

ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A2

Owner of the Declaration	VELUX Group
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-VEL-20240210-IBA1-EN
Issue date	23.07.2024
Valid to	22.07.2029

VELUX Commercial acrylic dome rooflights (Akrylovenlys)
VELUX Group

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1. General Information

VELUX Group

Programme holder

IBU – Institut Bauen und Umwelt e.V.
Hegelplatz 1
10117 Berlin
Germany

Declaration number

EPD-VEL-20240210-IBA1-EN

This declaration is based on the product category rules:

Windows and doors , 01.08.2021
(PCR checked and approved by the SVR)

Issue date

23.07.2024

Valid to

22.07.2029



Dipl.-Ing. Hans Peters
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(Managing Director Institut Bauen und Umwelt e.V.)

VELUX Commercial acrylic dome rooflights (Akrylovenlys)

Owner of the declaration

VELUX Group
Ådalsvej 99
2970 Hørsholm
Denmark

Declared product / declared unit

1 m² of VELUX Commercial acrylic dome rooflights (Akrylovenlys).

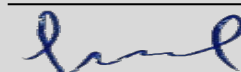
Scope:

The LCA represents 100% of the production volume of VELUX Commercial acrylic dome rooflights produced by VELUX Commercial in Kongerslev (DK).
The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

The EPD was created according to the specifications of EN 15804+A2. In the following, the standard will be simplified as *EN 15804*.

Verification

The standard EN 15804 serves as the core PCR		
Independent verification of the declaration and data according to ISO 14025:2011		
☐	internally	☒ externally



Dr.-Ing. Nikolay Minkov,
(Independent verifier)

2. Product

2.1 Product description/Product definition

The declared acrylic domes are 2-3-4-5 layer plastic rooflights in either dome or pyramid shape. The outer layer is made in acrylic (PMMA) or polycarbonate material (PC) with inner layers of acrylic (PMMA). The dome is framed by aluminum profile in either black, grey or white.

The upstand is made of either insulated plywood put together in a sandwich construction or as massive rafter wood.

For the placing on the market of the product in the European Union/European Free Trade Association (EU/EFTA) (with the exception of Switzerland) *Regulation (EU) No. 305/2011 (CPR)* applies. The product needs a declaration of performance taking into consideration:

- *EN 1873:2005, Prefabricated accessories for roofing - Individual rooflights of plastics - Product specification and test methods*

and the CE-marking.

2.2 Application

VELUX Commercial acrylic domes are intended for the lighting by means of daylight and of ventilating interior spaces by means of opening devices

Areas of application for the VELUX Commercial acrylic domes are:

- heated industrial buildings
- warehouses
- small production factory
- car service/mechanics
- stock facility
- sport facilities incl. locker rooms
- temporary houses
- exhibition area
- wholesale
- schools & day cares
- railway stations

2.3 Technical Data

Technical characteristics

Technical characteristics listed according to *DoP No. 457503-2* for Acrylic/Polycarbonate rooflight, Curved or Pyramid dome Types 20-H--, 30-H--, 40-H--, 50-H--, 20-P--, 30-P, 40-P--, 50-P — with insulating upstand type I48:

Name	Value	Unit
Resistance to upward load	NPD	
Resistance to downward load	NPD	
Reaction to fire, upstand acc. EN 13501	D-s2, d0	
Reaction to fire, top: PMMA acc. EN 13501	E	
Reaction to fire, top: PC acc. EN 13501	B-s1, d0	
Reaction to fire, top: PMMA+PC acc. EN 13501	E	
Resistance to fire	NPD	
External fire performance	NPD	
Water tightness	NPD	
Small, hard body	NPD	
Large, soft body acc. EN 1873	SB 1200	
Direct airborne sound insulation	20 - 22	dB
Thermal transmittance acc. EN 1873	1.2-2.0	W/(m ² K)
Luminous transmittance; clear layer(s) acc. EN 1873	68 % - 82 %	
Luminous transmittance; opal layer added acc. EN 1873	64 % - 77 %	
Air permeability	NPD	
Durability	NPD	

NPD: no performance declared

Thermal transmittance calculated for insulated upstand 30 cm above roof construction, for size 120 cm x 120 cm, based on worst case openable units with curved dome

Performance data of the product in accordance with the declaration of performance with respect to its essential characteristics according to:

- *EN 1873:2005, Prefabricated accessories for roofing - Individual rooflights of plastics - Product specification and test methods.*

2.4 Delivery status

VELUX Commercial domes are available in sizes ranging from 520 mm x 520 mm (0.27 m²) to 1200 mm x 2400 mm (2.9 m²) with a standard size of 850 mm x 850 mm (0.72 m²). The height can range from 100 mm to 1000 mm with a standard height of 300 mm.

2.5 Base materials/Ancillary materials

The declared product is composed of:

Name	Value	Unit
Poly(methyl methacrylate) (PMMA)	32 %	-
Polycarbonate (PC)	30 %	-
Plywood	18 %	-
Sawn timber	12 %	-
Stone wool	3 %	
Aluminium	2 %	
Steel	2 %	
Others	1 %	-

1. This product/article/at least one partial article contains substances listed in the *ECHA candidate list* (date: 15.08.2023) exceeding 0.1 percentage by mass: **no**.

2. This product/article/at least one partial article contains other carcinogenic, mutagenic or reprotoxic (CMR) substances in categories 1A or 1B which are not on the *ECHA candidate list*,

exceeding 0.1 percentage by mass: **not investigated with suppliers.**

3. Biocide products were added to this construction product or it has been treated with biocide products (this then concerns a treated product as defined by the (EU) *Ordinance on Biocide Products No. 528/2012*): **no.**

2.6 Manufacture

All the raw materials including wood, plywood, polycarbonate, acrylic, aluminium, actuators and all ancillary materials (fittings, screws, glue, plastic parts, gasket, etc.) are bought from external suppliers. First the wood and plywood are cross-cut for the production of the upstands; in addition, all aluminium parts are cross-cut, drilled and welded; in a last preparatory step, the polycarbonate and the acrylic are crosscut and shaped. All the components are then assembled to the final product, which undergoes a final inspection.

Only a few items are bought manufactured from a sub supplier. That is the aluminium sheets for windscreens and standard sizes frames for insulated upstands. Also the wood for solid frames (Kehlet) is bought from external.

Normally aluminium is not surface treated; sometimes the aluminium parts are painted (wet paint) from a local dealer, but not very often.

The insulated upstand made from wood/plywood come usually as laminated material; only in a few cases, the interior side of the upstands are painted.

In order to guarantee the quality assurance of the product, VELUX operates a quality management system according to *ISO 9001*.

2.7 Environment and health during manufacturing

The health of employees is protected by suitable measures specified by the authorities. These include safety goggles, hearing protection, helmets, gloves, safety shoes, etc. Waste generated during every process in the company is collected, sorted and disposed of in a professional and resource-conserving manner.

2.8 Product processing/Installation

The rooflights upstand is fixed to the roof sub-construction with screws and brackets (not supplied by VELUX Commercial). The type of fastening depends on the sub-construction. After fixating the upstand, the factory pre-assembled top unit is fixed to the upstand or ventilation frame using screws.

After fixating the complete rooflight, the roof membrane is sealed with materials brought by the installer.

2.9 Packaging

For the transport to the construction site, the VELUX Commercial acrylic domes are loaded onto a lorry and fixed with multi-use fastening belts. Usually, no additional packaging is used.

2.10 Condition of use

The material composition of VELUX Commercial acrylic domes does not change over their service life.

2.11 Environment and health during use

VELUX Commercial acrylic domes do not contain any pollutants that could be released during use.

Environmental protection: According to current knowledge, hazards to water, air and soil cannot arise when the products are used as intended.

Health protection: According to current knowledge, no health hazards or impairments are to be expected.

2.12 Reference service life

It is not possible to calculate the reference service life according to *ISO 15686*. The service life based on a manufacturer's declaration is 30 years. The corresponding utilization scenario is declared in chapter 4.

2.13 Extraordinary effects

Fire

See table 2.3 for the reaction to fire of the different components.

Water

In the event of unforeseen exposure to water (flood), no adverse effects on human health or the environment are to be expected.

Mechanical destruction

In the event of unforeseen mechanical destruction, VELUX Commercial acrylic domes must be replaced; no adverse effects on human health or the environment are to be expected.

2.14 Re-use phase

VELUX Commercial acrylic domes can be dismantled manually without any problems. The metal parts are usually recycled, and the wooden and plastic parts are sent for thermal recycling for energy recovery.

2.15 Disposal

VELUX Commercial acrylic domes can be disposed of in an appropriate landfill. However, due to the value of the materials or the carbon content of the wooden and plastic parts, recycling or energy recovery is preferable and common.

Waste code according to the *European Waste List* (Regulation on the European Waste List):

17 02 01 wood
17 02 03 plastics
17 04 02 aluminium
17 04 05 iron and steel

2.16 Further information

Further documentation on the products, technical data sheets, BIM files, etc. can be found at:

www.commercial.velux.com

3. LCA: Calculation rules

3.1 Declared Unit

1 m² of VELUX Commercial acrylic domes is declared.

Declared unit and mass reference

Name	Value	Unit
Declared unit	1	m ²
Grammage	19.80	kg/m ²

A representative acrylic domes in dome shape of the size 850 mm x 850 mm and with a height of 300 mm is declared. It consists of 3-layers of plastic sheets (PC/PMMA/PMMA) and includes a upstand of insulated wood (48 mm).

3.2 System boundary

Type of the EPD: "cradle to gate with modules C1–C4, and module D".

The production of VELUX Commercial acrylic domes (**modules A1-A3**) includes raw material extraction, energy generation, waste treatment and all transports up to the factory gate. In accordance with *COUNCIL REGULATION (EU) No 333/2011*, secondary metals are modelled as part of the product system from the moment they are available as unmixed scrap. For production wastes that are incinerated, it is assumed that they are incinerated in a municipal waste incineration plant with an R-value < 0.6. This means that the incineration process is considered a waste treatment process and included in the calculations. The generated 'exported energy' is assumed to have reached the end-of-waste status and is considered in module D.

Module A4 is not declared for being optional. In building assessments, the specific transport distance from Kongerslev/Denmark to the construction site can be considered.

The products are delivered to the construction site ready to be installed. Minor impacts from installation, e.g. using cranes, etc. can be considered insignificant in the light of the total environmental impacts across the life cycle. No packaging is used for the transport to the construction site that would need to be disposed of in module A5. **Module A5** is not declared for being optional.

Minor impacts from de-installation, e.g. using cranes, etc. can be considered insignificant in the light of the total environmental impacts across the life cycle. The values of **module C1** are hence 'zero'.

In the end-of-life, it is assumed that the disassembled products are brought to a sorting plant for construction materials, where metals and burnable wastes are separated.

Metals are recycled; it is assumed that these fractions reach end-of-waste state after having been sorted and transported to a recycler. Wooden parts and plastics are incinerated (also due to the very limited data availability on plastics recycling and its benefits). On average, an average transport distance of 50 km has been assumed in **module C2** with an average lorry for the transport of the wastes to an incineration plant or to a recycling facility.

The disassembled product is shredded and the materials are sorted in **module C3**. The recovered material leaves the product system as 'materials for recycling'. The net amounts of the metals leaving the product system are considered as 'use of secondary material' in Module D. The wooden parts and the plastics are treated in a waste incineration plant with an efficiency $R1 < 0.6$ (according to *CEWEP Energy Report III*); the recovered energy is reported as 'exported energy' and considered in Module D.

Module C4 is not declared as a "recovery scenario" is assumed on product level, including waste treatment from sorting/recycling in module C3.

Module D contains the benefits and loads beyond the system boundary related to the recycling of metals, which result from the treatment of recycled materials from the point of end-of-waste status to the point of substitution (as loads) and the substitution of primary resources (as benefits). It also includes the benefits and loads related to the energy recovery from plastic and wooden wastes in a municipal waste incineration plant as modelled in Module C3. Only net flows leaving the product system are considered in module D. The recycled content and the assumed processing losses (e.g., during remelting) are taken from *ecoinvent v.3.9.1* datasets.

3.3 Estimates and assumptions

No further assumptions and estimates relevant to the result had to be made beyond the points made in chapter 3 and chapter 4.

3.4 Cut-off criteria

No data available from the company survey was neglected. These include, among other things, material use, energy demand (heat, electricity), packaging materials of raw materials (insofar as they are generated as waste) and product packaging, consumables in production, waste treatment and the transport of all inputs and outputs. With this approach, mass and energy flows below 1 % were also accounted for. No processes were neglected that would have been known to the project managers and would have contributed significantly to the indicators of the impact assessment.

3.5 Background data

Ecoinvent v3.9.1 (2022) with the system model 'allocation – cut-off by classification – unit processes' is used as the background database.

3.6 Data quality

The foreground data are based on extensive and detailed data collection at the production site. The foreground data could be fully linked with corresponding data records from the background database *ecoinvent v3.9.1* with the system model "allocation – cut-off by classification – unit processes".

The background data was updated in 2022. Thus, the quality of the foreground and background data can be rated as very good.

The variability of the products consists only in its configuration (size). An estimate of the variance of results depending on the size of the products can be found in chapter 7.

3.7 Period under review

The LCA data represents the production conditions for the year 2022.

3.8 Geographic Representativeness

Land or region, in which the declared product system is manufactured, used or handled at the end of the product's lifespan: Europe

3.9 Allocation

No co-products are generated during the production of the VELUX Commercial products. Sorted production scrap of the different metals, notably aluminium, is considered a secondary material with no economic value (so no burdens allocated) and considered in the quantification of net flows leaving the product system. This approach is chosen to ensure a coherent quantification of net flows entering module D.

Biogenic carbon is allocated based on physical flows regardless of the allocation procedure chosen for the process. The biogenic carbon content of wood products entering or leaving the product system is quantified (manually) as part of the GWP in conformity with *EN 16485*.

No processes were modelled as part of the foreground model that would have required an allocation of multi-input processes. Background datasets on municipal waste incineration plants were taken from *ecoinvent* without any modification.

Allocation of reuse, recycling and recovery was avoided by the cut-off approach in the foreground model in line with *EN 15804*.

3.10 Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to *EN 15804* and the building context, respectively the product-specific characteristics of performance, are taken

into account.

Ecoinvent v3.9.1 (2022) with the system model 'allocation – cut-off by classification – unit processes' is used as the background database.

4. LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

Information on describing the biogenic carbon content at factory gate

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

Name	Value	Unit
Biogenic carbon content in product	-	kg C
Biogenic carbon content in accompanying packaging	2.24	kg C

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Reference service life

Name	Value	Unit
Life Span according to the manufacturer	30	a
Declared product properties (at the gate) and finishes	The product has passed internal quality controls and complies with product standard for CE marking	-
Design application parameters (if instructed by the manufacturer), including the references to the appropriate practices and application codes	Installation according to assembly instructions and state of the art.	-
An assumed quality of work, when installed in accordance with the manufacturer's instructions	Carried out in accordance with the manufacturer's instructions.	-
Outdoor environment, (for outdoor applications), e.g. weathering, pollutants, UV and wind exposure, building orientation, shading, temperature	The declared products are intended for installation outside the building: They are therefore designed to withstand outdoor conditions throughout their service life.	-
Indoor environment (for indoor applications), e.g. temperature, moisture, chemical exposure	The declared products are not intended for installation inside a building.	-
Usage conditions, e.g. frequency of use, mechanical exposure	Standard use in any type of building, i.e., opening/closing as often as necessary.	-
Maintenance e.g. required frequency, type and quality and replacement of components	The declared products are designed for a reference service life of 30 years. They are maintained by cleaning water at the discretion of the building occupants.	-

Module C1

Inputs and outputs from de-installation are disregarded.

Module C2

On average, an transport distance of 50 km to a sorting/recycling facility and an additional 50 km for sorted wooden and plastic parts to a municipal waste incineration plant.

Module C3

A consumption of 0.03 kWh/kg of electricity for shredding and sorting and 0.437 MJ/kg of diesel fuel for internal logistics are taken into account to disassemble the product. The recovered material leaves the product system as 'materials for recycling'. The net amounts of the metals leaving the product system are considered as 'use of secondary material' in Module D.

As stated above, it is assumed that 100 % of the wooden and plastic parts are treated in a waste incineration plant with an efficiency $R1 < 0.6$ (according to *CEWEP Energy Report III*); according to the same source, an efficiency of 31.0 % is assumed for the production of heat and 18.0 % for the production of electricity (always referring to the lower heating value of the waste). The recovered energy is reported as 'exported energy' and considered in Module D.

Module C4

Not relevant according to the assumed end-of-life scenario.

Module D

Module D contains the benefits and loads beyond the system boundary related to the recycling of metals, which result from the treatment of recycled materials from the point of end-of-waste status to the point of substitution (as loads) and the substitution of primary resources (as benefits). It also includes the benefits and loads related to the energy recovery from wooden and plastic wastes in a municipal waste incineration plant as modelled in Module C3. Only net flows leaving the product system are considered in module D.

5. LCA: Results

The set of characterisation factors EF 3.1 has been used.

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

Product stage			Construction process stage		Use stage							End of life stage				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	MND	MND	MND	MND	MNR	MNR	MNR	MND	MND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 m² of the VELUX Commercial acrylic dome rooflights

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Global Warming Potential total (GWP-total)	kg CO ₂ eq	7.1E+01	0	2.86E-01	3.94E+01	0	-6.48E+01
Global Warming Potential fossil fuels (GWP-fossil)	kg CO ₂ eq	7.97E+01	0	2.86E-01	3.07E+01	0	-6.04E+01
Global Warming Potential biogenic (GWP-biogenic)	kg CO ₂ eq	-8.74E+00	0	2.4E-04	8.66E+00	0	-4.36E+00
Global Warming Potential luluc (GWP-luluc)	kg CO ₂ eq	8.74E-02	0	1.4E-04	1.17E-03	0	-9.68E-02
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC11 eq	3.47E-06	0	6.27E-09	1.89E-07	0	-9.6E-07
Acidification potential of land and water (AP)	mol H ⁺ eq	3.59E-01	0	1.34E-03	1.77E-02	0	-1.46E-01
Eutrophication potential aquatic freshwater (EP-freshwater)	kg P eq	2.42E-03	0	2.35E-06	6.53E-05	0	-6.78E-03
Eutrophication potential aquatic marine (EP-marine)	kg N eq	6.9E-02	0	5.26E-04	7.78E-03	0	-2.68E-02
Eutrophication potential terrestrial (EP-terrestrial)	mol N eq	8.09E-01	0	5.68E-03	8.52E-02	0	-3.23E-01
Formation potential of tropospheric ozone photochemical oxidants (POCP)	kg NMVOC eq	3.08E-01	0	1.98E-03	2.37E-02	0	-1.04E-01
Abiotic depletion potential for non fossil resources (ADPE)	kg Sb eq	5.44E-04	0	8.91E-07	3.9E-06	0	-4.75E-05
Abiotic depletion potential for fossil resources (ADPF)	MJ	1.53E+03	0	4.13E+00	2.16E+01	0	-8.62E+02
Water use (WDP)	m ³ world eq deprived	3.19E+01	0	1.8E-02	3.63E-01	0	-2.69E+00

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 m² of the VELUX Commercial acrylic dome rooflights

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Renewable primary energy as energy carrier (PERE)	MJ	1.64E+02	0	6.43E-02	1.03E+02	0	-1.37E+02
Renewable primary energy resources as material utilization (PERM)	MJ	1.02E+02	0	0	-1.02E+02	0	0
Total use of renewable primary energy resources (PERT)	MJ	2.66E+02	0	6.43E-02	1.46E+00	0	-1.37E+02
Non renewable primary energy as energy carrier (PENRE)	MJ	1.15E+03	0	4.13E+00	4.07E+02	0	-8.76E+02
Non renewable primary energy as material utilization (PENRM)	MJ	3.85E+02	0	0	-3.85E+02	0	0
Total use of non renewable primary energy resources (PENRT)	MJ	1.53E+03	0	4.13E+00	2.17E+01	0	-8.76E+02
Use of secondary material (SM)	kg	2.67E-01	0	0	0	0	6.54E-01
Use of renewable secondary fuels (RSF)	MJ	0	0	0	0	0	0
Use of non renewable secondary fuels (NRSF)	MJ	0	0	0	0	0	0
Use of net fresh water (FW)	m ³	1.62E+00	0	1.12E-03	2.98E-02	0	-2.75E-01

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 m² of the VELUX Commercial acrylic dome rooflights

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Hazardous waste disposed (HWD)	kg	6.39E-03	0	2.6E-05	1.14E-04	0	-5.34E-04
Non hazardous waste disposed (NHWD)	kg	1.28E+01	0	2.63E-01	1.1E+00	0	-4.75E+00
Radioactive waste disposed (RWD)	kg	4.3E-03	0	2.42E-06	5.73E-05	0	-5.53E-03
Components for re-use (CRU)	kg	0	0	0	0	0	0
Materials for recycling (MFR)	kg	5.79E-02	0	0	8.63E-01	0	8.63E-01
Materials for energy recovery (MER)	kg	0	0	0	0	0	0
Exported electrical energy (EEE)	MJ	3.22E+00	0	0	8.77E+01	0	0
Exported thermal energy (EET)	MJ	5.55E+00	0	0	1.51E+02	0	0

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1 m² of the VELUX Commercial acrylic dome rooflights

Parameter	Unit	A1-A3	C1	C2	C3	C4	D
Incidence of disease due to PM emissions (PM)	Disease incidence	4.15E-06	0	2.81E-08	2.91E-07	0	-1E-06
Human exposure efficiency relative to U235 (IR)	kBq U235 eq	2.58E+00	0	2.14E-03	3.43E-02	0	-2.44E+00

Comparative toxic unit for ecosystems (ETP-fw)	CTUe	2.27E+03	0	2.03E+00	7.98E+01	0	-1.62E+02
Comparative toxic unit for humans (carcinogenic) (HTP-c)	CTUh	1.14E-07	0	1.54E-10	7.65E-09	0	-1.67E-08
Comparative toxic unit for humans (noncarcinogenic) (HTP-nc)	CTUh	9.24E-07	0	3.2E-09	4.65E-08	0	-2.96E-07
Soil quality index (SQP)	SQP	1.31E+03	0	3.1E+00	3.24E+00	0	-1.05E+02

Disclaimer 1 – for the indicator “Potential Human exposure efficiency relative to U235”. 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 or radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, radon and from some construction materials is also not measured by this indicator.

Disclaimer 2 – for the indicators “abiotic depletion potential for non-fossil resources”, “abiotic depletion potential for fossil resources”, “water (user) deprivation potential, deprivation-weighted water consumption”, “potential comparative toxic unit for ecosystems”, “potential comparative toxic unit for humans – cancerogenic”, “Potential comparative toxic unit for humans - not cancerogenic”, “potential soil quality index”. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high as there is limited experience with the indicator.

6. LCA: Interpretation

Figure 1 illustrates the relative contributions of the different modules along the life cycle for VELUX Commercial acrylic dome rooflights.

dome rooflights.

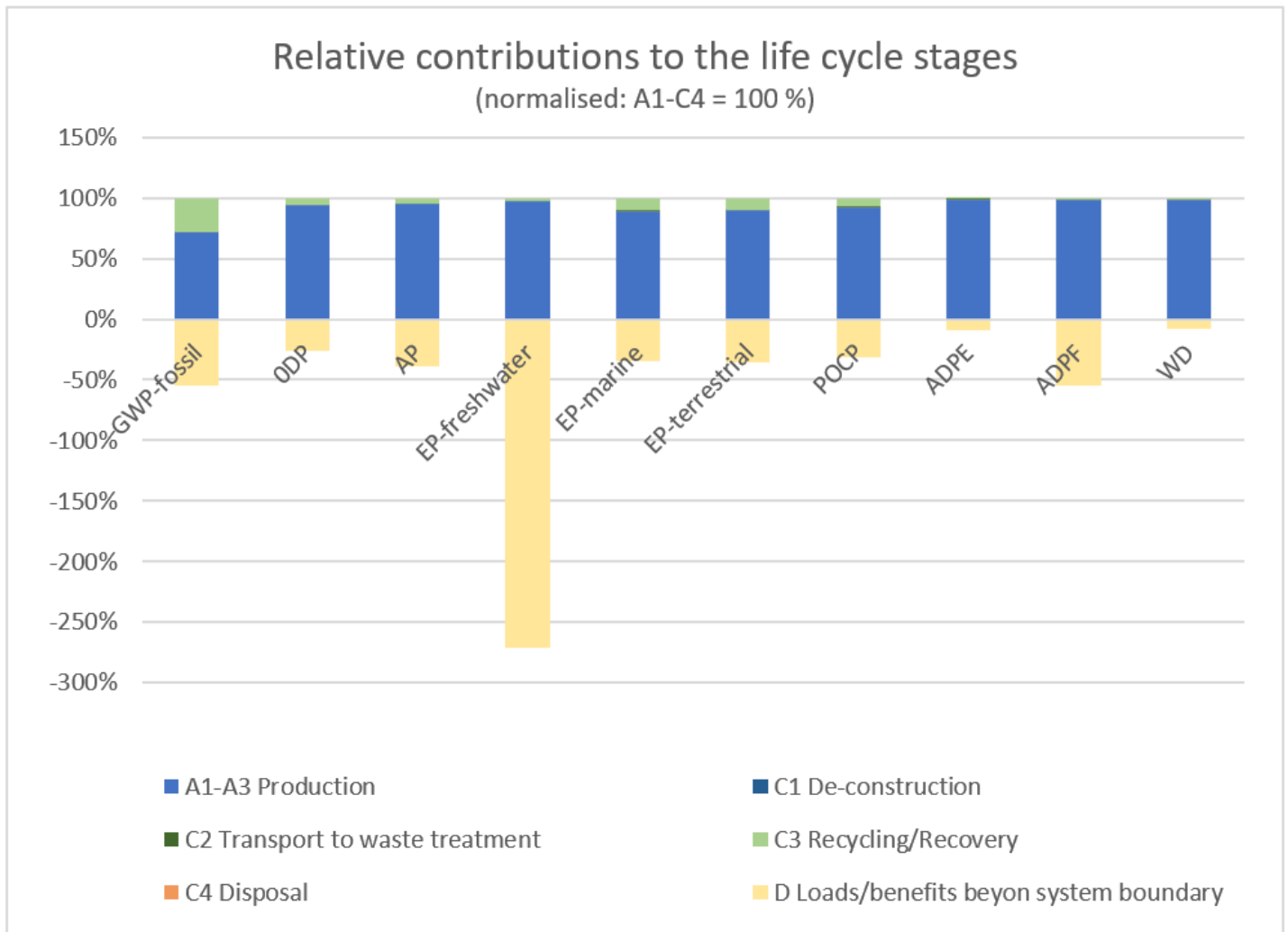


Figure 1: Relative environmental impacts of the different life cycle stages for VELUX Commercial acrylic dome rooflights (modules A1–A3 = 100 %)

By far the largest part of environmental impacts is caused during production (modules A1-A3) of the VELUX Commercial acrylic domes. The contributions of other life cycle stages are comparably small.

Benefits and burdens beyond the system boundary (module D) are in the order of -270 % to -10 % of the impacts over the product life cycle (modules A1-C4).

The use of renewable primary energy is caused on the one hand by the share of renewable energy in the electricity mix and on the other hand by the primary energy content of sawn timber and plywood used in the upstand; the production stage is the main driver of this impact category whereas the renewable energy stored in the wooden material is rebooked as used as an energy carrier in module C3.

The use of non-renewable primary energy is mainly caused on the one hand by the share of non-renewable energy in the electricity mix and heat consumption during production and on the other hand by the primary energy content of the plastic

materials (polycarbonate and acrylic); the production stage is the main driver of this impact category whereas the non-renewable energy stored in the plastic components is rebooked as used as an energy carrier in module C3.

Non-hazardous waste as the quantitatively most relevant waste flows is mainly caused during maintenance due to the replacement of the motor; hazardous and radioactive waste are mainly caused by the European electricity mix used during the use phase.

The LCA for the VELUX Commercial products have been calculated for representative products, which are in fact quite close to the composition of the weighted average production in 2022. To assess the possible variance, a 'maximum' version in terms of material intensity (highest upstand, highest number of

acrylic/polycarbonate layers, etc.) has been assessed per product group. The higher material intensity of the maximum version is not compensated by a higher surface area covered but lead to higher impact of around 30 % to 50 % in most impact indicators.

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7. Requisite evidence

7.1 Formaldehyde

No test defined in applicable product standards.

7.2 MDI

No test defined in applicable product standards.

7.3 Checking for pretreatment of the substances used (Measurement according to AltholzV)

Not applicable; no test defined in applicable product standards.

7.4 Fire gas toxicity

No test defined in applicable product standards.

7.5 VOC emissions

No test defined in applicable product standards.

8. References

Product category rules of IBU

IBU (2021)

IBU (2021): General Instructions for the EPD Programme of the Institut Bauen und Umwelt e.V. Version 2.0, Institut Bauen und Umwelt, Berlin.

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IBU (2021): PCR Part A: Calculation rules for the life cycle assessment and requirements on the project report according to EN 15804+A2. Version 1.3, Institut Bauen und Umwelt e.V., Berlin.

IBU (2023)

IBU (2023): PCR Part B: Requirements on the EPD for windows and doors. Version 2023/04, Institut Bauen und Umwelt e.V., Berlin.

Standards and legal documents

EN 1873

EN 1873:2005, Prefabricated accessories for roofing - Individual rooflights of plastics - Product specification and test methods.

EN 15804

DIN EN 15804+A2:2022-03, sustainability of construction works - Environmental product declarations - Core rules for the product category construction products; German version EN 15804: 2012+A2:2019 + AC:2021.

EN 16485

DIN EN 16485:2014-07, Round and sawn timber - Environmental Product Declarations - Product category rules for wood and wood-based products for use in construction; German version EN 16485:2014.

ISO 9001

DIN EN ISO 9001:2015, Quality management systems - Requirements.

ISO 14025

DIN EN ISO 14025:2006-07, Environmental labels and declarations - Type III Environmental declarations - Principles and procedures.

ISO 14044

DIN EN ISO 14044:2006-07, Environmental management - Life cycle assessment - Requirements and guidance.

ECHA candidate list

The candidate list of substances of very high concern, European Chemicals Agency, Helsinki. Available at: <https://echa.europa.eu/nl/-/four-news-substances-added-to-the-candidate-list>.

Regulation on biocidal products

REGULATION (EU) No 528/2012 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 22 May 2012 concerning the making available on the market and use of biocidal products.

Regulation (EU) Nr. 305/2011(CPR)

REGULATION (EU) No 305/2011 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC.

COUNCIL REGULATION (EU) No 333/2011

COUNCIL REGULATION (EU) No 333/2011 of 31 March 2011 establishing criteria determining when certain types of scrap metal cease to be waste under Directive 2008/98/EC of the European Parliament and of the Council.

European Waste List (Waste index)

<http://www.gesetze-im-internet.de/avv/anlage.htm> EN 16485



Additional references

CEWEP Energy Report III

Reimann D.O. (2013): CEWEP Energy Report III (Status 2007 – 2010); Results of Specific Data for Energy, R1 Plant Efficiency Factor and NCV of 314 European Waste-to-Energy

(WtE) Plants. CEWEP, Würzburg/Brussels, 2013.

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