SENTINEL HOLDING
INSTITUT

SHI-PRODUKTPASS

Produkte finden - Gebäude zertifizieren

SHI-Produktpass-Nr.:

15305-10-1005

VELUX Glazing planes VGP

Warengruppe: Skylight - Alufenster - 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 10.10.2025

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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

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QNG - 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.

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

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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.

Aluminium

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./ We offer products which operated through electric/solar powered sources, which results in an automised product package.	

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
SOC 2.1 Barrierefreiheit (*)	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: we offer products which can integrate automation systems.	

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			

Beschichtung

Kriterium	Pos. / Relevante Bauteile / Bau-Materialien / Flächen	Betrachtete Stoffe / Aspekte	Qualitätsstufe
ENV 1.2 Risiken für die lokale Umwelt, 03.05.2024 (3. Auflage)	1 Beschichtungen auf nicht mineralischen Untergründen: Metalle, Holz, Kunststoffe	VVOC, VOC, SVOC Emissionen oder Gehalt	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)	1 Beschichtungen auf nicht mineralischen Untergründen: Metalle, Holz, Kunststoffe	VVOC, VOC, SVOC Emissionen oder Gehalt	Qualitätsstufe: 4
Nachweis: Herstellererklärung vom 04.08.2025			

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DGNB Neubau 2018

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Aluminium

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			

Beschichtung

Kriterium	Pos. / Relevante Bauteile / Bau-Materialien / Flächen	Betrachtete Stoffe / Aspekte	Qualitätsstufe
ENV 1.2 Risiken für die lokale Umwelt	1 Beschichtungen auf nicht mineralischen Untergründen: Metalle, Holz, Kunststoffe	VOC	Qualitätsstufe: 4
Nachweis: Herstellererklärung vom 04.08.2025			

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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.

Aluminium

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			

Beschichtung

Kriterium	Pos. / Bauprodukttyp	Betrachtete Schadstoffgruppe	Qualitätsniveau
1.1.6 Risiken für die lokale Umwelt	3a Lacke, Lasuren, Beizen inkl. Grundbeschichtungen (entspr. Decopaint-RL Kat. D + E + F)	VOC / gefährliche Stoffe / Schwermetalle (Blei, Cadmium, Chrom-VI)	Qualitätsniveau 5
Nachweis: Herstellererklärung vom 04.08.2025			

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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

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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.

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.

Smart EPD ist ein unabhängiges Programm zur Erstellung und Veröffentlichung von Environmental Product Declarations (EPDs). Das Programm unterstützt Hersteller dabei, die Umweltwirkungen ihrer Produkte transparent und vergleichbar darzustellen. Die Arbeit von Smart EPD basiert auf international anerkannten Normen wie ISO 14025, EN 15804 und ISO 21930. Jede EPD, die unter dem Smart-EPD-Programm veröffentlicht wird, muss vorab durch eine unabhängige Verifizierungsstelle geprüft werden.

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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.

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

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.

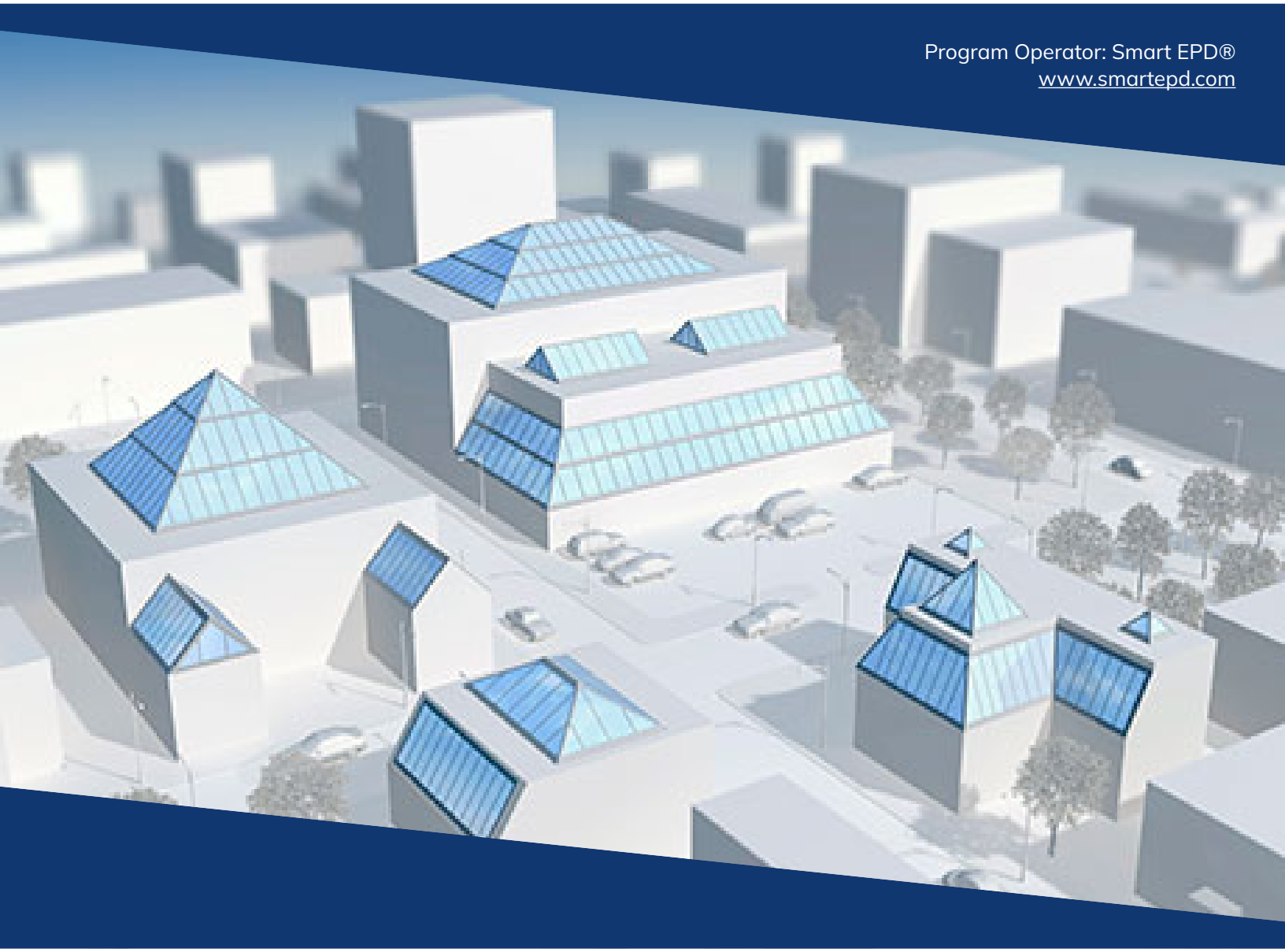
Birthe Uldahl Kjeldsen
Senior manager
Technical Values
Standardisation & Technical Performance
VELUX A/S
Ådalsvej 99, DK 2970 Hørsholm

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

Environmental Product Declaration

IN ACCORDANCE WITH ISO 14025 AND EN 15804+A2

Program Operator: Smart EPD®
www.smartepd.com



Glazing Panels - Double Glazed

Date of Issue	Expiration date	Last updated
Jul 30, 2025	**Jul 30, 2030**	**Jul 30, 2025**

Refer to the EPD Library at www.smartepd.com for the latest EPD listing information

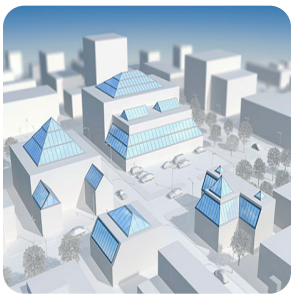
General Information

VELUX

Ådalsvej 99, 2970 Hørsholm, Denmark

+45 45164000

birthe.kjeldsen@velux.com velux.com



Product Name:	Glazing Panels - Double Glazed
Declared Unit:	1 m2 of a window ≤ 2,3 m² (reference dimensions according to EN 17213: 1,23 m × 1,48 m)
Declaration Number:	SmartEPD-2025-001-0562-01
Date of Issue:	July 30, 2025
Expiration:	July 30, 2030
Last updated:	July 30, 2025
EPD Scope:	Cradle to gate with other options A1 - A3, A4, A5, C1 - C4, D
Market(s) of Applicability:	Europe

General Organization Information

VELUX is a Danish manufacturing company that specializes in roof windows, skylights, sun tunnels and related accessories. The company is headquartered in Hrsholm, Denmark and is a part of VKR Holding A/S. VELUX Group is a founding partner of the global Active House Alliance.
Further information can be found at: https://www.velux.com

Limitations, Liability, and Ownership

Environmental declarations from different programs (ISO 14025) may not be comparable. Comparison of the environmental performance of products using EPD information shall be based on the product's use and impacts at the building level, and therefore EPDs may not be used for comparability purposes when not considering the whole building life cycle. EPD comparability is only possible when all stages of a life cycle have been considered. However, variations and deviations are possible. Example of variations: Different LCA software and background LCI datasets may lead to differences results for upstream or downstream of the life cycle stages declared. The EPD owner has sole ownership, liability, and responsibility for the EPD.

Reference Standards

Standard(s):	ISO 14025 and EN 15804+A2
Core PCR:	IBU PCR for Building-Related Products and Services Part A v1.4 v.1.4 Date of issue: April 15, 2024
Sub-category PCR:	IBU Part B: Requirements on the EPD for Windows and Doors v.1.0/1.7/1.4 Date of issue: January 25, 2021 Valid until: January 25, 2026

Sub-category PCR review panel:	Contact Smart EPD for more information.
General Program Instructions:	Smart EPD General Program Instructions v.1.0, November 2022

Verification Information

LCA Author/Creator:	Juan David Villegas | juan@parqhq.com
EPD Program Operator:	Smart EPD | info@smartepd.com | www.smartepd.com 585 Grove St., Ste. 145 PMB 966, Herndon, VA 20170, USA
Verification:	Independent critical review of the LCA and data, according to ISO 14044 and ISO 14071: External Rifat Karim | Independent Consultant | rifat.chimique@gmail.com Independent external verification of EPD, according to ISO 14025 and reference PCR(s): External Rifat Karim | Independent Consultant | rifat.chimique@gmail.com

Product Information

Declared Unit:	1 m2 of a window ≤ 2,3 m² (reference dimensions according to EN 17213: 1,23 m × 1,48 m)
Mass:	48.1078 kg
Reference Service Life:	30 Years
Product Specificity:	✗ Product Average ✓ Product Specific

Product Description

A bespoke glass system with slim and shallow profiles for optimal daylight influx. VELUX Glazing Panels enable the creation of a wide range of rooflight designs from flush installations in a pitched roof to pyramids on a flat roof.
Further information can be found at: https://commercial.velux.co.uk/products/glass-roof-systems/glazing-panels

Product Specifications

Product Classification Codes:	EC3 - Openings -> TranslucentWallAndRoofAssemblies

Material Composition

Material/Component Category	Origin	% Mass
Blind rivets, nuts , screws, plates	DNK, LTU	4.19
Gaskets, washers	DNK, LTU	0.86
Glazing	LTU	80.47
Profiles, support brackets, tubes and strips	LVA, DNK	14.48

Packaging Material	Origin	kg Mass
Cardboard		0.08
Pallet		0.05
Plastic cover		0.39

Biogenic Carbon Content	kg C per m2
Biogenic carbon content in product	None
Biogenic carbon content in accompanying packaging	0.06

Hazardous Materials
No regulated hazardous or dangerous substances are included in this product.

EPD Data Specificity

Primary Data Year: Jan 1, 2024 - Dec 31, 2025

Manufacturing Specificity:

- ✗ Industry Average
- ✗ Manufacturer Average
- ✓ Facility Specific

Averaging:

Averaging was not conducted for this EPD

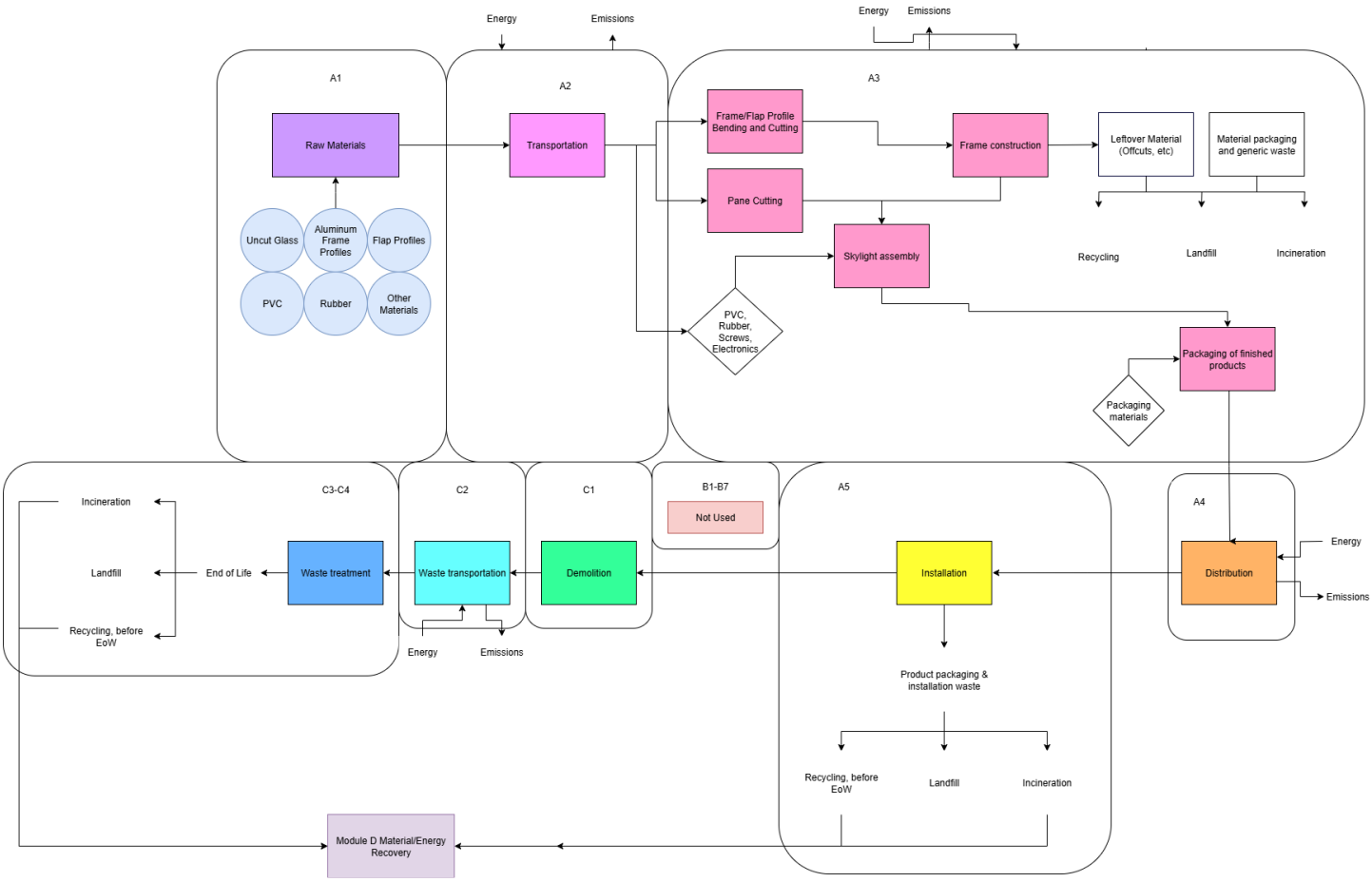
System Boundary

Production	A1	Raw material supply	✓
	A2	Transport	✓
	A3	Manufacturing	✓
Construction	A4	Transport to site	✓
	A5	Assembly / Install	✓
Use	B1	Use	ND
	B2	Maintenance	ND
	B3	Repair	ND
	B4	Replacement	ND
	B5	Refurbishment	ND
	B6	Operational Energy Use	ND
	B7	Operational Water Use	ND
End of Life	C1	Deconstruction	✓
	C2	Transport	✓
	C3	Waste Processing	✓
	C4	Disposal	✓
Benefits & Loads Beyond System Boundary	D	Recycling, Reuse Recovery Potential	✓

Plants

Voerde, DE
Alte Hünxer Str. 179, 46562 Voerde (Niederrhein)-Friedrichsfeld, Germany

Product Flow Diagram



VELUX product manufacturing begins when flap profile parts, uncut glazing, aluminum or plastic profiles, vertical end pieces, and other small components such as screws and gaskets are bent, cut, welded, and assembled into complete flaps and skylight systems. If needed, extra components like DSL grids and electronic parts for home-automation systems are custom-cut and assembled to specification. Once manufacturing is finished, products are delivered to distribution centers and then transported to the end user by truck.

Software and Database

LCA Software:	SimaPro v. 9.5
LCI Foreground Database(s):	Ecoinvent v. 3.9.1
LCI Background Database(s):	Ecoinvent v. 3.9.1

Data Quality

Precision & Completeness

• **Precision:** Inventory data were directly measured, calculated, or conservatively estimated from primary sources using consistent units and QA checks. Background processes from ecoinvent v3 were adopted with their documented uncertainty/precision metadata where available, preserving a transparent record of data quality.

• **Completeness:** The product system's mass balance and inventory completeness were thoroughly checked. Some exclusions were made in line with the PCR requirements, such as personnel impacts, R&D activities, business travel, and point-of-sale infrastructure. However, no data were intentionally omitted.

Consistency and Reproducibility

• **Consistency:** Primary data for all modules were consistently gathered aiming at the highest level of detail possible. Background processes were modeled mainly with the ecoinvent database. The same allocation rules, cut-off criteria, and impact assessment methods were applied throughout, ensuring methodological coherence and consistent data quality across the entire LCA model.

• **Reproducibility:** This study ensures reproducibility by providing comprehensive disclosure of inputoutput data, dataset choices, and modeling approaches. A knowledgeable third party should be able to approximate the results using the same data and modeling methods.

Representativeness

• **Temporal:** Primary data were collected for a 12-month period representing the 2024 calendar year to ensure the representativeness of post-consumer content. Secondary data from the ecoinvent v3 database are typically representative of recent years.

• **Geographical:** Primary data represent VELUX's production facilities. Where applicable, differences in electric grid mix were considered using appropriate secondary data. The use of country-specific data ensures high geographical representativeness, and proxy data were only used when country-specific data were unavailable.

• **Technological:** Both primary and secondary data were tailored to the specific technologies studied, ensuring high technological representativeness.

Life Cycle Module Descriptions

Modules A1A3: The LCA model covers the manufacture of raw materials and components for VELUX products (A1) which are then transported to VELUX facilities by truck (A2). The manufacturing stage (A3) begins with receipt of these materials, which are bent, cut, welded, and assembled into finished flaps and skylight systems. When required, additional parts like DSL grids and electronic components for home-automation systems are custom-cut and assembled to order.

Modules A4A5: Once manufacture is completed, products are shipped to distribution centers and then to the end user by truck (A4). For installation (A5), a 3% material installation loss was assumed. This module includes disposal of that waste and of the product packaging.

Modules C1C4 and D: At end of life (C1C4), the product is assumed to be collected, and each waste stream (e.g., aluminum, glass, PVC) is handled separatelylandfilled, recycled, or incinerated with energy recovery. Loads and benefits beyond the system boundary are considered in Module D (e.g., displacement of virgin materials and electricity).

LCA Discussion

Allocation Procedure

Allocation of co-products was avoided, to the extent possible, based on the guidance given in ISO 14044:2006, 4.3, and in EN 15804+A2:2019. Energy use at the facility level was allocated by the amount of product produced. The manufacturing process does not consume water or generate wastewater or air emissions, other than those from fuel combustion. Solid waste was estimated using packaging masses and material losses and allocated following the polluter pays principle.

Cut-off Procedure

The system boundary was defined based on relevance to the goal of the study. For the raw material (A1) and process related inputs (A3), all available energy and material flow data have been included in the model.

Renewable Electricity

Energy Attribute Certificates (EACs) such as Renewable Energy Certificates (RECs) or Power Purchase Agreements (PPAs) are included in the baseline reported results:	✕ No

Scenarios

Transport to the building/construction site (A4)

A4 Module

Fuel Type:	Diesel
Vehicle Type:	Truck and Trailer
Transport Distance:	150 km
Capacity Utilization:	33 %
Packaging Mass:	0.5104 kg
Weight of products transported:	48.62 kg
Capacity utilization volume factor:	1
Assumptions for scenario development:	Transport distance includes finished product to distribution center and distribution center to point of sale.

Installation in to the building/construction site (A5)

A5 Module

Installation Scrap Rate Assumed:	3 %
Product Lost per Declared/Functional Unit:	1.443 kg
Mass of Packaging Waste Specified by Type:	0.5104 kg
Biogenic Carbon Contained in Packaging:	0.05878 kg
Assumptions for scenario development:	

End of Life (C1 - C4)

C1 - C4 Modules

Collection Process

Collected with Mixed Construction Waste:	48.11 kg

Recovery

Recycling:	19.4 kg
Landfill:	27.02 kg
Incineration:	1.689 kg

Reuse, Recovery and / or Recycling Potentials & Relevant Scenario Information (D)

D Module

Recycling Rate of Product:	0.4032 %
Recycled Content of Product:	0.09491 %
Net Energy Benefit from Material Flow Declared in C3 for Energy Recovery:	135.9 MJ
Further assumptions for scenario development:	Energy recovery from incineration assumes 18% electrical efficiency and 31% thermal

Results

Environmental Impact Assessment Results

EF 3.1

per 1 m2 of product of a window ≤ 2,3 m² (reference dimensions according to EN 17213: 1,23 m × 1,48 m) .

LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

Impact Category	Method	Unit	A1A2A3	A4	A5	C1	C2	C3	C4	D
GWP-total	EF 3.1	kg CO2 eq	1.07e+2	1.50e-2	4.16e+0	0	3.94e-1	3.56e+0	7.74e-2	-4.07e+1
GWP-biogenic	EF 3.1	kg CO2 eq	1.28e+0	1.20e-5	1.16e-1	0	3.14e-4	2.79e-4	1.73e-5	2.26e-1
GWP-fossil	EF 3.1	kg CO2 eq	1.06e+2	1.50e-2	4.04e+0	0	3.93e-1	3.56e+0	7.73e-2	-4.09e+1
GWP-luluc	EF 3.1	kg CO2 eq	1.07e-1	7.33e-6	3.22e-3	0	1.92e-4	2.87e-5	9.19e-6	-6.30e-2
ODP	EF 3.1	kg CFC11 eq	3.39e-6	3.41e-10	1.03e-7	0	8.93e-9	3.72e-9	1.16e-9	-7.37e-7
AP	EF 3.1	mol H+ eq	6.84e-1	3.72e-5	2.08e-2	0	9.73e-4	8.27e-4	6.98e-4	-2.80e-1
EP-freshwater	EF 3.1	kg P eq	2.43e-2	1.11e-6	7.34e-4	0	2.90e-5	1.10e-5	3.93e-6	-1.20e-2
EP-marine	EF 3.1	kg N eq	1.28e-1	1.01e-5	3.97e-3	0	2.65e-4	4.69e-4	3.13e-4	-4.72e-2
EP-terrestrial	EF 3.1	mol N eq	1.40e+0	1.04e-4	4.32e-2	0	2.72e-3	4.01e-3	3.40e-3	-5.29e-1
POCP	EF 3.1	kg NMVOC eq	4.39e-1	6.07e-5	1.35e-2	0	1.59e-3	1.02e-3	1.03e-3	-1.70e-1
ADP-minerals&metals	EF 3.1	kg Sb eq	1.10e-3	4.20e-8	3.30e-5	0	1.10e-6	1.79e-7	2.77e-8	-8.60e-5
ADP-fossil	EF 3.1	MJ	1.41e+3	2.28e-1	4.29e+1	0	5.97e+0	7.09e-1	9.90e-1	-4.54e+2
WDP	EF 3.1	m3 depriv.	2.67e+1	1.09e-3	8.39e-1	0	2.85e-2	1.60e-1	2.21e-3	-5.51e+0

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

Abbreviations:

GWP = Global Warming Potential, 100 years (may also be denoted as GWP-total, GWP-fossil (fossil fuels), GWP-biogenic (biogenic sources), GWP-luluc (land use and land use change)), ODP = Ozone Depletion Potential, AP = Acidification Potential, EP = Eutrophication Potential, SFP = Smog Formation Potential, POCP = Photochemical oxidant creation potential, ADP-Fossil = Abiotic depletion potential for fossil resources, ADP-Minerals&Metals = Abiotic depletion potential for non-fossil resources, WDP = Water deprivation potential, PM = Particular Matter Emissions, IRP = Ionizing radiation, human health, ETP-fw = Eco-toxicity (freshwater), HTP-c = Human toxicity (cancer), HTP-nc = Human toxicity (non-cancer), SQP = Soil quality index.

Comparisons cannot be made between product-specific or industry average EPDs at the design stage of a project, before a building has been specified. Comparisons may be made between product-specific or industry average EPDs at the time of product purchase when product performance and specifications have been established and serve as a functional unit for comparison. Environmental impact results shall be converted to a functional unit basis before any comparison is attempted. Any comparison of EPDs shall be subject to the requirements of ISO 21930 or EN 15804. EPDs are not comparative assertions and are either not comparable or have limited comparability when they have different system boundaries. EPDs are not comparative assertions and are either not comparable or have limited comparability when they have different system boundaries, are based on different product category rules or are missing relevant environmental impacts. Such comparison can be inaccurate, and could lead to erroneous selection of materials or products which are higher-impact, at least in some impact categories.

Resource Use Indicators

per 1 m2 of product of a window ≤ 2,3 m² (reference dimensions according to EN 17213: 1,23 m × 1,48 m) .

Indicator	Unit	A1A2A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	1.05e+2	3.34e-3	3.15e+0	0	8.73e-2	2.79e-2	8.17e-3	-4.25e+1
PERM	MJ	0	0	0	0	0	0	0	0
PERT	MJ	1.05e+2	3.34e-3	3.15e+0	0	8.73e-2	2.79e-2	8.17e-3	-4.25e+1
PENRE	MJ	1.41e+3	2.28e-1	4.29e+1	0	5.97e+0	7.09e-1	9.90e-1	-4.54e+2
PENRM	MJ	4.12e-1	9.62e-6	1.24e-2	0	2.52e-4	3.09e-5	1.16e-5	-1.03e-1
PENRT	MJ	1.41e+3	2.28e-1	4.29e+1	0	5.97e+0	7.09e-1	9.90e-1	-4.54e+2
SM	kg	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0
FW	m3	8.13e-1	3.09e-5	2.56e-2	0	8.09e-4	5.05e-3	5.31e-5	-2.24e-1

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

Abbreviations:

RPRE or PERE = Renewable primary resources used as energy carrier (fuel), RPRM or PERM = Renewable primary resources with energy content used as material, RPRT or PERT = Total use of renewable primary resources with energy content, NRPRE or PENRE = Non-renewable primary resources used as an energy carrier (fuel), NRPRM or PENRM = Non-renewable primary resources with energy content used as material, NRPRT or PENRT = Total non-renewable primary resources with energy content, SM = Secondary materials, RSF = Renewable secondary fuels, NRSF = Non-renewable secondary fuels, RE = Recovered energy, ADPF = Abiotic depletion potential, FW = Use of net freshwater resources, VOCs = Volatile Organic Compounds.

Waste and Output Flow Indicators

per 1 m2 of product of a window ≤ 2,3 m² (reference dimensions according to EN 17213: 1,23 m × 1,48 m) .

Indicator	Unit	A1A2A3	A4	A5	C1	C2	C3	C4	D
HWD	kg	0	0	0	0	0	0	0	0
NHWD	kg	3.66e-1	0	8.99e-1	0	0	0	2.70e+1	0
RWD	kg	1.80e-3	6.95e-8	5.42e-5	0	1.82e-6	3.48e-7	1.17e-7	-5.74e-4
CRU	kg	0	0	0	0	0	0	0	0
MFR	kg	5.78e-1	0	6.69e-1	0	0	0	1.94e+1	-2.00e+1
MER	kg	7.03e-1	0	4.33e-1	0	0	1.69e+0	0	-2.10e+0

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

Abbreviations:

HWD = Hazardous waste disposed, NHWD = Non-hazardous waste disposed, RWD = Radioactive waste disposed, HLRW = High-level radioactive waste, ILLRW = Intermediate- and low-level radioactive waste, CRU = Components for re-use, MFR or MR = Materials for recycling, MER = Materials for energy recovery, MNER = Materials for incineration, no energy recovery, EE or EEE = Recovered energy exported from the product system, EET = Exported thermal energy.

Carbon Emissions and Removals

per 1 m2 of product of a window ≤ 2,3 m² (reference dimensions according to EN 17213: 1,23 m × 1,48 m) .

Indicator	Unit	A1A2A3	A4	A5	C1	C2	C3	C4	D
Bio Carbon Removal from Product	kg C	0	0	0	0	0	0	0	0
Bio Carbon Emission from Product	kg C	0	0	0	0	0	0	0	0
Bio Carbon Removal from Packaging	kg C	-2.30e-1	0	0	0	0	0	0	0
Bio Carbon Emission from Packaging	kg C	1.71e-1	0	5.88e-2	0	0	0	0	0
Bio Carbon Emission from Waste during Manufacturing (renewable source)	kg C	0	0	0	0	0	0	0	0
Calcination Carbon Removal	kg C	0	0	0	0	0	0	0	0
Carbonation Carbon Emission	kg C	0	0	0	0	0	0	0	0
Carbon Emission from Waste during Manufacturing (non-renewable source)	kg C	0	0	0	0	0	0	0	0

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

Abbreviations:

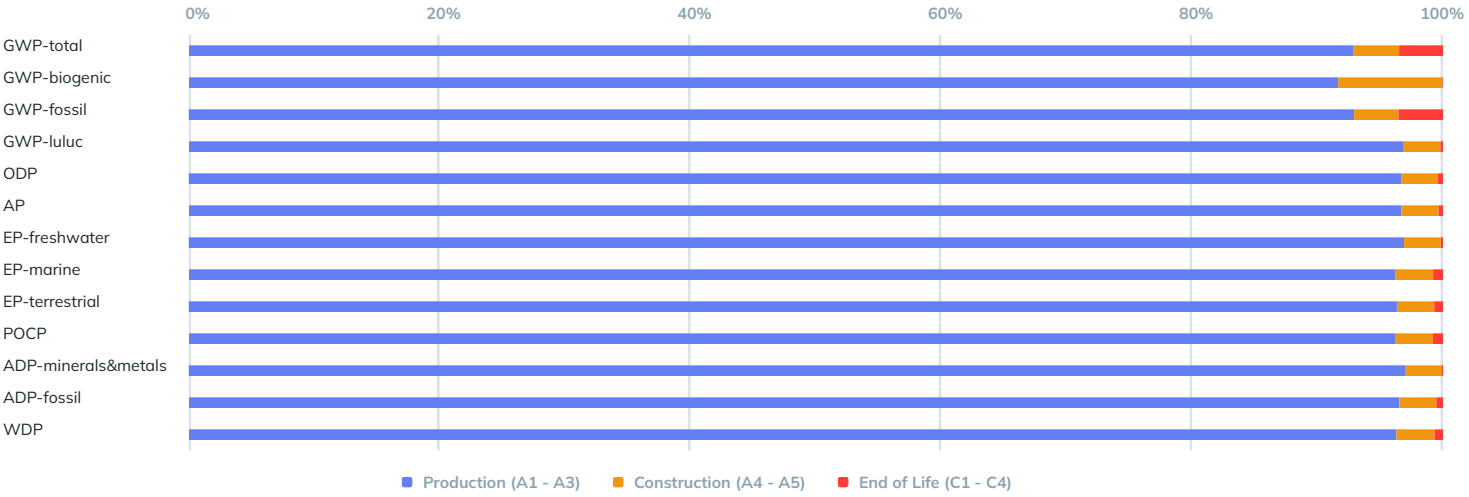
BCRP = Biogenic Carbon Removal from Product, BCEP = Biogenic Carbon Emission from Product, BCRK = Biogenic Carbon Removal from Packaging, BCEK = Biogenic Carbon Emission from Packaging, BCEW = Biogenic Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes, CCE = Calcination Carbon Emissions, CCR = Carbonation Carbon Removals, CWNR = Carbon Emissions from Combustion of Waste from Non-Renewable Sources used in Production Processes, GWP-luc = Carbon Emissions from Land-use Change.

Interpretation

• The manufacturing of the products in this analysis involves the direct procurement of raw materials from suppliers. These materials are then transported to manufacturing facilities in the EU where they are stored, processed, and combined to produce finished products. Notably, the product stage (stage 1) has the highest impact contribution, mainly attributed to the combined environmental impacts associated with raw material manufacturing and energy used in manufacturing the products.

• For products with significant manufacturing energy impacts, the shift to renewable energy sources is recommended.

• Given that the raw materials used in product manufacturing have a significant impact, exploration of opportunities to substitute these materials with alternatives that have a lower environmental impact. Additionally, consideration should be given to collaborating with suppliers who employ sustainable manufacturing techniques or integrate more renewable energy into their production processes. Such initiatives can lead to more environmentally friendly products and further enhance the sustainability of the products in this analysis.



Additional Environmental Information

None

Further Information

Name	Unit	Value
Heat transfer coefficient glass acc. to EN 674 / EN 675	W/(m²K)	~1.1
Heat transfer coefficient window acc. to EN 674 / EN 675	W/(m²K)	~1.3
Total energy transmittance	%	~62
Joint permeability coefficient acc. to EN 1026	m³/mh	< 2.6
Water tightness acc. EN 12208 unprotected / protected	class	E1200
Deflection as a result of wind loads acc. to EN 12211	mm	< L/300
Mounting type (sealing system)	–	Installed on bespoke sub-construction
Noise protection against external noise acc. DIN EN ISO 10140 and DIN EN ISO 717	dB	~35
Air permeability acc. EN 12207	class	Class 4
Resistance against wind loads acc. DIN EN 12211	mm	C5
Radiation properties acc. EN 410 or 133631 and 2: Total energy transmittance g	%	~62
Radiation properties EN 410 or 133631 and 2: Light transmisson level rv	%	~75
Reaction to fire	class	B-s1,d0

References

• Institut Bauen und Umwelt e.V. (IBU). (2021). General Programme Instructions for the IBU EPD Programme Part A: Calculation Rules for the LifeCycle Assessment and Requirements on the Background Report. Version 2.0, 01032021. Berlin: IBU.

• Institut Bauen und Umwelt e.V. (IBU). (2021). Product Category Rules for Construction Products Part B: Requirements on the EPD for Windows and Doors. Version 1.7, 082021. Berlin: IBU.

• European Committee for Standardization (CEN). (2019). EN 15804:2012+A2:2019 Sustainability of construction works Environmental product declarations Core rules for the product category of construction products. Brussels: CEN. (Including AC:2021)

• International Organization for Standardization (ISO). (2006). ISO 14040:2006 Environmental management Life cycle assessment Principles and framework. Geneva: ISO. (Amendment 1:2020; confirmed current 2022)

• International Organization for Standardization (ISO). (2006). ISO 14044:2006 Environmental management Life cycle assessment Requirements and guidelines. Geneva: ISO. (Amendments 1:2017 and 2:2020 included; confirmed current 2022)

• International Organization for Standardization (ISO). (2006). ISO 14025:2006 Environmental labels and declarations Type III environmental declarations Principles and procedures. Geneva: ISO

• Eurostat. (2024). Circular Economy indicators. Waste management: https://ec.europa.eu/eurostat/web/circular-economy/database

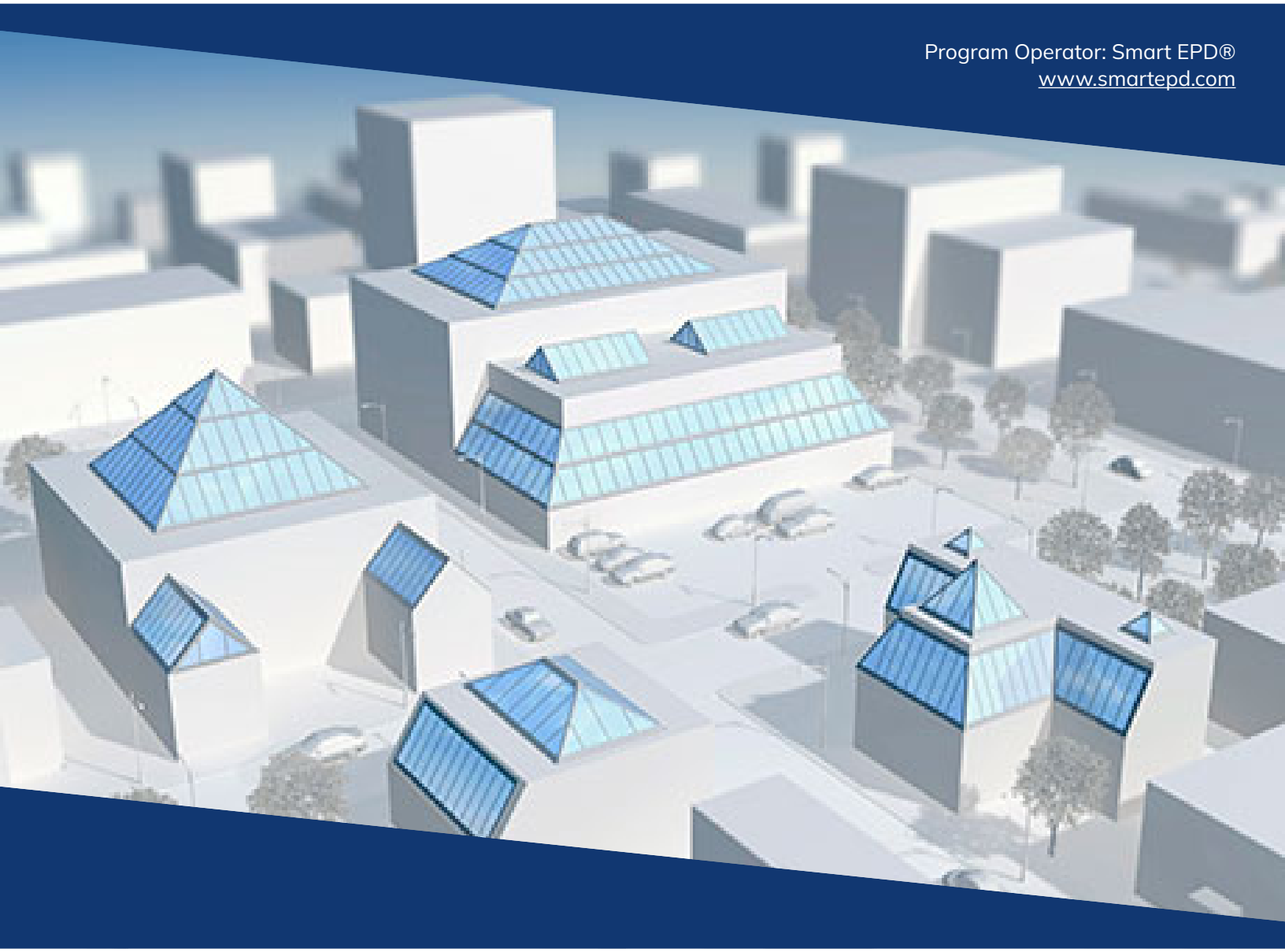
• Stichting National Environmental Database. (2022). Environmental Performance Assessment Method for Construction Works. version 1.1.

• European Committee for Standardization (CEN). (2019). EN 17074:2019 Sustainability of construction works Environmental product declarations Specific core rules for windows and doors. Brussels: CEN.

Environmental Product Declaration

IN ACCORDANCE WITH ISO 14025 AND EN 15804+A2

Program Operator: Smart EPD®
www.smartepd.com



Glazing Panels - Triple Glazed

Date of Issue	Expiration date	Last updated
Jul 30, 2025	**Jul 30, 2030**	**Jul 30, 2025**

Refer to the EPD Library at www.smartepd.com for the latest EPD listing information

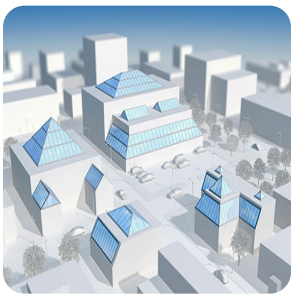
General Information

VELUX

Ådalsvej 99, 2970 Hørsholm, Denmark

+45 45164000

birthe.kjeldsen@velux.com velux.com



Product Name:	Glazing Panels - Triple Glazed
Declared Unit:	1 m2 of a window ≤ 2,3 m² (reference dimensions according to EN 17213: 1,23 m × 1,48 m)
Declaration Number:	SmartEPD-2025-001-0563-01
Date of Issue:	July 30, 2025
Expiration:	July 30, 2030
Last updated:	July 30, 2025
EPD Scope:	Cradle to gate with other options A1 - A3, A4, A5, C1 - C4, D
Market(s) of Applicability:	Europe

General Organization Information

VELUX is a Danish manufacturing company that specializes in roof windows, skylights, sun tunnels and related accessories. The company is headquartered in Hrsholm, Denmark and is a part of VKR Holding A/S. VELUX Group is a founding partner of the global Active House Alliance.
Further information can be found at: https://www.velux.com

Limitations, Liability, and Ownership

Environmental declarations from different programs (ISO 14025) may not be comparable. Comparison of the environmental performance of products using EPD information shall be based on the product's use and impacts at the building level, and therefore EPDs may not be used for comparability purposes when not considering the whole building life cycle. EPD comparability is only possible when all stages of a life cycle have been considered. However, variations and deviations are possible. Example of variations: Different LCA software and background LCI datasets may lead to differences results for upstream or downstream of the life cycle stages declared. The EPD owner has sole ownership, liability, and responsibility for the EPD.

Reference Standards

Standard(s):	ISO 14025 and EN 15804+A2
Core PCR:	IBU PCR for Building-Related Products and Services Part A v1.4 v.1.4 Date of issue: April 15, 2024
Sub-category PCR:	IBU Part B: Requirements on the EPD for Windows and Doors v.1.0/1.7/1.4 Date of issue: January 25, 2021 Valid until: January 25, 2026

Sub-category PCR review panel:	Contact Smart EPD for more information.
General Program Instructions:	Smart EPD General Program Instructions v.1.0, November 2022

Verification Information

LCA Author/Creator:	Juan David Villegas | juan@parqhq.com
EPD Program Operator:	Smart EPD | info@smartepd.com | www.smartepd.com 585 Grove St., Ste. 145 PMB 966, Herndon, VA 20170, USA
Verification:	Independent critical review of the LCA and data, according to ISO 14044 and ISO 14071: External Rifat Karim | Independent Consultant | rifat.chimique@gmail.com Independent external verification of EPD, according to ISO 14025 and reference PCR(s): External Rifat Karim | Independent Consultant | rifat.chimique@gmail.com

Product Information

Declared Unit:	1 m2 of a window ≤ 2,3 m² (reference dimensions according to EN 17213: 1,23 m × 1,48 m)
Mass:	62.8992 kg
Reference Service Life:	30 Years
Product Specificity:	✗ Product Average ✓ Product Specific

Product Description

A bespoke glass system with slim and shallow profiles for optimal daylight influx. VELUX Glazing Panels enable the creation of a wide range of rooflight designs from flush installations in a pitched roof to pyramids on a flat roof.
Further information can be found at: https://commercial.velux.co.uk/products/glass-roof-systems/glazing-panels

Product Specifications

Product Classification Codes:	EC3 - Openings -> TranslucentWallAndRoofAssemblies

Material Composition

Material/Component Category	Origin	% Mass
Blind rivets, nuts , screws, plates	LTU, DNK	1.7
Gaskets, washers	LTU, DNK	1.3
Glazing	LTU	84.16
Profiles, support brackets, tubes and strips	DNK, LVA	12.84

Packaging Material	Origin	kg Mass
Cardboard		0.1
Pallet		0.06
Plastic cover		0.5

Biogenic Carbon Content	kg C per m2
Biogenic carbon content in product	None
Biogenic carbon content in accompanying packaging	0.08

Hazardous Materials
No regulated hazardous or dangerous substances are included in this product.

EPD Data Specificity

Primary Data Year: Jan 1, 2024 - Dec 31, 2025

Manufacturing Specificity:

- ✗ Industry Average
- ✗ Manufacturer Average
- ✓ Facility Specific

Averaging:

Averaging was not conducted for this EPD

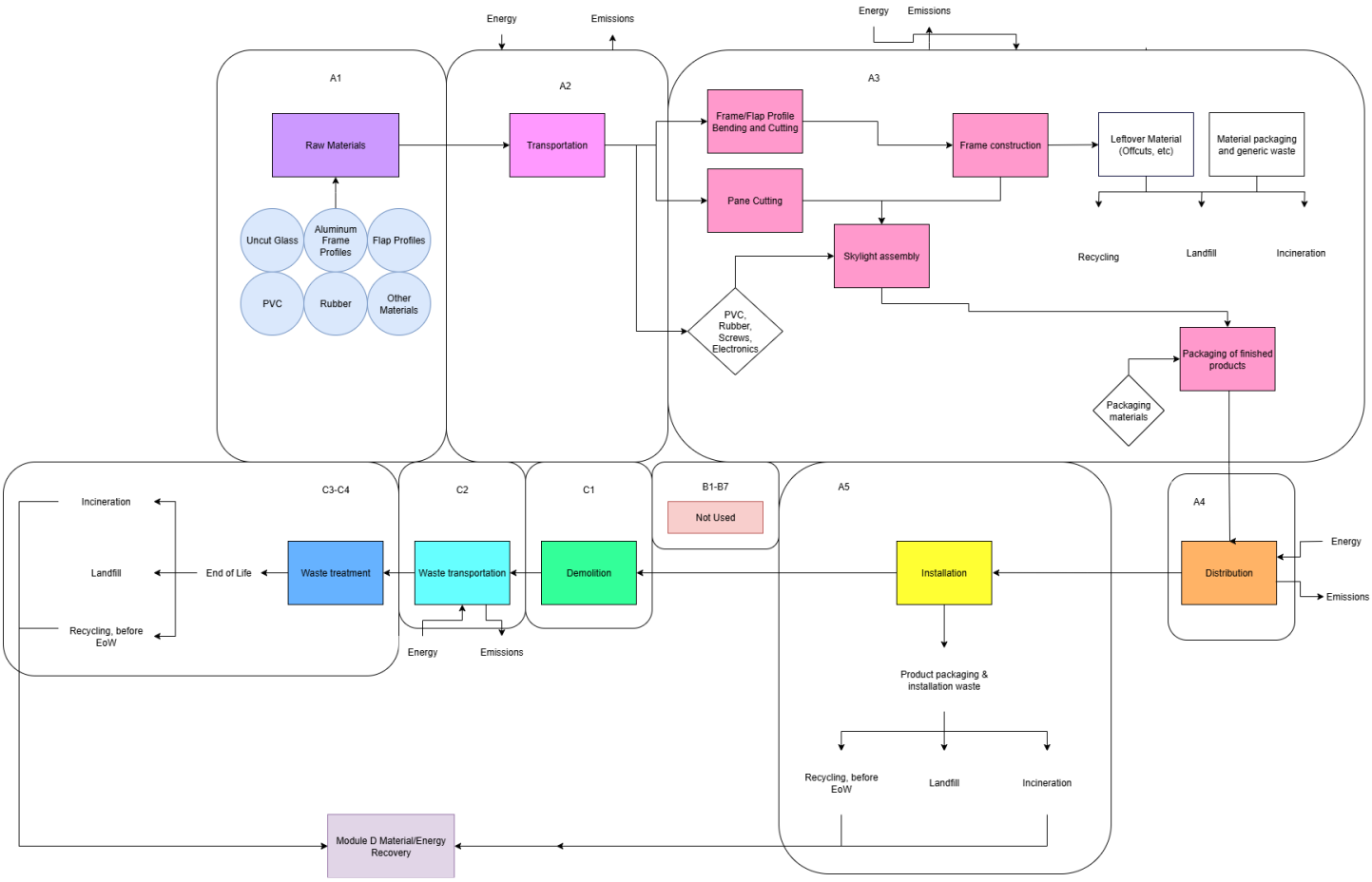
System Boundary

Production	A1	Raw material supply	✓
	A2	Transport	✓
	A3	Manufacturing	✓
Construction	A4	Transport to site	✓
	A5	Assembly / Install	✓
Use	B1	Use	ND
	B2	Maintenance	ND
	B3	Repair	ND
	B4	Replacement	ND
	B5	Refurbishment	ND
	B6	Operational Energy Use	ND
	B7	Operational Water Use	ND
End of Life	C1	Deconstruction	✓
	C2	Transport	✓
	C3	Waste Processing	✓
	C4	Disposal	✓
Benefits & Loads Beyond System Boundary	D	Recycling, Reuse Recovery Potential	✓

Plants

Voerde, DE
Alte Hünxer Str. 179, 46562 Voerde (Niederrhein)-Friedrichsfeld, Germany

Product Flow Diagram



VELUX product manufacturing begins when flap profile parts, uncut glazing, aluminum or plastic profiles, vertical end pieces, and other small components such as screws and gaskets are bent, cut, welded, and assembled into complete flaps and skylight systems. If needed, extra components like DSL grids and electronic parts for home-automation systems are custom-cut and assembled to specification. Once manufacturing is finished, products are delivered to distribution centers and then transported to the end user by truck.

Software and Database

LCA Software:	SimaPro v. 9.5
LCI Foreground Database(s):	Ecoinvent v. 3.9.1
LCI Background Database(s):	Ecoinvent v. 3.9.1

Data Quality

Precision & Completeness

• **Precision:** Inventory data were directly measured, calculated, or conservatively estimated from primary sources using consistent units and QA checks. Background processes from ecoinvent v3 were adopted with their documented uncertainty/precision metadata where available, preserving a transparent record of data quality.

• **Completeness:** The product system's mass balance and inventory completeness were thoroughly checked. Some exclusions were made in line with the PCR requirements, such as personnel impacts, R&D activities, business travel, and point-of-sale infrastructure. However, no data were intentionally omitted.

Consistency and Reproducibility

• **Consistency:** Primary data for all modules were consistently gathered aiming at the highest level of detail possible. Background processes were modeled mainly with the ecoinvent database. The same allocation rules, cut-off criteria, and impact assessment methods were applied throughout, ensuring methodological coherence and consistent data quality across the entire LCA model.

• **Reproducibility:** This study ensures reproducibility by providing comprehensive disclosure of inputoutput data, dataset choices, and modeling approaches. A knowledgeable third party should be able to approximate the results using the same data and modeling methods.

Representativeness

• **Temporal:** Primary data were collected for a 12-month period representing the 2024 calendar year to ensure the representativeness of post-consumer content. Secondary data from the ecoinvent v3 database are typically representative of recent years.

• **Geographical:** Primary data represent VELUX's production facilities. Where applicable, differences in electric grid mix were considered using appropriate secondary data. The use of country-specific data ensures high geographical representativeness, and proxy data were only used when country-specific data were unavailable.

• **Technological:** Both primary and secondary data were tailored to the specific technologies studied, ensuring high technological representativeness.

Life Cycle Module Descriptions

Modules A1A3: The LCA model covers the manufacture of raw materials and components for VELUX products (A1) which are then transported to VELUX facilities by truck (A2). The manufacturing stage (A3) begins with receipt of these materials, which are bent, cut, welded, and assembled into finished flaps and skylight systems. When required, additional parts like DSL grids and electronic components for home-automation systems are custom-cut and assembled to order.

Modules A4A5: Once manufacture is completed, products are shipped to distribution centers and then to the end user by truck (A4). For installation (A5), a 3% material installation loss was assumed. This module includes disposal of that waste and of the product packaging.

Modules C1C4 and D: At end of life (C1C4), the product is assumed to be collected, and each waste stream (e.g., aluminum, glass, PVC) is handled separatelylandfilled, recycled, or incinerated with energy recovery. Loads and benefits beyond the system boundary are considered in Module D (e.g., displacement of virgin materials and electricity).

LCA Discussion

Allocation Procedure

Allocation of co-products was avoided, to the extent possible, based on the guidance given in ISO 14044:2006, 4.3, and in EN 15804+A2:2019. Energy use at the facility level was allocated by the amount of product produced. The manufacturing process does not consume water or generate wastewater or air emissions, other than those from fuel combustion. Solid waste was estimated using packaging masses and material losses and allocated following the polluter pays principle.

Cut-off Procedure

The system boundary was defined based on relevance to the goal of the study. For the raw material (A1) and process related inputs (A3), all available energy and material flow data have been included in the model.

Renewable Electricity

Energy Attribute Certificates (EACs) such as Renewable Energy Certificates (RECs) or Power Purchase Agreements (PPAs) are included in the baseline reported results:	✕ No

Scenarios

Transport to the building/construction site (A4)

A4 Module

Fuel Type:	Diesel
Vehicle Type:	Truck and Trailer
Transport Distance:	150 km
Capacity Utilization:	33 %
Packaging Mass:	0.6673 kg
Weight of products transported:	63.57 kg
Capacity utilization volume factor:	1
Assumptions for scenario development:	Transport distance includes finished product to distribution center and distribution center to point of sale.

Installation in to the building/construction site (A5)

A5 Module

Installation Scrap Rate Assumed:	3 %
Product Lost per Declared/Functional Unit:	1.887 kg
Mass of Packaging Waste Specified by Type:	0.6673 kg
Biogenic Carbon Contained in Packaging:	0.07686 kg
Assumptions for scenario development:	

End of Life (C1 - C4)

C1 - C4 Modules

Collection Process

Collected with Mixed Construction Waste:	62.9 kg

Recovery

Recycling:	23.88 kg
Landfill:	37.01 kg
Incineration:	2.012 kg

Reuse, Recovery and / or Recycling Potentials & Relevant Scenario Information (D)

D Module

Recycling Rate of Product:	0.3796 %
Recycled Content of Product:	0.1002 %
Net Energy Benefit from Material Flow Declared in C3 for Energy Recovery:	166.9 MJ
Further assumptions for scenario development:	Energy recovery from incineration assumes 18% electrical efficiency and 31% thermal

Results

Environmental Impact Assessment Results

EF 3.1

per 1 m2 of product of a window ≤ 2,3 m² (reference dimensions according to EN 17213: 1,23 m × 1,48 m) .

LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

Impact Category	Method	Unit	A1A2A3	A4	A5	C1	C2	C3	C4	D
GWP-total	EF 3.1	kg CO2 eq	1.35e+2	1.50e-2	5.28e+0	0	5.21e-1	4.24e+0	1.06e-1	-4.83e+1
GWP-biogenic	EF 3.1	kg CO2 eq	1.57e+0	1.20e-5	1.49e-1	0	4.15e-4	3.32e-4	2.38e-5	2.32e-1
GWP-fossil	EF 3.1	kg CO2 eq	1.34e+2	1.50e-2	5.13e+0	0	5.20e-1	4.24e+0	1.06e-1	-4.85e+1
GWP-luluc	EF 3.1	kg CO2 eq	1.25e-1	7.33e-6	3.78e-3	0	2.54e-4	3.42e-5	1.26e-5	-7.52e-2
ODP	EF 3.1	kg CFC11 eq	4.63e-6	3.41e-10	1.41e-7	0	1.18e-8	4.43e-9	1.59e-9	-8.80e-7
AP	EF 3.1	mol H+ eq	8.80e-1	3.72e-5	2.68e-2	0	1.29e-3	9.84e-4	9.56e-4	-3.45e-1
EP-freshwater	EF 3.1	kg P eq	2.82e-2	1.11e-6	8.52e-4	0	3.84e-5	1.31e-5	5.38e-6	-1.33e-2
EP-marine	EF 3.1	kg N eq	1.63e-1	1.01e-5	5.08e-3	0	3.51e-4	5.58e-4	4.29e-4	-5.76e-2
EP-terrestrial	EF 3.1	mol N eq	1.80e+0	1.04e-4	5.55e-2	0	3.60e-3	4.77e-3	4.66e-3	-6.50e-1
POCP	EF 3.1	kg NMVOC eq	5.58e-1	6.07e-5	1.72e-2	0	2.10e-3	1.21e-3	1.40e-3	-2.03e-1
ADP-minerals&metals	EF 3.1	kg Sb eq	1.18e-3	4.20e-8	3.56e-5	0	1.46e-6	2.12e-7	3.79e-8	-9.20e-5
ADP-fossil	EF 3.1	MJ	1.79e+3	2.28e-1	5.43e+1	0	7.90e+0	8.44e-1	1.36e+0	-5.40e+2
WDP	EF 3.1	m3 depriv.	3.49e+1	1.09e-3	1.10e+0	0	3.77e-2	1.90e-1	3.02e-3	-6.56e+0

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

Abbreviations:

GWP = Global Warming Potential, 100 years (may also be denoted as GWP-total, GWP-fossil (fossil fuels), GWP-biogenic (biogenic sources), GWP-luluc (land use and land use change)), ODP = Ozone Depletion Potential, AP = Acidification Potential, EP = Eutrophication Potential, SFP = Smog Formation Potential, POCP = Photochemical oxidant creation potential, ADP-Fossil = Abiotic depletion potential for fossil resources, ADP-Minerals&Metals = Abiotic depletion potential for non-fossil resources, WDP = Water deprivation potential, PM = Particular Matter Emissions, IRP = Ionizing radiation, human health, ETP-fw = Eco-toxicity (freshwater), HTP-c = Human toxicity (cancer), HTP-nc = Human toxicity (non-cancer), SQP = Soil quality index.

Comparisons cannot be made between product-specific or industry average EPDs at the design stage of a project, before a building has been specified. Comparisons may be made between product-specific or industry average EPDs at the time of product purchase when product performance and specifications have been established and serve as a functional unit for comparison. Environmental impact results shall be converted to a functional unit basis before any comparison is attempted. Any comparison of EPDs shall be subject to the requirements of ISO 21930 or EN 15804. EPDs are not comparative assertions and are either not comparable or have limited comparability when they have different system boundaries. EPDs are not comparative assertions and are either not comparable or have limited comparability when they have different system boundaries, are based on different product category rules or are missing relevant environmental impacts. Such comparison can be inaccurate, and could lead to erroneous selection of materials or products which are higher-impact, at least in some impact categories.

Resource Use Indicators

per 1 m2 of product of a window ≤ 2,3 m² (reference dimensions according to EN 17213: 1,23 m × 1,48 m) .

Indicator	Unit	A1A2A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	1.28e+2	3.34e-3	3.84e+0	0	1.16e-1	3.32e-2	1.12e-2	-4.95e+1
PERM	MJ	0	0	0	0	0	0	0	0
PERT	MJ	1.28e+2	3.34e-3	3.84e+0	0	1.16e-1	3.32e-2	1.12e-2	-4.95e+1
PENRE	MJ	1.79e+3	2.28e-1	5.43e+1	0	7.90e+0	8.44e-1	1.36e+0	-5.40e+2
PENRM	MJ	4.90e-1	9.62e-6	1.47e-2	0	3.33e-4	3.67e-5	1.59e-5	-1.22e-1
PENRT	MJ	1.79e+3	2.28e-1	5.43e+1	0	7.90e+0	8.44e-1	1.36e+0	-5.40e+2
SM	kg	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0
FW	m3	1.04e+0	3.09e-5	3.29e-2	0	1.07e-3	6.01e-3	7.27e-5	-2.65e-1

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

Abbreviations:

RPRE or PERE = Renewable primary resources used as energy carrier (fuel), RPRM or PERM = Renewable primary resources with energy content used as material, RPRT or PERT = Total use of renewable primary resources with energy content, NRPRE or PENRE = Non-renewable primary resources used as an energy carrier (fuel), NRPRM or PENRM = Non-renewable primary resources with energy content used as material, NRPRT or PENRT = Total non-renewable primary resources with energy content, SM = Secondary materials, RSF = Renewable secondary fuels, NRSF = Non-renewable secondary fuels, RE = Recovered energy, ADPF = Abiotic depletion potential, FW = Use of net freshwater resources, VOCs = Volatile Organic Compounds.

Waste and Output Flow Indicators

per 1 m2 of product of a window ≤ 2,3 m² (reference dimensions according to EN 17213: 1,23 m × 1,48 m) .

Indicator	Unit	A1A2A3	A4	A5	C1	C2	C3	C4	D
HWD	kg	0	0	0	0	0	0	0	0
NHWD	kg	4.94e-1	0	1.23e+0	0	0	0	3.70e+1	0
RWD	kg	2.18e-3	6.95e-8	6.57e-5	0	2.41e-6	4.14e-7	1.60e-7	-6.79e-4
CRU	kg	0	0	0	0	0	0	0	0
MFR	kg	6.54e-1	0	8.27e-1	0	0	0	2.39e+1	-2.47e+1
MER	kg	9.26e-1	0	5.60e-1	0	0	2.01e+0	0	-2.54e+0

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

Abbreviations:

HWD = Hazardous waste disposed, NHWD = Non-hazardous waste disposed, RWD = Radioactive waste disposed, HLRW = High-level radioactive waste, ILLRW = Intermediate- and low-level radioactive waste, CRU = Components for re-use, MFR or MR = Materials for recycling, MER = Materials for energy recovery, MNER = Materials for incineration, no energy recovery, EE or EEE = Recovered energy exported from the product system, EET = Exported thermal energy.

Carbon Emissions and Removals

per 1 m2 of product of a window ≤ 2,3 m² (reference dimensions according to EN 17213: 1,23 m × 1,48 m) .

Indicator	Unit	A1A2A3	A4	A5	C1	C2	C3	C4	D
Bio Carbon Removal from Product	kg C	0	0	0	0	0	0	0	0
Bio Carbon Emission from Product	kg C	0	0	0	0	0	0	0	0
Bio Carbon Removal from Packaging	kg C	-2.61e-1	0	0	0	0	0	0	0
Bio Carbon Emission from Packaging	kg C	1.84e-1	0	7.69e-2	0	0	0	0	0
Bio Carbon Emission from Waste during Manufacturing (renewable source)	kg C	0	0	0	0	0	0	0	0
Calcination Carbon Removal	kg C	0	0	0	0	0	0	0	0
Carbonation Carbon Emission	kg C	0	0	0	0	0	0	0	0
Carbon Emission from Waste during Manufacturing (non-renewable source)	kg C	0	0	0	0	0	0	0	0

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

Abbreviations:

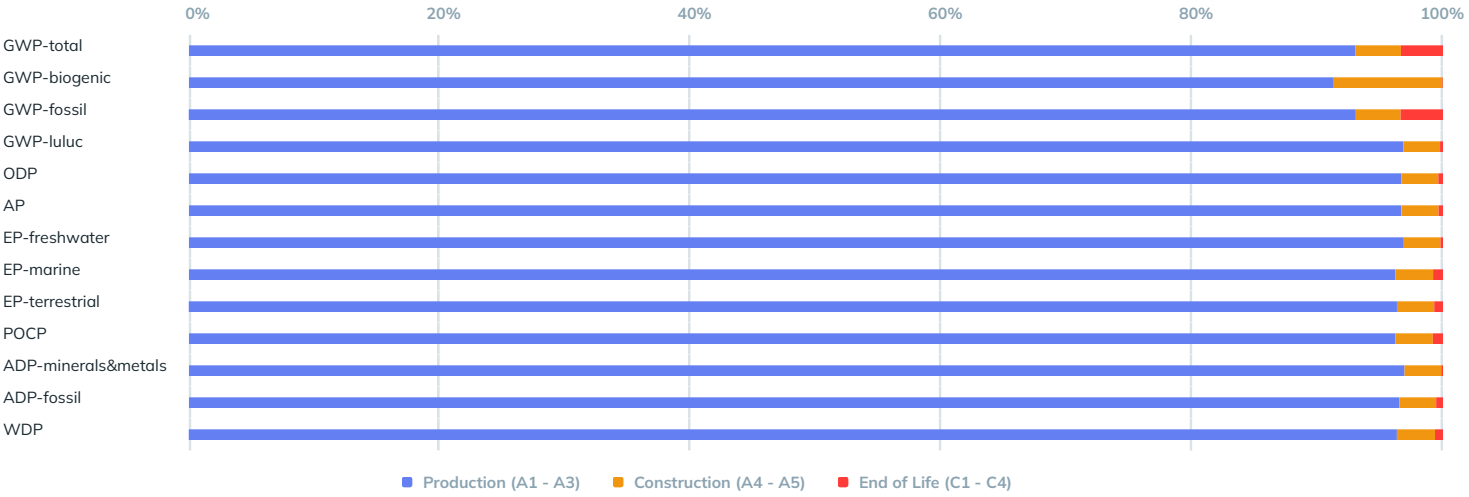
BCRP = Biogenic Carbon Removal from Product, BCEP = Biogenic Carbon Emission from Product, BCRK = Biogenic Carbon Removal from Packaging, BCEK = Biogenic Carbon Emission from Packaging, BCEW = Biogenic Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes, CCE = Calcination Carbon Emissions, CCR = Carbonation Carbon Removals, CWNR = Carbon Emissions from Combustion of Waste from Non-Renewable Sources used in Production Processes, GWP-luc = Carbon Emissions from Land-use Change.

Interpretation

• The manufacturing of the products in this analysis involves the direct procurement of raw materials from suppliers. These materials are then transported to manufacturing facilities in the EU where they are stored, processed, and combined to produce finished products. Notably, the product stage (stage 1) has the highest impact contribution, mainly attributed to the combined environmental impacts associated with raw material manufacturing and energy used in manufacturing the products.

• For products with significant manufacturing energy impacts, the shift to renewable energy sources is recommended.

• Given that the raw materials used in product manufacturing have a significant impact, exploration of opportunities to substitute these materials with alternatives that have a lower environmental impact. Additionally, consideration should be given to collaborating with suppliers who employ sustainable manufacturing techniques or integrate more renewable energy into their production processes. Such initiatives can lead to more environmentally friendly products and further enhance the sustainability of the products in this analysis.



Additional Environmental Information

None

Further Information

Name	Unit	Value
Heat transfer coefficient glass acc. to EN 674 / EN 675	W/(m²K)	0.5
Heat transfer coefficient window acc. to EN 674 / EN 675	W/(m²K)	~1.0
Total energy transmittance	%	50
Joint permeability coefficient acc. to EN 1026	m³/mh	< 2.6
Water tightness acc. EN 12208 unprotected / protected	class	E1200
Deflection as a result of wind loads acc. to EN 12211	mm	< L/300
Mounting type (sealing system)	–	Installed on bespoke sub-construction
Noise protection against external noise acc. DIN EN ISO 10140 and DIN EN ISO 717	dB	~38
Air permeability acc. EN 12207	class	Class 4
Resistance against wind loads acc. DIN EN 12211	mm	C5
Radiation properties acc. EN 410 or 133631 and 2: Total energy transmittance g	%	50
Radiation properties EN 410 or 133631 and 2: Light transmisson level rv	%	73
Reaction to fire	class	B-s1,d0

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