LATIN AMERICA EPD®

# ENVIRONMENTAL PRODUCT DECLARATION

*In accordance with EN 15804+A1 and ISO 14025*

## Outdoor gypsum board X-terium

**Date of issue: 19/07/2021**
**Validity: 5 years**
**Valid until: 18/07/2026**
**Version: 1**
**Scope of the EPD®: Mexico**

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.

**Registration number**
**The International EPD® System:**
**S-P-01664**

ECO PLATFORM EPD EN 15804 VERIFIED

Plaka SAINT-GOBAIN

# General information

**Manufacturer:** Saint-Gobain Plaka S.A de C.V, Avenida La Noria No. 123 Santa Rosa Jauregui Insdustrial Park, Querétaro 76220 Querétaro, Mexico
**Programme used:** International EPD System www.environdec.com/, EPD registered through the fully aligned regional programme/hub: EPD Latin America www.epd-americalatina.com/ www.epdlatinamerica.com
**Programme operator:**

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Mexico: Av. Convento de Actopan 24 Int. 7A,
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**EPD registration number/declaration number:** S-P-01664
**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 2.33 for Construction products and Construction with reference to the Saint Gobain Environmental Product Declaration Methodological Guide for Construction Products
**Owner of the declaration:** Saint-Gobain Plaka S.A. de C.V.
**Product / product family name and manufacturer represented:** X-terium 12.7, outdoor gypsum board.
**Declaration issued:** 2021-07-19
**Valid until:** 2026-07-18
**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**: Rosa Mondragon (Saint-Gobain Plaka) and Patricia Jimenez Diaz (Saint-Gobain)
**Contact:** Rosa Mondragon (Rosa.Mondragon@saint-gobain.com) and Patricia Jimenez Diaz (Patricia.JimenezDiaz@saint-gobain.com)

**The declared unit is 1 m² of X-terium gypsum board.**

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

**Geographical scope of the EPD®:** Mexico

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 2.33 |
| **PCR review was conducted by:** | The Technical Committee of the International EPD® System. Chair: Massimo Marino.<br>Contact via info@environdec.com |
| **Independent verification of the declaration, according to EN ISO 14025:2010**<br>**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®) covers outdoor gypsum board, X-terium 12.7.

X-terium is a non-combustible synthetic gypsum board specially formulated to resist moisture, fungal and algae growth, coated with a fiber glass mat to withstand all weather conditions.

The systems with X-terium for walls, soffits and façade elements provide advantages such as quick and easy installation and light weight for exterior applications.

Gypsum boards are made of plaster and additive with special high-strength paperboard as described in the table below:

| Ingredients | X-terium 12.7 |
|---|---|
| Calcium Sulphate dihydrate | >85% |
| Fiber Glass | >10% |
| Additives | >5% |

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

| PARAMETER | VALUE (expressed per declared unit) |
|---|---|
| Quantity for 1 m² of product | 9.5 kg |
| Thickness | 12.7 mm |
| Surfacing | Glass mesh: 780 g/m² |
| Packaging for the transportation and distribution | Gypsum culls: 0.08 kg |
| Product used for the Installation | Jointing compound: 3.33 kg/ m²<br>Jointing tape: 1.1 kg/m²<br>Screws: 0.03 kg/ m²<br>Water: 0.83 l/m² |

During the life cycle of the product any hazardous substance listed in the "Candidate List of Substances of Very High Concern (SVHC) for authorization" has not been used in a percentage higher than 0,1% of the weight of the product.

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

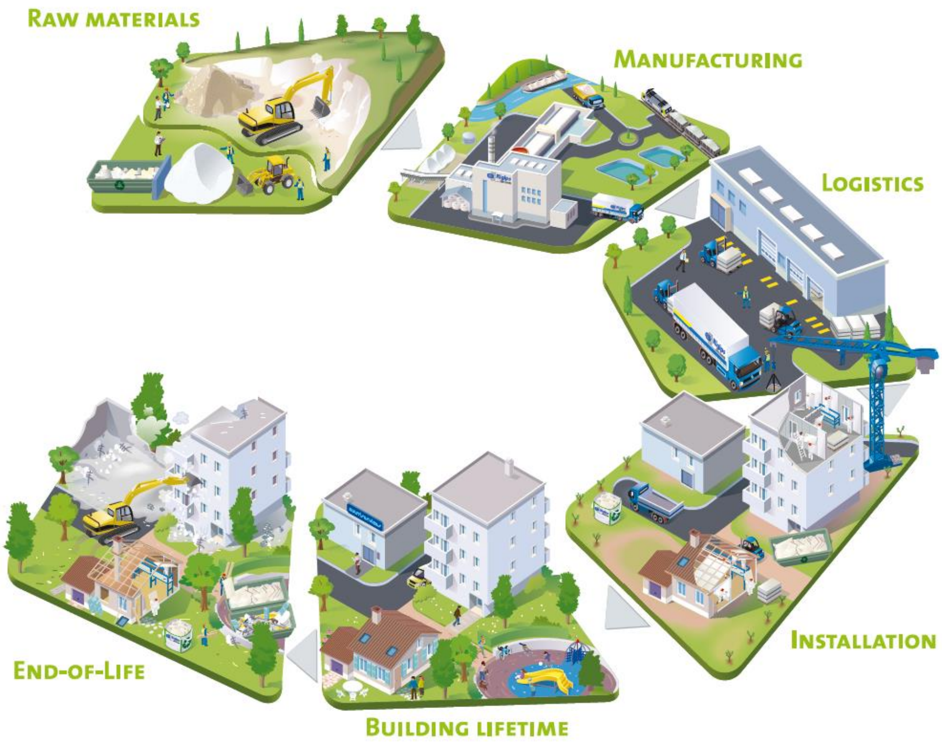
# LCA calculation information

| | |
|---|---|
| **EPD TYPE DECLARED** | Cradle to gate with options |
| **DECLARED UNIT** | The declared unit is 1 m² of X-terium board |
| **SYSTEM BOUNDARIES** | Cradle to gate with options: stages A1 – A3, A4 – A5, B1 – B7, C1 – C4 |
| **REFERENCE SERVICE LIFE (RSL)** | 50 years<br>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.<br>Recycling, energy and waste data have been calculated on a mass basis. |
| **GEOGRAPHICAL COVERAGE AND TIME PERIOD** | Scope includes: Mexico<br>Primary data is collected from one production site at Saint-Gobain Plaka S.A de C.V<br>Data collected for the year 2020<br>Background data: Ecoinvent (v3.1 2013 and 3.5 2015) and GaBi (SP37 2019) |
| **PRODUCT CPC CODE** | 37530 Articles of plaster or of composition based on 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

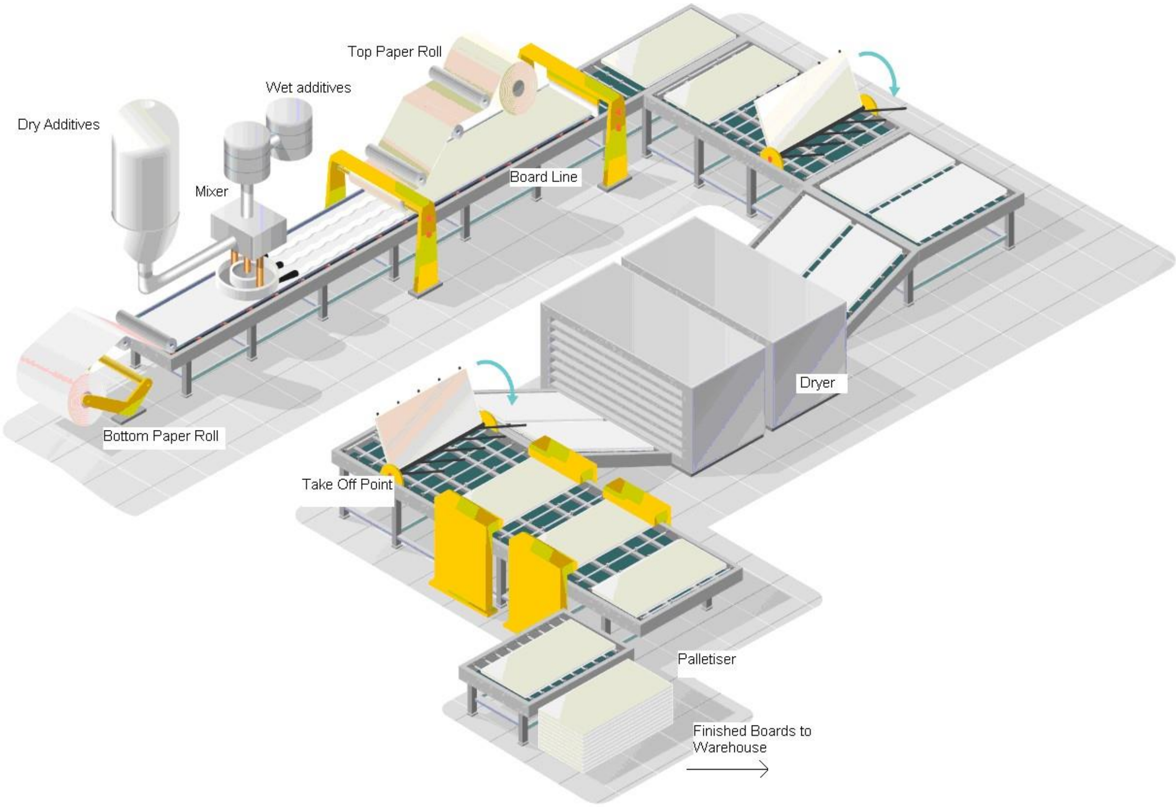
Description of the stage: the product stage of plaster products is subdivided into 3 modules A1, A2 and A3 respectively "Raw material supply", "transport to manufacturer" and "manufacturing".

**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*




## 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 declared unit) |
|---|---|
| **Fuel type and consumption of vehicle or vehicle type used for transport e.g. long distance truck, boat, etc.** | Truck, maximum load weight of 29 t and consumption of 0.38 liters per km |
| **Distance** | 1321.5 km |
| **Capacity utilisation (including empty returns)** | 81% (30% of empty return) |
| **Bulk density of transported products** | 500-800 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 declared unit) |
|---|---|
| **Ancillary materials for installation (specified by materials)** | Jointing compound 3.33 kg/m2 board, tape 1.1 m /m2 board, screws 24 /m2 board |
| **Water use** | 0.83 litres/m2 board |
| **Other resource use** | None |
| **Quantitative description of energy type (regional mix) and consumption during the installation process** | None |
| **Wastage of materials on the building site before waste processing, generated by the product's installation (specified by type)** | Plasterboard: 5%<br>Screws: 0.03 kg<br>Jointing Compound: 3.33 kg<br>Jointing Tape: 0.008 kg<br>Gypsum culls: 0.08 kg |
| **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)** | Plasterboard: 5% to landfill<br>Screws: 0.03 kg to landfill<br>Jointing Compound: 3.33 kg to landfill<br>Jointing Tape: 0.008 kg to landfill<br>Gypsum culls: 0.08 kg to landfill |
| **Direct emissions to ambient air, soil and water** | None |

## 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.

## 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 declared unit) |
|---|---|
| **Collection process specified by type** | 100% collected with mixed construction waste |
| **Recovery system specified by type** | none |
| **Disposal specified by type** | 100% landfilled |
| **Assumptions for scenario development (e.g. transportation)** | On average, board waste is transported 40 km to the landfill facility. |

## Reuse/recovery/recycling potential, D

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

# LCA results

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 declared unit of 1 m² X-terium gypsum board.

| 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 for 1m² of X-terium 12.7

| 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* | 3,2E+00 | 5,7E-01 | 3,0E-01 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6,2E-02 | 2,7E-02 | 0 | 2,2E-01 | 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-07 | 8,7E-17 | 1,1E-08 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8,5E-18 | 6,7E-18 | 0 | 1,2E-15 | 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* | 1,8E-02 | 2,3E-03 | 1,3E-03 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,2E-04 | 1,1E-04 | 0 | 1,3E-03 | 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* | 2,1E-03 | 5,5E-04 | 1,4E-04 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,3E-05 | 2,8E-05 | 0 | 1,4E-04 | MNA |
| | Excessive enrichment of waters and continental surfaces with nutrients, and the associated adverse biological effects, | | | | | | | | | | | | | | |
| Photochemical ozone creation (POPC) *kg Ethylene equiv/FU* | 4,6E-04 | 8,3E-05 | 1,0E-04 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,5E-05 | 4,5E-06 | 0 | 1,0E-04 | 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* | 1,0E-04 | 7,6E-09 | 1,2E-05 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,6E-09 | 2,4E-09 | 0 | 7,5E-08 | MNA |
| Abiotic depletion potential for fossil ressources (ADP-fossil fuels) - *MJ/FU* | 4,6E+01 | 7,9E+00 | 3,7E+00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7,8E-01 | 3,7E-01 | 0 | 3,0E+00 | MNA |
| | Consumption of non-renewable resources, thereby lowering their availability for future generations. | | | | | | | | | | | | | | |

## RESOURCE USE for 1m² of X-terium 12.7

| Parameters | Product stage | Construction process stage | | Use stage | | | | | | | End-of-life stage | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A1 / A2 / A3 | A4 Transpo rt | A5 Installati on | B1 Use | B2 Mainten ance | B3 Repair | B4 Replace ment | B5 Refurbis hment | B6 Operatio nal energy | B7 Operatio nal water | C1 Deconst ruction / demoliti | C2 Transpo rt | C3 Waste processi | C4 Disposal | D Reuse, recovery, recycling |
| Use of renewable primary energy excluding renewable primary energy resources used as raw materials *MJ/FU* | 7,13E+00 | 1,8E-01 | 6,4E-01 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,5E-03 | 2,2E-02 | 0 | 3,9E-01 | MNA |
| Use of renewable primary energy used as raw materials *MJ/FU* | 1,36E+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 used as raw materials) *MJ/FU* | 8,50E+00 | 1,8E-01 | 6,4E-01 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,5E-03 | 2,2E-02 | 0 | 3,9E-01 | MNA |
| Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials - *MJ/FU* | 4,88E+01 | 7,9E+00 | 4,0E+00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7,8E-01 | 3,7E-01 | 0 | 3,1E+00 | MNA |
| Use of non-renewable primary energy used as raw materials *MJ/FU* | 4,21E-01 | 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 primary energy resources used as raw materials) - *MJ/FU* | 4,93E+01 | 7,9E+00 | 4,0E+00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7,8E-01 | 3,7E-01 | 0 | 3,1E+00 | MNA |
| Use of secondary material *kg/FU* | 1,15E-03 | 0 | 5,5E-05 | 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* | 2,35E-02 | 6,1E-05 | 2,4E-03 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4,6E-06 | 3,7E-05 | 0 | 7,7E-04 | MNA |

## WASTE CATEGORIES for 1m² of X-terium 12.7

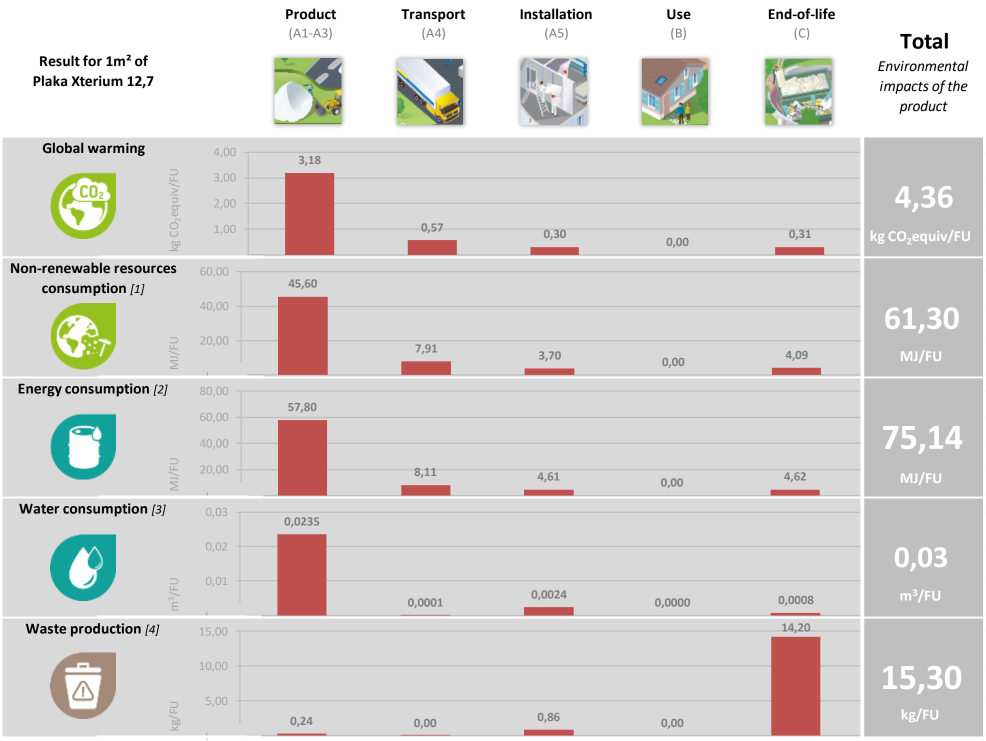
| Parameters | Product stage | Construction process stage | | Use stage | | | | | | | End-of-life stage | | | | D Reuse, recovery, recycling |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A1 / A2 / A3 | A4 Transport | A5 Installation | B1 Use | B2 Maintenance | B3 Repair | B4 Replacement | B5 Refurbishment | B6 Operational energy | B7 Operational water | C1 Deconstruction / demolition | C2 Transport | C3 Waste processing | C4 Disposal | |
| Hazardous waste disposed *kg/FU* | 3,9E-08 | 2,8E-08 | 7,0E-09 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9,6E-11 | 2,1E-08 | 0 | 5,2E-08 | MNA |
| Non-hazardous (excluding inert) waste disposed *kg/FU* | 2,4E-01 | 9,6E-05 | 8,6E-01 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,1E-04 | 3,1E-05 | 0 | 1,4E+01 | MNA |
| Radioactive waste disposed *kg/FU* | 8,8E-04 | 9,3E-06 | 8,3E-05 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9,6E-07 | 7,5E-07 | 0 | 4,1E-05 | MNA |

## OUTPUT FLOWS for 1m² of X-terium 12.7

| 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 | 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* | 1,6E+00 | 0 | 7,7E-02 | 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 declared unit of 1 m² of X-terium board.




*[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. $CO_2$ 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. Combustion of fuel in transport vehicles will generate the second highest percentage of greenhouse gas emissions.

### 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 such as natural gas and coal 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 plasterboard so we would expect the production modules to contribute the most to this impact category.

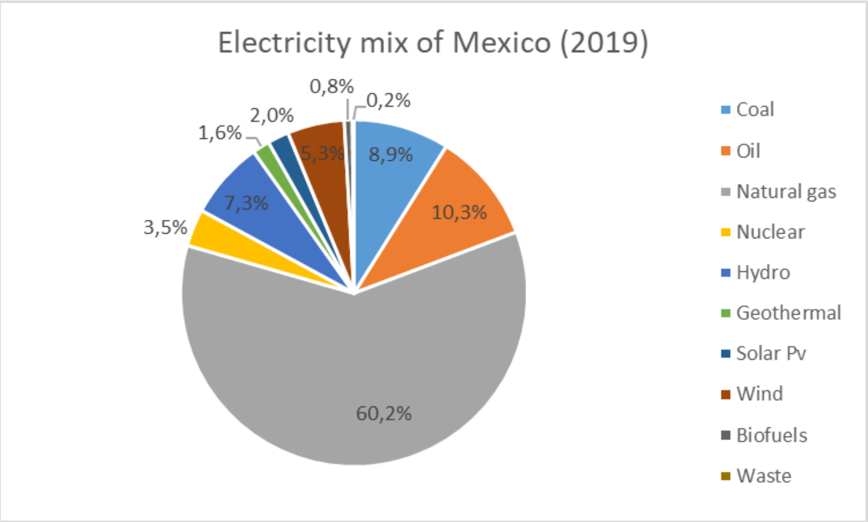
**Water Consumption**
Water is used within the manufacturing facility and therefore we see the highest contribution in the production phase. However, we recycle a lot of the water on site so the contribution is still relatively low. The second highest contribution occurs in the installation site due to the water used on the joint components.

**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 100% of the product is assumed here to be sent to landfill once it reaches the end of life state. The very small impact associated with installation is due to the loss rate of product during implementation.

# Additional information

## Electricity description

| TYPE OF INFORMATION | DESCRIPTION |
|---|---|
| Location | Representative of average production in Mexico |
| Geographical representativeness description | Split of energy sources in Mexico<br>- Hard coal: 8.5%<br>- Oil: 10.3%<br>- Natural gas: 60.2%<br>- Nuclear: 3.5%<br>- Hydro: 7.3%<br>- Geothermal: 1.6%<br>- Solar PV: 2.0%<br>- Wind: 5.3%<br>- Biofuels: 0.8%<br>- Waste: 0.2% |
| Reference year | 2019 |
| Type of data set | Cradle to gate from IEA |
| Source | International Energy Agency -2019 |
| $CO_2$ emission kg $CO_2$ eq. / kWh | 0.68 |



# References


1. EPD International (2017) General Programme Instructions for the International EPD® System. Version 3.0, dated 2017-12-11. www.environdec.com.
2. The International EPD System PCR 2012:01 Construction products and Construction services, Version 2.33
3. EN 15804:2012 + A1:2013 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products
4. ISO 21930:2017 Sustainability in building construction – Environmental declaration of building products
5. ISO 14025:2006 Environmental labels and declarations – Type III environmental declarations – Principles and procedures
6. ISO 14040:2006 Environmental management. Life cycle assessment. Principles and framework
7. ISO 14044:2006 Environmental management. Life cycle assessment. Requirements and guidelines
8. Saint-Gobain Environmental Product Declaration Methodological Guide for Construction Products, Version 3.0.1 (2013)
9. European Chemical Agency, Candidate List of substances of very high concern for Authorisation. http://echa.europa.eu/chem_data/authorisation_process/candidate_list_table_en.asp
10. International Energy Agence IEA World Energy Balances 2017 – https://webstore.iea.org/world-energy-balances-2017