

ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH:
EN 15804+A2 & ISO 14025

EPD holder:
Officine Maccaferri S.p.A.

MACCAFERRI

Issued on 31 December 2025

Valid until 31 December 2030



MacLine GCL W & MacLine GCL N
MacLine GCL WL & MacLine GCL NL
MacForm

GENERAL INFORMATION

EPD OWNER

Manufacturer / EPD Holder	Officine Maccaferri S.p.A.
Address	Via Alberico Albricci, 9 - 20122 Milano (MI) Italy
Contact details	+39 051 6436 000 info.hq@maccaferri.com
Website	www.maccaferri.com

PRODUCT IDENTIFICATION

Product name	MacLine GCL W & MacLine GCL N MacLine GCL WL & MacLine GCL NL MacForm
Place(s) of production	Poland

EPD INFORMATION

EPD Polska program operator	Multicert Sp. z o.o. Ul. Mydlarska 47, 04-690 Warszawa, Poland www.epd.org.pl , epd@epd.org.pl
EPD standards	This EPD is in accordance with EN 15804+A2 and ISO 14025 standards.
Product category rules	The CEN standard EN 15804+A2 serves as the core PCR.
EPD verification	Independent verification of this EPD and data, according to ISO 14025: <input type="checkbox"/> Internal certification <input checked="" type="checkbox"/> External verification
EPD verifier	Izabela Sztamberek-Sochan, Ph.D.
EPD number	EPD-P 09.12.2025
Registration:	EPD Polska www.epd.org.pl
Publishing date	31 December 2025
EPD valid until	31 December 2030
Reasons for performing LCA	B2B
Accountability	The EPD Holder is responsible for the information provided and evidence. Multicert Sp. z o.o. does not hold responsibility for the manufacturer information, life cycle assessment data nor supporting evidence.

EPDs of construction products may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context.

COMPANY INFORMATION

HOLDER OF THE EPD

Officine Maccaferri S.p.A.
Via Alberico Albricci
9 - 20122 Milano (MI)
Italy

Founded in 1879, Officine Maccaferri is specialized in the development of engineering solutions for the civil and environmental construction industry. Its continued growth is based upon long-held values of innovation, integrity, excellent service, and respect for the environment. The vision is to become a leading international provider of advanced solutions to the civil, geotechnical, and environmental construction markets. Officine Maccaferri delivers solutions from retaining walls to hydraulic works and from rockfall mitigation systems to soil reinforcement.

SCOPE OF THIS EPD

This Environmental Product Declaration (EPD) covers specific product groups marketed by Maccaferri, including:

- (i) MacLine GCL geosynthetic clay liners:
 - MacLine GCL W,
 - MacLine GCL N,
 - MacLine GCL WL,
 - MacLine GCL NL, and
- (ii) the MacForm high-performance geocomposite.

The environmental profile declared in this EPD is based on primary data collected from a specific manufacturing facility located in Poland, operating under Maccaferri's quality standards and technical specifications. The LCA dataset reflects the actual production processes, material sources, and energy consumption of this facility, as documented in the underlying LCA study.

This declaration is valid exclusively for products manufactured using the production system (including material sources and process parameters) as documented in the LCA study. This EPD follows a cradle-to-gate system boundary (Modules A1–A3) with end-of-life Modules C1–C4 and Module D, in accordance with EN 15804+A2.

Officine Maccaferri S.p.A. is the owner of this EPD and is responsible for its correct application in the market.

PRODUCT INFORMATION

PRODUCT DESCRIPTION

The products covered by this EPD are MacLine GCL W, MacLine GCL N, MacLine GCL WL and MacLine GCL NL geosynthetic clay liners (GCL), and the MacForm high-performance geocomposite.

MacLine GCL W and MacLine GCL N

MacLine GCL W and MacLine GCL N are high-performance needlepunched geosynthetic clay liners (GCL). They are composite hydraulic barrier products manufactured by placing a layer of sodium bentonite between two geotextile layers and mechanically bonding the structure by needlepunching. The reinforcement creates an integrated fibre-bentonite matrix that improves internal stability and helps maintain consistent barrier performance under typical installation conditions.

Upon contact with water, the bentonite swells to form a low-permeability, self-sealing hydraulic barrier, making it a reliable solution for water containment, landfill liners, and other waterproofing and environmental protection applications.

MacLine GCL WL and MacLine GCL NL

MacLine GCL WL and MacLine GCL NL are needlepunched geosynthetic clay liners (GCL) incorporating an additional polymer film layer applied on one side of the product. This polymer layer complements the bentonite core by providing an enhanced barrier function and an additional protective interface, while retaining the reinforced needlepunched construction characteristic of the MacLine GCL family.

MacForm

MacForm is a high-performance geocomposite consisting of a mineral core integrated within a geosynthetic structure. It is manufactured as a composite product in which the mineral component is contained and stabilised between geotextile layers, creating a durable engineered layer suitable for demanding civil and environmental applications.

Upon contact with water, the mineral blend hydrates and hardens, forming a permanent, rigid layer with high tensile strength and puncture resistance, making it an effective solution for channel lining and erosion control.

Declared unit: 1 m² of the product.

PRODUCT APPLICATION

MacLine GCL W / MacLine GCL N / MacLine GCL WL / MacLine GCL NL

MacLine GCL products are intended for use as hydraulic barrier layers in civil and environmental engineering works. Typical applications include:

- sealing of ponds, lagoons and water retention areas,
- lining of canals and channels,
- barrier layers in earthworks such as embankments, berms and cut-off applications,
- use within containment systems (e.g., as part of basal and capping lining solutions), where a low-permeability layer is required.

The products rely on the swelling behaviour of sodium bentonite to form a low-permeability barrier after hydration. Laminated versions (WL / NL) are typically selected when an enhanced barrier function and additional surface protection are required.

MacForm

MacForm is intended for demanding infrastructure and environmental works where a robust geocomposite layer is required. Typical applications include:

- stabilisation and reinforcement of soil structures,
- creation of a durable technical/protective layer in engineered lining and earthworks systems,
- use in water-related and environmental applications where resistance to mechanical loads and long-term performance are required.

PRODUCT STANDARDS

The products covered by this EPD are manufactured under following standards:

EN 13361 - Geosynthetic barriers - Characteristics required for use in the construction of reservoirs and dams.

EN 13362 -Geosynthetic Barriers - Characteristics required for use in the construction of canals.

EN 13492 -Geosynthetic barriers - Characteristics required for use in the construction of liquid waste disposal sites, transfer stations or secondary containment.

EN 13491- Geosynthetic barriers - Characteristics required for use in the construction of tunnels and associated underground structures.

EN 15382- Geosynthetic barriers - Characteristics required for use in transportation infrastructure.

PRODUCT RAW MATERIAL COMPOSITION

PRODUCT VARIANT	MACLINE GCL W MACLINE GCL N	MACLINE GCL WL MACLINE GCL NL	MacForm
Bentonite	76%	74%	
Polypropylene (nonwoven)	3%	3%	
Polypropylene (woven)	2%	2%	
Tap water	19%	18%	
Polyethylene	-	2%	
Ethylene-vinyl acetate	-	1%	
Cement 33% + mineral aggregate 67%			93%
Polyester			6%
Polypropylene			1%

REACH – SUBSTANCES OF VERY HIGH CONCERN (SVHC)

The products do not contain any REACH SVHC substances in amounts greater than 0,1% (1000 ppm).

PRODUCT LIFE-CYCLE

RAW MATERIALS ACQUISITION AND TRANSPORT (A1, A2)

Modules A1 and A2 address the extraction, processing and transport of raw materials used to manufacture the declared products.

Module A1 covers the upstream lifecycle of raw material production, from the extraction of natural resources through refining and processing, to the delivery of processed materials to the manufacturing site. For MacLine GCL W and MacLine GCL N, the main inputs include bentonite, nonwoven and woven geotextiles, and process water. MacLine GCL WL and MacLine GCL NL additionally incorporate polyethylene (PE) and ethylene-vinyl acetate (EVA) films for lamination. For MacForm, the product consists of a mineral concrete mix reinforced with nonwoven and woven geotextiles.

All materials were modelled using background datasets from the ecoinvent v3.9.1 database. No supplier-specific EPD datasets were applied.

Module A2 includes transport of all raw and intermediate materials to the production site. Transport modelling is based on Polish and European average data for truck and sea freight, using regionalised fuel consumption and emissions datasets from ecoinvent v3.9.1.

Only materials and processes contributing more than 1% of total product mass or environmental impact are included, in line with the cut-off criteria defined in EN 15804+A2.

MANUFACTURING (A3)

Module A3 covers the manufacturing and packaging of the products carried out at the manufacturing facility producing the goods under Maccaferri-defined production requirements.

The process begins with the receipt of qualified raw materials such as bentonite, geotextiles, synthetic components, mineral mixes and polymers. For the MacLine GCL products, the bentonite core is combined with geotextile layers and the assembly is then mechanically bonded by needlepunching, which interlocks the layers and stabilises the structure. Where required, an additional film/laminate layer is applied as a finishing step to enhance the barrier function and improve mechanical robustness. The finished material is then trimmed and converted into the required delivery format, typically cut to size and rolled.

MacForm is produced as a composite geocomposite layer by preparing the mineral core and integrating it within geosynthetic layers to obtain a stable engineered structure, followed by finishing operations to achieve the required dimensions and supply form.

Energy use in this module is based on site-specific production data per declared unit and includes grid electricity consumed by production lines and auxiliary equipment (e.g., conveying/handling systems and other supporting utilities). Any additional on-site energy

carriers and consumables used during manufacturing and packaging (where applicable) are included in the factory data for Module A3.

Manufacturing includes multiple quality assurance checkpoints, covering incoming material preparation, in-process control and final inspection. Key characteristics such as mechanical performance, barrier-related properties (where relevant) and layer uniformity are verified under internal procedures, supported by laboratory testing. Finished batches are labelled to ensure full identification and traceability.

Products are packaged using appropriately selected materials (e.g., protective films, straps, spacers and pallets) to protect them during handling, transport and storage. Production off-cuts and non-conforming materials are managed in line with standard industrial practice; where feasible, recoverable fractions are reused internally, while remaining residues are handled as industrial waste.

END OF LIFE (C1, C2, C3, C4, D)

At the end of life, no dedicated deinstallation or removal processes are carried out for bentonite mats or cementitious mats. These products are either left in situ (in the construction or ground) or are removed together with other mineral construction and demolition waste during standard demolition activities. Indicator values for modules C1-C4 are declared as '0' because the end-of-life scenario assumes the product remains in situ (no activity), in accordance with EN 15804+A2, Clause 7.2.2. Modules C1-C4 are included within the declared system boundary; however, due to the absence of any physical end-of-life activities, they are reported with indicator values equal to zero (0).

Module C4 (disposal). The products covered by this EPD are permanently installed waterproofing and sealing systems that remain integrated with the building structure or embedded in the ground throughout the entire service life and beyond. At end of life, these products are not removed, extracted, or separately processed. They remain in situ as part of the demolished structure or ground material. In accordance with EN 15804+A2, Clause 7.2.2, when no deinstallation, removal, waste processing, or disposal activity occurs, the environmental impacts for module C4 shall be declared as zero ('0'). This scenario reflects the actual end-of-life practice for permanently installed geosynthetic barriers, which are not designed for recovery and do not leave the system boundary as waste requiring active disposal treatment. No re-use, recycling, or energy recovery is involved for the main product. Any potential environmental impacts associated with the long-term presence of these materials in the ground or within demolished structures are outside the scope of this declaration and are not accounted for in modules C1-C4.

Module D (benefits and loads beyond the system boundary) is included where relevant and covers only potential loads and benefits from energy recovery of packaging waste (e.g. incineration with energy recovery), if such treatment occurs during production (A3), in accordance with the system boundary approach and as required by EN 15804.

No additional end-of-life processes or secondary material recovery are modelled for the product itself.

LIFE-CYCLE ASSESSMENT

LIFE-CYCLE ASSESSMENT INFORMATION

Data reference period 2024 year

DECLARED AND FUNCTIONAL UNIT

Declared Unit 1 m²

Product Variant	Mass per Declared Unit [m ²]
MacLine GCL W MacLine GCL N	5920 g/m ²
MacLine GCL WL MacLine GCL NL	6100 g/m ²
MacForm	8400 g/m ²

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

Biogenic carbon content in the product, kg C: -

Biogenic carbon content in the packaging, kg C: -

SYSTEM BOUNDARY

The scope of the EPD is "cradle to gate with modules C1–C4 and D".

The following life cycle modules are included in the declared scope: A1 (Raw material supply), A2 (Transport), A3 (Manufacturing), C1 (Deconstruction/demolition), C2 (Transport at end-of-life), C3 (Waste processing), C4 (Disposal), and D (Benefits and loads beyond the system boundary).

Module A4 (Transport to the construction site) and Module A5 (Installation) are not declared, as transport distances and installation activities are highly project-specific and outside the scope of this EPD.

Modules C1, C2, C3, and C4 are included within the declared system boundary, but are not modelled for these products, as no deinstallation, removal, waste processing, or disposal operations occur at end of life. Indicator values for modules C1–C4 are declared as zero (0) because the end-of-life scenario assumes the product remains in situ (no activity), in accordance with EN 15804+A2, Clause 7.2.2.

Module D (Benefits and loads beyond the system boundary) is modelled for packaging materials only (energy recovery from plastic packaging and recycling of cardboard), as the products themselves do not leave the system as recoverable materials.

Table 2: system boundary diagram

Product stage		Assembly stage			Use stage							End of life stage			Beyond the system boundaries	
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
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deinstallation/Demolition	Transport	Waste processing	Disposal	Reuse / Recycling

X – module included/declared

MND – Module Not Declared

MNR – Module Not Relevant

CUT-OFF CRITERIA

The study fully covers all mandatory EN 15804:2012+A2:2019 modules and processes. No hazardous materials or substances have been omitted from the system boundary.

All major raw material and energy inputs are included. All inputs and outputs from unit processes for which data are available are taken into account in the calculations. No single neglected unit process exceeds 1% of the total mass or energy flows. The total of all neglected input and output flows does not exceed 5% of the total mass or energy use.

The production of capital goods (equipment), construction of infrastructure, and the maintenance and operation of capital equipment are excluded. Personnel-related activities, as well as energy and water use associated with company management and sales/administrative activities, are also excluded.

ESTIMATES AND ASSUMPTIONS

The Life Cycle Assessment (LCA) was carried out in accordance with EN 15804+A2, applying the standard rules for impact indicators, system boundaries, data quality requirements, allocation procedures, and the cut-off approach. The study models Modules A1–A3, and end-of-life Modules C1–C4 and D. Modules A4 and A5 are not declared, as installation impacts are highly project-specific and outside the scope of this Environmental Product Declaration (EPD). The main modelling assumptions are described below.

Where specific and up-to-date primary data could not be obtained, the study applied recognised industry-average assumptions and background datasets from ecoinvent v3.9.1.

For allocation, all relevant input and output flows were apportioned using a mass-based method. Average transport distances for raw materials and finished products were derived from the company's internal logistics records for 2024. Where shipment-specific distances were missing, company-wide average distances were used.

The electricity emission factor applied for manufacturing was taken from the KOBiZE publication Emission Factors for Electricity in Poland (December 2024), i.e. 0.701 kg CO₂e/kWh.

The study assumes that all key raw material and energy inputs are captured. Any omitted flows are estimated to represent less than 5% of total mass or energy use, with no individual flow exceeding 1%, consistent with the cut-off rules of EN 15804+A2.

End-of-Life assumptions:

No dedicated deinstallation or removal processes are expected for bentonite mats at end of life. These products typically remain in situ during demolition. Cementitious mats are removed together with bulk mineral demolition waste, without separate treatment.

Due to the absence of biogenic carbon and the permanent physical integration with the subgrade or soil during installation, the product qualifies for the 'no activity' scenario in the end-of-life stage (Modules C1-C4). Consequently, in accordance with the protocol defined in EN 15804+A2, Clause 7.2.2, which specifies that '0' shall be declared if there is no activity in the scenario, all indicator values for Stage C are reported as zero ('0').

Module C4 is reported as '0' because the product remains permanently integrated with the subgrade or soil, and no active landfilling or disposal process occurs.

Packaging management:

Packaging waste arising from manufacturing (A3) is assumed to be incinerated with energy recovery. The environmental burdens of this treatment are accounted for in Module A3, while potential benefits and loads associated with recovered energy are reported in Module D, representing substitution effects beyond the system boundary.

ALLOCATION

Allocation is performed in line with the requirements of EN 15804+A2. The production information compiled for 2024 covers all relevant product groups manufactured at the production site during that year, including geosynthetic clay liners (GCLs) and mineral composite mats.

Because these product groups use comparable production resources and follow similar processing steps, allocation is based on average relationships by product mass within each product type. Manufacturing inputs and outputs are recorded and then allocated on a mass basis to the declared unit, i.e. 1 m² for the products covered by this EPD.

DATA QUALITY

For foreground data, the LCA study uses high-quality primary information compiled for the year 2024, including average transport distances for raw material supplies. No supplier-specific EPDs were used as foreground inputs for the main raw materials.

All required background datasets were sourced from the ecoinvent v3.9.1 database available in the openLCA software environment, using consistent and well-documented datasets as provided through the ecoinvent database and its documentation.

GEOGRAPHIC REPRESENTATIVENESS

The product system is manufactured and managed in Poland (Europe).

ENVIRONMENTAL IMPACT DATA - MacLine GCL W and MacLine GCL N

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2 – [DU=1m²]

Impact category	Unit	A1	A2	A3	A4-A5	B1-B7	C1	C2	C3	C4	D
GWP-Total	kg CO2 eq.	1,18E+00	6,51E-01	1,46E-01	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,66E-02
GWP-fossil	kg CO2 eq.	1,17E+00	6,50E-01	1,32E-01	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,41E-02
GWP-biogenic	kg CO2 eq.	6,37E-03	-7,10E-05	1,41E-02	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,54E-03
GWP LULUC	kg CO2 eq.	8,00E-04	4,90E-04	3,24E-05	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-7,05E-07
GWP-GHG	kg CO2 eq.	1,18E+00	6,51E-01	1,41E-01	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,41E-02
ODP	kg CFC-11 eq.	1,21E-07	1,02E-08	8,92E-10	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-2,57E-10
AP	mol H+ eq.	5,79E-03	1,78E-02	7,20E-04	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,18E-07
EP-freshwater	kg P eq.	2,40E-04	2,38E-05	1,20E-04	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,27E-07
EP-marine	kg N eq.	1,28E-03	4,45E-03	1,70E-04	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,49E-06
EP-terrestrial	mol N eq.	1,44E-02	4,92E-02	9,90E-04	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,70E-06
POCP	kg NMVOC eq.	4,95E-03	1,34E-02	3,00E-04	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-4,31E-06
ADPE (disc.2)	kg Sb eq.	3,49E-06	5,34E-07	7,58E-08	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,75E-09
ADPF (disc.2)	MJ, (NCV)	3,17E+01	8,14E+00	1,25E+00	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-9,04E-02
WDP (disc.2)	m3 World eq.	4,14E-01	2,47E-02	2,33E-02	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,10E-04
Acronyms	GWP-total – Climate change, total global warming potential; GWP-fossil – Climate change, fossil fuels; GWP-biogenic – Climate change, biogenic carbon; GWP-luluc – Climate change, land use and land use change; GHG-GWP – Climate change, global warming potential of greenhouse gas emissions excluding biogenic carbon, ODP – Ozone layer depletion; AP – Acidification of terrestrial and freshwater environments; EP-freshwater – Eutrophication, freshwater; EP-marine – Eutrophication, marine; EP-terrestrial – Eutrophication, terrestrial; POCP – Photochemical ozone formation (smog formation); ADPE – Abiotic depletion, minerals and metals; ADPF – Abiotic depletion, fossil fuels; WDP – Water scarcity (water use deprivation potential); NCV - net calorific value.										
Disclaimer 2	The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.										

ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF - [DU=1m²]

Impact category	Unit	A1	A2	A3	A4-A5	B1-B7	C1	C2	C3	C4	D
PM	Disease Incidence	7,10E-08	2,06E-08	5,02E-09	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,66E-12
IRP (disc.1)	kBq U235 eq.	5,45E-02	4,59E-03	3,40E-03	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-6,46E-05
ETP-fw (disc.2)	CTUe	6,35E+00	3,98E+00	4,32E-01	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,84E-02
HTP-c (disc.2)	CTUh	3,47E-10	2,79E-10	8,81E-11	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,64E-13
HTP-nc (disc.2)	CTUh	8,14E-09	2,35E-09	1,37E-09	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,63E-11
SQP (disc.2)	Dimensionless	7,17E+00	1,02E+00	2,75E-01	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-8,10E-04
Acronyms	PM – Particulate matter emissions (potential incidence of disease); IRP – Ionising radiation, human health exposure potential; ETP-fw – Ecotoxicity, freshwater; HTP-c – Human toxicity, cancer effects; HTP-nc – Human toxicity, non-cancer effects; SQP – Land use related impacts, soil quality.										
Disclaimer 1	This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.										
Disclaimer 2	The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.										

USE OF NATURAL RESOURCES – [DU=1m²]

Impact category	Unit	A1	A2	A3	A4-A5	B1-B7	C1	C2	C3	C4	D
PERE	MJ, (NCV)	7,99E-01	6,42E-02	1,41E-01	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-5,60E-04
PERM	MJ, (NCV)	0,00E+00	0,00E+00	0,00E+00	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ, (NCV)	7,99E-01	6,42E-02	1,41E-01	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-5,60E-04
PENRE	MJ, (NCV)	1,88E+01	8,14E+00	1,25E+00	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-9,04E-02
PENRM	MJ, (NCV)	1,29E+01	0,00E+00	0,00E+00	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ, (NCV)	3,17E+01	8,14E+00	1,25E+00	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-9,04E-02
SM	kg	0,00E+00	0,00E+00	0,00E+00	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ, (NCV)	0,00E+00	0,00E+00	0,00E+00	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	MJ, (NCV)	0,00E+00	0,00E+00	0,00E+00	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m3	1,90E-02	8,20E-04	3,40E-03	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,29E-05
Acronyms	PERE – Use of renewable primary energy as energy carriers; PERM – Use of renewable primary energy resources as raw materials; PERT – Total use of renewable primary energy resources (PERE + PERM); PENRE – Use of non-renewable primary energy as energy carriers; PENRM – Use of non-renewable primary energy resources as raw materials; PENRT – Total use of non-renewable primary energy resources (PENRE + PENRM); SM – Use of secondary material; RSF – Use of renewable secondary fuels; NRSF – Use of non-renewable secondary fuels; FW – Net use of fresh water; NCV - net calorific value.										

OUTPUT FLOWS – [DU=1m²]

Impact category	Unit	A1	A2	A3	A4-A5	B1-B7	C1	C2	C3	C4	D
CRU	kg	0,00E+00	0,00E+00	0,00E+00	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MFR	kg	0,00E+00	0,00E+00	0,00E+00	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MER	kg	0,00E+00	0,00E+00	0,00E+00	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EEE	MJ	0,00E+00	0,00E+00	0,00E+00	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EET	MJ	0,00E+00	0,00E+00	8,72E-02	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Acronyms	CRU – Components for re-use; MFR – Materials for recycling; MER – Materials for energy recovery; EEE – Exported electrical energy; EET – Exported thermal energy.										

WASTE – [DU=1m²]

Impact category	Unit	A1	A2	A3	A4-A5	B1-B7	C1	C2	C3	C4	D
HWD	kg	3,04E-05	4,13E-05	1,95E-06	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-3,76E-07
NHWD	kg	1,74E-03	1,80E-04	2,47E-05	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,12E-06
RWD	kg	1,35E-05	1,06E-06	8,35E-07	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,64E-08
Acronyms	HWD – Hazardous waste disposed; NHWD – Non-hazardous waste disposed; RWD – Radioactive waste disposed.										

ENVIRONMENTAL IMPACT DATA - MacLine GCL WL and MacLine GCL NL

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2 – [DU=1m²]

Impact category	Unit	A1	A2	A3	A4-A5	B1-B7	C1	C2	C3	C4	D
GWP-Total	kg CO2 eq.	1,56E+00	6,62E-01	1,50E-01	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,71E-02
GWP-fossil	kg CO2 eq.	1,55E+00	6,62E-01	1,36E-01	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,45E-02
GWP-biogenic	kg CO2 eq.	4,43E-03	-6,21E-05	1,46E-02	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,62E-03
GWP LULUC	kg CO2 eq.	9,90E-04	4,90E-04	3,34E-05	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-7,26E-07
GWP-GHG	kg CO2 eq.	1,56E+00	6,63E-01	1,46E-01	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,45E-02
ODP	kg CFC-11 eq.	1,24E-07	1,05E-08	9,19E-10	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-2,65E-10
AP	mol H+ eq.	7,20E-03	1,78E-02	7,40E-04	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,30E-07
EP-freshwater	kg P eq.	3,10E-04	2,46E-05	1,20E-04	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,31E-07
EP-marine	kg N eq.	1,55E-03	4,46E-03	1,70E-04	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,54E-06
EP-terrestrial	mol N eq.	1,72E-02	4,93E-02	1,02E-03	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,99E-06
POCP	kg NMVOC eq.	6,26E-03	1,34E-02	3,10E-04	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-4,44E-06
ADPE (disc.2)	kg Sb eq.	4,54E-06	5,61E-07	7,81E-08	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,80E-09
ADPF (disc.2)	MJ, (NCV)	4,50E+01	8,30E+00	1,29E+00	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-9,32E-02
WDP (disc.2)	m3 World eq.	7,62E-01	2,55E-02	2,40E-02	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,40E-04
Acronyms	GWP-total – Climate change, total global warming potential; GWP-fossil – Climate change, fossil fuels; GWP-biogenic – Climate change, biogenic carbon; GWP-luluc – Climate change, land use and land use change; GHG-GWP – Climate change, global warming potential of greenhouse gas emissions excluding biogenic carbon, ODP – Ozone layer depletion; AP – Acidification of terrestrial and freshwater environments; EP-freshwater – Eutrophication, freshwater; EP-marine – Eutrophication, marine; EP-terrestrial – Eutrophication, terrestrial; POCP – Photochemical ozone formation (smog formation); ADPE – Abiotic depletion, minerals and metals; ADPF – Abiotic depletion, fossil fuels; WDP – Water scarcity (water use deprivation potential); NCV - net calorific value.										
Disclaimer 2	The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.										

ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF - [DU=1m²]

Impact category	Unit	A1	A2	A3	A4-A5	B1-B7	C1	C2	C3	C4	D
PM	Disease Incidence	8,50E-08	2,12E-08	5,17E-09	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,71E-12
IRP (disc.1)	kBq U235 eq.	8,55E-02	4,85E-03	3,50E-03	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-6,66E-05
ETP-fw (disc.2)	CTUe	7,20E+00	4,07E+00	4,45E-01	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,96E-02
HTP-c (disc.2)	CTUh	4,53E-10	2,84E-10	9,08E-11	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,87E-13
HTP-nc (disc.2)	CTUh	1,02E-08	2,45E-09	1,41E-09	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,80E-11
SQP (disc.2)	Dimensionless	8,01E+00	1,11E+00	2,84E-01	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-8,30E-04
Acronyms	PM – Particulate matter emissions (potential incidence of disease); IRP – Ionising radiation, human health exposure potential; ETP-fw – Ecotoxicity, freshwater; HTP-c – Human toxicity, cancer effects; HTP-nc – Human toxicity, non-cancer effects; SQP – Land use related impacts, soil quality.										
Disclaimer 1	This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.										
Disclaimer 2	The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.										

USE OF NATURAL RESOURCES – [DU=1m²]

Impact category	Unit	A1	A2	A3	A4-A5	B1-B7	C1	C2	C3	C4	D
PERE	MJ, (NCV)	1,16E+00	6,70E-02	1,46E-01	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-5,80E-04
PERM	MJ, (NCV)	0,00E+00	0,00E+00	0,00E+00	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ, (NCV)	1,16E+00	6,70E-02	1,46E-01	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-5,80E-04
PENRE	MJ, (NCV)	2,44E+01	8,30E+00	6,56E-01	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-9,32E-02
PENRM	MJ, (NCV)	2,06E+01	0,00E+00	6,30E-01	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ, (NCV)	4,50E+01	8,30E+00	1,29E+00	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-9,32E-02
SM	kg	0,00E+00	0,00E+00	0,00E+00	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ, (NCV)	0,00E+00	0,00E+00	0,00E+00	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	MJ, (NCV)	0,00E+00	0,00E+00	0,00E+00	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m3	3,59E-02	8,50E-04	3,50E-03	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,39E-05
Acronyms	PERE – Use of renewable primary energy as energy carriers; PERM – Use of renewable primary energy resources as raw materials; PERT – Total use of renewable primary energy resources (PERE + PERM); PENRE – Use of non-renewable primary energy as energy carriers; PENRM – Use of non-renewable primary energy resources as raw materials; PENRT – Total use of non-renewable primary energy resources (PENRE + PENRM); SM – Use of secondary material; RSF – Use of renewable secondary fuels; NRSF – Use of non-renewable secondary fuels; FW – Net use of fresh water; NCV - net calorific value.										

OUTPUT FLOWS – [DU=1m²]

Impact category	Unit	A1	A2	A3	A4-A5	B1-B7	C1	C2	C3	C4	D
CRU	kg	0,00E+00	0,00E+00	0,00E+00	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MFR	kg	0,00E+00	0,00E+00	0,00E+00	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MER	kg	0,00E+00	0,00E+00	0,00E+00	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EEE	MJ	0,00E+00	0,00E+00	0,00E+00	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EET	MJ	0,00E+00	0,00E+00	8,98E-02	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Acronyms	CRU – Components for re-use; MFR – Materials for recycling; MER – Materials for energy recovery; EEE – Exported electrical energy; EET – Exported thermal energy.										

WASTE – [DU=1m²]

Impact category	Unit	A1	A2	A3	A4-A5	B1-B7	C1	C2	C3	C4	D
HWD	kg	3,70E-05	4,23E-05	2,01E-06	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-3,87E-07
NHWD	kg	1,85E-03	1,90E-04	2,55E-05	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,15E-06
RWD	kg	2,14E-05	1,13E-06	8,61E-07	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,69E-08
Acronyms	HWD – Hazardous waste disposed; NHWD – Non-hazardous waste disposed; RWD – Radioactive waste disposed.										

ENVIRONMENTAL IMPACT DATA - MacForm

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2 – [DU=1m²]

Impact category	Unit	A1	A2	A3	A4-A5	B1-B7	C1	C2	C3	C4	D
GWP-Total	kg CO2 eq.	5,34E+00	8,96E-01	2,07E-01	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,35E-02
GWP-fossil	kg CO2 eq.	5,31E+00	8,95E-01	1,87E-01	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,99E-02
GWP-biogenic	kg CO2 eq.	2,57E-02	8,20E-04	2,00E-02	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,60E-03
GWP LULUC	kg CO2 eq.	3,58E-03	4,40E-04	4,59E-05	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-9,97E-07
GWP-GHG	kg CO2 eq.	5,32E+00	8,95E-01	2,00E-01	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,99E-02
ODP	kg CFC-11 eq.	8,04E-06	1,95E-08	1,26E-09	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-3,64E-10
AP	mol H+ eq.	2,08E-02	1,96E-03	1,02E-03	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,91E-07
EP-freshwater	kg P eq.	1,07E-03	6,36E-05	1,60E-04	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,79E-07
EP-marine	kg N eq.	4,54E-03	4,90E-04	2,30E-04	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,11E-06
EP-terrestrial	mol N eq.	5,50E-02	5,01E-03	1,40E-03	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,37E-05
POCP	kg NMVOC eq.	1,91E-02	3,04E-03	4,30E-04	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-6,09E-06
ADPE (disc.2)	kg Sb eq.	2,10E-05	2,08E-06	1,07E-07	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-2,48E-09
ADPF (disc.2)	MJ, (NCV)	7,38E+01	1,28E+01	1,77E+00	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,28E-01
WDP (disc.2)	m3 World eq.	1,60E+00	6,35E-02	3,29E-02	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,01E-03
Acronyms	GWP-total – Climate change, total global warming potential; GWP-fossil – Climate change, fossil fuels; GWP-biogenic – Climate change, biogenic carbon; GWP-luluc – Climate change, land use and land use change; GHG-GWP – Climate change, global warming potential of greenhouse gas emissions excluding biogenic carbon, ODP – Ozone layer depletion; AP – Acidification of terrestrial and freshwater environments; EP-freshwater – Eutrophication, freshwater; EP-marine – Eutrophication, marine; EP-terrestrial – Eutrophication, terrestrial; POCP – Photochemical ozone formation (smog formation); ADPE – Abiotic depletion, minerals and metals; ADPF – Abiotic depletion, fossil fuels; WDP – Water scarcity (water use deprivation potential); NCV - net calorific value.										
Disclaimer 2	The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.										

ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF - [DU=1m²]

Impact category	Unit	A1	A2	A3	A4-A5	B1-B7	C1	C2	C3	C4	D
PM	Disease Incidence	2,18E-07	5,33E-08	7,11E-09	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-2,34E-12
IRP (disc.1)	kBq U235 eq.	2,60E-01	1,72E-02	4,80E-03	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-9,15E-05
ETP-fw (disc.2)	CTUe	1,77E+01	6,27E+00	6,11E-01	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,43E-02
HTP-c (disc.2)	CTUh	2,11E-09	4,00E-10	1,25E-10	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,08E-12
HTP-nc (disc.2)	CTUh	4,11E-08	7,85E-09	1,94E-09	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,96E-11
SQP (disc.2)	Dimensionless	1,76E+01	7,68E+00	3,89E-01	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,14E-03
Acronyms	PM – Particulate matter emissions (potential incidence of disease); IRP – Ionising radiation, human health exposure potential; ETP-fw – Ecotoxicity, freshwater; HTP-c – Human toxicity, cancer effects; HTP-nc – Human toxicity, non-cancer effects; SQP – Land use related impacts, soil quality.										
Disclaimer 1	This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.										
Disclaimer 2	The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.										

USE OF NATURAL RESOURCES – [DU=1m²]

Impact category	Unit	A1	A2	A3	A4-A5	B1-B7	C1	C2	C3	C4	D
PERE	MJ, (NCV)	4,14E+00	2,00E-01	2,00E-01	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-8,00E-04
PERM	MJ, (NCV)	0,00E+00	0,00E+00	0,00E+00	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ, (NCV)	4,14E+00	2,00E-01	2,00E-01	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-8,00E-04
PENRE	MJ, (NCV)	5,56E+01	1,28E+01	1,77E+00	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,28E-01
PENRM	MJ, (NCV)	1,82E+01	0,00E+00	0,00E+00	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ, (NCV)	7,38E+01	1,28E+01	1,77E+00	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,28E-01
SM	kg	0,00E+00	0,00E+00	0,00E+00	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ, (NCV)	0,00E+00	0,00E+00	0,00E+00	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	MJ, (NCV)	0,00E+00	0,00E+00	0,00E+00	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m3	6,61E-02	2,10E-03	4,81E-03	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,66E-05
Acronyms	PERE – Use of renewable primary energy as energy carriers; PERM – Use of renewable primary energy resources as raw materials; PERT – Total use of renewable primary energy resources (PERE + PERM); PENRE – Use of non-renewable primary energy as energy carriers; PENRM – Use of non-renewable primary energy resources as raw materials; PENRT – Total use of non-renewable primary energy resources (PENRE + PENRM); SM – Use of secondary material; RSF – Use of renewable secondary fuels; NRSF – Use of non-renewable secondary fuels; FW – Net use of fresh water; NCV - net calorific value.										

OUTPUT FLOWS – [DU=1m²]

Impact category	Unit	A1	A2	A3	A4-A5	B1-B7	C1	C2	C3	C4	D
CRU	kg	0,00E+00	0,00E+00	0,00E+00	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MFR	kg	0,00E+00	0,00E+00	0,00E+00	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MER	kg	0,00E+00	0,00E+00	0,00E+00	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EEE	MJ	0,00E+00	0,00E+00	0,00E+00	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EET	MJ	0,00E+00	0,00E+00	1,23E-01	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Acronyms	CRU – Components for re-use; MFR – Materials for recycling; MER – Materials for energy recovery; EEE – Exported electrical energy; EET – Exported thermal energy.										

WASTE – [DU=1m²]

Impact category	Unit	A1	A2	A3	A4-A5	B1-B7	C1	C2	C3	C4	D
HWD	kg	2,82E-03	8,10E-05	2,75E-06	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-5,32E-07
NHWD	kg	2,73E-02	3,60E-04	3,50E-05	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-1,58E-06
RWD	kg	6,49E-05	4,18E-06	1,18E-06	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-2,32E-08
Acronyms	HWD – Hazardous waste disposed; NHWD – Non-hazardous waste disposed; RWD – Radioactive waste disposed.										

SCENARIO DOCUMENTATION

Manufacturing energy scenario documentation

Scenario parameter	Value
Electricity supply mix	100% national grid electricity (Poland), based on metered annual consumption/production data
Source and quality of electricity data (grid share)	Emission Factors for Electricity in Poland reported in December 2024 by KOBiZE – the National Centre for Emissions Management in Poland
Electricity CO ₂ / kWh (grid share only)	0.701 kg CO ₂ e / kWh

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EPD VERIFICATION:

The verification procedure of this Environmental Product Declaration (EPD) was carried out in accordance with ISO 14025. The EPD is valid for five years from the date of publication and may be updated earlier in case of significant changes. Renewal of validity requires review and, if necessary, updating.

EPD CONTRIBUTORS

Manufacturer representative

Moreno Scotto - Head of the Geosynthetics Business Unit

EPD verifier

Izabela Sztamberek-Sochan, Ph.D.

Note: The sole ownership and liability of this declaration are with the owner. Construction product declarations may not be comparable if they do not comply with EN 15804. For detailed information on comparability, please refer to EN 15804 and ISO 14025.

CERTIFICATE

TYPE III EPD DECLARATION

(ENVIRONMENTAL PRODUCT DECLARATION)

Reg. No. EPD-P 09.12.2025



This document confirms that the Environmental Product Declaration developed by **Officine Maccaferri S.p.A.** for

MaLine GCL W & MaLine GCL N
MaLine GCL WL & MaLine GCL NL
MacForm

manufactured in accordance with **EN 13361, EN 13362, EN 13492, EN 13491 and EN 15382** standards meets the requirements of standards **EN 15804:2012+A2:2019** and **ISO 14025**, and that the data contained therein has been prepared correctly.

The Declaration was published on December 31, 2025 and is valid until December 31, 2030, or until it is deregistered or its publication on the website www.epd.org.pl is discontinued.

Authenticity of this certificate can be confirmed in the public register at www.epd.org.pl



Izabela Sztamberek-Sochan, Ph.D.
EPD Polska Verifier



Warsaw, December 31, 2025

Grzegorz Suwara
CEO Multicert Sp. z o.o.