



Issuance date: 02.09.2025

Validity date: 02.09.2030

## Sandwich panels with PIR insulation core



### Owner of the EPD:

ARPANEL – sandwich panels, Adamietz 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. Their aspects were verified by the independent body according to ISO 14025. Basically, a 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-A3, C1-C4 and D modules in accordance with EN 15804+A2 (Cradle-to-Gate with options)

**The year of preparing the EPD:** 2025

**Service Life:** > 50 years

**PCR:** ITB-PCR A, v. 1.6

**Declared unit:** 1 m<sup>2</sup>

**Reasons for performing LCA:** B2B

**Representativeness:** Polish, European

## **MANUFACTURER**

ARPANEL – sandwich panels, Adamietz Sp. z o.o. have been present on the market since 2013 and since the very beginning it have been engaged in supplying the highest quality sandwich panels for roof and wall cladding of enclosed buildings, industrial buildings, store and production buildings, logistics centres, etc. At Arpanel production facility, we create insulating sandwich panels, roof and wall panels for use in a wide variety of steel, reinforced concrete and wooden structures. Arpanel supply with sandwich panels with the MiWo mineral wool core with increased fire resistance, and the MiWo MXL with increased load-bearing capacity, as well as panels with PIR polyisocyanurate foam.

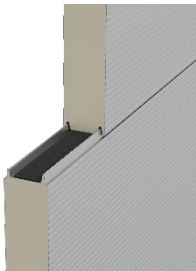
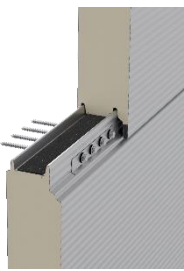


Arpanel sandwich panels production facility is located in Strzelce Opolskie, Poland. Both types of Arpanel sandwich panels, with mineral wool and PIR cores, can be produced on the same, so-called “combi” line.



*Figure 1 A view of ARPANEL headquarter located in Strzelce Opolskie (Poland).*

## PRODUCTS DESCRIPTION AND APPLICATION

ARPANEL PIR wall sandwich panels with a polyisocyanurate foam core are distinguished by good thermal insulation performance. The panel installation system and the appropriate profile of the panel connection make the wall sandwich panels tight for the penetration of air, water vapour and rain. ARPANEL PIR is an solution for external wall cladding, partition walls and ceilings of production halls, warehouses, shopping and logistics centres, car dealerships, industrial facilities and buildings.

Types of ARPANEL sandwich panels with PIR insulation core				
Type of panel	wall			roof
Name	ARPANEL S PIR	ARPANEL SU PIR	ARPANEL CH PIR	ARPANEL D PIR
				
Insulation core	Polyisocyanurate foam PIR			
Fastening system	standard	hidden	standard	
Thickness [mm]	40 60 80 100	60 80 100 120	120 140 160 200	40/80 60/100 80/120 100/140 120/160 160/200
Panel width [mm]	1000 1100 1150	1000	1000 1100 1150	1000
Thickness of cladding external/internal [mm]	0,5/0,5			
External profiling	Micro 8 Micro 14 Micro 30 Linear Smooth			Trapezoid
Internal profiling	Linear Smooth Micro 20			

More information can be found on the Arpanel brand website : [https:// www.arpanel.eu/](https://www.arpanel.eu/)

### **LIFE CYCLE ASSESSMENT (LCA) – general rules applied**

#### **Declared Unit**

The declaration refers to declared unit (DU) – 1 m<sup>2</sup> of sandwich panels with PIR insulation core

#### **Allocation**

The allocation rules used for this EPD are based on general ITB PCR A, v. 1.6. Production of PIR insulation panels is a line process conducted in the factory of ARPANEL – sandwich panels, Adamietz Sp. z o.o., located in Strzelce Opolskie (Poland). Allocation was done on product mass basis.

All impacts from raw materials extraction and processing are allocated in module A1 of LCA. Impacts from the Arpanel production were inventoried on the annual production volume expressed in mass units. 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-A3, 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, v. 1.6. All materials and energy consumption inventoried in factory were included in calculation. Office impacts were also taken into consideration. In the assessment, all significant parameters from gathered production data were inventoried and were included in the calculations, i.e. all material used per formulation, utilised thermal energy, internal fuel and electric power consumption, direct production waste, water consumption and all available emission measurements.

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***

Raw materials such as steel sheet coils, polyols, isocyanates, catalysts, pentane and, adhesives or packaging materials come from both local and foreign suppliers. In the case of ARPANEL PIR sandwich panels family a core material is a rigid polyurethane foam obtained in a controlled chemical reaction during production process. A vast majority of liquid components, necessary for chemical reactions, are sourced from foreign suppliers. Hot-dip galvanised and colour coated steel sheets are being used as facings. Steel sheet coils are being sourced at domestic and foreign steel mills. Means of transport include mainly big trucks (> 16 t), average truck (10-16 t) and ship are applied. European standards for average combustion were used for calculations.

#### **Module A3: *Production***

Schematic of the PIR production process is presented in Figure 2. Raw materials such as polyols, polymeric isocyanates, catalysts or pentane are delivered to factory located in Strzelce Opolskie, where are manufacturing in a few step process including mixing of components, stabilization, foaming, cutting to length or edge forming of faces. Then the final PIR insulation panels are packed and shipped.

### PIR Core Sandwich Panel Production Process

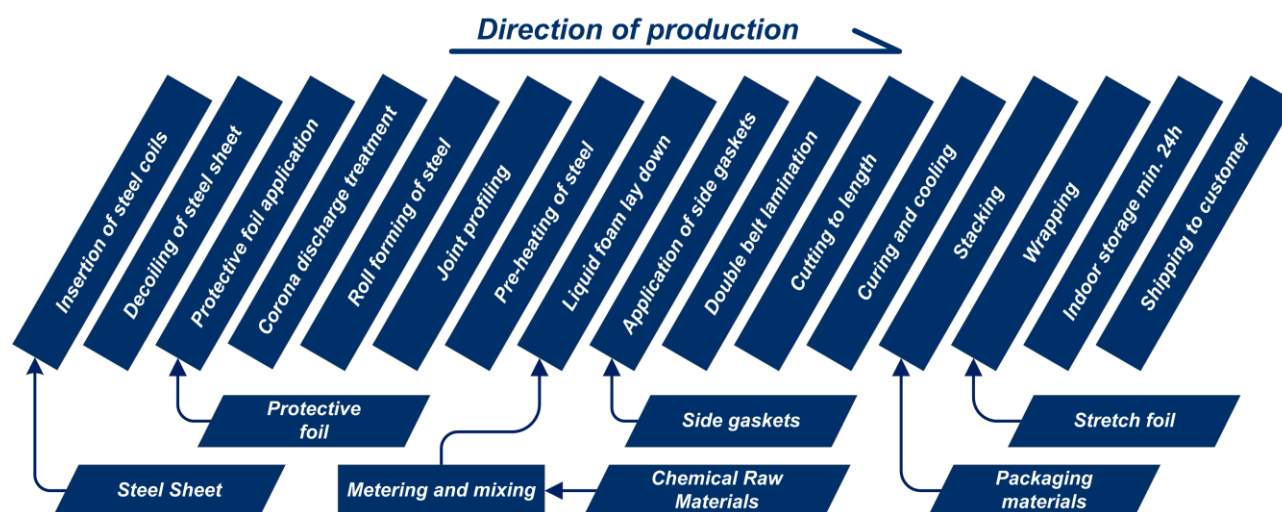


Figure 2. A scheme of PIR core sandwich panel production process by ARPANEL – sandwich panels, Adamietz Sp. z o.o.

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

It is assumed that at the end-of-life, 100% of sandwich panels with PIR core are demounted using electric tools (module C1) and is transported to waste processing plant which is 100 km away, on 16-32 t lorry EURO 5 (module C2). It is assumed that 60 % of PIR cores and 98 % of steel sheets are energy/material recovery. The residue wastes are forwarded to a landfill in the form of mixed construction and demolition wastes (40 % PIR cores and 2 % steel sheets). End-of-life scenario was summarized in Table 1. Environmental burdens declared in module C4 are associated with waste-specific emissions to air and groundwater. A potential credit (environmental benefits) resulting from energy / material recovery are presented in module D.

Table 1. End-of-life scenario for PIR panels manufactured by ARPANEL – sandwich panels, Adamietz Sp. z o.o.

Material	Waste processing (energy / material recovery)	Landfilling
Steel sheets	98%	2%
PIR core	60%	40%

#### Data quality

The data selected for LCA analysis originates from ITB-LCI questionnaires completed by Arpanel using the inventory data, ITB database, Ecoinvent database v. 3.10 and KOBIZE. KOBIZE data is supplemented with Ecoinvent v. 3.10 data on the national electricity mix impact where no specific indicator data is provided. No specific data collected is older than five years and no generic datasets used are older than ten years. The representativeness, completeness, reliability, and consistency are judged as good.

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### Data collection period

Primary data provided by Arpanel covers a period of 01.01.2024 – 31.12.2024 (1 year). The life cycle assessments were prepared for Poland and Europe as reference area.

### Assumptions and estimates

The impacts of the representative of PIR were inventoried and calculated based on consumption for the entire PIR product group presented in Tables 4-7 for the PIR with densities of 40 kg/m<sup>3</sup> and thickness of 100 mm. Conversion factors for others panel thicknesses (40 ÷ 200) are presented in Table 2.

*Table 2. Conversion factors for the estimation of environmental impact for different panel thicknesses about density of 40 kg/m<sup>3</sup>. Multiply the LCA-result of each impact category in the environmental impact table with the corresponding factors.*

Panel thickness	40 mm	60 mm	80 mm	100 mm	120 mm	140 mm	160 mm	200 mm
Conversion factor	0.65	0.76	0.88	1.00	1.12	1.24	1.35	1.59

### Calculation rules

LCA was performed using ITB-LCA tool developed in accordance with EN 15804 + A2.

### Databases

The data for the processes comes from Ecoinvent v. 3.10 and ITB-Database. Specific data quality analysis was a part of external audit. Polish electricity mix used (production) is 0.597 kg CO<sub>2</sub>/kWh (KOBIZE 2023).

## LIFE CYCLE ASSESSMENT (LCA) – Results

### Declared unit

The declaration refers to declared unit (DU) – 1 m<sup>2</sup> of PIR insulation panels about density of 40 kg/m<sup>3</sup> and thickness of 100 mm. Conversion factors for different panel thickness are presented above (Table 2).

*Table 3. System boundaries for the environmental characteristic of PIR production process by ARPANEL – sandwich panels, Adamietz Sp. z o.o.*

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	MND	MND	MND	MND	MND	MND	MND	MND	MND	MD	MD	MD	MD	MD

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Table 4. Life cycle assessment (LCA) results for PIR about density of 40 kg/m<sup>3</sup> and thickness of 100 mm manufactured by ARPANEL – sandwich panels, Adamietz Sp. z o.o. - environmental impacts (DU: 1 m<sup>2</sup>)

Indicator	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
Global Warming Potential - total	eq. kg CO <sub>2</sub>	2.79E+01	1.31E+00	6.25E-01	2.98E+01	2.64E-01	2.47E-01	1.00E+01	2.65E+00	-1.40E+01
Greenhouse gas potential - fossil	eq. kg CO <sub>2</sub>	2.77E+01	1.31E+00	6.21E-01	2.96E+01	2.63E-01	2.47E-01	9.78E+00	2.65E+00	-1.39E+01
Greenhouse gas potential - biogenic	eq. kg CO <sub>2</sub>	1.49E-01	4.33E-03	3.92E-03	1.58E-01	6.08E-04	8.43E-04	2.37E-01	1.68E-04	-9.90E-02
Global warming potential - land use and land use change	eq. kg CO <sub>2</sub>	1.47E-02	5.30E-04	2.15E-04	1.54E-02	3.26E-04	9.68E-05	2.42E-04	2.74E-05	-4.67E-03
Stratospheric ozone depletion potential	eq. kg CFC 11	1.34E-06	2.94E-07	3.53E-08	1.67E-06	4.16E-09	5.70E-08	3.29E-08	2.12E-09	3.84E-08
Soil and water acidification potential	eq. mol H <sup>+</sup>	1.47E-01	6.36E-03	6.61E-03	1.60E-01	1.52E-03	1.00E-03	2.69E-03	3.32E-03	-1.39E-02
Eutrophication potential - freshwater	eq. kg P	1.05E-02	8.67E-05	1.09E-03	1.17E-02	1.53E-04	1.66E-05	8.84E-05	8.52E-06	-2.63E-03
Eutrophication potential - seawater	eq. kg N	4.13E-02	1.86E-03	9.49E-04	4.41E-02	5.27E-04	3.02E-04	1.13E-03	1.66E-02	-4.04E-03
Eutrophication potential - terrestrial	eq. mol N	2.75E-01	2.03E-02	8.20E-03	3.03E-01	4.95E-03	3.29E-03	1.07E-02	1.84E-02	-3.96E-02
Potential for photochemical ozone synthesis	eq. kg NMVOC	1.29E-01	6.10E-03	2.33E-03	1.38E-01	1.63E-03	1.01E-03	2.97E-03	4.70E-03	-1.65E-02
Potential for depletion of abiotic resources - non-fossil resources	eq. kg Sb	1.93E-04	4.54E-06	8.87E-07	1.99E-04	6.98E-07	8.74E-07	6.90E-06	2.07E-07	1.09E-04
Abiotic depletion potential - fossil fuels	MJ	5.14E+02	1.93E+01	1.12E+01	5.45E+02	3.71E+00	3.66E+00	3.26E+00	1.08E+00	-6.25E+01
Water deprivation potential	eq. m <sup>3</sup>	2.05E+01	8.85E-02	2.02E-01	2.08E+01	1.75E-01	1.69E-02	1.05E-01	1.02E-01	-2.53E+00



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*Table 5. Life cycle assessment (LCA) results for PIR about density of 40 kg/m<sup>3</sup> and thickness of 100 mm manufactured by ARPANEL – sandwich panels, Adamietz Sp. z o.o. - additional impacts indicators (DU: 1 m<sup>2</sup>)*

Indicator	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
Particulate matter	disease incidence	INA	INA	INA	INA	INA	INA	INA	INA	INA
Potential human exposure efficiency relative to U235	eg. kBq U235	INA	INA	INA	INA	INA	INA	INA	INA	INA
Potential comparative toxic unit for ecosystems	CTUe	INA	INA	INA	INA	INA	INA	INA	INA	INA
Potential comparative toxic unit for humans (cancer effects)	CTUh	INA	INA	INA	INA	INA	INA	INA	INA	INA
Potential comparative toxic unit for humans (non-cancer effects)	CTUh	INA	INA	INA	INA	INA	INA	INA	INA	INA
Potential soil quality index	dimensionless	INA	INA	INA	INA	INA	INA	INA	INA	INA

*Table 6. Life cycle assessment (LCA) results for PIR about density of 40 kg/m<sup>3</sup> and thickness of 100 mm manufactured by ARPANEL – sandwich panels, Adamietz Sp. z o.o. - environmental aspects related to resource use (DU: 1 m<sup>2</sup>)*

Indicator	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
Consumption of renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	3.01E+01	2.74E-01	7.10E-01	3.11E+01	-7.99E+01	5.25E-02	3.30E-02	2.13E-02	-3.33E+00
Consumption of renewable primary energy resources used as raw materials	MJ	1.53E+00	0.00E+00	0.00E+00	1.53E+00	8.00E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total consumption of renewable primary energy resources	MJ	3.16E+01	2.74E-01	7.13E-01	3.26E+01	1.11E-01	5.25E-02	2.43E-01	2.13E-02	-3.33E+00
Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials	MJ	4.09E+02	1.93E+01	1.04E+01	4.38E+02	3.75E+00	3.66E+00	-1.15E+02	-7.28E+01	5.46E+01
Consumption of non-renewable primary energy resources used as raw materials	MJ	1.05E+02	0.00E+00	0.00E+00	1.05E+02	0.00E+00	0.00E+00	1.17E+02	7.38E+01	-1.17E+02
Total consumption of non-renewable primary energy resources	MJ	5.15E+02	1.93E+01	1.18E+01	5.46E+02	3.75E+00	3.66E+00	3.37E+00	1.08E+00	-6.25E+01
Consumption of secondary materials	kg	6.74E+00	6.55E-03	8.63E-04	6.75E+00	5.41E-03	1.23E-03	4.38E-03	6.16E-04	-1.03E+01
Consumption of renewable secondary fuels	MJ	3.41E-02	7.01E-05	4.80E-06	3.42E-02	6.68E-05	1.35E-05	2.35E-04	9.87E-06	-1.96E-04
Consumption of non-renewable secondary fuels	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	0.00E+00
Net consumption of freshwater resources	m <sup>3</sup>	4.91E-01	2.40E-03	3.25E-03	4.96E-01	3.28E-03	4.60E-04	2.50E-03	7.80E-05	-7.65E-02



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Table 7. Life cycle assessment (LCA) results for PIR about density of 40 kg/m<sup>3</sup> and thickness of 100 mm manufactured by ARPANEL – sandwich panels, Adamietz Sp. z o.o. - environmental information describing waste categories (DU: 1 m<sup>2</sup>)

Indicator	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
Hazardous waste. neutralized	kg	1.75E+00	2.14E-02	1.17E-03	1.78E+00	4.44E-02	4.11E-03	9.33E-02	1.68E-02	5.90E-01
Non-hazardous waste neutralised	kg	2.36E+01	3.81E-01	6.76E-02	2.41E+01	2.33E+01	7.29E-02	3.40E+00	2.39E+00	-1.28E+01
Radioactive waste	kg	4.17E-04	1.30E-04	1.83E-05	5.65E-04	1.43E-06	2.52E-05	1.46E-05	4.16E-07	-2.58E-04
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
Materials for recycling	kg	6.36E-03	1.13E-04	8.90E-01	8.97E-01	3.52E-05	1.13E-05	9.40E+00	8.32E-06	-1.87E-03
Materials for energy recovery	kg	1.75E-05	4.80E-07	1.06E-07	1.81E-05	2.27E-07	9.16E-08	3.17E-07	9.79E-08	3.23E-05
Energy exported	MJ	1.28E+00	2.09E-02	2.89E-02	1.33E+00	2.60E-03	4.06E-03	6.83E-02	5.48E-04	-2.48E-01

## Type III Environmental Product Declaration No. 833/2025

### 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+A2 and ITB PCR A, v. 1.6	
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	
LCA, LCI audit and input data verification: Mateusz Kozicki, PhD	
Verification of LCA: Michał Piasecki, PhD. DSc. Eng	

Note 1: The declaration owner has the sole ownership, liability and responsibility for the information provided and contained in EPD. Declarations within the same product category but from different programmes may not be comparable. 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. Depending on the application, a corresponding conversion factor such as the specific weight per surface area must be taken into consideration.

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 (17065/17025 certified). 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. v. 1.6 General Product Category Rules for Construction Products
- EN 14509: 2013-12 Self-supporting double skin metal faced insulating panels - Factory made products - Specifications
- 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
- ISO 15686-1:2011 Buildings and constructed assets – Service life planning – Part 1: General principles and framework
- ISO 15686-8:2008 Buildings and constructed assets – Service life planning – Part 8: Reference service life and service-life estimation
- ISO 20915:2018 Life cycle inventory calculation methodology for steel products
- EN 15804:2012+A2:2019 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products
- ISO 14067:2018 Greenhouse gases - Carbon footprint of products — Requirements and guidelines for quantification
- EN 15942:2012 Sustainability of construction works – Environmental product declarations – Communication format business-to-business
- KOBIZE Emissions (CO<sub>2</sub>, SO<sub>2</sub>, NO<sub>x</sub>, CO and total dust) from electricity, 2023

LCA, LCI audit and input data verification  
Mateusz Kozicki, PhD

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02-656 Warsaw, Ksawerów 21

# CERTIFICATE No 833/2025 of TYPE III ENVIRONMENTAL DECLARATION

Products:

**Sandwich panels  
with PIR insulation core**

Manufacturer:

**ARPANEL - sandwich panels, Adamietz Sp. z o.o.**

Braci Prankel 1, 47-100 Strzelce Opolskie, 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 2<sup>nd</sup> September 2025 is valid for 5 years  
or until amendment of mentioned Environmental Declaration

Head of the Thermal Physic, Acoustics  
and Environment Department

*Agnieszka Winkler-Skalna*  
Agnieszka Winkler-Skalna, PhD



Deputy Director  
for Research and Innovation

*Krzysztof Kuczyński*  
Krzysztof Kuczyński, PhD

Warsaw, September 2025