Environmental Product Declaration (EPD)
According to ISO 14025 and EN 15804

Modulares Glasdach MS78

Registration number:	EPD-Kiwa-EE-167790-en
Issue date:	13-06-2024
Valid until:	13-06-2029
Declaration owner:	LAMILUX Heinrich Strunz GmbH
Publisher:	Kiwa-Ecobility Experts
Program operator:	Kiwa-Ecobility Experts
Status:	verified

1 General information

1.1 PRODUCT

Modulares Glasdach MS78

1.2 REGISTRATION NUMBER

EPD-Kiwa-EE-167790-en

1.3 VALIDITY

Issue date: 13-06-2024

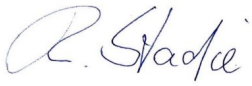
Valid until: 13-06-2029

1.4 PROGRAM OPERATOR

Kiwa-Ecobility Experts
Wattstraße 11-13
13355 Berlin
DE

Raoul Mancke

(Head of programme operations, Kiwa-Ecobility Experts)



Dr. Ronny Stadie

(Verification body, Kiwa-Ecobility Experts)

1.5 OWNER OF THE DECLARATION

Manufacturer: LAMILUX Heinrich Strunz GmbH

Address: Zehstr. 2, 95111 Rehau

E-mail: Helmut.Rosenstiel@lamilux.de

Website: www.lamilux.de

Production location: Lamilux Heinrich Strunz GmbH

Address production location: Zehstraße 2, 95111 Rehau

1.6 VERIFICATION OF THE DECLARATION

The independent verification is in accordance with the ISO 14025:2011. The LCA is in compliance with ISO 14040:2006 and ISO 14044:2006. The EN 15804:2012+A2:2019 serves as the core PCR.

☐ Internal ☒ External

Lucas Pedro Berman, Senda

1.7 STATEMENTS

The owner of this EPD shall be liable for the underlying information and evidence. The programme operator Kiwa-Ecobility Experts shall not be liable with respect to manufacturer data, life cycle assessment data and evidence.

1.8 PRODUCT CATEGORY RULES

Kiwa-Ecobility Experts (Kiwa-EE) – General Product Category Rules (2022-02-14)

DIN EN 17213 Windows and doors - Environmental Product Declarations - Product category rules for windows and pedestrian doorsets (2020-09)

1.9 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+A2. For the evaluation of the comparability, the following aspects have to be considered in particular: PCR used, functional or declared unit, geographical reference, the definition of

1 General information

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 EPD program operators may differ. 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).

1.10 CALCULATION BASIS

LCA method R<THiNK: Ecobility Experts | EN15804+A2

LCA software*: Simapro 9.1

Characterization method: EN 15804 +A2 Method v1.0

LCA database profiles: EcoInvent version 3.6

Version database: v3.17 (2024-05-22)

** Simapro is used for calculating the characterized results of the Environmental profiles within R<THiNK.*

1.11 LCA BACKGROUND REPORT

This EPD is generated on the basis of the LCA background report 'Modulares Glasdach MS78' with the calculation identifier ReTHiNK-67790.

2 Product

2.1 PRODUCT DESCRIPTION

The Modulares Glasdach MS78 is a daylight element. It is available in widths of up to 3 meters with variable lengths. It can be installed with an inclination of between 5° and 30°. This, together with the flat glass surface and the frame profile on the eaves side, ensures optimum water drainage. Dirt edges are also avoided and the glass surfaces are cleaner.

The high glass proportion of the MS78 provides an optimal daylight incidence. The MS78 also allows a custom integration of vents, ensuring a maximum supply of fresh air to a building.

It guarantees maximum safety from the first sealing level thanks to a butt-jointed drainage profile (SEP), the best quality standards thanks to a high degree of prefabrication as well as durable and easy-to-clean materials and surfaces.

Material	Composition
Glass	52,1 %
Aluminium	36,5 %
Steel	4,1 %
Rockwool	3,8 %
Plastic	1 %
Rubber	0,7 %
Electronics	0,5 %
Other	1,3 %

The product is produced in Germany, and sold both inside and outside of Germany.

2.2 APPLICATION (INTENDED USE OF THE PRODUCT)

The Modulares Glasdach MS78 can be used on roofs to provide daylight and ventilate a building.

2.3 REFERENCE SERVICE LIFE

RSL PRODUCT

According to the PCR, a reference service life of 30 years can be assumed without documentation. The prerequisite for this is that the manufacturer's guidelines are followed when installing, servicing and maintaining the product.

USED RSL (YR) IN THIS LCA CALCULATION:

30

2.4 TECHNICAL DATA

The measurements of 1 m² (declared unit) of the Modulares Glasdach MS78 are the following:

Parameter	Value
Width (per module)	1,00 m
Height (per module)	0,90 m
Amount of modules	1,09
Surface area	1 m²
Weight	87,738 kg

The measurements of 1,82 m² of the Modulares Glasdach MS78 (the full product) are the following:

Parameter	Value
Width (per module)	1,00 m
Height (per module)	0,90 m
Amount of modules	2
Surface area	1,82 m²
Weight	159,07 kg

The following technical data applies to this product.

Parameter	Value

2 Product

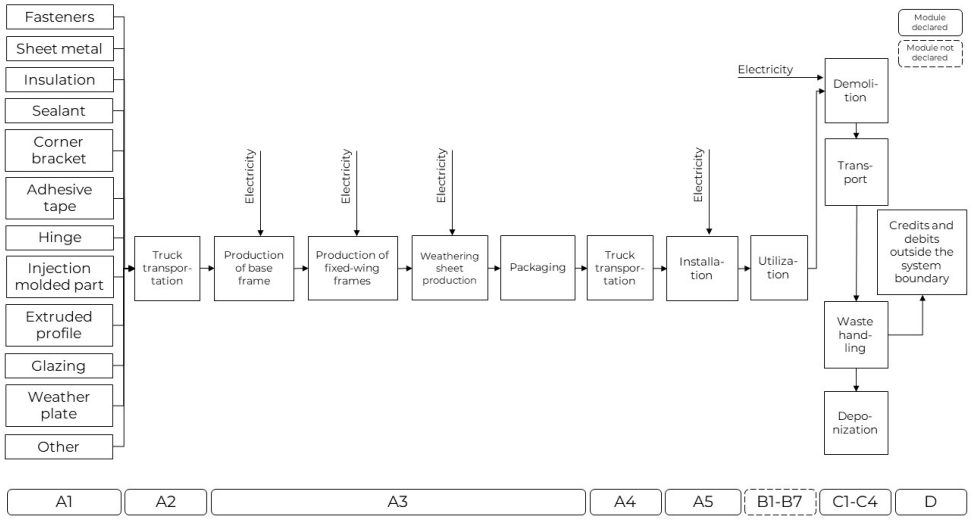
Tightness against driving rain according to DIN EN 12208	E1800
Air permeability according to DIN EN 12207	Class 4
Resistance to wind load according to DIN EN 12210	Up to class C5
Weight per unit area	Approx. 60-100kg/m² - depending on module size and glass type
Overall system heat transfer coefficient Uw	1.0-1.5 W/m²K - depending on module size and glass type
Fall-through protection according to DIN 18008-6	

2.5 SUBSTANCES OF VERY HIGH CONCERN

No substance present in the product with a contribution of more than 0.1 % of the total weight is present on the "List of Potentially Hazardous Substances" (SVHC) that are candidates for authorisation under REACH legislation.

2.6 DESCRIPTION PRODUCTION PROCESS

The Modulares Glasdach MS78 is manufactured in three different steps. First, the raw materials are supplied. Then the sheet metal is laser cut and bent. Then there are three different production processes. The first is the production of the base frames. Then the fixed/sash frames are produced. Finally, the weather sheets are produced. Each of these three elements is transported to the construction site and assembled there.

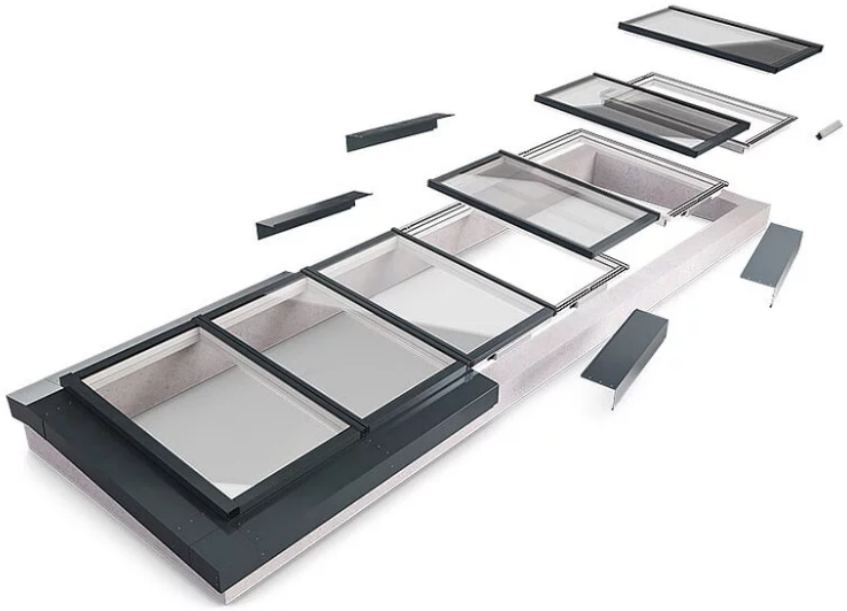


2.7 CONSTRUCTION DESCRIPTION

The base frames are fitted first. Then the fixed and sash frames are fitted. The insulation is then fitted. Finally, the weatherboarding is fitted.

For the installation of the Modulares Glasdach MS78, it is assumed that a crane is needed.

2 Product



3 Calculation rules

3.1 DECLARED UNIT

1 m² glass roof

The declared unit is one square meter glass roof.

Reference unit: square meter (m2)

3.2 CONVERSION FACTORS

Description	Value	Unit
Reference unit	1	m2
Weight per reference unit	87.455	kg
Conversion factor to 1 kg	0.011434	m2

3.3 SCOPE OF DECLARATION AND SYSTEM BOUNDARIES

This is a Cradle to gate with options LCA. The life cycle stages included are as shown below:

(X = module included, ND = module not declared)

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

The modules of the EN15804 contain the following:

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

3.4 REPRESENTATIVENESS

The input data are representative for Modulares Glasdach MS78, a product of LAMILUX Heinrich Strunz GmbH. The data are representative for Germany.

3.5 CUT-OFF CRITERIA

Production phase (modules A1-A3)

All input flows (e.g. raw materials, transportation, energy use, packaging, etc.) and output flows (e.g. production waste) are considered in this LCA. The total neglected input flows do not exceed the limit of 5% of energy use and mass.

3 Calculation rules

Excluded processes are:

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

Construction phase (modules A4-A5)

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

End-of-Life phase (modules 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 not exceed the limit of 5% of energy use and mass.

Benefits and loads outside of the system boundaries (modul 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.

3.6 ALLOCATION

Allocations were avoided as far as possible. No by-products or co-products are produced during the manufacture of the analysed product. The energy requirements of production were allocated to the individual products on the basis of energy consumption measurements. Specific information on the allocations within the background data can be found in the documentation of the Ecoinvent datasets.

3.7 DATA COLLECTION & REFERENCE TIME PERIOD

The data was collected in the beginning of 2024.

3.8 ESTIMATES AND ASSUMPTIONS

The Modulares Glasdach MS78 can be freely configurated in width and height so that it can be customised to the customers' requirements. For this EPD, the Modulares Glasdach MS78 with 2 modules that both have a width of 1,00 m and a height of 0,90 m have been selected. This product has a surface area of 1,82 m^2, but since the functional unit should be 1 m^2 according to the PCR, all inputs have been recalculated to 1 m^2. The results can be calculated for the full Modulares Glasdach MS78 of 1,82 m^2 by multiplying the results by 1,82.

For this product, several raw materials are used that consist of secondary material, sometimes having a mixture of primary and secondary material. This has been reflected accurately in the LCA, and proof has been provided on the secondary content of the respective materials.

For module A4 (transportation to the customer or construction site), both customers inside and outside Germany were taken into account. In 2022, 72,7% of revenue is attributable to domestic sales (i.e. within Germany) and 27,3% to international sales. This was taken into account when calculating the transportation distance for module A4. Transportation to domestic customers is carried out in small batches via distributors and consists of 2 parts, namely a longer route with a large truck (40 t) and a shorter route with a smaller truck (7.5 t). Here, a deviation has been made from the PCR (DIN EN 17213), because an internal calculation could be made.

How the MS78 modular glass roof is assembled and disassembled depends largely on the customer. As it is a large product with glass, this LCA assumes that the product must be installed and dismantled using a crane. Therefore, the electricity consumption for modules A5 (assembly) and C1 (disassembly) was taken into account. The electricity consumption for this crane was calculated in kWh per m^2 and the environmental profile of the European electricity standard (low voltage) was applied to take account of Lamilux's international clientele. The same scenario was assumed for modules A5 and C1.

The scenarios modelled for these modules are currently in use and are representative for the most likely scenarios.

3.9 DATA QUALITY

The quality of the data used for this EPD can be divided into three categories according to the criteria of the United Nations Global Environmental Guidelines for the development of an LCA database (as described in EN 15804+A2).

The quality level of geographical representativeness is very good, the quality level of technical representativeness can be considered good, and the temporal

3 Calculation rules

representativeness can also be considered good. Therefore, the overall data quality for this EPD can be described as good.

3.10 GUARANTEES OF ORIGIN

The "market-based approach" was taken into account for this LCA, so invoices from the electricity provider have been made available. A company specific electricity mix has been modelled based on that, and has been used in this LCA.

4 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.

	Value and unit
Vehicle type used for transport	Module A4 Lamilux (option 2)
Fuel type and consumption of vehicle	
Distance	391 km
Capacity utilisation (including empty returns)	
Bulk density of transported products	
Volume capacity utilisation factor	

4.2 ASSEMBLY (A5)

The following information describes the scenarios for flows entering the system and flows leaving the system at module A5.

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 (EU) - low voltage (max 1kV)	1.5	kWh

FLOWS LEAVING THE SYSTEM

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

Description	Value	Unit
Output materials as result of loss during construction	0	%
Output materials as result of waste processing of materials used for installation/assembly at the building site	0.000	kg
Output materials as result of waste processing of used packaging	26.000	kg

4.3 DE-CONSTRUCTION, DEMOLITION (C1)

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

4 Scenarios and additional technical information

Description	Amount	Unit
Electricity (EU) - low voltage (max 1kV)	1.500	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]	Landfill [km]	Incineration [km]	Recycling [km]	Re-use [km]
aluminium, cast alloy for buildings (i.a. profiles, sheets, pipes) (NMD ID 4)	Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	0
elastomeres (i.a. epdm) (i.a. roofing, foils) (NMD ID 20)	Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	0
plastics, via residue (NMD ID 43)	Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	0
Galvanised steel (i.a. profiles, sheets) (NMD ID 75)	Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	0
EoL electronics - passive components	Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	0
plastics, other (i.a. profiles, sheets, pipes) (NMD ID 45)	Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	0
glass (i.a. flat glass) (NMD ID 28)	Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	0
finishes (adhered to wood, plastic, metal) (NMD ID 2)	Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	0
glass wool (insulation) (NMD ID 30)	Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	0
rock wool (insulation) (NMD ID 78)	Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	0
copper (i.a. sheets, pipes) (NMD ID 41)		0	100	150	50	0

4 Scenarios and additional technical information

Waste Scenario	Transport conveyance	Not removed (stays in work) [km]	Landfill [km]	Incineration [km]	Recycling [km]	Re-use [km]
	Lorry (Truck), unspecified (default) | market group for (GLO)					
Recycled aluminium	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 [%]	Re-use [%]
aluminium, cast alloy for buildings (i.a. profiles, sheets, pipes) (NMD ID 4)	NL	0	3	3	94	0
elastomeres (i.a. epdm) (i.a. roofing, foils) (NMD ID 20)	NL	0	10	85	5	0
plastics, via residue (NMD ID 43)	NL	0	20	80	0	0
Galvanised steel (i.a. profiles, sheets) (NMD ID 75)	NL	0	5	0	95	0
EoL electronics - passive components	DE	0	5	35	60	0
plastics, other (i.a. profiles, sheets, pipes) (NMD ID 45)	NL	0	0	90	10	0
glass (i.a. flat glass) (NMD ID 28)	NL	0	30	0	70	0
finishes (adhered to wood, plastic, metal) (NMD ID 2)	NL	0	0	100	0	0

4 Scenarios and additional technical information

Waste Scenario	Region	Not removed (stays in work) [%]	Landfill [%]	Incineration [%]	Recycling [%]	Re-use [%]
glass wool (insulation) (NMD ID 30)	NL	0	85	5	10	0
rock wool (insulation) (NMD ID 78)	NL	0	85	5	10	0
copper (i.a. sheets, pipes) (NMD ID 41)	NL	0	5	0	95	0
Recycled aluminium	DE	0	0	3	97	0

Waste Scenario	Not removed (stays in work) [kg]	Landfill [kg]	Incineration [kg]	Recycling [kg]	Re-use [kg]
aluminium, cast alloy for buildings (i.a. profiles, sheets, pipes) (NMD ID 4)	0.000	0.642	0.642	20.125	0.000
elastomeres (i.a. epdm) (i.a. roofing, foils) (NMD ID 20)	0.000	0.051	0.433	0.025	0.000
plastics, via residue (NMD ID 43)	0.000	0.505	2.018	0.000	0.000
Galvanised steel (i.a. profiles, sheets) (NMD ID 75)	0.000	0.196	0.000	3.717	0.000
EoL electronics - passive components	0.000	0.158	1.102	1.890	0.000
plastics, other (i.a. profiles, sheets, pipes) (NMD ID 45)	0.000	0.000	0.108	0.012	0.000
glass (i.a. flat glass) (NMD ID 28)	0.000	13.650	0.000	31.850	0.000
finishes (adhered to wood, plastic, metal) (NMD ID 2)	0.000	0.000	0.100	0.000	0.000
glass wool (insulation) (NMD ID 30)	0.000	0.008	0.000	0.001	0.000
rock wool (insulation) (NMD ID 78)	0.000	2.796	0.165	0.329	0.000
copper (i.a. sheets, pipes) (NMD ID 41)	0.000	0.002	0.000	0.029	0.000
Recycled aluminium	0.000	0.000	0.207	6.693	0.000
Total	**0.000**	**18.007**	**4.777**	**64.672**	**0.000**

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	Net output flow [kg]	Energy recovery [MJ]
aluminium, cast alloy for buildings (i.a. profiles, sheets, pipes) (NMD ID 4)	20.125	0.000
elastomeres (i.a. epdm) (i.a. roofing, foils) (NMD ID 20)	0.025	11.787
Total	**57.086**	**63.179**

4 Scenarios and additional technical information

Waste Scenario	Net output flow [kg]	Energy recovery [MJ]
plastics, via residue (NMD ID 43)	0.000	47.328
Galvanised steel (i.a. profiles, sheets) (NMD ID 75)	3.032	0.000
EoL electronics - passive components	1.890	0.000
plastics, other (i.a. profiles, sheets, pipes) (NMD ID 45)	0.012	4.063
glass (i.a. flat glass) (NMD ID 28)	31.850	0.000
finishes (adhered to wood, plastic, metal) (NMD ID 2)	0.000	0.000
glass wool (insulation) (NMD ID 30)	0.001	0.000
rock wool (insulation) (NMD ID 78)	0.329	0.000
copper (i.a. sheets, pipes) (NMD ID 41)	0.029	0.000
Recycled aluminium	-0.207	0.000
Total	**57.086**	**63.179**

5 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.

5.1 ENVIRONMENTAL IMPACT INDICATORS PER SQUARE METER

CORE ENVIRONMENTAL IMPACT INDICATORS EN15804+A2

Abbr.	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
AP	mol H+ eqv.	5.11E+0	2.62E-2	2.40E-1	5.38E+0	1.73E-2	1.45E-2	3.76E-3	4.50E-3	3.98E-2	9.65E-4	-2.40E+0
GWP-total	kg CO2 eqv.	7.79E+2	4.52E+0	2.82E-1	7.84E+2	5.57E+0	4.54E+1	6.65E-1	7.77E-1	1.88E+1	1.95E-1	-3.65E+2
GWP-b	kg CO2 eqv.	2.89E+0	2.08E-3	-4.13E+1	-3.84E+1	3.60E-3	4.19E+1	1.93E-2	3.58E-4	3.76E-1	6.99E-4	1.60E+0
GWP-f	kg CO2 eqv.	7.73E+2	4.51E+0	4.15E+1	8.19E+2	5.57E+0	3.51E+0	6.44E-1	7.76E-1	1.84E+1	1.94E-1	-3.66E+2
GWP-luluc	kg CO2 eqv.	2.37E+0	1.65E-3	1.17E-1	2.49E+0	2.21E-3	1.93E-3	1.50E-3	2.84E-4	4.85E-3	4.38E-5	-1.38E+0
EP-m	kg N eqv.	7.88E-1	9.22E-3	4.49E-2	8.42E-1	3.55E-3	4.98E-3	4.77E-4	1.59E-3	7.57E-3	3.94E-4	-3.63E-1
EP-fw	kg P eqv.	2.61E-2	4.55E-5	1.71E-3	2.78E-2	5.10E-5	8.56E-5	6.88E-5	7.83E-6	2.59E-4	1.67E-6	-1.20E-2
EP-T	mol N eqv.	8.72E+0	1.02E-1	4.97E-1	9.32E+0	3.97E-2	5.61E-2	5.88E-3	1.75E-2	8.62E-2	3.65E-3	-4.14E+0
ODP	kg CFC 11 eqv.	3.60E-5	9.96E-7	2.80E-6	3.98E-5	1.30E-6	2.61E-7	5.42E-8	1.71E-7	7.75E-7	4.05E-8	-1.36E-5
POCP	kg NMVOC eqv.	2.53E+0	2.90E-2	1.65E-1	2.72E+0	1.55E-2	1.50E-2	1.49E-3	4.99E-3	2.40E-2	1.07E-3	-1.20E+0
ADP-f	MJ	7.97E+3	6.81E+1	5.48E+2	8.59E+3	8.75E+1	2.50E+1	1.33E+1	1.17E+1	6.90E+1	2.89E+0	-3.43E+3
ADP-mm	kg Sb-eqv.	1.36E-2	1.14E-4	1.09E-2	2.46E-2	1.64E-4	2.09E-5	4.69E-6	1.97E-5	1.63E-4	9.46E-7	1.06E-1
WDP	m3 world eqv.	1.32E+2	2.43E-1	1.17E+1	1.44E+2	2.94E-1	3.82E-1	1.48E-1	4.19E-2	1.07E+0	4.14E-2	-2.74E+1

AP=Acidification (AP) | **GWP-total**=Global warming potential (GWP-total) | **GWP-b**=Global warming potential - Biogenic (GWP-b) | **GWP-f**=Global warming potential - Fossil (GWP-f) | **GWP-luluc**=Global warming potential - Land use and land use change (GWP-luluc) | **EP-m**=Eutrophication marine (EP-m) | **EP-fw**=Eutrophication, freshwater (EP-fw) | **EP-T**=Eutrophication, terrestrial (EP-T) | **ODP**=Ozone depletion (ODP) | **POCP**=Photochemical ozone formation - human health (POCP) | **ADP-f**=Resource use, fossils (ADP-f) | **ADP-mm**=Resource use, minerals and metals (ADP-mm) | **WDP**=Water use (WDP)

5 Results

ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS EN15804+A2

Abbr.	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
ETP-fw	CTUe	1.98E+4	6.07E+1	1.13E+3	2.10E+4	7.32E+1	4.80E+1	9.07E+0	1.04E+1	4.02E+2	4.00E+2	-9.00E+3
PM	disease incidence	6.06E-5	4.06E-7	3.16E-6	6.41E-5	4.05E-7	1.19E-7	9.84E-9	6.98E-8	4.76E-7	1.88E-8	-2.89E-5
HTP-c	CTUh	4.01E-6	1.97E-9	6.28E-8	4.07E-6	2.07E-9	7.13E-9	2.34E-10	3.39E-10	7.27E-9	5.83E-11	-4.91E-7
HTP-nc	CTUh	1.82E-5	6.64E-8	9.18E-7	1.92E-5	7.75E-8	4.41E-8	7.99E-9	1.14E-8	2.96E-7	1.79E-9	-7.45E-6
IR	kBq U235 eqv.	1.62E+1	2.85E-1	1.40E+0	1.79E+1	3.82E-1	1.61E-1	1.14E-1	4.90E-2	2.97E-1	1.20E-2	-4.56E+0
SQP	Pt	1.93E+3	5.90E+1	5.24E+3	7.23E+3	8.04E+1	1.24E+1	3.24E+0	1.02E+1	6.34E+1	6.01E+0	-2.16E+3

ETP-fw=Ecotoxicity, freshwater (ETP-fw) | **PM**=Particulate Matter (PM) | **HTP-c**=Human toxicity, cancer (HTP-c) | **HTP-nc**=Human toxicity, non-cancer (HTP-nc) | **IR**=Ionising radiation, human health (IR) | **SQP**=Land use (SQP)

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)	None
	Depletion potential of the stratospheric ozone layer (ODP)	None
	Potential incidence of disease due to PM emissions (PM)	None
ILCD type / level 2	Acidification potential, Accumulated Exceedance (AP)	None
	Eutrophication potential, Fraction of nutrients reaching freshwater end compartment (EP-freshwater)	None
	Eutrophication potential, Fraction of nutrients reaching marine end compartment (EP-marine)	None
	Eutrophication potential, Accumulated Exceedance (EP-terrestrial)	None
	Formation potential of tropospheric ozone (POCP)	None
	Potential Human exposure efficiency relative to U235 (IRP)	1
ILCD type / level 3	Abiotic depletion potential for non-fossil resources (ADP-minerals&metals)	2
	Abiotic depletion potential for fossil resources (ADP-fossil)	2
	Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	2

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ILCD classification	Indicator	Disclaimer
	Potential Comparative Toxic Unit for ecosystems (ETP-fw)	2
	Potential Comparative Toxic Unit for humans (HTP-c)	2
	Potential Comparative Toxic Unit for humans (HTP-nc)	2
	Potential Soil quality index (SQP)	2

Disclaimer 1 – 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.

Disclaimer 2 – The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

5.2 INDICATORS DESCRIBING RESOURCE USE AND ENVIRONMENTAL INFORMATION BASED ON LIFE CYCLE INVENTORY (LCI)

PARAMETERS DESCRIBING RESOURCE USE

Abbr.	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	9.70E+2	8.52E-1	4.43E+2	1.41E+3	1.37E+0	2.91E+0	2.51E+0	1.47E-1	7.21E+0	5.89E-2	-7.65E+2
PERM	MJ	0.00E+0	0.00E+0	3.50E+2	3.50E+2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PERT	MJ	9.70E+2	8.52E-1	7.92E+2	1.76E+3	1.37E+0	2.91E+0	2.51E+0	1.47E-1	7.37E+0	5.96E-2	-7.65E+2
PENRE	MJ	8.37E+3	7.23E+1	5.61E+2	9.01E+3	9.29E+1	2.64E+1	1.39E+1	1.24E+1	7.19E+1	3.02E+0	-3.65E+3
PENRM	MJ	8.00E+1	0.00E+0	2.29E+1	1.03E+2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	-1.07E+0
PENRT	MJ	8.46E+3	7.23E+1	5.84E+2	9.11E+3	9.29E+1	2.64E+1	1.39E+1	1.24E+1	7.38E+1	3.07E+0	-3.65E+3
SM	Kg	3.13E+0	0.00E+0	1.06E-3	3.13E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.34E-2
RSF	MJ	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
NRSF	MJ	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
FW	M3	5.64E+0	8.29E-3	4.06E-1	6.05E+0	1.08E-2	2.64E-2	1.11E-2	1.43E-3	4.83E-2	3.21E-3	-1.95E+0

PERE=renewable primary energy ex. raw materials | **PERM**=renewable primary energy used as raw materials | **PERT**=renewable primary energy total | **PENRE**=non-renewable primary energy ex. raw materials | **PENRM**=non-renewable primary energy used as raw materials | **PENRT**=non-renewable primary energy total | **SM**=use of secondary material | **RSF**=use of renewable secondary fuels | **NRSF**=use of non-renewable secondary fuels | **FW**=use of net fresh water

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OTHER ENVIRONMENTAL INFORMATION DESCRIBING WASTE CATEGORIES

Abbr.	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	Kg	1.53E-1	1.72E-4	5.02E-2	2.03E-1	2.23E-4	3.66E-5	8.83E-6	2.97E-5	1.77E-1	3.40E-6	2.18E-1
NHWD	Kg	1.43E+2	4.32E+0	8.11E+0	1.55E+2	5.89E+0	3.39E+0	4.48E-2	7.42E-1	3.39E+0	1.80E+1	-6.81E+1
RWD	Kg	2.35E-2	4.47E-4	1.47E-3	2.54E-2	5.92E-4	1.59E-4	9.40E-5	7.69E-5	3.24E-4	1.84E-5	-5.32E-3

HWD=hazardous waste disposed | **NHWD**=non hazardous waste disposed | **RWD**=radioactive waste disposed

ENVIRONMENTAL INFORMATION DESCRIBING OUTPUT FLOWS

Abbr.	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
CRU	Kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
MFR	Kg	0.00E+0	0.00E+0	2.45E+0	2.45E+0	0.00E+0	1.25E+0	0.00E+0	0.00E+0	6.28E+1	0.00E+0	0.00E+0
MER	Kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
EET	MJ	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.17E+2
EEE	MJ	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	6.82E+1

CRU=Components for re-use | **MFR**=Materials for recycling | **MER**=Materials for energy recovery | **EET**=Exported Energy Thermic | **EEE**=Exported Energy Electric

5 Results

5.3 INFORMATION ON BIOGENIC CARBON CONTENT PER SQUARE METER

BIOGENIC CARBON CONTENT

The following Information describes the biogenic carbon content in (the main parts of) the product at the factory gate per square meter:

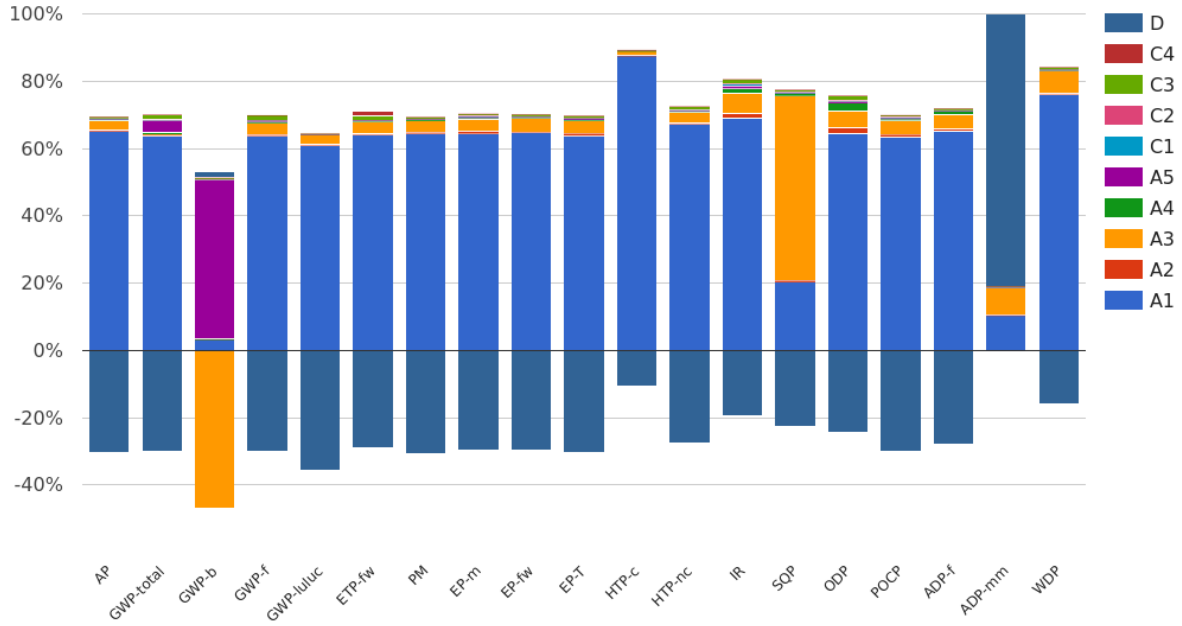
Biogenic carbon content	Amount	Unit
Biogenic carbon content in the product	0	kg C
Biogenic carbon content in accompanying packaging	11.36	kg C

UPTAKE OF BIOGENIC CARBON DIOXIDE

The following amount 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.

Uptake Biogenic Carbon dioxide	Amount	Unit
Packaging	41.67	kg CO2 (biogenic)

6 Interpretation of results



As can be seen in the graph, module A1 has the largest influence on almost all environmental impact categories. After that, module D has the biggest influence, and even has a bigger influence than module A1 on the category Resource use, minerals and metals (ADP-mm). The other modules all have a relatively low influence on the categories.

The big influence of both modules A1 and module D on the results can be attributed to the aluminium consisting of primary material used in the product. Aluminium has a large impact on all categories, and simultaneously has a high value as a secondary material. The high value as a secondary material has a large impact on module D, and leads to the high benefits that can be seen in the graph. The aluminium consisting (partially) of secondary material used in this product is in a separate category, and has a significantly lower influence on the modules.

7 References

ISO 14040
ISO 14040:2006-10, Environmental management - Life cycle assessment - Principles and framework; EN ISO 14040:2006

ISO 14044
ISO 14044:2006-10, Environmental management - Life cycle assessment - Requirements and guidelines; EN ISO 14040:2006

ISO 14025
ISO 14025:2011-10: Environmental labels and declarations — Type III environmental declarations — Principles and procedures

EN 15804+A2
EN 15804+A2: 2019: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products

General PCR Ecobility Experts
Kiwa-Ecobility Experts (Kiwa-EE) – General Product Category Rules (2022-02-14)

DIN EN 17213
Windows and doors - Environmental Product Declarations - Product category rules for windows and pedestrian doorsets; German version EN 17213:2020 (2020-09)

DIN EN 12208
Windows and doors - Watertightness - Classification; German version EN 12208:1999 (2000-06)

DIN EN 12207
Windows and doors - Air permeability - Classification; German version EN 12207:2016 (2017-03)

DIN EN 12210
Windows and doors - Resistance to wind load - Classification; German version EN 12210:2016 (2016-09)

DIN 18008-6
Glass in building - Design and construction rules - Part 6: Additional requirements for walk-on glazing in case of maintenance procedures and for fall-through glazing (2018-02)

8 Contact information

Publisher	Operator	Owner of declaration

Kiwa-Ecobility Experts
Wattstraße 11-13
13355 Berlin, DE

E-mail:
DE.Ecobility.Experts@kiwa.com
Website:
https://www.kiwa.com/de/en/themes/ecobility-experts/ecobility-experts-epd-program/

Kiwa-Ecobility Experts
Wattstraße 11-13
13355 Berlin, DE

E-mail:
DE.Ecobility.Experts@kiwa.com
Website:
https://www.kiwa.com/de/en/themes/ecobility-experts/ecobility-experts-epd-program/

LAMILUX Heinrich Strunz GmbH
Zehstr. 2
95111 Rehau, DE

E-mail:
Helmut.Rosenstiel@lamilux.de
Website:
www.lamilux.de

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