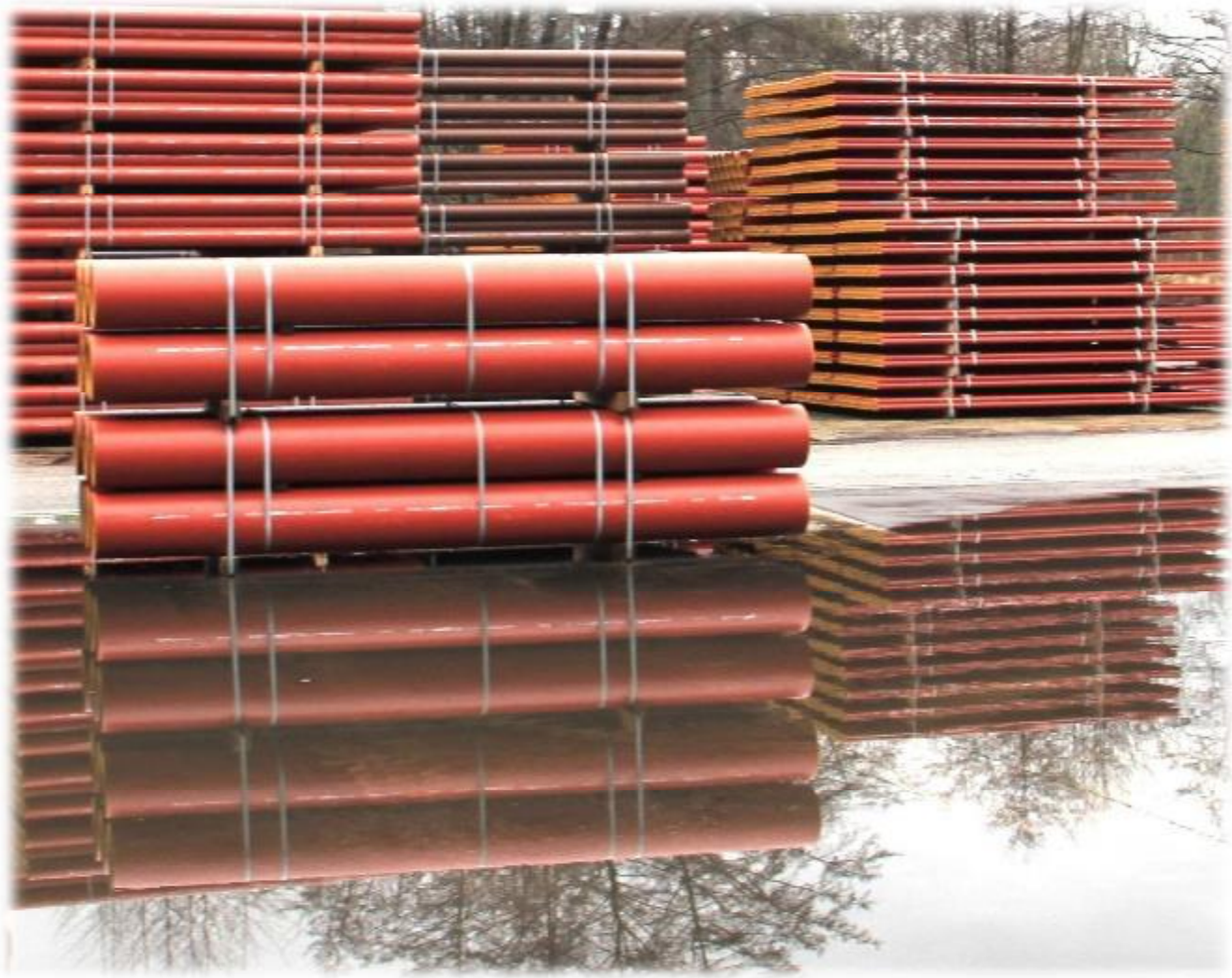


Environmental Product Declaration

Cast iron waste water and rainwater drainage system

ENSIGN

Date of publication: 2020-11-04

Validity: 5 years

Valid until: 2025-10-29

In accordance with PCR 2012:01 Construction products and construction services v 2.33 (EN 15804:2012+A1) and EN 14025:2010

Scope of the EPD®: Ireland and United Kingdom

Registration number

The International EPD® System:

S-P-02190

EPD®

EPD VERIFIED

The environmental impacts of this product have been assessed over its whole life cycle. Its Environmental Product Declaration has been verified by an independent third party.

Contents

Warning:

The information contained in this declaration is supplied on the responsibility of Saint-Gobain PAM (Manufacturer)

Any exploitation, total or partial, of the information supplied by this declaration must as minimum always show the complete reference of the original EPD and its producer who will be able to supply a full copy.

Reading Guide:

Reading example: -9,0 E -03 = -9,0 x 10-3

The following display rules apply:

- If the result of the inventory calculation is nil, then the value zero is displayed
- If the module is not evaluated; then the value « MNA » is displayed

Use of the EPD for Product comparison:

EPDs of construction products may be not comparable if they do not comply with EN 15804 . Environmental Product Declarations within the same product category from different programs may not be comparable

The EN 15804+A1 standard defines in § 5.3 « Comparability of EPD for building products », conditions under which building products can be compared on the basis of the information supplied by the EPD

« A comparison of the environmental performance of building products using EPD information must be in accordance with the use of products and their impacts on the building, and must consider the entire life cycle (all information modules) »

General information:

Environmental Product Declaration complies with PCR 2012:01 Construction products and construction services v 2.33 (EN 15804:2012+A1) and EN 14025:2010.

EPD Owner: Saint-Gobain PAM, 21 avenue Camille Cavalier, PONT-A-MOUSSON, 54700, France

Saint-Gobain Pam in its continuous improvement objectives and eco-design, has conducted internally a complete life cycle analysis of its products

EPD Type: « from cradle to grave » Individual EPD

Product Category Rule identification: PCR 2012:01 Construction products and construction services v 2.33 (EN 15804:2012+A1) and EN 14025:2010

Commercial reference and represented manufacturers: ENSIGN, manufactured in Bayard plant for Saint-Gobain PAM

This declaration is based on the study developed by Yves Coquelet (Yves.Coquelet@saint-gobain.com) and Jean-Michel Roch (Jean-Michel.Roch@Saint-Gobain.com).

This declaration was produced the 04 November 2020, validated until October the 29 2025 (5-year validity period)

Declaration's accompanying report produced in August 2020. The information related to the EPD validity is consistent with the specifications included in the project report.

External independent verification carried out by: Marcel Gomez Ferrer

CEN STANDARD EN15804 served as the core PCR	
EPD program operator	The International EPD® System. Operated by EPD® International AB. www.environdec.com.
PCR review conducted by	The Technical Committee of the International EPD® System Chair : Massimo Marino Contact via info@environdec.com
Independent verification of the environmental declaration and data according to standard EN ISO 14025:2010	Internal ☐ External ☒
Third part v**erifier**	Marcel Gomez Ferrer Marcel Gomez Consultoria Ambiental (www.marcelgomez.com)Phone : +34 630 64 35 93 Email : info@marcelgomez.com
Accredited or approved by	The International EPD System

Description of Functional unit and product

Functional Unit description:

Taking into consideration the product functions, functional unit can be described as: to ensure 1 linear meter of piping system used to drain waste and rain water.

Description of the product and its use:

This EPD document describes the impacts of 1 linear meter of the cast iron pipe system used to drain building waste water. This declaration includes all the elements of PAM cast iron pipe system needed for its installation.

Technical data and physical characteristics

- UN CPC code: 41273
- Fire reaction: A2 s1-d0 comply with Standard NF EN 13501-1+A1 :2013
- Acoustic properties: Structural noise LscA < 5dB(A) (results from IBP laboratory in Stuttgart, for a flow rate of 2l/s and with PAM'Acoustic). For more informations about acoustic properties see page 19

Description of principal components and/or materials on 1 linear meter of product

Parameter	Value
Mass	7,41 kg
Coatings	Internal coatings: Epoxy External coatings: Epoxy or acrylic-based paint
Packaging	Metal strips: 12 g/FU Wooden pallets: 123 g/FU PE strips: 4 g/FU
Products used in Cast iron pipe system.	ENSIGN cast iron pipes and fittings – 7,17 kg Stainless couplings – 0,17 kg Elastomer seals (EPDM) – 0,07 kg

"During the life cycle of the product any hazardous substance listed in the "Candidate List of Substances of Very High Concern (SVHC) for authorization[1]" has been used in a percentage higher than 0.1% of the weight of the product"

"The verifier and the program operator do not make any claim nor have any responsibility of the legality of the product"

[1] http://echa.europa.eu/chem_data/authorisation_process/candidate_list_table_en.asp

Reference lifespan description

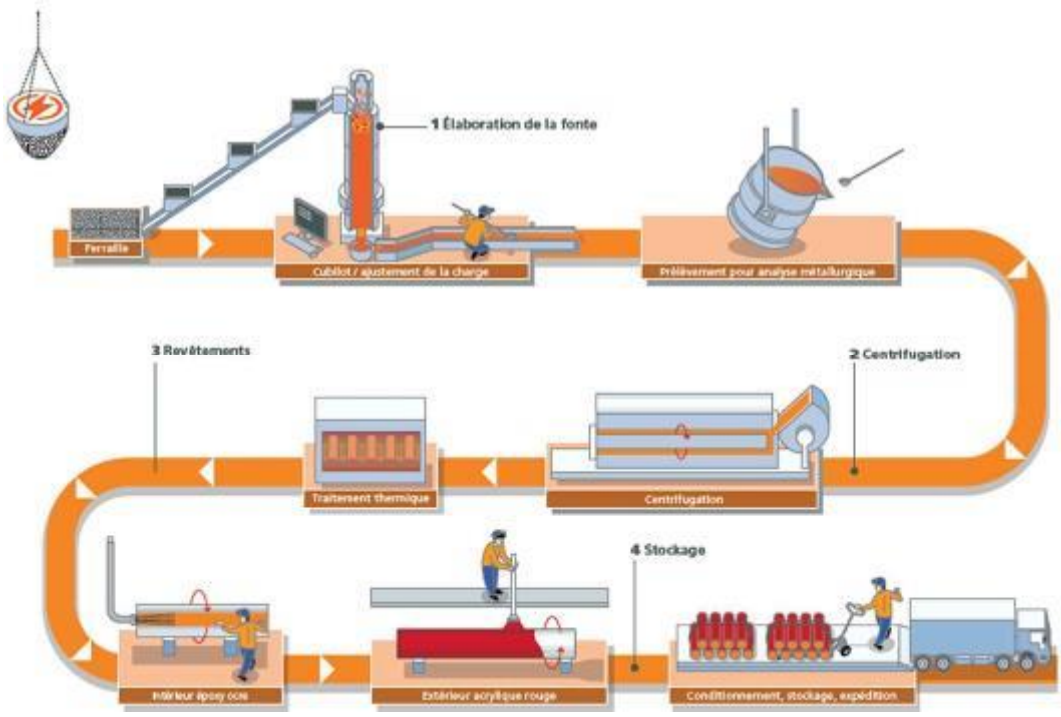
Reference lifespan	70 years
Justification	The reference lifespan has been defined by a scientific approach which includes laboratory ageing tests and a correlation study conducted by university laboratories, based on observations of installations over several decades.
Declared properties of the product (at the factory exit)	NF EN 877/A1 – December 2006 + AC - January 2008
Theorical parameters of application	Installation in compliance with SG PAM guidelines
Assumed quality of the project, when installation complies with manufacturer instructions	Application compliant with EN 12056 standard and PAM application guidelines.
External environment (for external applications)	Compliant with EN 877 and PAM application guidelines
Internal environment (indoor applications)	Compliant with EN 877 and PAM application guidelines
Terms of use	Compliant with Local regulation and PAM application guidelines
Maintenance	The current local regulation does not indicate the frequency of maintenance.

Life cycle stages

Life cycle scheme

The following LCA is based on the declared unit, defined as 1 linear meter of cast iron pipe system, installed in accordance with the proper rules, aimed to collect and drain waste water and sewage in 4-storey building, over period of 70 years.

Production stage A1 - A3:



1. Cast iron production

- Cupola/ load adjustment
- sampling for metallurgical analysis

2. Centrifugation

- heat treatment:
- centrifugation

3. Coatings

- interior lining : ochre epoxy
- exterior lining : red epoxy exterior

4. Storage

Conditioning, storage and expedition

Stage description:

The cast iron products production stage is subdivided in three modules: A1 supply of raw materials. A2 transportation and A3. Manufacturing

Standard EN 15 804+A1 enables to aggregates modules A1, A2, A3. This standard is applicable to this EPD.

A1: Supply of raw materials:

This module takes into account supply and treatment of raw materials and energies produced up-front manufacturing process.

In particular, cast iron is obtained in a secondary melting process: Bayard sur Marne plant is equipped with a hot wind cupola used during raw materials treatment, mainly composed by scrap, coke, silicon carbide and lime. Telford Plant which produces fittings is equipped with an electric furnace and use renewable electricity.

A2: Transport to manufacturer:

Raw materials are transported to the plant of Bayard in France. For each raw material, modelling includes transport by road, waterway and railway (average values)

A3: Manufacturing:

Piping systems manufacturing follows the phases presented in the next graph.

Manufacturing, included supply materials, products and energy, as well as end-of life waste processing or landfilling activity of final waste during production stage. This module includes product and packaging manufacturing. Production of packaging material is taken into account during this stage. Treatment of waste resulting of this stage is also included.

Construction stage: A4- A5

Stage description:

Building stage is divided in two modules, A4 transport to construction site and A5, installation in the building

Scenarios description and additional technical data:

A4: Transport to construction site:

This module includes transport from the exit of the plant to the building site. Transport is calculated on a scenario including the following parameters

Parameter	Value
Fuel type and consumption depending on the vehicle used for transportation, for example, long-haul truck, ship, etc.	– 40t truck (diesel) - 24t (0.38l/km) maximal load 16t Read load
Average distance to the construction site (weighted average between Fittings(215 km) and pipes (567 km+215 km))	683 km Ireland & United Kingdom
Load use (including empty backhauls)	83%
Transported product density	1018kg/m3
Coefficient of use of voluminal capacity	1

A5: Installation in the building

This module includes waste generated during the installation of honeycomb partition in the building, additional production generated to compensate for these losses and the building waste processing. The scenarios used for the quantity of waste generated during the installation and the building waste processing are:

Parameter	Valeur
Auxiliary inputs for installations	Not concerned
Water use	Not concerned
Other resources use	None
Quantitative description by energy Type (EU28:mix) and consumption during installation product	Electricity: 0,009 MJ/UF
Waste produced on building sites before treatment of waste generated by product installation	5% representing 0,37 kg of pipe + 0,006 kg of packaging
Materials (specified by type) produced by waste treatment on building for example collection for recycling, energy recovery and disposal covers)	0,006kg (straps, boxes, plastic site) Landfilled waste + 0,37 kg of recovered pipe
Direct emission in the air, soil and water	Not concerned

Use stages (excluding potential savings): B1-B7

Stage description

Use stage is divided on 7 modules:

- B1: Use or application of installed product
- B2: Maintenance
- B3: Repair
- B4: Replacement
- B5: Refurbishment works
- B6: Energy needs during operational phase
- B7: Water needs during operational phase

Scenarios description and additional technical data:

No technical operation is requested during use phase until end of life. Thus, cast iron pipe systems destined to drain building water have no impacts on this stage.

End-of-life stage: C1-C4

Stage description

This stage includes the following different end-of-life modules; C1, de-construction, demolition; C2, transportation to waste processing. C3, Treatment of waste collected to be reused, recuperation and / or recycling, C4, disposal.

Scenarios description and additional technical data:

As most of metals, cast iron and stainless steel are reusable without losing any of their properties. Hence the metallic elements of the system can be collected and fully valued at the end of the life cycle.

C1 Deconstruction and demolition

The end-of-life of the system having been linked with the building's end-of-life. Therefore, no deconstruction effect has been considered on this stage. In our case, the environmental impact is supposed to be very low and can be neglected.

C2 Transportation to waste treatment:

For this study, a 50Km small truck journey has been considered distance in a small truck.

C3 Treatment of waste collected to reuse, recuperation and / or recycling:

Waste sorted by reuse, recuperate and/ or recycle. Metallic content is fully reused.

C4 Disposal:

Landfilling of materials, products, including supply and transport, as well as energy and water consumption, -5% of the entire system is sent to landfilling (in particular, EPDM seals)

Parameter	Value
Collection process specified by type	7,41 kg/UF
Recovery system specified by type	7,04 kg/UF of cast iron is recycled
Disposal specified by type	EPDM and a small part of cast iron oxides are considered as landfilled 0,37 kg/UF
Assumptions for scenario development (e.g. transportation)	8t load Truck and distance of 25 km

Charges and loads, D

Cast iron pipe elements are considered as 100% recyclable. As scraps are considered as a stock for metallurgy industry any advantage related to scrap production are accounted in this study scrap. Therefore, module D is not considered as relevant.

Information for Life cycle analysis calculation

Used PCR	PCR 2012:01 Construction products and construction services (EN 15804:A1) V2.33.
System boundaries	From cradle to the grave: stages = A1-3, A4-5, B1-7, C1-4 Module D is not declared
Allocations	As the plant produce only one product allocations are made on a mass basis. Any impact has been accounted for co-products. They are considered as available stock with no relevant impact. The polluter pays and modularity principles have been followed.
Temporal geographical representativeness	France, 2016 (primary data collection period) External data: Ecoinvent 3.6 and Worldsteel modules.
Results variability *	Variance between unique pipe systems and separate network for the same building has been studied and conducted to almost zero gaps. Also, variance between different diameters for a given installation has been studied and conducted to non-significant gaps (of 10%). Hypothesis are described more precisely within the accompanying report of the EPD. All emissions to air, water and soil as well as all materials and energy used were included, except for long-term emissions (> 100 years)
CUT-OFF RULES	Life Cycle Inventory data for a minimum of 99% of total inflows to the upstream and core module shall be included and at least 95% at the module level. Flows related to human activities such as employee transport are excluded. The construction of plants, production of machines and transportation systems are excluded since the related flows are supposed to be negligible compared to the production of the building product when compared at these systems lifetime level.

Life cycle analysis results

LCA (Life Cycle Analysis) model, data aggregation and environmental impacts are calculated using Gabi 8.7 software

Tables below present LCA results of Saint-Gobain ENSIGN system.

CML 4.1 impact method has been used, and ECOINVENT 3.6 database to obtain the inventory of generic data. Raw materials and energy consumption, as well as transport distances have been taken directly from the manufacturing plant (Production data according to 2016 and transport data according to 2018)

Environmental impacts

Indicators below represent all the environmental impacts that our products may have throughout their life cycle.

ENVIRONMENTAL IMPACTS														
Parameters	Production stage	Construction stage		Use stage							End-of life stage				Benefits and loads beyond the system boundaries
	A1/A2/A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 RReplacement	B5 Refurbishment	B6 Operational energy use	B7 Water consumption	C1 De-construction/ demolition	C2 Transport	C3 Waste processing	C4 Disposal	
Global warming potential, GWP (*kg CO2equiv/UF*)	Global warming potential of a gas refers to total contribution of global warming resulting from the emission of one unit of this gas compared to one unit of reference gas, carbon dioxide, whose GWP is standardized to 1.														
	1,07E+01	2,64E-01	5,38E-01	0	0	0	0	0	0	0	0	9,68E-03	3,07E-02	2,96E-01	MNA
Depletion of the stratospheric ozone layer, ODP (*kg CFC 11 equiv/UF*)	Destruction of the stratospheric ozone layer which protects the earth from harmful ultraviolet radiation. The destruction of the ozone layer is caused by the breakage of specific chlorine and/or compounds containing bromine which break when they reach the stratosphere and destroy ozone molecules by catalytic reactions.														
	8,19E-07	5,27E-17	4,10E-08	0	0	0	0	0	0	0	0	1,93E-18	4,93E-09	6,08E-17	MNA
Acidification of soil and water, AP (*kg SO2equiv/UD)*	Acid pollutants have negative impacts on natural ecosystems and human environment including buildings. Main sources of acidifying substances emission are agriculture and fuel combustion used to electricity production, heating and transportation.														
	2,81E-02	1,05E-03	1,41E-03	0	0	0	0	0	0	0	0	3,84E-05	1,49E-04	8,41E-05	MNA
Eutrophication EP (*kg (PO4)3equiv/UF)*	An excessive enrichment of water and continental surfaces, by nutrients, which can cause adverse biological effects														
	4,37E-03	2,59E-04	2,24E-04	0	0	0	0	0	0	0	0	9,47E-06	3,09E-05	3,44E-04	MNA
Photochemical ozone creation *(Kg Ethene equiv/UF)*	Chemical reactions caused by sunlight energy. Reaction between nitrogen oxides and oils, in the presence of sunlight creating ozone is an example of a photochemical reaction.														
	5,10E-04	3,16E-05	1,93E-04	0	0	0	0	0	0	0	0	1,16E-06	1,00E-05	9,26E-05	MNA
Depletion of abiotic resources ***(****kg Sb equiv/UF)*	2,93E-05	3,30E-09	1,47E-06	0	0	0	0	0	0	0	0	1,21E-10	5,89E-07	3,50E-09	MNA
Depletion of fossil resources *(MJ/UF)*	Renewable and non-renewable resources consumption, reducing therefore their availability for future generations.														
	1,19E+02	3,70E+00	8,04E+00	0	0	0	0	0	0	0	0	1,35E-01	4,54E-01	2,57E-01	MNA

Ressources use

RESSOURCES USE														
Parameters	Production stage	Construction stage		Use stage							End-of life stage				Benefits and loads beyond the system boundaries
	A1/A2/A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 RReplacement	B5 Refurbishment	B6 operational energy use	B7 Water consumption	C1 De-construction/ demolition	C2 Transport	C3 Waste processing	C4 Disposal	
Use of renewable primary energy, excluding renewal primary energy resources used as raw materials- MJ/FU.	2,60E+01	8,96E-02	1,31E+00	0	0	0	0	0	0	0	0	3,28E-03	3,74E-02	2,05E-02	MNA
Use of renewable primary energy resources as raw materials- MJ/FU	0,00E+00	0	0	0	0	0	0	0	0	0	0	0	0	0	MNA
Total use of renewable primary energy resources (primary energy and primary energy resources as raw materials- MJ/FU	2,60E+01	8,96E-02	1,31E+00	0	0	0	0	0	0	0	0	3,28E-03	3,74E-02	2,05E-02	MNA
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials - MJ/FU	1,86E+02	3,71E+00	9,36E+00	0	0	0	0	0	0	0	0	1,36E-01	5,39E-01	2,65E-01	MNA
Use of non-renewable primary energy resources as raw materials- MJ/FU	0,00E+00	0	0	0	0	0	0	0	0	0	0	0	0	0	MNA
Total use of non-renewable primary energy resources (primary energy and energy resources as raw materials- MJ/FU	1,86E+02	3,71E+00	9,36E+00	0	0	0	0	0	0	0	0	1,36E-01	5,39E-01	2,65E-01	MNA
Use of secondary material- kg/FU	9,14E+00	0	4,57E-01	0	0	0	0	0	0	0	0	0	0	0	MNA
Use of renewable secondary fuels- MJ/FU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	MNA
Use of non-renewable secondary fuels- MJ/FU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	MNA
Net use of fresh water- m3/FU	2,08E-01	1,63E-05	1,04E-02	0	0	0	0	0	0	0	0	5,96E-07	1,85E-04	4,10E-05	MNA

Waste categories

Table below represents wastes from our products throughout their life cycle.

WASTE CATEGORIES															
Parameters	Production stage	Construction stage		Use stage							End-of life stage				Benefits and loads beyond the system boundaries
	A1/A2/A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 RReplacement	B5 Refurbishment	B6 Operational energy use	B7 Water consumption	C1 De-construction/ demolition	C2 Transport	C3 Waste processing	C4 Disposal	
Hazardous waste disposed (kg / UF)	2,44E-08	2,39E-10	1,24E-09	0	0	0	0	0	0	0	0	8,74E-12	0	1,24E-09	MND
Non-hazardous waste disposed (kg / UF)	3,28E-01	7,51E-05	2,14E-02	0	0	0	0	0	0	0	0	2,75E-06	3,79E-01	0	MND
Radioactive waste disposed (kg / UF)	6,01E-03	4,20E-06	3,00E-04	0	0	0	0	0	0	0	0	1,54E-07	0	3,25E-06	MND

Output flows

Table below represents output flows, that means materials, compounds or energy which are reused, recycled or collected. Waste from our products throughout their life cycles.

OUTPUT FLOWS															
Parameters	Production stage	Construction stage		Use stage							End-of life stage				D Benefits and loads beyond the system boundaries
	A1/A2/A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 RReplacement	B5 Refurbishment	B6 Operational energy use	B7 Water consumption	C1 De-construction/ demolition	C2 Transport	C3 Waste processing	C4 Disposal	
Components for re-use (kg/UF)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	MNA
Materials for recycling (kg/UF)	3,29E+00	0	7,04E-01	0	0	0	0	0	0	0	0	0	7,19E+00	0	MNA
Materials for energy recovery (kg/UF)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	MNA
Exported energy (MJ/UF)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	MNA

Total per Life cycle stage	Production stage	Construction stage	Use stage	End-of life stage	Life cycle total
Environmental impact					
Global warming, *GWP*	1,07E+01	8,03E-01	0	3,37E-01	1,18E+01
Depletion of the stratospheric ozone layer, *ODP (kg CFC 11 equiv/UF)*	8,19E-07	4,10E-08	0	4,93E-09	8,64E-07
Acidification of soil and water, AP *(kg SO2equiv/UD)*	2,81E-02	2,46E-03	0	2,72E-04	3,08E-02
Eutrophication EP (*kg (PO4)3-equiv/UF)*	4,37E-03	4,83E-04	0	3,84E-04	5,23E-03
Photochemical ozone creation *(Kg Ethene equiv/UF)*	5,10E-04	2,25E-04	0	1,04E-04	8,38E-04
Depletion of abiotic resources *(kg Sb equiv/UF)*	2,93E-05	1,48E-06	0	5,92E-07	3,14E-05
Depletion of fossil resources *(MJ/UF)*	1,19E+02	1,17E+01	0	8,47E-01	1,31E+02
Resources consumption					
Use of renewable primary energy, excluding renewal primary energy resources used as raw materials-MJ/FU	2,60E+01	1,40E+00	0	6,11E-02	2,75E+01
Use of renewable primary energy resources as raw materials- MJ/FU	0,00E+00	0	0	0	0,00E+00
Total use of renewable primary energy resources (primary energy and primary energy resources as raw materials- MJ/FU	2,60E+01	1,40E+00	0	6,11E-02	2,75E+01
Use of non-renewable primary energy excluding nonrenewable primary energy resources used as raw materials- MJ/FU	1,86E+02	1,31E+01	0	9,40E-01	2,00E+02
Use of non-renewable primary energy resources as raw materials- MJ/FU	0,00E+00	0	0	0	0,00E+00
Total use of non-renewable primary energy resources (primary energy and energy resources as raw materials- MJ/FU	1,86E+02	1,31E+01	0	9,40E-01	2,00E+02
Use of secondary material- kg/FU	9,14E+00	4,57E-01	0	0	9,59E+00
Use of renewable secondary fuels- MJ/FU	0	0	0	0	0
Use of non-renewable secondary fuels- MJ/FU	0	0	0	0	0
Net use of fresh water- m3/FU	2,08E-01	1,05E-02	0	2,27E-04	2,19E-01
Waste categories					
Hazardous waste disposed (kg / UF)	2,44E-08	1,48E-09	0	1,25E-09	2,71E-08
Non-hazardous waste disposed (kg / UF)	3,28E-01	2,14E-02	0	3,79E-01	7,28E-01
Radioactive waste disposed (kg / UF)	6,01E-03	3,05E-04	0	3,40E-06	6,31E-03
Output Flows					
Components for re-use (kg/UF)	0	0	0	0	0
Materials for recycling(kg/UF)	3,29E+00	7,04E-01	0	7,19E+00	1,12E+01
Materials for energy recovery (kg/UF)	0	0	0	0	0
Exported energy (MJ/UF)	0	0	0	0	0

• Life cycle interpretation

Table below presents a part of the environmental indicators results. The table enables to have a quick and synthetic overview of environmental footprint of the functional unit (1m of Saint Gobain PAM ENSIGN cast iron pipe system for collection and drainage of waste water, sewage and rainwater in buildings).

[1] This indicator corresponds to the abiotic depletion potential of fossil resources.
[2] This indicator corresponds to the total use of primary energy.
[3] This indicator corresponds to the use of net fresh water.
[4] This indicator corresponds to the sum of hazardous, non-hazardous and radioactive waste disposed.

MANUFACTURING STAGE DOMINATES

Thanks to the synoptic overview, it is possible to assess which stages of the LCA are the most impacting for the chosen indicators. For example, it appears that for Saint-Gobain GLOBAL® PLUS cast iron pipe system, production stage is the most impacting on global warming, non-renewal resources consumption, energy consumption and water consumption. For each indicator, this stage is responsible of more than 90% of the described product's impact.

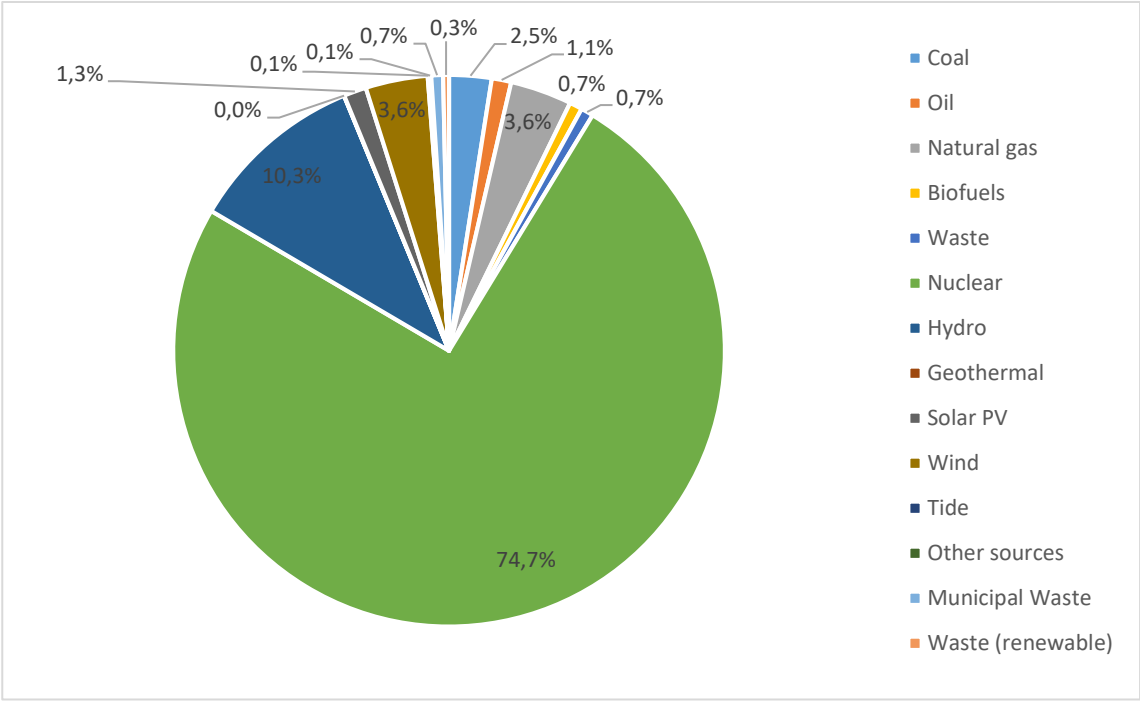
OUR IMPACTS DURING PRODUCTION

Production stage appears to be the first responsible of our footprint. This footprint is generated during metal in manufacturing phase production. ISO 14001 and ISO 50001 certifications enable to continually improve environmental management of our production sites as well as our products.

In comparison with previous analysis, water consumption in Bayard sur Marne factory, consisting primarily of process water discharged with no treatment, has been significantly reduced in more than 70% since 2011.

Additional information about Electricity

TYPE OF INFORMATION	DESCRIPTION
Location	Representative of average production in France (2015)
Geographical Representativeness description	Split of energy sources in France: Coal 2,5% — Geothermal 0,0% Oil 1,1% — Solar PV 1,3% Natural gas 3,6% — Wind 3,6% Biofuels 0,7% — Tide 0,1% Waste 0,7% — Other sources 0,1% Nuclear 74,7% — Municipal Waste 0,7% Hydro 10,3% — Waste (renewable) 0,3%
Reference year	2015
Type of data set	Cradle to gate
Source	IEA



DATA SOURCE	AMOUNT	UNIT
Thinkstep (2015)	0,080	kg CO2 eq / MJ

Additional information about the emission of dangerous substances into indoor air, in the soil and water during use stage

Indoor air:

Saint-Gobain PAM products are intrinsically tight and non-permeable. They comply with standard NF EN 877, which specifies cast-iron mechanic properties and coatings performances of products intended for wastewater or rainwater systems and connection in sewage systems. Their design and installation are such as to produce liquid-tight and gas-tight networks, therefore to reduce health risks and controlling odors emissions.

If it is deemed necessary to perform decontamination operations in networks, the nature of certain parts (short access pipes…), the pressure resistance, the coating performances and removable couplings offer a wide range of preventive or curative solutions.

Soil and Water:

Saint-Gobain PAM cast iron waste water pipe systems within buildings contribute to create and keep good sanitary conditions within buildings.

All cast iron jointing systems allow the installation of any type of drainage systems without using external material (glue or others), and there is therefore no particular sanitary risk from the jointing.

The inner linings are 99% polymerized, which means that there is no transfer of VOC or other disposals into the water during the lifetime of the product. There is no possibility of water contamination by coating products (paints) once polymerization has been carried out at the factory.

Contribution of the product to the quality of life inside the buildings

Product characteristics contributing to hydrothermal comfort within buildings

Not apply to described building's drainage of waste water and rainwater system *

Product characteristics contributing to acoustic comfort within buildings

Airborne noises

Cast iron, thanks to its thickness and density, intrinsically possesses an exceptional sound reduction index, which means that it meets new regulation requirements. The results are: 47 dB(A) for rate of 2 l/s and 50 dB(A) for rate of 4 l/s (test carried out in Fraunhofer IBP laboratory on a DN100 in accordance with standard NF EN 14366)

Structure-borne sounds

Saint-Gobain PAM offers couplings, elastomer sealing gaskets, bracketing and stack supports which allow to obtain better results than the ones demanded by regulatory requirements, even for walls with a mass per unit area of only 150 kg/ m2

These points have been confirmed by test carried out in acoustic laboratories at CSTB and IBP, which took into account the new European test code on "Measurement of noise on waste water installation" Results are available upon request.

Product characteristics contributing to visual comfort within buildings

Saint-Gobain PAM cast iron pipe drainage systems are more often installed behind walls and ducts.

However, when installed in exposed position, Saint-Gobain PAM cast iron pipe systems have external coating which is compatible with finishing paints, in a color chosen by the technical adviser or the customer in order to fit in or improve the appearance of the building.

Product characteristics contributing to olfactory comfort within buildings

Saint-Gobain PAM products are intrinsically water tight and non-permeable. Their design and installation conditions enable to have liquid-tight and gas-tight (smells, etc.) networks, and thus be nuisance free. It should be noted in particular that Saint-Gobain PAM products comply with paragraph 478 of standard NF EN 877, which stated that couplings and joints must be airtight to positive internal pressure of 0 mbar to 10 mbar.

Additional information

Other contributions of the product particularly related to the eco-management of buildings and economy

Eco-management of building

Concerning care and maintenance of Saint-Gobain PAM cast iron « building » network (system)

- There is no need of a particular maintenance other than some traps cleaning, which can be easily removed and reassembled;
- They have inner linings which prevent suspended solids from being retained;
- The can withstand, without damage, chemical substances used in traditional cleaning (acid or base).
  They can withstand high pressure cleaning systems, by their good mechanical and high internal pressure resistance;
- Considering the extensive variety of products of each range and ease of installation, they can be easily maintained or modified, all with minimal waste.

Saint-Gobain PAM cast iron networks are easy to disassemble and to assemble, thanks to mechanical couplings for connecting the parts (without gluing or welding)

Note: Descaling operations are necessary, no matter the materials used, and can be carried out by jetting.

Economic concerns

The intrinsic qualities of the product offer:

- A lifespan at least equal to the building's lifespan with a good resistance to stress, even unusual, subject to compliance with standards and technical requirements;
- Ease of repair or modification, minimizing the volume of lost materials;
- Complete and effective recycling both for disassembled subsets parts and for the entire drainage system at end of life.

Environment management system

Saint-Gobain PAM environment management system has been certified according to the standards ISO 14001 and ISO 50001.

Reference

- ISO 14040:2006: Environmental Management-Life Cycle Assessment-Principles and framework.
- ISO 14044:2006: Environmental Management-Life Cycle Assessment-Requirements and guidelines.
- ISO 14025:2010: Environmental labels and Declarations-Type III Environmental Declarations-Principles and procedures.
- UNE-EN 15804:2012+A1:2013: Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
- PCR 2012:01 Construction products and construction services v 2.33 (EN 15804:2012+A1)
- General Program Instructions for the International EPD® System, version 2.5
- The underlying LCA study