SENTINEL HOLDING
INSTITUT

SHI-PRODUKTPASS

Produkte finden - Gebäude zertifizieren

SHI-Produktpass-Nr.:

15305-10-1000

VELUX Flachdach-Fenster KONVEX-GLAS/FLACH-GLAS CFU, CVU mit ISU 2093 oder ISU 1093

Warengruppe: Dachflächenfenster

VELUX®

VELUX A/S
Aadalsvej 99
2970 Hørsholm

Produktqualitäten:

- QNG Qualitätssiegel Nachhaltiges Gebäude ✓
- DGNB NEUBAU 2023 ✓
- DGNB NEUBAU 2018 ✓
- BNB-BN NEUBAU V2015 ✓
- BREEAM DE NEUBAU 2018 ✓

GEPRÜFT NACHHALTIGES PRODUKT
SHI PRODUKT PASS
SENTINEL HOLDING INSTITUT
www.sentinel-holding.eu

Köttner

Helmut Köttner
Wissenschaftlicher Leiter
Freiburg, den 27.08.2025

SENTINEL HOLDING
INSTITUT

Produkt:

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Inhalt

Wir sind stolz darauf, dass die SHI-Datenbank, die erste und einzige Datenbank für Bauprodukte ist, die ihre umfassenden Prozesse sowie die Aktualität regelmäßig von dem unabhängigen Prüfunternehmen SGS-TÜV Saar überprüfen lässt.

SGS

SGS TÜV SAAR

SENTINEL HOLDING
INSTITUT

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Qualitätssiegel Nachhaltiges Gebäude

Das Qualitätssiegel Nachhaltiges Gebäude, entwickelt durch das Bundesministerium für Wohnen, Stadtentwicklung und Bauwesen (BMWSB), legt Anforderungen an die ökologische, soziokulturelle und ökonomische Qualität von Gebäuden fest. Das Sentinel Holding Institut prüft Bauprodukte gemäß den QNG-Anforderungen für eine Zertifizierung und vergibt das QNG-ready Siegel. Das Einhalten des QNG-Standards ist Voraussetzung für den KfW-Förderkredit. Für bestimmte Produktgruppen hat das QNG derzeit keine spezifischen Anforderungen definiert. Diese Produkte sind als nicht bewertungsrelevant eingestuft, können jedoch in QNG-Projekten genutzt werden.

Allgemeine Anwendung

Kriterium	Pos. / Bauproduktgruppe	Betrachtete Stoffe	QNG Freigabe
3.1.3 Schadstoffvermeidung in Baumaterialien	nicht zutreffend	nicht zutreffend	QNG-ready nicht bewertungsrelevant

Holzanteil

Kriterium	Bewertung
ANF2-WG1 Nachhaltige Materialgewinnung	Kann Gesamtbewertung positiv beeinflussen
Nachweis: PEFC zertifiziert	

Produkt:

VELUX Flachdach-Fenster KONVEX-GLAS/FLACH-GLAS CFU, CVU mit ISU 2093 oder ISU 1093

SHI Produktpass-Nr.:

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DGNB Neubau 2023

Das DGNB-System (Deutsche Gesellschaft für Nachhaltiges Bauen) bewertet die Nachhaltigkeit von Gebäuden verschiedener Art. Das System ist sowohl anwendbar für private und gewerbliche Großprojekte als auch für kleinere Wohngebäude. Die Version 2023 setzt hohe Standards für ökologische, ökonomische, soziokulturelle und funktionale Aspekte während des gesamten Lebenszyklus eines Gebäudes.

Allgemeine Anwendung

Kriterium	Bewertung
ECO 1.1 Gebäudebezogene Kosten im Lebenszyklus (*)	Kann Gesamtbewertung positiv beeinflussen

Nachweis: An improved u-value can contribute to more energy efficient building components. Sloped roof windows, flat roof windows and other Velux windows can result in less frequent use of electric light. Use of window's opening can also increase ventilation. Further detailing can be completed with more case-to-case information.

Kriterium	Bewertung
ECO 2.6 Klimaresilienz (*)	Kann Gesamtbewertung positiv beeinflussen

Nachweis: Velux Products provide natural cooling and ventilation, see documentation of windows application. Materials providing heat protection are the individual window's glazing and implementation of various accessories.

Kriterium	Bewertung
ENV 1.1 Klimaschutz und Energie (*)	Kann Gesamtbewertung positiv beeinflussen

Nachweis: Some of the products include PV cells. This generates PV panels on both the roof and in the product./ Connected to ECO 1.1 as well as an implementation of the automation of the windows and Velux Active. / We offer products which operated through electric/solar powered sources, which results in an automised product package./ The product is charaterised for its high durability (see life time test attached), but is not characterised for its recyclability.

Kriterium	Bewertung
SOC 1.1 Thermischer Komfort (*)	Kann Gesamtbewertung positiv beeinflussen
Nachweis: The opening of the windows introduce fresh air into the building + offering of various shading and glazing materials resulting in a solar protection	

Kriterium	Bewertung
SOC 1.3 Schallschutz und akustischer Komfort (*)	Kann Gesamtbewertung positiv beeinflussen
Nachweis: We offer some products with high sound properties as well as external accessories	

Kriterium	Bewertung
SOC 1.4 Visueller Komfort (*)	Kann Gesamtbewertung positiv beeinflussen
Nachweis: Connected to ECO 1.1	

Kriterium	Bewertung
TEC 1.3 Qualität der Gebäudehülle (*)	Kann Gesamtbewertung positiv beeinflussen
Nachweis: We offer some products with higher insulation properties with various glazings and an addition of various accessories	

Kriterium	Bewertung
TEC 1.4 Einsatz und Integration von Gebäudetechnik (*)	Kann Gesamtbewertung positiv beeinflussen
Nachweis: Some of the products include PV cells. This generates PV panels on both the roof and in the product.	

Kriterium	Pos. / Relevante Bauteile / Bau-Materialien / Flächen	Betrachtete Stoffe / Aspekte	Qualitätsstufe
ENV 1.2 Risiken für die lokale Umwelt, 03.05.2024 (3. Auflage)	32 Sämtliche Aluminium und Edelstahlbauteile	Chrom-VI	Qualitätsstufe: 4
Nachweis: Herstellererklärung vom 04.08.2025			

Kriterium	Pos. / Relevante Bauteile / Bau-Materialien / Flächen	Betrachtete Stoffe / Aspekte	Qualitätsstufe
ENV 1.2 Risiken für die lokale Umwelt, 29.05.2025 (4. Auflage)	32 Sämtliche Aluminium und Edelstahlbauteile	Chrom-VI	Qualitätsstufe: 4
Nachweis: Herstellererklärung vom 04.08.2025			

Holzanteil

Kriterium	Pos. / Relevante Bauteile / Bau-Materialien / Flächen	Betrachtete Stoffe / Aspekte	Qualitätsstufe
ENV 1.2 Risiken für die lokale Umwelt, 03.05.2024 (3. Auflage)	30a Masshaltige Holzbauteile: Außentüren und Außenfenster	Holzschutzmittel (Produktart 8 nach 528/2012/EG)	Qualitätsstufe: 3
Nachweis: Herstellererklärung vom Februar 2025 zum Einsatz von Bioziden.			

Kriterium	Qualitätsstufe
ENV 1.3 Verantwortungsbewusste Ressourcengewinnung	Kann Gesamtbewertung positiv beeinflussen
Nachweis: PEFC zertifiziert	

Kriterium	Pos. / Relevante Bauteile / Bau-Materialien / Flächen	Betrachtete Stoffe / Aspekte	Qualitätsstufe
ENV 1.2 Risiken für die lokale Umwelt, 29.05.2025 (4. Auflage)	30a Masshaltige Holzbauteile: Außentüren und Außenfenster	Holzschutzmittel (Produktart 8 nach 528/2012/EG)	Qualitätsstufe: 4
Nachweis: Herstellererklärung vom Februar 2025 zum Einsatz von Bioziden.			

Produkt:

VELUX Flachdach-Fenster KONVEX-GLAS/FLACH-GLAS CFU, CVU mit ISU 2093 oder ISU 1093

SHI Produktpass-Nr.:

15305-10-1000

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DGNB Neubau 2018

Das DGNB-System (Deutsche Gesellschaft für Nachhaltiges Bauen) bewertet die Nachhaltigkeit von Gebäuden verschiedener Art. Das System ist sowohl anwendbar für private und gewerbliche Großprojekte als auch für kleinere Wohngebäude.

Allgemeine Anwendung

Kriterium	Pos. / Relevante Bauteile / Bau-Materialien / Flächen	Betrachtete Stoffe / Aspekte	Qualitätsstufe
ENV 1.2 Risiken für die lokale Umwelt	32 Sämtliche Aluminium- und Edelstahlbauteile der Hülle. Nicht betrachtet werden Sonnenschutzlamellen, Rolladenkästen sowie Edelstahlgeländer	Chrom-VI	Qualitätsstufe: 4
Nachweis: Herstellererklärung vom 04.08.2025			

Holzanteil

Kriterium	Pos. / Relevante Bauteile / Bau-Materialien / Flächen	Betrachtete Stoffe / Aspekte	Qualitätsstufe
ENV 1.2 Risiken für die lokale Umwelt	30a Masshaltige Holzbauteile: Außentüren und Außenfenster		Qualitätsstufe: 3
Nachweis: Herstellererklärung vom Februar 2025 zum Einsatz von Bioziden.			

Produkt:

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BNB-BN Neubau V2015

Das Bewertungssystem Nachhaltiges Bauen ist ein Instrument zur Bewertung von Büro- und Verwaltungsgebäuden, Unterrichtsgebäuden, Laborgebäuden sowie Außenanlagen in Deutschland. Das BNB wurde vom damaligen Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit (BMUB) entwickelt und unterliegt heute dem Bundesministerium für Wohnen, Stadtentwicklung und Bauwesen.

Allgemeine Anwendung

Kriterium	Pos. / Bauprodukttyp	Betrachtete Schadstoffgruppe	Qualitätsniveau
1.1.6 Risiken für die lokale Umwelt	27 eloxierte Aluminium- und passivierte Edelstahloberflächen	Schwermetalle (Chrom-VI)	Qualitätsniveau 5
Nachweis: Herstellererklärung vom 04.08.2025			

Holzanteil

Kriterium	Pos. / Bauprodukttyp	Betrachtete Schadstoffgruppe	Qualitätsniveau
1.1.6 Risiken für die lokale Umwelt	26 Chemische Imprägnierung nichttragender Bauteile	Biozide	Qualitätsniveau 3
Nachweis: Herstellererklärung vom Februar 2025 zum Einsatz von Bioziden.			

Kriterium	Bewertung
1.1.7 Nachhaltige Materialgewinnung	Kann Gesamtbewertung positiv beeinflussen
Nachweis: PEFC zertifiziert	

Produkt:

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SHI Produktpass-Nr.:

15305-10-1000

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BREEAM DE Neubau 2018

BREEAM (Building Research Establishment Environmental Assessment Methodology) ist ein britisches Gebäudebewertungssystem, welches die Nachhaltigkeit von Neubauten, Sanierungsprojekten und Umbauten einstuft. Das Bewertungssystem wurde vom Building Research Establishment (BRE) entwickelt und zielt darauf ab, ökologische, ökonomische und soziale Auswirkungen von Gebäuden zu bewerten und zu verbessern.

Kriterium	Produktkategorie	Betrachtete Stoffe	Qualitätsstufe
Hea 02 Qualität der Innenraumluft			nicht bewertungsrelevant

Produkt:

VELUX Flachdach-Fenster KONVEX-GLAS/FLACH-GLAS CFU, CVU mit ISU 2093 oder ISU 1093

SHI Produktpass-Nr.:

15305-10-1000

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Produktsiegel

In der Baubranche spielt die Auswahl qualitativ hochwertiger Materialien eine zentrale Rolle für die Gesundheit in Gebäuden und deren Nachhaltigkeit. Produktlabels und Zertifikate bieten Orientierung, um diesen Anforderungen gerecht zu werden. Allerdings besitzt jedes Zertifikat und Label eigene Prüfkriterien, die genau betrachtet werden sollten, um sicherzustellen, dass sie den spezifischen Bedürfnissen eines Bauvorhabens entsprechen.

PEFC™

Auch hier werden Hölzer und Holzprodukte aus nachhaltiger Forstwirtschaft ausgezeichnet. Laut Umweltverbänden sind die Anforderungen nicht ganz so hoch wie beim FSC. Auch hier spielen gesundheitliche Kriterien keine Rolle.

GEPRÜFT NACHHALTIGES PRODUKT
QNG READY
SENTINEL HOLDING INSTITUT

Produkte mit dem QNG-ready Siegel des Sentinel Holding Instituts eignen sich für Projekte, für welche das Qualitätssiegel Nachhaltiges Gebäude (QNG) angestrebt wird. QNG-ready Produkte erfüllen die Anforderungen des QNG Anhangdokument 3.1.3 "Schadstoffvermeidung in Baumaterialien". Das KfW-Kreditprogramm Klimafreundlicher Neubau mit QNG kann eine höhere Fördersumme ermöglichen.

THIRD-PARTY VERIFIED
EPD
ISO 14025 and EN 15804
Institut Bauen und Umwelt e.V.

Das IBU ist eine Initiative von Bauprodukt- und Baukomponentenherstellern, die sich dem Leitbild der Nachhaltigkeit im Bauwesen verpflichten. IBU ist Programmbetreiber für Umwelt-Produktdeklarationen (Environmental Product Declaration, kurz: EPD) nach der Norm EN 15804. Das IBU-EPD-Programm steht für umfassende Ökobilanzen und Umweltwirkungen von Bauprodukten und eine unabhängige Überprüfung durch Dritte.

Produkt:
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SHI Produktpass-Nr.:
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Rechtliche Hinweise

(*) Die Kriterien dieses Steckbriefs beziehen sich auf das gesamte Bauobjekt. Die Bewertung erfolgt auf der Ebene des Gebäudes. Im Rahmen einer sachgemäßen Planung und fachgerechten Installation können einzelne Produkte einen positiven Beitrag zum Gesamtergebnis der Bewertung leisten. Das Sentinel Holding Institut stützt sich einzig auf die Angaben des Herstellers.

Alle Kriterien finden Sie unter:
https://www.sentinel-holding.eu/de/Themenwelten/Pr%C3%BCfkriterien%20f%C3%BCr%20Produkte

Wir sind stolz darauf, dass die SHI-Datenbank, die erste und einzige Datenbank für Bauprodukte ist, die ihre umfassenden Prozesse sowie die Aktualität regelmäßig von dem unabhängigen Prüfunternehmen SGS-TÜV Saar überprüfen lässt.

SGS TÜV SAAR

Herausgeber

Sentinel Holding Institut GmbH
Bötzinger Str. 38
79111 Freiburg im Breisgau
Tel.: +49 761 59048170
info@sentinel-holding.eu
www.sentinel-holding.eu

To whom it may concern

VELUX A/S
Ådalsvej 99
DK-2970 Hørsholm
Denmark
Telephone +45 45 16 40 00
www.velux.com

Date: 04 August 2025

Sentinel Haus criteria

VOC content

We can confirm that the plants performing the factory coating of our products are operated in accordance with or (for smaller companies) in accordance with the 31st Ordinance of the Federal Emission Control Act or by the Europe-wide regulation Regulation 2010/75/EU - Industrial Emissions Directive (IED), (formerly Regulation 1999/13/EU).

We are working with our supplier base to investigate means of reducing the VOC content of the applied coating materials.

We are continuously working on reducing our negative social and environmental impact. Information on this work can be found in our Sustainability Report 2023 (link).

Chemical content
We hereby declare that all products comply with the following criteria.

- No use of halogenated blowing agents
- No use of brominated flame retardants (HBCD)
- No use of reproduction toxic boron compounds in quantities of more than 0.1% (w/w)
- No use of chrome VI oxide surface treatment (passivation)
- No use of lead, tin and cadmium compounds in quantities of more than 0,1% in our windows, except for MSL awning blind and KFX smoke ventilation control unit, both contains lead ((CAS no 743-92-1) in quantities of more than 0,1%.
- No use of chrome VI compounds
- None of our products contain any substances (incl. reproductive-toxic phthalates) of very high concern or substances from the candidate list in quantities of more than 0.1 % (w/w)
- No use of cadmium in PVC components in quantities of more than 0.01%

Yours sincerely,
Birthe Uldahl Kjeldsen
Birthe Kjeldsen
Senior manager,
Product Specification and Documentation
Product Regulatory Affairs

To Whom it May Concern

Ådalsvej 99
DK-2970 Hørsholm
Denmark
+45 45 16 40 00 Telephone
+45 45 16 40 01 Telefax

Valid: 22 January 2025 – 21 January 2026

VELUX A/S is aware of REACH regulation and acknowledge the obligations which derive from the regulation.

We can confirm that none of the VELUX products, packaging etc. are covered by the obligation to register in accordance to REACH.

Furthermore, we can confirm that none[1] of our products contain any Substances of Very High Concern or substances at the Candidate list in quantities of more than 0,1% (w/w).

We can also confirm that we are in contact with our suppliers to ensure that they are aware of REACH.

Birthe Uldahl Kjeldsen
Senior manager
Technical Values
Standardisation & Technical Performance
VELUX A/S
Ådalsvej 99, DK 2970 Hørsholm

[1] Apart from backup batteries for smoke ventilation products (KFX) and small PV modules used in VELUX MSL awning blinds, please see separate certificate.

To Whom it May Concern

Ådalsvej 99
DK-2970 Hørsholm
Denmark
+45 45 16 40 00 Telephone
+45 45 16 40 01 Telefax

February 2025
Renewal date: February 2027

VELUX A/S is aware of the Biocidal Product Regulation (528/2012/EU) (BPR) and Biocidal Product Regulation, implementing regulation (2023/2596 (EU)) and acknowledge the obligations which derive from the regulations.

VELUX wooden windows and wooden upstands for flat roof windows (VMR) are considered treated articles containing wood preservatives. All biocidal products used in our products are covered by the obligation to register in accordance with BPR.

We can confirm that all biocidal products used in our VELUX products are registered in accordance with BPR.

We can also confirm that we are in contact with our suppliers to ensure that they are aware of BPR.

One of the active substances (propiconazole) used in the wood preservation of VELUX wooden roof windows (PT8) triggers a labelling requirement, which entails that all VELUX roof wooden windows from 1 July 2024 has a label on with the text: "This product contains wood treated with propiconazole" in English. Furthermore the following information is available online through the QR code from the product data plate:

VELUX sloped roof windows:

This product contains wood treated with propiconazole. It must not be used for furniture and play structures such as playgrounds.

Use and Maintenance
VELUX wooden windows are treated with propiconazole and a topcoat to protect the product. In the case of sanding during repair on topcoat, dust must be collected and disposed of appropriately and respiration equipment must be worn. After grinding we recommend that a new topcoat is applied over the sanded area.

Disposal of product
It´s important to note that the product is not suitable for use as furniture or play structures, as per Biocidal Product Regulation, implementing regulation 2023/2596 (EU).
Treated or painted wood must be disposed of according to local regulations.

Birthe Kjeldsen

Birthe Kjeldsen
Manager, Technical Values
Ådalsvej 99, DK 2970 Hørsholm

CHAIN OF CUSTODY CERTIFICATE

Certificate no.:
DNVFI-PEFC-COC-000075

Initial certification date:
25 August 2008

Valid:
19 September 2022 – 09 January 2027

This is to certify that

VELUX A/S

Platinvej 14, 6000 Kolding, Denmark

and the sites as mentioned in the appendix accompanying this certificate

meets the requirements of following international PEFC standards:
PEFC ST 2002:2020, PEFC ST 2001:2020

This certificate is valid for the following product or service ranges:
Manufacturing, sales and distribution of wooden roof windows.

The validity of this certificate shall be verified on www.pefc.org.

Place and date:
Espoo, 19 September 2022

PEFC
PEFC/02-44-32
www.pefc.fi

FINAS
Finnish Accreditation Service
S018 (EN ISO/IEC 17065)

For the issuing office:
DNV - Business Assurance
Keilaranta 1, 02150 Espoo, Finland

Kimmo Haarala
Management Representative

Lack of fulfilment of conditions as set out in the Certification Agreement may render this Certificate invalid.

Certificate no.: DNVFI-PEFC-COC-000075
Place and date: Espoo, 19 September 2022

Appendix to Certificate

VELUX A/S

Locations included in the certification are as follows:

Site Name	Site Address	Site Scope
JTJ Sonneborn Industrie GmbH	Am Arzbach 13, DE-99869 Sonneborn, Germany	Manufacturing of wooden roof windows and windows components
NB Polska Sp. z o.o.	Ul. Sloneczna 29, PL-62-200 Gniezno, Poland	Manufacturing of roof windows and components for windows
NM Polska Sp. z o.o.	Ul. Olesnicka 12, PL-46-100 Namyslow, Poland	Manufacturing, sales and distribution of wooden roof windows
Østbirk Bygningsindustri A/S	Ryvej 21, 8752 Østbirk, Denmark	Manufacturing of wooden roof windows and windows components
Partizánske Building Components-SK s.r.o	Malobielicka 1/215, 95804 Partizanske, Slovak Republic	Manufacturing of wooden roof windows and windows components
Thyregod Bygningsindustri A/S	Nordre Ringvej 9, 7323 Give, Denmark	Manufacturing of wooden roof windows and windows components
VELUX A/S	Platinvej 14, 6000 Kolding, Denmark	Logistics HQ
VELUX A/S - DC Portugal	Travessa do Areeiro 272, PT-2440-05, Batalha, Portugal	Distribution and warehousing of wooden roof windows
VELUX A/S - European Central Warehouse CEE	H-9431 Fertod, Malom Köz 1, Hungary	Distribution and warehousing of wooden roof windows
VELUX A/S - Feuquières	Zone Industrielle, F-80210, Feuquières en Vimeu, France	Manufacturing of wooden roof windows and windows components
VELUX A/S - JTJ-D Sonneborn	Am Arzbach 13, DE-99869 Sonneborn, Germany	Distribution and warehousing of wooden roof windows
VELUX A/S - Kolding	Jupitervej 4, 6000 Kolding, Denmark	Central Purchasing
VELUX A/S - LOG-V	Platinvej 14, 6000 Kolding, Denmark	Manufacturing, sales and distribution of wooden roof windows.
VELUX A/S - NB PL Gniezno	Ul. Sloneczna 29, PL-62-200 Gniezno, Poland	Distribution and warehousing of wooden roof windows
VELUX A/S - NM PL Namyslow	Ul. Olesnicka 12, PL-46-100 Namyslow, Poland	Distribution and warehousing of wooden roof windows
VELUX A/S - Nordic DC FWH	Platinvej 14, 6000 Kolding, Denmark	Distribution and warehousing of wooden roof windows
VELUX A/S - PBC SK	Malobielická 1/225, SK-958 04 Partizánske, Slovak Republic	Distribution and warehousing of wooden roof windows
VELUX A/S V-LOG	Platinvej 14, 6000 Kolding, Denmark	Sales of wooden roof windows
VELUX Belgium	Boulevard de l'europe 121, B-1300 Wavre, Belgium	Sales of wooden roof windows
VELUX Company Ltd.	Woodside Way, Glenrothes East, GB-KY7 4ND, United Kingdom	Sales of wooden roof windows
VELUX Danmark A/S	Breeltevej 20, 2970 Hørsholm, Denmark	Sales of wooden roof windows
VELUX Deutschland GmbH	Gazellenkamp 168, DE-22527 Hamburg, Germany	Sales of wooden roof windows

Certificate no.: DNVFI-PEFC-COC-000075
Place and date: Espoo, 19 September 2022

Site Name	Site Address	Site Scope
VELUX France SAS	1, rue Paul Cézanne, F-91421, Morangis Cédex, France	Sales of wooden roof windows
VELUX Italia S.p.a.	Via Strà 152 - I-37030 Colognola ai Colli (VR) - Italy	Sales of wooden roof windows
VELUX Magyarország LKR Korlátolt Felelösségü TársaságS	H-9431 Fertod, Malom köz 1, Hungary	Manufacturing of wooden roof windows and windows components
VELUX Nederland B.V	Molensteijn 2, NL-3454 ZJ De Meern, Netherlands	Sales of wooden roof windows
VELUX Norway AS	Gjerdrumsvej 10 D, NO-0484 Oslo, Norway	Sales of wooden roof windows
VELUX Romania SRL	Coresi Business Park, 5 Turnului Street, RO-500152, Brasov, Romania	Sales of wooden roof windows
VELUX Schweiz AG	Industristrasse 7, CH-4632 Trimbach, Switzerland	Sales of wooden roof windows
VELUX Spain, S. A.	Ctra. de La Coruña 18, 150, E-28231, Las Rozas de Madrid, Spain	Sales of wooden roof windows
VELUX Svenska AB	Karbingatan 22, SE-254 67, Helsingborg, Sweden	Sales of wooden roof windows
VKR France (Feuquiéres-en-Vimeu)	ul. Krakowiaków 34, PL-02-255 Warszawa, Poland	Sales of wooden roof windows
VKR France (Feuquières-en-Vimeu)	Zone Industrielle, 80210, Feuquiéres-en-Vimeu, France	Distribution and warehousing of wooden roof windows

Certificate no.: DNVFI-PEFC-COC-000075
Place and date: Espoo, 19 September 2022

Appendix to Certificate

Multi-site certificate

Product category:	08031 (Windows)
Material category:	PEFC certified
Applied chain of custody method:	Percentage
Tree species:	Pinus sylvestris, Picea abies, Pinus pinaster, Quercus robur, Betula spp

VELUX feststehendes Flachdach-Fenster CFU

Verglasung 20, doppelt verglast

10 Jahre Garantie

0°-15°

Geben Sie Ihrem Zuhause ein neues Gesicht, indem Sie mit VELUX Flachdach-Fenstern der neuen Generation den Zauber von Tageslicht in Bereiche bringen, in denen Sie dies nicht für möglich gehalten hätten. Das Basiselement des feststehenden Flachdach-Fensters weist ein einzigartiges Design mit schlankem Blendrahmen und unsichtbarem Flügel auf und sorgt so im Inneren des Hauses für maximales Tageslicht und ein schönes Erscheinungsbild. Dieses feststehende Basiselement verfügt über eine 2-fach-Verglasung, ist aber auch mit 3-fach-Verglasung erhältlich. Es zeichnet sich außerdem durch eine hervorragende Energieeffizienz sowie Schalldämmung bei Regen, Hagel oder Verkehrslärm aus und erhöht so Ihren Wohnkomfort.

- Der kaum sichtbare Oberlichtblendrahmen trägt zu einem randlosen Ausblick in den Himmel bei und lässt möglichst viel Tageslicht herein.
- Schlanker und unsichtbarer Flügel für einen randlosen Ausblick in den Himmel und möglichst viel Tageslicht.
- Genießen Sie maximales Tageslicht und ein stilvolles Innendesign dank diskret im Oberlicht platzierter Rollos oder Hitzeschutz-Markisen.
- Genießen Sie dank unserer energieeffizienten doppelten Isolierglasscheibe ruhigere Innenräume und einer sehr guten Wärmedämmung.
- Die niedrige Platzierung der Isolierglasscheibe in der Konstruktion sorgt für eine optimale Energieleistung und ein elegantes, schlankes Aussehen – besonders bei montierten Rollos und Hitzeschutz-Markisen.
- Genießen Sie das beruhigende Gefühl der Sicherheit mit unserem einbruchhemmenden Flachdach-Oberlicht mit Verbund-Sicherheitsglas (VSG) (P4A-Sicherheitsverglasung auf der Innenscheibe).
- Genießen Sie eine ruhigere Raumatmosphäre dank der sehr guten Schalldämmwerte.

CE

Creation date 08-07-2025 20:11:20 FRW Base units de-DE - Approved

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-20220142-IBJ3-EN
Issue date	25.07.2022
Valid to	24.07.2027

VELUX flat roof window CFU

VELUX A/S

Institut Bauen und Umwelt e.V.

www.ibu-epd.com | https://epd-online.com

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-20220142-IBJ3-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

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 flat roof window CFU

Owner of the declaration

VELUX Group
Ådalsvej 99
2970 Hørsholm
Denmark

Declared product / declared unit

The declaration represents 1 piece of a VELUX flat roof window CFU with a fixed base unit of the size 1.20 m x 1.20 m = 1.44 m^2

Scope:

The declaration covers 100% of VELUX flat roof windows CFU with a fixed base unit by Østbirk Bygningsindustri, 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 flat roof window CFU consists of a fixed base unit made of a PUR/GRP curb with a wooden core, integrated glazing unit and a single layer flat or curved glass top unit on top. For the placing of the product on the market in the European Union/European Free Trade Association /EU/EFTA) (with the exception of Switzerland) the *Regulation (EU) No. 305/2011 (CPR)* applies. The product needs a declaration of performance taking into consideration *EAD 220062-00-0401*, June 2017, rooflight with bonded or mechanically fastened cover glass and the CE-marking. For the application and use the respective national provisions apply.

2.2 Application

Velux flat roof windows CVU are used in 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.

The declared values in the table relate to the reference product incl. an average pane. For other covered product variants, specific values can be selected at the bottom of the above-mentioned download page

Constructional data for CFU 120120 20+ISU 1093

For other variants, see velux.com/ce

Name	Value	Unit
External fire performance EN 13501-5	NPD	-
Water tightness EN 1873	9A	Class
Resistance to wind load	C3	Class
Resistance to snow load	5 mm toughened/ -- / 4 mm toughened / 16 mm / 7.5 mm (33.4) laminated float	-
Impact resistance	3	Class
Bonding of cover glass	Compliant (ΔX≥0.75)	-
Airborne sound insulation EN ISO 410-3	39 (-1;-5)	dB
Thermal transmittance EN 1873	Urc,ref300: 0,65 W/(m2K) Arc,ref300: 4,4 m2	-
Total solar energy transmittance	0,52	-
Light transmittance EN 410	0,69	-
Frame factor	0,1	-
Air permeability EN 1026	4	Class

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

- *EAD 220062-00-0401*, June 2017, rooflight with bonded or mechanically fastened cover glass.

2.4 Delivery status

The product is available in pre-defined sizes covering 0,6x0,6m to 1,5x1,5m.

2.5 Base materials/Ancillary materials

Composition of the base unit CFU:

polyurethane 8 %

heat-treated wood 10 %

aluminium 10 %

galvanized steel 5 %

PVC 3 %

laminated glass 30 %

tempered glass 15 %

heat strenghtened glass 15 %

others

Composition of the top unit (ISU 1093):

Curved glass 73 %

Aluminium 25 %

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	%
Glass	12	%
Steel	10	%
Others	0	%

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

2.6 Manufacture

Base unit:

The PU raw material, gaskets and other minor components are produced outside Velux.

Cutting and profiling of wood reinforcements are done at production sites in Polen and Denmark.

The PUR/GRP curb with wooden core and the insulating glass unit are assembled at the production site in Denmark.

The production and final assembly of the base unit takes place at the production site in Denmark.

The final production processes include preparation of the PU/wood frame by cutting and profiling of wood, moulding, cutting, sandblasting and painting, cutting and mounting of gaskets and installation of glazing unit as well as packaging, stacking and wrapping of the product on pallets.

Top unit:

All raw materials and components are produced outside Velux.

The glass top unit is assembled at the production site in Slovakia.

The final production processes include assembly of product, as well as packaging, stacking and wrapping of the product 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 product is delivered to the customer in two parts, a top and bottom part. After the hole in the roof is prepared, the bottom part of the product can be installed with the use of a screwdriver, after which the top unit can be fastened to the bottom unit.

2.9 Packaging

The packaging usually consists of:
- polyethylene film
- polystyrene foam parts
- cardboard

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

The plastic packaging (polyethylene (PE) film, polystyrene foam parts) can be recycled if separated by type; alternatively, they can be incinerated.

2.10 Condition of use

The material composition of VELUX flat roof windows does not change over their service life.

2.11 Environment and health during use

VELUX flat roof windows 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 4.

2.13 Extraordinary effects

Fire

Fire performance according to EN 13501:1

Name	Value
Building material class	D
Burning droplets	s2
Smoke gas development	d2

Water

In the event of unforeseen exposure to water (flood), VELUX flat roof windows 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 flat roof windows must be replaced; apart from potential injuries from glass cullet, no adverse effects on human health or the environment are to be expected.

2.14 Re-use phase

VELUX flat roof windows can be dismantled manually without any problems. The metal parts are usually recycled, and the plastic parts and wood are sent for thermal recycling for energy recovery. Flat glass can be recycled whereas laminated glass is usually used as secondary aggregate in road construction or landfilling.

2.15 Disposal

VELUX flat roof windows 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 and wood, 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 02 glass
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 piece of a fixed VELUX flat roof window CFU with a base unit made of a polyurethane, heat-treated wood and plywood with an integrated glazing unit with 1.20 m x 1.20 m = 1.44 m^2.

Declared unit

Name	Value	Unit
Declared unit	1	pce.
Area	1.44	m^2
Weight	133	kg

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 flat roof windows (**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 (plastics, wood, etc.) 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. Metals and cardboard 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 to B7 are not relevant for the product under consideration or no significant environmental impacts occur.

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

Module C2 comprises the transport of the dismantled VELUX flat roof window 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); coated and uncoated flat glass is assumed to be recycled whereas laminated glass is assumed to be landfilled due to very limited recycling potential. Metals and flat glass recycled; it is assumed that these fractions reach the end-of-waste state after having been sorted and transported to a recycler; laminated glass is landfilled. The combustible material (plastics, wood, etc.) 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 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 site. 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.
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 *DIN 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 *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	4.57	kg C
Biogenic carbon content in accompanying packaging	2.22	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, wood, etc.) is assumed to be transported 50 km with a lorry 16-32 metric tons, 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 and cardboard 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 tons, 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 EAD 220062-00-0401 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. 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. For biogenic carbon stored in product, see above.

Module B2
Annual cleaning with water (e.g., using 1 l/m^2 of tap water per annual cleaning) is neglected.

Module B6
No electricity is used.

Module C1
Manual de-installation is assumed, 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, plastics are incinerated (also due to the very limited availability on plastics recycling and its benefits); coated and uncoated flat glass is assumed to

be recycled whereas laminated glass is assumed to be landfilled due to very limited recycling potential.

The combustible material (plastics, wood, etc.) is assumed to be transported 50 km with a lorry 16-32 metric tons, EURO6 to an incineration plant.

Metals and flat glass recycled; it is assumed that these fractions the each end-of-waste state after having been sorted and transported to a recycler over 150 km with a lorry 16-32 metric tons, EURO6.

Laminated glass is landfilled, including a transport of 30 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 and the wooden 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).

Furthermore, it includes the benefits of raw material substitution of the recycling of flat glass, with the exception of laminated glass, which cannot be used for the production of glass again. Recovered flat glass is assumed to have reached the end-of-waste state as sorted glass cullet; glass cullet is assumed to replace virgin raw material for glass production – impacts on the energy required to remelt recycled glass as compared to virgin glass production are neglected due to a lack of data.

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.

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 piece fixed VELUX flat roof window CFU, 1.20 m x 1.20 m = 1.44 m2

Parameter	Unit	A1-A3	A5	B1	B2	B6	C1	C2	C3	C4	D
GWP-total	kg CO_2 eq	5.18E+02	2.1E+01	0	0	0	0	1.31E+00	1.55E+00	5.65E+01	-3.39E+02
GWP-fossil	kg CO_2 eq	5.5E+02	5.19E+00	0	0	0	0	1.31E+00	1.54E+00	3.97E+01	-3.38E+02
GWP-biogenic	kg CO_2 eq	-3.25E+01	1.58E+01	0	0	0	0	0	6.56E-03	1.67E+01	0
GWP-luluc	kg CO_2 eq	9.6E-01	1.89E-04	0	0	0	0	5.35E-04	1.71E-03	3.29E-03	-1.17E+00
ODP	kg CFC11 eq	6.81E-05	1.07E-07	0	0	0	0	3.08E-07	9.48E-08	1.22E-06	-1.26E-05
AP	mol H^+ eq	2.74E+00	3.04E-03	0	0	0	0	7.45E-03	5.88E-03	3.29E-02	-2.04E+00
EP-freshwater	kg P eq	1.5E-02	3.66E-06	0	0	0	0	9.66E-06	1.99E-04	9.91E-05	-1.39E-02
EP-marine	kg N eq	5.01E-01	1.15E-03	0	0	0	0	2.68E-03	1.88E-03	1.37E-02	-3.05E-01
EP-terrestrial	mol N eq	5.27E+00	1.27E-02	0	0	0	0	2.95E-02	2.14E-02	1.42E-01	-3.37E+00
POCP	kg NMVOC eq	1.54E+00	3.57E-03	0	0	0	0	8.42E-03	5.71E-03	3.47E-02	-9.96E-01
ADPE	kg Sb eq	8.98E+02	1.57E-06	0	0	0	0	4.4E-06	2.68E-06	2.66E-05	2.68E-03
ADPF	MJ	5.02E+03	7E+00	0	0	0	0	2.02E+01	2.12E+01	3.48E+01	-3.23E+03
WDP	m^3 world eq deprived	1.32E+02	2.93E-02	0	0	0	0	6.64E-02	5.29E-02	1.92E+00	-4.23E+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 piece fixed VELUX flat roof window CFU, 1.20 m x 1.20 m = 1.44 m2

Parameter	Unit	A1-A3	A5	B1	B2	B6	C1	C2	C3	C4	D
PERE	MJ	4.32E+02	1.08E-01	0	0	0	0	2.86E-01	2.69E+00	1.82E+02	-4.07E+02
PERM	MJ	3.6E+02	-1.81E+02	0	0	0	0	0	-8.46E-02	-1.79E+02	0
PERT	MJ	7.92E+02	-1.81E+02	0	0	0	0	2.86E-01	2.6E+00	2.95E+00	-4.07E+02
PENRE	MJ	6.2E+03	6.77E+01	0	0	0	0	2.02E+01	1.7E-05	4.31E+02	-3.24E+03
PENRM	MJ	4.57E+02	-6.07E+01	0	0	0	0	0	0	-3.97E+02	0
PENRT	MJ	6.66E+03	7E+00	0	0	0	0	2.02E+01	1.7E-05	3.48E+01	-3.24E+03
SM	kg	2.23E+01	0	0	0	0	0	0	0	0	4.32E+00
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	4.17E+00	1.53E-03	0	0	0	0	2.2E-03	5.07E-03	5.95E-02	-2.11E+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 piece fixed VELUX flat roof window CFU, 1.20 m x 1.20 m = 1.44 m2

Parameter	Unit	A1-A3	A5	B1	B2	B6	C1	C2	C3	C4	D
HWD	kg	6.99E-02	1.9E-05	0	0	0	0	5.16E-05	1.7E-05	6.86E-05	4.04E-02
NHWD	kg	1.06E+02	5.3E-01	0	0	0	0	1.36E+00	8.65E-02	5.03E+01	-7.58E+01

RWD	kg	4.63E-02	9.92E-05	0	0	0	0	2.92E-04	1.92E-04	2.88E-04	-1.05E-02
CRU	kg	0	0	0	0	0	0	0	0	0	0
MFR	kg	4.09E+00	1.07E+01	0	0	0	0	0	4.82E+01	0	0
MER	kg	0	0	0	0	0	0	0	0	0	0
EEE	MJ	1.52E+01	7.89E+00	0	0	0	0	0	0	7.48E+01	0
EET	MJ	2.95E+01	1.55E+01	0	0	0	0	0	0	1.47E+02	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 piece fixed VELUX flat roof window CFU, 1.20 m x 1.20 m = 1.44 m2

Parameter	Unit	A1-A3	A5	B1	B2	B6	C1	C2	C3	C4	D
PM	Disease incidence	2.78E-05	4.37E-08	0	0	0	0	1.18E-07	9.13E-08	2.17E-07	-2.4E-05
IR	kBq U235 eq	1.03E+01	3E-02	0	0	0	0	8.78E-02	7.38E-02	1.38E-01	-3.99E+00
ETP-fw	CTUe	1.18E+04	2.66E+01	0	0	0	0	1.6E+01	1.25E+01	4.77E+02	-6.45E+03
HTP-c	CTUh	9.81E-07	9.01E-10	0	0	0	0	6.39E-10	3.38E-10	1.15E-08	-3.39E-07
HTP-nc	CTUh	1.3E-05	1.21E-08	0	0	0	0	1.84E-08	1.1E-08	1.63E-07	-5.42E-06
SQP	SQP	2.32E+03	5.88E+00	0	0	0	0	1.73E+01	2.87E+00	2.28E+01	-4.38E+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.

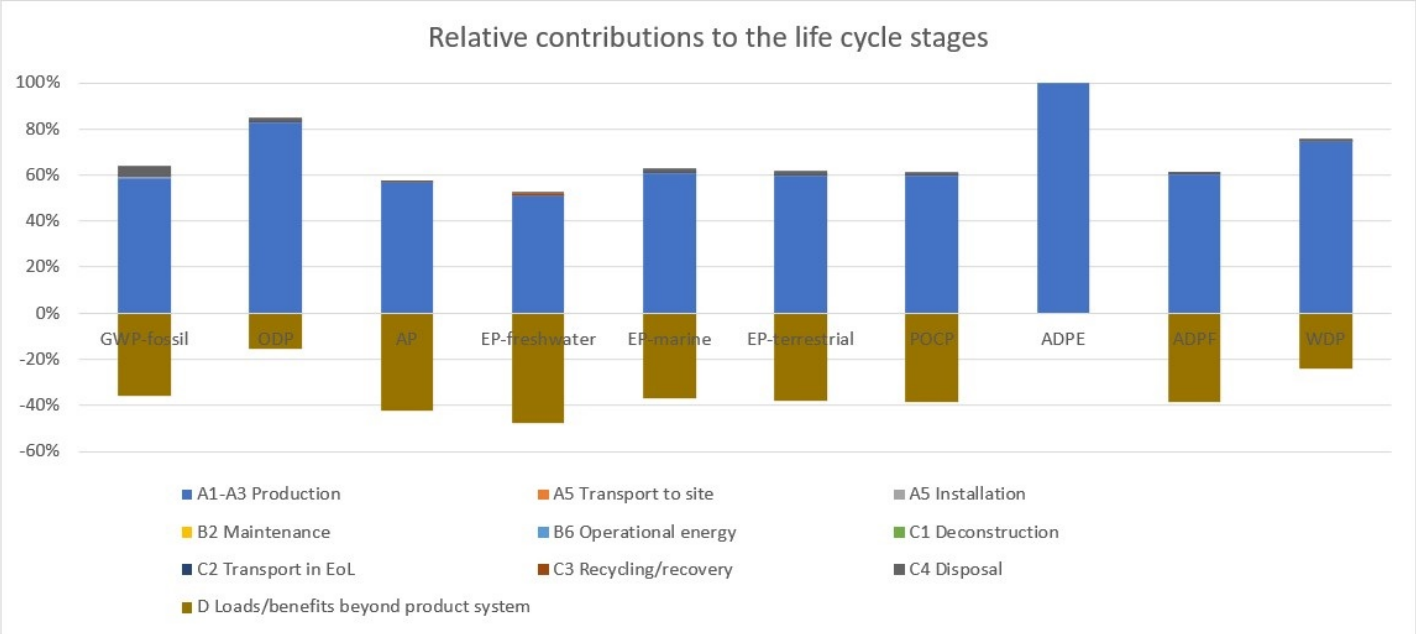

Figure 1: Relative environmental impacts of the different life cycle stages for the fixed flat roof window CFU

The largest part of environmental impacts – between 90% and rather100 % - is caused during production (modules A1-A3) of the flat roof window. No operational energy is used as the flat roof window cannot be opened.
Benefits and burdens beyond the system boundary (module D) are in the order of 0 % to about 130 % of the impacts over the product life cycle (modules A1-C4). [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 is the main driver of this impact category; also for the use of non-renewable primary energy, the production phase is the most impacting life cycle stage.
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 the production of the glass and during disposal of the product; hazardous and radio-active wastes are mainly caused by the European electricity mix.

[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

7.1 Formaldehyde
Not tested based on applicable product standard.

7.2 MDI
Not tested based on applicable product standard. **7.3 Checking of pre-treatment of substances used according to AltholzVO**
Not applicable; not tested based on applicable product standard. **7.4. Fire gas toxicity**
Not tested based on applicable product standard. **7.5 VOC emissions**
Not tested based on applicable product standard.

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 (2021)
IBU (2021):PCR Part B: Requirements on the EPD for windows and doors. Version 2021/01, 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 1873
DIN EN 1873:2005, Prefabricated accessories for roofing - Individual rooflights of plastics - Product specification and test methods.

EAD 220062-00-0401
EAD 220062-00-0401, June 2017, rooflight with bonded or mechanically fastened cover glass

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

Weidema et al. (2013)
Weidema, B., C. Bauer, R. Hischier, C. Mutel, T. Nemecek, J. Reinhard, C.O. Vadenbo, G. Wernet (2013): Overview and methodology, Data quality guideline for the ecoinvent database version 3. ecoinvent report no. 1 (v3), St. Gallen, Schweiz.

ecoinvent 3.8
ecoinvent 3.8, LCA database, 12/2021. Ecoinvent centre, Zürich.

Publisher

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

+49 (0)30 3087748- 0
info@ibu-epd.com
www.ibu-epd.com

Programme holder

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

+49 (0)30 3087748- 0
info@ibu-epd.com
www.ibu-epd.com

Author of the Life Cycle Assessment

Dr. Frank Werner - Umwelt & Entwicklung
Kammelenbergstrasse 30
9011 St. Gallen
Switzerland

+ 41 (0)44 241 39 06
frank@frankwerner.ch
http://www.frankwerner.ch/

Owner of the Declaration

VELUX Group
Ådalsvej 99
2970 Hørsholm
Denmark

+4545164726
jakob.roerbech@velux.com
www.velux.com

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-20220140-IBJ3-EN
Issue date	25.07.2022
Valid to	24.07.2027

VELUX flat roof window CVU - grid-connected

VELUX A/S

www.ibu-epd.com | https://epd-online.com

1. General Information

VELUX A/S

Programme holder

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

Declaration number

EPD-VEL-20220140-IBJ3-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

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 flat roof window CVU - grid-connected

Owner of the declaration

VELUX Group
Ådalsvej 99
2970 Hørsholm
Denmark

Declared product / declared unit

The declaration represents 1 piece of a grid-connected VELUX flat roof window CVU of the size 1.20 m x 1.20 m = 1.44 m^2

Scope:

The declaration covers 100% of grid-connected VELUX flat roof windows CVU by Østbirk Bygningsindustri, 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 grid-connected Velux flat roof windows CVU consists of a motorised base unit made of a PUR/GRP curb with a wooden core, with an integrated glazing unit and hinges on one side to allow for venting and a single layer flat or curved glass top unit on top. For the placing of the product on the market in the European Union/European Free Trade Association /EU/EFTA) (with the exception of Switzerland) the *Regulation (EU) No. 305/2011 (CPR)* applies. The product needs a declaration of performance taking into consideration *EAD 220062-00-0401*, June 2017, rooflight with bonded or mechanically fastened cover glass and the CE-marking. For the application and use the respective national provisions apply.

2.2 Application

Velux flat roof windows CVU are used in 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.

The declared values in the table relate to the reference product incl. an average pane. For other covered product variants, specific values can be selected at the bottom of the above-mentioned download page

Constructional data for CVU 120120 20+ISU 1093

For other variants, see velux.com/ce

Name	Value	Unit
Resistance to fire EN 13501-2	NPD	-
External fire performance EN 13501-5	NPD	-
Water tightness EN 1873	9A	Class
Resistance to wind load	C3	Class
Resistance to snow load	5 mm toughened/ -- / 4 mm toughened / 16 mm / 7.5 mm (33.4) laminated float	-
Impact resistance	3	Class
Bonding of cover glass	Compliant (ΔX≥0.75)	-
Airborne sound insulation EN ISO 410-3	39 (-1;-5)	dB
Thermal transmittance EN 1873	Urc,ref300: 0,65 W/(m2K) Arc,ref300: 4,4 m2	-
Total solar energy transmittance	0,52	-
Light transmittance EN 410	0,69	-
Frame factor	0,1	-
Air permeability EN 1026	4	Class

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

- *EAD 220062-00-0401*, June 2017, rooflight with bonded or mechanically fastened cover glass.

2.4 Delivery status

The product is available in pre-defined sizes covering 0,6x0,6m to 1,5x1,5m.

2.5 Base materials/Ancillary materials

Composition of the base unit CVU:

polyurethane 7 %

heat-treated wood 8 %

galvanized steel 7 %

PU with glass fibres 13 %

laminated glass 25 %

tempered glass 12 %

heat strenghtened glass 15 %

others

Composition of the top unit (ISU 1093):
Curved glass 73 % Aluminium 25 % others

Composition of the motor (CVP mains):

glavanized steel 15 %

iron/cast iron 20 %

steel 15 %

PET/PC/PA 10 %

cables 10 %

DC motor 10 %

cables 15 %

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	%
Glass	12	%
Steel	10	%
Others	0	%

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

2.6 Manufacture

Base unit:

PU raw material, gaskets and other minor components are produced outside Velux.

Cutting and profiling of wood reinforcements are done at production sites in Polen and Denmark.

The PUR/GRP curb with wooden core, the insulating glass unit and the motor and the wall switch are assembled at the production site in Denmark.

The production and final assembly of the base unit takes place at the production site in Denmark.

The final production processes includes preparation of the PU/wood frame by cutting and profiling of wood, moulding, cutting, sandblasting and painting, assembly of the GRP sash by pultrusion, profiling and drilling, cutting and mounting of gaskets and installation of glazing unit and window opener as well as packaging, stacking and wrapping of the product on pallets.

Top unit:

All raw materials and components are produced outside Velux.

The glass top unit is assembled at production site at Slovakia.

The final production processes include the assembly of the product as well as packaging, stacking and wrapping of the product 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

ThThe product is delivered to the customer in two parts, a top and bottom part. After the hole in the roof is prepared, the bottom part of the product can be installed with the use of a screwdriver, after which the top unit can be fastened to the bottom unit.

2.9 Packaging

The packaging usually consists of:
- polyethylene film
- polystyrene foam parts
- cardboard

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

The plastic packaging (polyethylene (PE) film, polystyrene foam parts) can be recycled if separated by type; alternatively, they can be incinerated.

2.10 Condition of use

The material composition of VELUX flat roof windows does not change over their service life.

2.11 Environment and health during use

VELUX flat roof windows 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 4.

2.13 Extraordinary effects

Fire

Fire performance according to EN 13501:1

Name	Value
Building material class	D
Burning droplets	s2
Smoke gas development	d2

Water

In the event of unforeseen exposure to water (flood), VELUX flat roof windows 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 flat roof windows must be replaced; apart from potential injuries from glass cullet, no adverse effects on human health or the environment are to be expected.

2.14 Re-use phase

VELUX flat roof windows can be dismantled manually without any problems. The metal parts are usually recycled, and the plastic parts and wood are sent for thermal recycling for energy recovery. Flat glass can be recycled whereas laminated glass is usually used as secondary aggregate in road construction or landfilling.

2.15 Disposal

VELUX flat roof windows 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 and wood, recycling or energy recovery is preferable and common.

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

16 02 14 electronic parts
17 02 01 wood
17 02 02 glass
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 piece of a grid-connected VELUX flat roof window CVU with a base unit made of a polyurethane, heat-treated wood and plywood curb with an integrated glazing unit with 1.20 m x 1.20 m = 1.44 m^2.

Declared unit

Name	Value	Unit
Declared unit	1	pce.
Area	1.44	m^2
Weight	133	kg

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 flat roof windows (**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 (plastics, wood, etc.) 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. Metals and cardboard 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 to B7 are not relevant for the product under consideration or no significant environmental impacts occur.

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

Module C2 comprises the transport of the dismantled VELUX flat roof window 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); coated and uncoated flat glass is assumed to be recycled whereas laminated glass is assumed to be landfilled due to very limited recycling potential. Metals and flat glass recycled; it is assumed that these fractions reach the end-of-waste state after having been sorted and transported to a recycler; laminated glass is landfilled. The combustible material (plastics, wood, etc.) 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 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 site. 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.
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 *DIN 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 *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	4.57	kg C
Biogenic carbon content in accompanying packaging	2.22	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, wood, etc.) is assumed to be transported 50 km with a lorry 16-32 metric tons, 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 and cardboard 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 tons, 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 EAD 220062-00-0401 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. For biogenic carbon stored in product, see above.

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/m2 of tap water per annual cleaning) is neglected.

Module B6

For motor-operated flat roof windows, electricity is used both in

stand-by and during operations.

Module C1
Manual de-installation is assumed, 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, plastics are incinerated (also due to the very limited availability on plastics recycling and its benefits); coated and uncoated flat glass is assumed to be recycled whereas laminated glass is assumed to be landfilled due to very limited recycling potential.

The combustible material (plastics, wood, etc.) is assumed to be transported 50 km with a lorry 16-32 metric tons, EURO6 to an incineration plant.

Metals and flat glass 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.

Laminated glass is landfilled, including a transport of 30 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 and the wooden 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).

Furthermore, it includes the benefits of raw material substitution of the recycling of flat glass, with the exception of laminated glass, which cannot be used for the production of glass again. Recovered flat glass is assumed to have reached the end-of-waste state as sorted glass cullet; glass cullet is assumed to replace virgin raw material for glass production – impacts on the energy required to remelt recycled glass as compared to virgin glass production are neglected due to a lack of data.

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 piece VELUX flat roof window CVU - grid-connected, 1.20 m x 1.20 m = 1.44 m2

Parameter	Unit	A1-A3	A5	B1	B2	B6	C1	C2	C3	C4	D
GWP-total	kg CO_2 eq	4.38E+02	2.14E+01	0	1.39E+01	6.87E+02	0	1.34E+00	2.65E+00	6.46E+01	-1.93E+02
GWP-fossil	kg CO_2 eq	4.7E+02	5.33E+00	0	1.39E+01	6.85E+02	0	1.34E+00	2.57E+00	4.78E+01	-1.92E+02
GWP-biogenic	kg CO_2 eq	-3.28E+01	1.6E+01	0	0	0	0	0	7.8E-02	1.67E+01	0
GWP-luluc	kg CO_2 eq	6.49E-01	1.92E-04	0	1.41E-02	1.71E+00	0	5.44E-04	1.99E-03	3.5E-03	-6.04E-01
ODP	kg CFC11 eq	7E-05	1.08E-07	0	3.24E-06	3.47E-05	0	3.13E-07	1.12E-07	1.31E-06	-8.09E-06
AP	mol H^+ eq	2.39E+00	3.09E-03	0	2.25E-01	3.53E+00	0	7.58E-03	7.01E-03	4.27E-02	-1.07E+00
EP-freshwater	kg P eq	1.36E-02	3.72E-06	0	1.13E-03	7.69E-02	0	9.83E-06	2.29E-04	1.06E-04	-8.87E-03
EP-marine	kg N eq	4.58E-01	1.17E-03	0	1.89E-02	4.52E-01	0	2.72E-03	2.27E-03	1.86E-02	-1.62E-01
EP-terrestrial	mol N eq	4.66E+00	1.29E-02	0	2.2E-01	5.23E+00	0	3E-02	2.57E-02	1.92E-01	-1.79E+00
POCP	kg NMVOC eq	1.39E+00	3.63E-03	0	7.34E-02	1.43E+00	0	8.57E-03	6.83E-03	4.7E-02	-5.33E-01
ADPE	kg Sb eq	8.98E+02	1.6E-06	0	4.27E-03	1.66E-03	0	4.48E-06	3.15E-06	2.85E-05	1.22E-03
ADPF	MJ	4.53E+03	7.11E+00	0	1.6E+02	1.45E+04	0	2.06E+01	2.46E+01	3.99E+01	-1.95E+03
WDP	m^3 world eq deprived	1.37E+02	2.98E-02	0	6.94E+00	1.62E+02	0	6.75E-02	1.08E-01	2.09E+00	-2.21E+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 piece VELUX flat roof window CVU - grid-connected, 1.20 m x 1.20 m = 1.44 m2

Parameter	Unit	A1-A3	A5	B1	B2	B6	C1	C2	C3	C4	D
PERE	MJ	3.44E+02	1.1E-01	0	1.53E+01	2.75E+03	0	2.91E-01	3.09E+00	1.82E+02	-2.3E+02
PERM	MJ	3.64E+02	-1.84E+02	0	-2.22E-16	0	0	0	-1.01E+00	-1.79E+02	0
PERT	MJ	7.08E+02	-1.84E+02	0	1.72E+01	2.75E+03	0	2.91E-01	2.09E+00	3.18E+00	-2.3E+02
PENRE	MJ	5.62E+03	6.95E+01	0	1.59E+02	1.46E+04	0	2.06E+01	2.04E-05	5.24E+02	-1.96E+03
PENRM	MJ	5.46E+02	-6.24E+01	0	0	0	0	0	0	-4.84E+02	0
PENRT	MJ	6.17E+03	7.11E+00	0	1.59E+02	1.46E+04	0	2.06E+01	2.04E-05	3.99E+01	-1.96E+03
SM	kg	2.67E+01	0	0	1.4E+00	0	0	0	0	0	-1.22E+00
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	3.99E+00	1.56E-03	0	1.57E-01	9.35E+00	0	2.24E-03	6.49E-03	7.01E-02	-1.12E+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 piece VELUX flat roof window CVU - grid-connected, 1.20 m x 1.20 m = 1.44 m2

Parameter	Unit	A1-A3	A5	B1	B2	B6	C1	C2	C3	C4	D
HWD	kg	5.32E-02	1.93E-05	0	5.41E-03	5.15E-03	0	5.25E-05	2.04E-05	8.07E-05	1.98E-02
NHWD	kg	8.73E+01	5.39E-01	0	5.04E+00	5.46E+01	0	1.38E+00	4.92E-01	5.81E+01	-4.03E+01

RWD	kg	4.55E-02	1.01E-04	0	7.09E-04	1.95E-01	0	2.97E-04	2.22E-04	3.27E-04	-6.68E-03
CRU	kg	0	0	0	0	0	0	0	0	0	0
MFR	kg	5.24E+00	1.09E+01	0	3.07E+00	0	0	0	4.51E+01	0	0
MER	kg	0	0	0	0	0	0	0	0	0	0
EEE	MJ	1.52E+01	8.11E+00	0	1.82E+00	0	0	0	0	8.62E+01	0
EET	MJ	2.96E+01	1.6E+01	0	3.58E+00	0	0	0	0	1.7E+02	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 piece VELUX flat roof window CVU - grid-connected, 1.20 m x 1.20 m = 1.44 m2

Parameter	Unit	A1-A3	A5	B1	B2	B6	C1	C2	C3	C4	D
PM	Disease incidence	2.2E-05	4.44E-08	0	1.04E-06	9.01E-06	0	1.2E-07	1.06E-07	2.75E-07	-1.23E-05
IR	kBq U235 eq	1.02E+01	3.05E-02	0	3.89E-01	1.32E+02	0	8.93E-02	8.56E-02	1.52E-01	-2.57E+00
ETP-fw	CTUe	1.19E+04	2.73E+01	0	1.65E+03	7.3E+03	0	1.63E+01	1.92E+01	5.04E+02	-3.44E+03
HTP-c	CTUh	1.18E-06	9.25E-10	0	8.56E-08	1.95E-07	0	6.5E-10	4.55E-10	1.58E-08	-1.71E-07
HTP-nc	CTUh	1.61E-05	1.24E-08	0	2.76E-06	6.34E-06	0	1.88E-08	2.33E-08	1.82E-07	-2.53E-06
SQP	SQP	2.28E+03	5.98E+00	0	9.99E+01	2.23E+03	0	1.75E+01	3.5E+00	2.73E+01	-2.52E+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.

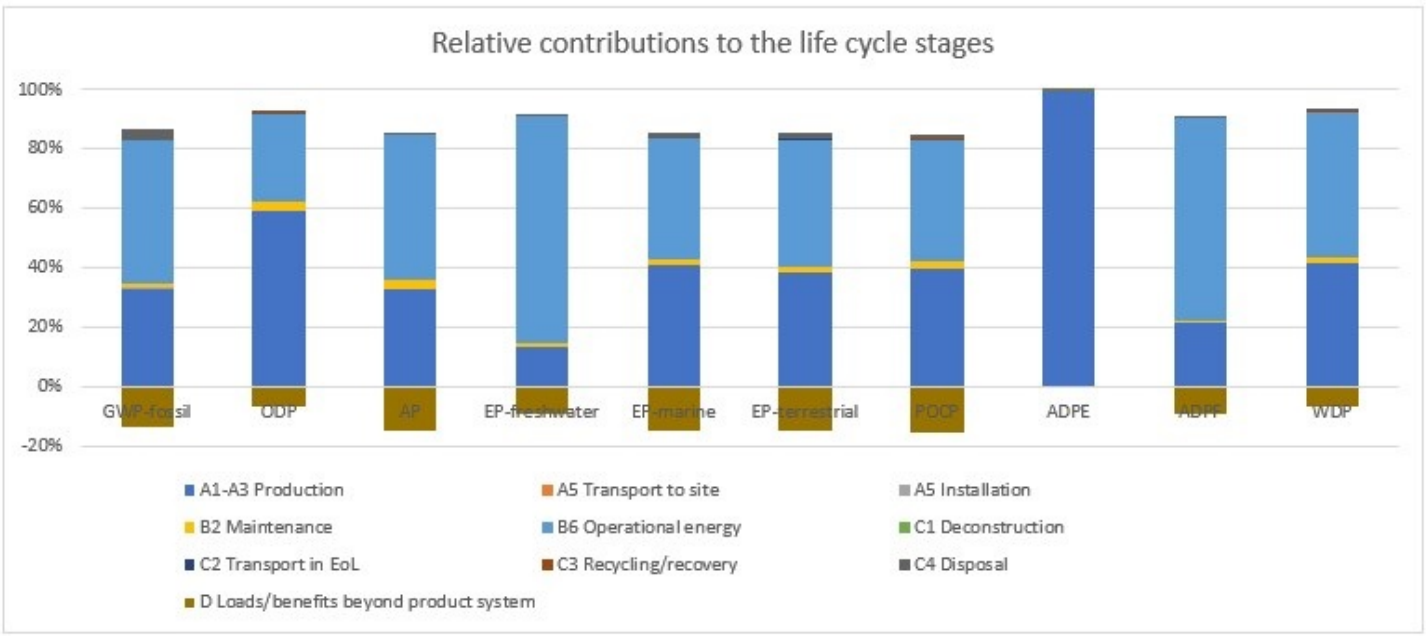

Figure 1: Relative environmental impacts of the different life cycle stages for the flat roof window CVU - grid-connected

The largest part of environmental impacts is caused during production (modules A1-A3) ranging from 15% to roughly 100%, and during the generation of operational energy (module B2) The relative contributions of these main drivers differs from one impact category to another.
Benefits and burdens beyond the system boundary (module D) are in the order of 0% to 30% of the impacts over the product life cycle (modules A1-C4). [1] The use of renewable primary energy is mainly caused by the share of renewable energy in the electricity mix, thus the production stage is the main drivers of this impact category; for the use of non-renewable primary energy, the operational energy (module B6) is the most impacting life cycle stage.
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 the production of the glass and during disposal of the product; hazardous and radio-active wastes are mainly caused by the European electricity mix.

[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

7.1 Formaldehyde
Not tested based on applicable product standard.

7.2 MDI
Not tested based on applicable product standard. **7.3 Checking of pre-treatment of substances used according to AltholzVO**
Not applicable; not tested based on applicable product standard. **7.4. Fire gas toxicity**
Not tested based on applicable product standard. **7.5 VOC emissions**
Not tested based on applicable product standard.

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 (2021)
IBU (2021):PCR Part B: Requirements on the EPD for windows and doors. Version 2021/01, 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 1873
DIN EN 1873:2005, Prefabricated accessories for roofing - Individual rooflights of plastics - Product specification and test methods.

EAD 220062-00-0401
EAD 220062-00-0401, June 2017, rooflight with bonded or mechanically fastened cover glass

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

Weidema et al. (2013)
Weidema, B., C. Bauer, R. Hischier, C. Mutel, T. Nemecek, J. Reinhard, C.O. Vadenbo, G. Wernet (2013): Overview and methodology, Data quality guideline for the ecoinvent database version 3. ecoinvent report no. 1 (v3), St. Gallen, Schweiz.

ecoinvent 3.8
ecoinvent 3.8, LCA database, 12/2021. Ecoinvent centre, Zürich.

Publisher

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

+49 (0)30 3087748- 0
info@ibu-epd.com
www.ibu-epd.com

Programme holder

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

+49 (0)30 3087748- 0
info@ibu-epd.com
www.ibu-epd.com

Author of the Life Cycle Assessment

Dr. Frank Werner - Umwelt & Entwicklung
Kammelenbergstrasse 30
9011 St. Gallen
Switzerland

+ 41 (0)44 241 39 06
frank@frankwerner.ch
http://www.frankwerner.ch/

Owner of the Declaration

VELUX Group
Ådalsvej 99
2970 Hørsholm
Denmark

+4545164726
jakob.roerbech@velux.com
www.velux.com

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-20220141-IBJ3-EN
Issue date	25.07.2022
Valid to	24.07.2027

VELUX flat roof window CVU - solar-powered

VELUX A/S

Institut Bauen und Umwelt e.V.

ECO PLATFORM EPD VERIFIED

www.ibu-epd.com | https://epd-online.com

1. General Information

VELUX A/S

Programme holder

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

Declaration number

EPD-VEL-20220141-IBJ3-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

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 flat roof window CVU - solar-powered

Owner of the declaration

VELUX Group
Ådalsvej 99
2970 Hørsholm
Denmark

Declared product / declared unit

The declaration represents 1 piece of a solar-powered VELUX flat roof window CVU of the size 1.20 m x 1.20 m = 1.44 m^2

Scope:

The declaration covers 100% of solar-powered VELUX flat roof windows CVU by Østbirk Bygningsindustri, 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 solar-powered Velux flat roof windows CVU consists of a motorised base unit made of a PUR/GRP curb with a wooden core, with integrated glazing unit and hinges on one side to allow for venting and a single layer flat or curved glass top unit on top. For the placing of the product on the market in the European Union/European Free Trade Association /EU/EFTA) (with the exception of Switzerland) the *Regulation (EU) No. 305/2011 (CPR)* applies. The product needs a declaration of performance taking into consideration *EAD 220062-00-0401*, June 2017, rooflight with bonded or mechanically fastened cover glass and the CE-marking. For the application and use the respective national provisions apply.

2.2 Application

Velux flat roof windows CVU are used in 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.

The declared values in the table relate to the reference product incl. an average pane. For other covered product variants, specific values can be selected at the bottom of the above-mentioned download page

Constructional data for CVU 120120 20+ISU 1093

For other variants, see velux.com/ce

Name	Value	Unit
Resistance to fire EN 13501-2	NPD	-
External fire performance EN 13501-5	NPD	-
Water tightness EN 1873	9A	Class
Resistance to wind load	C3	Class
Resistance to snow load	5 mm toughened/ -- / 4 mm toughened / 16 mm / 7.5 mm (33.4) laminated float	-
Impact resistance	3	Class
Bonding of cover glass	Compliant (ΔX≥0.75)	-
Airborne sound insulation EN ISO 410-3	39 (-1;-5)	dB
Thermal transmittance EN 1873	Urc,ref300: 0,65 W/(m2K) Arc,ref300: 4,4 m2	-
Total solar energy transmittance	0,52	-
Light transmittance EN 410	0,69	-
Frame factor	0,1	-
Air permeability EN 1026	4	Class

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

- *EAD 220062-00-0401*, June 2017, rooflight with bonded or mechanically fastened cover glass.

2.4 Delivery status

The product is available in pre-defined sizes covering 0,6x0,6m to 1,5x1,5m.

2.5 Base materials/Ancillary materials

Composition of the base unit CVU:
polyurethane 7 %
heat-treated wood 8 %
galvanized steel 7 %
PU with glass fibres 13 %
laminated glass 25 %
tempered glass 12 %
heat strenghtened glass 15 %
others

Composition of the top unit (ISU 1093):
Curved glass 73 %
Aluminium 25 %
others

Composition of the motor (CVP solar):
glavanized steel 15 %
iron/cast iron 20 %
steel 15 %
PET/PC/PA 10 %
cables 10 %
DC motor 8 %
solar cell 5 %
battery 10 %
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	%
Glass	12	%
Steel	10	%
Others	0	%

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

2.6 Manufacture

Base unit:

The PU raw material, gaskets and other minor components are produced outside Velux.

Cutting and profiling of wood reinforcements are done at production sites in Polen and Denmark.

The PUR/GRP curb with wooden core, the insulating glass unit, the motor and the wall switch are assembled at the production site in Denmark.

The production and final assembly of the base unit takes place at the production site in Denmark.

The final production processes includes preparation of the PU/wood frame by cutting and profiling of wood, moulding, cutting, sandblasting and painting, assembly of the GRP sash by pultrusion, profiling and drilling, cutting and mounting of gaskets and installation of the glazing unit and window opener as well as packaging, stacking and wrapping of the product on pallets.

Top-unit:

All raw materials and components are produced outside Velux.

The glass top unit is assembled at the production site in Slovakia.

The final production processes include assembly of product, as well as packaging, stacking and wrapping of the product 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 product is delivered to the customer in two parts, a top and bottom part. After the hole in the roof is prepared, the bottom part of the product can be installed with the use of a screwdriver, after which the top unit can be fastened to the bottom unit.

2.9 Packaging

The packaging usually consists of:
- polyethylene film
- polystyrene foam parts
- cardboard

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

The plastic packaging (polyethylene (PE) film, polystyrene foam parts) can be recycled if separated by type; alternatively, they can be incinerated.

2.10 Condition of use

The material composition of VELUX flat roof windows does not change over their service life.

2.11 Environment and health during use

VELUX flat roof windows 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 4.

2.13 Extraordinary effects

Fire

Fire performance according to EN 13501:1

Name	Value
Building material class	D
Burning droplets	s2
Smoke gas development	d2

Water

In the event of unforeseen exposure to water (flood), VELUX flat roof windows 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 flat roof windows must be replaced; apart from potential injuries from glass cullet, no adverse effects on human health or the environment are to be expected.

2.14 Re-use phase

VELUX flat roof windows can be dismantled manually without any problems. The metal parts are usually recycled, and the plastic parts and wood are sent for thermal recycling for energy recovery. Flat glass can be recycled whereas laminated glass is usually used as secondary aggregate in road construction or landfilling.

2.15 Disposal

VELUX flat roof windows 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 and wood, recycling or energy recovery is preferable and common.

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

16 02 14 electronic parts
17 02 01 wood
17 02 02 glass
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 piece of a solar-powered VELUX flat roof window CVU with a base unit made of a polyurethane, heat-treated wood and plywood with an integrated glazing unit with 1.20 m x 1.20 m = 1.44 m^2.

Declared unit

Name	Value	Unit
Declared unit	1	pce.
Area	1.44	m²
Weight	134	kg

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 flat roof windows (**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 (plastics, wood, etc.) 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. Metals and cardboard 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 to B7 are not relevant for the product under consideration or no significant environmental impacts occur.

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

Module C2 comprises the transport of the dismantled VELUX flat roof window 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); coated and uncoated flat glass is assumed to be recycled whereas laminated glass is assumed to be landfilled due to very limited recycling potential. Metals and flat glass recycled; it is assumed that these fractions reach the end-of-waste state after having been sorted and transported to a recycler; laminated glass is landfilled. The combustible material (plastics, wood, etc.) 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 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 site. 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.
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 *DIN 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 *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	4.57	kg C
Biogenic carbon content in accompanying packaging	2.24	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, wood, etc.) is assumed to be transported 50 km with a lorry 16-32 metric tons, 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 and cardboard 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 tons, 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 EAD 220062-00-0401 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. For biogenic carbon stored in product, see above.

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 flat roof windows, electricity is used both in stand-by and during operations.

Module C1
Manual de-installation is assumed, 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, plastics are incinerated (also due to the very limited availability on plastics recycling and its benefits); coated and uncoated flat glass is assumed to be recycled whereas laminated glass is assumed to be landfilled due to very limited recycling potential.

The combustible material (plastics, wood, etc.) is assumed to be transported 50 km with a lorry 16-32 metric tons, EURO6 to an incineration plant.

Metals and flat glass 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.

Laminated glass is landfilled, including a transport of 30 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 and the wooden 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).

Furthermore, it includes the benefits of raw material substitution of the recycling of flat glass, with the exception of laminated glass, which cannot be used for the production of glass again. Recovered flat glass is assumed to have reached the end-of-waste state as sorted glass cullet; glass cullet is assumed to replace virgin raw material for glass production – impacts on the energy required to remelt recycled glass as compared to virgin glass production are neglected due to a lack of data.

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 piece VELUX flat roof window CVU - solar-powered, 1.20 m x 1.20 m = 1.44 m2

Parameter	Unit	A1-A3	A5	B1	B2	B6	C1	C2	C3	C4	D
GWP-total	kg CO_2 eq	4.55E+02	2.14E+01	0	3.21E+01	0	0	1.35E+00	3.11E+00	6.45E+01	-1.93E+02
GWP-fossil	kg CO_2 eq	4.87E+02	5.33E+00	0	3.21E+01	0	0	1.34E+00	3.03E+00	4.77E+01	-1.92E+02
GWP-biogenic	kg CO_2 eq	-3.28E+01	1.6E+01	0	-1.39E-17	0	0	0	7.65E-02	1.67E+01	0
GWP-luluc	kg CO_2 eq	6.77E-01	1.92E-04	0	4.27E-02	0	0	5.47E-04	2.01E-03	3.5E-03	-6.03E-01
ODP	kg CFC11 eq	7.23E-05	1.08E-07	0	5.59E-06	0	0	3.15E-07	1.15E-07	1.31E-06	-8.08E-06
AP	mol H^+ eq	2.59E+00	3.09E-03	0	4.33E-01	0	0	7.63E-03	7.21E-03	4.27E-02	-1.07E+00
EP-freshwater	kg P eq	1.49E-02	3.72E-06	0	2.43E-03	0	0	9.89E-06	2.3E-04	1.06E-04	-8.86E-03
EP-marine	kg N eq	4.77E-01	1.17E-03	0	3.85E-02	0	0	2.74E-03	2.35E-03	1.86E-02	-1.62E-01
EP-terrestrial	mol N eq	4.86E+00	1.29E-02	0	4.13E-01	0	0	3.02E-02	2.65E-02	1.92E-01	-1.79E+00
POCP	kg NMVOC eq	1.47E+00	3.63E-03	0	1.52E-01	0	0	8.62E-03	7.04E-03	4.7E-02	-5.33E-01
ADPE	kg Sb eq	8.98E+02	1.6E-06	0	5.48E-03	0	0	4.5E-06	3.21E-06	2.85E-05	1.22E-03
ADPF	MJ	4.77E+03	7.11E+00	0	4.01E+02	0	0	2.07E+01	2.5E+01	3.99E+01	-1.95E+03
WDP	m^3 world eq deprived	1.65E+02	2.98E-02	0	3.51E+01	0	0	6.79E-02	1.35E-01	2.09E+00	-2.21E+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 piece VELUX flat roof window CVU - solar-powered, 1.20 m x 1.20 m = 1.44 m2

Parameter	Unit	A1-A3	A5	B1	B2	B6	C1	C2	C3	C4	D
PERE	MJ	4.1E+02	1.1E-01	0	8.1E+01	2.52E+04	0	2.93E-01	3.12E+00	1.82E+02	-2.3E+02
PERM	MJ	3.64E+02	-1.84E+02	0	1.11E-16	0	0	0	-9.86E-01	-1.79E+02	0
PERT	MJ	7.74E+02	-1.84E+02	0	8.29E+01	2.52E+04	0	2.93E-01	2.14E+00	3.18E+00	-2.3E+02
PENRE	MJ	5.86E+03	6.95E+01	0	4E+02	0	0	2.07E+01	2.11E-05	5.23E+02	-1.96E+03
PENRM	MJ	5.45E+02	-6.24E+01	0	0	0	0	0	0	-4.83E+02	0
PENRT	MJ	6.41E+03	7.11E+00	0	4E+02	0	0	2.07E+01	2.11E-05	3.99E+01	-1.96E+03
SM	kg	2.67E+01	0	0	1.4E+00	0	0	0	0	0	-3.53E-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	4.9E+00	1.56E-03	0	1.07E+00	0	0	2.26E-03	6.9E-03	7.01E-02	-1.12E+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 piece VELUX flat roof window CVU - solar-powered, 1.20 m x 1.20 m = 1.44 m2

Parameter	Unit	A1-A3	A5	B1	B2	B6	C1	C2	C3	C4	D
HWD	kg	7.09E-02	1.93E-05	0	2.31E-02	0	0	5.28E-05	2.11E-05	8.06E-05	1.98E-02
NHWD	kg	9.09E+01	5.39E-01	0	8.89E+00	0	0	1.39E+00	7.08E-01	5.81E+01	-4.03E+01

RWD	kg	4.69E-02	1.01E-04	0	2.08E-03	0	0	2.99E-04	2.25E-04	3.27E-04	-6.67E-03
CRU	kg	0	0	0	0	0	0	0	0	0	0
MFR	kg	5.25E+00	1.09E+01	0	3.5E+00	0	0	0	4.56E+01	0	0
MER	kg	0	0	0	0	0	0	0	0	0	0
EEE	MJ	1.52E+01	8.11E+00	0	1.68E+00	0	0	0	0	8.6E+01	0
EET	MJ	2.96E+01	1.6E+01	0	3.31E+00	0	0	0	0	1.69E+02	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 piece VELUX flat roof window CVU - solar-powered, 1.20 m x 1.20 m = 1.44 m2

Parameter	Unit	A1-A3	A5	B1	B2	B6	C1	C2	C3	C4	D
PM	Disease incidence	2.3E-05	4.44E-08	0	2.03E-06	0	0	1.21E-07	1.07E-07	2.75E-07	-1.23E-05
IR	kBq U235 eq	1.11E+01	3.05E-02	0	1.37E+00	0	0	8.99E-02	8.68E-02	1.52E-01	-2.57E+00
ETP-fw	CTUe	1.26E+04	2.73E+01	0	2.33E+03	0	0	1.64E+01	2.2E+01	5.04E+02	-3.44E+03
HTP-c	CTUh	1.21E-06	9.25E-10	0	1.14E-07	0	0	6.54E-10	4.95E-10	1.58E-08	-1.71E-07
HTP-nc	CTUh	1.7E-05	1.24E-08	0	3.59E-06	0	0	1.89E-08	2.93E-08	1.81E-07	-2.53E-06
SQP	SQP	2.35E+03	5.98E+00	0	1.69E+02	0	0	1.77E+01	3.63E+00	2.73E+01	-2.52E+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.

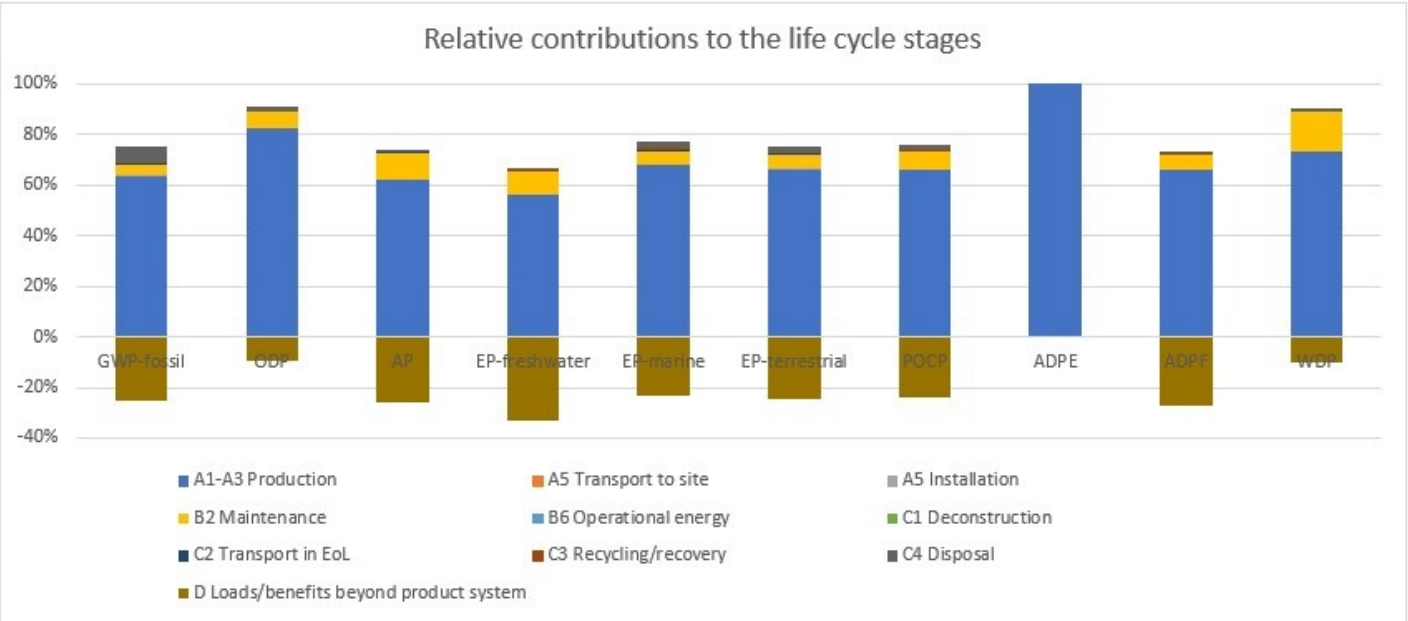

Figure 1: Relative environmental impacts of the different life cycle stages for the solar-powered flat roof window CVU

The largest part of environmental impacts is caused during production (modules A1-A3) ranging from 80% to roughly 100%, and during the generation of operational energy (module B2) The relative contributions of these main drivers differs from one impact category to another.
Benefits and burdens beyond the system boundary (module D) are in the order of 0% to almost 100% of the impacts over the product life cycle (modules A1-C4). [1] The use of renewable primary energy is mainly caused by the use of operational energy, thus the use stage is the main drivers of this impact category; for the use of non-renewable primary energy, the production stage (modules A1-A3) is the most impacting life cycle stage.
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 the production of the glass and during disposal of the product; hazardous and radio-active wastes are mainly caused by the European electricity mix.

[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

7.1 Formaldehyde
Not tested based on applicable product standard.

7.2 MDI
Not tested based on applicable product standard. **7.3 Checking of pre-treatment of substances used according to AltholzVO**
Not applicable; not tested based on applicable product standard. **7.4. Fire gas toxicity**
Not tested based on applicable product standard. **7.5 VOC emissions**
Not tested based on applicable product standard.

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 (2021)
IBU (2021):PCR Part B: Requirements on the EPD for windows and doors. Version 2021/01, 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 1873
DIN EN 1873:2005, Prefabricated accessories for roofing - Individual rooflights of plastics - Product specification and test methods.

EAD 220062-00-0401
EAD 220062-00-0401, June 2017, rooflight with bonded or mechanically fastened cover glass

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

Weidema et al. (2013)
Weidema, B., C. Bauer, R. Hischier, C. Mutel, T. Nemecek, J. Reinhard, C.O. Vadenbo, G. Wernet (2013): Overview and methodology, Data quality guideline for the ecoinvent database version 3. ecoinvent report no. 1 (v3), St. Gallen, Schweiz.

ecoinvent 3.8
ecoinvent 3.8, LCA database, 12/2021. Ecoinvent centre, Zürich.

Publisher

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

+49 (0)30 3087748- 0
info@ibu-epd.com
www.ibu-epd.com

Programme holder

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

+49 (0)30 3087748- 0
info@ibu-epd.com
www.ibu-epd.com

Author of the Life Cycle Assessment

Dr. Frank Werner - Umwelt & Entwicklung
Kammelenbergstrasse 30
9011 St. Gallen
Switzerland

+ 41 (0)44 241 39 06
frank@frankwerner.ch
http://www.frankwerner.ch/

Owner of the Declaration

VELUX Group
Ådalsvej 99
2970 Hørsholm
Denmark

+4545164726
jakob.roerbech@velux.com
www.velux.com