ENVIRONMENTAL PRODUCT DECLARATION

In accordance with EN 15804 and ISO 14025

Gyproc GTS 9 Tuulensuojalevy - Sheathing Board

Date of issue: 25.2.2019
Validity: 5 years
Valid: 31.12.2018-31.12.2023
Scope of the EPD®: Finland and Baltic

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 in RTS EPD: RTS_26_19

Laura Sariola Committee secretary	*Markku Hedman* RTS Director General

General information

Manufacturer: Saint-Gobain Finland Oy, Gyproc
Programme used: The Building Information Foundation RTS sr
Publisher: The Building Information Foundation RTS sr
EPD registration/declaration number: RTS_26_19
Product Category Rules and the scope of the declaration: The declaration has been prepared in accordance with EN 15804:2012+A1:2013 and ISO 14025 standards and the additional requirements stated in the RTS PCR (English version,18.6.2018)
Site of manufacture: Ojangontie 23, PL 44, 02401 Kirkkonummi, Y-tunnus 0951555-3
Owner of the declaration: Saint-Gobain Finland Oy, Gyproc
Product / product family name and manufacturer represented: plasterboard
UN CPC code: 37530 Articles of plaster or of composition based on plaster
Date of issue: 25-2-2019
Valid: 31-12-2018 to 31-12-2023
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: Martin Erlandsson, IVL Swedish Environmental Research Institute , based on the PCR mentioned above.
EPD Prepared by: LCA Central Team, Saint-Gobain.
Contact: Malin Dalborg from Gyproc Saint-Gobain (Malin.Dalborg@saint-gobain.com) and Patricia Jimenez Diaz from LCA central team ((Patricia.JimenezDiaz@saint-gobain.com).

The declared unit is 1 m² of installed building plasterboard of 9.5 mm thickness, with 7.10 kg/m² of weight and 747 kg/m3 of density and with a specified function and an expected average service life of 50 years.

EPD of construction products may not be comparable if they do not comply with EN15804 and seen in a building context

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

Environmental management systems in place at site: ISO 14001 - N° FI HS KI 0 5 3 6 6 I 9AB
Health and safety management systems in place at site: DS/OHSAS 18001:2008 – N° FI HS KI 0 5 3 6 6 I 9AB
Quality management systems in place at site: ISO 9001:2015 – N° FI HS KI 0 5 3 6 6 I 9AB

Geographical scope of the EPD®: Finland and Baltic

CEN standard EN 15804 serves as the core PCR[a]	
PCR:	RTS PCR protocol: EPDs published by the Building Information Foundation RTS sr, PT 18 RT EPD Committee (02/06/2016)
Independent verification of the declaration, according to EN ISO 14025:2010 **Internal ☐ External ☒**	
Third party verifier:	Martin Erlandsson, IVL Swedish Environmental Research Institute
Accredited or approved by	The Building Information Foundation RTS sr

Product description

Product description and use:
This Environmental Product Declaration describes the environmental impacts of 1 m² installed building plasterboard of 9.5 mm thickness, with 7.10 kg/m² of weight and 747 kg/m3 of density and with a specified function and an expected average service life of 50 years.

Gyproc GTS 9 Tuulensuojalevy - Sheathing Board is made up of a gypsum core (a blend of recycled gypsum and natural gypsum) with additives and paper liner.

Gyproc GTS 9Tuulensuojalevy - Sheathing Board is a square edge wind resistant plasterboard for weather protection on exterior walls. Designed with permeability to let out the moisture which builds within the buildings structures. Gyproc GTS 9 board has weatherproofing treatment which enables outdoor exposure for three months before installation of the cladding.
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Raw material of the product:

Product structure / composition / raw material	Quantity (p%*)	Usability			Origin of the raw materials
		Renewable	Non-renewable	Recycled	
Natural Gypsum	70 -75	X			EU
Recycled Gypsum	12-25			X	EU
Additives	1-3		X		EU
Paper (bottom and top)	5-7	X			EU

* Order of magnitude, not exact composition

Technical data/physical characteristics:

EN CLASSIFICATION	D – 6.5
REACTION TO FIRE	Euroclass A2-S1, d0 (EN 13501-1:2002)
WATER VAPOUR RESISTANCE	10 μ (EN 12524:2000)
THERMAL CONDUCTIVITY	0,25 W/ (m.K) (EN 12524:2000)

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

PARAMETER	VALUE (expressed per functional/declared unit)
Quantity of plaster for 1 m² of product	7.10 kg
Thickness	9.5 mm
Surfacing	Paper: 371 7g/m²
Packaging for the transportation and distribution	Polyethylene film: 0.003 kg/m² Graphic paper label: 0.000026 kg/m² Wooden pallet: 0.0046 unit/m²
Product used for the Installation	Screws: 8 /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 Product-specific (one product, one manufacturing site)
DECLARED UNIT	1 m² of installed board of 12.5mm of thickness and 7.10 kg/m² of weight
SYSTEM BOUNDARIES	Cradle to Gate with options: stages A1 – 3, A4 – A5, B1 – 7, C1 – 4 and D
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: Finland and Baltic Data included is collected from one production site in Kirkkonummi, Finland, Saint-Gobain Finland Oy, Gyproc Data collected for the year 2018. Cradle to grave study. 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.

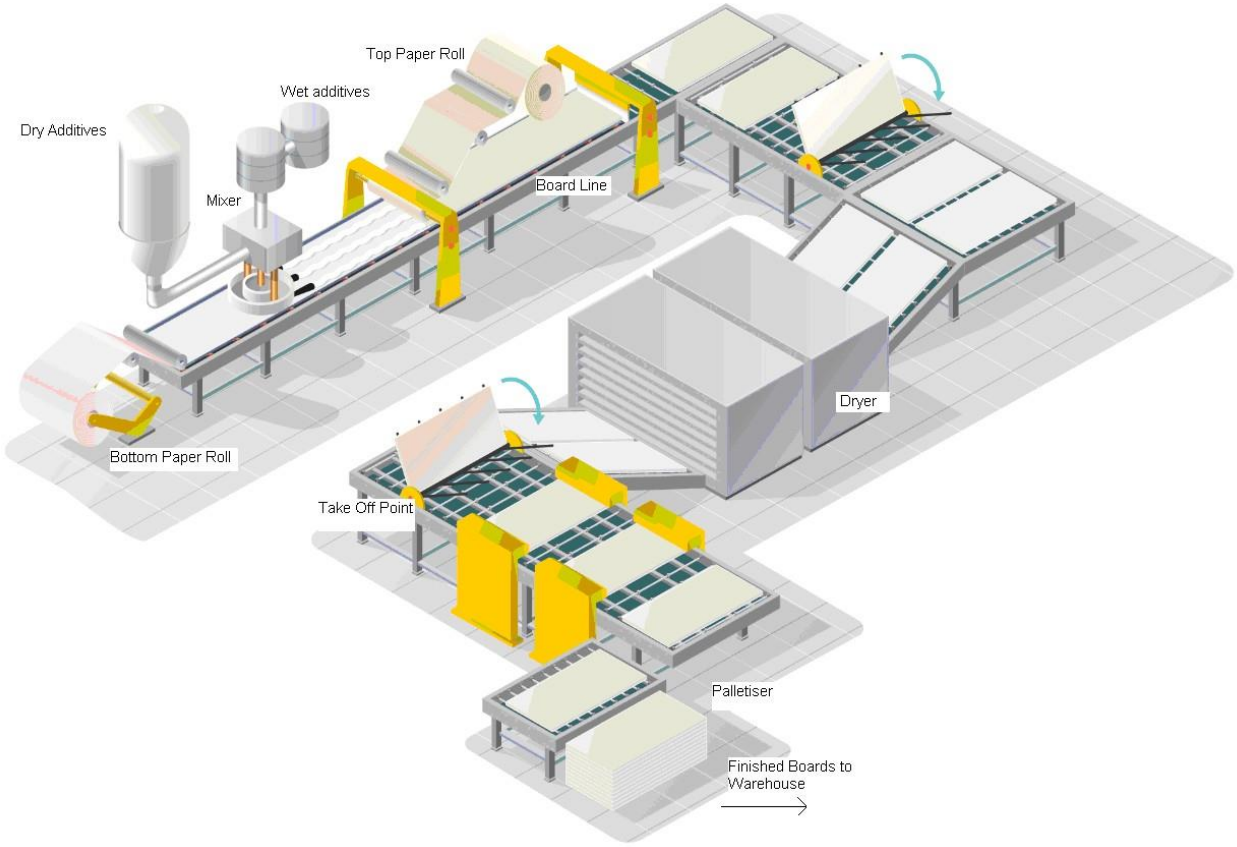
A2, transport to the manufacturer.
The raw materials are transported to the manufacturing site. The modelling includes road, boat and/or train transportations of each raw material.

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.

Object	Value	Data quality
A3 data quality of electricity and CO2 emission kg CO2 eq. / kWh	0.075	The emission of Finnish electricity is based on Thinkstep database and Guarantee of Origin certificate. Thinkstep dataset come from International Energy Agency, 2013.

The LCA calculation has been made taking into account the fact that during the manufacturing process it is used 100% renewable electricity. This 100% renewable electricity bought is evidenced by Guarantee of Origin certificates (GOs) from LOS, valid for the period chosen in the calculation (2018).

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 Container ship ocean with 27500 t, and consumption of 109 liters per km
Distance	Finland market: Truck: 168 km Baltic market: Truck: 57 km, Container ship: 50.6 km (Data is average distances regarding production percentage)
Capacity utilisation (including empty returns)	85% for truck and 24% for container ship
Bulk density of transported products	747 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)	Screws: 8 /m2 board
Water use	None
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: 0.21 kg (2.5%) Polyethylene film: 0.003 kg Graphic paper label: 0.000026 kg Wooden pallet: 0.0046 unit (0.138 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: 0.21 kg to landfill Screws: 0 kg Polyethylene film: 0.003 kg to recycling Graphic paper label: 0.000026 kg to recycling Wooden pallet: 0.0046 unit (0.138 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.

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	7.8 kg collected with mixed construction waste
Recovery system specified by type	15% for recycling (1.8kg)
Disposal specified by type	85% landfilled (6.0 kg)
Assumptions for scenario development (e.g. transportation)	On average, Gypsum waste is transported 200 km by truck to the recycling facility, and 32 km to the landfill facility.

Reuse/recovery/recycling potential, D

Description of the stage: An end of life recycling rate of 15% 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 building plasterboard of 9.5 mm thickness, with 7.10 kg/m² of weight and 747 kg/m3 of density and with a specified function and an expected average service life of 50 years.

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*	1,7E+00	2,4E-01	9,0E-02	0	0	0	0	0	0	0	3,1E-02	2,6E-02	0	9,7E-02	1,5E-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. GWP only accounts for greenhouse gases (GWPGHG) as outlined in EN 15804 and do not include biogenic CO^2.														
Ozone Depletion (ODP) *kg CFC 11 equiv/FU*	7,8E-08	2,8E-14	2,0E-09	0	0	0	0	0	0	0	8,2E-15	9,2E-15	0	9,2E-14	1,1E-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*	7,1E-03	2,2E-03	4,0E-04	0	0	0	0	0	0	0	1,1E-04	2,8E-04	0	5,8E-04	9,4E-05
	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*	3,0E-03	3,3E-04	1,0E-04	0	0	0	0	0	0	0	6,4E-06	4,0E-05	0	7,9E-05	2,3E-05
	Excessive enrichment of waters and continental surfaces with nutrients, and the associated adverse biological effects.														
Photochemical ozone creation (POPC) *kg Ethylene equiv/FU*	3,2E-04	1,1E-04	3,6E-05	0	0	0	0	0	0	0	7,2E-06	1,4E-05	0	4,8E-05	1,8E-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*	2,4E-06	3,7E-09	2,0E-06	0	0	0	0	0	0	0	8,6E-10	1,1E-09	0	3,4E-08	9,9E-09
Abiotic depletion potential for fossil ressources (ADP-fossil fuels) - *MJ/FU*	2,7E+01	3,3E+00	1,2E+00	0	0	0	0	0	0	0	3,9E-01	3,5E-01	0	1,3E+00	2,3E-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*	2,08E+01	6,7E-02	6,3E-01	0	0	0	0	0	0	0	1,2E-03	9,9E-03	0	1,5E-01	2,1E+00
Use of renewable primary energy used as raw materials *MJ/FU*	4,45E+00	0	1,1E-01	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*	2,52E+01	6,7E-02	7,4E-01	0	0	0	0	0	0	0	1,2E-03	9,9E-03	0	1,5E-01	2,1E+00
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials - *MJ/FU*	2,83E+01	3,3E+00	1,3E+00	0	0	0	0	0	0	0	3,9E-01	3,5E-01	0	1,3E+00	1,9E-01
Use of non-renewable primary energy used as raw materials *MJ/FU*	6,77E-01	0	1,7E-02	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*	2,90E+01	3,3E+00	1,3E+00	0	0	0	0	0	0	0	3,9E-01	3,5E-01	0	1,3E+00	1,9E-01
Use of secondary material *kg/FU*	1,14E+00	0	2,9E-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
Use of net fresh water - m^3/FU	1,43E-02	2,6E-05	4,3E-04	0	0	0	0	0	0	0	2,5E-06	1,4E-05	0	2,5E-04	2,4E-04

WASTE CATEGORIES

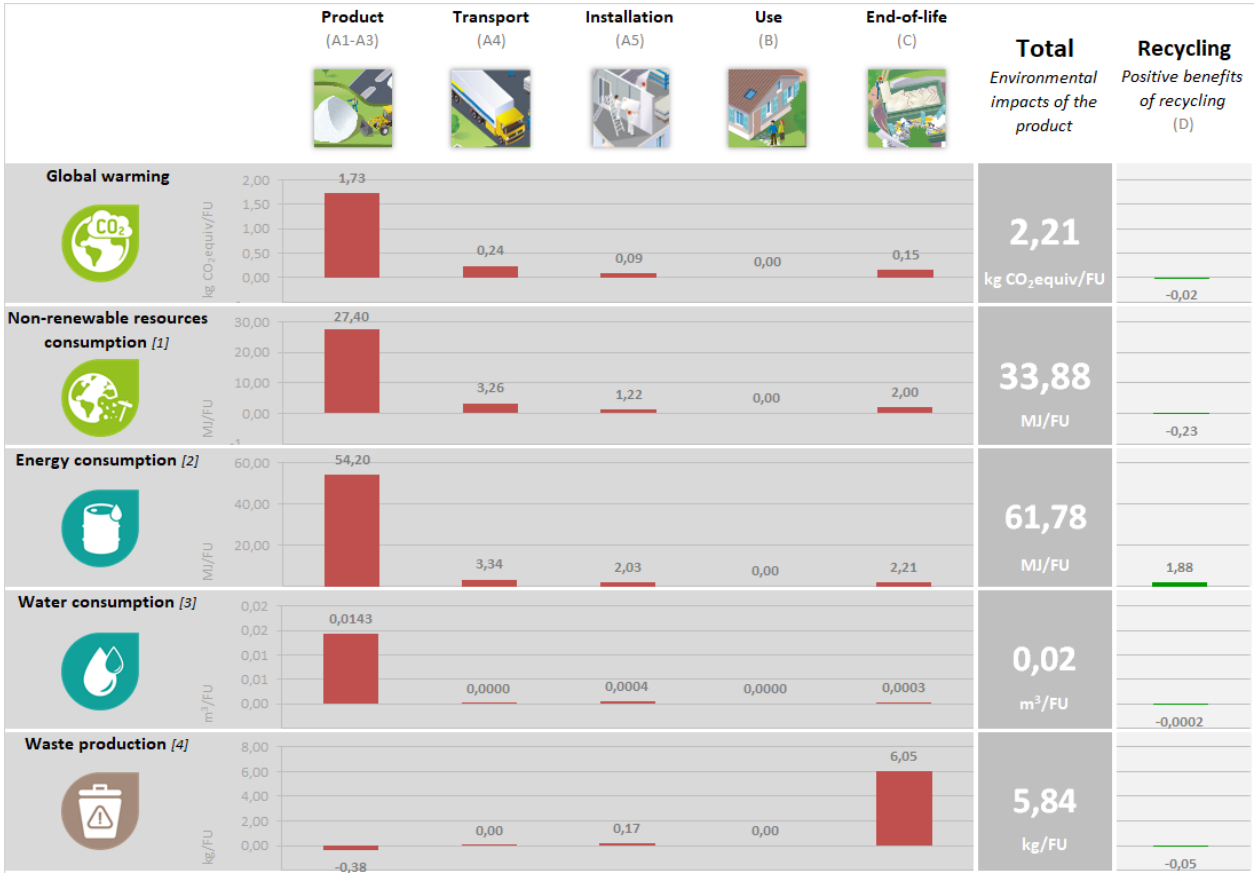
Parameters	Product stage	Construction process stage		Use stage							End-of-life stage				D Reuse, recovery, recycling
	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
Hazardous waste disposed *kg/FU*	1,4E-07	1,1E-08	5,3E-09	0	0	0	0	0	0	0	4,7E-11	7,1E-09	0	2,1E-08	9,3E-09
Non-hazardous (excluding inert) waste disposed *kg/FU*	3,8E-01	3,3E-05	1,7E-01	0	0	0	0	0	0	0	5,7E-05	1,2E-05	0	6,1E+00	4,5E-02
Radioactive waste disposed *kg/FU*	2,1E-04	3,6E-06	1,7E-05	0	0	0	0	0	0	0	5,0E-07	5,0E-07	0	1,8E-05	1,5E-05

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	0
Materials for recycling *kg/FU*	3,8E-02	0	1,4E-01	0	0	0	0	0	0	0	0	0	1,1E+00	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 building plasterboard of 9.5 mm thickness, with 7.10 kg/m² of weight and 747 kg/m3 of density and with a specified function and an expected average service life of 50 years.



[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.

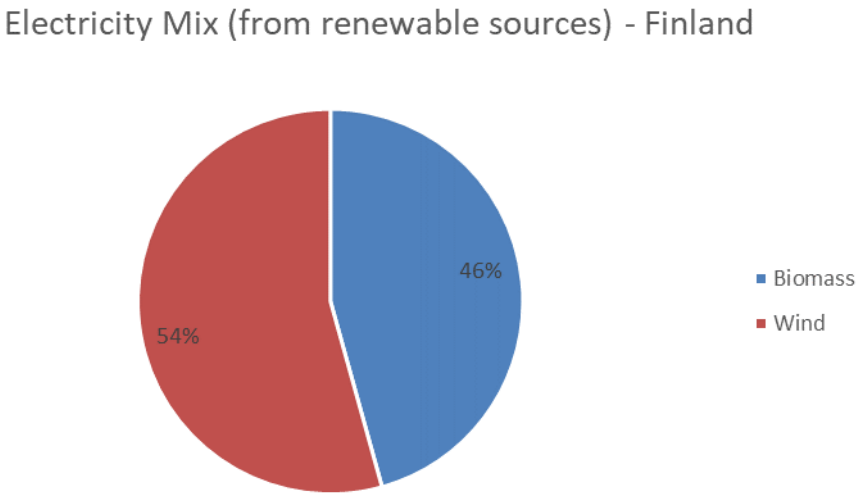
Water Consumption
Water is used within the manufacturing facility and therefore we see the highest contribution in the production phase. However, we recycle a lot of the water on site so the contribution is still relatively low. The second highest contribution occurs in the installation site due to the 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 Finland
Geographical representativeness description	**Split of energy sources in Finland** - Wind: 54% - Biomass: 46%
Reference year	2018
Type of data set	Cradle to gate from Thinkstep
Source	Gabi database from International Energy Agency -2013 Guarantee of Origin certificates (GOs) - 2018



Additional information on release of dangerous substances to indoor air, soil and water

The product is for outdoor application.

References

1. RTS PCR protocol: EPDs published by the Building Information Foundation RTS sr, PT 18 RT EPD Committe (English version,18.6.2018)
2. EN 15804:2012 + A1:2013 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products
3. ISO 21930:2007 Sustainability in building construction – Environmental declaration of building products
4. ISO 14025:2006 Environmental labels and declarations – Type III environmental declarations – Principles and procedures
5. ISO 14040:2006 Environmental management. Life cycle assessment. Principles and framework
6. ISO 14044:2006 Environmental management. Life cycle assessment. Requirements and guidelines
7. Saint-Gobain Environmental Product Declaration Methodological Guide for Construction Products, Version 3.0.1 (2013)
8. EN 12524: 2000 Building materials and products - Hydrothermal properties - Tabulated design values
9. EN 13501-1:2002 Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests (includes Amendments A1:2009)
10. 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
11. LCA report, Information for the Environmental Product Declaration of Gyproc plasterboards. Saint-Gobain Finland Oy Gyproc, December 2018