NUPI INDUSTRIE ITALIANE S.p.A.

ENVIRONMENTAL PRODUCT DECLARATION

Product names:

PE-RT/AL/HDPE PIPES FOR HOT AND COLD WATER - TYPE MULTINUPI

Site Plants:

IMOLA (BO)

in compliance with ISO 14025 and EN 15804+A2:2019

Program Operator	EPDItaly
Publisher	EPDItaly

Declaration Number	2026PCMLN
Registration Number	EPDITALY1363

Issue Date	15/09/2026
Valid to	15/09/2031





General information

EPD OWNER:	Nupi Industrie Italiane S.p.A., Piazza San Marco n. 1, 20121 – Milano (MI) Italy
PLANT INVOLVED in the declaration:	Imola: Via Colombarotto n. 58 - 40026 Imola (BO) - Italy
SCOPE OF APPLICATION:	This Environmental Product Declaration (EPD) is valid for MULTINUPI pipes, type PE-RT/AL/HDPE. The production plant involved is the one located in Imola (BO). The type of declaration is related to an average pipe product. The life cycle assessment is representative of the product introduced in the declaration for the given system boundaries.
PROGRAM OPERATOR:	EPDITALY, via Gaetano De Castillia 10, 20124 Milano, Italia.
INDIPENDENT CHECK:	This declaration has been developed referring to EPDItaly, following the General Program Instruction; further information and the document itself are available at: www.epditaly.it. EPD document valid within the following geographical area: Italy and other countries according to sales market conditions. CEN standard EN 15804 served as the core PCR (PCR ICMQ-001/15 rev.3.2; 03/11/2025) PCR review was conducted by Daniele Pace. Contact via info@epditaly.it Independent verification of the declaration and data, according to EN ISO 14025:2010. Third party verifier: ICMQ SpA, via De Castillia, 10 20124 Milano (www.icmq.it) ☐EPD process certification (Internal)☑ EPD verification (External) ***Accredited by: Accredia***
CPC CODE:	3632 - Tubes, pipes and hoses, and fittings therefor, of plastics
CORPORATE CONTACT:	info@nupinet.com
TECHNICAL SUPPORT:	Sphera https://www.sphera.com
COMPARABILITY:	Environmental product declarations published within the same product category, but from different programs, may not be comparable. In particular, EPDs of construction products may not be comparable if they do not comply with EN 15804+A2.
ACCOUNTABILITY:	Nupi Industrie Italiane S.p.A relieves EPDItaly from any non-compliance with environmental legislation. The EPD owner will be responsible for the information and supporting evidence; EPDItaly

	declines all responsibility for the manufacturer's information, data and results of the life cycle assessment.
REFERENCE DOCUMENT:	This declaration has been developed following the EPDItaly Program Regulations and Annexes of EPDItaly, available at www.epditaly.it.
PRODUCT CATEGORY RULES (PCR):	PCR ICMQ-001/15 rev.3.2 – 03/11/2025 EN 15804+A2:2019 is the framework reference for PCRs. UNI EN 16904:2025
EPD PROJECT REPORT	2026_05_28_I report MULTINUPI

Company

OUR MISSION – FOR OVER 50 YEARS

Cutting edge solutions for any kind of installation

The primary goal of Nupi Industrie Italiane S.p.A. corporate strategy is not only the production of systems that meet performance requirements and comply with the use for which they are intended, but above all general customer satisfaction. Producing better and faster are goals that technology makes more and more compatible.

In 2022, Nupi Industrie Italiane S.p.A. celebrated its 50th anniversary! In October 2015, it took over from Nupigeco S.p.A., founded in October 2008 from the merger of NUPI S.p.A. and GECO System S.p.A., to form a single large company. Combining their many years of experience and constant growth, the two firms decided to create a new flexible and advanced company, ready to play its role to satisfy the demands of the market whilst being environmentally astute.

The goal was to combine the expertise in the development and production of piping systems for plumbing, industrial applications, gas, irrigation and heating, with the experience in the production of polymer pipes specifically dedicated to oil, chemical and petrochemical fields.







Management System and Certifications

Nupi Industrie Italiane S.p.A. submits its management and production systems to external audits performed by third party certification bodies.
Audit frequency depends on the procedure established by the specific standard and by each certification body. Nupi Industrie Italiane S.p.A. is certified in compliance with the standards for quality (EN ISO 9001), environment (EN ISO 14001) and Health and Safety of workers (ISO 45001).
Thanks to the synergy between the phases of research, production, quality control and after-sales service, the company obtained several international quality company and product certifications.

UNI EN ISO 9001
UNI EN ISO 14001
ISO 45001



MANAGMENT UNI EN ISO 9001:2015 QUALITY

POLICY UNI EN ISO 14001:2015 ENVIRONMENTAL

SAFETY UNI ISO 45001:2018 AT WORK

Product Certifications

The company leadership is based on these solid foundations in a competitive and high technology industry such as plastics processing. A record that NUPI Industrie Italiane S.p.A. maintains thanks to high quality products and constant attention to customers' needs through an efficient after-sales service, a precise and timely technical assistance and installers' training.
NUPI products are of high quality, complying with regulations and conforming to the most stringent standards and certifications schemes. The full updated list is available on the website: www.nupiindustrieitaliane.com.

EPD Goal and scope

The entire life cycle of the product is considered (Type of EPD: cradle to grave and module D) and the modules described below are declared in this EPD:

*Modules **A1-A3** include those processes that provide energy and material input for the system (A1), transport up to the factory gate of the plant (A2), manufacturing processes as well as waste processing and emissions to air (A3).*

*Module **A4** includes the transport from the production site to the customer or to the point of installation of the products.*

*Module **A5** considers all pipe systems installation steps (negligible), the installation is done inside building mainly manually performed) plus packaging waste processing (recycling, incineration, disposal). Credits from energy substitution are declared in module D. During this phase, a specific leftover has been considered.*

*Module **B1** considers the use of the installed product. During the use of plastic piping systems, a scenario of zero impact is considered.*

*Module **B2** includes the maintenance of the product. A scenario of zero impact is considered.*

*Modules **B3-B4-B5** are related to the repair, replacement and refurbishment of the products. If the products are properly installed no repair, replacement or refurbishment processes are necessary. A scenario of zero impact is then considered.*

*Modules **B6-B7** consider energy use and operational water to operate building systems. No operational energy or water use are considered. A scenario of zero impact is then considered.*

*Module **C1** considers deconstruction, including dismantling or demolition of the product from the building.*
For products installed inside buildings a scenario of zero impact is considered.

*Module **C2** considers transportation of the discarded piping system to a recycling or disposal process.*

*Module **C3** considers waste processing for products sorting, recycling and incineration.*

*Module **C4** includes all waste disposal processes, including pre-treatment and management of the disposal site.*

*Module **D** includes benefits from all net flows in the end-of-life stage that leave the product boundary system after having passed the end-of-waste stage. Benefits from packaging incineration (electricity and thermal energy) are declared within module D.*

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

X = modules included in the study

The emission factor for the electricity used in A3 is 0.503 KgCO2eq/kWh.

According to the PCR ICMQ-001/15 rev. 3.2 this EPD is a “cradle to grave and module D” Type. it is an average EPD for the product MULTINUPI pipes produced in NUPI INDUSTRIE ITALIANE S.p.A. plant located in Imola (BO) and sold in Europe. All data refer to the 2024 production and sales.

All manufacturing activities and packaging/auxiliary’s production are in module A3, while energy production and input materials are in A1. Transport to clients (A4) is included together with end-of-life scenarios (benefits and loads included according to D module).

- The declaration is a Type 3 EPD (product EPD based on a qualified LCA-Tool) according to /UNI EN 16904:2025 – Plastics piping systems inside the building structure - Environmental product declarations - Product category rules complementary to EN 15804.

PCR-ICMQ-001-15_Rev-3.2; 03/11/2025 – PCR for construction products.

REGULATIONS OF THE EPDItaly PROGRAMME 6/.

Geographical validity: EU

Time Representativeness: The primary data cover a period of 12 months, reference 2024.

Database: MLC Database 2024.2

NUPI LCA Tool v.5 25.01.2025: The LCA model is created using the Sphera LCA for Expert (previously GaBi Professional) Software system for life cycle engineering, developed by Sphera. The /MANAGED LCA CONTENT (GABI DATABASES)/ provides the life cycle inventory data for several of the raw and process materials obtained from the background system.

EPD realized by means of a validated algorithm:
In 2019 NUPI Industrie Italiane S.p.A. implemented and certified a Process for EPD generation by using an algorithm that has been validated and certified by ICMQ S.p.A., in agreement with EPDItaly’s requirements. The process is based on an automatic data collection from different manufacturing plants that have been integrated, verified and validated in compliance with internal procedures. The validated algorithm allows the automatic calculation of the indicators reported into the current EPD coming from an LCA model implemented into the NUPI LCA process tool.
In 2025, after the five years period of validity, the NUPI LCA tool has been updated and validated by ICMQ S.p.A. The LCA tool enables the creation of partly verified LCA results for pipes, fittings and piping systems produced by NUPI.

Product description

Detailed product description

PE-RT/Aluminium/HDPE pipes produced by Nupi Industrie Italiane S.p.A. denominated MULTINUPI meet the requirements of a wide range of applications.

MULTINUPI allow the transport of hot, cold, sanitary water under pressure, inside building and for the distribution of compressive air for industrial applications.

They are suitable for different types of installations such as risers, connections to sanitaryware, piping for chilled water for fan convectors, connections between thermal generators, distribution manifolds and compressive air distribution.

MuLTINUPI piping systems can be used in several installations such as houses, large apartment buildings, hotels, hospitals, shopping malls, churches, schools, gyms, etc.

MultiNUPI is a system of multilayer pipes and BRASS and PPSU mechanical pressure fittings for the hot and cold water inside building.

MultiNUPI fittings are of “press-fitting" type, i.e. with mechanical pressure. The innovation of the MultiNUPI system is the integration of the new MULTI-PRESSING range which allows to switch from a single clamping system (using only "U" profile jaws) to a multiple clamping system, suitable for 5 different types of clamps: TH - U - H - B – F.

Production processes description

PIPE EXTRUSION (Imola)



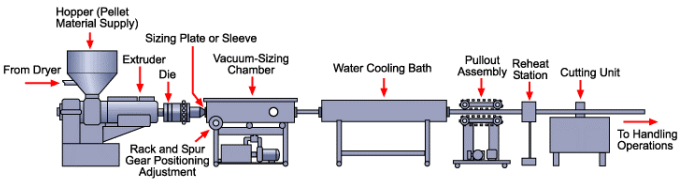


Figure 1 Pipes extrusion process

Nupi Industrie Italiane S.p.A. Imola plant manufactures both solid wall (monolayer) plastic pipes, in diameter sizes ranging from 14 mm to 250 mm, and coextruded multilayer (from two to five layers) pipes.

The raw materials used to manufacture plastic pipes are supplied in pellets (provided in bulk transporter, octabins or bags), both as natural resin or finished compound. Resin is pneumatically conveyed from the bulk transporters to silos at the plant site. The resin is then transferred from the silos to the pipe extruder by a vacuum transfer system.

The pipe extrusion line consists of the extruder, die, cooling systems, puller, printer, saw and take-off equipment. The function of the extruder is to heat, melt, mix, and convey the material to the die, where it is shaped into a pipe. The extruder is used to heat the raw material and then force the resulting melted polymer

through the pipe extrusion die. The pipe extrusion die supports and distributes the homogeneous polymer melt around a solid mandrel, which forms it into an annular shape for solid wall pipe.

The dimensions and tolerances of the pipe are determined and set during the sizing and cooling operation. The sizing operation holds the pipe in its proper dimensions during the cooling of the molten material. During vacuum sizing, the molten material is drawn through a sizing tube or rings while its surface is cooled enough to maintain proper dimensions and a circular form. The outside surface of the pipe is held against the sizing sleeve by vacuum. After the pipe exits the vacuum sizing tank, it is moved through a second vacuum tank or a series of spray or immersion cooling tanks.

The puller must provide the necessary force to pull the pipe through the entire cooling operation. Pipes are marked at specific intervals through ink jet or hot marking with tape machines.

For multilayers plastic pipe the coextruded technology is used.

Finished pipes can be coiled (depending to their sizes and physical/mechanical characteristics) or cut in customised straight lengths for handling and shipping convenience. Coiled pipes and straight lengths are then arranged with the proper packaging, ready for the storage, handling and transport phases.

Metal-plastic pipes are manufactured on specifically designed inline equipment integrating all important process steps. They are made up of five layers perfectly joined thanks to an innovative technological process supported by cutting-edge equipment.

The first extruded layer is the PE-RT polyethylene layer that guarantees resistance to high temperatures. The adhesive layer is added to this one to then wrap the aluminium, with different thickness depending on the welded diameter. The aluminium layer makes the pipe malleable and similar to copper. Once a second adhesive layer is applied, the external high-density polyethylene layer is extruded to protect the aluminium, making it resistant to external agents.

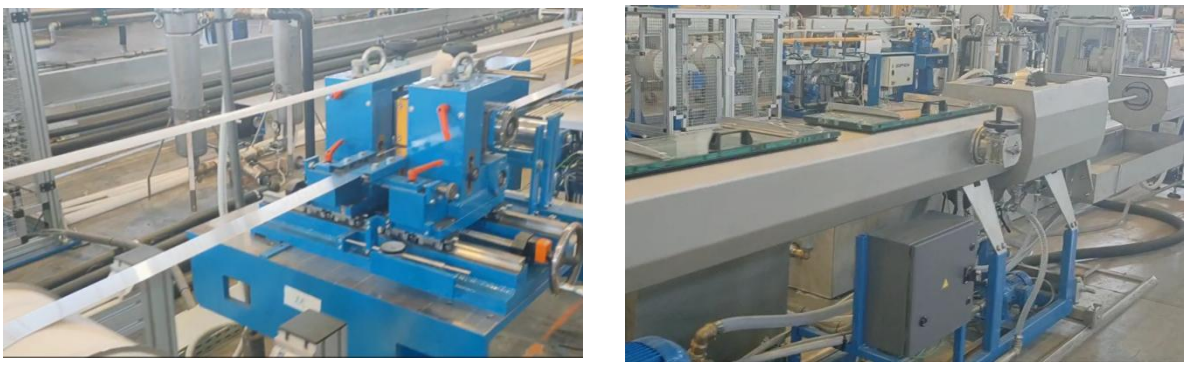


Figure 2 Aluminium-plastic pipes extrusion process

Technical data

MultiNUPI pipes are designed to fully exploit the characteristics of the materials used to make them and offer high performance standards that allow them to be used both for plumbing and heating systems.

The table below, an excerpt from EN ISO 21003-1 for multilayer metal-plastic pipes for cold and hot water, demonstrates the fields of use and the corresponding operating pressures and temperatures guaranteed for this system.

Class	T_D °C	Time at T_D year	T_{max} °C	Time at T_{max} year	T_{mal} °C	Time at T_{mal} h	Field of application
1	60	49	80	1	95	100	Hot sanitary water (60°C)
2	70	49	80	1	95	100	Hot sanitary water (70°C)
4	20 + 40 + 60	2,5 + 20 + 25	70	2,5	100	100	Floor heating and low-temperature radiators
5	20 + 60 + 80	14 25 10	90	1	100	100	High-temperature radiator heating

- Each nation will select its class 1 or 2 in conformity with national regulations.
- Where more than one operating temperature appears in a class, the times must be combined. For example, the operating temperature profiled for 50 years for a class 5 is 20°C for 14 years combined with 60°C for 25 years, 80°C for 10 years, 90°C for 1 year and 100°C for 100 hours.

Note: For values of Toper (Operating Temperature), Tmax (Maximum Temperature) and Tmal (Malfunctioning Temperature) exceeding those indicated in this table, this international Standard cannot be applied.

Operating Performance Table

Service Conditions - Application classes as per EN ISO 21003 and ISO 10508

MultiNUPI pipe system meets the characteristics of all classes at 10 bars.

Base materials/ancillary materials in the declared unit

Material		Declared Unit
PE-RT/Polyethylene granulate	Base	31.9%
Aluminium	Base	41.7%
Pigments for Polyethylene	Ancillary	0.3%
Tie-layer (PE based)	Base	5.0%
PE-HD	Base	21.1%
TOTAL		100%

Description of declared unit

This EPD refers to an average multilayer pipe made of polyethylene and aluminium. The declared unit is 1 kg of multilayer pipe. The reference product model is based on a DN 16 pipe, while production data cover diameters from DN 16 to DN 63. A sensitivity analysis confirmed that the environmental results are representative of the entire diameter range considered (16 – 20 – 25 – 26 – 32 – 40 – 50 and 63 mm). Annex I provides the specific weight of each product.

The declared unit's packaging includes 0.002 kg/kg of plastic protective sleeve, 0.037 kg of wooden pallets and 0.004 kg/kg of stretch film.

The product does not contain substances included in the "Candidate list of substances of very high concern (SVHC) for authorization" in a percentage greater than 0.1%.

Products Distribution

In NUPI, pipes are supplied to customers in customised dimensions with appropriate protection and packaging. The product packaging is made of wooden pallets and crates, plastic sheaths, stretch film.

For MULTINUPI pipes the typical packaging used is plastic sheaths and wooden pallets.

This phase includes the transport of the pipes from the manufacturing site to distribution centre.

As reference for the distribution, the PCR scenario has been used (EU market, 300 km, lorry > 32 t Euro 5, utilisation factor 22%).

Installation

According to PCR EN 16904 installation of the product was considered to be negligible, as it is done manually in the building. Environmental impacts from waste packaging materials (A5) and release of biogenic carbon dioxide from wood pallets was considered. The impacts of material production, its processing and its disposal as installation waste are also included. Packaging treatment scenarios are based on Eurostat data for Europe.

No emissions are generated during installation and plastic pipes installations do not cause health or environmental hazards. 3% of scraps have been included in.

Condition of use:

Operational use (pumping energy) is not relevant for the EPD since it falls outside the system boundaries of the LCA project. Maintenance is not needed for the MULTINUPI hot & cold pipe system. According to UNI EN 16904 a general scenario of zero impact for plastic piping systems inside the building is considered.

Reference service life

MULTINUPI piping systems are regarded as having 50 years RSL independent of their material according to UNI EN 16904.

End of life

After the demolition and deconstruction phase, the PEF - Annex C V2.1 May 2020 has been chosen (45 % incineration, 55% landfill).

As per UNI EN 16904 for the transport from the installation site to the treatment site (C2), the considered distances were:

- incineration = 150 km
- landfill = 50 km

This transport was modelled with trucks 28-32 t, EURO 5.

LCA results – Environmental impacts per declared unit

The tables below show the environmental impacts results of 1 kg of an average MULTINUPI pipes.

Additional environmental impact indicators have been calculated and included in the project report but are not declared according to /EN 15804+A2:2019/ chapter 7.2.3.2.

CORE ENVIRONMENTAL IMPACT INDICATORS												
	A1	A2	A3	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
GWP - total [kg CO_2 eq.]	5,42E+00	1,01E-01	-5,71E-03	5,52E+00	4,46E-02	2,80E-01	0,00E+00	0,00E+00	7,94E-03	9,05E-01	1,69E-02	-4,55E-01
GWP- fossil [kg CO_2 eq.]	5,43E+00	9,87E-02	4,98E-02	5,58E+00	4,46E-02	2,07E-01	0,00E+00	0,00E+00	7,93E-03	9,05E-01	1,68E-02	-4,53E-01
GWP - biogenic [kg CO_2 eq.]	-1,23E-02	2,88E-04	-5,56E-02	-6,76E-02	4,10E-05	7,25E-02	0,00E+00	0,00E+00	7,28E-06	2,20E-05	5,03E-05	-1,88E-03
GWP - LULUC [kg CO_2 eq.]	9,85E-04	1,68E-03	8,03E-05	2,75E-03	5,78E-06	8,69E-05	0,00E+00	0,00E+00	1,03E-06	6,55E-06	7,62E-05	-4,01E-05
ODP [kg CFC-11 eq.]	2,48E-11	1,47E-14	2,16E-13	2,50E-11	5,59E-15	7,69E-13	0,00E+00	0,00E+00	9,91E-16	1,04E-13	5,16E-14	-3,69E-12
AP [mol of H+ eq.]	2,19E-02	1,50E-04	7,37E-05	2,21E-02	5,27E-05	6,84E-04	0,00E+00	0,00E+00	1,07E-05	1,09E-04	1,07E-04	-4,59E-04
EP - freshwater [kg P eq.]	3,43E-06	4,26E-07	8,17E-08	3,94E-06	1,18E-08	3,78E-07	0,00E+00	0,00E+00	2,09E-09	1,71E-08	6,05E-06	-7,02E-07
EP - marine [kg N eq.]	4,75E-03	5,63E-05	2,71E-05	4,83E-03	1,99E-05	1,51E-04	0,00E+00	0,00E+00	4,23E-06	2,46E-05	2,50E-05	-1,42E-04
EP - terrestrial [mol of N eq.]	5,18E-02	6,65E-04	2,96E-04	5,28E-02	2,23E-04	1,65E-03	0,00E+00	0,00E+00	4,75E-05	4,93E-04	2,74E-04	-1,54E-03
POCP [kg NMVOC eq.]	1,56E-02	1,49E-04	9,00E-05	1,58E-02	5,80E-05	5,00E-04	0,00E+00	0,00E+00	1,16E-05	7,20E-05	7,83E-05	-4,11E-04
ADPe [kg Sb eq.]*	1,93E-06	8,69E-09	8,19E-09	1,95E-06	1,20E-09	5,88E-08	0,00E+00	0,00E+00	2,13E-10	8,50E-10	1,10E-09	-3,84E-08
ADPf [MJ]*	1,00E+02	1,31E+00	7,65E-01	1,02E+02	5,95E-01	3,13E+00	0,00E+00	0,00E+00	1,06E-01	1,98E-01	2,60E-01	-8,07E+00
WDP [m^3 world equiv.]*	1,77E+00	1,55E-03	1,90E-02	1,79E+00	1,12E-04	5,94E-02	0,00E+00	0,00E+00	1,99E-05	8,34E-02	2,07E-03	-4,68E-02

Caption: GWP - total = global warming potential; GWP - fossil = global warming potential (fossil fuel only); GWP - biogenic = global warming potential (biogenic); GWP - luluc = global warming potential (land use only); ODP = ozone depletion; AP = acidification terrestrial and freshwater; EP - freshwater = eutrophication potential (freshwater); EP - marine = eutrophication potential (marine); EP- terrestrial = eutrophication potential (terrestrial); POCP = photochemical ozone formation; ADPE = abiotic depletion potential (element), ADPF = abiotic depletion potential (fossil) WDP = water scarcity.

*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 according to EN 15804+A2:2019 chapter 7.2.3.2.

LCA results – Resource use per declared unit

RESOURCE USE												
	A1	A2	A3	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
PERE [MJ]	3,06E+01	1,13E-01	1,52E-01	3,09E+01	4,36E-03	1,12E+00	0,00E+00	0,00E+00	7,73E-04	4,86E-02	4,12E-02	-2,47E+00
PERM [MJ]	0,00E+00	0,00E+00	6,20E-01	6,20E-01	0,00E+00	-1,67E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT [MJ]	3,06E+01	1,13E-01	7,72E-01	3,15E+01	4,36E-03	9,55E-01	0,00E+00	0,00E+00	7,73E-04	4,86E-02	4,12E-02	-2,47E+00
PENRE [MJ]	7,10E+01	1,31E+00	4,54E-01	7,28E+01	5,95E-01	2,76E+00	0,00E+00	0,00E+00	1,06E-01	1,34E+01	2,60E-01	-8,07E+00
PENRM [MJ]	2,94E+01	0,00E+00	3,11E-01	2,97E+01	0,00E+00	3,70E-01	0,00E+00	0,00E+00	0,00E+00	-1,32E+01	0,00E+00	0,00E+00
PENRT [MJ]	1,00E+02	1,31E+00	7,65E-01	1,02E+02	5,95E-01	3,13E+00	0,00E+00	0,00E+00	1,06E-01	1,98E-01	2,60E-01	-8,07E+00
SM [kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,44E-02
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	0,00E+00	0,00E+00	0,00E+00
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	0,00E+00	0,00E+00
FW [m^3]	6,18E-02	1,26E-04	5,12E-04	6,24E-02	4,76E-06	2,01E-03	0,00E+00	0,00E+00	8,44E-07	1,97E-03	6,25E-05	-1,92E-03

Caption: 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; PENRE = Use of non renewable primary energy excluding non renewable primary energy resources used as raw materials; PENRM = 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 secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

LCA results – Output flows and waste categories per declared unit

WASTE CATEGORIES AND OUTPUT FLOWS												
	A1	A2	A3	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
HWD [kg]	1,30E-08	5,03E-11	2,45E-09	1,55E-08	2,16E-11	8,32E-10	0,00E+00	0,00E+00	3,84E-12	9,40E-11	6,45E-11	-4,99E-09
NHWD [kg]	1,64E+00	2,15E-04	1,23E-03	1,64E+00	6,20E-05	8,34E-02	0,00E+00	0,00E+00	1,10E-05	1,00E-02	7,74E-01	-3,95E-03
RWD [kg]	2,61E-03	2,39E-06	2,06E-05	2,63E-03	9,47E-07	8,13E-05	0,00E+00	0,00E+00	1,68E-07	1,44E-05	3,38E-06	-5,30E-04
EEE [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	0,00E+00	0,00E+00
EET [MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,91E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
CRU [kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MER [kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,08E-01	0,00E+00	0,00E+00	0,00E+00	1,88E+00	0,00E+00	0,00E+00
MFR [kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,80E-01	0,00E+00	0,00E+00	0,00E+00	3,40E+00	0,00E+00	0,00E+00

.Caption: HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy

LCA results – Biogenic carbon content of product and packaging per functional unit

Biogenic carbon content of product and packaging	
Biogenic carbon content in product [kg]	0,00E+00
Biogenic carbon content in packaging [kg]	1,35E-02

Assumptions and approximations

Where possible, a conservative approach has been adopted, overestimating burdens to prove irrelevance. In other cases, proxy data were selected based on scientific experience, in order to improve the accuracy of the model. Where it was not possible to know the precise composition of materials in the supply chain (due to commercial or industrial confidential suppliers' reasons or due to missing datasets), these have been approximated with LCIs of similar materials, estimated by the combination of available dataset or reconstructed with literature data.

1. Where potential benefits from energy recovery in A5 and C modules are considered, for rest of world countries (other than Europe) these are calculated based on the European grid mix.
2. Wastes deriving from extraordinary maintenance activities have not been considered.
3. For mixed packaging waste the production impact is considered, but as it is mainly made of polyethylene, the polyethylene production is considered.
4. Some components produced by third party companies come to NUPI with their own packaging. This packaging is not accounted for in this study.
5. In case of CCHP system in place as electricity is produced only for internal use, no electricity is sent to national grid.
6. Internal transports between production sites have not been considered
7. A European scenario has been considered for end of life scenarios.

Cut off criteria

EN 15804+A2:2019 requires that where there are data gaps or insufficient input data for a unit process the cut-off criteria shall be 1% of renewable and non-renewable primary energy usage and 1% of the total mass of this unit process. It can be concluded that the total sum of neglected material flows does not exceed 5% of mass, energy or environmental relevance. On the other hand, impacts generated from the machinery and facilities itself are neglected. This is in accordance with ISO14040/44 (2006).

Data quality

The data quality can be considered as good. The LCA model has been checked and most relevant flows were considered. Technological, geographical and temporal representativeness is good.

Examination period

Primary data collected in the context of this study refer to 2024.

Allocation of background data

In general, the allocation principles used in standard Sphera LCA for Expert (previously GaBi Professional) datasets are explained within Sphera LCA for Expert (GaBi)-Documentation (MANAGED LCA CONTENT (GABI DATABASES)).

- **Module A1** includes the manufacture of primary materials which are required for the pipes/fittings manufacturing. The datasets for the primary basic materials already include their upstream process. The energy demand is also considered.

- **Module A2** includes the transports of the basic materials to the pipes producer. Fuel use is also included in the transport sub-plans. Truck-trailer, Euro 6 A-C, 20 - 28t gross weight / 12.4t payload capacity.
- **Module A3** includes the production of pipes, auxiliaries and packaging materials. In this module are also considered emissions to air, production of wastes and their treatment (such activities refer to NUPI Industrie Italiane S.p.A. direct activities. Primary data have been used for (such as plastic extrusion for pipes production).
- **Module A4** takes into account the transport to the final distributor.
- **Module A5**

  During the installation there is a 3% scrap that is considered in module A5 (as per UNI EN 16904), as well as all the impacts generated by the production of the scrap. The treatment scenario associated with material leftover follows the same end-of-life decided for the portion of the same material contained in the product.

  Module B (Use stage): Operational use (pumping energy) is not relevant for the plastic pipe system, since it falls outside the system boundaries of the LCA project. Maintenance is not needed for the plastic pipes.

  According to UNI EN 16904:2025 a general scenario of zero impact for plastic piping systems inside the building is considered.

- **Module C1** (Deconstruction / demolition)- Demolition for S&W and H&C piping systems: As generic scenario for the demolition of piping system, it is considered that it is mainly demolished together with the construction of the building. During the demolition of a building a significant amount of energy is used. This energy is mainly used to break inert waste streams, such as concrete and brick, and only a very little, insignificant part could be allocated to the piping system. Therefore, the impact of the deconstruction/demolition stage allocated to the piping system can be considered as zero.

- **Module C2, C3** (sorting, recycling and incineration with energy recovery) and **C4** (landfill) consider the end of life scenarios of the product. The percentages to the given scenarios have been suggested by the UNI EN 16904:2025 as shown below:

- Incineration 45%
- Landfill 55%

  For treatment of packaging waste, the most updated European average scenarios (EUROSTAT 2021) for Europe were used.

- **Module D** consists of loads and benefits beyond the system boundaries.

Other additional environmental information

Emissions to indoor air:

No direct emissions at the building site. Nupi Industrie Italiane S.p.A confirms that the MULTINUPI pipes do not contain any substances mentioned on the REACH-list.

Emissions to soil and water:

No direct emissions at the building site. Nupi Industrie Italiane S.p.A confirms that MULTINUPI pipes do not contain any substances mentioned on the REACH-list.

Annex I – Products specific weight table

Items Code	Description	Pipe weight (kg/m)
TMULTI16	PIPE MULTINUPI D.16	0,12
TMULTI20	PIPE MULTINUPI D.20	0,17
TMULTI202	PIPE MULTINUPI D.20X2	0,16
TMULTI25	PIPE MULTINUPI D.25	0,23
TMULTI26	PIPE MULTINUPI D.26	0,27
TMULTI32	PIPE MULTINUPI D.32	0,44
TMULTI40	PIPE MULTINUPI D.40	0,66
TMULTI50	PIPE MULTINUPI D.50	0,91
TMULTI63	PIPE MULTINUPI D.63	1,37

References

ISO 14040: Environmental management - Life cycle assessment - Principles and framework.

ISO 14044: Environmental Management – Life Cycle Assessment – Requirements and Guidelines.

ISO 14025: Environmental labels and declarations - Type III environmental declarations - Principles and procedures.

EN 15804+A2:2019: Sustainability of construction works -Environmental Product Declarations - Core rules for the product category of construction products.

MANAGED LCA CONTENT (GABI DATABASES) - Life cycle assessment database, by Sphera Solutions GmbH, Leinfelden-Echterdingen, 2024.2 https://sphera.com/life-cycle-assessment-lca-database/

SPHERA LCA FOR EXPERT (GABI) - Life cycle assessment software (version 10), by Sphera Solutions GmbH, Leinfelden-Echterdingen, 2024 https://sphera.com/life-cycle-assessment-lca-software/

UNI EN 16904:2025 – Plastics piping systems inside the building structure - Environmental product declarations - Product category rules complementary to EN 15804.

PCR-ICMQ-001-15_Rev-3.2; 03/11/2025 – PCR for construction products.

REGULATIONS OF THE EPDItaly PROGRAMME V.6.

EN 15941 - Sustainability of construction works - Data quality for environmental assessment of products and construction work - Selection and use of data.

CEN/TR 16970:2016 - Sustainability of construction works - Guidance for the implementation of EN 15804.

EPD background report NUPI LCA tool v.8.1 30-01-2025.

EUROSTAT 2021 - Packaging waste by waste management operations.