

Environmental Product Declaration

as per ISO 14025 and EN 15804



Owner of the declaration: SIA ARBO Windows

Publisher: Kiwa-Ecobility Experts

Program operator: Kiwa-Ecobility Experts

Registration number: EPD-ArboWindows-241-EN

Issue date: 02-03-2023

Valid to: 01-03-2028

IV GROUP

WINDOW and BALCONY DOORS – WOOD

WINDOW and BALCONY DOORS – WOOD WITH ALUMINIUM CLADDING

1. General information

SIA ARBO Windows

Programme operator

Kiwa-Ecobility Experts
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13355 Berlin
Germany

Declaration number

EPD-ArboWindows-241-EN

This declaration is based on the Product Category Rules

EN 17213:2020 Windows and doors – Environmental Product Declarations – Product category rules for windows and pedestrian doorsets (PCR B)

Issue date

02.03.2023

Valid to

01.03.2028



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Group IV Windows and Balcony Doors

Owner of the declaration

SIA ARBO Windows
Kustes dambis 32
Ventspils, LV-3601
Latvia

Declared product / declared unit

1 m² of product

Scope

IV Group window / balcony door wooden and wooden with aluminium cladding is triple-glazed and has a thermal transmittance of 1,1 W/(m²*K). The dimensions (height x width) are made according to the customer's requirements. The calculation is based on the assumption that LCA results are scalable for the desired window dimension. The product is manufactured in Ventspils, Latvia, and marketed internationally.

Kiwa-Ecobility Experts shall not be liable with respect to manufacturer information, life cycle assessment data and evidence.

Verification

The standard EN 15804+A2:2019 serves as the core PCR

Independent verification of the declaration and data according to ISO 14025:2006

☐ internally

☒ externally



Natalia Chebaeva
(External verifier – Ecomatters)

2. Product

2.1 Product description

This EPD covers the IV Group wood and wood aluminium clad windows and balcony doors. The windows and doors are inward-opening customized building components with different mode of action (e.g. tilt, fixed, tilt and turn). The dimensions (height x width) are adapted according to customer's requirements. The results are an average of the whole group.

IV Group windows and balcony doors includes the following products:

- IV 78 Window – Wood;
- IV 78 Window – Wood with aluminium cladding;
- IV 92 Window – Wood;
- IV 92 Window – Wood with aluminium cladding;
- IV 68 Window – Wood;
- IV 68 Window – Wood with aluminium cladding;
- IV 92 EI30 Fire-resistant window (fixed and tilt and turn);
- FT/EI 92.48 Fire-resistant window
- IV 78 Door – Wood;
- IV 78 Door – Wood with aluminium cladding;
- IV 92 Door – Wood;
- IV 92 Door – Wood with aluminium cladding;
- IV 68 Door – Wood;
- IV 68 Door – Wood with aluminium cladding.



Figure 1: Window – wood with aluminium cladding



Figure 2: Door – Wood with aluminium cladding



Figure 3: Tilt and turn/ tilt wood window

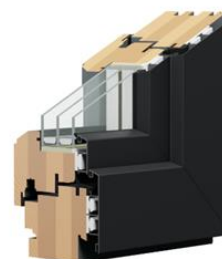


Figure 4: Tilt and turn/ tilt wood-aluminium window



Figure 5: Fixed wood window

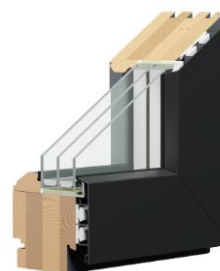


Figure 6: Fixed wood-aluminium window



Figure 7: Tilt and turn wood balcony doors



Figure 8: Tilt and turn wood – aluminium balcony doors

The products included in the IV Group are very similar products and go through the same production steps. A wooden frame is identified to be the single highest contributor to the differences within the declared group of products.

The products with the wooden frame of 20 kg are IV 68 Windows and IV 68 Doors. The products with the wooden frame of 25 kg are IV 78 Windows and IV 78 Doors. And the products with the wooden frame of 30 kg are as follows: IV 92 Windows, IV 92 EI30 Fire-resistant windows, FT/EI 92.48 Fire-resistant windows and IV 92 Doors.

The biggest total result difference between the products without aluminium cladding in mandatory LCIA categories are as follows: Eutrophication, marine (EP-fw, kg N eqv.) and Photochemical ozone formation - human health (POCP, kg NMVOC eqv.) are 7% lower for windows/ balcony doors with wooden frame of 20 kg than with wooden frame of 30 kg. Global warming potential (GWP-total, kg CO₂ eqv.) is 3% lower for windows/ balcony doors with wooden frame of 20 kg.

The biggest total result difference between the products with aluminium cladding in mandatory LCIA categories are as follows: Eutrophication, marine (EP-fw, kg N eqv.) and Photochemical ozone formation - human health (POCP, kg NMVOC eqv.) are 5% lower for windows/ balcony doors with wooden frame of 20 kg than with wooden frame of 30 kg. Global warming potential (GWP-total, kg CO₂ eqv.) is 2% lower for windows/ balcony doors with wooden frame of 20 kg.

Overall, the difference is within +/-10%, for the total of modules A1-C4 across any of the core impact indicators.

Given that the results are presented in two result tables for 1 m² of a window, i.e. the results of a product with the lowest amount of wood frame of 20 kg and the highest amount of wood frame of 30 kg, respectively. In addition, LCA results of the IV Group windows and balcony doors are declared separately for wooden windows/ balcony doors and wooden windows/ balcony doors with aluminium cladding.

2.2 Application

The products are used as enclosures for openings in facades of buildings. The intended uses are in domestic and commercial locations.

UN CPC code: 42120

2.3 Placing on the market / Application rules

The harmonized standard for windows and pedestrian doorsets is EN 14351-1. The CE mark is applied to the finished products. According to the Construction Products Regulation CPR (EU) No. 305/2011, the essential properties of products are declared in the CE marking and Declaration of Performance.

The factory production control of SIA ARBO Windows conforms to requirements of above mentioned standard according to system 3. Factory production control ensures the quality of the products.

SIA ARBO Windows meets requirements of the following additional certifications:

- P-MARK;
- NDVK (Norwegian Door-And Window Control);
- FSC®;
- Management system certifications: ISO 9001:2015, ISO 14001:2015 and ISO 50001:2018.

Market: Norway, Sweden, Denmark, United Kingdom, Finland and elsewhere. Waste scenarios are calculated for Norwegian market.

2.4 Technical data

For the description of the declared performances Regulation (EU) No. 305/2011 is used. The harmonized standard for windows and pedestrian doorsets is EN 14351-1.

Technical Data – IV Group windows and balcony doors without and with aluminium cladding

Characteristic	Value		Unit
Type	IV wooden window / door	IV wooden with ALU window / door	-
Glass type	Flat glass, Triple glazing	Flat glass, Triple glazing	-
Total Weight*	43,45 / 53,45	44,99 / 54,99	kg
Thickness x width	105 x 57 / 115 x 57	105 x 57 / 115 x 57	mm
Glass surface*	0,62	0,62	m ²
Heat permeability, window (U _w -value) (EN 10077)	1,0	1,1	W/(m ² *K)
Safety equipment	n.a.	n.a.	-
Sound insulation	n.a.	n.a.	db
Air permeability (EN 1026)	Class 4	Class 4	-
Water tightness (EN12208)	9A	9A	-
Resistance to wind load, test pressure (EN 12210)	Class 3	Class 3	-
Resistance to wind load, frame deflection (EN 12210)	Class C	Class C	-
Dangerous substances	None	None	

Note: * Reference size 1m²

2.5 Base materials / Ancillary

Characteristic	Value		Unit
Type	IV wooden window / door	IV wooden with ALU window / door	-
Wood (pine)	20,00 / 30,00	20,00 / 30,00	kg
Glass	18,86	18,53	kg
Steel	1,19	1,27	kg
Aluminium	1,09	3,47	kg
Plastics (diverse materials)*	1,09	0,50	kg
Paint, impregnant, primer	1,21	1,21	kg
Argon	0,03	0,03	kg

Note: * mixture of TPE, PVC, PP

2.6 Information on biogenic carbon content

Name	Value	Unit
Product (wood frame 20 kg)	9,09	kg C
Product (wood frame 30 kg)	13,64	kg C
Packaging	0,00	kg C

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

2.7 Manufacturing

The manufacturing contains the following processes:

- Extraction and delivery of raw materials;
- Cutting and profiling;
- Impregnation;
- Assembly of frame;
- Priming and painting of frame;
- Assembly of complete product;
- Packing and delivery.

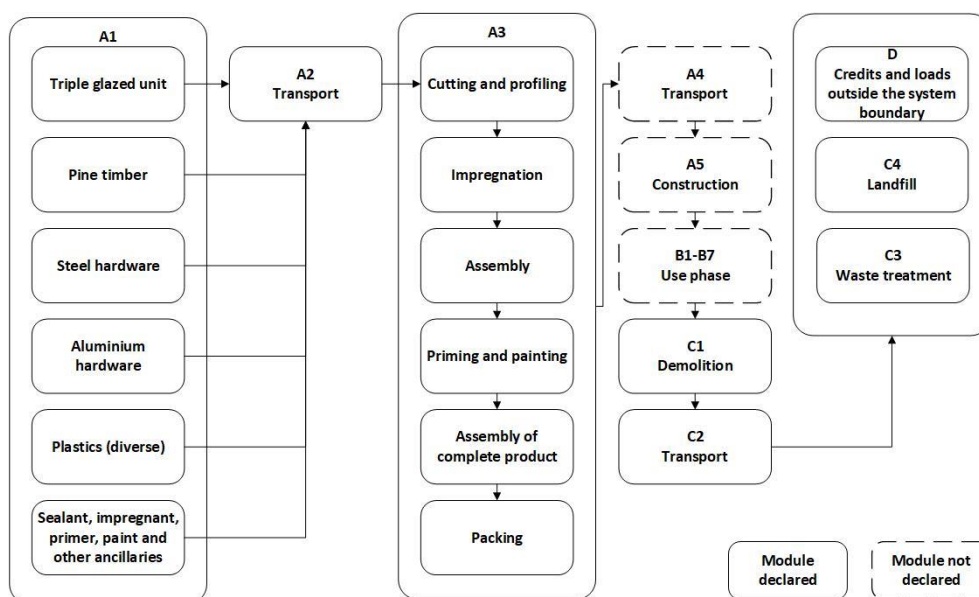


Figure 9: Overview of the production route of a window (A1-A3, C1-C4, D)

2.8 Packaging

The finished product is placed and fixed on pallets in a vertical position. The corners of the product are covered by cardboard. All products on the pallet are covered by packing film. Wrapping the pallet with a wrapping film protects the products from short-term exposure to moisture, transport dust and other adverse effects during transportation. The transportation does not cause any losses as products are secured properly.

2.9 Production waste

The data on generated production waste is recorded as accurately as possible. Thus, the generated production waste is allocated per declared unit. There is no production waste for metal, because steel and aluminium hardware is delivered of the size as in the drawings (no cutting is made). Other materials such as plastics (diverse material) and aluminium profiles are cut to the required size.

3. LCA: Calculation rules

3.1 Declared unit

In accordance with PCR B (EN 17213), one square meter was chosen as the declared unit for a window / balcony door representing the IV Group. Further information for describing the declared unit can be found in the table below.

Declared units – IV Group window and balcony door without and with aluminium cladding

Description	Value		Unit
Type	IV wooden window / door	IV wooden with ALU window / door	-
Declared unit	1	1	m ²
Frame: material type	Pine	Pine	-
Frame: mass	20,00 / 30,00	20,00 / 30,00	kg
Glass: material type	Flat glass, triple glazing	Flat glass, triple glazing	-
Glass: mass	18,86	18,53	kg
Seal: material type	TPE / Silicone	TPE / Silicone	-
Seal: mass	0,330 / 0,110	0,411 / 0,110	kg
Hardware and profile: material type	Steel / aluminium	Steel / aluminium	-
Hardware and profile: mass	1,19 / 1,09	1,27 / 2,40	kg
Total mass	43,45 / 53,45	44,99 / 54,99	kg
Configuration	4-12-4-12-4	4-12-4-12-4	-
Gas type	Argon	Argon	-
Conversion factor to 1 kg	0,023 / 0,019	0,022 / 0,018	m ² /kg

3.2 System boundary

This Life cycle assessment is made for EPD type "Cradle to gate with modules C1-C4 and module D": The Environmental Product Declaration analyses the Production stage (A1-A3), the End-of-Life stage (C1-C4) and the Benefits and loads beyond the system boundary (D).

In a typical window manufacturing process, the individual components such as framing materials, glazing units, hardware (hinges, locks, handles etc.), impregnant, sealant, primers, paints and other ancillary materials are delivered to the manufacturing site. The processes that are performed at the manufacturing site are: cutting and profiling, impregnation, assembly of frame, treatment and coating, assembly of complete product, packing and delivery. All inputs including raw materials, primary products, energy and auxiliary materials as well as the accumulated waste, are considered in the assessment.

Production stage

A1: This stage considers the extraction and processing of raw materials as well as energy consumption. All installed raw materials of the products were analyzed, and the masses were determined.

A2: The raw materials are transported to the manufacturing plant. In this case, the model includes road/ maritime transportation of each raw material. Supplier information regarding the transport distances and vehicle type were provided by SIA ARBO Windows or chosen from relevant market profiles.

A3: This stage includes the manufacture of products and packaging. It also considers the energy consumption and waste generated at the manufacturing site. The national electricity mix of Latvia was taken into account.

Assembly stage

A4: Transportation of assembly stage is not declared.

A5: Installation process is not declared. The packaging is not modelled in C-D modules as it is discarded in module A5 which is not declared.

Use stage

B1 to B7: The use of the final product is not within the manufacturer's sphere of influence. Therefore, modules B1-7 have not been considered.

End of life stage

C1: Demolition concerns the removal of the window, whereby no environmental impact is assumed (e.g. emissions to air, water or soil). No information was found in the life cycle databases consulted for the dismantling operations of windows/ doors, nor was there a bibliography regarding the inputs or residues generated during these operations. Then dismantling is assumed at the site (so transport in C1 would be 0 km). Therefore there is no contribution on impact categories of this module. The resulting waste materials and quantities are included in the respective modules.

C2: Transport module concerns transportation to waste processing. All of end-of-life product is assumed to be sent to the closest facilities (C2).

Transport to waste processing (C2)

Name	Vehicle type	Distance
Truck*	Lorry (Truck), unspecified (default) market group for (GLO)	Landfill:100 km; Incineration: 150 km (energy recovery on site 0); Recycling: 50 km; Re-Use: 0 km

*Note: * For all transports, the environmental profile of a non-specific truck transport was used (conservative assumption): The vehicle operates with diesel, and it provides a fleet average that includes different lorry classes as well as EURO classes. This transport used an average load factor, including empty return trips.*

C3 and C4: At the end-of-life is based on the assumption that all material components after their service life are disassembled to a specific waste flow (e.g. wood, metal, plastic and glass). The individual parts are assigned to the material-specific disposal route – waste processing (C3) for reuse, recovery and/or recycling) or landfill (C4).

End of life (C1-C4)

Name	Value		Unit
	IV wooden window / door	IV wooden with ALU window / door	
Collected separately waste type	43,45 53,45	44,99 54,99	kg
Collected as mixed construction waste	0,00 0,00	0,00 0,00	kg
Re-use	0,00 0,00	0,00 0,00	kg
Recycle	7,82 7,82	10,06 10,06	kg
Energy recovery	20,15 29,65	19,58 29,08	kg
Landfilling	14,42 14,92	14,29 14,79	kg

3.3 Estimates and assumptions

All installed raw materials of the product were analysed, and the masses were determined following the allocation and cut-off requirements. Production-specific energy consumption were measured and provided by SIA ARBO Windows.

Since the production process is quite similar for all of the products produced at the manufacturing site, the energy consumption, ancillary materials and production waste is allocated according to the annual production of the standard sized elements and then declared per square meter of the product. The total annual production data is recorded to a high standard of accuracy and precision.

The production waste of wood, paint and other mixed production waste is collected separately. Wood waste is thermally recovered at the site. As the product is marketed internationally, no country-specific waste scenario can be considered. Therefore, the waste scenario of PCR B (EN 17213 Appendix B.3) was adopted. Removing the window does not result in any emissions to air or soil, so the value for module C1 is assumed to be zero.

3.4 Cut-off criteria

The study does not exclude any modules or processes which are stated mandatory in the EN 15804 and applicable PCR. The study does not exclude any hazardous materials or substances included in the Candidate List of Substances of Very High Concern (SVHCs) for authorization with concentrations higher than 0.1% weight by weight. All material flows that contribute to more than 1% of the total mass, energy or environmental impact of the system have been considered in the LCA. It can be assumed that the neglected processes in total contributed less than 5% to the considered impact categories.

The product stage includes materials, energy and waste flows only related to production processes (e.g. energy and water use related to company management and sales activities are excluded where technically possible; production, manufacture, and construction of manufacturing capital goods and infrastructure, other processes which are not directly related to the production of windows and doors).

3.5 Background Data

The Life Cycle Assessment was modelled with the R<THiNK software from NIBE. The background data is taken from Ecoinvent version 3.6 (2019) "Allocation, cut-off" database. Geographical reference space of the background data is Europe or Global. Almost all consistent datasets contained in the Ecoinvent database are documented and can be viewed in the online Ecoinvent documentation. The reference year to collect all input data is 2021. The geographical reference area is Europe or Global and can be seen in the system description boundary table.

3.6 Data quality

In the operating data survey all relevant process-specific data has been collected. The data relating to the manufacturing phase of the window was determined by SIA ARBO Windows.

Secondary data was taken from the Ecoinvent 3.6 (2019) database. The database is regularly checked and thus complies with the requirements of ISO 14040/44 (background data is not older than 10 years). The background data meets the requirements of EN 15804.

The general rule was followed that specific data from specific production processes or average data derived from specific processes must be given priority when calculating an EPD or Life Cycle Assessment. Data for processes that the manufacturer cannot influence or choose, were backed up with generic data.

3.7 Period Under review

All process-specific data was collected for the manufacturing year 2021. The quantities of raw and ancillary materials as well as energy consumption have been recorded and averaged over the entire operating year 2021.

3.8 Allocation

There are no co-products in the raw material supply and manufacturing phase, therefore no allocation methods were used at this stage (for co-products). Appropriation or attribution of inputs and outputs, e.g. auxiliary materials, energy (utilities), waste have been done on the basis of production volumes in 2021 (reference year), taking into account an area of a standard sized windows (as per PCR B EN 17213), e.g. windows size 1,23 m x 1,48 m (area of a window 1,84 m²). The Life Cycle Assessment was modelled with the R<THiNK software from NIBE. The background data is taken from Ecoinvent version 3.6 (2019) Allocation, cut-off library. Almost all consistent datasets contained in the Ecoinvent database is documented and can be viewed in the online Ecoinvent documentation. Allocation principles in the background are in compliance with the foreground. Specific information on allocations within the background data can be found in the Ecoinvent database version 3.6 (2019) document.

3.9 Calculation methods

For life cycle assessment, the calculation methods described in ISO 14040 have been applied. The evaluation is based on the phases in the system boundaries.

3.10 Mix of electricity and CO₂-Certificates

The electricity mix (medium voltage) was chosen, using the country-specific market dataset (Latvia) from the background database. Reference year of the dataset 2019, reference year of the electricity mix is at least 2012. The Ecoinvent profile used for the gridmix includes the imported energy and excludes the exported energy.

3.11 Comparability

EPD of construction products may not be comparable if they do not comply with the requirements of EN 15804. 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 considered.

3.12 Reference Service Life (RSL)

According to the standard EN 17213 a reference service life of 30 years is assumed without IGU replacement. This is on the basis that the installation, maintenance and servicing of the product follows the relevant instructions of the manufacturer which are submitted to every customer and also available on the web page of SIA ARBO Windows. It should be noted that the Use stage with modules B1-B7 is not declared.

4. System boundary description and LCA results

This Life cycle assessment is made for EPD type “cradle to gate with modules C1-C4 and module D”. The Environmental Product Declaration analyses the Production stage (A1-A3), the end-of-life stage (C1-C4) and the Benefits and loads beyond the system boundary (D).

System boundary description

Description of the system boundary																
Production stage			Construction process stage		Use stage							End of life stage				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manufacturing	Transport from manufacturer to place of use	Construction-installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction / demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X
Geography																
EU, GLO	EU, GLO	LV, EU	MND	MND	MND	MND	MND	MND	MND	MND	MND	EU	EU	EU, NO	EU	EU, GLO
X=Module declared MND=Module not declared																

All major materials, production energy use and waste are included for phases A1, A2, A3, C1, C2, C3 and C4. Use stage B1-B7 is not relevant for this type of product and is not declared.

The following tables show the results of the impact assessment indicators, resource use, waste and other output streams. The results for window wooden and window wooden with aluminium cladding are shown separately. The results presented refer to the declared average product.

Disclaimer on ADP-e, ADP-f, WDP, ETP-fw, HTP-c, HTP-nc, SQP: The results of these environmental impact indicators must be used with caution, as the uncertainties in these results are high or as there is limited experience with the indicator.

Disclaimer on IR: This impact category mainly addresses the potential effect of low dose ionizing radiation on human health in the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents and occupational exposures, nor does it consider radioactive waste disposal in underground facilities. Potential ionizing radiation from soil, radon, and some building materials is also not measured by this indicator.

4.1 Results of the LCA for IV Group windows and balcony doors wooden

Results of the LCA: Environmental impact of 1 m ² window / balcony door (wood frame 20 kg)									
Parameter	Unit	A1	A2	A3	C1	C2	C3	C4	D
Core environmental impact indicators (EN 15804)									
ADP-f	MJ	7,32E+02	7,01E+01	2,75E+02	0,00E+00	1,02E+01	7,12E+00	2,15E+00	-3,28E+02
ADP-mm	kg Sb-equiv.	1,72E-03	1,14E-04	7,56E-05	0,00E+00	1,71E-05	1,35E-05	5,41E-07	4,25E-03
AP	mol H+ eqv.	4,65E-01	2,87E-02	1,28E-01	0,00E+00	3,92E-03	9,42E-03	6,74E-04	-9,71E-02
EP-fw	kg P eqv.	2,09E-03	5,70E-05	2,57E-04	0,00E+00	6,82E-06	2,38E-05	8,35E-07	-4,63E-04
EP-m	kg N eqv.	7,54E-02	9,52E-03	2,55E-02	0,00E+00	1,38E-03	3,65E-03	2,76E-04	-1,37E-02
EP-T	mol N eqv.	8,72E-01	1,05E-01	3,06E-01	0,00E+00	1,52E-02	4,16E-02	2,70E-03	-1,59E-01
GWP-b	kg CO2 eqv.	-3,30E+01	3,11E-03	6,92E+00	0,00E+00	3,12E-04	3,28E+01	1,81E+00	-3,50E-01
GWP-f	kg CO2 eqv.	5,88E+01	4,72E+00	1,81E+01	0,00E+00	6,76E-01	3,60E+00	7,99E-02	-2,12E+01
GWP-luluc	kg CO2 eqv.	2,76E-01	2,09E-03	2,54E-02	0,00E+00	2,48E-04	4,84E-04	1,96E-05	-1,83E-01
GWP-total	kg CO2 eqv.	2,61E+01	4,72E+00	2,50E+01	0,00E+00	6,77E-01	3,64E+01	1,89E+00	-2,18E+01
ODP	kg CFC 11 eqv.	4,99E-06	1,01E-06	2,89E-06	0,00E+00	1,49E-07	1,39E-07	3,16E-08	-3,05E-06
POCP	kg NMVOC eqv.	2,45E-01	3,08E-02	8,47E-02	0,00E+00	4,35E-03	1,10E-02	8,01E-04	-5,38E-02
WDP	m3 world eqv.	1,46E+01	2,70E-01	3,19E+00	0,00E+00	3,65E-02	2,56E-01	1,95E-02	-4,15E-01
Additional environmental impact indicators (EN 15804)									
ETP-fw	CTUe	1,41E+03	6,76E+01	3,12E+02	0,00E+00	9,10E+00	6,95E+01	3,49E+01	-1,76E+02
HTP-c	CTUh	7,11E-08	3,38E-09	1,96E-08	0,00E+00	2,95E-10	7,90E-08	3,02E-11	-2,83E-08
HTP-nc	CTUh	1,23E-06	7,54E-08	2,10E-07	0,00E+00	9,95E-09	4,14E-08	8,93E-10	-1,67E-07
IR	kBq U235 eqv.	2,03E+00	2,95E-01	1,23E+00	0,00E+00	4,27E-02	2,81E-02	9,18E-03	-1,28E+00
PM	disease incidence	5,72E-06	4,29E-07	2,91E-06	0,00E+00	6,08E-08	8,45E-08	1,40E-08	-9,18E-07
SQP	Pt	5,47E+03	5,32E+01	7,23E+02	0,00E+00	8,85E+00	4,84E+00	4,75E+00	-8,94E+01
ADP-e =Depletion of abiotic resources-elements ADP-f =Depletion of abiotic resources-fossil fuels AP =Acidification of soil and water EP-fw =Eutrophication, freshwater EP-m =Eutrophication marine EP-T =Eutrophication, terrestrial GWP-b =Global warming potential – Biogenic GWP-f =Global warming potential – Fossil GWP-luluc =Global warming potential – Land use and land use change GWP-total =Global warming potential ODP =Ozone layer depletion POCP =Photochemical oxidants creation WDP =Water use ETP-fw =Ecotoxicity, freshwater HTP-c =Human toxicity, cancer HTP-nc =Human toxicity, non-cancer IR =Ionising radiation, human health PM =Particulate Matter SQP =Land use									

Results of the LCA: Resource use and environmental information of 1 m² window / balcony door (wood frame 20 kg)

Parameter	Unit	A1	A2	A3	C1	C2	C3	C4	D
PERE	MJ	5,06E+02	1,09E+00	1,60E+02	0,00E+00	1,28E-01	6,48E-01	3,87E-02	-8,80E+01
PERM	MJ	2,80E+02	0,00E+00	1,40E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	7,86E+02	1,09E+00	1,74E+02	0,00E+00	1,28E-01	6,48E-01	3,87E-02	-8,80E+01
PENRE	MJ	7,39E+02	7,44E+01	2,94E+02	0,00E+00	1,08E+01	7,60E+00	2,28E+00	-3,55E+02
PENRM	MJ	4,40E+01	0,00E+00	1,32E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	7,83E+02	7,44E+01	2,95E+02	0,00E+00	1,08E+01	7,60E+00	2,28E+00	-3,55E+02
SM	kg	5,86E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m ³	4,88E-01	9,48E-03	1,04E-01	0,00E+00	1,24E-03	1,61E-02	2,51E-03	-3,78E-01
HWD	kg	6,56E-03	4,62E-04	3,03E-04	0,00E+00	2,58E-05	6,83E-03	2,32E-06	8,25E-03
NHWD	kg	1,01E+01	3,79E+00	1,79E+00	0,00E+00	6,47E-01	4,98E-01	1,44E+01	-2,54E+00
RWD	kg	2,26E-03	4,56E-04	1,20E-03	0,00E+00	6,70E-05	2,98E-05	1,43E-05	-1,24E-03
CRU	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MFR	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,82E+00	0,00E+00	0,00E+00
MER	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EE	MJ	0,00E+00	0,00E+00	-6,86E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,53E+02
EET	MJ	0,00E+00	0,00E+00	-4,34E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-9,69E+01
EEE	MJ	0,00E+00	0,00E+00	-2,52E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-5,63E+01

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

Results of the LCA: Environmental impact of 1 m ² window / balcony door (wood frame 30 kg)									
Parameter	Unit	A1	A2	A3	C1	C2	C3	C4	D
Core environmental impact indicators (EN 15804)									
ADP-f	MJ	7,63E+02	7,66E+01	2,75E+02	0,00E+00	1,32E+01	8,00E+00	2,28E+00	-4,27E+02
ADP-mm	kg Sb-equiv.	1,81E-03	1,24E-04	7,56E-05	0,00E+00	2,22E-05	1,41E-05	5,49E-07	4,25E-03
AP	mol H+ eqv.	4,81E-01	3,19E-02	1,28E-01	0,00E+00	5,08E-03	1,24E-02	7,21E-04	-1,21E-01
EP-fw	kg P eqv.	2,23E-03	6,12E-05	2,57E-04	0,00E+00	8,83E-06	2,56E-05	9,88E-07	-4,96E-04
EP-m	kg N eqv.	8,03E-02	1,06E-02	2,55E-02	0,00E+00	1,79E-03	5,03E-03	3,06E-04	-1,78E-02
EP-T	mol N eqv.	9,28E-01	1,17E-01	3,06E-01	0,00E+00	1,97E-02	5,74E-02	2,87E-03	-2,08E-01
GWP-b	kg CO2 eqv.	-4,97E+01	3,29E-03	6,92E+00	0,00E+00	4,04E-04	4,83E+01	2,66E+00	-5,06E-01
GWP-f	kg CO2 eqv.	6,11E+01	5,15E+00	1,81E+01	0,00E+00	8,75E-01	3,69E+00	8,60E-02	-2,76E+01
GWP-luluc	kg CO2 eqv.	2,89E-01	2,26E-03	2,54E-02	0,00E+00	3,21E-04	5,08E-04	2,25E-05	-1,87E-01
GWP-total	kg CO2 eqv.	1,17E+01	5,16E+00	2,50E+01	0,00E+00	8,76E-01	5,20E+01	2,75E+00	-2,83E+01
ODP	kg CFC 11 eqv.	5,28E-06	1,10E-06	2,89E-06	0,00E+00	1,93E-07	1,50E-07	3,33E-08	-4,05E-06
POCP	kg NMVOC eqv.	2,61E-01	3,40E-02	8,47E-02	0,00E+00	5,63E-03	1,51E-02	8,61E-04	-6,77E-02
WDP	m3 world eqv.	1,49E+01	2,93E-01	3,19E+00	0,00E+00	4,72E-02	2,87E-01	2,53E-02	-7,65E-01
Additional environmental impact indicators (EN 15804)									
ETP-fw	CTUe	1,47E+03	7,33E+01	3,12E+02	0,00E+00	1,18E+01	7,21E+01	3,50E+01	-2,09E+02
HTP-c	CTUh	7,31E-08	3,58E-09	1,96E-08	0,00E+00	3,82E-10	1,16E-07	3,34E-11	-3,13E-08
HTP-nc	CTUh	1,27E-06	8,16E-08	2,10E-07	0,00E+00	1,29E-08	5,05E-08	1,02E-09	-1,86E-07
IR	kBq U235 eqv.	2,16E+00	3,23E-01	1,23E+00	0,00E+00	5,53E-02	3,05E-02	9,68E-03	-1,54E+00
PM	disease incidence	6,39E-06	4,67E-07	2,91E-06	0,00E+00	7,88E-08	1,09E-07	1,48E-08	-1,12E-06
SQP	Pt	8,09E+03	5,86E+01	7,23E+02	0,00E+00	1,14E+01	5,15E+00	5,05E+00	-1,30E+02
ADP-e =Depletion of abiotic resources-elements ADP-f =Depletion of abiotic resources-fossil fuels AP =Acidification of soil and water EP-fw =Eutrophication, freshwater EP-m =Eutrophication marine EP-T =Eutrophication, terrestrial GWP-b =Global warming potential – Biogenic GWP-f =Global warming potential – Fossil GWP-luluc =Global warming potential – Land use and land use change GWP-total =Global warming potential ODP =Ozone layer depletion POCP =Photochemical oxidants creation WDP =Water use ETP-fw =Ecotoxicity, freshwater HTP-c =Human toxicity, cancer HTP-nc =Human toxicity, non-cancer IR =Ionising radiation, human health PM =Particulate Matter SQP =Land use									

Results of the LCA: Resource use and environmental information of 1 m² window / balcony door (wood frame 30 kg)

Parameter	Unit	A1	A2	A3	C1	C2	C3	C4	D
PERE	MJ	7,29E+02	1,17E+00	1,60E+02	0,00E+00	1,65E-01	6,89E-01	4,28E-02	-1,06E+02
PERM	MJ	4,20E+02	0,00E+00	1,40E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	1,15E+03	1,17E+00	1,74E+02	0,00E+00	1,65E-01	6,89E-01	4,28E-02	-1,06E+02
PENRE	MJ	7,72E+02	8,14E+01	2,94E+02	0,00E+00	1,40E+01	8,56E+00	2,42E+00	-4,63E+02
PENRM	MJ	4,40E+01	0,00E+00	1,32E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	8,16E+02	8,14E+01	2,95E+02	0,00E+00	1,40E+01	8,56E+00	2,42E+00	-4,63E+02
SM	kg	5,86E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m ³	5,00E-01	1,03E-02	1,04E-01	0,00E+00	1,61E-03	2,07E-02	2,65E-03	-3,92E-01
HWD	kg	6,69E-03	4,78E-04	3,03E-04	0,00E+00	3,35E-05	6,83E-03	2,43E-06	8,14E-03
NHWD	kg	1,08E+01	4,18E+00	1,79E+00	0,00E+00	8,37E-01	5,80E-01	1,49E+01	-2,70E+00
RWD	kg	2,41E-03	4,99E-04	1,20E-03	0,00E+00	8,67E-05	3,25E-05	1,51E-05	-1,50E-03
CRU	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MFR	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,82E+00	0,00E+00	0,00E+00
MER	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EE	MJ	0,00E+00	0,00E+00	-6,86E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-2,20E+02
EET	MJ	0,00E+00	0,00E+00	-4,34E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,39E+02
EEE	MJ	0,00E+00	0,00E+00	-2,52E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-8,09E+01

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

4.2 Results of the LCA for IV Group windows and balcony doors wooden with aluminium cladding

Results of the LCA: Environmental impact of 1 m ² window / balcony door (wood frame 20 kg)									
Parameter	Unit	A1	A2	A3	C1	C2	C3	C4	D
Core environmental impact indicators (EN 15804)									
ADP-f	MJ	1,21E+03	8,04E+01	2,93E+02	0,00E+00	1,02E+01	1,11E+01	2,18E+00	-5,49E+02
ADP-mm	kg Sb-equiv.	2,53E-03	1,29E-04	6,14E-04	0,00E+00	1,72E-05	2,36E-05	5,66E-07	1,36E-02
AP	mol H+ eqv.	8,00E-01	3,28E-02	1,43E-01	0,00E+00	3,93E-03	1,17E-02	6,94E-04	-1,94E-01
EP-fw	kg P eqv.	3,96E-03	6,97E-05	3,21E-04	0,00E+00	6,84E-06	3,88E-05	9,86E-07	-1,27E-03
EP-m	kg N eqv.	1,26E-01	1,07E-02	2,80E-02	0,00E+00	1,39E-03	3,96E-03	2,79E-04	-2,37E-02
EP-T	mol N eqv.	1,43E+00	1,19E-01	3,33E-01	0,00E+00	1,53E-02	4,54E-02	2,74E-03	-2,69E-01
GWP-b	kg CO ₂ eqv.	-3,28E+01	3,99E-03	6,93E+00	0,00E+00	3,13E-04	3,28E+01	1,81E+00	-4,24E-01
GWP-f	kg CO ₂ eqv.	1,11E+02	5,43E+00	2,03E+01	0,00E+00	6,78E-01	2,78E+00	7,93E-02	-3,50E+01
GWP-luluc	kg CO ₂ eqv.	4,68E-01	2,55E-03	1,56E-02	0,00E+00	2,49E-04	7,09E-04	2,37E-05	-5,68E-01
GWP-total	kg CO ₂ eqv.	7,86E+01	5,44E+00	2,73E+01	0,00E+00	6,79E-01	3,56E+01	1,88E+00	-3,60E+01
ODP	kg CFC 11 eqv.	7,28E-06	1,15E-06	2,94E-06	0,00E+00	1,50E-07	1,41E-07	3,16E-08	-4,88E-06
POCP	kg NMVOC eqv.	4,09E-01	3,51E-02	9,21E-02	0,00E+00	4,36E-03	1,21E-02	8,10E-04	-9,70E-02
WDP	m ³ world eqv.	2,12E+01	3,19E-01	3,67E+00	0,00E+00	3,66E-02	2,27E-01	2,08E-02	7,18E-01
Additional environmental impact indicators (EN 15804)									
ETP-fw	CTUe	2,78E+03	7,97E+01	3,83E+02	0,00E+00	9,12E+00	6,68E+01	1,09E+02	-3,54E+02
HTP-c	CTUh	1,45E-07	4,44E-09	2,11E-08	0,00E+00	2,96E-10	7,91E-08	3,38E-11	-7,68E-08
HTP-nc	CTUh	2,52E-06	8,95E-08	2,50E-07	0,00E+00	9,98E-09	5,25E-08	9,96E-10	-7,75E-07
IR	kBq U235 eqv.	3,04E+00	3,39E-01	1,21E+00	0,00E+00	4,29E-02	4,51E-02	9,24E-03	-2,90E+00
PM	disease incidence	9,61E-06	4,97E-07	3,08E-06	0,00E+00	6,10E-08	1,15E-07	1,41E-08	-1,94E-06
SQP	Pt	5,57E+03	5,81E+01	7,29E+02	0,00E+00	8,87E+00	9,43E+00	4,75E+00	-9,69E+01
ADP-e =Depletion of abiotic resources-elements ADP-f =Depletion of abiotic resources-fossil fuels AP =Acidification of soil and water EP-fw =Eutrophication, freshwater EP-m =Eutrophication marine EP-T =Eutrophication, terrestrial GWP-b =Global warming potential – Biogenic GWP-f =Global warming potential – Fossil GWP-luluc =Global warming potential – Land use and land use change GWP-total =Global warming potential ODP =Ozone layer depletion POCP =Photochemical oxidants creation WDP =Water use ETP-fw =Ecotoxicity, freshwater HTP-c =Human toxicity, cancer HTP-nc =Human toxicity, non-cancer IR =Ionising radiation, human health PM =Particulate Matter SQP =Land use									

Results of the LCA: Resource use and environmental information of 1 m² window / balcony door (wood frame 20 kg)

Parameter	Unit	A1	A2	A3	C1	C2	C3	C4	D
PERE	MJ	5,73E+02	1,35E+00	1,59E+02	0,00E+00	1,28E-01	1,09E+00	4,21E-02	-1,83E+02
PERM	MJ	2,80E+02	0,00E+00	1,40E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	8,52E+02	1,35E+00	1,73E+02	0,00E+00	1,28E-01	1,09E+00	4,21E-02	-1,83E+02
PENRE	MJ	1,27E+03	8,53E+01	3,14E+02	0,00E+00	1,09E+01	1,18E+01	2,31E+00	-5,89E+02
PENRM	MJ	2,41E+01	0,00E+00	1,32E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	1,29E+03	8,53E+01	3,15E+02	0,00E+00	1,09E+01	1,18E+01	2,31E+00	-5,89E+02
SM	kg	6,23E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m ³	8,53E-01	1,13E-02	9,05E-02	0,00E+00	1,25E-03	1,65E-02	2,52E-03	-1,00E+00
HWD	kg	1,92E-02	6,49E-04	2,82E-03	0,00E+00	2,59E-05	2,18E-02	2,34E-06	2,71E-02
NHWD	kg	2,01E+01	4,09E+00	2,13E+00	0,00E+00	6,49E-01	6,53E-01	1,43E+01	-7,13E+00
RWD	kg	3,34E-03	5,21E-04	1,18E-03	0,00E+00	6,72E-05	4,97E-05	1,43E-05	-2,75E-03
CRU	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MFR	kg	0,00E+00	0,00E+00	1,24E-01	0,00E+00	0,00E+00	1,01E+01	0,00E+00	0,00E+00
MER	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EE	MJ	0,00E+00	0,00E+00	-6,86E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,44E+02
EET	MJ	0,00E+00	0,00E+00	-4,34E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-9,09E+01
EEE	MJ	0,00E+00	0,00E+00	-2,52E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-5,28E+01

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

Results of the LCA: Environmental impact of 1 m ² window / balcony door (wood frame 30 kg)									
Parameter	Unit	A1	A2	A3	C1	C2	C3	C4	D
Core environmental impact indicators (EN 15804)									
ADP-f	MJ	1,24E+03	8,69E+01	2,93E+02	0,00E+00	1,32E+01	1,20E+01	2,31E+00	-6,48E+02
ADP-mm	kg Sb-equiv.	2,62E-03	1,40E-04	6,14E-04	0,00E+00	2,22E-05	2,42E-05	5,74E-07	1,36E-02
AP	mol H+ eqv.	8,16E-01	3,60E-02	1,43E-01	0,00E+00	5,09E-03	1,47E-02	7,41E-04	-2,18E-01
EP-fw	kg P eqv.	4,09E-03	7,39E-05	3,21E-04	0,00E+00	8,85E-06	4,06E-05	1,14E-06	-1,30E-03
EP-m	kg N eqv.	1,31E-01	1,18E-02	2,80E-02	0,00E+00	1,79E-03	5,35E-03	3,08E-04	-2,78E-02
EP-T	mol N eqv.	1,49E+00	1,30E-01	3,33E-01	0,00E+00	1,98E-02	6,12E-02	2,90E-03	-3,18E-01
GWP-b	kg CO2 eqv.	-4,95E+01	4,18E-03	6,93E+00	0,00E+00	4,05E-04	4,83E+01	2,66E+00	-5,81E-01
GWP-f	kg CO2 eqv.	1,13E+02	5,87E+00	2,03E+01	0,00E+00	8,77E-01	2,87E+00	8,54E-02	-4,14E+01
GWP-luluc	kg CO2 eqv.	4,81E-01	2,72E-03	1,56E-02	0,00E+00	3,21E-04	7,33E-04	2,66E-05	-5,72E-01
GWP-total	kg CO2 eqv.	6,42E+01	5,88E+00	2,73E+01	0,00E+00	8,78E-01	5,12E+01	2,75E+00	-4,25E+01
ODP	kg CFC 11 eqv.	7,57E-06	1,24E-06	2,94E-06	0,00E+00	1,94E-07	1,52E-07	3,33E-08	-5,88E-06
POCP	kg NMVOC eqv.	4,26E-01	3,83E-02	9,21E-02	0,00E+00	5,64E-03	1,62E-02	8,71E-04	-1,11E-01
WDP	m3 world eqv.	2,15E+01	3,42E-01	3,67E+00	0,00E+00	4,73E-02	2,58E-01	2,66E-02	3,68E-01
Additional environmental impact indicators (EN 15804)									
ETP-fw	CTUe	2,83E+03	8,54E+01	3,83E+02	0,00E+00	1,18E+01	6,94E+01	1,09E+02	-3,87E+02
HTP-c	CTUh	1,47E-07	4,63E-09	2,11E-08	0,00E+00	3,83E-10	1,16E-07	3,70E-11	-7,98E-08
HTP-nc	CTUh	2,57E-06	9,58E-08	2,50E-07	0,00E+00	1,29E-08	6,15E-08	1,13E-09	-7,94E-07
IR	kBq U235 eqv.	3,17E+00	3,66E-01	1,21E+00	0,00E+00	5,54E-02	4,74E-02	9,75E-03	-3,16E+00
PM	disease incidence	1,03E-05	5,35E-07	3,08E-06	0,00E+00	7,89E-08	1,39E-07	1,50E-08	-2,13E-06
SQP	Pt	8,20E+03	6,35E+01	7,29E+02	0,00E+00	1,15E+01	9,74E+00	5,05E+00	-1,38E+02
ADP-e =Depletion of abiotic resources-elements ADP-f =Depletion of abiotic resources-fossil fuels AP =Acidification of soil and water EP-fw =Eutrophication, freshwater EP-m =Eutrophication marine EP-T =Eutrophication, terrestrial GWP-b =Global warming potential – Biogenic GWP-f =Global warming potential – Fossil GWP-luluc =Global warming potential – Land use and land use change GWP-total =Global warming potential ODP =Ozone layer depletion POCP =Photochemical oxidants creation WDP =Water use ETP-fw =Ecotoxicity, freshwater HTP-c =Human toxicity, cancer HTP-nc =Human toxicity, non-cancer IR =Ionising radiation, human health PM =Particulate Matter SQP =Land use									

Results of the LCA: Resource use and environmental information of 1 m² window / balcony door (wood frame 30 kg)

Parameter	Unit	A1	A2	A3	C1	C2	C3	C4	D
PERE	MJ	7,95E+02	1,43E+00	1,59E+02	0,00E+00	1,66E-01	1,13E+00	4,61E-02	-2,01E+02
PERM	MJ	4,20E+02	0,00E+00	1,40E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	1,22E+03	1,43E+00	1,73E+02	0,00E+00	1,66E-01	1,13E+00	4,61E-02	-2,01E+02
PENRE	MJ	1,30E+03	9,22E+01	3,14E+02	0,00E+00	1,40E+01	1,28E+01	2,45E+00	-6,97E+02
PENRM	MJ	2,41E+01	0,00E+00	1,32E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	1,33E+03	9,22E+01	3,15E+02	0,00E+00	1,40E+01	1,28E+01	2,45E+00	-6,97E+02
SM	kg	6,23E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m ³	8,65E-01	1,21E-02	9,05E-02	0,00E+00	1,61E-03	2,12E-02	2,66E-03	-1,01E+00
HWD	kg	1,93E-02	6,65E-04	2,82E-03	0,00E+00	3,35E-05	2,18E-02	2,45E-06	2,70E-02
NHWD	kg	2,08E+01	4,48E+00	2,13E+00	0,00E+00	8,39E-01	7,36E-01	1,48E+01	-7,28E+00
RWD	kg	3,49E-03	5,64E-04	1,18E-03	0,00E+00	8,69E-05	5,24E-05	1,51E-05	-3,01E-03
CRU	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MFR	kg	0,00E+00	0,00E+00	1,24E-01	0,00E+00	0,00E+00	1,01E+01	0,00E+00	0,00E+00
MER	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EE	MJ	0,00E+00	0,00E+00	-6,86E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-2,11E+02
EET	MJ	0,00E+00	0,00E+00	-4,34E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,33E+02
EEE	MJ	0,00E+00	0,00E+00	-2,52E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-7,74E+01

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

5. LCA: Interpretation

The following figures show the influence of the different life stages for the IV Group wooden window and balcony door and wooden with aluminium cladding. As shown in Figure 10 to Figure 13, the most of the environmental impact is attributed to the raw material processing phase (A1), followed by the transportation of raw materials (A2) and the production (A3). Potential credits come mainly from the material recovery of aluminium and steel.

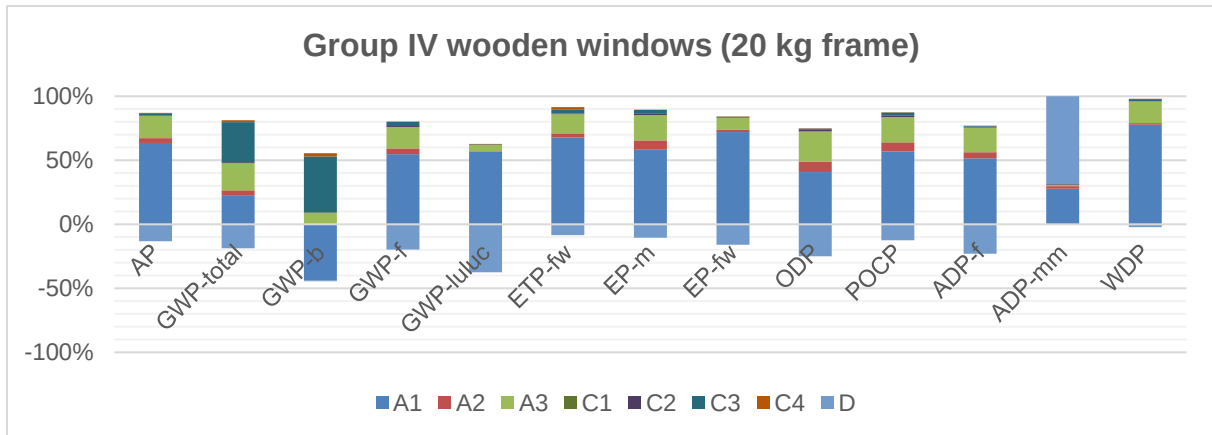


Figure 10: Influence of the modules A1 – A3, C1 – C4 and D on the analysed impact categories for IV wooden window and balcony door (20 kg frame)

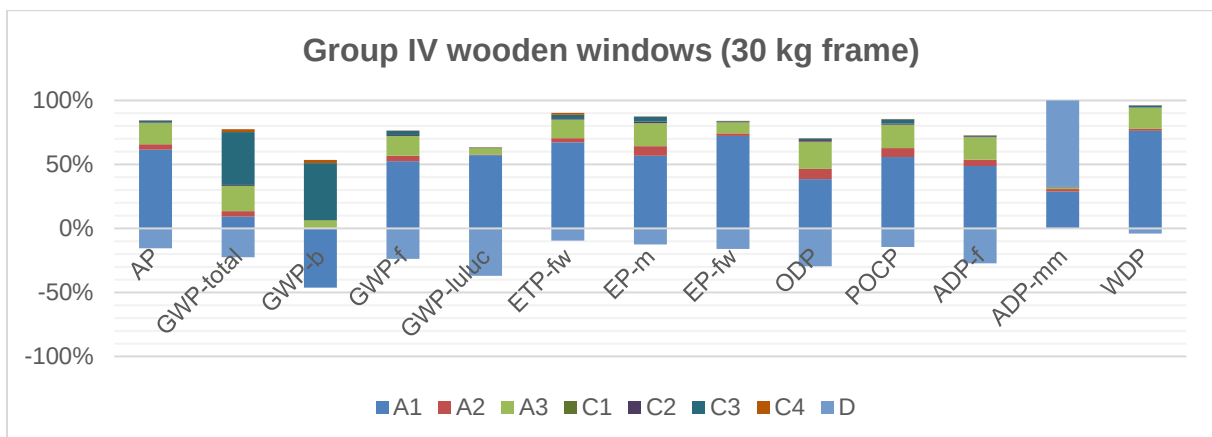


Figure 11: Influence of the modules A1 – A3, C1 – C4 and D on the analysed impact categories for IV wooden window and balcony door (30 kg frame)

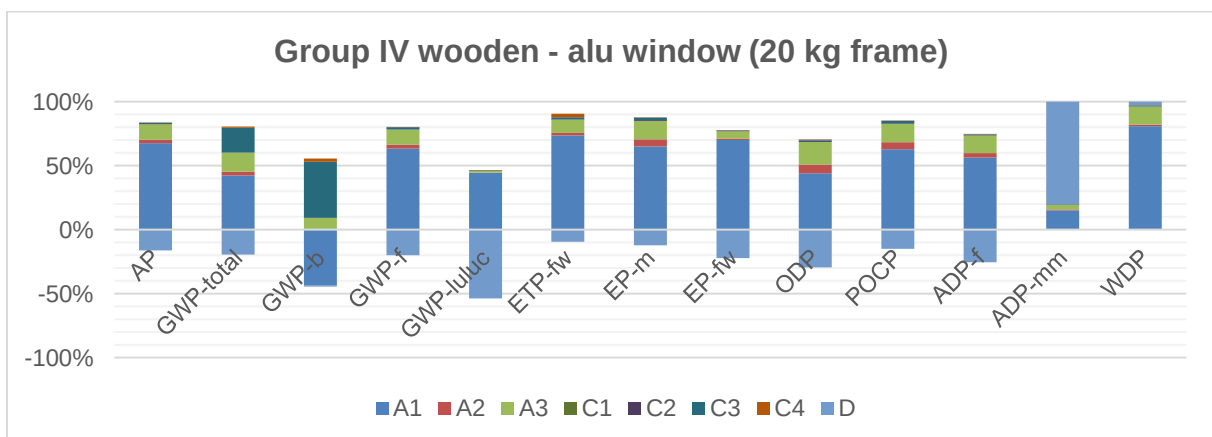


Figure 12: Influence of the modules A1 – A3, C1 – C4 and D on the analysed impact categories for IV wooden – alu window and balcony door (20 kg frame)

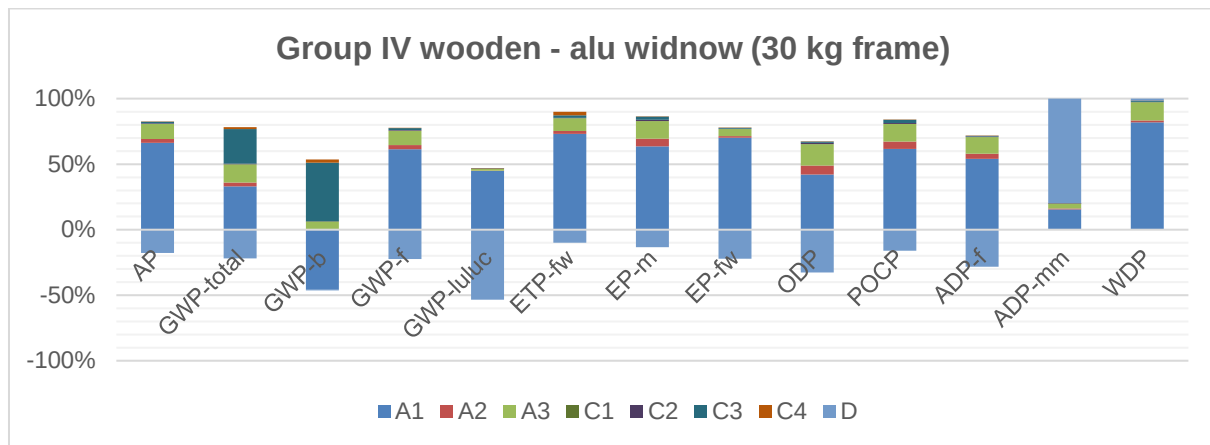


Figure 13: Influence of the modules A1 – A3, C1 – C4 and D on the analysed impact categories for IV wooden – alu window and balcony door (30 kg frame)

Overall, the quality of the data can be considered as good overall. The primary data collection has been done thoroughly. Data quality was calculated using the Data Quality level and criteria according to the PEF approach (Annex E.2 of EN15804+A2). The DQRs range from 1,67 to 2,67 for the most abundant inputs in terms of mass.

6. Additional information: Norwegian requirements

Greenhouse gas emissions from the use of electricity mix in the manufacturing phase

Data source	Amount	Unit
Ecoinvent 3.6 (year 2019)	0,526	CO2-eqv/kWh

Dangerous substances disclaimer

- ☐ The product contains no substances given by the REACH Candidate list or the Norwegian priority list
- ☒ The product contains substances given by the REACH Candidate list or the Norwegian priority list that are less than 0,1 % by weight.
- ☐ The product contain dangerous substances, more then 0,1% by weight, given by the REACH Candidate List or the Norwegian Priority list, see table.
- ☐ The product contains no substances given by the REACH Candidate list or the Norwegian priority list. The product is classified as hazardous waste (Avfallsforsikten, Annex III), see table.

Indoor environment

The EPD does not give information on release of dangerous substances to indoor air because the horizontal standards on measurement of release of regulated dangerous substances from construction products using harmonised test methods according to the provisions of the respective technical committees for European product standards are not available.

The product contains no dangerous substances on the REACH Candidate list or the Norwegian priority list, and a water-based release agent is used. Based on this it is assumed that the product has a negligible impact on the indoor environment.

Soil and water

The EPD does not give information on release of dangerous substances to soil and water because the horizontal standards on measurement of release of regulated dangerous substances from construction products using harmonised test methods according to the provisions of the respective technical committees for European product standards are not available.

Carbon footprint

Carbon footprint has not been worked out for the product.

7. References

CML-IA, 2013: Characterisation factors developed by Institute of Environmental Sciences (CML): University Leiden (NL) – <http://www.cml.leiden.edu/software/data-cmlia.html>

Ecoinvent Database Version 3.6 (2019)

European Commission Joint Research Centre Institute for Prospective Technological Studies (JCR), Seville, 2014: End-of-waste criteria for waste plastic for conversion

NIBE, 2022: R<THiNK Online-EPD-Tool

Norwegian EPD foundation, Oslo, 2021: NPCR Part A Construction products and services, Version 2.0

Norwegian EPD foundation, Oslo, 2021: NPCR 014 Part B for Windows and doors (references to EN 15804+A2)

Kiwa-Ecobility Experts, Berlin, 2022: PCR A – General Program Category Rules for Construction Products from the EPD programme of Kiwa-Ecobility Experts; Version 2.1

REACH Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) <https://echa.europa.eu/candidate-list-table>

Stichting Bouwkwaliiteit (SBK), Rijswijk, 2019: Assessment Method – Environmental Performance Construction and Civil Engineering Works (GWW), , Version "3.0 January 2019" incl. amendments July 2019, Jan 2020

Stichting National Environmental Database (NMD), Rijswijk 2022: Environmental Performance Assessment Method for Construction Works, Version 1.1.

Stichting National Environmental Database (NMD), Rijswijk, 2019: verification protocol - inclusion data in the Dutch environmental database

United Nations, New York, 2015 - Central Product Classification (CPC) Version 2.1

Standards

EN 15804:2014 (+A1), Sustainability of construction works – Environmental Product Declarations – Core rules for the product category of construction products

EN 15804:2020 (+A2), Sustainability of construction works – Environmental product declarations - Core rules for ,the product category of construction products

EN 16449:2014, Wood and wood-based products – Calculation of the biogenic carbon content of wood and conversion to carbon dioxide

EN 17213:2020, Windows and doors – Environmental Product Declarations – Product category rules for windows and pedestrian doorsets

ISO 14025:2006, Environmental labels and declarations – Type III environmental declarations – Principles and procedures

ISO 14040:2006, Environmental management – Life cycle assessment – Principles and framework

ISO 14044:2006, Environmental management – Life cycle assessment – Requirements and guidelines

ISO 21930:2007, Sustainability in building construction – Environmental declaration of building products

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