



Issuance date: 24.01.2024

Validity date: 24.01.2029

Aluminium Windows (dimension 1000x1300)



Owner of the EPD:

OKNOPLAST Sp. z o.o.
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Basic information

This declaration is the Type III Environmental Product Declaration (EPD) based on EN 15804+A2 and verified according to ISO 14025 by an external auditor. It contains the information on the impacts of the declared construction materials on the environment and their aspects verified by the independent body according to ISO 14025. Basically, comparison or evaluation of EPD data is possible only if all the compared data were created according to EN 15804+A2.

Life cycle analysis (LCA): A1-A5, C1-C4 and D modules in accordance with EN 15804
(Cradle-to-Gate with options)

The year of preparing the EPD: 2024

Product standard: EN 14351-1:2006+A2:2016

Service Life: 30 years for standard product

PCR: ITB-PCR A (PCR based on EN 15804)

Declared unit: 1 m² of reference window

Reasons for performing LCA: B2B

Representativeness: Polish, European

Type III Environmental Product Declaration No. 591/2024

OKNOPLAST is an international company whose portfolio includes PVC windows and external doors, roller blinds, garage doors and a wide range of accessories. Company operates in 19 countries in Europe and North America. The factory manufacturing products covered by this EPD is located in Poland (Podłęże).

Thanks to a wide range of products, focusing on uncompromising quality and setting new trends in the industry, Oknoplast is one of the most recognizable window companies in Europe. The product development department constantly researches the market and adapts new products to changing customer expectations. Rigorous product quality control standards, higher than those applicable in the industry, ensure safety and comfort of use for many years.



Fig. 1. The view of OKNOPLAST Sp. z o.o. in Podłęże

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PRODUCTS DESCRIPTION AND APPLICATION

Windows are used in the outer shell of buildings for lighting, ventilation and protection from the elements. Aluhaus safe aluminum and anti-burglary windows stand out from others because they are made extremely carefully and with great attention to every detail. In addition, only the highest quality materials are used to produce them, which guarantee reliable use for years. Aluminum windows made of aluminum profiles are not only extremely practical. Timeless aluminum windows are an element that you can easily keep clean and in good shape despite the passage of time thanks to the use of aluminum systems. The aluminum windows are also extremely impressive and you can easily match their color to the color of the facade. They are available in many colors, so you can easily match them to the style of the facade so that they do not stand out at all, or on the contrary - choose a vivid and contrasting shade that will be visible from a distance and emphasize the lightness of the structure. We will also create large fixed windows for you. The products represent all the advantages of aluminum windows. See for yourself and choose our modern windows. On average, 36% of product weight (covered by EPD) is made of aluminium and 52% of glass. The average weight of 1 m² of a reference aluminum window is 65.5 kg/m².

Table 1. Dimensions of windows and doors produced by OKNOPLAST Sp. z o.o.

	Min/Max width [mm]	Min/Max height [mm]	Min. packed thickness [mm]	Max. packed thickness [mm]
PVC Window	408÷1526	456÷2500	28	48
PVC Door	456÷1200	1917÷2607	28	40
Aluminium Window	380÷1550	380÷3030	24	50
Aluminium Door	700÷1300	1910÷2450	61	76

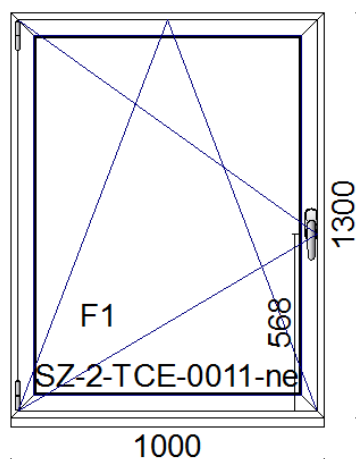


Fig. 2. Technical drawing of a reference aluminium windows (dimension 1000x1300)

LIFE CYCLE ASSESSMENT (LCA) – general rules applied

Allocation

The allocation rules used for this EPD are based on general ITB PCR A. Production of aluminium windows is a line process executed by OKNOPLAST Sp. z o.o. in plant located in Podłęże (Poland). Allocation was done on product mass basis. All impacts from raw materials extraction and processing are allocated in module A1 of the LCA. Impacts from the global line production of OKNOPLAST Sp. z o.o. were inventoried and 0,9% were allocated aluminium windows (mass based). Water and energy consumption, associated emissions and generated wastes are allocated to module A3. Packaging materials were taken into consideration.

System limits

The life cycle analysis (LCA) of the declared products covers: product stage – modules A1-A5, end of life – modules C1-C4 and benefits and loads beyond the system boundary – module D (cradle-to-gate with options) in accordance with EN 15804+A2 and ITB PCR A. Energy and water consumption, emissions as well as information on generated wastes were inventoried and were included in the calculations. It can be assumed that the total sum of omitted processes does not exceed 5% of all impact categories. In accordance with EN 15804+A2, machines and facilities (capital goods) required for the production as well as transportation of employees were not included in LCA.

Modules A1 and A2: *Raw materials supply and transport*

The product includes glass, aluminium profiles, steel components, auxiliary materials and packaging materials mainly from local suppliers. The means of transport are trucks. Polish and European fuel averages were used for calculations.

Module A3: *Production*

The production of aluminium windows includes receiving shipments of components from the plant. Then the elements are subjected to processes such as cutting, bending, gluing, cleaning and glazing. After complete assembly, the finished products are packed and transported to the main warehouse. Quality checks are carried out at individual production stages. A diagram of the production process is shown in Fig. 3.

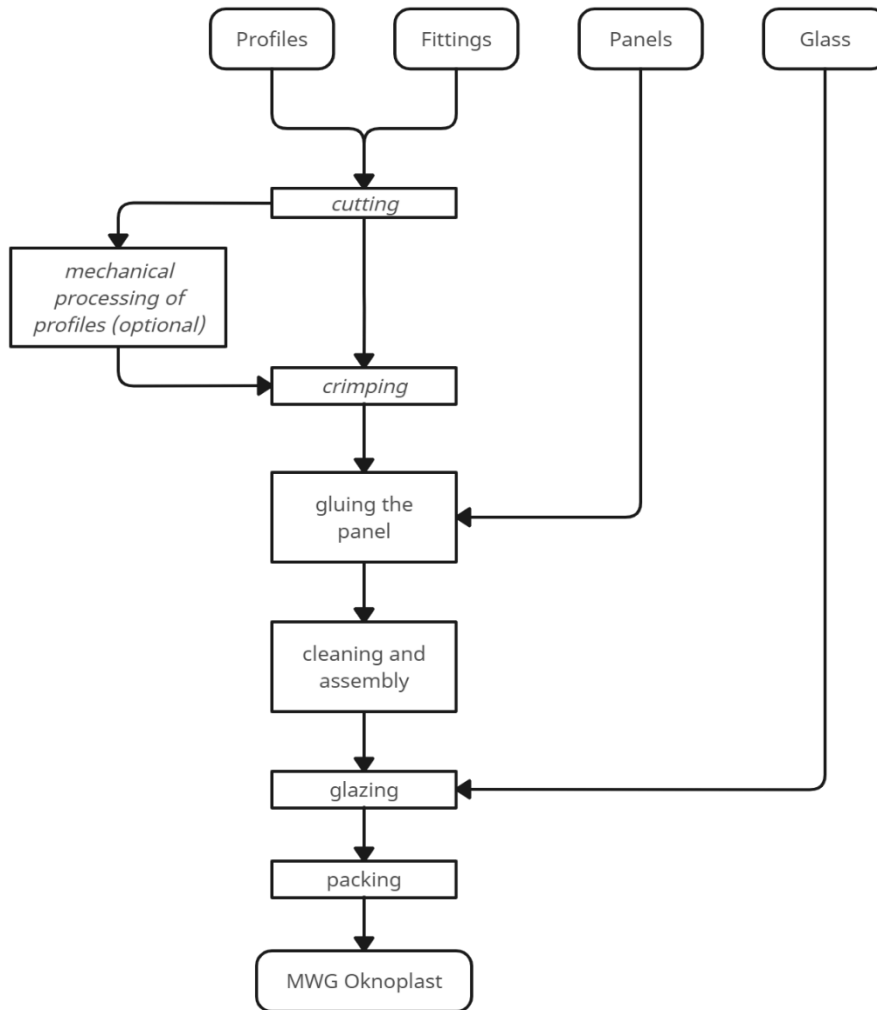


Fig. 3. The scheme of production by OKNOPLAST Sp. z o.o.

Module A4: Transport to consumer

Vehicle transport at distance 500 km is considered (emission standard: Euro 5) with 100% load capacity.

Modules A5: Installation

It is assumed that at the installation process is by using electric tools consuming 0.5 kWh/m².

Modules C1-C4 and D: End-of-life (EoL)

It is assumed that at the end-of-life, 100 % of aluminium windows are demounted using electric tools. Materials recovered from dismantled products are recycled, incinerated (module C3) and landfilled (module C4) according to the realistic treatment practice (mass allocation) of industrial waste what is presented in Table 5. 95 % of the resulting aluminium undergoes recycling after sorting and cutting while the remaining 5 % is forwarded to landfill as mixed construction and demolition wastes, 30 % of glass undergoes waste processing while the remaining 70 % is forwarded to landfill in the form of mixed construction and demolition wastes. A potential credits resulting from the recycling of aluminium and glass are presented in module D. Utilization of packaging material which constitute less than 1 % of the total system flows was not taken into consideration.

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Table 2. End-of-life scenario for OKNOPLAST aluminium windows and windows components

Material	Waste processing		Landfilling
	Material recovery (reuse, recycling)	Energy recovery (incineration)	
aluminium	95 %	0 %	5 %
glass	30 %	0 %	70 %
Other	50%	0%	50%

Electricity at end-of-life (module C) has been modelled using an average Polish electricity mix as the location where the product reaches end-of-life is unknown.

Data quality

The values determined to calculate the LCA originate from verified OKNOPLAST Sp. z o.o. inventory data.

Data collection period

The data for manufacture of the declared products refers to period between 01.01.2021 – 31.12.2021 (1 year). The life cycle assessments were prepared for Poland and Europe as reference area. No data collected is older than five years and no generic datasets used are older than ten years. The representativeness, completeness, reliability, and consistency is judged as good. The background data for the processes come from the following resources database Ecoinvent v.3.10 and specific EPDs for input material. Specific (LCI) data quality analysis was a part of the input data verification.

Assumptions and estimates

The impacts of aluminium windows were aggregated using weighted average. Impacts were inventoried and calculated for reference aluminium windows with dimensions of 1000x1300. Aluminium scrap is considered may be remelted once more.

Calculation rules

LCA was performed using ITB-LCA tool developed in accordance with EN 15804+A2. Emission of greenhouse gases was calculated using the IPCC 2013 GWP method with a 100-year horizon. Emission of acidifying substances, Emission of substances to water contributing to oxygen depletion, Emission of gases that contribute to the creation of ground-level ozone, Abiotic depletion, and ozone depletion emissions where all calculated with the CML-IA baseline method

Databases

The data for the processes come from the following databases: Ecoinvent v.3.10, specific EPDs, ITB-Database. Specific data quality analysis was a part of external ISO 14001 audit.

Additional information

Polish electricity (Ecoinvent v.3.10 supplemented by actual national KOBiZE data) emission factor used is 0.704 kg CO₂/kWh.

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LIFE CYCLE ASSESSMENT (LCA) – Results

Declared unit

The declaration refers to declared unit (DU) – 1 m² of reference aluminium windows with dimensions of 1000x1300 produced by OKNOPLAST Sp. z o.o.

Table 3. System boundaries for the environmental characteristic of the product.

Environmental assessment information (MD – Module Declared, MND – Module Not Declared, INA – Indicator Not Assessed)																
Product stage			Construction process		Use stage							End of life				Benefits and loads beyond the system boundary
Raw material supply	Transport	Manufacturing	Transport to construction site	Construction-installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction 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
MD	MD	MD	MD	MD	MND	MND	MND	MND	MND	MND	MND	MD	MD	MD	MD	MD

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Table 4. Life cycle assessment (LCA) results for specific product – environmental impacts (DU: 1 m²)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Global Warming Potential	eq. kg CO ₂	1.32E+02	1.52E+00	7.58E+00	1.41E+02	3.25E+00	3.52E-01	4.22E-01	6.51E-01	1.35E+01	2.09E-01	-2.89E+01
Greenhouse potential - fossil	eq. kg CO ₂	1.25E+02	1.51E+00	7.58E+00	1.34E+02	3.24E+00	3.52E-01	4.22E-01	6.48E-01	6.70E-01	2.07E-01	-2.84E+01
Greenhouse potential - biogenic	eq. kg CO ₂	1.09E+00	5.16E-03	1.99E-01	1.29E+00	8.57E-03	1.00E-02	1.20E-02	2.22E-03	1.40E-04	2.09E-03	-1.65E-01
Global warming potential - land use and land use change	eq. kg CO ₂	1.24E+00	5.92E-04	2.43E-03	1.25E+00	1.27E-03	1.20E-04	1.44E-04	2.54E-04	1.06E-04	2.10E-04	-3.32E-01
Stratospheric ozone depletion potential	eq. kg CFC ₁₁	8.87E-06	3.49E-07	3.87E-07	9.60E-06	7.50E-07	7.00E-09	8.40E-09	1.50E-07	8.19E+00	6.29E-08	-1.98E-06
Soil and water acidification potential	eq. mol H+	1.53E+00	6.13E-03	7.76E-02	1.61E+00	1.32E-02	3.80E-03	4.56E-03	2.63E-03	4.76E-02	1.75E-03	-2.55E-01
Eutrophication potential - freshwater	eq. kg P	1.13E-01	1.01E-04	1.29E-02	1.26E-01	2.09E-04	6.50E-04	7.80E-04	4.36E-05	4.53E-06	6.01E-05	-1.34E-02
Eutrophication potential - seawater	eq. kg N	1.64E-01	1.85E-03	1.13E-02	1.77E-01	3.97E-03	5.50E-04	6.60E-04	7.94E-04	1.90E-02	6.02E-04	-2.58E-02
Eutrophication potential - terrestrial	eq. mol N	1.74E+00	2.02E-02	9.59E-02	1.86E+00	4.33E-02	4.65E-03	5.58E-03	8.66E-03	3.59E-02	6.55E-03	-2.59E-01
Potential for photochemical ozone synthesis	eq. kg NMVOC	9.63E-01	6.18E-03	3.43E-02	1.00E+00	1.33E-02	1.30E-03	1.56E-03	2.65E-03	7.83E-03	1.89E-03	-9.58E-02
Potential for depletion of abiotic resources - non-fossil resources	eq. kg Sb	3.07E-03	5.35E-06	3.35E-05	3.11E-03	1.15E-05	1.67E-06	2.00E-06	2.30E-06	2.12E-07	7.01E-07	-2.16E-04
Abiotic depletion potential - fossil fuels	MJ	1.90E+03	2.24E+01	1.33E+02	2.05E+03	4.81E+01	5.80E+00	6.96E+00	9.62E+00	6.35E-01	4.78E+00	-3.66E+02
Water deprivation potential	eq. m ³	1.08E+02	1.04E-01	2.40E+00	1.10E+02	2.21E-01	1.20E-01	1.44E-01	4.45E-02	1.49E-02	2.78E-02	-2.59E+01

Table 5. Life cycle assessment (LCA) results for specific product – additional impacts indicators (DU: 1 m²)

Indicator	Unit	A1-A3	A4-A5	C1-C4	D
Particulate matter	disease incidence	INA	INA	INA	INA
Potential human exposure efficiency relative to U235	eg. kBq U235	INA	INA	INA	INA
Potential comparative toxic unit for ecosystems	CTUe	INA	INA	INA	INA
Potential comparative toxic unit for humans (cancer effects)	CTUh	INA	INA	INA	INA
Potential comparative toxic unit for humans (non-cancer effects)	CTUh	INA	INA	INA	INA
Potential soil quality index	dimensionless	INA	INA	INA	INA

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Table 6. Life cycle assessment (LCA) results for specific product - the resource use (DU: 1 m²)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Consumption of renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	3.49E+02	3.21E-01	8.50E+00	3.58E+02	6.93E-01	4.30E-01	5.16E-01	1.38E-01	1.17E-02	8.39E-02	-9.72E+01
Consumption of renewable primary energy resources used as raw materials	MJ	5.24E+01	0.00E+00	0.00E+00	5.24E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total consumption of renewable primary energy resources	MJ	4.01E+02	3.21E-01	8.57E+00	4.10E+02	6.93E-01	4.30E-01	5.16E-01	1.38E-01	1.17E-02	8.39E-02	-9.72E+01
Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	1.96E+03	2.24E+01	1.15E+02	2.10E+03	5.20E+01	5.82E+00	6.98E+00	9.62E+00	-3.09E+01	5.17E+00	-3.11E+02
Consumption of non-renewable primary energy resources used as raw materials	MJ	1.74E-01	0.00E+00	0.00E+00	1.74E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.15E+01	0.00E+00	0.00E+00
Total consumption of non-renewable primary energy resources	MJ	1.96E+03	2.24E+01	1.35E+02	2.12E+03	5.20E+01	5.82E+00	6.98E+00	9.62E+00	6.36E-01	5.17E+00	-3.68E+02
Consumption of secondary materials	kg	1.94E+01	7.51E-03	1.10E-02	1.94E+01	0.00E+00	5.30E-04	6.36E-04	3.23E-03	2.87E-04	0.00E+00	-4.89E-01
Consumption of renew. secondary fuels	MJ	2.42E-02	8.28E-05	5.96E-05	2.44E-02	0.00E+00	2.95E-06	3.55E-06	3.55E-05	3.90E-06	0.00E+00	-1.22E-03
Consumption of non-renewable secondary fuels	MJ	1.68E-01	0.00E+00	9.28E-02	2.61E-01	0.00E+00	4.70E-03	5.63E-03	0.00E+00	0.00E+00	0.00E+00	-2.37E-02
Net consumption of freshwater	m ³	2.44E+00	2.82E-03	3.30E-02	2.48E+00	2.39E-03	1.58E-03	1.89E-03	1.21E-03	5.62E-04	7.46E-04	-5.69E-01

Table 7. Life cycle assessment (LCA) results for specific product – waste categories (DU: 1 m²)

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste	kg	2.34E+00	2.51E-02	3.89E-03	2.37E+00	1.28E-04	6.00E-05	7.20E-05	1.08E-02	4.56E-08	7.52E-06	-5.52E+00
Non-hazardous waste	kg	6.84E+01	4.46E-01	2.97E-01	6.92E+01	2.52E+00	3.12E-03	3.74E-03	1.92E-01	1.19E-01	1.97E+01	-3.08E+00
Radioactive waste	kg	1.75E-02	1.67E-06	1.73E-04	1.77E-02	3.31E-04	4.35E-06	5.22E-06	7.18E-07	3.39E-06	2.91E-05	-4.47E-03
Components for re-use	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	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	6.80E-02	6.94E-05	1.30E-01	1.98E-01	0.00E+00	6.00E-06	7.20E-06	2.98E-05	4.24E-06	0.00E+00	-1.76E-03
Materials for energy recovery	kg	2.27E-04	5.61E-07	2.60E-03	2.83E-03	0.00E+00	5.25E-08	6.30E-08	2.41E-07	5.29E-08	0.00E+00	-7.57E-06
Exported Energy	MJ	2.41E+00	0.00E+00	3.45E-01	2.75E+00	0.00E+00	1.73E-02	2.08E-02	0.00E+00	6.48E-01	0.00E+00	-2.24E-01

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Verification

The process of verification of this EPD is in accordance with ISO 14025 and ISO 21930. After verification, this EPD is valid for a 5-year-period. EPD does not have to be recalculated after 5 years, if the underlying data have not changed significantly.

The basis for LCA analysis was EN 15804 and ITB PCR A	
Independent verification corresponding to ISO 14025 (subclause 8.1.3.)	
<input checked="" type="checkbox"/> external	<input type="checkbox"/> internal
External verification of EPD: Halina Prejzner, PhD. Eng. LCI audit and verification: Filip Poznański, M.Sc. Eng. LCA, LCI audit and input data verification: Michał Piasecki, PhD., D.Sc., Eng.	

Note 1: The declaration owner has the sole ownership, liability, and responsibility for the information provided and contained in EPD. Declarations of construction products may not be comparable if they do not comply with EN 15804+A2. For further information about comparability, see EN 15804+A2 and ISO 14025.

Note 2: ITB is a public Research Organization and Notified Body (EC Reg. no 1488) to the European Commission and to other Member States of the European Union designated for the tasks concerning the assessment of building products' performance. ITB acts as the independent, third-party verification organization (ISO 17025/17065/17029). ITB-EPD program is recognized and registered member of The European Platform - Association of EPD program operators and ITB-EPD declarations are registered and stored in the international ECO-PORTAL.

Normative references

- ITB PCR A General Product Category Rules for Construction Products (2023, v1.6)
- ISO 14025:2006. Environmental labels and declarations – Type III environmental declarations – Principles and procedures
- ISO 21930:2017 Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services
- ISO 14044:2006 Environmental management – Life cycle assessment – Requirements and guidelines
- EN 15804+A2 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
- CRU Group. Carbon footprint by cold metal by country - <https://www.crugroup.com/about-cru/>
- EAA 2020 - Circular Aluminium Action Plan - A strategy for achieving aluminium's full potential for circular economy by 2030.
- European Life Cycle Database. ELCD 3.2.
<http://epca.jrc.ec.europa.eu/ELCD3/index.xhtml?stock=default>
- Ecoinvent Database. <http://www.ecoinvent.org/database/>.
- Life-Cycle inventory data for aluminium production and transformation processes in Europe. Environmental Profile Report. February 2018.
- Aluminium Recycling in LCA – European Aluminium Association, 2013.
- KOBiZE Wskaźniki emisyjności CO₂, SO₂, NO_x, CO i pyłu całkowitego dla energii elektrycznej. December 2021



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CERTIFICATE № 591/2024 of TYPE III ENVIRONMENTAL DECLARATION

Products:

Aluminium Windows (dimension 1000x1300)

Manufacturer:

OKNOPLAST Sp. z o.o.

Ochmanów 117, 32-003 Podłęże, gm. Niepołomice, Poland

confirms the correctness of the data included in the development of
Type III Environmental Declaration and accordance with the requirements of the standard

EN 15804+A2

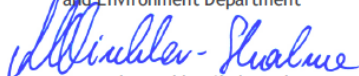
Sustainability of construction works.

Environmental product declarations.

Core rules for the product category of construction products.

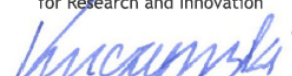
This certificate, issued on 24th January 2024 is valid for 5 years
or until amendment of mentioned Environmental Declaration

Head of the Thermal Physic, Acoustics
and Environment Department


Agnieszka Winkler-Skalna, PhD



Deputy Director
for Research and Innovation


Krzysztof Kuczyński, PhD

Warsaw, January 2024