THE INTERNATIONAL EPD® SYSTEM

# ENVIRONMENTAL PRODUCT DECLARATION

*In accordance with EN 15804 and ISO 14025*

## Gyptone 12.5mm with Activ'Air

Date of issue: 2017-07-17
Revision date: 2018-10-17
Validity: 5 years
Valid until: 2023-12-31
Scope of the EPD®: Europe

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-00942**

Gyproc
SAINT-GOBAIN

# General information

**Manufacturer:** Saint-Gobain Denmark A/S, Gyproc
**Programme used:** International EPD System http://www.environdec.com/
**EPD registration number/declaration number: S-P-00942**
**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 2.2 for Construction products and Construction services.
**Site of manufacture:** Kalundborg (Hareskovvej 12, DK-4400 Kalundborg)
**Owner of the declaration:** Saint-Gobain Denmark A/S, Gyproc
**Product / product family name and manufacturer represented:** plasterboard – Gyptone 12.5mm with Activ'Air
**UN CPC code:** 37530 Articles of plaster or of composition based on plaster
**Declaration issued:** 2017-07-17
**Revision date:** 2018-10-17
**Valid until:** 2023-12-31
**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 TEAM, Saint-Gobain Gypsum.
**Contact:** Malin Dalborg from Gyproc Saint-Gobain Denmark A/S (Malin.Dalborg@saint-gobain.com) and Patricia Jimenez Diaz from Gypsum and Insulation LCA central team ((Patricia.JimenezDiaz@saint-gobain.com).

**The declared unit is 1 m² of installed Gyptone 12.5mm with a weight of 9.20 kg/m² and a density of 736 kg/m3.**

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

**Environmental management systems in place at site:** **ISO 14001 - N° DK007354-1**
**Health and safety management systems in place at site:** **DS/OHSAS 18001:2008 – DK007352-1**
**Quality management systems in place at site:** **ISO 9001:2015 – DK007355-1**

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

| | |
|---|---|
| **CEN standard EN 15804 serves as the core PCR[a]** | |
| **PCR:** | PCR 2012:01 Construction products and Construction services, Version 2.2 |
| **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**<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®) describes the environmental impacts of 1 m² installed building plasterboard with a weight of 9.20 kg/m² and a density of 736 kg/m3.

Gyptone acoustic ceilings is made up of a gypsum core (a blend of Flue Gas Desulphurised Gypsum (DSG), external recycled gypsum (12 %) and natural gypsum) with additives and paper liner.

Gyptone acoustic ceilings are based on a 12.5 mm specialized gypsum board suitable for most interior building applications where normal levels of fire resistance, structural strength and sound insulation are specified. Gyptone ceilings are produced with Active Air, which is standard in all Gyptone ceiling boards, a patent technology designed to degrade VOC emissions from emitting building materials, paint, furniture, carpets etc. Active Air degrades VOC´s, like formaldehyde, into non harmful inert compounds. Active Air can reduce formaldehyde concentrations up to 70 %*. Gyptone ceiling can be mounted in suspended grid system with exposed or concealed grid as demountable or non-demountable boards with smooth surfaces. Gyptone ceilings are easy to install and have a robust surface with high impact resistance. Gyptone ceilings 12,5 mm are available in many formats and edges for optimal design options. The products are Gyptone 12,5 mm, Gyptone BIG 12,5 mm, Tiles 12,5 mm, Gyptone Plank 12,5 mm (corridor).

*The effectiveness of the Activ'Air technology has been tested by the accredited Eurofins and VITO laboratories to ISO 16000-23. Test show that Activ'Air decomposed up to 70% of the formaldehyde in a controlled test environment.

**Technical data/physical characteristics:**

| | |
|---|---|
| EN CLASSIFICATION | EN 14190:2014 |
| REACTION TO FIRE | Euroclass A2-S1, d0 |
| WATER VAPOUR RESISTANCE | NPD |
| THERMAL CONDUCTIVITY | NPD |
| EXTERNAL RECYCLING GYPSUM | 12 % |

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

| PARAMETER | VALUE |
|---|---|
| Quantity of plaster for 1 $m^2$ of product | 9.20 Kg |
| Thickness | 12.5 mm |
| Surfacing | Paper: 160 and 180 g/m²<br>Tissue and adhesive: 83 g/m² |
| Packaging for the transportation and distribution | Polyethylene film: 0.01 kg/m²<br>Wooden pallets: 0.024 unit/m²<br>Cardboard: 0.028 kg/m²<br>Paper protection: 0.009 kg/m²<br>Plastic: 0.013 kg/m²<br>Graphic label: 0.00001 kg/m² |
| Product used for the Installation | None |

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** | 1 m² of installed Gyptone 12.5 mm with a weight of 9.20 kg/m² |
| **SYSTEM BOUNDARIES** | Cradle to Gate with options: stages A1 – 3, A4 – A5, B1 – 7, C1 – 4 and D |
| **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: Europe<br>Data included is collected from one production site in Kalundborg, Denmark, Saint-Gobain Denmark A/S, Gyproc<br>Data collected for the year 2017.<br>Cradle to grave study.<br>Background data: Ecoinvent (from 2015 to 2016) and GaBi ( from 2013 to 2016) |
| **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

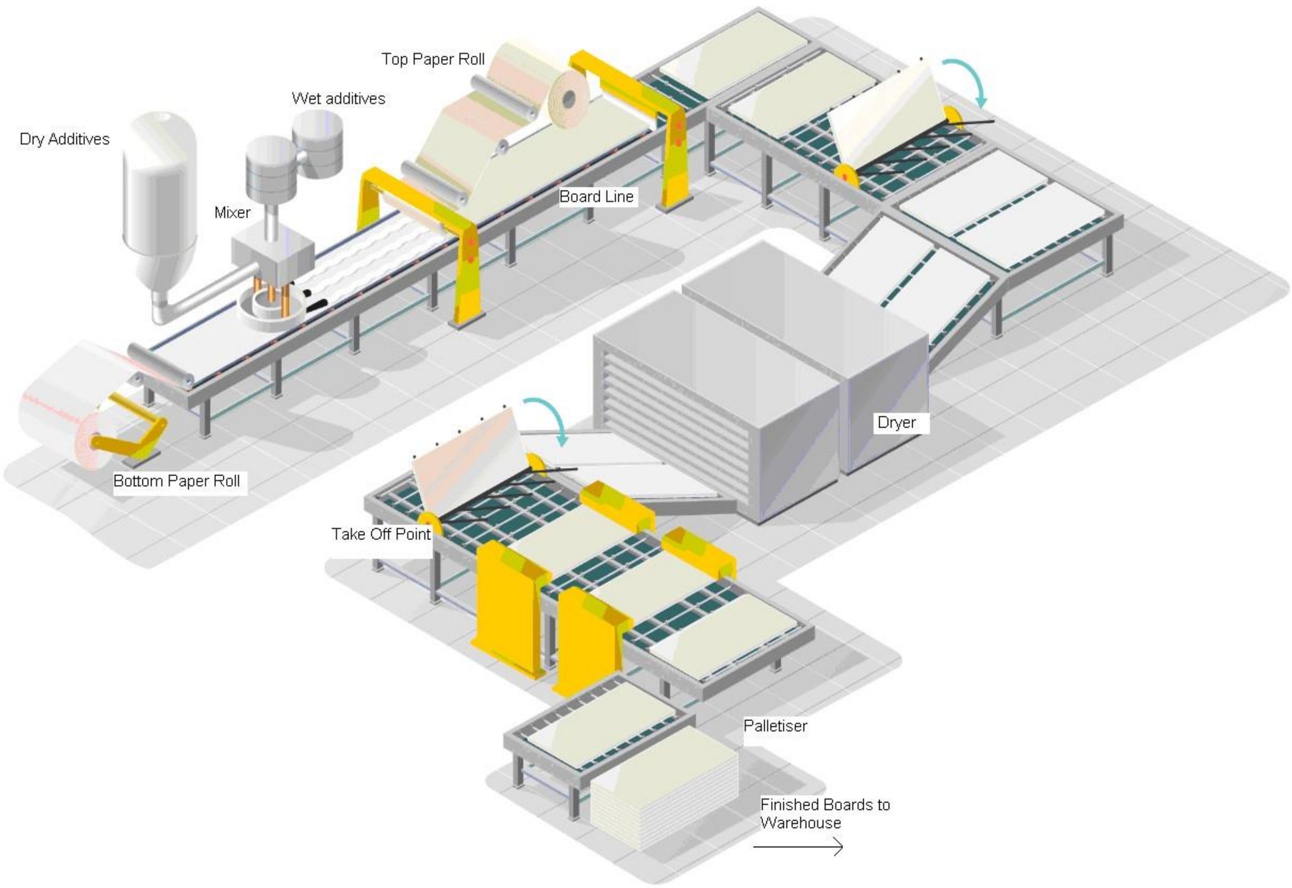
Description of the stage: the product stage of plaster products is subdivided into 3 modules A1, A2 and A3 respectively “Raw material supply”, “transport to manufacturer” and “manufacturing”.

**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*




**Manufacturing in detail:**
The initial materials are homogenously mixed to form a gypsum slurry that is spread via multiple hose outlets onto a paper liner on a moving conveyor belt. A second paper liner is fed onto the production line from above to form the plasterboard. The plasterboard continues along the production line where it is finished, dried, and cut to size.

Recycled Gypsum waste is reintegrated back into the manufacturing process wherever possible.

## 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/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 27 t and consumption of 0.38 liters per km |
| **Distance** | Truck: 1500 km |
| **Capacity utilisation (including empty returns)** | 85% for truck |
| **Bulk density of transported products** | 740 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/declared unit) |
|---|---|
| **Ancillary materials for installation (specified by materials)** | Jointing compound 0.33kg/m² board, tape 1.23m /m² board, screws 8 /m² board |
| **Water use** | 0.165 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: 0.46 kg (5%)<br>Screws: 0 kg<br>Jointing Compound: 0.0165 kg<br>Jointing Tape: 0.000257 kg<br>Wooden pallet: 0.369 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)** | Gyptone Plasterboard: 0.46 kg to landfill<br>Screws: 0 kg<br>Jointing Compound: 0.0165 kg to landfill<br>Jointing Tape: 0.000257 kg to landfill<br>Wooden pallet: 0.0945 kg to recycling |
| **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.

**Maintenance:**

| PARAMETER | VALUE (expressed per functional/declared 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 (expressed per functional/declared 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/declared 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/declared 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/declared 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/declared unit) |
|---|---|
| **Collection process specified by type** | 9.72 kg collected with mixed construction waste |
| **Recovery system specified by type** | 3% recycled (0.291 kg) *(source: internal study, mass allocation of Saint-Gobain plants)* |
| **Disposal specified by type** | 97% landfilled (9.43 kg) *(source: internal study, mass allocation of Saint-Gobain plants)* |
| **Assumptions for scenario development (e.g. transportation)** | On average, Gypsum waste is transported 50 km by truck to the recycling facility, and 25 km to the landfill facility. |

## Reuse/recovery/recycling potential, D

**Description of the stage:** An end of life recycling rate of 20% has been assumed using local demolition waste data, and adjusted considering the recyclability of the product. Figures displayed in Module D account for this recycling.

# 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 installed Gyptone12.5mm with a weight of 9.20 kg/m² and a density of 736 kg/m3.

| 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 | X |

## 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* | 2,8E+00 | 6,3E-01 | 2,0E-01 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4,3E-02 | 1,4E-02 | 0 | 1,5E-01 | 1,7E-02 |
| | 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* | 3,5E-08 | 7,5E-14 | 1,9E-09 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,1E-14 | 9,3E-15 | 0 | 1,4E-13 | 1,0E-13 |
| | 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 (chlorofluorocarbonsor halons), which break down when they reach the stratosphere and then catalytically destroy ozone molecules. | | | | | | | | | | | | | | |
| Acidification potential (AP) *kg $SO_2$ equiv/FU* | 6,1E-03 | 2,6E-03 | 7,1E-04 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,5E-04 | 1,1E-04 | 0 | 9,0E-04 | 1,3E-04 |
| | 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* | 9,2E-03 | 6,2E-04 | 5,2E-04 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 8,7E-06 | 1,8E-05 | 0 | 1,2E-04 | 3,1E-05 |
| | Excessive enrichment of waters and continental surfaces with nutrients, and the associated adverse biological effects. | | | | | | | | | | | | | | |
| Photochemical ozone creation (POPC) *kg Ethylene equiv/FU* | 7,7E-04 | 9,9E-05 | 6,9E-05 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 9,9E-06 | 5,0E-06 | 0 | 7,4E-05 | 2,4E-05 |
| | 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* | 3,2E-06 | 1,0E-08 | 2,1E-06 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,2E-09 | 1,0E-09 | 0 | 5,3E-08 | 1,3E-08 |
| Abiotic depletion potential for fossil ressources (ADP-fossil fuels) - *MJ/FU* | 4,1E+01 | 8,8E+00 | 2,9E+00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5,4E-01 | 1,8E-01 | 0 | 2,0E+00 | 2,6E-01 |
| | 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* | 3,23E+01 | 2,2E-01 | 2,0E+00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,6E-03 | 8,1E-03 | 0 | 2,4E-01 | 2,6E+00 |
| Use of renewable primary energy used as raw materials *MJ/FU* | 1,70E+00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) *MJ/FU* | 3,40E+01 | 2,2E-01 | 2,0E+00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1,6E-03 | 8,1E-03 | 0 | 2,4E-01 | 2,6E+00 |
| Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials - *MJ/FU* | 4,27E+01 | 8,8E+00 | 3,1E+00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5,4E-01 | 1,9E-01 | 0 | 2,1E-01 | 2,1E-01 |
| Use of non-renewable primary energy used as raw materials *MJ/FU* | 6,35E-01 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) - *MJ/FU* | 4,33E+01 | 8,8E+00 | 3,1E+00 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 5,4E-01 | 1,9E-01 | 0 | 2,0E+00 | 2,1E-01 |
| Use of secondary material *kg/FU* | 1,24E+00 | 0 | 6,4E-02 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Use of renewable secondary fuels- *MJ/FU* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Use of non-renewable secondary fuels - *MJ/FU* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| Parameters | 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 | D Reuse, recovery, recycling |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Use of net fresh water - *m³/FU* | 1,96E-02 | 7,5E-05 | 1,3E-03 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3,5E-06 | 1,5E-05 | 0 | 3,9E-04 | 2,9E-04 |

## WASTE CATEGORIES

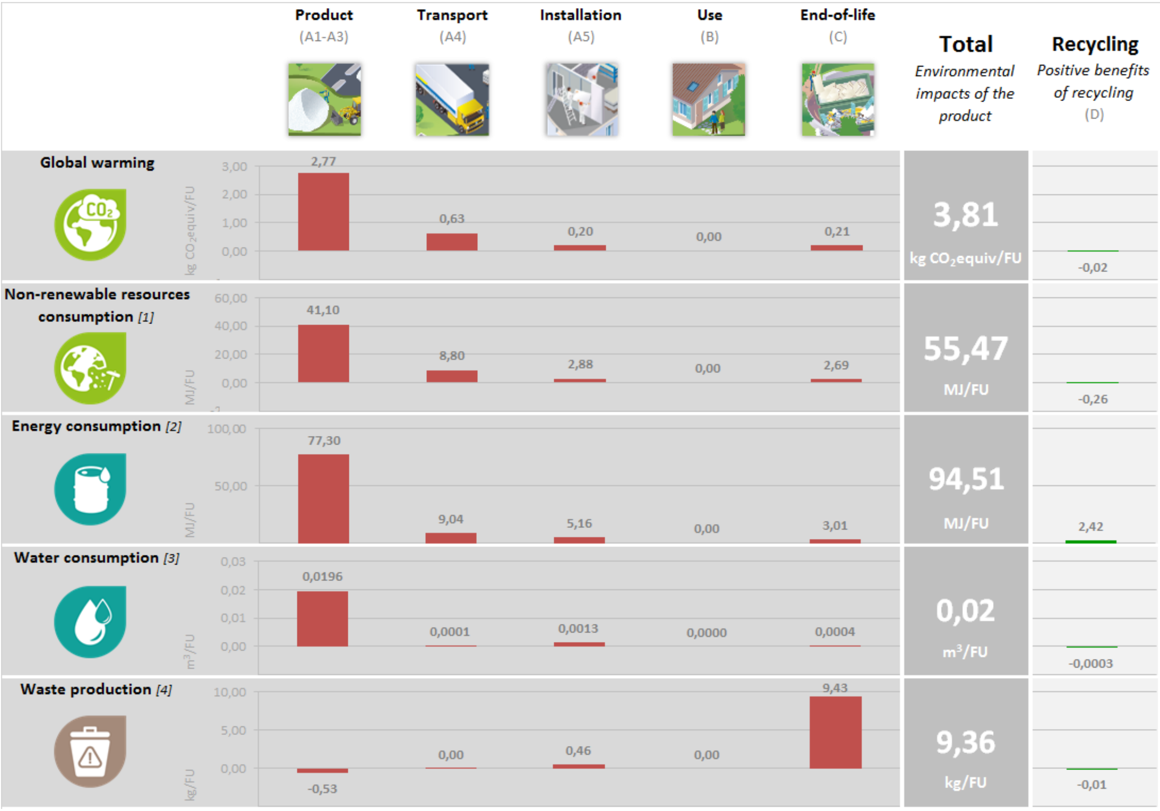
| Parameters | Product stage | Construction process stage | | Use stage | | | | | | | End-of-life stage | | | | D Reuse, recovery, recycling |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | A1 / A2 / A3 | A4 Transport | A5 Installation | B1 Use | B2 Maintenance | B3 Repair | B4 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* | 1,6E-07 | 3,6E-08 | 1,5E-08 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6,5E-11 | 8,0E-09 | 0 | 3,2E-08 | 1,2E-08 |
| Non-hazardous (excluding inert) waste disposed *kg/FU* | 5,3E-01 | 9,6E-05 | 4,6E-01 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 7,8E-05 | 1,2E-05 | 0 | 9,4E+00 | 1,3E-02 |
| Radioactive waste disposed *kg/FU* | 5,9E-04 | 9,7E-06 | 9,2E-05 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6,8E-07 | 3,5E-07 | 0 | 2,8E-05 | 2,1E-05 |

# OUTPUT FLOWS

| Parameters | Product stage | Construction process stage | | Use stage | | | | | | | End-of-life stage | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 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 | D Reuse, recovery, recycling |
| Components for re-use *kg/FU* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Materials for recycling *kg/FU* | 8,4E-01 | 0 | 4,2E-02 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2,9E-01 | 0 | 0 |
| Materials for energy recovery *kg/FU* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Exported energy, detailed by energy carrier *MJ/FU* | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

# LCA results interpretation

The following figure refers to a declared unit of 1 m² installed Gyptone 12.5mm with a weight of 9.20 kg/m² and a density of 736 kg/m3.




*[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. 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.

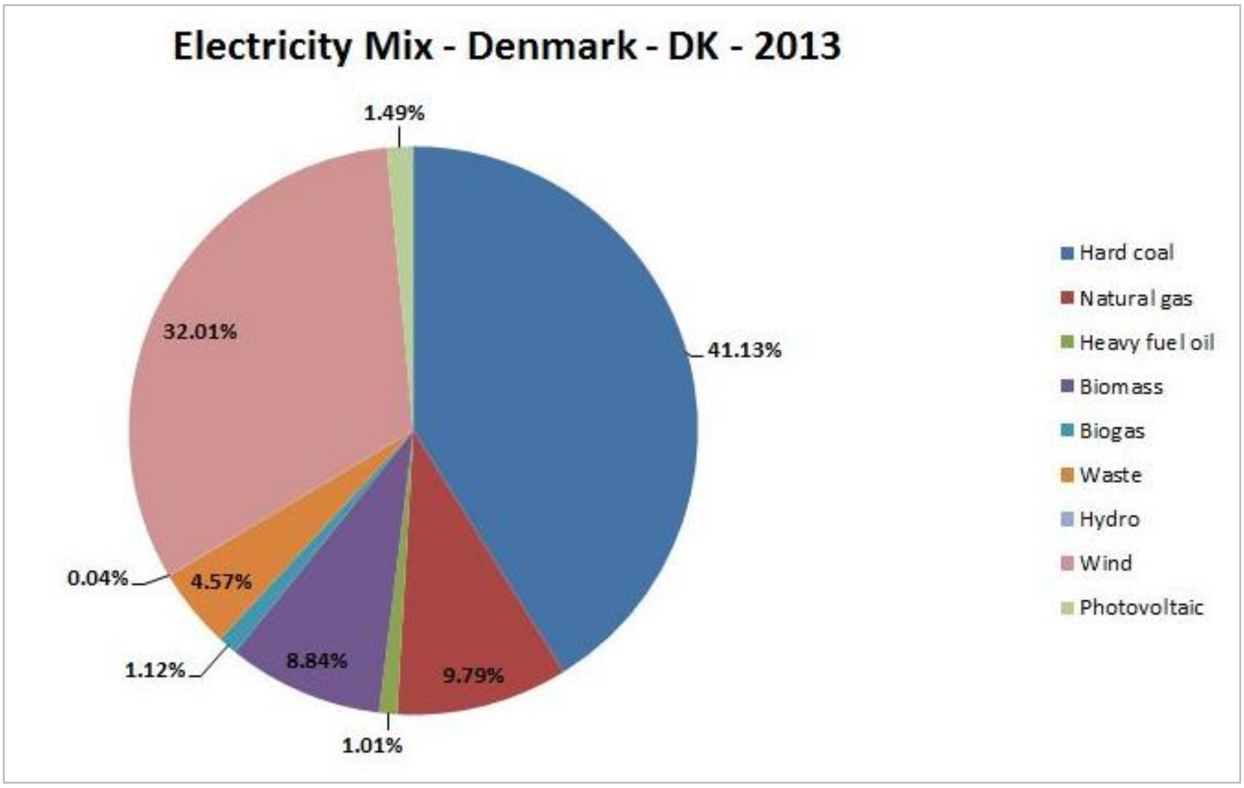
**Water Consumption**
Water is used within the manufacturing facility and therefore we see the highest contribution in the production phase. However, we recycle a lot of the water on site so the contribution is still relatively low. The second highest contribution occurs in the installation site due 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 80% of the product is assumed here to be sent to landfill once it reaches the end of life state. The remind 20% is recycled, for this reason there is a benefit impact associated with the production module. 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 Denmark (2013) |
| Geographical representativeness description | **Split of energy sources in Denmark**<br>- Hard coal: 41.13%<br>- Natural gas: 9.79%<br>- Heavy fuel oil: 1.01%<br>- Biomass: 8.84%<br>- Biogas: 1.12%<br>- Waste: 4.57%<br>- Hydro: 0.04%<br>- Wind: 32.01%<br>- Photovoltaic: 1.49% |
| Reference year | 2013 |
| Type of data set | Cradle to gate |
| Source | Gabi database |



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