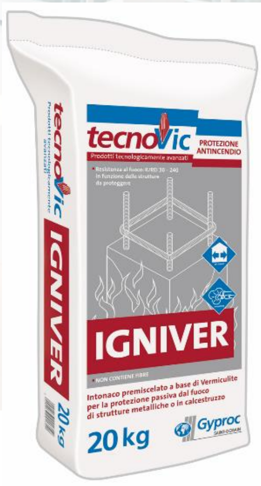
THE INTERNATIONAL EPD® SYSTEM

ENVIRONMENTAL PRODUCT DECLARATION

In accordance with EN 15804 and ISO 14025

Gyproc Igniver

Date of issue: 2020-04-05
Validity: 5 years
Valid until: 2025-04-06
Scope of the EPD®: Italy



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.

Registration number
The International EPD® System:
S-P-01688

Gyproc SAINT-GOBAIN

General information

Manufacturer: Saint-Gobain PPC Italia Spa, Via Ettore Romagnoli, 6, 20146 Milano, Italia
Programme used: International EPD System http://www.environdec.com/
EPD registration number/declaration number: S-P-01688
PCR identification: EN 15804 Sustainability of construction works – Environmental product declaration - core rules for the product category of construction product and The International EPD® System PCR 2012:01 version 2.3 for Construction products and Construction services with reference to sub PCR-A-Mortars applied to a surface (construction product) version 2018
Site of manufacture: Casola Valsenio plant / Saint-Gobain PPC Italia Spa, Italy.
Owner of the declaration: Saint-Gobain PPC Italia Spa.
Product / product family name and manufacturer represented: Gypsum Plasters
UN CPC code: 37410 Plaster
Declaration issued: 2020-04-05
Valid until: 2025-04-06
Demonstration of verification: an independent verification of the declaration was made, according to ISO 14025:2010. This verification was external and conducted by the following third party: Andrew NORTON, Renuables, based on the PCR mentioned above.
EPD Prepared by: Central LCA team, Saint-Gobain Gypsum.
Contact: Paola Bonfiglio from Saint-Gobain PPC Italia Spa (Paola.Bonfiglio@saint-gobain.com) and Patricia Jimenez Diaz from central LCA team (Patricia.JimenezDiaz@saint-gobain.com)

The functional unit is 1 m² of Igniver plaster delivered in powder and a yield of 4kg/m² for 1cm thickness.

Declaration of Hazardous substances: (Candidate list of Substances of Very High Concern): none

Environmental Management System in place at site: **ISO 14001:2015 certificate N°: IT276229/UK**
Quality Management System in place at site: **ISO 9001:2015 - certificate N°: IT239303-3**

Geographical scope of the EPD®: Italy

EPDs of construction products may not be comparable if they do not comply with EN 15804.

CEN standard EN 15804 serves as the core PCR[a]	
PCR:	PCR 2012:01 Construction products and Construction services, Version 2.3
PCR review was conducted by:	The Technical Committee of the International EPD® System. Chair: Massimo Marino. Contact via info@environdec.com
Independent verification of the declaration, according to EN ISO 14025:2010 **Internal ☐ External ☒**	
Third party verifier:	Andrew Norton , Renuables **http://renuables.co.uk**
Accredited or approved by	The International EPD System

Product description

Product description and use:
This Environmental Product Declaration (EPD®) describes the environmental impacts of 1 m² of Igniver plaster applied – theatrical metric yield 4kg/m² for 1cm thickness

Gyproc Igniver plasters is a pre-mixed fire-proof plaster based on gypsum and vermiculite, special binders and additives specific for mechanical application, for fire protection.

The packaging used is a polyethylene bag that contains 20 kg bagged Gyproc Igniver.

Technical data/physical characteristics:

EN CLASSIFICATION	C5/20 (EN 13279-1)
VAPOR RESISTANCE FACTOR	3.5 – 4 µ (EN 13279-1)
REACTION TO FIRE	A1
SMOKE CLASS	F0
THERMAL CONDUCTIVITY	0,045 W/ (m.K)

Description of the main components and/or materials for 1 m2 of product for the calculation of the EPD®:

PARAMETER	VALUE (expressed per functional unit)
Quantity of plaster per 1m²	4 kg
Thickness	1 cm
Packaging for the transportation and distribution	Polyethylene bag and PE stretch film: 9,33 g/kg Wooden pallet: 41,6 g/kg
Product used for the Installation	Water: 1.1 l/kg Energy consumption: 0.021 MJ/kg

During the life cycle of the product no hazardous substance listed in the “Candidate List of Substances of Very High Concern (SVHC) for authorization” 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.

LCA calculation information

EPD TYPE FUNCTIONAL	Cradle to grave
FUNCTIONAL UNIT	1 m² of Igniver plaster delivered in powder and a yield of 4kg/m² for 1cm thickness.
SYSTEM BOUNDARIES	Cradle to grave, stages A1 – A3, A4 – A5, B1 – B7, C1 – C4
REFERENCE SERVICE LIFE (RSL)	50 years By default, it corresponds to Standards building design life and value is included in Appendix III of Saint-Gobain Environmental Product Declaration Methodological Guide for Construction Products.
CUT-OFF RULES	Life Cycle Inventory data for a minimum of 99% of total inflows to the upstream and core module shall be included
ALLOCATIONS	Production data. Recycling, energy and waste data have been calculated on a mass basis.
GEOGRAPHICAL COVERAGE AND TIME PERIOD	Scope includes: Italy Data included is collected from one production site in Casola Valsenio Plant, Saint-Gobain PPC Italia Spa Data collected for the year 2018. Background data: Ecoinvent (from 2015 to 2016) and GaBi (from 2013 to 2016)
PRODUCT CPC CODE	37410 Plaster

According to EN 15804, EPDs of construction products may not be comparable if they do not comply with this standard. According to ISO 21930, EPDs might not be comparable if they are from different programmes.

Life cycle stages

Flow diagram of the Life Cycle

Product stage, A1-A3

Description of the stage: the product stage of plaster products is subdivided into 3 modules A1, A2 and A3 respectively “Raw material supply”, “transport to manufacturer” and “manufacturing”.

A1, raw material supply.
This includes the extraction and processing of all raw materials and energy which occur upstream from the manufacturing process.

A2, transport to the manufacturer.
The raw materials are transported to the manufacturing site. The modelling includes road, boat and/or train transportations of each raw material.

A3, manufacturing.
This module includes the manufacture of products and the manufacture of packaging. The production of packaging material is taken into account at this stage. The processing of any waste arising from this stage is also included.

Manufacturing process flow diagram

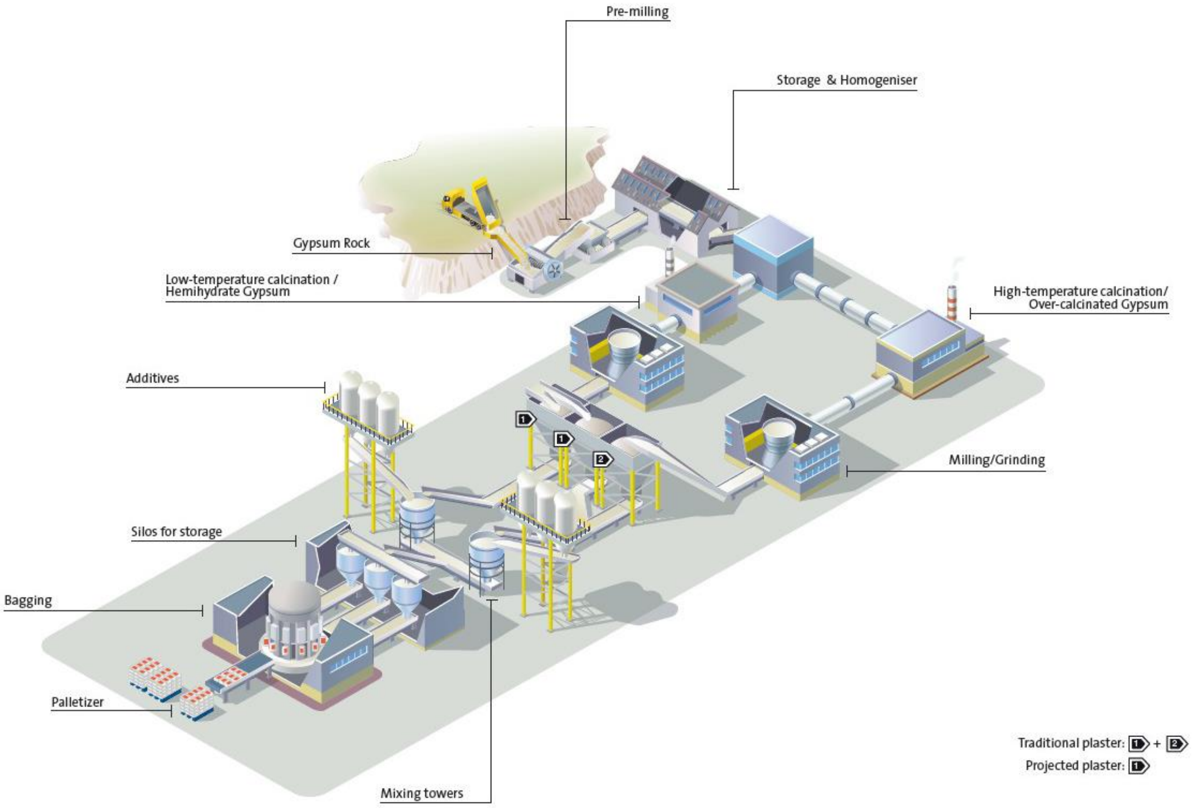


Figure 1: Manufacturing process flow diagram

Manufacturing in detail:

Gypsum rock is open pit quarried by drilling and blasting, then transported to a crushing plant where it is crushed, screened and stockpiled according to its quality. The stockpiled ore transported by trucks to manufacturing factory is first crushed to reduce rocks size and further dehydrated in calcining kilns to produce hemihydrate gypsum. Hemihydrate gypsum is further ground to obtain a specific surface area and then screened to remove any particles that are too large. In the manufacture of plasters, hemihydrate gypsum is batch mixed with additives and aggregates to produce finished product. The thoroughly mixed plaster is fed to a bagging operation.

Construction process stage, A4-A5

Description of the stage: the construction process is divided into 2 modules: A4, transport to the building site and A5, installation in the building

A4, transport to the building site.

This module includes transport from the production gate to the building site. Transport is calculated on the basis of a scenario with the parameters described in the following table.

PARAMETER	VALUE (expressed per functional unit)
Fuel type and consumption of vehicle or vehicle type used for transport e.g. long distance truck, boat, etc.	Long distance truck, maximum load weight of 30 t and consumption of 0.20 liters per km
Distance	256km
Capacity utilisation (including empty returns)	85% (30% empty returns)
Bulk density of transported products	450 kg/m^3
Volume capacity utilisation factor	1

A5, installation into the building.
The accompanying table quantifies the parameters for installing the product at the building site. All installation materials and their waste processing are included.

PARAMETER	VALUE (expressed per functional unit)
Ancillary materials for installation (specified by materials)	None
Water use	1.1 liters/kg
Other resource use	None
Quantitative description of energy type (regional mix) and consumption during the installation process	0.019 MJ/kg
Wastage of materials on the building site before waste processing, generated by the product's installation (specified by type)	Plaster with water: 5%
Output materials (specified by type) as results of waste processing at the building site e.g. of collection for recycling, for energy recovering, disposal (specified by route)	Plaster: 5% to landfill Polyethylene bag and stretch film: 9,33 g/ kg to recovery Wooden pallet: 41.6 g/kg to recovery
Direct emissions to ambient air, soil and water	Water emission to air (0.77l/kg)

Use stage (excluding potential savings), B1-B7

Description of the stage:
The use stage, related to the building fabric includes:

B1, use or application of the installed product;
B2, maintenance;
B3, repair;
B4, replacement;
B5, refurbishment;
B6, operational energy use
B7, operational water use

Description of scenarios and additional technical information:
The product has a reference service life of 50 years. This assumes that the product will last in situ with no requirements for maintenance, repair, replacement or refurbishment throughout this period. Therefore, it has no impact at this stage.

Maintenance:

PARAMETER	VALUE (expressed per functional unit)
Maintenance process	None required during product lifetime
Maintenance cycle	None required during product lifetime
Ancillary materials for maintenance (e.g. cleaning agent, specify materials)	None required during product lifetime
Wastage material during maintenance (specify materials)	None required during product lifetime
Net fresh water consumption during maintenance	None required during product lifetime
Energy input during maintenance (e.g. vacuum cleaning), energy carrier type, (e.g. electricity) and amount, if applicable and relevant	None required during product lifetime

Repair:

PARAMETER	VALUE (exp0ressed per functional unit)
Repair process	None required during product lifetime
Inspection process	None required during product lifetime
Repair cycle	None required during product lifetime
Ancillary materials (e.g. lubricant, specify materials)	None required during product lifetime
Wastage material during repair (specify materials)	None required during product lifetime
Net fresh water consumption during repair	None required during product lifetime
Energy input during repair (e.g. crane activity), energy carrier type, (e.g. electricity) and amount if applicable and relevant	None required during product lifetime

Replacement:

PARAMETER	VALUE (expressed per functional unit)
Replacement cycle	None required during product lifetime
Energy input during replacement (e.g. crane activity), energy carrier type, (e.g. electricity) and amount if applicable and relevant	None required during product lifetime
Exchange of worn parts during the product's life cycle (e.g. zinc galvanized steel sheet), specify materials	None required during product lifetime

Refurbishment:

PARAMETER	VALUE (expressed per functional unit)
Refurbishment process	None required during product lifetime
Refurbishment cycle	None required during product lifetime
Material input for refurbishment (e.g. bricks), including ancillary materials for the refurbishment process (e.g. lubricant, specify materials)	None required during product lifetime
Wastage material during refurbishment (specify materials)	None required during product lifetime
Energy input during refurbishment (e.g. crane activity), energy carrier type, (e.g. electricity) and amount	None required during product lifetime
Further assumptions for scenario development (e.g. frequency and time period of use, number of occupants)	None required during product lifetime

Use of energy and water:

PARAMETER	VALUE (expressed per functional unit)
Ancillary materials specified by material	None required during product lifetime
Net fresh water consumption	None required during product lifetime
Type of energy carrier (e.g. electricity, natural gas, district heating)	None required during product lifetime
Power output of equipment	None required during product lifetime
Characteristic performance (e.g. energy efficiency, emissions, variation of performance with capacity utilisation etc.)	None required during product lifetime
Further assumptions for scenario development (e.g. frequency and time period of use, number of occupants)	None required during product lifetime

End-of-life stage C1-C4

Description of the stage: This stage includes the next modules:

C1, de-construction, demolition;
C2, transport to waste processing;
C3, waste processing for reuse, recovery and/or recycling;
C4, disposal, including provision and all transport, provision of all materials, products and related energy and water use.

Description of the scenarios and additional technical information for the end-of-life:

PARAMETER	VALUE (expressed per functional unit)
Collection process specified by type	4 kg collected with mixed construction waste
Recovery system specified by type	0% of waste
Disposal specified by type	100% (4 kg) of plaster to municipal landfill
Assumptions for scenario development (e.g. transportation)	On average, plaster waste is transported 50 km by truck from construction/demolition sites to treatment plant (landfill).

Reuse/recovery/recycling potential, D

Description of the stage: module D has not been taken into account.

LCA result

Description of the system boundary (X = Included in LCA, MNA = Module Not Assessed)

CML 2001 has been used as the impact model. Specific data has been supplied by the plant, and generic data come from GABI and Ecoinvent databases.
All emissions to air, water, and soil, and all materials and energy used have been included.

All figures refer to a functional unit of 1 m² of Igniver plaster delivered in powder and a yield of 4kg/m² for 1cm thickness.

PRODUCT STAGE			CONSTRUCTION STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY
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
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	MNA

ENVIRONMENTAL IMPACTS

Parameters	Product stage	Construction process stage		Use stage							End-of-life stage				D Reuse, recovery, recycling
	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	
Global Warming Potential (GWP 100) - *kg CO_2 equiv/FU*	1,1E+00	6,2E-02	6,3E-02	0	0	0	0	0	0	0	2,2E-02	1,2E-02	0	8,0E-02	MNA
	The global warming potential of a gas refers to the total contribution to global warming resulting from the emission of one unit of that gas relative to one unit of the reference gas, carbon dioxide, which is assigned a value of 1.														
Ozone Depletion (ODP) *kg CFC 11 equiv/FU*	2,3E-08	9,5E-18	1,2E-09	0	0	0	0	0	0	0	3,1E-18	3,0E-18	0	4,5E-16	MNA
	Destruction of the stratospheric ozone layer which shields the earth from ultraviolet radiation harmful to life, This destruction of ozone is caused by the breakdown of certain chlorine and/or bromine containing compounds (chlorofluorocarbons or halons), which break down when they reach the stratosphere and then catalytically destroy ozone molecules,														
Acidification potential (AP) *kg SO_2 equiv/FU*	1,2E-02	2,5E-04	6,1E-04	0	0	0	0	0	0	0	7,9E-05	4,9E-05	0	4,6E-04	MNA
	Acid depositions have negative impacts on natural ecosystems and the man-made environment incl, buildings, The main sources for emissions of acidifying substances are agriculture and fossil fuel combustion used for electricity production, heating and transport,														
Eutrophication potential (EP) *kg $(PO_4)^{3-}$ equiv/FU*	5,3E-03	6,1E-05	2,7E-04	0	0	0	0	0	0	0	4,6E-06	1,3E-05	0	5,2E-05	MNA
	Excessive enrichment of waters and continental surfaces with nutrients, and the associated adverse biological effects,														
Photochemical ozone creation (POPC) *kg Ethylene equiv/FU*	5,4E-04	9,1E-06	3,8E-05	0	0	0	0	0	0	0	5,3E-06	2,0E-06	0	3,8E-05	MNA
	Chemical reactions brought about by the light energy of the sun, The reaction of nitrogen oxides with hydrocarbons in the presence of sunlight to form ozone is an example of a photochemical reaction.														
Abiotic depletion potential for non-fossil ressources (ADP-elements) - *kg Sb equiv/FU*	3,6E-06	8,3E-10	1,8E-07	0	0	0	0	0	0	0	5,6E-10	1,1E-09	0	2,7E-08	MNA
Abiotic depletion potential for fossil ressources (ADP-fossil fuels) - *MJ/FU*	1,9E+01	8,7E-01	1,1E+00	0	0	0	0	0	0	0	2,8E-01	1,7E-01	0	1,1E+00	MNA
	Consumption of non-renewable resources, thereby lowering their availability for future generations.														

RESOURCE USE

Parameters	Product stage	Construction process stage		Use stage							End-of-life stage				D Reuse, recovery, recycling
	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	
Use of renewable primary energy excluding renewable primary energy resources used as raw materials *MJ/FU*	7,40E+00	2,0E-02	3,9E-01	0	0	0	0	0	0	0	9,1E-04	9,8E-03	0	1,4E-01	MNA
Use of renewable primary energy used as raw materials *MJ/FU*	3,71E-01	0	1,8E-02	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 used as raw materials) *MJ/FU*	7,77E+00	2,0E-02	4,1E-01	0	0	0	0	0	0	0	9,1E-04	9,8E-03	0	1,4E-01	MNA
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials - *MJ/FU*	1,91E+01	8,7E-01	1,1E+00	0	0	0	0	0	0	0	2,8E-01	1,7E-01	0	1,1E+00	MNA
Use of non-renewable primary energy used as raw materials *MJ/FU*	5,69E+00	0	2,7E-01	0	0	0	0	0	0	0	0	0	0	0	MNA
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) - *MJ/FU*	2,48E+01	8,7E-01	1,4E+00	0	0	0	0	0	0	0	2,8E-01	1,7E-01	0	1,1E+00	MNA
Use of secondary material *kg/FU*	0	0	0	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
Use of net fresh water - *m^3/FU*	6,10E-03	6,6E-06	1,4E-03	0	0	0	0	0	0	0	1,7E-06	1,7E-05	0	2,8E-04	MNA

WASTE CATEGORIES

Parameters	Product stage	Construction process stage		Use stage							End-of-life stage				D Reuse, recovery, recycling
	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 *kg/FU*	7,3E-09	3,1E-09	1,8E-09	0	0	0	0	0	0	0	3,5E-11	9,2E-09	0	1,9E-08	MNA
Non-hazardous (excluding inert) waste disposed *kg/FU*	4,4E-03	1,1E-05	2,6E-01	0	0	0	0	0	0	0	4,1E-05	1,4E-05	0	5,1E+00	MNA
Radioactive waste disposed *kg/FU*	4,6E-05	1,0E-06	3,2E-06	0	0	0	0	0	0	0	3,5E-07	3,4E-07	0	1,5E-05	MNA

OUTPUT FLOWS															
Parameters	Product stage	Construction process stage		Use stage							End-of-life stage				D Reuse, recovery, recycling
	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	
Components for re-use *kg/FU*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	MNA
Materials for recycling *kg/FU*	7,5E-02	0	3,7E-01	0	0	0	0	0	0	0	0	0	0	0	MNA
Materials for energy recovery *kg/FU*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	MNA
Exported energy, detailed by energy carrier *MJ/FU*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	MNA

LCA results interpretation

The following figure refers to a functional unit of 1 m² of Igniver plaster delivered in powder and a yield of 4kg/m² for 1cm thickness.

[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.

Global Warming Potential (Climate Change) (GWP)

When analyzing the above figure for GWP, it can clearly be seen that the majority of contribution to this environmental impact is from the production modules (A1 – A3). This is primarily because the sources of greenhouse gas emissions are predominant in this part of the life cycle. CO2 is generated upstream from the production of electricity and is also released on site by the combustion of natural gas. We can see that other sections of the life cycle also contribute to the GWP; however, the production modules contribute to over 80% of the contribution. The installation phase will generate the second highest percentage of greenhouse gas emissions, followed by end-of-life and distribution phase.

Non-renewable resources consumptions

We can see that the consumption of non – renewable resources is once more found to have the highest value in the production modules. This is because a large quantity of natural gas is consumed within the factory, and non – renewable fuels are used to generate the large amount of electricity we use. The contribution to this impact from the other modules is very small and primarily due to the non – renewable resources consumed during transportation.

Energy Consumptions

As we can see, modules A1 – A3 have the highest contribution to total energy consumption. Energy in the form of electricity and natural gas is consumed in a vast quantity during the manufacture of plaster so we would expect the production modules to contribute the most to this impact category.

Water Consumption

As we don't use water in any of the other modules (A4, B1 – B7, C1 – C4), we can see that there is no contribution to water consumption. The highest contributor is the installation phase due to the fact that the plaster powder need water to be applied. For the production phase, water refers to upstream (water used in the raw material extraction and manufacture and for energy production) is the second contribution.

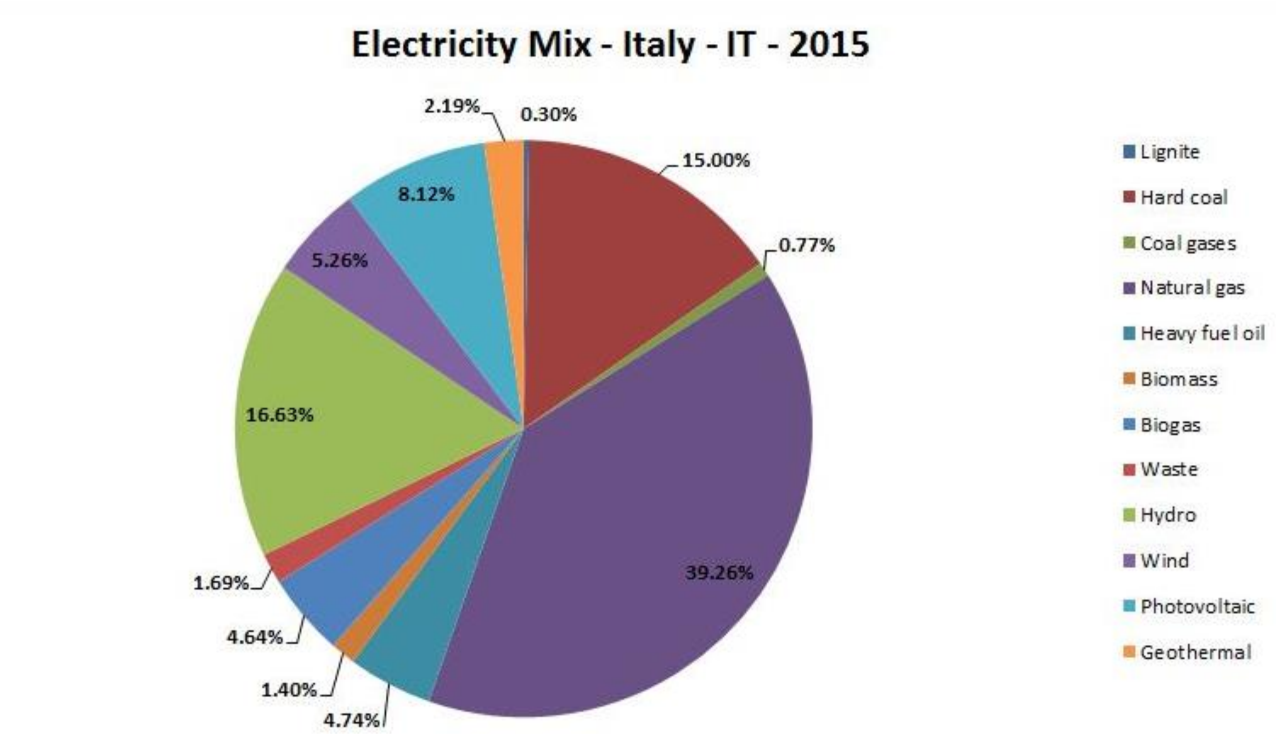
Waste Production

Waste production does not follow the same trend as the above environmental impacts. The largest contributor is the end of life module. This is because the entire product is assumed here to be sent to landfill once it reaches the end of life state. However, there is a still a small impact associated with the installation module since we do generate a loss rate of product during implementation.

Additional information

Electricity description

TYPE OF INFORMATION	DESCRIPTION
Location	Representative of average production in Italy
Geographical representativeness description	Split of energy sources in Italy: - Lignite: 0.30% - Hard coal: 15.00% - Coal gases: 0.77% - Natural gas: 39.26% - Heavy fuel oil: 4.74% - Biomass:1.40% - Biogas: 4.64% - Waste: 1.69% - Hydro: 16.63% - Wind: 5.26% - Photovoltaic: 8.12% - Geothermal: 2.19%
Reference year	2015
Type of data set	Cradle to gate
Source	GaBi database from 2019 version



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