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-20220136-IBJ3-EN
Issue date	25.07.2022
Valid to	24.07.2027

VELUX roller shutter - grid-conntected

VELUX A/S

Institut Bauen und Umwelt e.V.

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ECO PLATFORM EPD VERIFIED

1. General Information

VELUX A/S

Programme holder

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

Declaration number

EPD-VEL-20220136-IBJ3-EN

This declaration is based on the product category rules:

Sun protection systems, 01.08.2021
(PCR checked and approved by the SVR)

Issue date

25.07.2022

Valid to

24.07.2027

Dipl.-Ing. Hans Peters
(Chairman of Institut Bauen und Umwelt e.V.)

Florian Pronold
(Managing Director Institut Bauen und Umwelt e.V.)

VELUX roller shutter - grid-conntected

Owner of the declaration

VELUX Group
Ådalsvej 99
2970 Hørsholm
Denmark

Declared product / declared unit

The declaration represents 1 m^2 of the grid-connected VELUX roller shutter SML of the size MK06 = area of 0.91884 m^2 (0.78 m*1.178 m). Being the most sold product of this product family the declared values are also representative for the VELUX roller shutters SMG and SMH of the same size.

Scope:

The declaration covers 100% of grid-connected VELUX roller shutters SML, SMG and SMH produced by KH-SK France S.A.S, France and by Gåsdal Bygningsindustri A/S, Denmark.
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. Eva Schmincke,
(Independent verifier)

2. Product

2.1 Product description/Product definition

The Velux grid-connected roller shutters SML, SMG and SMH are exterior shutters to be installed in connection with a VELUX roof window. 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 13659:2015*, Shutters and external venetian blinds - Performance requirements including safety and the CE-marking. For the application and use the respective national provisions apply.

2.2 Application

VELUX shutters are installed on the exterior side of a VELUX roof window, in connection with home improvement, renovation and new build.

2.3 Technical Data

The Declaration of Performance including relevant technical specifications and test methods/test standards can be downloaded from the website www.velux.com/ce

Constructional data

Name	Value	Unit
Resistance to wind load according to EN 13659	4	-

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

- *EN 13659:2015*, Shutters and external venetian blinds - Performance requirements including safety.

2.4 Delivery status

Roller shutters are manufactured ready for installation in predefined sizes, which are available for installation on most VELUX windows types and within the majority of the window size range.

2.5 Base materials/Ancillary materials

Composition of the shutter SML:
Aluminium 70 %
EPDM 7 %
Polycarbonate 5 %
others

Composition of the corresponding motor SML:
DC motor 30 %
Distaloy AB 25 %
Aluminium 20 %
PET 5 %
Wire/cable 5 %
others

1) This product/article/at least one partial article contains substances listed in the *candidate list* (date: 02.03.2022) exceeding 0.1 percentage by mass:

- no

2) This product/article/at least one partial article contains other CMR substances in categories 1A or 1B which are not on the *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) *Regulation on Biocidal Products No. 528/2012*):

- no

Recycled content

Name	Value	Unit
Aluminum	30	%
Others	0	%

The values stated in the table relate to the recycled material streams in VELUX production.

2.6 Manufacture

Extruded aluminum profiles, aluminum coils, rubber and plastic are produced outside Velux.

The production and final assembly of shutters takes place in the production sites in Denmark and France.

The final production processes include shortening of extruded profiles, aluminum coils, cutting, drilling, rollforming of aluminum band, mounting of rubber gasket, brackets as well as packaging and stacking, wrapping on pallets.

The factories are *ISO 9001* certified.

2.7 Environment and health during manufacturing

All factories are *ISO 14001* and *ISO 45001* certified.

2.8 Product processing/Installation

The factory-assembled product is installed on-site on the pre-installed window, by use of a screw driver.

2.9 Packaging

The packaging usually consists of:

- polyethylene film
- cardboard
- paper inserts

The use of other packaging materials is possible, but insignificant in terms of quantity.

The plastic packaging (polyethylene (PE) film as well as the cardboard and paper can be recycled if separated by type; alternatively, they can be incinerated.

2.10 Condition of use

The material composition of VELUX roller shutters does not change over their service life.

2.11 Environment and health during use

VELUX roller shutters 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 reference service life based on a manufacturer's declaration is 30 years. The corresponding utilization scenario is declared in 4. The products are designed for outdoor use; external influences on the ageing of the product are minimal.

2.13 Extraordinary effects

Fire
Product not tested according to *EN 13501* under the CE-mark.
Water
In the event of unforeseen exposure to water (flood), the electronic parts of VELUX roller shutters must be replaced as electrical components; no adverse effects on human health or the environment are to be expected.

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

2.14 Re-use phase
VELUX roller shutters can be dismantled manually without any problems. The metal parts are usually recycled, and the plastic parts are sent for thermal recycling for energy recovery.

2.15 Disposal
VELUX roller shutters are mostly inert and can be disposed of in an appropriate landfill. However, due to the value of the materials or the carbon content of the plastic parts, recycling or energy recovery is preferable and common.

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

16 02 14 electronic parts
17 02 03 plastics
17 04 14 mixed metals

2.16 Further information
Further documentation on the products, technical data sheets, BIM files, etc. can be found at:
www.velux.com

3. LCA: Calculation rules

3.1 Declared Unit
The declared unit is 1 m^2 of the grid-connected VELUX roller shutter SML of the size MK06 = area of 0.91884 m^2 (0.78 m*1.178 m).
Being the most sold product of this product family and due to minimal differences in the bill of materials, the declared values are also representative for the VELUX roller shutters SMG and SMH of the same size.

Declared unit

Name	Value	Unit
Declared unit	1	m^2
Grammage	11.7	kg/m^2

3.2 System boundary
Type of EPD: Cradle to gate with options, with modules C1 – C4, and module D (A1-A3, C1-C3, D and additional modules

The production of VELUX roller shutters (**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 modeled as part of the product system from the moment they are available as unmixed scrap.
Waste or secondary fuels are not used for production.

Module A4 is not declared due to large variances in transport distances between the production site and the construction site, where the product is installed.

Module A5: The products are delivered to the construction site ready to be installed. Manual installation is assumed, and electricity consumption related to electric drilling machines, screw drivers, etc. is considered to be negligible. The combustible packaging material (PE-foil) is assumed to be thermally treated in a municipal waste incineration plant with an efficiency R1 < 0.6 (according to the ecoinvent dataset used); the recovered energy is declared as exported energy.
Cardboard and paper are recycled; it is assumed that these fractions reach the end-of-waste state after having been sorted and transported (as a conservative choice) to a recycler. No packaging waste is landfilled.

Modules B1, B3 to B5 and B7 are not relevant for the product under consideration or no significant environmental impacts occur.

Module B2 includes the one-time replacement of the motor over the service life after 15 years. Since the composition and content of recyclate for the electric motor is not known, it is not considered for the calculation of module D.

Module B6 includes the electricity consumption for opening and closing the roller shutters over their service life.

Module C1 includes manual dismantling, with no significant environmental impact.

Module C2 comprises the transport of the dismantled VELUX roller shutter to a sorting plant and then to a waste incineration plant for the thermally treated plastic fraction.

Modules C3/C4: Given the complexity of the inventoried products, a mixed end-of-life scenario is modelled, allowing the different materials to follow their most likely path.
As a rule of thumb, metals are recycled, and plastics are incinerated (also due to the very limited data availability of plastics recycling and its benefits).

It is assumed that metals reach an end-of-waste state after having been sorted and transported to a recycler. The combustible material (plastics) is assumed to be thermally treated in a municipal waste incineration plant.

Module D includes the benefits and burdens associated with recycling metals beyond the system boundary, resulting from the treatment of recycled materials from the point of end-of-waste to the point of substitution (as loads) and substitution of primary resources (as benefits).
It also includes the benefits and burdens associated with energy recovery from plastic waste in a municipal waste incineration (MWI) plant, as modeled in Module C3.
In Module D, only net flows of metals leaving the product system are considered.

3.3 Estimates and assumptions
No further assumptions and estimates relevant to the result had to be made beyond the points made in this chapter 3 and in 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 3.8 (2021) is used as the background database.

3.6 Data quality

The foreground data are based on extensive and detailed data collection at the production sites. The foreground data could be fully linked with corresponding data records from the background database *ecoinvent 3.8*.
The background data was updated in 2021. Thus, the quality of the foreground and background data can be rated as very good.

3.7 Period under review

The LCA data represents the production conditions for the year 2021.

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 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.
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 *DIN 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.

4. LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

Information on describing the biogenic carbon content at factury gate

Name	Value	Unit
Biogenic carbon content in product	0.0891	kg C
Biogenic carbon content in accompanying packaging	0.787	kg C

Note: 1 kg of biogenic carbon is equivalent to 44/12 kg of CO_2.

Module A5
The products are delivered to the construction site ready to be installed. Manual installation is assumed, and electricity consumption related to electric drilling machines, screw drivers, etc. is considered to be negligible.

The combustible packaging material (plastics) is assumed to be transported 50 km with a lorry 16-32 metric ton, EURO6 to an incineration plant with an efficiency R1 < 0.6 (according to the *ecoinvent* dataset used); the recovered energy is declared as exported energy; for its quantification an efficiency of 25.6 % is assumed for the production of heat and 13.0 % for the production of electricity (always referring to the lower heating value of the waste).

Metals, cardboard and paper are recycled; it is assumed that these fractions reach the end-of-waste state after having been sorted and transported (as a conservative choice) to a recycler over 150 km with a lorry 16-32 metric ton, EURO6.

No packaging waste is landfilled.

The use of multi-way pallets is not taken into account as packaging material.

Reference service life

Name	Value	Unit
Reference service life according to manufacturer's declaration	30	a
Declared product properties (at the gate) and finishes	The product has passed internal quality controls and complies with EN 13659 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 life of 30 years, with the motor replaced every 15 years. They are maintained by cleaning water at the discretion of the building occupants.	-

Module B1
The products are assumed to have no direct emissions during the use phase. The indicator values of Module B1 are thus 0. The roller shutters store minimal quantities of biogenic carbon.

Module B2
The maintenance scenario (B2) covers the replacement of the motor over the service life of the product. Given that the detailed composition of the motor and its electronic components is not known, potential loads and benefits related to the motor and electronics are disregarded.

Annual cleaning with water (e.g., using 1 l/m^2 of tap water per annual cleaning) is neglected.

Module B6
For motor-operated roller shutters, electricity is used both on stand-by and during the opening/closing cycles.

Module C1
Manual de-installation is assumed, and electricity consumption related to electric screw drivers, etc. is considered to be negligible. Thus, no environmental impacts are declared in module C1.

Module C2
Given the complexity of the inventoried products, a mixed end-of-life scenario is modelled, allowing the different materials to follow their most likely path.

It should also be noted that the deconstruction and waste treatment scenario can vary a lot, depending on the actual situation. Thus, a generic end-of-life scenario is assumed.

As a rule of thumb, metals are recycled and plastics are incinerated (also due to the very limited data availability of plastics recycling and its benefits). The combustible material (plastics) is assumed to be transported 50 km with a lorry 16-32 metric tons, EURO6 to an incineration plant. Metals are recycled; it is assumed that these fractions reach the end-of-waste state after having been sorted and transported to a recycler over 150 km with a lorry 16-32 metric tons, EURO6.

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.

Module C4
As stated above, it is assumed that 100% of the plastic parts are treated in a waste incineration plant with an efficiency R1 < 0.6 (according to the *ecoinvent* dataset used); 25.57% of the lower heating value of the plastic parts are recovered as heat and 13.0% as electricity. Recovered energy is reported as 'exported energy' and considered in Module D.

Some of the material, notably laminated flat glass is assumed to be landfilled.

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 plastic wastes in a MWIP as modelled in Modules A3, A5 and C3.

The benefits of the recycling of the motor and electronic parts are not considered due to the absence of data on its composition and recycled content.

Due to a lack of data for plastics from de-construction activities, the substitution potential of recycled plastics is not taken into account.

Only net flows leaving the product system are considered in module D.

5. LCA: Results

Disclaimer:

EP-freshwater: This indicator has been calculated as 'kg P eq' as required in the characterization model (EUTREND model, Struijs et al., 2009b, as implemented in ReCiPe; http://eplca.jrc.ec.europa.eu/LCDN/developerEF.xhtml)

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	X	X	X	MNR	MNR	MNR	X	MND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 m2 VELUX roller shutter SML of the size MK06 = area of 0.919 m2 (0.78 m * 1.178 m)

Parameter	Unit	A1-A3	A5	B1	B2	B6	C1	C2	C3	C4	D
GWP-total	kg CO_2 eq	1.64E+02	3.97E+00	0	4.85E+00	3.62E+01	0	2.1E-01	1.01E+00	7.47E+00	-1.59E+02
GWP-fossil	kg CO_2 eq	1.67E+02	8.26E-01	0	4.84E+00	3.61E+01	0	2.1E-01	6.5E-01	7.47E+00	-1.58E+02
GWP-biogenic	kg CO_2 eq	-3.5E+00	3.14E+00	0	0	0	0	0	3.56E-01	0	0
GWP-luluc	kg CO_2 eq	4.08E-01	3.71E-05	0	8.34E-03	9.01E-02	0	8.56E-05	3.21E-04	1.03E-04	-5.82E-01
ODP	kg CFC11 eq	8.24E-06	2.1E-08	0	7.53E-07	1.83E-06	0	4.93E-08	1.87E-08	3.64E-08	-5.35E-06
AP	mol H^+ eq	1.07E+00	5.77E-04	0	4.91E-02	1.86E-01	0	1.19E-03	1.19E-03	1.86E-03	-1.01E+00
EP-freshwater	kg P eq	5.91E-03	7.07E-07	0	2.58E-04	4.06E-03	0	1.55E-06	3.61E-05	3.31E-06	-5.95E-03
EP-marine	kg N eq	1.71E-01	2.16E-04	0	6.75E-03	2.38E-02	0	4.29E-04	3.95E-04	8.12E-04	-1.5E-01
EP-terrestrial	mol N eq	1.82E+00	2.39E-03	0	6.11E-02	2.76E-01	0	4.72E-03	4.41E-03	8.64E-03	-1.66E+00
POCP	kg NMVOC eq	5.54E-01	6.74E-04	0	1.92E-02	7.54E-02	0	1.35E-03	1.17E-03	2.14E-03	-4.9E-01
ADPE	kg Sb eq	2.11E-03	3.08E-07	0	6.58E-04	8.76E-05	0	7.04E-07	5.21E-07	8.88E-07	1.37E-03
ADPF	MJ	1.86E+03	1.38E+00	0	4.95E+01	7.66E+02	0	3.24E+00	3.98E+00	1.34E+00	-1.44E+03
WDP	m^3 world eq deprived	3.64E+01	5.6E-03	0	1.44E+00	8.55E+00	0	1.06E-02	3.16E-02	8.58E-02	-2.11E+01

GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential)

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 m2 VELUX roller shutter SML of the size MK06 = area of 0.919 m2 (0.78 m * 1.178 m)

Parameter	Unit	A1-A3	A5	B1	B2	B6	C1	C2	C3	C4	D
PERE	MJ	1.61E+02	2.08E-02	0	5E+00	1.45E+02	0	4.58E-02	4.93E-01	9.86E-02	-1.91E+02
PERM	MJ	4.07E+01	-3.61E+01	0	0	0	0	0	-4.59E+00	0	0
PERT	MJ	2.02E+02	2.08E-02	0	5E+00	1.45E+02	0	4.58E-02	-4.1E+00	9.86E-02	-1.91E+02
PENRE	MJ	1.75E+03	1.28E+01	0	4.79E+01	7.73E+02	0	3.24E+00	3.52E-06	9.77E+01	-1.45E+03
PENRM	MJ	1.08E+02	-1.14E+01	0	0	0	0	0	0	-9.63E+01	0
PENRT	MJ	1.86E+03	1.38E+00	0	4.79E+01	7.73E+02	0	3.24E+00	3.52E-06	1.34E+00	-1.45E+03
SM	kg	8.73E-01	0	0	1.15E-02	0	0	0	0	0	1.01E+01
RSF	MJ	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0
FW	m^3	2.29E+00	2.37E-04	0	8.92E-01	1.12E-01	0	5.36E-04	6.35E-04	9.8E-04	1.51E+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 net fresh water

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 m2 VELUX roller shutter SML of the size MK06 = area of 0.919 m2 (0.78 m * 1.178 m)

Parameter	Unit	A1-A3	A5	B1	B2	B6	C1	C2	C3	C4	D
HWD	kg	2.69E-02	3.62E-06	0	1.2E-03	2.72E-04	0	8.25E-06	3.52E-06	5.73E-06	2.06E-02
NHWD	kg	4.17E+01	9.84E-02	0	1.61E+00	2.88E+00	0	2.17E-01	1.96E-01	2.92E-01	-3.81E+01

RWD	kg	8E-03	1.96E-05	0	3.22E-04	1.03E-02	0	4.68E-05	3.57E-05	8.44E-06	-4.48E-03
CRU	kg	0	0	0	0	0	0	0	0	0	0
MFR	kg	1.13E+00	2.13E+00	0	6.39E-01	0	0	0	9.67E+00	0	0
MER	kg	0	0	0	0	0	0	0	0	0	0
EEE	MJ	2.77E-01	1.48E+00	0	2.81E-01	0	0	0	0	1.25E+01	0
EET	MJ	5.46E-01	2.91E+00	0	5.52E-01	0	0	0	0	2.46E+01	0

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional:
1 m2 VELUX roller shutter SML of the size MK06 = area of 0.919 m2 (0.78 m * 1.178 m)

Parameter	Unit	A1-A3	A5	B1	B2	B6	C1	C2	C3	C4	D
PM	Disease incidence	1.19E-05	8.49E-09	0	3.43E-07	4.75E-07	0	1.89E-08	1.71E-08	1.05E-08	-1.11E-05
IR	kBq U235 eq	3.83E+00	5.92E-03	0	1.47E-01	6.97E+00	0	1.41E-02	1.38E-02	4.2E-03	-1.54E+00
ETP-fw	CTUe	4.47E+03	1.24E+00	0	3.21E+02	3.85E+02	0	2.56E+00	4.51E+00	1.66E+01	-2.94E+03
HTP-c	CTUh	2.42E-07	1.32E-10	0	1.55E-08	1.03E-08	0	1.02E-10	9.22E-11	9.76E-10	-1.61E-07
HTP-nc	CTUh	4.34E-06	1.9E-09	0	4.51E-07	3.34E-07	0	2.95E-09	6.92E-09	1.04E-08	-2.51E-06
SQP	SQP	5.36E+02	1.16E+00	0	2.11E+01	1.18E+02	0	2.76E+00	6.15E-01	4.62E-01	-1.91E+02

PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index

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 of the declared products.

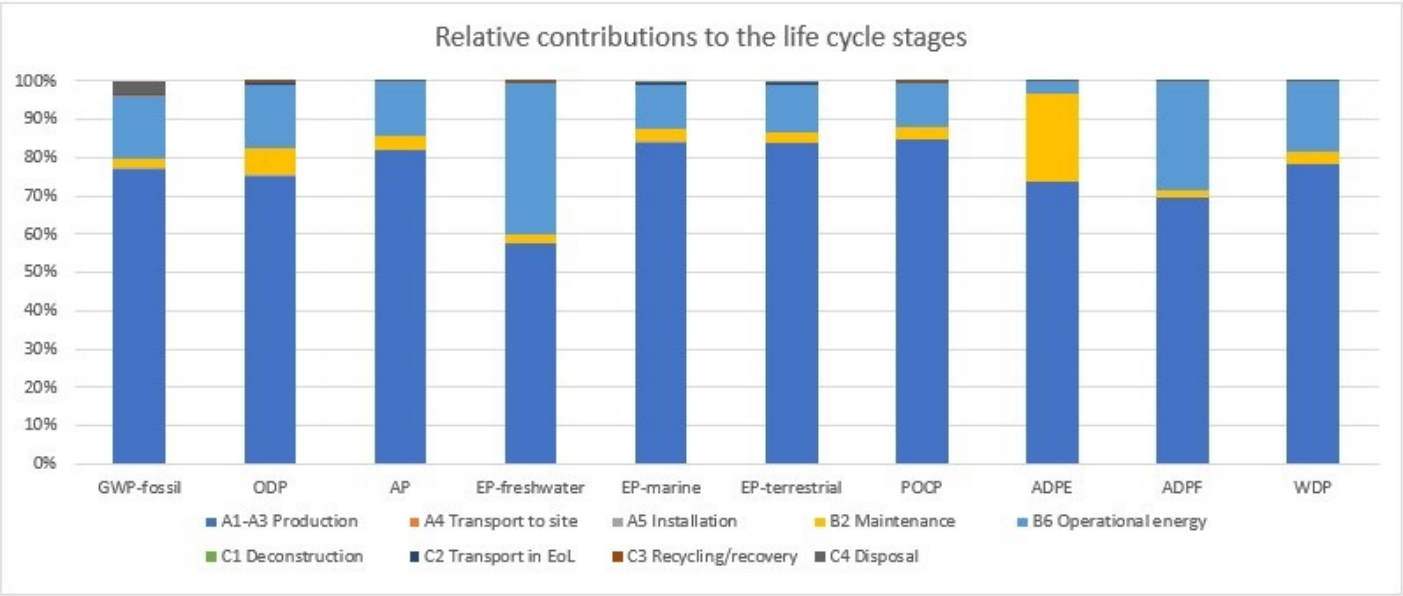

Figure 1: Relative environmental impacts of the different life cycle stages for the shutter SML with grid-connected motor

The largest part of environmental impacts – between 60 % and 85 % - is caused during production (modules A1-A3) of the shutter and its motor. Operational energy use adds another 20 % to 40% to the environmental impacts over the life cycle. The replacement of the motor – the disposal of the obsolete motor and the production of and installation of its replacement – is comparably insignificant with exception of the ADP elements, where copper and other rather rare metals add to this impact category (module B2).
Benefits and burdens beyond the system boundary (module D) are in the order of 50 % to 80 % of the impacts over the product life cycle (modules A1-C4). The net positive impact ('load') of the ADPelements is related to copper input as the copper cathode for the remelting of recycled aluminium. [1] The use of renewable primary energy is mainly caused by the share of renewable energy in the electricity mix, thus the production stage and the use of operational energy are the main drivers of this impact category; the same holds also for the use of non-

renewable primary energy.
Material use of primary energy is negligible and related to plastic parts of the product and packaging material. The material use of primary energy is transferred to its energy use when the materials containing primary energy are incinerated with energy recovery.
Non-hazardous waste as the quantitatively most relevant waste flows is mainly caused during maintenance due to the replacement of the motor; hazardous and radio-active wastes are mainly caused by the European electricity mix used during the use phase.

Except for the ADPelements (where the contributions are 45 % of the impacts of the roller shutter itself), the contributions of the motor as compared to the base unit are small (usually below 5 %).

[1] Benefits resulting from the recycling of plastics as well as from the recycling of the electronic parts are disregarded due to the lack of data on the recycling processes and related to the detailed composition of the electronic parts.

7. Requisite evidence

VOC testing is not required for products without contact to indoor air.

8. References

Product category rules of IBU

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

IBU (2017)
IBU (2017): PCR Teil A: PCR Part A: Calculation rules for the life cycle assessment and requirements for the project report. Version 1.8., Institut Bauen & Umwelt, Berlin.

IBU (2019)
IBU (2019): PCR Part B: Requirements on the EPD for sun protection systems. Version 2019/07, Institut Bauen & Umwelt, Berlin.

Standards and legal documents

EN 15804
DIN EN 15804+A2:2019, Sustainability of construction works - Environmental product declarations - Core rules for the product category construction products.

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 (ISO 14044:2006); German and English versions EN ISO 14044:2006.

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

ISO 14001
DIN EN ISO 14001:2015:
Environmental management systems - Requirements with guidance for use.

ISO 45001
ISO 45001:2018-03, Occupational health and safety management systems - Requirements with guidance for use.

EN 13659
EN 13659:2015, Shutters and external venetian blinds - Performance requirements including safety

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.

ECHA-List
The Candidate List of substances of very high concern, available via https://echa.europa.eu/nl/-/four-newsubstances-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

Additional references

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