Environmental Product Declaration

Cast iron wastewater and rainwater drainage system
AGILIUM From Saint-Gobain PAM Batiment SAS

Date of publication: 2023-07-03
Validity: 5 years
Valid until: 2028-07-03
In accordance with PCR 2019 Construction products and construction services v 1.2.5
EN 15804:2012+A2:2019 and ISO 14025:2006
Scope of the EPD: Ireland and UK

Registration number
S-P-09525
Programme : The International EPD® System www.environdec.com
Programme Operator : EPD International AB

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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+A2 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

Company information

Manufacturer : Saint-Gobain PAM Bâtiment SAS

Production plant: Bayard-sur-Marne, France (pipes) – Telford, United Kingdom (fittings)

Management system - related certifications: ISO 9001 – ISO 14001 – ISO 50001
Programme used: EN 15804:2012+A2:2019 Sustainability of construction works – Environmental product declaration - core rules for the product category of construction product and The International EPD® System
PCR identification: PCR 2019:14 version 1.2.5 for Construction products and Construction services
Prepared by: IVL Swedish Environemental Research Institute, EPD International Secretariat

UN CPC CODE : 41273

Owner of the declaration: Saint-Gobain PAM Bâtiment SAS, 21, avenue Camille Cavallier - BP 129
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Product name and manufacturer represented: This EPD describes the environmental impact of 1 linear meter of piping system used to drain waste and rainwater.

EPD® prepared by: Yves Coquelet (yves.coquelet@saint-gobain.com)
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Geographical scope of the EPD®: United Kingdom and Ireland

EPD® registration number: S-P-09525

Declaration issued: 2023-07-03, valid until: 2028-07-03

Demonstration of verification: An independent verification of the declaration was made, according to EN ISO 14025:2010. This verification was external and conducted by a third party, based on the PCR mentioned above (see information below).

Programme information

PROGRAMME:	The International EPD® System
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CEN standard EN 15804:2012 + A2:2019 serves as the Core Product Category Rules (PCR)

Product category rules (PCR): PCR 2019:14 Construction Products, version 1.2.5

PCR review was conducted by: The Technical Committee of the International EPD® System. See www.environdec.com/TC for a list of members.
Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact.

President: Massimo Marino

Independent third-party verification of the declaration and data, according to ISO 14025:2006:

☐ EPD process certification ☒ EPD verification

Third party verifier: Yannick Le Guern, ELYS Conseil
Approved by: The International EPD© System

Procedure for follow-up of data during EPD validity involves third part verifier: ☒ Yes ☐ No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.
EPDs within the same product category but registered in different EPD programmes may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison.

Description of Declared unit and product

Declared Unit description:

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

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 wastewater. 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+A2 :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 information about acoustic properties see page 20

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

Parameter	Value	Post-consumer recycled material content, weight %	Biogenic material, weight % and kg C /kg
Mass	5,94 kg	82 %	
Products used in Cast iron pipe system.	AGILIUM cast iron pipes and fittings: 4,71 kg Cast iron fittings: 0,99 kg Elastomer seals (EPDM): 0,09 kg Stainless steel seals: 0,10 kg Steel rings: 0,05 kg	85 % 90 % 0 % 0 % 0 %	0 % 0 % 0 % 0 % 0 %
Coatings	Internal coating pipes: Epoxy based paint (130 µm) Internal coating fittings: Epoxy based paint (70 µm) External coating pipes: Acrylic based paint (40 µm) External coating fittings: Epoxy based paint (70 µm)	0 % 0 % 0 % 0 %	0 % 0 % 0 % 0 %
Packaging	Wooden pieces: 0,062 kg Wooden pallets: 0,105 kg Plastic sheet to protect fittings: 0,009 kg Cardboard: 0,005 kg Steel: 0,026 kg	0 % 0 % 0 % 0 % 0 %	41 % - 0,025 kg C/kg of FU 41 % - 0,043 kg C/kg of FU 0 % 43% - 0,002 kg C/kg of FU 0 %

"During the life cycle of the product no 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

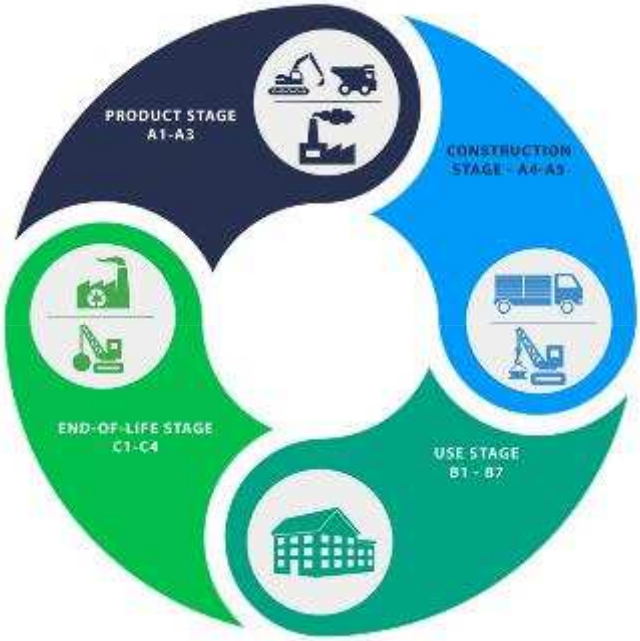
Reference lifespan description

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 – October 2021
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.

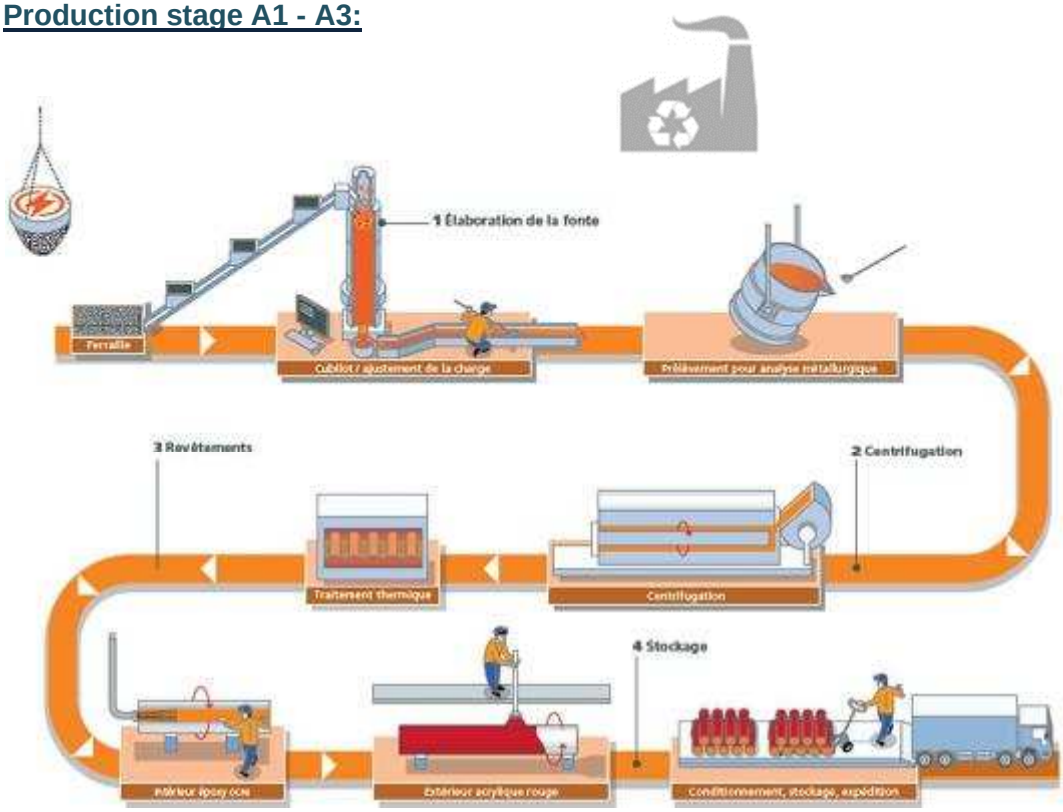
Life cycle stages

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 wastewater and sewage in 4-storey building, over period of 70 years.



Production stage A1 - A3:



Cast iron production

- Cupola/ load adjustment
- sampling for metallurgical analysis

2. Centrifugation

- heat treatment:
- centrifugation

3. Coatings

- interior lining
- exterior lining

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 15804+A2 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 supplied with 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 accounted 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 19t Read load
Average distance to the construction site (weighted average between fittings (215 km) and pipes (567 km+215 km))	683 km Truck 113km of ship
Load use (including empty backhauls)	55%
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/DU
Waste produced on building sites before treatment of waste generated by product installation	3% representing 0,178 kg of pipe + 0,214 kg of packaging
Materials (specified by type) produced by waste treatment on building for example collection for recycling, energy recovery and disposal covers.)	0,214kg (straps, boxes, plastic site) Landfilled waste + 0,178 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

Scenario 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.

Scenario description and additional technical data:

As most 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.

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

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

C4 Disposal:

Landfilling of materials, products, including supply and transport, as well as energy and water consumption, 10% of the entire system is sent to landfilling (in particular, EPDM seals)

Parameter	Value
Collection process specified by type	5,94 kg/DU
Recovery system specified by type	5,26 kg/DU of cast iron is recycled
Disposal specified by type	a small part of cast iron is considered as landfilled 0,59 kg/DU
Incineration	0.09 kg of EPDM is considered as burned without energy recovery
Assumptions for scenario development (e.g. transportation)	8t load Truck and distance of 25 km

Charges and loads, D

Cast iron is 100% recyclable, and this indefinitely. Metal, considered as scrap iron at end-of-life is recycled by ferrous metal recycling process like electric furnace. Recycled metal enables reduction of impacts thanks to diminution of use of primary raw materials and energy in melting process. Benefit results from the difference of environmental impact between a product made with primary raw material (iron ore) and a product made with secondary raw material (scrap iron). Environmental burdens of recycling are considered as well as the benefit for avoiding future raw materials extraction.
Agilium system is composed of 97,3% of metal, 10% is considered lost at end of life.

The recycled content is composed of post-consumer metallic scraps (82% of declared unit) and pre-consumer scraps coming from other industry (open-loop scraps). For D module, all metallics parts have been computed excluding coatings.

The resulting net Flow to module D is -0.400 kg / DU

Information for Life cycle analysis calculation

Parameter	Value
Used PCR	PCR 2019 Construction products and construction services v 1.2.5 – EN 15804+A2.
System boundaries	From cradle to the grave: stages = A1-3, A4-5, B1-7, C1-4 and Module D
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, 2021 and united Kingdom 2021 (primary data collection period) External data: Ecoinvent 3.8 and Thinkstep (Gabi) 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 10 software

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

EF 3.0 impact method has been used, and ECOINVENT 3.8 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 2021 and transport data according to 2021)

LCA scope

System boundaries (X=included. MND=module not declared)																	
	PRODUCT STAGE			CONSTRUCTION STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM
	Raw material supply	Transport	Manufacturing	Transport	Construction-Installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-recovery
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Geography	Fr, UK	Fr, UK	Fr, UK	UK, IR	UK, IR	-	-	-	-	-	-	-	UK, IR	UK, IR	UK, IR	UK, IR	UK, IR
Specific data used	>90 % GWP- GHG																
Variation products	Not concerned																
Variation site	not concerned, one site of production per component of the system"																

Variation system: The most representative and impacting system has been considered: R+4 & single stack system

Environmental impacts

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

	Product stage	Construction stage		Use stage							End of life stage				D Reuse, recovery, recycling
Impacts Indicators	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
Climate Change - total [kg CO2 eq.]	8,45E+00	3,00E-01	4,67E-01	0	0	0	0	0	0	0	0	1,59E-02	2,46E-02	2,25E-01	2,83E-01
Climate Change, fossil [kg CO2 eq.]	8,58E+00	2,93E-01	2,82E-01	0	0	0	0	0	0	0	0	1,55E-02	2,39E-02	2,24E-01	2,85E-01
Climate Change, biogenic [kg CO2 eq.]	-1,34E-01	7,29E-03	4,53E-01	0	0	0	0	0	0	0	0	3,97E-04	6,47E-04	9,34E-04	-1,61E-03
Climate Change, land use and land use change [kg CO2 eq.]	1,00E-02	2,72E-05	3,11E-04	0	0	0	0	0	0	0	0	1,48E-06	2,36E-05	1,80E-05	1,48E-04
Ozone depletion [kg CFC-11 eq.]	1,64E-07	3,12E-14	5,09E-09	0	0	0	0	0	0	0	0	1,66E-15	4,28E-09	4,72E-10	-2,86E-12
Acidification [Mole of H+ eq.]	2,50E-02	2,00E-03	8,20E-04	0	0	0	0	0	0	0	0	8,82E-05	1,45E-04	1,12E-04	1,59E-03
Eutrophication, freshwater [kg P eq.]	1,65E-03	9,50E-08	5,51E-05	0	0	0	0	0	0	0	0	5,10E-09	7,53E-06	6,54E-07	-1,27E-07
Eutrophication, marine [kg N eq.]	5,07E-03	2,92E-07	1,69E-04	0	0	0	0	0	0	0	0	1,57E-08	2,31E-05	2,01E-06	-3,90E-07
Eutrophication, terrestrial [Mole of N eq.]	6,66E-03	9,18E-04	2,47E-04	0	0	0	0	0	0	0	0	4,37E-05	4,70E-05	4,38E-05	3,11E-04
Photochemical ozone formation, human health [kg NMVOC eq.]	6,95E-02	1,01E-02	2,32E-03	0	0	0	0	0	0	0	0	4,80E-04	5,01E-04	4,12E-04	3,37E-03
Resource use, mineral and metals [kg Sb eq.]*	2,17E-02	1,80E-03	7,73E-04	0	0	0	0	0	0	0	0	8,22E-05	1,42E-04	1,06E-04	1,13E-03
Resource use, fossils [MJ]	1,70E-05	1,60E-08	5,24E-07	0	0	0	0	0	0	0	0	8,49E-10	1,20E-07	1,61E-08	-3,56E-08
Water use [m^3 world equiv.]*	1,36E+02	4,01E+00	4,30E+00	0	0	0	0	0	0	0	0	2,13E-01	4,14E-01	1,58E-01	1,82E+00

** The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator*

Ressources use

	Product stage	Construction stage		Use stage							End of life stage				D Reuse, recovery, recycling
Ressources Use indicators	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
Use of renewable primary energy (PERE) [MJ]	3,88E+01	1,00E-01	1,18E+00	0	0	0	0	0	0	0	0	5,44E-03	2,96E-02	1,88E-02	-1,20E+00
Primary energy resources used as raw materials (PERM) [MJ]	2,62E+00	0	7,86E-02	0	0	0	0	0	0	0	0	0	0	0	0
Total use of renewable primary energy resources (PERT) [MJ]	4,14E+01	1,00E-01	1,26E+00	0	0	0	0	0	0	0	0	5,44E-03	2,96E-02	1,88E-02	-1,20E+00
Use of non-renewable primary energy (PENRE) [MJ]	1,33E+02	4,03E+00	4,18E+00	0	0	0	0	0	0	0	0	2,14E-01	4,14E-01	1,58E-01	1,87E+00
Non-renewable primary energy resources used as raw materials (PENRM) [MJ]	4,04E+00	0	1,21E-01	0	0	0	0	0	0	0	0	0	0	0	0
Total use of non-renewable primary energy resources (PENRT) [MJ]	1,37E+02	4,03E+00	4,30E+00	0	0	0	0	0	0	0	0	2,14E-01	4,14E-01	1,58E-01	1,87E+00
Input of secondary material (SM) [kg]	4,83E+00	0	1,45E-01	0	0	0	0	0	0	0	0	0	0	0	0
Use of renewable secondary fuels (RSF) [MJ]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Use of non renewable secondary fuels (NRSF) [MJ]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Use of net fresh water (FW) [m3]	9,14E-02	2,55E-05	2,78E-03	0	0	0	0	0	0	0	0	1,36E-06	1,45E-04	3,47E-04	2,71E-04

Waste categories and output flows

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

	Product stage	Construction stage		Use stage							End of life stage				D Reuse, recovery, recycling
Output Flows and waste category	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
Hazardous waste disposed (HWD) [kg]	1,19E-03	9,93E-12	3,57E-05	0	0	0	0	0	0	0	0	5,29E-13	7,90E-07	1,30E-07	-3,85E-10
Non-hazardous waste disposed (NHWD) [kg]	2,68E+00	1,06E-04	2,58E-01	0	0	0	0	0	0	0	0	5,67E-06	2,17E-02	5,94E-01	-8,48E-02
Radioactive waste disposed (RWD) [kg]	4,01E-03	4,79E-06	1,23E-04	0	0	0	0	0	0	0	0	2,55E-07	2,69E-06	1,34E-06	-1,36E-04
Components for re-use (CRU) [kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Materials for Recycling (MFR) [kg]	2,56E+00	0	2,55E-01	0	0	0	0	0	0	0	0	0	5,26E+00	0	0
Material for Energy Recovery (MER) [kg]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Exported electrical energy (EEE) [MJ]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Exported thermal energy (EET) [MJ]	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Biogenic content of product

Table below represents the total content of biogenic content

	Product stage
Biogenic Carbon Content (kg C)	A1 / A2 / A3
Biogenic carbon content in product [kg]	0
Biogenic carbon content in packaging [kg]	7,29E-02

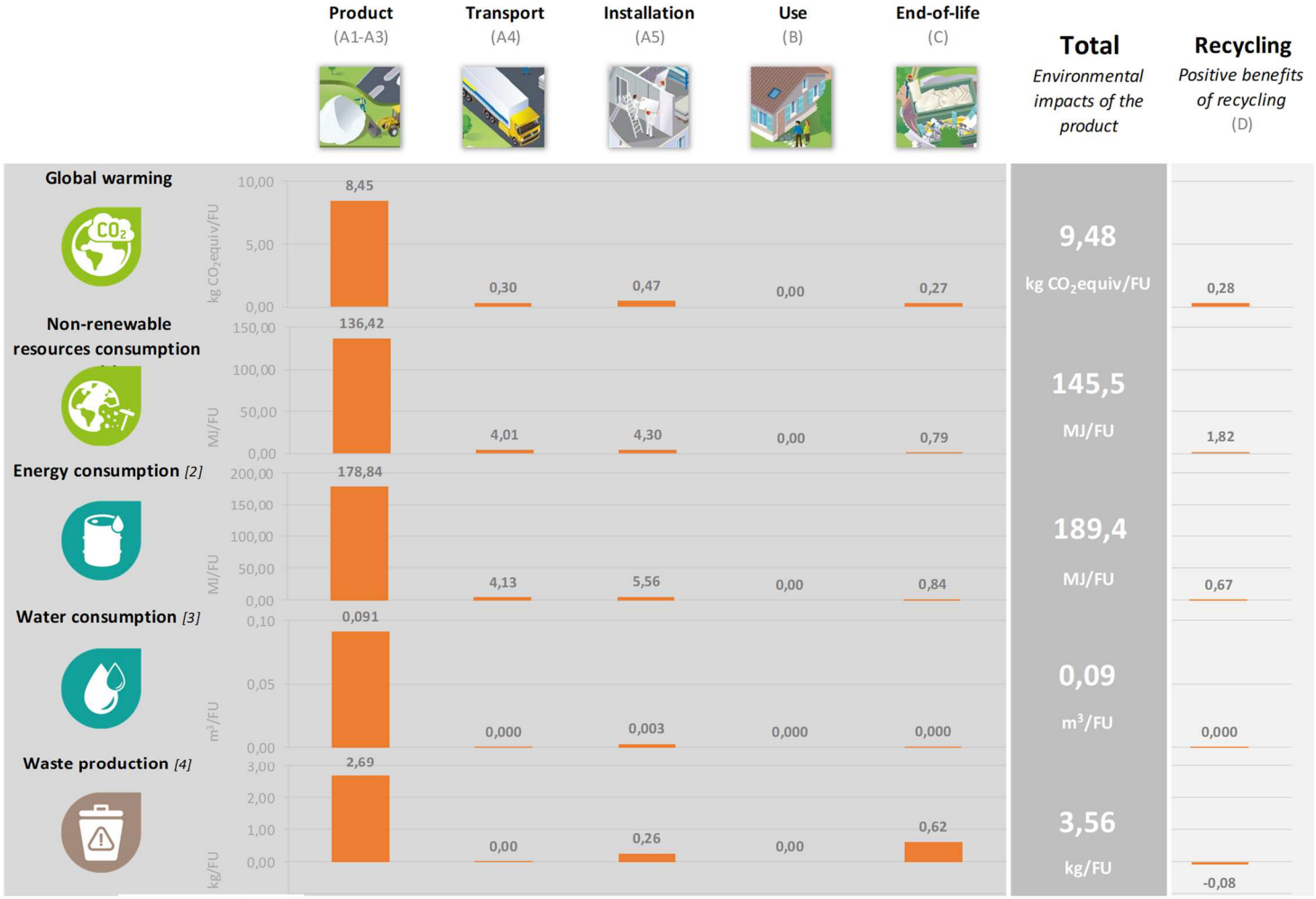
Additional Voluntary indicator

	Product stage	Construction stage		Use stage							End of life stage				D Reuse, recovery, recycling
Impacts Indicators	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
GWP-GHG (kg CO2 eq.)[2]	8,43E+00	2,89E-01	3,78E-01	0	0	0	0	0	0	0	0	1,53E-02	2,36E-02	2,23E-01	2,72E-01

[2] The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus almost equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

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 declared unit (1m of AGILIUM cast iron pipe system for collection and drainage of wastewater, 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

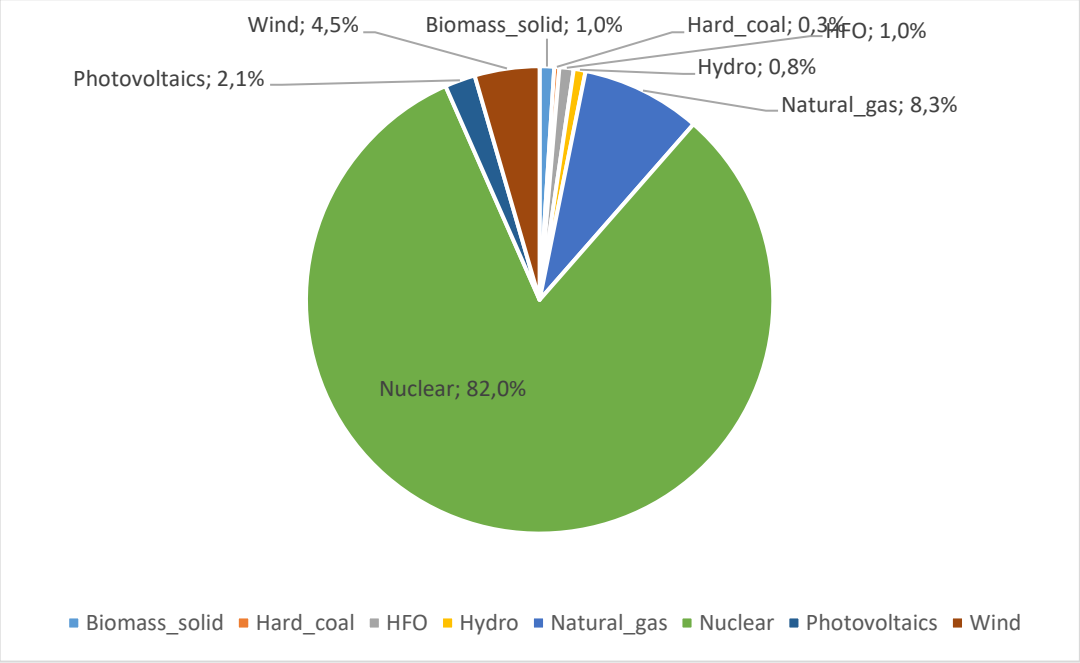
Thanks to the synoptic overview, it is possible to assess which stages of the LCA are the most impacting for the chosen indicators. For example, it appears that for Saint-Gobain Agilium pipe system, production stage is the most impacting on global warming, non-renewal resources consumption, energy consumption 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.

Additional information about Electricity

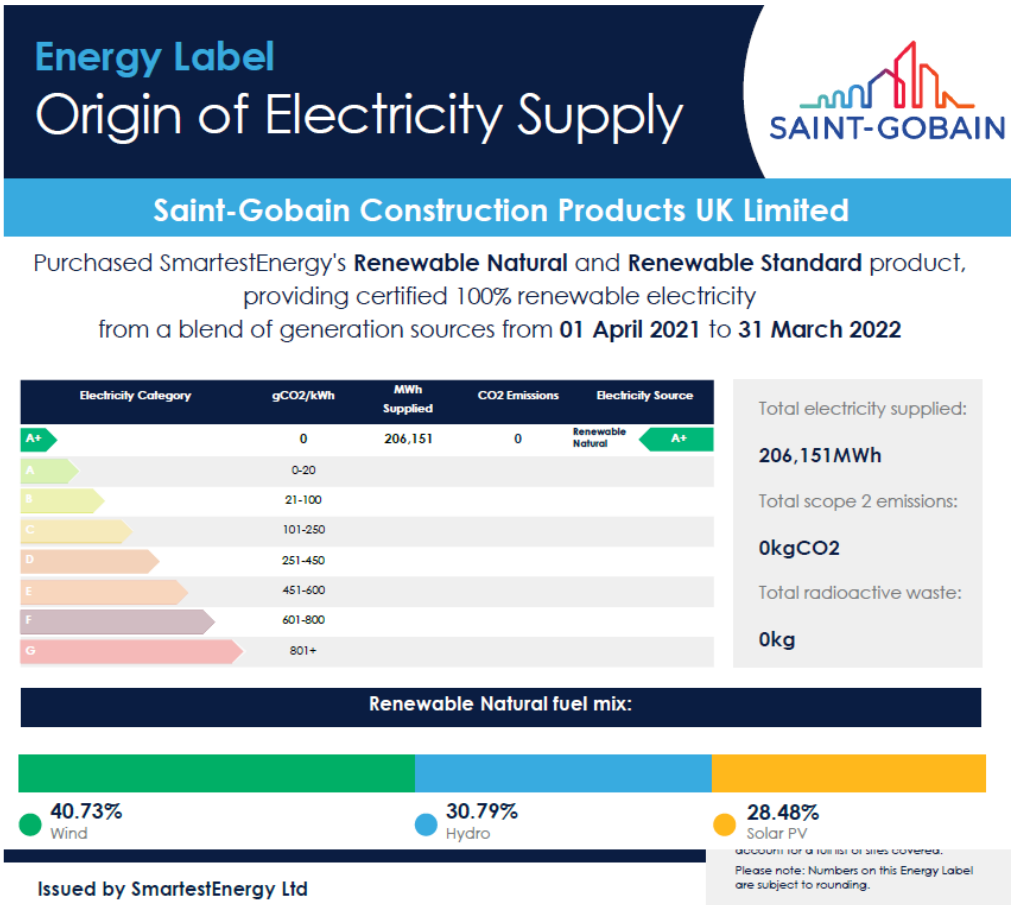
TYPE OF INFORMATION	DESCRIPTION
Location	Representative of residual average production in France (2021)
Geographical **Representativeness** **Description**	Split of energy sources in France: 2021 Biomass_solid 1,0% Hard_coal 0,3% HFO 1,0% Hydro 0,8% Natural_gas 8,3% Nuclear 82,0% Photovoltaics 2,1% Wind 4,5%
Reference year	2021
Type of data set	Cradle to gate
Source	**European Residual Mixes 2021 Association of Issuing Bodies**



DATA SOURCE	AMOUNT	UNIT
European Residual Mixes 2021 Association of Issuing Bodies Computation with Gabi Thinkstep modules and 2,2% grid losses	0,057	kg CO2 eq / kWh

Electricity description for Telford

TYPE OF INFORMATION	DESCRIPTION
Location	Representative of average Consumption in TELFORD plant UK (2021)
Geographical	Split of energy sources for Telford:
Representativeness	2021
description	Wind 40,73% Hydro 30,79% Solar PV 28,48%
Reference year	2021
Type of data set	Cradle to gate
Source	**SmartestEnergy Ltd**



DATA SOURCE	AMOUNT	UNIT
Thinkstep modules based on repartition With10% grid losses	0,017	kg CO2 eq / kWh

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 wastewater 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 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 wastewater 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 are based on the new European test code on "Measurement of noise on wastewater 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 an 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 watertight 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
- Considering the extensive variety of products of each range and ease of installation, they can be easily maintained or modified, all with minimal waste.

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+A2:2013: Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
- PCR 2019 Construction products and construction services v 1.2.5
- General Program Instructions for the International EPD® System, version 4.0
- The underlying LCA study