E-06	2.82E-05	4.11E-07	5.76E-06	0.00E+00	4.16E-06	-6.44E-07
CRU	Kg	0.00E+00									
MFR	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.09E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	Kg	0.00E+00									
EET	MJ	0.00E+00	5.50E-01								
EEE	MJ	0.00E+00	3.19E-01								

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**=Use of fresh water | **HWD**=Hazardous waste disposed | **NHWD**=Non-hazardous waste disposed | **RWD**=Radioactive waste disposed | **CRU**=Components for re-use | **MFR**=Materials for recycling | **MER**=Materials for energy recovery | **EET**=Exported energy, thermal | **EE**=Exported energy, electrical

8.3 StoCarrier Hydro (15 mm)

LCA results – Indicators describing environmental impacts based on the impact assessment (LCIA): 1m ² StoCarrier Hydro (15 mm) (EN 15804+A2)											
Parameter	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
Core environmental impact indicators (EN 15804+A2)											
GWP-total	kg CO2 eqv.	3.14E+00	4.50E-01	-2.16E-01	1.37E-01	8.56E-01	7.62E-03	1.32E-01	0.00E+00	5.95E-02	-2.59E-02
GWP-f	kg CO2 eqv.	3.13E+00	4.49E-01	4.76E-01	1.37E-01	1.56E-01	7.48E-03	1.32E-01	0.00E+00	5.13E-02	-2.54E-02
GWP-b	kg CO2 eqv.	8.17E-03	1.81E-04	-6.93E-01	5.53E-05	7.00E-01	1.25E-04	5.30E-05	0.00E+00	8.17E-03	-2.89E-04
GWP-luluc	kg CO2 eqv.	2.55E-03	1.64E-04	7.71E-04	5.03E-05	1.22E-04	9.06E-06	4.83E-05	0.00E+00	1.43E-05	-2.53E-04
ODP	kg CFC 11 eqv	4.10E-07	9.95E-08	5.87E-08	3.03E-08	2.24E-08	2.94E-10	2.91E-08	0.00E+00	2.11E-08	-6.69E-09
AP	mol H+ eqv	2.04E-02	2.58E-03	1.48E-03	7.96E-04	9.87E-04	2.17E-05	7.63E-04	0.00E+00	4.87E-04	-6.89E-04
EP-fw	kg P eqv.	1.12E-04	4.46E-06	1.42E-05	1.38E-06	5.36E-06	1.13E-06	1.33E-06	0.00E+00	5.75E-07	-2.27E-06
EP-m	kg N eqv.	4.34E-03	9.08E-04	3.58E-04	2.81E-04	2.66E-04	3.37E-06	2.69E-04	0.00E+00	1.68E-04	-2.02E-04
EP-T	mol N eqv.	4.95E-02	1.00E-02	4.10E-03	3.09E-03	3.01E-03	5.32E-05	2.96E-03	0.00E+00	1.85E-03	-3.29E-03
POCP	kg NMVOC eqv.	1.58E-02	2.86E-03	1.51E-03	8.83E-04	9.03E-04	1.01E-05	8.46E-04	0.00E+00	5.37E-04	-5.86E-04
ADP-mm	kg Sb-eqv.	9.12E-05	1.15E-05	4.92E-06	3.48E-06	3.76E-06	6.21E-08	3.33E-06	0.00E+00	4.70E-7	-3.36E-7
ADP-f	MJ	5.23E+01	6.78E+00	7.75E+00	2.07E+00	2.45E+00	1.02E-01	1.98E+00	0.00E+00	1.44E+00	-3.28E-01
WDP	m3 world eqv.	1.17E+00	2.39E-02	6.07E-02	7.41E-03	4.27E-02	3.88E-04	7.10E-03	0.00E+00	6.43E-02	-2.81E-03

LCA results - Indicators describing resource use and environmental information derived from life cycle inventory (LCI):StoCarrier Hydro (15 mm) (EN 15804+A2)

Parameter	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	2.54E+00	8.57E-02	1.03E+01	2.59E-02	4.12E-01	1.85E-02	2.48E-02	0.00E+00	1.16E-02	-5.72E+00
PERM	MJ	0.00E+00	0.00E+00	5.88E+00	0.00E+00	1.76E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	2.54E+00	8.57E-02	1.61E+01	2.59E-02	5.88E-01	1.85E-02	2.48E-02	0.00E+00	1.16E-02	-5.72E+00
PENRE	MJ	4.43E+01	7.20E+00	8.34E+00	2.20E+00	2.27E+00	1.09E-01	2.11E+00	0.00E+00	1.52E+00	-3.48E-01
PENRM	MJ	1.18E+01	0.00E+00	1.08E-01	0.00E+00	3.56E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-2.78E-03
PENRT	MJ	5.61E+01	7.20E+00	8.45E+00	2.20E+00	2.63E+00	1.09E-01	2.11E+00	0.00E+00	1.52E+00	-3.51E-01
SM	Kg	0.00E+00									
RSF	MJ	0.00E+00									
NRSF	MJ	0.00E+00									
FW	M3	3.31E-02	8.18E-04	2.00E-03	2.52E-04	1.40E-03	4.63E-05	2.42E-04	0.00E+00	1.53E-03	-8.30E-05
HWD	Kg	4.62E-05	1.72E-05	1.27E-05	5.25E-06	3.22E-06	1.28E-07	5.03E-06	0.00E+00	2.14E-06	-1.03E-06
NHWD	Kg	3.72E-01	4.22E-01	7.44E-02	1.31E-01	7.35E-01	4.28E-04	1.26E-01	0.00E+00	9.75E+00	-1.02E-02
RWD	Kg	1.09E-04	4.47E-05	1.41E-05	1.36E-05	7.59E-06	4.11E-07	1.31E-05	0.00E+00	9.43E-06	-1.77E-06
CRU	Kg	0.00E+00									
MFR	Kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.46E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	Kg	0.00E+00									
EET	MJ	0.00E+00	0.00E+00	6.57E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.56E+00
EEE	MJ	0.00E+00	0.00E+00	3.81E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.08E-01

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**=Use of fresh water | **HWD**=Hazardous waste disposed | **NHWD**=Non-hazardous waste disposed | **RWD**=Radioactive waste disposed | **CRU**=Components for re-use | **MFR**=Materials for recycling | **MER**=Materials for energy recovery | **EET**=Exported energy, thermal | **EE**=Exported energy, electrical

9. References

Ecoinvent 2019	Ecoinvent Datenbank Version 3.6 (2019)
EN 15804	EN 15804:2012+A2:2019: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products
ISO 14025	ISO 14025:2010 Environmental labels and declarations — Type III environmental declarations — Principles and procedures
ISO 14040	ISO 14040:2006 Environmental management - Life cycle assessment - Principles and framework
ISO 14044	ISO 14044:2006 Environmental management - Life cycle assessment - Requirements and guidelines
NMD 2019	NMD STICHTING NATIONAL ENVIRONMENTAL DATABASE: Environmental Performance Assessment Method for Construction; 1.1 (March 2022); Rijswijk
PCR A	Kiwa-Ecobility Experts, Berlin, 2022: PCR A – General Program Category Rules for Construction Products from the EPD programme of Kiwa-Ecobility Experts; Version 2.1
PCR B	Kiwa-Ecobility Experts, Berlin, 2020: PCR B – Product Category Rules for steel construction products, Requirements on the Environmental Product Declarations for steel construction products; Version 2020-03-13 (draft)
DIN 52612:	1984 Testing of thermal insulating materials; determination of thermal conductivity by means of the guarded hot plate apparatus; conversion of the measured values for building application
DIN EN ISO 178:	2010 Plastics – Determination of flexural properties (ISO 178:2010); German version EN ISO 178:2010, 2011-04
DIN EN ISO 7783-2	EN ISO 7783-2:1999 Paints and varnishes– Coating materials and coating systems for exterior masonry and concrete – Part 2: Determination and classification of water vapour transmission rate (permeability) (ISO 7783-2:1999), 1999-06
R<THINK 2023R<THiNK;	Online-EPD-Tool by NIBE B.V.
SimaPro Software	Industry data LCA library; website: https://simapro.com/databases/industry-data-lca-library

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