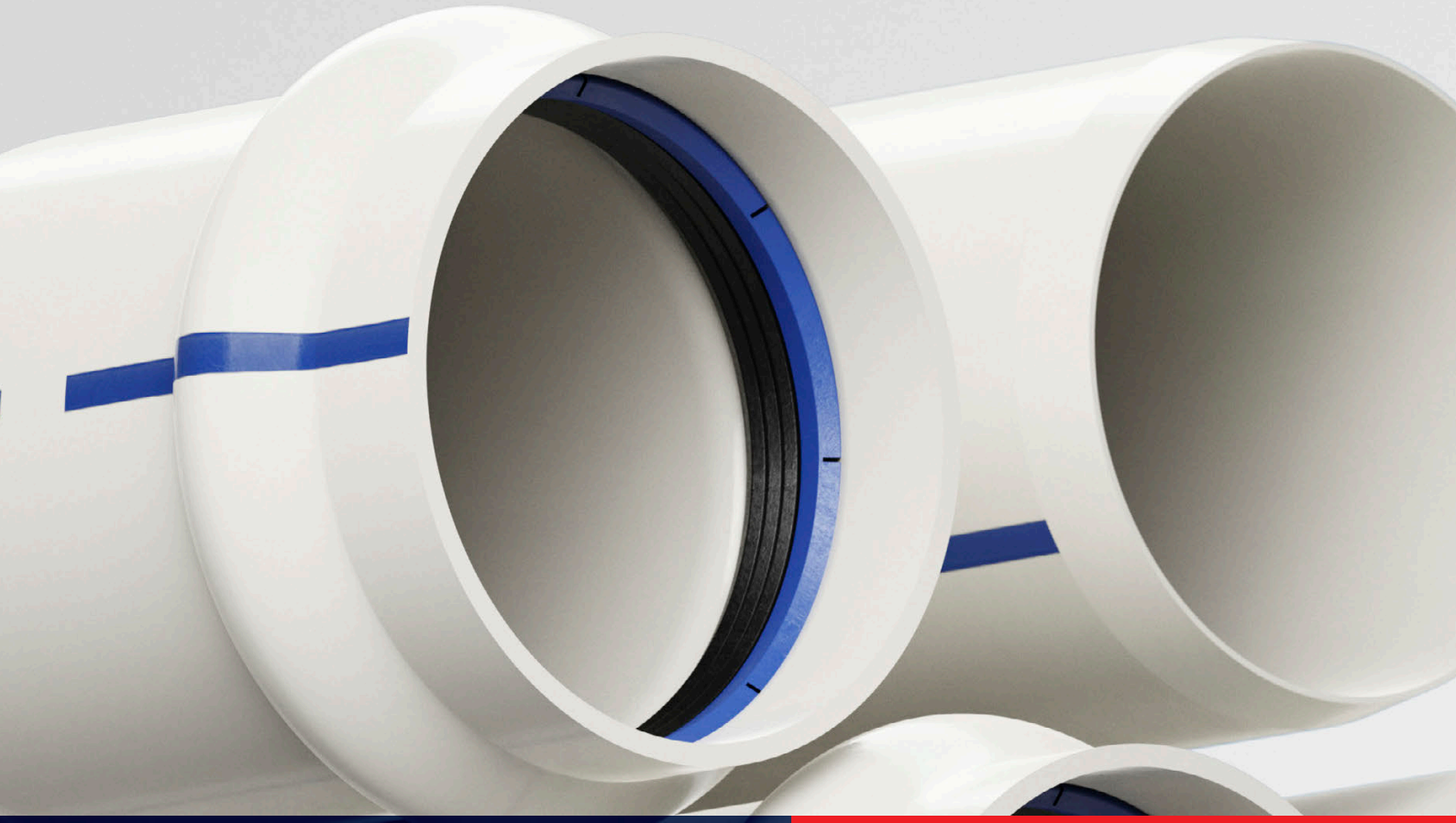
GPFBiopipe



EPD INTERNATIONAL EPD SYSTEM

ECO PLATFORM EPD VERIFIED

Bioriented PVC Pipes (PVC-O) for pressurised water supply systems

Environmental Product Declaration | In accordance with ISO 14025:2006 and EN 15804:2012 + A2:2019/AC:2021

Programme:
The International EPD® System
www.environdec.com
Programme operator:
EPD International AB
EPD registration number:
EPD-IES-0032080:001
Version date: 2026-09-08
Validity date: 2031-09-08

An EPD may be updated or withdrawn if circumstances change. To view the latest version of the EPD and check its validity, visit www.environdec.com

Grupo Plásticos Ferro

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Life Cycle Assessment (LCA)	8



→ The Programme

Programme	The International EPD® System
Address	EPD International AB · P.O. Box 210 60 · SE-100 31 Stockholm, Sweden
Website	www.environdec.com
Email	support@environdec.com
Product Category Rules (PCR)	**CEN standard EN 15804 serves as the Core Product Category Rules (PCR)**. PCR 2019:14 Construction products (v2.0.1), published on 5 June 2025, valid until 7 April 2030. 36323 – Plastic pipes, tubes and hoses, and fittings therefor.
PCR review carried out by	The Technical Committee of the International EPD® System. The full list of members is available at www.environdec.com. The review committee can be contacted via support@environtec.com. Chairs of the PVC review: Rob Rouwette (chair) and Noa Meron (co-chair).
External and independent ('third-party') verification of the declaration and data, according to ISO 14025:2006, via EPD verification through	☒ Individual EPD verification without a pre-verified LCA/EPD tool.
Third-party verifier	Agnieszka Pikus Greenwise
Approved by	The International EPD System
The procedure for monitoring data during the EPD's validity period involves the participation of an external verifier	No

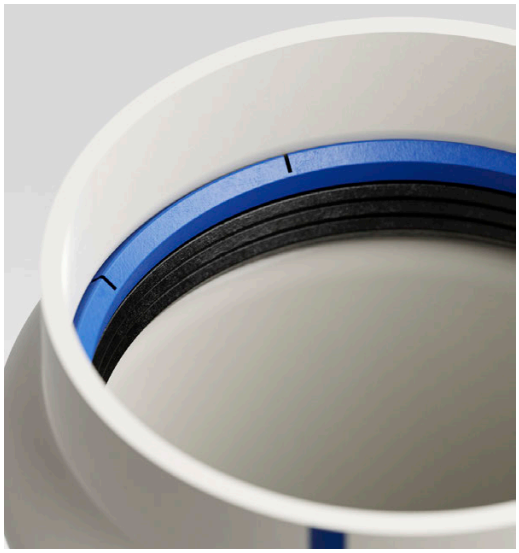
An **Environmental Product Declaration**, or **EPD®**, is a standardised and verified method of **quantifying a product's environmental impacts** based on a consistent set of rules known as PCRs (Product Category Rules). An EPD must provide up-to-date information and may be updated if conditions change. Therefore, the stated validity is subject to the EPD remaining registered and published on **www.environdec.com**. The EPD holder is solely responsible for the EPD and assumes all civil and legal liability arising from it.

EPDs belonging to the same product category but registered under different EPD schemes, or which do not comply with standard EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or on fully aligned PCRs or versions of PCRs; cover products with identical functions, technical performance and uses (e.g. identical declared/functional units); have equivalent system boundaries and data descriptions; apply equivalent data quality requirements, data collection methods and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of the characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information on comparability, see standards EN 15804 and ISO 14025.

References

EPD OWNER	GPF Grupo Plásticos Ferro	**P. FERRO GPF, S.L.** www.grupogpf.com sostenibilidad@grupogpf.com Paseo Marítimo Alcde. Fco. Vázquez, 63, Plaza Interior 15002 A Coruña Spain
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PROGRAMME OPERATOR	EPD INTERNATIONAL EPD SYSTEM	**The International EPD® System** www.environdec.com info@environdec.com EPD International AB PO Box 210 60 SE-100 31 Stockholm Sweden
INDIVIDUAL VERIFIER		Agnieszka Pikus – EPD Individual Verifier agnieszkapikus@greenwise.com.pl





Information about the owner of the EPD

Grupo Plásticos Ferro (GPF) is a Spanish industrial group founded in 1960 and comprising a group of companies dedicated to **the design, manufacture and distribution of products and systems based on plastic materials**. GPF is the leading manufacturer and distributor of **plastic pipes and fittings** in the Iberian Peninsula, and one of the largest and most stable groups in the sector in Europe.

Since its inception in Muras (Lugo, Spain), GPF has grown and expanded whilst remaining a 100% family-owned group, witnessing and playing an active part in the transformation that has profoundly shaped the sector, and committed to **innovation**, the **circular economy** and **environmental protection** – fundamental pillars for **sustainable development** and the **continuous improvement** of our society's quality of life.

The group has an **extensive industrial infrastructure** covering approximately 800,000 m², with over 800 employees spread across 8 manufacturing plants and 16 logistics centres in the Iberian Peninsula and Morocco. This industrial and logistical capacity enables the group to offer a responsive and efficient service, with a wide range of products and a growing international presence; it now operates across all five continents, with its main markets being Spain, France, Morocco and Portugal.

GPF is committed **to quality employment** and to **close, stable relationships** with its customers and suppliers, embracing the necessary technological and regulatory changes in the constant pursuit of **sustainable solutions** not only for its sector, but for the planet.

01 **OVER 65 YEARS IN THE SECTOR**
Leaders in the manufacture of plastic pipes and fittings

02 **QUALITY THAT MAKES THE DIFFERENCE**
Leadership, strategic infrastructure and innovative solutions

03 **SUSTAINABILITY AND THE FUTURE**
A plastics industry that respects and cares for the environment

QUALITY

The quality department pays particular attention to the various stages of the manufacturing process, from the receipt and inspection of raw materials through to the finished products, which are **analysed continuously and regularly** in both in-house and external laboratories.

In order to meet the demands of each market as efficiently and flexibly as possible, the companies within the GPF Group hold a **wide range of international standard certifications**, both general and country-specific, ensuring compliance with applicable regulations.

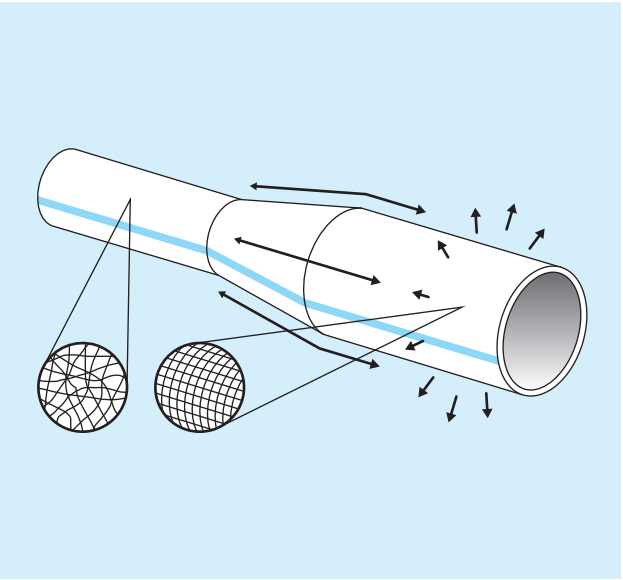
SUSTAINABILITY

Sustainability is a fundamental strategic pillar of GPF's activities, integrating criteria relating to **quality, the environment and energy efficiency** into all its operations, from the eco-design of products through to their manufacture and distribution. GPF is committed to preventing environmental impacts, the efficient use of resources, the utilisation of clean and renewable energy sources, and continuous improvement, whilst encouraging its staff to engage with these objectives.

Grupo Plásticos Ferro

GPFBiopipe

Bioriented PVC Pressure Pipes (PVC-O). Technical solutions with a lower environmental impact



Pressurised water supply system manufactured from **Bioriented PVC** using in-line biaxial molecular orientation technology. It offers **high mechanical** and chemical **resistance**, as well as **excellent hydraulic properties**

What is PVC-O?

PVC is a polymer whose molecules are randomly oriented. In **PVC-O**, under specific conditions of pressure, temperature and speed, and by stretching the material, the molecules are aligned. This results in a **laminar** (layered) **structure** that **significantly improves the physical and mechanical properties of PVC**, giving it exceptional characteristics and extraordinary additional competitive advantages, whilst retaining the attributes of the original raw material.

Biopipe® Bioriented PVC

The bi-orientation process is carried out using a technology that stretches the polymer (PVC) molecules under specific conditions. This stretching can take place in one or two directions. **In GPF Biopipe® Bi-Oriented PVC pipes, the stretching takes place in two directions: radial and axial**. This results in a **Bi-Oriented PVC system**, which gives the pipe superior performance and greater strength.

- **Manufactured using less raw materials and energy**
- **Reduction in CO_2 emissions throughout the product's life cycle**
- **100% recyclable**
- **High hydraulic efficiency:** thinner walls, higher flow rate
- **Greater strength and durability + Reduced maintenance costs**
- **Quality certifications in accordance with ISO 16422 and EN 17176 standards**

Bioriented PVC Pressure Pipes (PVC-O)

GPF Biopipe® Bi-Oriented PVC pipes are **the most advanced**, **safe and competitive solution** for pressurised water systems

The in-line method

GPF Biopipe® Bi-Oriented PVC pressure pipes are manufactured using the **IN-LINE method**, in which **the orientation unit is directly connected to the extrusion process**, offering a number of advantages over offline systems (where the orientation unit and extruder are two separate, unconnected processes):

- **Guaranteed continuous biaxial orientation.**
- **Quality control throughout the entire production process.**
- **Continuous dimensional control:** uniform wall thicknesses and diameters.
- **High production speed and stability.**
- **Ability to manufacture in different lengths.**
- **Energy efficiency:** high productivity with low energy costs.

TECHNICAL SPECIFICATIONS	VALUE
Minimum required strength (MRS)	50 MPa
Safety factor	1.4
Class	500
Short-term modulus of elasticity	4,000 MPa
Absolute roughness K	0.007
Hanzen–Williams roughness	150
Manning roughness	0.009
Poisson's ratio	0.35–0.43
Average coefficient of linear thermal expansion	0.08 mm/m °C
Thermal conductivity	0.16 W/m °C

Biopipe® quality and sustainability

GPF Biopipe® pipes are manufactured to **MRS 50**, which represents the most demanding classification: **Class 500**, and they hold **quality certificates**

GPF Biopipe® pipes are manufactured in accordance with **ISO 16422** and **UNE EN 17176** and hold **quality certifications.** The regulations governing PVC-O provide for different classifications based on the **Minimum Required Strength (MRS)**. This value is determined by performing a regression analysis of **long-term hydrostatic pressure** test data, in accordance with ISO 9080. The regression analysis enables the minimum strength to be predicted for a specific service life. The data is extrapolated to predict the minimum strength at 20°C and over the specified service life of 50 years.

Areas of application

PRESSURISED DRINKING WATER SUPPLY SYSTEMS

IRRIGATION SYSTEMS

PRESSURISED SANITATION SYSTEMS

OTHER UNDERGROUND APPLICATIONS FOR PRESSURISED NON-DRINKING WATER (reuse of reclaimed water, fire-fighting networks, etc.)

UN CPC Code: CPC 36323 – Plastic pipes, tubes and hoses, and fittings therefor.

→ Content declaration

The material content per unit declared as '1 kg of product' is set out in the following table:

MATERIAL	QUANTITY	RECYCLED MATERIAL (%)	UNITS	PERCENTAGE (%)
PVC	0.910	0.00%	kg	91.00%
Elastomeric components	0.090	0.00%	kg	9.00%

The material content per unit declared as '1 kg of product' is set out in the following table:
The weight and contents of the packaging:

MATERIAL	QUANTITY (kg)	BIOGENIC CARBON CONTENT (kg C)
Wood	0.036	0.02
Plastic	0.003	0.00
Total	0.038	0.02

Information on the environmental, hazardous or toxic properties of the substances contained in the product: The products do not contain any SVHC substances as defined by REACH in quantities exceeding 0.1% (1000 ppm). **Declared percentage of biogenic or recycled materials:** The product contains 0% biogenic material. 100% of the PVC resin used is virgin plastic.

→ LCA information

Declared unit: 1 kilogram (1 kg) of pipework.
Time frame: The primary data was collected internally. The production data refers to the year 2024.
Geographical scope: Málaga, Spain (manufacturing).
LCA databases and software used: The Ecoinvent database provides life cycle inventory data for raw materials and processed materials obtained from the reference system. The database version used is Ecoinvent 3.11. The LCA software used is SimaPro 10.2.0.2 and EIME v11.0.
Methodology: The methodology used for the key environmental impact indicators complies with standard EN 15804 + A2 (in line with the EF 3.1 method).
Description of system boundaries: cradle-to-gate with options, modules C1-C4, module D and optional modules. The system boundaries cover the product stages (A1–A3), transport to the construction site (A4), end-of-life (C1–C4) and benefits and burdens beyond the system (module D), in accordance with EN 15804 and PCR 2019:14. The system boundaries are illustrated in the figure below.
Electricity mix GWP: 0.00749 kg CO_2 eq/kWh; The low GWP-GHG value of the electricity mix is due to the high share of renewable electricity sources used in the manufacturing facilities. The corresponding datasets were selected from ecoinvent v3.11 and are representative of the reference year 2024.

A detailed description of the life cycle stages included in the EPD is provided below.

The product stage (A1–A3) includes:

- A1 – Extraction and processing of raw materials, including the production of primary and secondary materials.
- A2 – Transport of raw materials to the manufacturing plant.
- A3 – Manufacturing processes, including energy consumption, auxiliary materials and waste management.

This stage covers the supply of all materials, energy and packaging, as well as the treatment of waste until it no longer qualifies as waste or is finally disposed of at the production plant.

The construction process stage includes:

- A4 – Transport to the site.

Module A4 considers the environmental impacts associated with transporting the product from the manufacturing plant to the installation site, using average distances and representative logistics scenarios. The transport has been modelled using lorry with an average transport distance of 645 km from the manufacturing facility to the construction site.

The end-of-life stage (C1–C4) includes:

- C1 – Deconstruction or demolition.
- C2 – Transport to waste treatment.
- C3 – Waste treatment for reuse, recovery and/or recycling.
- C4 – Final disposal.

A representative European end-of-life scenario has been applied to all declared products. The scenario assumes that 30% of the product is sent to material recycling and 70% is sent to incineration with energy recovery at the end of its service life.

Module C1 has been considered negligible, as no significant energy or material consumption is associated with the removal of the product.

For **module C2**, transport from the demolition site to the waste treatment facility has been modelled using a standard lorry with an average transport distance of 50 km.

Module C3 includes the treatment of 30% of the product mass destined for material recycling, while **Module C4** includes the final incineration of the remaining 70% of the product mass.

This stage includes all processes related to the removal of the product, its transport, treatment and incineration with energy recovery at the end of its service life.

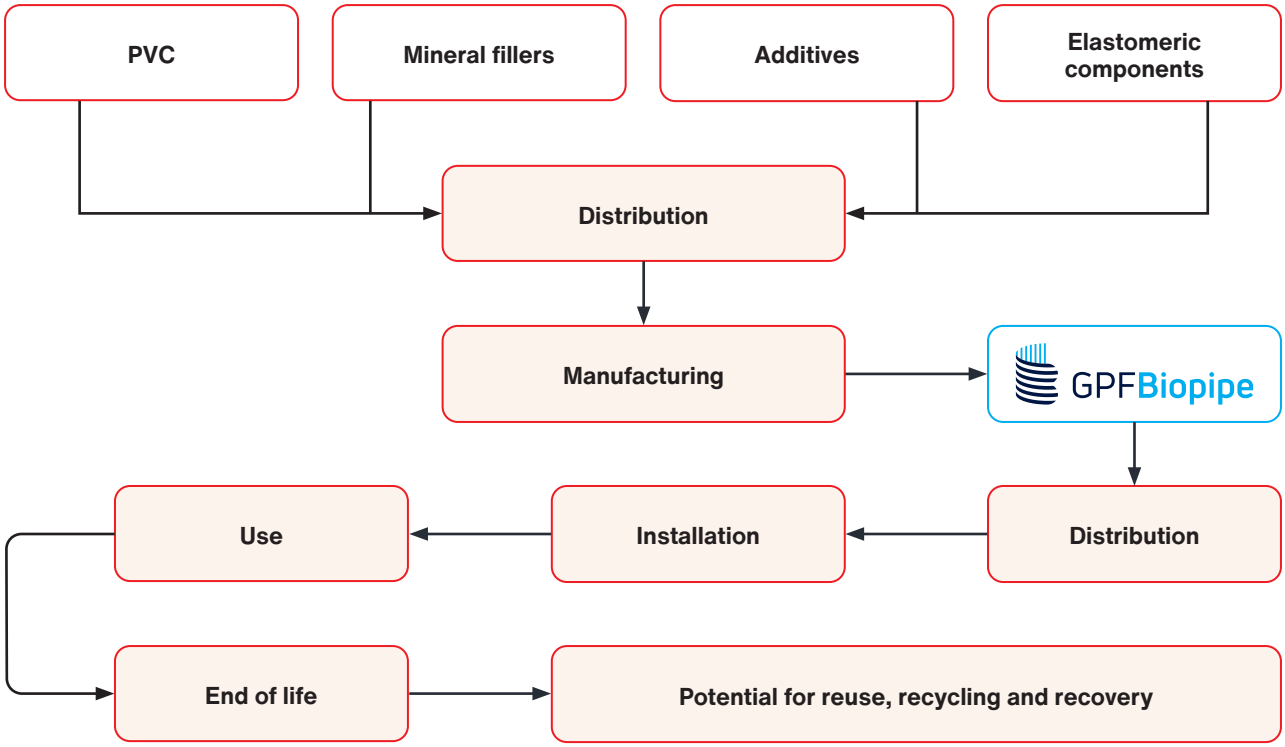
Benefits and impacts beyond the system boundaries (Module D):

Module D covers the potential environmental benefits and impacts associated with the reuse, recycling or energy recovery of materials outside the system boundaries. These benefits are calculated by considering the substitution of raw materials or primary energy, in accordance with standard EN 15804.

The following table summarises the life cycle stages considered and the modules included in this Environmental Product Declaration:

	Product stage			**Construction stage**		**Use stage**							**End-of-life stage**				Potential for reuse, recycling and recovery
	Supply of raw materials	Transport	Manufacturing	Transport	Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water consumption	Deconstruction / demolition	Transport	Waste treatment	Disposal	
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Declared modules	X	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	RER		Spain	Global													
Primary data share	4.05%																

→ System diagram



Data quality analysis: The inventory analysis was based on a combination of specific and generic data. The table below sets out the type of data, the sources and the reference year for each EPD module. This table also shows the proportion of primary data contributing to the GWP-GHG results for the 'cradle-to-gate' phase.

PROCESS	SOURCE TYPE	SOURCE	REFERENCE YEAR	DATA CATEGORY	SHARE OF PRIMARY DATA, OF GWP GHG RESULTS FOR A1 - A3
Raw materials (A1)					
Virgin PVC	Database	Ecoinvent v3.11	2024	Secondary data	94.71%
Mineral filler	Database	Ecoinvent v3.11	2024	Secondary data	0.66%
Transport of raw materials (A2)	Inventory	GPF	2024	Primary data	3.84%
Production (A3)					
Packaging	Database	Ecoinvent v3.11	2024	Secondary data	0.57%
Energy consumption	Inventory	GPF	2024	Primary data	0.21%

The total contribution of processes modelled using primary data represents 4.05% of the GWP-GHG results for modules A1–A3. The remaining 95.95% is associated with secondary datasets, primarily related to raw material production.

The quality of the data used in this study was assessed in terms of geographical, technological and temporal representativeness, in accordance with EN 15804:2012+A2:2019 and EN 15941:2010.

Primary data were collected from the manufacturing facilities for the reference year 2024 and are representative of the actual production processes. Secondary data were obtained from recognised LCA databases and were selected to reflect the relevant geographical and technological conditions. The overall data quality assessment confirmed that the datasets used are appropriate for the intended application and that no datasets were considered to be of poor quality.

→ Environmental performance

The environmental impact results associated with the declared unit are presented below, broken down by life cycle modules in accordance with the established methodology.

Mandatory impact categories for 1 kg of Biopipe:

IMPACT CATEGORY	UNIT	A1 – A3	A4	C1	C2	C3	C4	D
Acidification	mol H+ eq	5.78E-03	7.73E-05	0.00E+00	8.85E-06	0.00E+00	2.50E-04	-1.46E-03
Climate change	kg CO_2 eq	2.26E+00	5.28E-02	0.00E+00	7.59E-03	0.00E+00	4.69E-01	-5.64E-01
Climate change - Biogenic	kg CO_2 eq	3.33E-03	1.86E-06	0.00E+00	2.59E-07	0.00E+00	5.43E-05	-8.72E-04
Climate change - Fossil	kg CO_2 eq	2.26E+00	5.28E-02	0.00E+00	7.59E-03	0.00E+00	4.69E-01	-5.62E-01
Climate change - Land use and LU change	kg CO_2 eq	1.53E-03	1.34E-06	0.00E+00	1.86E-07	0.00E+00	7.21E-05	-3.91E-04
Climate change - GHG	kg CO_2 eq	2.26E+00	5.28E-02	0.00E+00	7.59E-03	0.00E+00	4.69E-01	-5.64E-01
Eutrophication, marine	kg N eq	1.24E-03	1.74E-05	0.00E+00	1.96E-06	0.00E+00	1.18E-04	-3.13E-04
Eutrophication, freshwater	kg P eq	7.92E-05	4.57E-08	0.00E+00	6.36E-09	0.00E+00	4.30E-07	-2.06E-05
Eutrophication, terrestrial	mol N eq	1.22E-02	1.90E-04	0.00E+00	2.15E-05	0.00E+00	1.21E-03	-3.05E-03
Ozone depletion	kg CFC-11 eq	9.23E-07	1.11E-09	0.00E+00	1.55E-10	0.00E+00	3.55E-10	-2.42E-07
Photochemical ozone formation	kg NMVOC eq	8.83E-03	1.47E-04	0.00E+00	1.92E-05	0.00E+00	3.03E-04	-2.22E-03
Resource use, fossils	MJ	5.80E+01	7.20E-01	0.00E+00	1.00E-01	0.00E+00	2.00E-01	-1.48E+01
Resource use, minerals and metals	kg Sb eq	2.65E-07	1.79E-09	0.00E+00	2.51E-10	0.00E+00	1.39E-08	-6.76E-08
Water use	m^3 depriv.	3.22E+00	3.06E-04	0.00E+00	4.26E-05	0.00E+00	3.21E-02	-8.29E-01

Resource use indicators for 1 kg of Biopipe:

IMPACT CATEGORY	UNIT	A1 – A3	A4	C1	C2	C3	C4	D
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ	9.84E+00	7.84E-06	0.00E+00	1.72E-04	0.00E+00	6.40E-01	-8.79E-02
Use of renewable primary energy resources used as raw materials	MJ	6.83E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	1.05E+01	7.84E-06	0.00E+00	1.72E-04	0.00E+00	6.40E-01	-8.79E-02
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	4.56E+01	1.97E-03	0.00E+00	4.21E-02	0.00E+00	3.80E+00	-1.13E+00
Use of non-renewable primary energy resources used as raw materials	MJ	2.33E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-6.00E-01
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	6.89E+01	1.97E-03	0.00E+00	4.21E-02	0.00E+00	3.80E+00	-1.73E+00
Use of secondary material	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of 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
Use 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
Net use of fresh water	m^3	7.25E-02	9.41E-08	0.00E+00	2.03E-06	0.00E+00	6.08E-04	-1.87E-03

Waste indicators for 1 kg of Biopipe:

IMPACT CATEGORY	UNIT	A1 – A3	A4	C1	C2	C3	C4	D
Hazardous waste disposed	kg	1.43E-03	4.76E-06	0.00E+00	6.64E-07	0.00E+00	2.13E-06	-3.72E-04
Non-hazardous waste disposed	kg	1.55E-02	2.13E-05	0.00E+00	2.98E-06	0.00E+00	1.74E-02	-4.05E-03
Radioactive waste disposed	kg	7.63E-05	6.73E-08	0.00E+00	9.42E-09	0.00E+00	6.53E-08	-1.99E-05

Outflow indicators for 1 kg of Biopipe:

IMPACT CATEGORY	UNIT	A1 – A3	A4	C1	C2	C3	C4	D
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
Materials for recycling	kg	5.06E-08	1.83E-14	0.00E+00	4.02E-13	3.00E-01	3.40E-09	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.00E-01	0.00E+00
Exported energy, electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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 experienced with the indicator. The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks. The results of the end-of-life stage (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3).

→ Additional scenario – 100% material recycling

The environmental impact results associated with the declared unit are presented below, broken down by life cycle modules in accordance with the established methodology.

Mandatory impact categories for 1 kg of Biopipe with 100% material recycling:

IMPACT CATEGORY	UNIT	A1 – A3	A4	C1	C2	C3	C4	D
Acidification	mol H+ eq	5.78E-03	7.73E-05	0.00E+00	8.85E-06	0.00E+00	0.00E+00	-1.46E-03
Climate change	kg CO_2 eq	2.26E+00	5.28E-02	0.00E+00	7.59E-03	0.00E+00	0.00E+00	-5.64E-01
Climate change - Biogenic	kg CO_2 eq	3.33E-03	1.86E-06	0.00E+00	2.59E-07	0.00E+00	0.00E+00	-8.72E-04
Climate change - Fossil	kg CO_2 eq	2.26E+00	5.28E-02	0.00E+00	7.59E-03	0.00E+00	0.00E+00	-5.62E-01
Climate change - Land use and LU change	kg CO_2 eq	1.53E-03	1.34E-06	0.00E+00	1.86E-07	0.00E+00	0.00E+00	-3.91E-04
Climate change - GHG	kg CO_2 eq	2.26E+00	5.28E-02	0.00E+00	7.59E-03	0.00E+00	0.00E+00	-5.64E-01
Eutrophication, marine	kg N eq	1.24E-03	1.74E-05	0.00E+00	1.96E-06	0.00E+00	0.00E+00	-3.13E-04
Eutrophication, freshwater	kg P eq	7.92E-05	4.57E-08	0.00E+00	6.36E-09	0.00E+00	0.00E+00	-2.06E-05
Eutrophication, terrestrial	mol N eq	1.22E-02	1.90E-04	0.00E+00	2.15E-05	0.00E+00	0.00E+00	-3.05E-03
Ozone depletion	kg CFC-11 eq	9.23E-07	1.11E-09	0.00E+00	1.55E-10	0.00E+00	0.00E+00	-2.42E-07
Photochemical ozone formation	kg NMVOC eq	8.83E-03	1.47E-04	0.00E+00	1.92E-05	0.00E+00	0.00E+00	-2.22E-03
Resource use, fossils	MJ	5.80E+01	7.20E-01	0.00E+00	1.00E-01	0.00E+00	0.00E+00	-1.48E+01
Resource use, minerals and metals	kg Sb eq	2.65E-07	1.79E-09	0.00E+00	2.51E-10	0.00E+00	0.00E+00	-6.76E-08
Water use	m^3 depriv.	3.22E+00	3.06E-04	0.00E+00	4.26E-05	0.00E+00	0.00E+00	-8.29E-01

Resource use indicators for 1 kg of Biopipe with 100% material recycling:

IMPACT CATEGORY	UNIT	A1 – A3	A4	C1	C2	C3	C4	D
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ	9.84E+00	7.84E-06	0.00E+00	1.72E-04	1.46E+00	6.40E-01	-8.79E-02
Use of renewable primary energy resources used as raw materials	MJ	6.83E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	1.05E+01	7.84E-06	0.00E+00	1.72E-04	1.46E+00	6.40E-01	-8.79E-02
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	4.56E+01	1.97E-03	0.00E+00	4.21E-02	2.22E+00	3.80E+00	-1.13E+00
Use of non-renewable primary energy resources used as raw materials	MJ	2.33E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-6.00E-01
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	6.89E+01	1.97E-03	0.00E+00	4.21E-02	2.22E+00	3.80E+00	-1.73E+00
Use of secondary material	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of 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
Use 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
Net use of fresh water	m^3	7.25E-02	9.41E-08	0.00E+00	2.03E-06	4.38E-04	6.08E-04	-1.87E-03

Waste indicators for 1 kg of Biopipe with 100% material recycling:

IMPACT CATEGORY	UNIT	A1 – A3	A4	C1	C2	C3	C4	D
Hazardous waste disposed	kg	1.43E-03	4.76E-06	0.00E+00	6.64E-07	0.00E+00	2.13E-06	-3.72E-04
Non-hazardous waste disposed	kg	1.55E-02	2.13E-05	0.00E+00	2.98E-06	0.00E+00	1.74E-02	-4.05E-03
Radioactive waste disposed	kg	7.63E-05	6.73E-08	0.00E+00	9.42E-09	0.00E+00	6.53E-08	-1.99E-05

Outflow indicators for 1 kg of Biopipe with 100% material recycling:

IMPACT CATEGORY	UNIT	A1 – A3	A4	C1	C2	C3	C4	D
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
Materials for recycling	kg	5.06E-08	1.83E-14	0.00E+00	4.02E-13	3.00E-01	3.40E-09	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.00E-01	0.00E+00
Exported energy, electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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 experienced with the indicator. The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks. The results of the end-of-life stage (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3).

→ Additional scenario – 100% incineration with energy recovery

The environmental impact results associated with the declared unit are presented below, broken down by life cycle modules in accordance with the established methodology.

Mandatory impact categories for 1 kg of Biopipe with 100% incineration with energy recovery:

IMPACT CATEGORY	UNIT	A1 – A3	A4	C1	C2	C3	C4	D
Acidification	mol H+ eq	5.78E-03	7.73E-05	0.00E+00	8.85E-06	0.00E+00	3.56E-04	-1.46E-03
Climate change	kg CO_2 eq	2.26E+00	5.28E-02	0.00E+00	7.59E-03	0.00E+00	6.70E-01	-5.64E-01
Climate change - Biogenic	kg CO_2 eq	3.33E-03	1.86E-06	0.00E+00	2.59E-07	0.00E+00	7.75E-05	-8.72E-04
Climate change - Fossil	kg CO_2 eq	2.26E+00	5.28E-02	0.00E+00	7.59E-03	0.00E+00	6.69E-01	-5.62E-01
Climate change - Land use and LU change	kg CO_2 eq	1.53E-03	1.34E-06	0.00E+00	1.86E-07	0.00E+00	1.03E-04	-3.91E-04
Climate change - GHG	kg CO_2 eq	2.26E+00	5.28E-02	0.00E+00	7.59E-03	0.00E+00	6.70E-01	-5.64E-01
Eutrophication, marine	kg N eq	1.24E-03	1.74E-05	0.00E+00	1.96E-06	0.00E+00	1.68E-04	-3.13E-04
Eutrophication, freshwater	kg P eq	7.92E-05	4.57E-08	0.00E+00	6.36E-09	0.00E+00	6.14E-07	-2.06E-05
Eutrophication, terrestrial	mol N eq	1.22E-02	1.90E-04	0.00E+00	2.15E-05	0.00E+00	1.72E-03	-3.05E-03
Ozone depletion	kg CFC-11 eq	9.23E-07	1.11E-09	0.00E+00	1.55E-10	0.00E+00	5.07E-10	-2.42E-07
Photochemical ozone formation	kg NMVOC eq	8.83E-03	1.47E-04	0.00E+00	1.92E-05	0.00E+00	4.33E-04	-2.22E-03
Resource use, fossils	MJ	5.80E+01	7.20E-01	0.00E+00	1.00E-01	0.00E+00	2.86E-01	-1.48E+01
Resource use, minerals and metals	kg Sb eq	2.65E-07	1.79E-09	0.00E+00	2.51E-10	0.00E+00	1.99E-08	-6.76E-08
Water use	m^3 depriv.	3.22E+00	3.06E-04	0.00E+00	4.26E-05	0.00E+00	4.59E-02	-8.29E-01

Resource use indicators for 1 kg of Biopipe with 100% incineration with energy recovery:

IMPACT CATEGORY	UNIT	A1 – A3	A4	C1	C2	C3	C4	D
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ	9.84E+00	7.84E-06	0.00E+00	1.72E-04	0.00E+00	9.14E-01	-8.79E-02
Use of renewable primary energy resources used as raw materials	MJ	6.83E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	1.05E+01	7.84E-06	0.00E+00	1.72E-04	0.00E+00	9.14E-01	-8.79E-02
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	4.56E+01	1.97E-03	0.00E+00	4.21E-02	0.00E+00	5.42E+00	-1.13E+00
Use of non-renewable primary energy resources used as raw materials	MJ	2.33E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-6.00E-01
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	6.89E+01	1.97E-03	0.00E+00	4.21E-02	0.00E+00	5.42E+00	-1.73E+00
Use of secondary material	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of 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
Use 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
Net use of fresh water	m^3	7.25E-02	9.41E-08	0.00E+00	2.03E-06	0.00E+00	8.69E-04	-1.87E-03

Waste indicators for 1 kg of Biopipe with 100% incineration with energy recovery:

IMPACT CATEGORY	UNIT	A1 – A3	A4	C1	C2	C3	C4	D
Hazardous waste disposed	kg	1.43E-03	4.76E-06	0.00E+00	6.64E-07	0.00E+00	3.02E-01	-3.72E-04
Non-hazardous waste disposed	kg	1.55E-02	2.13E-05	0.00E+00	2.98E-06	0.00E+00	3.05E-06	-4.05E-03
Radioactive waste disposed	kg	7.63E-05	6.73E-08	0.00E+00	9.42E-09	0.00E+00	2.49E-02	-1.99E-05

Outflow indicators for 1 kg of Biopipe with 100% incineration with energy recovery:

IMPACT CATEGORY	UNIT	A1 – A3	A4	C1	C2	C3	C4	D
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
Materials for recycling	kg	5.06E-08	1.83E-14	0.00E+00	4.02E-13	0.00E+00	4.85E-09	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E+00	0.00E+00
Exported energy, electricity	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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 experienced with the indicator. The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks. The results of the end-of-life stage (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3).

→ Abbreviations

ABBREVIATIONS	DEFINITION
EN	European Standard
EF	Environmental Footprint
ES	Spain
GPI	General Programme Instructions
ISO	International Organisation for Standardisation (ISO)
CEN	European Committee for Standardisation (CEN)
CPC	Central Product Classification
GHS	Globally Harmonised System of Classification and Labelling of Chemicals
GRI	Global Reporting Initiative (GRI)
ND	Not Declared
RER	Europe

→ References

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→ Version history

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EPD
INTERNATIONAL EPD SYSTEM