ENVIRONMENTAL PRODUCT DECLARATION

no. 01-06/2025

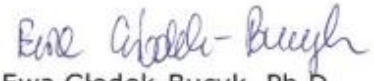
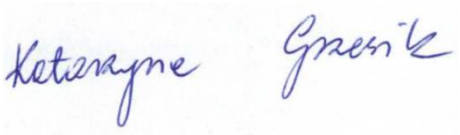
Aluminium clad-plastic roof windows

FAKRO PP Sp. z o.o

Owner of the declaration:	*FAKRO PP Sp. z o.o.*
Programm owner:	*Łukasiewicz Research Network– Institute of Ceramics and Building Materials*
Program name:	*Environmental product declaration*
Data of issue:	***10.06.2025***
Declaration valid until:	***10.06.2030***

ENVIERONMENTAL PRODUCT DECLARATION no. 01-06/2025

1. GENERAL INFORMATION

Product of declaration:	Aluminium clad-plastic roof windows: • double glazed, • triple glazed
Program owner: Łukasiewicz Research Network– Institute of Ceramics and Building Materials Environmental Engineering Center in Opole. **http://www.icimb.pl/opole/**	**Declaration owner:** FAKRO PP Sp. z o.o. ul. Węgierska 144a 33-300 Nowy Sącz Telefon: +48 18 444-0-444 Fax: +48 18 444-0-333 Adres: e-mail: fakro@fakro.pl **https:/www.fakro.pl/**
Declared unit:	1 m^2
Date of issue:	10.06.2025
Declaration valid until:	10.06.20230
Life Cycle Analysis (LCA):	A1-A3, C1-C4 and D according to PN-EN 15804+A2 (Cradle-to-Gate with options)
Product Categorization (PCR) Rules	PN-EN 15804+A2:2020-03 Sustainability of construction works. Environmental Product Declarations. Basic principles of categorization of construction products, ICIMB-PCR A.
Representatives:	Polish product, year 2024
Declared durability:	40 years
Reasons for performing LCA:	B2B
Standard of product	EN 14351-1:2006+A2:2016
Declarations that are the result of different programs or are not performed in accordance with the standard may not be comparable.	
The Łukasiewicz – Institute of Ceramics and Building Materials Environmental Engineering Center provides access to the Type III environmental declaration for aluminium clad-plastic roof windows to interested parties.	
The declaration owner is responsible for the information and the base evidence. Łukasiewicz Research Network - Institute of Ceramics and Building Materials Center for Environmental Engineering is not responsible for the manufacturer's information and data and evidence regarding the life cycle assessment.	
Authors' team: Katarzyna Kiprian, M.Sc. Ewa Głodek-Bucyk, Ph.D. Patryk Okoń, M.Sc. **Approved:**  Joanna Poluszyńska, PhD Director of the Environmental Engineering Center  Ewa Głodek-Bucyk, Ph.D. Leader of the Process Engineering Research Group	**Review:** CEN standard PN-EN 15804+A2 serves as the main PCR document. Independent verification of declarations and data according to EN ISO 14025:2010 ☐ Internal ☒ External  Katarzyna Grzesik, PhD, DSc

2. MANUFACTURER AND PRODUCT INFORMATION

FAKRO Group is an international company operating in the construction industry since 1991. The FAKRO Group, employing over 4,000 people, consists of 11 production companies and 17 distribution companies. The product range of FAKRO includes primarily:

- Wooden and aluminium clad-plastic roof windows in various designs and with different opening systems. In addition to roof windows, the product portfolio also includes flat roof windows,
- Flashings, electric control systems, loft ladders, access roof windows, light tunnels, smoke ventilation systems,,
- Accessories for roof windows: venetian blinds, curtains, internal and external roller shutters, external awnings, installation accessories, films and membranes.

The company's headquarters is located in Nowy Sącz, where FAKRO has more than 230,000 m² of production, warehouse, and office space.
The environmental impact of purchased products is becoming increasingly important for both consumers and manufacturers. For this reason, the production process at FAKRO undergoes numerous assessments, confirmed by the many certificates awarded to FAKRO.

Aluminium clad-plastic GREENVIEW windows are a new generation of FAKRO windows constructed of multi-chamber PVC profiles, strengthened from the inside with galvanised steel. They provide very good interior lighting, ventilation of the room and contact with the outside environment.

As standard, these windows are equipped with the topSafe system, thermoPro technology and a sash guiding system. Available in white or in golden oak, pine and anthracite veneers.

- The **PTP-V, PTP-X** is a pivot window allowing the sash to be rotated through 180° and left in any position. The PTP-V window comes with an automatic air inlet, while PTP-X model does not. The pivot function allows the outer surface of the pane to be safely cleaned thanks to the use of a locking bolt

- The **PPP-V MAX, PPP-X MAX** is a top hung and pivot window with two separate sash opening functions: top hung and pivot. The first one allows the sash to be left in any position from 0° to 45°, while the pivot function enables the sash to be rotated through 180°. The PPP-V MAX window is equipped with an automatic air inlet, while the PPP-X MAX model does not.

- The **PWP** is an insulated window combining a roof window and an access roof light. This solution enables simultaneous illumination of rooms and comfortable and safe access to the roof. The window is side-hung and therefore side-opening. Once unlocked, the sash can be opened up to 90°.

- The **PLP, PRP, PVP** L-shaped combination window is intended for installation in a vertical wall within the loft space to extend the roof window into the wall. It can be combined with roof windows of any design. The window can be tilt and turn opened to left (PLP), tilt and turn opened to right (PRP) or tilt (PVP). The tilt is approximately 11 cm and the opening is up to 90°.

- The **PXP** is a non-opening window installed exclusively under a standard roof window. It is designed for vertical combinations, providing an additional element increasing the field of view and ingress of natural light into the room.

- The **PNP-V, PNP-X** is a non-opening window installed as a regular/separate window in the roof slope. It offers very good interior lighting and contact with the outside environment.

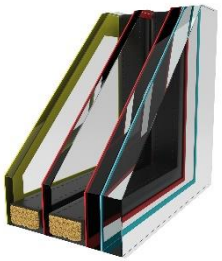
Windows are equipped with double and triple glazed units, while their different configurations are included in the EPD.

Double-glazed units may have the following structure:

- 4-17-4 m.in. U30
- 4-15-33.2 m.in. P20, G20

Triple-glazed units may have the following struct

- 4-15-4-15-33.2 m.in. P50, L41
- 8-14-4-12-33.2 m.in. R50
- 4-16-4-16-4 m.in. U41, U55, U50
- 4-15-4-15-6 m.in. U46



PTP-V pivot windows with the double-glazed U30 unit and the triple-glazed P50 unit were chosen as representative models.

MATERIAL	PTP-V U30	PTP-V P50
PLASTIC	32%	27%
GLASS	31%	43%
METAL	30%	24%
OTHER	7%	6%

The performance characteristics of the windows are specified in the Declarations of Performance, which can be downloaded from the company's website.
The production process of aluminium clad-plastic roof windows begins in the raw materials warehouse, where all necessary materials for the final product are stored. Materials taken for further production include, among others, PVC profiles, steel profiles, glass sheets, and metal coils.
The first stage of actual production is profile processing. PVC and steel profiles are taken from the warehouse and undergo appropriate preparation operations. This includes cutting, drilling, and other tasks aimed at preparing components for further assembly. At the same time, the glass production process takes place. Glass sheets are retrieved from the warehouse and cut to the required dimensions. The glass is then ground, tempered in a furnace to increase strength, and finally assembled into insulating glass units, which will be installed in the finished windows.
Another important stage is the production of flashings. Metal coils are taken from the warehouse, cut into strips, and stamped into finished flashing elements, which serve to finish and protect the window structure.
In parallel, identification and operational materials are prepared. This includes the creation of labels, user manuals, packaging, and marketing materials that will be included with the finished product.
The central stage of the entire process is window assembly. At this point, the frame and sash are fitted with hinges, locking components, and handles. The sash is joined with the frame, followed by the installation of the insulating glass unit and the flashing elements. The finished window is carefully packaged to protect it from damage during transport.
The final stage of the production process is the transfer of the finished window to the finished goods warehouse, where the product awaits shipment to the customer or further distribution.
The production of loft ladders with wooden steps is carried out according to a defined process (see Fig. 1).

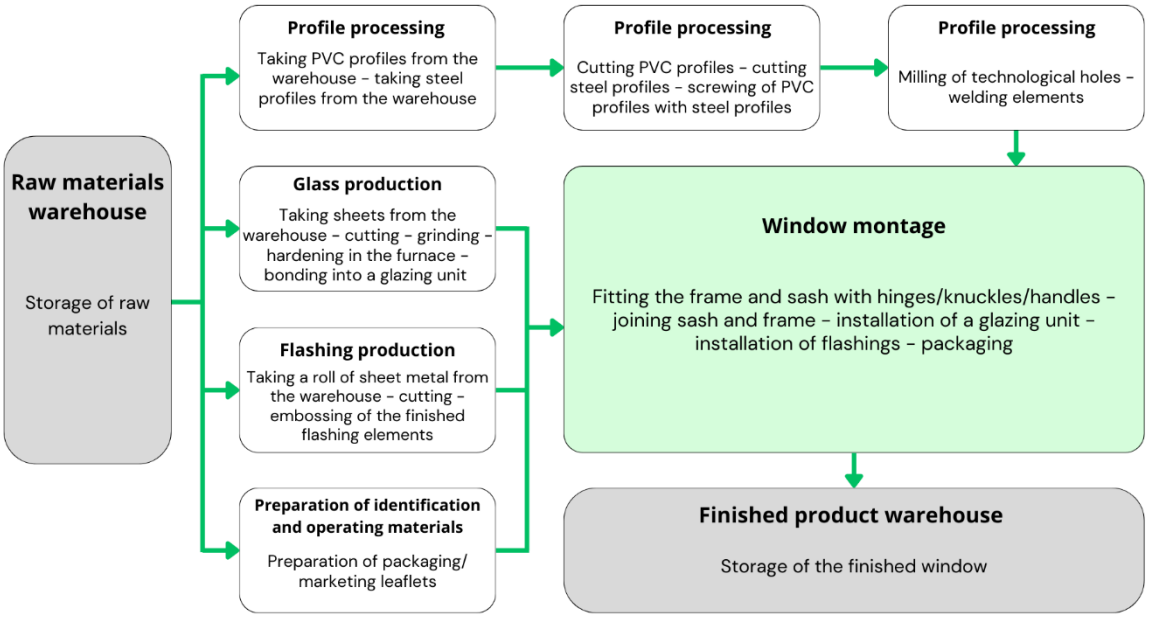


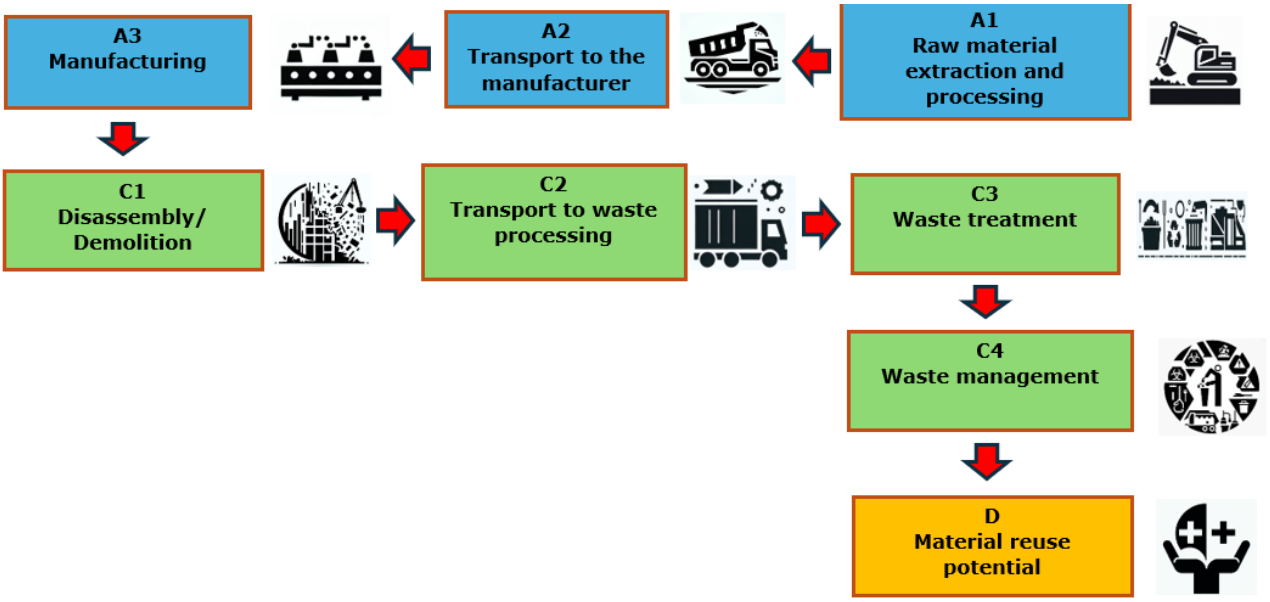
Figure 1. Production diagram of aluminium clad-plastic roof windows manufactured by Fakro PP Sp. z o.o.

3. LCA: CALCULATION RULES

The environmental declaration is based on average data provided by the owner of the declaration, Fakro PP Sp. z o.o. divided into groups of aluminum clad-plastic roof windows with a double-glazed unit and for the group of aluminum clad-plastic roof windows with a triple-glazed unit; for one production plant located in Nowy Sącz, ul. Węgierska 144a. Average values were determined separately for the two product groups.

System limitations

The life cycle analysis of the tested products includes modules A1-A3, C1-C4 and D (Cradle to Gate whit options) in accordance PN-EN 15804.



Data colleration period

Data on the production process were provided in 2025 for the period 01.01.2024 - 31.12.2024 (12 months) and correspond to the production technology of the time. These are average values, determined separately for both product groups based on the share of the products covered by the declaration in the total production at the plant.

Declared unit

1 m²

Assumptions

A1 – extraction and consumption of raw materials refers to specific mass shares in the production process, per unit declared of the product.
A2 – distances from the place of obtaining raw materials to the production plant individual for each raw material, means of transport differentiated due to the method of delivery of raw materials,
A3 – CO_2, NO_x, SO_2, and particulate emissions from the production process were provided by the manufacturer.
C1 – Describes the handling of aluminium clad-plastic roof windows during dismantling/demolition. Calculations are based on the developed scenario.
C2 – Refers to the transport of waste from the construction site to the recovery or disposal facility. Calculations are based on the developed scenario.
C3 – Takes into account the environmental impact during the processing of demolition waste containing elements of aluminium

clad-plastic roof windows at the waste recovery plant. Calculations are based on the developed scenario.
C4 – Accounts for the environmental impact of landfilling and recycling aluminium clad-plastic roof window components. Calculations are based on the developed scenario.
D – Refers to the impact and benefits of using secondary materials. Calculations are based on the developed scenario.

Cut-off criteria

99% of all bulk streams involved in the production process were taken into account. All the energy used in the process was taken into account in the environmental declaration.

General data

The data for the calculations come from Ecoinvent v. 3.10 and have been supplemented with KOBiZE *CO_2, SO_2, NO_x, CO and total particulate matter emission factors for electricity, December 2024.*
Emission factors for electricity were determined using the actual KOBiZE data. The Polish electricity emission factor used (Ecoinvent supplemented with current national data from KOBiZE) is 0.597 kg CO_2/kWh. A detailed analysis of data quality was part of an external audit.

Allocation

All data on components manufactured at the plant were provided by the owner of the declaration, Fakro PP Sp. z o.o i and were referred to the declared unit of the product – 1 m^2. The allocation rules used in this EPD are based on the general ICIMB-PCR A principles.

4. LCA: SCENARIOS AND ADDITTIONAL TECHNICAL INFORMATION

The life cycle assessment was developed in accordance with the requirements of the standards PN-EN ISO 15804+A2:2020, PN-EN ISO 14025, and PN-EN ISO 14040. The product category rules were adopted in accordance with the PN-EN 15804 standard.

For the purpose of the life cycle analysis of the products covered by the environmental declaration within the scope of "cradle to gate with options," scenarios were developed for modules C1–C4 and D:

Module C1 - Demolition/Demolition – Manual deconstruction was assumed. Due to negligible values, energy and material consumption in this module were omitted. The module value is zero.

Module C2 – Transport- Waste is transported to a processing facility, where recyclable fractions, fractions intended for incineration, and fractions destined for landfill are separated and directed to appropriate further processes.

- Transport is carried out using trucks with a load capacity of 16–32 tons, compliant with EURO 6 emission standards.
- Transport distance is 100 km from the demolition site. The truck is fully loaded in both directions.

Module C3 - **Waste treatment** – It is assumed that all waste goes to a waste processing facility, where it is sorted. Electricity consumption per 1 kg of waste is 0.03 kWh/kg, and fuel consumption is 0.315 MJ/kg. The following processes were assumed for the calculations: unloading (loader), crushing (crusher). Benefits from the use of secondary materials are accounted for in Module D.

Module C4 – Waste management - It is assumed that the waste which cannot be further utilized is sent to a landfill. These are wastes separated during the processing phase (Module C3).

Module D - **Material reuse potential** – This module includes the benefits resulting from the reuse of waste generated during the processing of roof windows in Module C3. Glass and metal recycling, as well as energy (heat) generated from the incineration of plastic waste in a thermal waste treatment plant, were taken into account.

5. LCA: RESULTS

The table below shows the LCA modules taken into account in the calculation of the environmental impact categories for the products covered by the declaration.

SYSTEM BOUNDARIES (X –MODULE INCLUDED IN LCA, MND – MODULE NOT DECLARED)																
Products stage			**Construction process stage**		**Use stage**							**End-of-life stage**				**Benefits and loads beyond the system boundary**
Raw material supply	Transport	Production	Transport	Construction process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction	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**

The following tables present the results of the LCA analysis for aluminium clad-plastic roof windows with double and triple glazing. The abbreviations used to describe the impact categories are explained below:

GWP-total	Global warming potential
GWP-fossil	Global warming potential fossil fuel
GWP-biogenic	Global warming potential biogenic
GWP-luluc	Global warming potential land use and land change
ODP	Depletion potential of the stratospheric ozone layer
AP	Acidification potential of land and water
EP-freshwater	Eutrophication potential, fraction of nutrients reaching freshwater end compartment
EP-marine	Eutrophication potential, fraction of nutrients reaching marine end compartment
EP-terrestial	Eutrophication potential, Accumulated Exceedance
POCP	Formation potential of tropospheric ozone photochemical oxidants
ADP-minerals&metals	Abiotic depletion potential for nonfossil resources
ADP-fossil	Abiotic depletion potential for fossil resources
WDP	Water (user) deprivation potential
PM	Potential incidence of disease due to PM emissions
IRP	Potential Human exposure efficiency relative to U235
ETP-fw	Potential comparative Toxic Unit for ecosystems
HTP-c	Potential comparative Toxic Unit for humans (cancerogenic)
HTP-nc	Potential comparative Toxic Unit for humans (non-cancerogenic)
SQP	Potential soil quality index
PERE	Use of renewable primary energy excluding renewable primary energy resources used as raw materials
PERM	Use of renewable primary energy resources used as raw materials
PERT	Total use of renewable primary energy resources
PEN-RE	Use of non-renewable primary energy resources excluding non-renewable primary energy resources used as raw materials
RE	Use of non-renewable primary energy resources used as raw materials
PENRT	Total use of non-renewable primary energy resources

SM	Use of secondary material
RSF	Use of renewable fuels
NRSF	Use of non-renewable secondary fuels
FW	Use of net fresh water

MAIN IMPACT INDICATORS: 1 m² aluminium clad-plastic roof windows with double-glazed units. (78x118 cm)									
	Etap Cyklu Życia								
Indicator	**Unit**	**A1**	**A2**	**A3**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-total	kg CO_2 eq.	8,81E+01	2,75E+00	2,52E+00	0,00E+00	7,09E-01	1,22E+00	1,38E-02	-7,31E+00
GWP-fossil	kg CO_2 eq.	8,97E+01	2,75E+00	8,31E+00	0,00E+00	7,09E-01	1,22E+00	1,37E-02	-7,28E+00
GWP-biogenic	kg CO_2 eq.	-1,67E+00	1,79E-03	-5,83E+00	0,00E+00	4,91E-04	1,79E-03	3,64E-05	-2,59E-02
GWP-luluc	kg CO_2 eq.	9,05E-02	9,23E-04	3,27E-02	0,00E+00	2,35E-04	7,65E-04	1,43E-06	-6,80E-03
ODP	kg CFC11 eq.	1,11E-05	5,47E-08	1,21E-07	0,00E+00	1,41E-08	1,19E-08	2,12E-10	-5,71E-08
AP	mol H+ eq.	4,68E-01	5,59E-03	2,98E-02	0,00E+00	1,48E-03	8,63E-03	1,22E-04	-3,16E-02
EP-freshwater	kg PO_4 eq.	3,59E-02	1,90E-04	2,21E-03	0,00E+00	4,80E-05	5,93E-04	4,05E-07	-4,07E-03
EP-marine	kg N eq.	8,77E-02	1,31E-03	1,06E-02	0,00E+00	3,55E-04	3,41E-03	5,62E-05	-6,01E-03
EP-terrestrial	mol N eq.	9,36E-01	1,42E-02	9,24E-02	0,00E+00	3,83E-03	3,62E-02	6,15E-04	-5,89E-02
POCP	kg NMVOC eq.	3,65E-01	9,26E-03	2,84E-02	0,00E+00	2,45E-03	1,07E-02	1,84E-04	-1,88E-02
ADP-minerals & metals	kg Sb eq.	2,49E-03	9,43E-06	1,80E-05	0,00E+00	2,31E-06	9,39E-07	5,62E-09	-2,79E-05
ADP-fossil	MJ	1,62E+03	3,85E+01	6,78E+01	0,00E+00	9,97E+00	1,48E+01	1,80E-01	-7,66E+01
WDP	WDP (m^3) świat. ekw	5,57E+01	1,56E-01	1,31E+00	0,00E+00	4,14E-02	4,56E-02	3,88E-04	-8,53E-01

ADDITIONAL IMPACT INDICATORS: 1 m² aluminium clad-plastic roof windows with double-glazed units. (78x118 cm)									
	Etap Cyklu Życia								
Indicator	**Unit**	**A1**	**A2**	**A3**	**C1**	**C2**	**C3**	**C4**	**D**
PM	Disease incidency	8,13E-03	3,05E-04	6,32E-04	0,00E+00	8,77E-05	3,19E-04	5,90E-06	-4,38E-04
IRP	kBq U235 eq.	1,25E+01	5,71E-02	4,40E-01	0,00E+00	1,29E-02	8,87E-03	9,90E-05	-1,78E-01
ETP-fw	CTUe	2,23E-02	1,18E-04	1,38E-03	0,00E+00	2,99E-05	3,69E-04	2,52E-07	-2,53E-03
HTP-c	CTUh	5,70E-06	1,88E-08	1,01E-07	0,00E+00	5,03E-09	3,33E-09	5,29E-11	-1,98E-08
HTP-nc	CTUh	1,25E-06	2,33E-08	6,72E-08	0,00E+00	6,26E-09	7,30E-09	2,42E-11	-9,49E-08
SQP	-	6,15E+02	2,08E+01	6,20E+02	0,00E+00	6,02E+00	2,04E+00	2,21E-01	-1,64E+01

INDICATORS DESCRIBTIONS RESOURCE CONSUMPTION: 1 m² aluminium clad-plastic roof windows with double-glazed units. (78x118 cm)

	Etap Cyklu Życia								
Indicator	**Unit**	**A1**	**A2**	**A3**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	2,00E+02	7,36E-01	1,19E+02	0,00E+00	1,71E-01	7,83E-01	5,35E-03	-4,44E+00
PERM	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
PERT	MJ	2,00E+02	7,36E-01	1,19E+02	0,00E+00	1,71E-01	7,83E-01	5,35E-03	-4,44E+00
PEN-RE	MJ	1,73E+03	4,10E+01	7,30E+01	0,00E+00	1,06E+01	1,57E+01	1,91E-01	-8,16E+01
RE	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
PENRT	MJ	1,73E+03	4,10E+01	7,30E+01	0,00E+00	1,06E+01	1,57E+01	1,91E-01	-8,16E+01
SM	kg	0,00E+00	0,00E+00	1,47E+01	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	2,51E+00	8,81E-03	1,57E-01	0,00E+00	1,81E-03	9,04E-03	7,28E-06	-2,11E-02

INDICATORS DESCRIBING OUTPUT STREAMS AND WASTE: 1 m² aluminium clad-plastic roof windows with double-glazed units. (78x118 cm)

	Etap Cyklu Życia								
Wskaźnik	**Jednostka (odniesiona do DU)**	**A1**	**A2**	**A3**	**C1**	**C2**	**C3**	**C4**	**D**
Ilość odpadów niebezpiecznych	kg	WN	WN	1,17E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Ilość odpadów innych niż niebezpieczne	kg	WN	WN	1,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Ilość odpadów radioaktywnych	kg	WN	WN	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Komponenty do ponownego użycia	kg	WN	WN	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materiały do recyklingu	kg	WN	WN	1,47E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materiały do odzysku energii	kg	WN	WN	7,11E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Wyeksportowana energia	MJ/energy carrier	WN	WN	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,63E+01

CARBON BIOGENIC	
Contents organic carbon in product (kg C_{org})	**0,00E+00**
Contents organic carbon in packaging (kg C_{org})	**1,43E+00**

FAKRO

ENVIERONMENTAL PRODUCT DECLARATION no. 01-06/2025

Łukasiewicz Institute of Ceramics and Building Materials

MAIN IMPACT INDICATORS: 1 m² aluminium clad-plastic roof windows with triple-glazed units. (78x118 cm)

	Life Cycle Stage							
Indicator	**Unit**	**A1**	**A2**	**A3**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-total	kg CO_2 eq.	9,76E+01	3,03E+00	2,52E+00	0,00E+00	9,50E-01	1,82E+00	2,26E-02	-8,66E+00
GWP-fossil	kg CO_2 eq.	9,91E+01	3,03E+00	8,31E+00	0,00E+00	9,49E-01	1,81E+00	2,25E-02	-8,35E+00
GWP-biogenic	kg CO_2 eq.	-1,61E+00	1,97E-03	-5,83E+00	0,00E+00	6,57E-04	2,67E-03	5,97E-05	-3,08E-01
GWP-luluc	kg CO_2 eq.	9,30E-02	1,02E-03	3,27E-02	0,00E+00	3,15E-04	1,14E-03	2,35E-06	-7,59E-03
ODP	kg CFC11 eq.	1,13E-05	6,02E-08	1,21E-07	0,00E+00	1,89E-08	1,77E-08	3,48E-10	-6,51E-08
AP	mol H+ eq.	5,61E-01	6,15E-03	2,98E-02	0,00E+00	1,98E-03	1,28E-02	2,00E-04	-3,59E-02
EP-freshwater	kg PO_4 eq.	3,69E-02	2,09E-04	2,22E-03	0,00E+00	6,43E-05	8,83E-04	6,66E-07	-4,53E-03
EP-marine	kg N eq.	1,03E-01	1,45E-03	1,06E-02	0,00E+00	4,75E-04	5,08E-03	9,23E-05	-6,94E-03
EP-terrestrial	mol N eq.	1,12E+00	1,56E-02	9,24E-02	0,00E+00	5,12E-03	5,39E-02	1,01E-03	-6,84E-02
POCP	kg NMVOC eq.	4,16E-01	1,02E-02	2,84E-02	0,00E+00	3,29E-03	1,60E-02	3,02E-04	-2,17E-02
ADP-minerals & metals	kg Sb eq.	2,55E-03	1,04E-05	1,80E-05	0,00E+00	3,09E-06	1,40E-06	9,23E-09	-3,47E-05
ADP-fossil	MJ	1,72E+03	4,24E+01	6,78E+01	0,00E+00	1,33E+01	2,20E+01	2,95E-01	-8,65E+01
WDP	WDP (m^3) świat. ekw	5,79E+01	1,72E-01	1,31E+00	0,00E+00	5,54E-02	6,80E-02	6,38E-04	-9,66E-01

ADDITIONAL IMPACT INDICATORS: 1 m² aluminium clad-plastic roof windows with triple-glazed units. (78x118 cm)

	Life Cycle Stage							
Indicator	**Unit**	**A1**	**A2**	**A3**	**C1**	**C2**	**C3**	**C4**	**D**
PM	Disease incidency	4,84E-03	2,23E-04	5,67E-03	0,00E+00	1,17E-04	4,75E-04	9,69E-06	-5,12E-04
IRP	kBq U235 eq.	1,29E+01	6,28E-02	4,40E-01	0,00E+00	1,73E-02	1,32E-02	1,63E-04	-2,25E-01
ETP-fw	CTUe	1,56E-02	5,59E-04	8,31E-03	0,00E+00	4,00E-05	5,49E-04	4,14E-07	-2,82E-03
HTP-c	CTUh	5,72E-06	2,07E-08	1,01E-07	0,00E+00	6,74E-09	4,96E-09	8,69E-11	-2,46E-08
HTP-nc	CTUh	1,29E-06	2,57E-08	6,72E-08	0,00E+00	8,38E-09	1,09E-08	3,98E-11	-1,10E-07
SQP	-	6,45E+02	2,29E+01	6,20E+02	0,00E+00	8,06E+00	3,04E+00	3,63E-01	-2,70E+01

INDICATORS DESCRIBTIONS RESOURCE CONSUMPTION: 1 m² aluminium clad-plastic roof windows with triple-glazed units. (78x118 cm)

	Life Cycle Stage							
Indicator	**Unit**	**A1**	**A2**	**A3**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	2,05E+02	8,10E-01	1,19E+02	0,00E+00	2,29E-01	1,17E+00	8,78E-03	-5,69E+00
PERM	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
PERT	MJ	2,05E+02	8,10E-01	1,19E+02	0,00E+00	2,29E-01	1,17E+00	8,78E-03	-5,69E+00
PEN-RE	MJ	1,84E+03	4,51E+01	7,30E+01	0,00E+00	1,42E+01	2,34E+01	3,13E-01	-9,21E+01
RE	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
PENRT	MJ	1,84E+03	4,51E+01	7,30E+01	0,00E+00	1,42E+01	2,34E+01	3,13E-01	-9,21E+01
SM	kg	0,00E+00	0,00E+00	1,47E+01	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	2,58E+00	9,70E-03	1,57E-01	0,00E+00	2,43E-03	1,35E-02	1,19E-05	-2,36E-02

INDICATORS DESCRIBING OUTPUT STREAMS AND WASTE: 1 m² aluminium clad-plastic roof windows with triple-glazed units. (78x118 cm)									
	Life Cycle Stage								
Indicator	**Unit (expressed per DU)**	**A1**	**A2**	**A3**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste	kg	WN	WN	1,17E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Non-hazardous waste	kg	WN	WN	1,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Radioactive waste	kg	WN	WN	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Components for re-use	kg	WN	WN	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	WN	WN	1,47E+01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for energy recovery	kg	WN	WN	7,11E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy	MJ/energy carrier	WN	WN	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,63E+01

BIOGENIC CARBON	
Contents organic carbon in product (kg C_{org})	**0,00E+00**
Contents organic carbon in packaging (kg C_{org})	**1,43E+00**

6. INTERPRETATION OF LCA

Figures 4 and 5 present diagrams of the shares of individual life cycle modules on the basic impact categories for aluminium clad-plastic roof windows with double-glazed and triple-glazed units.

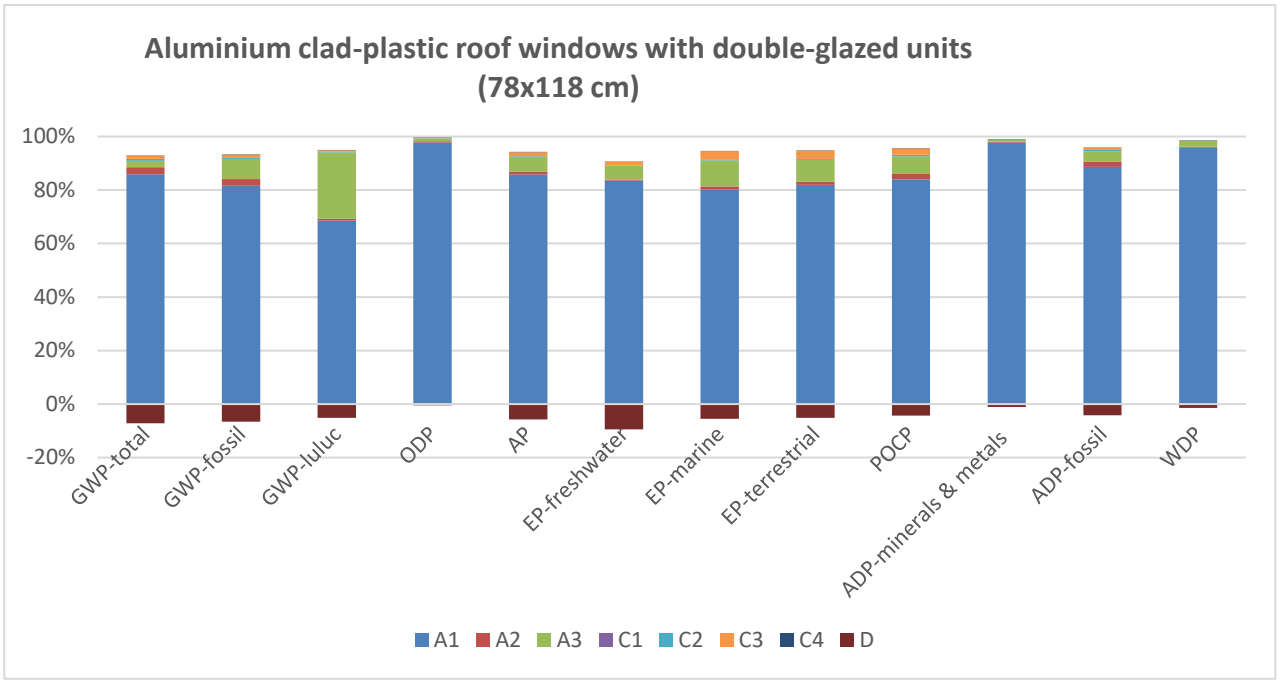


Figure 3 Shares of life cycle modules in the main categories of impacts – aluminium clad-plastic roof windows with double-glazed units

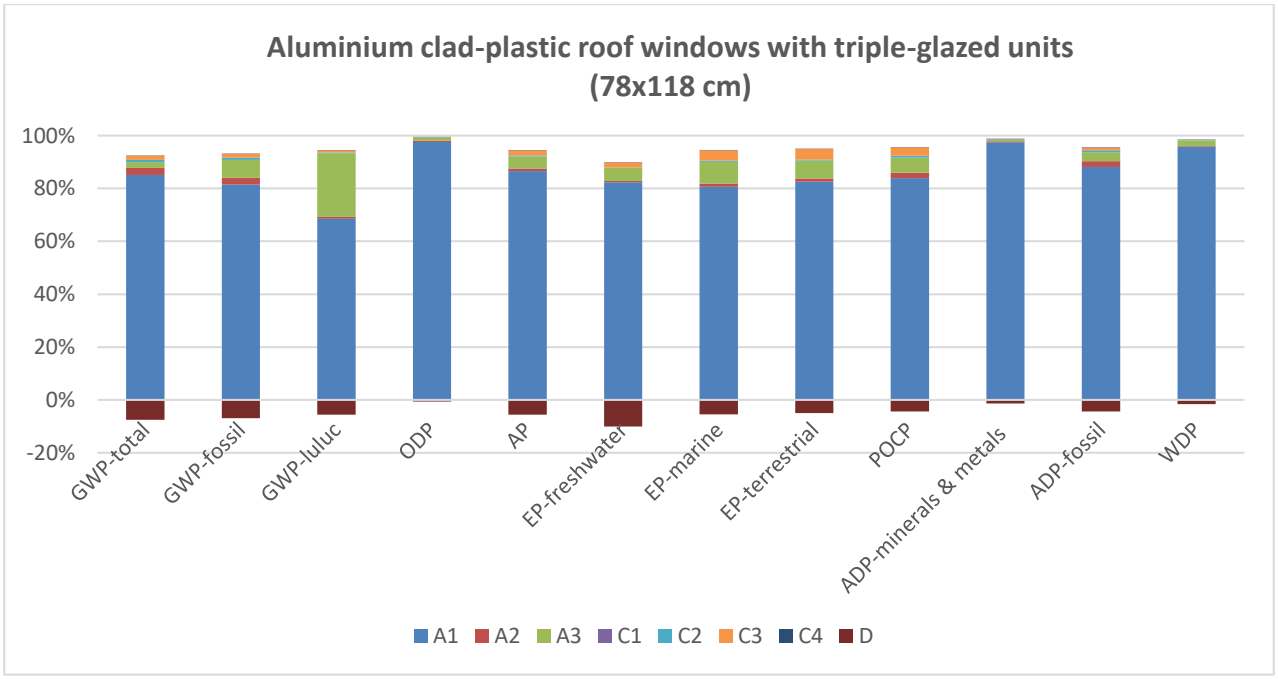


Figure 4 Shares of life cycle modules in the main categories of impacts – aluminium clad-plastic roof windows with triple-glazed units.

LITERATURE

- ✓ ICIMB-PCR A. General Product Category Rules for Construction Products.
- ✓ PN-EN 15804+A2:2020, Sustainability of building structures -- Environmental product declarations -Basic principles of categorization of construction products.
- ✓ PN-EN ISO 14025:2014-04, Environmental labels and declarations -- Type III environmental declarations -- Rules and procedures.
- ✓ PN-EN ISO 14040:2009 Environmental management. Life Cycle Assessment. Principles and structure.
- ✓ PN-EN ISO 14044:2009, Environmental management. Life Cycle Assessment. Requirements and guidelines.
- ✓ ISO 21930:2017 – Sustainability in buildings and civil engineering works — Core rules for environmental product declarations of construction products.
- ✓ PN-EN 15942:2012 Sustainability of construction works – Environmental product declarations – Communication format business-to-business.
- ✓ KOBiZE CO_2, SO_2, NO_x, CO and total particulate matter emission factors for electricity, December 2023.
- ✓ SK CERTYFICATE of constancy of performance of essential charactericstics of product SK01-ZSV-0387,
- ✓ Act of 14 December 2012 on Waste, Journal of Laws 2013, item 21.
- ✓ Act of 27 April 2001 – Environmental Protection Law, Journal of Laws 2024, item 54.
- ✓ Data from the company website:https://www.fakro.pl/.

Explanatory materials can be obtained by contacting a representative of FAKRO PP Sp. z o.o. directly.