

ENVIRONMENTAL PRODUCT DECLARATION

Nr 02-12/2023

CERAMIC TILES

Röben Polska Sp. z o.o. and Wspólnicy Sp.K.



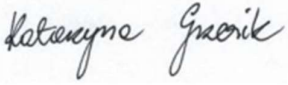


Owner of the EPD: Röben Polska Sp. z o.o. and Wspólnicy Sp. K.
Programme owner: Sieć Badawcza Łukasiewicz – Instytut Ceramiki i Materiałów Budowlanych
Name of programme: Centrum Inżynierii Środowiska
Issued: **06.12.2023**
Valid until: **06.12.2028**

1. INFORMACJE OGÓLNE

<p>Owner of the EPD:</p> <p>Röben Polska Sp. z o.o. and Wspólnicy Sp. K.</p>	<p>Products covered by the EPD:</p> <p>Ceramic tiles</p>
<p>Programme owner:</p> <p>Łukasiewicz Research Network – Institute of Ceramics and Building Materials http://www.icimb.pl/opole/</p>	<p>Owner of the EPD:</p> <p>Röben Polska Sp. z o.o. and Wspólnicy Sp. K. 2 Ceramiczna str 55-300 Środa Śląska Telephone: +48 71 39 78 111 e-mail: biuro@roben.pl https://www.roben.pl/</p>
<p>Date of issuance:</p> <p>06.12.2023</p>	<p>Declared product/declared unit:</p> <p>The declared unit (DU) for the products is 1 kg (1 kilogram) ceramic tiles BERGAMO, PIEMONT, MONZA, MILANO.</p>
<p>EPD valid until:</p> <p>06.12.2028</p>	<p>Scope:</p> <p>The declaration covers the following products: ceramic tiles BERGAMO, PIEMONT, MONZA, MILANO produced in the Röben Polska Sp. z o.o. and Wspólnicy Sp.K.; 2 Ceramiczna str, 55-300 Środa Śląska.</p> <p>It contains information about the impact of the declared products on the environment. All data on the production cycle have been collected by Röben Polska Sp. z o.o. and Wspólnicy Sp.K. from March 3, 2022, to February 2, 2023 (12 months) and corresponded to the production's technology of that time. All data are averaged for total production of ceramics tiles BERGAMO, PIEMONT, MONZA, MILANO produced by Röben Polska Sp. z o.o. and Wspólnicy Sp.K. in Środa Śląska.</p> <p>The life cycle assessment has been developed in accordance with the requirements of PN-EN ISO 15804+A2:2020, PN-EN ISO 14025 and PN-EN ISO 14040. The rules for product categorization have been adopted in accordance with the PN-EN 15804 standard.</p> <p>The declaration owner is responsible for the underlying information and evidence. Łukasiewicz Research Network – Institute of Ceramics and Building Materials Environmental Engineering Center in Opole is not responsible for the manufacturer's information and data and evidence regarding the life cycle assessment.</p> <p>Declarations resulting from different programs or performed not in accordance with the standard may not be compared.</p>



Product Category Rules (PCR)	According to: PN-EN 15804+A2:2020-03 Sustainability of construction works. Environmental product declarations. Basic principles of categorization of construction products.
Representativeness:	Polish product, year 2022/2023
Reference Service Life (RSL):	Non declared service life
Reasons for performing LCA:	B2B
Life cycle Analysis (LCA):	LCA covers modules A1-A5, C1-C4 and D according to PN-EN 15804+A2 standard (Cradle-to-Gate with options)
<p>Łukasiewicz Research Network – Institute of Ceramics and Building Materials, Environmental Engineering Center provides access to the type III EPD for ceramic tiles by Röben Polska Sp. z o.o. and Wspólnicy Sp. K. to the interested parties.</p>	
<p>Authors:</p> <p>Katarzyna Kiprian, MSc Eng. Ewa Głodek-Bucyk, PhD Eng.</p> <p>Approved by: Joanna Poluszyńska, PhD</p> <p></p> <p>Director of the environmental engineering center</p> <p>Ewa Głodek-Bucyk, PhD Eng.</p> <p></p> <p>Leader of Process Engineering Research Group</p>	<p>Verification:</p> <p>CEN PN-EN 15804+A2 standard serves as main PCR. Independent EPD and data verification according to PN-EN ISO 14025:2010 standard.</p> <p><input type="checkbox"/> internal <input checked="" type="checkbox"/> external</p> <p></p> <p>Katarzyna Grzesik, PhD Eng.</p>





2. INFORMACJE O PRODOCENCIE I PRODUKTACH

Röben Polska Sp. z o.o. and Wspólnicy Sp.K. is a company that has been producing ceramic building materials for over 160 years. The company has production in Germany and the USA, and since 1994 a manufacture in Środa Śląska, Poland. It is the largest and most modern Röben roofing plant in Europe. The company's product range includes ceramic roof tiles, clinker and facing bricks, as well as ceramic flooring. Ceramic roofing tile is made mainly from ceramic clays and light materials. Production is carried out by molding from a plastic mass glazed or engobed as required, and then fired at a temperature of about 1000°C. The finished ceramic tile is characterized by high mechanical strength, water absorption of less than 10% and is a frost-resistant product.

Caring for the environment is one of the company's most important foundations. The company is Güteschutz Ziegel e.V. Zertifizierungs- und Überwachungsstelle certified. The quality of the products is confirmed by tests in accredited laboratories.

The company focuses on innovation, constantly looking for new ways of development and developing products in such a way that they best meet the needs of their users.

The group of products covered by the declaration are ceramic tiles:

-  Röben BERGAMO
-  Röben PIEMONTE
-  Röben MONZA
-  Röben MILANO

The indicative composition of the products covered by the declaration is presented in the table below:

Material	Mass fraction [%]
Clay	54,9
Basalt	15,0
Debris	8,0
Dewon	10,0
Sand	12,0
Additives	0,2



The technological of the production process of ceramic tiles is shown below:

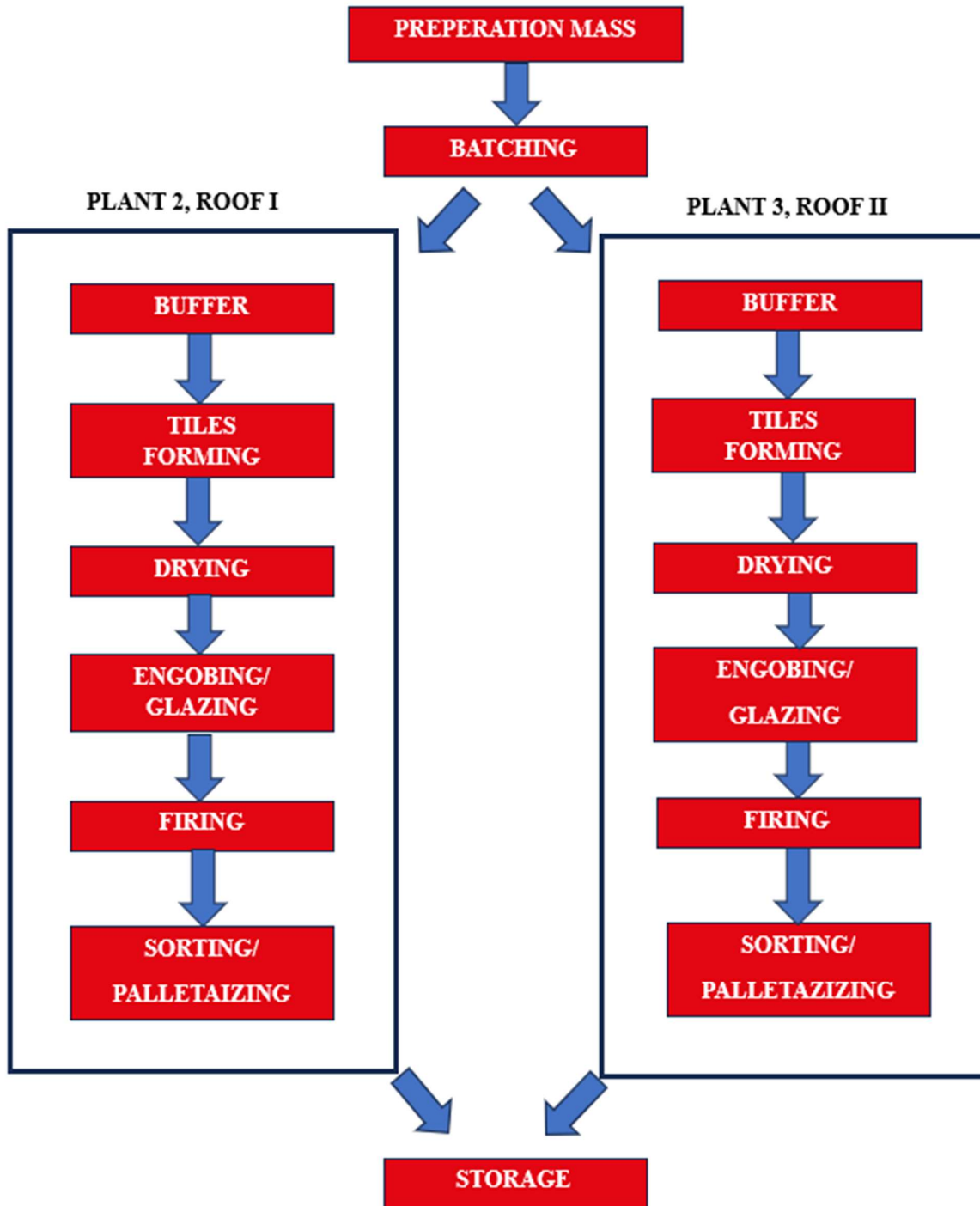


Fig. 1: The production diagram of ceramic tiles by Röben Polska Sp. z o.o. and Wspólnicy Sp.K.



BERGAMO
CERAMIC ROOF TILES

Modern ceramic
roof covering



Ceramic tiles BERGAMO is a flat tile. It is distinguished by its minimalist form - an excellent choice for fans of modern architecture who appreciate minimalism, harmonious shapes and high quality. It is suitable for roof pitches of 25° and more. Tile weight approx. 3.95 kg..

Technical data - ceramic tiles Röben BERGAMO:

Base characteristics	Performance characteristics
Weight 1 piece	ok. 3,95 kg
Dimension	ok. 43,6x28,5 cm
Quantity per m ²	ok. 11,8-12,8 piece
Min. angle of roofs	od 25°
Weight m ²	ok. 48,5 kg
Frost resistance	Yes



PIEMONT
CERAMIC ROOF TILES

Perfect for new
and renovated roofs



Ceramic tiles PIEMONT is suitable for any type of roof. Its specially shaped locks allow for a large tolerance between maximum retraction and retraction of 38 mm. It can be used on a renovated roof without the need to replace the existing rafter framing. Tile weight approx. 3.97 kg.

Technical data - ceramic tiles Röben PIEMONT:

Base characteristics	Performance characteristics
Weight 1 piece	ok. 3,97 kg
Dimension	ok. 47,2x29,0 cm
Quantity per m ²	ok. 10,1-11,2 piece
Min. angle of roofs	od 22°
Weight m ²	ok. 40,1-44,5 kg
Frost resistance	Yes



MONZA

CERAMIC ROOF TILES

Fast and economical
roof covering



Ceramic tiles MONZA has an enlarged format, which allows for an efficient and quick installation while speeding up roofing work. There are only about 9.5 pieces per 1 m². There are additional serrations at the side edge of the tile, which guarantee a more solid and stable fastening of the tile to the batten. Weight of one piece approx. 4,07 kg.

Technical data - ceramic tiles Röben MONZA:

Base characteristics	Performance characteristics
Weight 1 piece	ok. 4,07 kg
Dimension	Ok. 46,4x30,4 cm
Quantity per m ²	ok. 9,4-9,9 piece
Min. angle of roofs	od 22°
Weight m ²	ok. 38,3-40,3 kg
Frost resistance	Yes



MILANO
CERAMIC ROOF TILES

Classic shape, versatile use



Ceramic tiles MILANO commonly called Dutch - it has the shape of the letter "S". It is an excellent option for renovated roofs due to its large sliding tolerance of up to 41 mm. It works well in places exposed to strong wind. It is intended for roofs with a minimum inclination angle of 22°. Weight of 1 piece: approx. 3.9 kg.

Technical data - ceramic tiles Röben MILANO:

Base characteristics	Performance characteristics
Weight 1 piece	ok. 3,90 kg
Dimension	Ok. 46,6x30,6 cm
Quantity per m ²	ok. 10,3-11,5 piece
Min. angle of roofs	od 22°
Weight m ²	ok. 40,2-44,9 kg
Frost resistance	Yes



3. LCA: CALCULATION RULES

System boundaries

The life cycle analysis of the tested products includes A1-A3, A4, A5, C1-C4 and D (Cradle to Gate with options) modules in accordance with PN-EN 15804. It includes the following modules:

- “ A1 – extraction and preparation of raw materials, generation of electricity and Energy carriers for auxiliary processes,
- “ A2 – transport raw materials to the gate of the production plant,
- “ A3 – production, including ancillary processes and emissions,
- “ A4 – transport to the building site,
- “ A5 – installation into the building,
- “ C1 – deconstruction/demolition,
- “ C2 – transport to the waste processing facility,
- “ C3 – processing of waste material,
- “ C4 – treatment of waste material,
- “ D – re-use potential.

Data collection period

Data on the production process was collected in the years 2022-2023 (in the period 01.03.2022 to 28.02.2023).

Declared unit (DU)

Due to negligible differences between the two groups of products, the declared unit of 1 kg ceramic tiles BERGAMO, PIEMONTE, MONZA, MILANO produced by Röben Polska Sp. z o.o. and Wspólnicy Sp.K. in Środa Śląska.

Assumptions

A1 – extraction and consumption of raw materials refers to specific mass shares in the production process per declared unit 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 raw materials delivery.

A3 – values of CO₂, NO_x, SO₂, dust and other emissions from the production process obtained as a result of measurements carried out at the plant, other estimated on the basis of fuel consumption.

A4 - transport is carried out using trucks with a capacity of 16-32 tonnes meeting EURO 6 emission standards, average distance from plant to customer 100 km.

A5 - the consumption of energy and other raw materials in this module has been omitted due to negligible values.

C1 – describes the disassembly/dismantling of the material. Data is collected on the basis of a developed scenario. A preliminary sorting of the material takes place at the demolition site. The dismantling of the ceramic tiles does not require energy and material input, and manual dismantling is possible. The impact of these operations is so low that the environmental impact of C1 is neglected.

C2 – it is assumed that pre-sorted waste from the demolition of ceramic tiles is always transported to a waste recovery or disposal facility. Data is collected based on the scenario developed.

C3 – Takes into account the environmental impact during the treatment of construction and demolition waste containing ceramic tiles at the waste recovery facility. Data is collected based on a developed scenario.



C4 – should consider the impact of landfilled construction debris containing ceramic tiles. Landfill operations are not considered in the developed scenario as the waste is not a worthless waste, is recyclable and should not go to municipal landfill.

D – addresses the impact and effects of using secondary material. For ceramic tiles, 100% of the product is assumed to be recycled.

Cut-off criteria

99% of all mass flows involved in the production process were taken into account.

All the energy used in the process has been taken into account in the EPD.

General data

Data for calculations come from Ecoinvent v. 3.9. and KOBIZE 2023. Emission factors for electricity were determined using actual KOBIZE 2023 data. A detailed analysis of data quality was part of the external audit.

Allocation

All data provided by the manufacturer have been referred to the declared unit (DU) of the product – 1 kg of ceramic tiles produced by company Röben Polska Sp. z o.o. and Wspólnicy Sp.K. in Śródzie Śląskiej.

4. LCA: SCENERIOS AND ADDITIONAL TECHNICAL DATA

For the life cycle analysis of the products covered by the environmental statement in terms of 'Cradle to gate with options', scenarios were developed for modules A4, A5 and C1, C2, C3,C4 and D:

Module A4:

Transport is carried out with trucks of 16-32 tonnes meeting EURO 6 emission standards, Average distance from plant to customer 100 km.

Module A5:

The consumption of energy and other raw materials in this module has been omitted due to negligible values.



Module C1:

At the end of its useful life, the product is disassembled manually. The impact of this module can therefore be assumed to be zero.

Module C2:

Transport of waste containing ceramic tiles is directed to a recovery facility (recycling plant).

In order to calculate the impact of this module, the following assumptions were made:

- 100% of the waste mass is transported to the recovery facility as part of waste 17 01 01 (construction rubble),
- transport is carried out using dump trucks with a capacity of 7.5 - 16 tonnes, meeting EURO 6 emission standards
- the material is transported to a waste treatment site located within 100 km of the demolition site.

Module C3:

Waste treatment, e.g. collection of waste fractions from demolition and treatment of material streams for reuse, recycling and energy recovery. On the basis of national experience, it is assumed that ceramic tiles can be classified as construction rubble waste. As building rubble is a valuable waste, it is therefore recyclable. The following processes were assumed for the calculations: unloading (loader), crushing (crusher).

Module C4:

Should take into account the impact of stored construction rubble containing ceramic tiles. Storage operations are not considered in the developed scenario. Construction waste, including construction rubble, can be recovered and recycled, allowing materials to be reused, reducing waste and reducing environmental impacts. This approach is in line with the principles of sustainability and resource efficiency. This not only reduces the burden on landfills, but also saves natural resources and reduces emissions associated with the production of new building materials.

Module D

For ceramic tiles, 100% of the product is assumed to be recycled.



5. LCA: RESULTS

The table below shows the LCA modules included 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			Products stage		Products stage							Products stage				Products stage
Raw material supply	Raw material supply	Raw material supply	Raw material supply	Raw material supply	Raw material supply	Raw material supply	Raw material supply	Raw material supply	Raw material supply	Raw material supply	Raw material supply	Raw material supply	Raw material supply	Raw material supply	Raw material supply	Raw material supply
A1	A1	A1	A1	A1	A1	A1	A1	A1	A1	A1	A1	A1	A1	A1	A1	A1
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

The following tables present the results of the LCA analysis for ceramic tiles. Explanations of the abbreviations used to describe the impact categories are given 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-terrestrial	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



CORE ENVIRONMENTAL IMPACT INDICATORS: 1 kg Roben Bergamo											
	Life Cycle Stage										
Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
GWP-total	kg CO ₂ eq.	1,13E-02	2,59E-02	2,54E-01	1,63E-02	0,00E+00	0,00E+00	2,13E-02	5,91E-02	0,00E+00	-3,58E-03
GWP-fossil	kg CO ₂ eq.	1,12E-02	2,59E-02	2,81E-01	1,63E-02	0,00E+00	0,00E+00	2,13E-02	5,90E-02	0,00E+00	-3,57E-03
GWP-biogenic	kg CO ₂ eq.	6,89E-05	2,24E-05	-2,75E-02	1,41E-05	0,00E+00	0,00E+00	1,94E-05	1,31E-04	0,00E+00	-1,08E-05
GWP-luluc	kg CO ₂ eq.	1,11E-05	1,04E-05	1,40E-04	6,51E-06	0,00E+00	0,00E+00	1,01E-05	9,93E-06	0,00E+00	-3,55E-07
ODP	kg CFC11 eq.	1,59E-09	5,99E-09	2,77E-08	3,77E-09	0,00E+00	0,00E+00	4,81E-09	6,58E-09	0,00E+00	-7,32E-10
AP	mol H+ eq.	9,30E-05	7,35E-05	6,87E-04	4,63E-05	0,00E+00	0,00E+00	6,04E-05	5,17E-04	0,00E+00	-3,63E-05
EP-freshwater	kg PO ₄ eq.	3,38E-06	1,70E-06	1,34E-04	1,07E-06	0,00E+00	0,00E+00	1,61E-06	3,81E-05	0,00E+00	-1,64E-07
EP-marine	kg N eq.	2,54E-05	1,49E-05	1,50E-04	9,40E-06	0,00E+00	0,00E+00	1,18E-05	1,64E-04	0,00E+00	-1,57E-05
EP-terrestrial	mol N eq.	3,18E-04	1,63E-04	1,38E-03	1,02E-04	0,00E+00	0,00E+00	1,28E-04	1,73E-03	0,00E+00	-1,72E-04
POCP	kg NMVOC eq.	8,14E-05	6,25E-05	4,23E-04	3,94E-05	0,00E+00	0,00E+00	4,93E-05	4,76E-04	0,00E+00	-4,79E-05
ADP-minerals & metals	kg Sb eq.	3,96E-07	9,20E-08	2,80E-07	5,77E-08	0,00E+00	0,00E+00	9,77E-08	2,84E-08	0,00E+00	-1,84E-09
ADP-fossil	MJ	1,44E-01	3,92E-01	4,17E+00	2,47E-01	0,00E+00	0,00E+00	3,19E-01	7,26E-01	0,00E+00	-4,80E-02
WDP	WDP (m ³) swiat. ekw	2,85E-02	1,19E-03	1,49E-02	7,52E-04	0,00E+00	0,00E+00	1,06E-03	4,70E-03	0,00E+00	-7,57E-05
ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS: 1 kg Roben Bergamo											
	Life Cycle Stage										
Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
PM	Disease incidence	1,63E-09	2,08E-09	2,89E-09	1,31E-09	0,00E+00	0,00E+00	1,46E-09	8,40E-09	0,00E+00	-9,55E-10
IRP	kBq U235 eq.	1,08E-03	2,02E-03	4,54E-03	1,27E-03	0,00E+00	0,00E+00	1,70E-03	2,65E-03	0,00E+00	-2,13E-04
ETP-fw	CTUe	3,38E-06	1,70E-06	1,34E-04	1,07E-06	0,00E+00	0,00E+00	1,61E-06	3,81E-05	0,00E+00	-1,64E-07
HTP-c	CTUh	2,43E-11	9,92E-12	8,08E-11	6,23E-12	0,00E+00	0,00E+00	9,41E-12	1,83E-11	0,00E+00	-1,13E-12
HTP-nc	CTUh	6,29E-10	3,11E-10	1,66E-09	1,96E-10	0,00E+00	0,00E+00	2,52E-10	6,05E-10	0,00E+00	-3,17E-11
SQP	-	7,50E-01	2,73E-01	3,28E+00	1,72E-01	0,00E+00	0,00E+00	1,89E-01	1,12E-01	0,00E+00	-6,29E-03
PARAMETERS DESCRIBING RESOURCE: 1 kg Roben Bergamo											
	Life Cycle Stage										
Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	1,01E-02	5,63E-03	6,72E-01	3,54E-03	0,00E+00	0,00E+00	5,42E-03	2,65E-02	0,00E+00	-2,98E-04
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	0,00E+00	0,00E+00
PERT	MJ	1,01E-02	5,63E-03	6,72E-01	3,54E-03	0,00E+00	0,00E+00	5,42E-03	2,65E-02	0,00E+00	-2,98E-04
PEN-RE	MJ	1,49E-01	4,08E-01	4,76E+00	2,57E-01	0,00E+00	0,00E+00	3,32E-01	8,48E-01	0,00E+00	-5,07E-02
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	0,00E+00	0,00E+00
PENRT	MJ	1,49E-01	4,08E-01	4,76E+00	2,57E-01	0,00E+00	0,00E+00	3,32E-01	8,48E-01	0,00E+00	-5,07E-02
SM	kg	0,00E+00	0,00E+00	1,30E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,00E-01	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	0,00E+00	1,89E-01
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	0,00E+00	0,00E+00
FW	m ³	8,52E-05	6,27E-05	4,18E-03	4,45E-05	0,00E+00	0,00E+00	7,23E-05	2,43E-02	0,00E+00	-7,96E-06
ENVIRONMENTAL INFORMATION DESCRIBING WASTE AND OUTPUT FLOWS: 1 kg Roben Bergamo											
	Life Cycle Stage										
Indicator	Unit (expressed per DU)	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste	kg	WN	WN	2,32E-08	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00



Non-hazardous waste	kg	WN	WN	4,02E-06	0,00E+00	0,00E+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	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	0,00E+00	0,00E+00
Materials for recycling	kg	WN	WN	1,30E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,00E-01	0,00E+00	0,00E+00
Materials for energy recovery	kg	WN	WN	2,43E-02	0,00E+00	0,00E+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	0,00E+00	0,00E+00	1,89E-01

CARBON ORGANIC

Contents organic carbon in product (kg C_{org}) **0,00E+00**

Contents organic carbon in packaging (kg C_{org}) **1,19E-02**

CORE ENVIRONMENTAL IMPACT INDICATORS: 1 kg Roben Piemont

Indicator	Unit	Life Cycle Stage									
		A1	A2	A3	A4	A5	C1	C2	C3	C4	D
GWP-total	kg CO ₂ eq.	1,27E-02	2,60E-02	2,53E-01	1,63E-02	0,00E+00	0,00E+00	2,14E-02	5,91E-02	0,00E+00	-3,58E-03
GWP-fossil	kg CO ₂ eq.	1,26E-02	2,60E-02	2,81E-01	1,63E-02	0,00E+00	0,00E+00	2,13E-02	5,90E-02	0,00E+00	-3,57E-03
GWP-biogenic	kg CO ₂ eq.	6,99E-05	2,25E-05	-2,89E-02	1,41E-05	0,00E+00	0,00E+00	1,94E-05	1,31E-04	0,00E+00	-1,08E-05
GWP-luluc	kg CO ₂ eq.	1,16E-05	1,04E-05	1,42E-04	6,51E-06	0,00E+00	0,00E+00	1,01E-05	9,93E-06	0,00E+00	-3,55E-07
ODP	kg CFC11 eq.	1,87E-09	6,02E-09	2,78E-08	3,77E-09	0,00E+00	0,00E+00	4,81E-09	6,58E-09	0,00E+00	-7,32E-10
AP	mol H+ eq.	9,65E-05	7,39E-05	6,88E-04	4,63E-05	0,00E+00	0,00E+00	6,04E-05	5,17E-04	0,00E+00	-3,63E-05
EP-freshwater	kg PO ₄ eq.	3,47E-06	1,71E-06	1,34E-04	1,07E-06	0,00E+00	0,00E+00	1,61E-06	3,81E-05	0,00E+00	-1,64E-07
EP-marine	kg N eq.	2,61E-05	1,50E-05	1,50E-04	9,40E-06	0,00E+00	0,00E+00	1,18E-05	1,64E-04	0,00E+00	-1,57E-05
EP-terrestrial	mol N eq.	3,26E-04	1,63E-04	1,38E-03	1,02E-04	0,00E+00	0,00E+00	1,28E-04	1,73E-03	0,00E+00	-1,72E-04
POCP	kg NMVOC eq.	8,42E-05	6,28E-05	4,25E-04	3,94E-05	0,00E+00	0,00E+00	4,93E-05	4,76E-04	0,00E+00	-4,79E-05
ADP-minerals & metals	kg Sb eq.	4,02E-07	9,25E-08	2,82E-07	5,77E-08	0,00E+00	0,00E+00	9,77E-08	2,84E-08	0,00E+00	-1,84E-09
ADP-fossil	MJ	1,62E-01	3,94E-01	4,18E+00	2,47E-01	0,00E+00	0,00E+00	3,19E-01	7,26E-01	0,00E+00	-4,80E-02
WDP	WDP (m ³) świat. ekw.	2,85E-02	1,20E-03	1,51E-02	7,52E-04	0,00E+00	0,00E+00	1,06E-03	4,70E-03	0,00E+00	-7,57E-05

ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS: 1 kg Roben Piemont

Indicator	Unit	Life Cycle Stage									
		A1	A2	A3	A4	A5	C1	C2	C3	C4	D
PM	Disease incidence	1,71E-09	2,09E-09	2,91E-09	1,31E-09	0,00E+00	0,00E+00	1,46E-09	8,40E-09	0,00E+00	-9,55E-10
IRP	kBq U235 eq.	1,17E-03	2,03E-03	4,58E-03	1,27E-03	0,00E+00	0,00E+00	1,70E-03	2,65E-03	0,00E+00	-2,13E-04
ETP-fw	CTUe	3,47E-06	1,71E-06	1,34E-04	1,07E-06	0,00E+00	0,00E+00	1,61E-06	3,81E-05	0,00E+00	-1,64E-07
HTP-c	CTUh	2,48E-11	9,97E-12	8,27E-11	6,23E-12	0,00E+00	0,00E+00	9,41E-12	1,83E-11	0,00E+00	-1,13E-12
HTP-nc	CTUh	6,41E-10	3,13E-10	1,66E-09	1,96E-10	0,00E+00	0,00E+00	2,52E-10	6,05E-10	0,00E+00	-3,17E-11
SQP	-	7,60E-01	2,74E-01	3,40E+00	1,72E-01	0,00E+00	0,00E+00	1,89E-01	1,12E-01	0,00E+00	-6,29E-03

PARAMETERS DESCRIBING RESOURCE: 1 kg Róben Piemont

Life Cycle Stage											
Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	1,04E-02	5,66E-03	6,94E-01	3,54E-03	0,00E+00	0,00E+00	5,42E-03	2,65E-02	0,00E+00	-2,98E-04
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	0,00E+00	0,00E+00
PERT	MJ	1,04E-02	5,66E-03	6,94E-01	3,54E-03	0,00E+00	0,00E+00	5,42E-03	2,65E-02	0,00E+00	-2,98E-04
PEN-RE	MJ	1,69E-01	4,10E-01	4,76E+00	2,57E-01	0,00E+00	0,00E+00	3,32E-01	8,48E-01	0,00E+00	-5,07E-02
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	0,00E+00	0,00E+00
PENRT	MJ	1,69E-01	4,10E-01	4,76E+00	2,57E-01	0,00E+00	0,00E+00	3,32E-01	8,48E-01	0,00E+00	-5,07E-02
SM	kg	0,00E+00	0,00E+00	1,30E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,00E-01	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	0,00E+00	1,97E-01
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	0,00E+00	0,00E+00
FW	m ³	8,76E-05	6,30E-05	4,18E-03	3,94E-05	0,00E+00	0,00E+00	6,40E-05	2,43E-02	0,00E+00	-7,55E-06

ENVIRONMENTAL INFORMATION DESCRIBING WASTE AND OUTPUT FLOWS: 1 kg Róben Piemont

Life Cycle Stage											
Indicator	Unit (expressed per DU)	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste	kg	WN	WN	2,32E-08	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Non-hazardous waste	kg	WN	WN	4,02E-06	0,00E+00	0,00E+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	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	0,00E+00	0,00E+00
Materials for recycling Materials for energy recovery	kg	WN	WN	1,30E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,00E-01	0,00E+00	0,00E+00
Materials for recycling	kg	WN	WN	2,54E-02	0,00E+00	0,00E+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	0,00E+00	0,00E+00	1,97E-01

CARBON ORGANIC

Contents organic carbon in product (kg C_{org}) **0,00E+00**

Contents organic carbon in packaging (kg C_{org}) **1,24E-02**



CORE ENVIRONMENTAL IMPACT INDICATORS: 1 kg Roben Monza											
Life Cycle Stage											
Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
GWP-total	kg CO ₂ eq.	1,31E-02	2,60E-02	2,85E-01	1,63E-02	0,00E+00	0,00E+00	2,14E-02	5,91E-02	0,00E+00	-3,58E-03
GWP-fossil	kg CO ₂ eq.	1,30E-02	2,60E-02	3,14E-01	1,63E-02	0,00E+00	0,00E+00	2,13E-02	5,90E-02	0,00E+00	-3,57E-03
GWP-biogenic	kg CO ₂ eq.	6,91E-05	2,25E-05	-2,91E-02	1,41E-05	0,00E+00	0,00E+00	1,94E-05	1,31E-04	0,00E+00	-1,08E-05
GWP-luluc	kg CO ₂ eq.	1,16E-05	1,04E-05	1,38E-04	6,51E-06	0,00E+00	0,00E+00	1,01E-05	9,93E-06	0,00E+00	-3,55E-07
ODP	kg CFC11 eq.	1,95E-09	6,02E-09	3,34E-08	3,77E-09	0,00E+00	0,00E+00	4,81E-09	6,58E-09	0,00E+00	-7,32E-10
AP	mol H ⁺ eq.	9,74E-05	7,38E-05	6,94E-04	4,63E-05	0,00E+00	0,00E+00	6,04E-05	5,17E-04	0,00E+00	-3,63E-05
EP-freshwater	kg PO ₄ eq.	3,46E-06	1,71E-06	1,28E-04	1,07E-06	0,00E+00	0,00E+00	1,61E-06	3,81E-05	0,00E+00	-1,64E-07
EP-marine	kg N eq.	2,63E-05	1,50E-05	1,54E-04	9,40E-06	0,00E+00	0,00E+00	1,18E-05	1,64E-04	0,00E+00	-1,57E-05
EP-terrestrial	mol N eq.	3,27E-04	1,63E-04	1,43E-03	1,02E-04	0,00E+00	0,00E+00	1,28E-04	1,73E-03	0,00E+00	-1,72E-04
POCP	kg NMVOC eq.	8,49E-05	6,28E-05	4,46E-04	3,94E-05	0,00E+00	0,00E+00	4,93E-05	4,76E-04	0,00E+00	-4,79E-05
ADP-minerals & metals	kg Sb eq.	4,03E-07	9,24E-08	2,80E-07	5,77E-08	0,00E+00	0,00E+00	9,77E-08	2,84E-08	0,00E+00	-1,84E-09
ADP-fossil	MJ	1,67E-01	3,94E-01	4,77E+00	2,47E-01	0,00E+00	0,00E+00	3,19E-01	7,26E-01	0,00E+00	-4,80E-02
WDP	WDP (m ³) świat. ekw	1,94E-02	1,20E-03	1,51E-02	7,52E-04	0,00E+00	0,00E+00	1,06E-03	4,70E-03	0,00E+00	-7,57E-05
ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS: 1 kg Roben Monza											
Life Cycle Stage											
Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
PM	Disease incidency	1,73E-09	2,09E-09	3,22E-09	1,31E-09	0,00E+00	0,00E+00	1,46E-09	8,40E-09	0,00E+00	-9,55E-10
IRP	kBq U235 eq.	1,18E-03	2,03E-03	5,70E-03	1,27E-03	0,00E+00	0,00E+00	1,70E-03	2,65E-03	0,00E+00	-2,13E-04
ETP-fw	CTUe	3,46E-06	1,71E-06	1,59E-04	1,07E-06	0,00E+00	0,00E+00	1,61E-06	3,81E-05	0,00E+00	-1,64E-07
HTP-c	CTUh	2,49E-11	9,96E-12	9,58E-11	6,23E-12	0,00E+00	0,00E+00	9,41E-12	1,83E-11	0,00E+00	-1,13E-12
HTP-nc	CTUh	6,44E-10	3,13E-10	2,17E-09	1,96E-10	0,00E+00	0,00E+00	2,52E-10	6,05E-10	0,00E+00	-3,17E-11
SQP	-	7,63E-01	2,74E-01	3,45E+00	1,72E-01	0,00E+00	0,00E+00	1,89E-01	1,12E-01	0,00E+00	-6,29E-03
PARAMETERS DESCRIBING RESOURCE: 1 kg Roben Monza											
Life Cycle Stage											
Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	1,03E-02	5,66E-03	6,91E-01	3,54E-03	0,00E+00	0,00E+00	5,42E-03	2,65E-02	0,00E+00	-2,98E-04
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	0,00E+00	0,00E+00
PERT	MJ	1,03E-02	5,66E-03	6,91E-01	3,54E-03	0,00E+00	0,00E+00	5,42E-03	2,65E-02	0,00E+00	-2,98E-04
PEN-RE	MJ	1,74E-01	4,10E-01	5,39E+00	2,57E-01	0,00E+00	0,00E+00	3,32E-01	8,48E-01	0,00E+00	-5,07E-02
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	0,00E+00	0,00E+00
PENRT	MJ	1,74E-01	4,10E-01	5,39E+00	2,57E-01	0,00E+00	0,00E+00	3,32E-01	8,48E-01	0,00E+00	-5,07E-02
SM	kg	0,00E+00	0,00E+00	1,30E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,00E-01	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	0,00E+00	1,97E-01
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	0,00E+00	0,00E+00
FW	m ³	8,48E-05	6,30E-05	4,03E-03	3,94E-05	0,00E+00	0,00E+00	6,40E-05	2,43E-02	0,00E+00	-7,55E-06
ENVIRONMENTAL INFORMATION DESCRIBING WASTE AND OUTPUT FLOWS: 1 kg Roben Monza											
Life Cycle Stage											
Indicator	Unit (expressed per DU)	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste	kg	WN	WN	2,32E-08	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00



Non-hazardous waste	kg	WN	WN	4,57E-06	0,00E+00	0,00E+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	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	0,00E+00	0,00E+00
Materials for recycling Materials for energy recovery	kg	WN	WN	1,30E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,00E-01	0,00E+00	0,00E+00
Materials for recycling	kg	WN	WN	2,53E-02	0,00E+00	0,00E+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	0,00E+00	0,00E+00	1,97E-01

CARBON ORGANIC

Contents organic carbon in product (kg C_{org})	0,00E+00
Contents organic carbon in packaging (kg C_{org})	1,24E-02

CORE ENVIRONMENTAL IMPACT INDICATORS: 1 kg Roben Milano

Indicator	Unit	Life Cycle Stage									
		A1	A2	A3	A4	A5	C1	C2	C3	C4	D
GWP-total	kg CO ₂ eq.	1,24E-02	2,63E-02	2,85E-01	1,63E-02	0,00E+00	0,00E+00	2,13E-02	5,91E-02	0,00E+00	-3,58E-03
GWP-fossil	kg CO ₂ eq.	1,24E-02	2,62E-02	3,14E-01	1,63E-02	0,00E+00	0,00E+00	2,13E-02	5,90E-02	0,00E+00	-3,57E-03
GWP-biogenic	kg CO ₂ eq.	6,87E-05	2,27E-05	-2,92E-02	1,41E-05	0,00E+00	0,00E+00	1,94E-05	1,31E-04	0,00E+00	-1,08E-05
GWP-luluc	kg CO ₂ eq.	1,14E-05	1,05E-05	1,39E-04	6,51E-06	0,00E+00	0,00E+00	1,01E-05	9,93E-06	0,00E+00	-3,55E-07
ODP	kg CFC11 eq.	1,83E-09	6,08E-09	3,34E-08	3,77E-09	0,00E+00	0,00E+00	4,81E-09	6,58E-09	0,00E+00	-7,32E-10
AP	mol H+ eq.	9,58E-05	7,46E-05	6,94E-04	4,63E-05	0,00E+00	0,00E+00	6,04E-05	5,17E-04	0,00E+00	-3,63E-05
EP-freshwater	kg PO ₄ eq.	3,42E-06	1,72E-06	1,28E-04	1,07E-06	0,00E+00	0,00E+00	1,61E-06	3,81E-05	0,00E+00	-1,64E-07
EP-marine	kg N eq.	2,60E-05	1,51E-05	1,54E-04	9,40E-06	0,00E+00	0,00E+00	1,18E-05	1,64E-04	0,00E+00	-1,57E-05
EP-terrestrial	mol N eq.	3,24E-04	1,65E-04	1,43E-03	1,02E-04	0,00E+00	0,00E+00	1,28E-04	1,73E-03	0,00E+00	-1,72E-04
POCP	kg NMVOC eq.	8,37E-05	6,34E-05	4,46E-04	3,94E-05	0,00E+00	0,00E+00	4,92E-05	4,76E-04	0,00E+00	-4,79E-05
ADP-minerals & metals	kg Sb eq.	4,01E-07	9,35E-08	2,80E-07	5,77E-08	0,00E+00	0,00E+00	9,76E-08	2,84E-08	0,00E+00	-1,84E-09
ADP-fossil	MJ	1,59E-01	3,98E-01	4,78E+00	2,47E-01	0,00E+00	0,00E+00	3,19E-01	7,26E-01	0,00E+00	-4,80E-02
WDP	WDP (m ³) świat. ekw	1,94E-02	1,21E-03	1,52E-02	7,52E-04	0,00E+00	0,00E+00	1,06E-03	4,70E-03	0,00E+00	-7,57E-05

ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS: 1 kg Roben Milano

Indicator	Unit	Life Cycle Stage									
		A1	A2	A3	A4	A5	C1	C2	C3	C4	D
PM	Disease incidence	1,70E-09	2,11E-09	2,90E-09	1,31E-09	0,00E+00	0,00E+00	1,46E-09	8,40E-09	0,00E+00	-9,55E-10
IRP	kBq U235 eq.	1,14E-03	2,05E-03	4,92E-03	1,27E-03	0,00E+00	0,00E+00	1,70E-03	2,65E-03	0,00E+00	-2,13E-04
ETP-fw	CTUe	3,42E-06	1,72E-06	1,28E-04	1,07E-06	0,00E+00	0,00E+00	1,61E-06	3,81E-05	0,00E+00	-1,64E-07
HTP-c	CTUh	2,47E-11	1,01E-11	8,49E-11	6,23E-12	0,00E+00	0,00E+00	9,41E-12	1,83E-11	0,00E+00	-1,13E-12



HTP-nc	CTUh	6,39E-10	3,16E-10	1,62E-09	1,96E-10	0,00E+00	0,00E+00	2,52E-10	6,05E-10	0,00E+00	-3,17E-11
SQP	-	7,58E-01	2,77E-01	3,41E+00	1,72E-01	0,00E+00	0,00E+00	1,89E-01	1,12E-01	0,00E+00	-6,29E-03

PARAMETERS DESCRIBING RESOURCE: 1 kg Roben Milano

Life Cycle Stage											
Indicator	Unit	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	1,02E-02	5,72E-03	6,93E-01	3,54E-03	0,00E+00	0,00E+00	5,41E-03	2,65E-02	0,00E+00	-2,98E-04
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	0,00E+00	0,00E+00
PERT	MJ	1,02E-02	5,72E-03	6,93E-01	3,54E-03	0,00E+00	0,00E+00	5,41E-03	2,65E-02	0,00E+00	-2,98E-04
PEN-RE	MJ	1,65E-01	4,14E-01	5,39E+00	2,57E-01	0,00E+00	0,00E+00	3,31E-01	8,48E-01	0,00E+00	-5,07E-02
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	0,00E+00	0,00E+00
PENRT	MJ	1,65E-01	4,14E-01	5,39E+00	2,57E-01	0,00E+00	0,00E+00	3,31E-01	8,48E-01	0,00E+00	-5,07E-02
SM	kg	0,00E+00	0,00E+00	1,30E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,00E-01	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	0,00E+00	1,98E-01
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	0,00E+00	0,00E+00
FW	m ³	8,37E-05	6,37E-05	4,03E-03	3,94E-05	0,00E+00	0,00E+00	6,39E-05	2,43E-02	0,00E+00	-7,55E-06

ENVIRONMENTAL INFORMATION DESCRIBING WASTE AND OUTPUT FLOWS: 1 kg Roben Milano

Life Cycle Stage											
Indicator	Unit (expressed per DU)	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste	kg	WN	WN	2,32E-08	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Non-hazardous waste	kg	WN	WN	4,02E-06	0,00E+00	0,00E+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	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	0,00E+00	0,00E+00
Materials for recycling Materials for energy recovery	kg	WN	WN	1,30E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,00E-01	0,00E+00	0,00E+00
Materials for recycling	kg	WN	WN	2,54E-02	0,00E+00	0,00E+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	0,00E+00	0,00E+00	1,98E-01

CARBON ORGANIC

Contents organic carbon in product (kg C_{org})	0,00E+00
Contents organic carbon in packaging (kg C_{org})	1,24E-02



6. INTERPRETATION OF LCA

Figures 2, 3, 4 and 5 show contributions of the each life cycl module to the basic impact categories for ceramic tiles Röben BERGAMO, Röben PIEMONTE, Röben MONZA, Röben MILANO

Fig. 2 Shares of life cycle modules on main categories of influence - Röben BERGAMO:

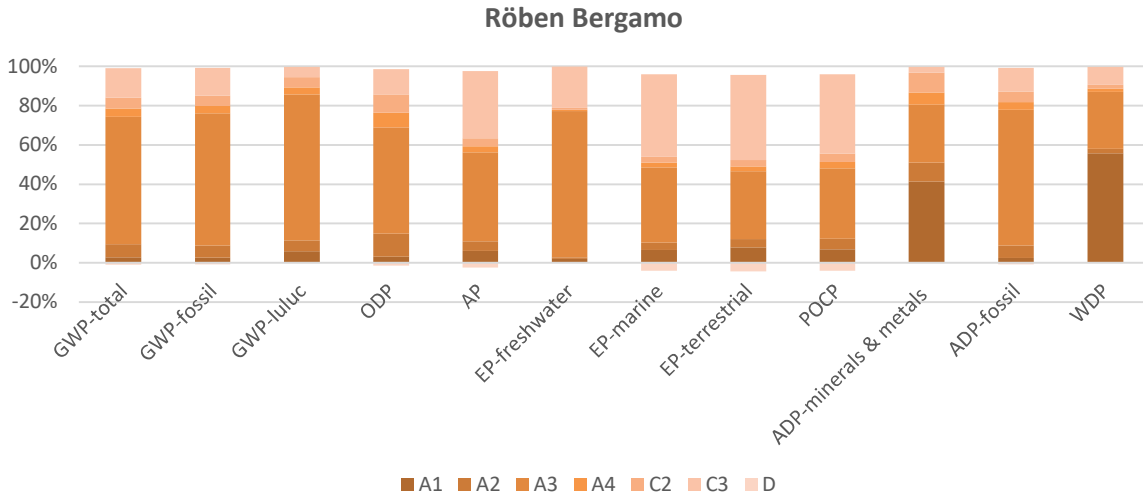


Fig. 3 Shares of life cycle modules on main categories of influence - Röben PIEMONTE:

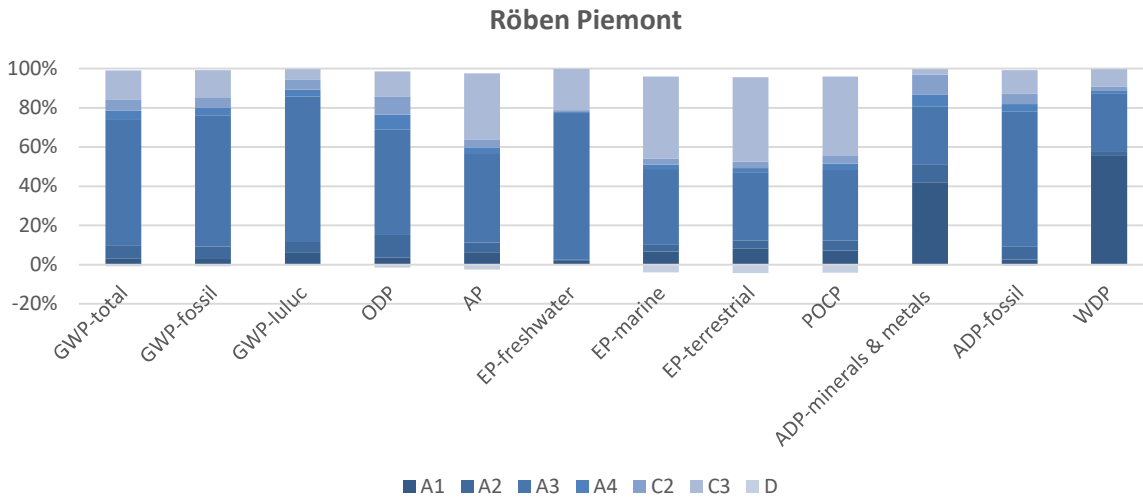


Fig. 4 Shares of life cycle modules on main categories of influence - *Röben MONZA*:

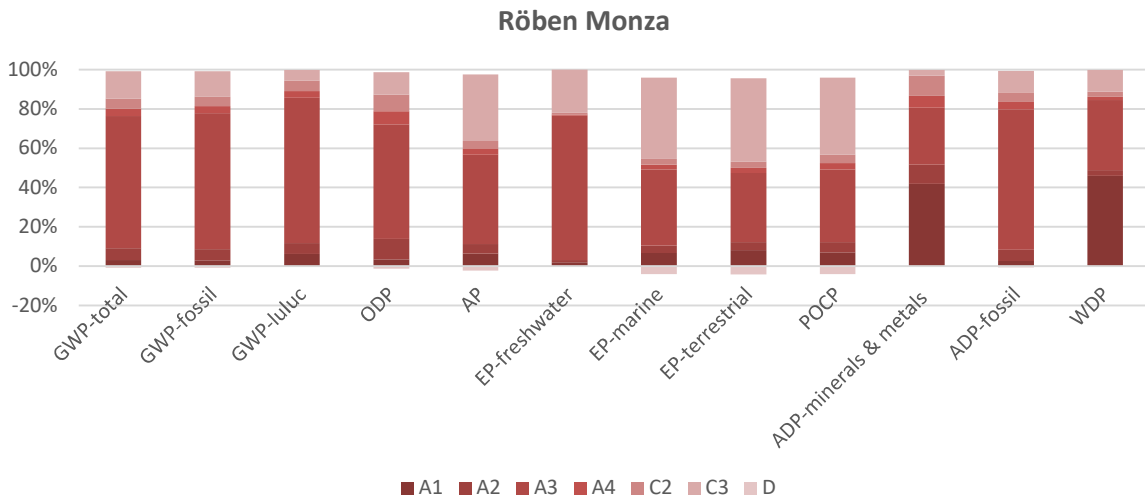
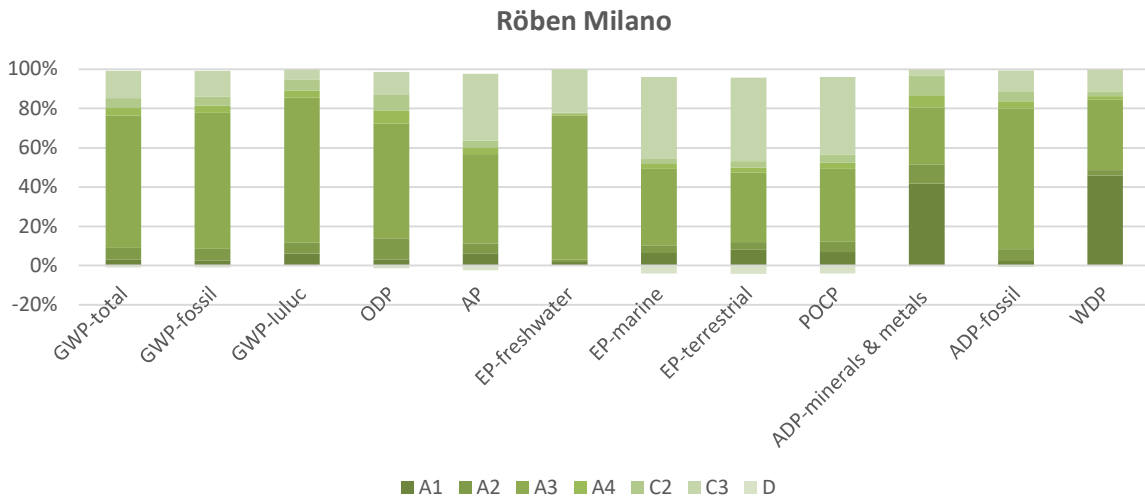





Fig. 5 Shares of life cycle modules on main categories of influence - *Röben MILANO*:



-  The LCA analysis proved that have the greatest impact on the value of the environmental impact indicators is due to production-related processes including auxiliary processes and emissions (A3).

-  Transport to the waste treatment site (module C2) has relatively minor impact on the final values of the LCIA analysis.

-  The waste treatment process (construction debris containing declared products) also has no significant impact on the end result.

LITERATURE

- ✓ PN-EN ISO 14025:2014-04, Environmental labels and declarations – Type III environmental declarations – Rules and procedures.
- ✓ PN-EN 15804+A2:2020, Sustainability of construction works – Environmental product declarations – Basic rules for categorizing construction products.
- ✓ 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.
- ✓ EN 15942:2012, Sustainability of construction works – Environmental product declarations – Communication format business-to-business.
- ✓ Explanatory materials can be found on the manufacturers website: **www.robent.pl**





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PROCESS ENGINEERING RESEARCH GROUP

TYPE III ENVIRONMENTAL DECLARATION CERTIFICATE

no. 02-12/2023

Products:

Ceramic tiles

Owner:

Röben Polska Sp. z o.o. and Wspólnicy Sp.K.

**2 Ceramiczna Str.
55-300 Środa Śląska**

The declaration was developed in accordance with the requirements of the standard:

PN-EN 15804+A2: 2020-03

Sustainability of construction works
Environmental product declarations
Core rules for the product category of construction products

The declaration was verified in accordance with the requirements of the standard:

PN-EN ISO 14025:2010

Environmental labels and declarations
Type III environmental declarations. Principles and procedures

The certificate was issued for the first time on **December,06 2023** and is valid for 5 years or until the said EPD is amended.

**Process Engineering
Research Group Leader**

Ewa Głodek-Bucyk, PhD Eng.



**Director of
Center Of Environmental
Engineering**

Joanna Poluszyńska, PhD

Opole, December 2023