Environmental Product Declaration

According to ISO 14025

Fibre Cement Flatboard Products

Cembrit Holding A/S

Declaration number
EPD-CEM-2012111-E

Institute Construction and Environment
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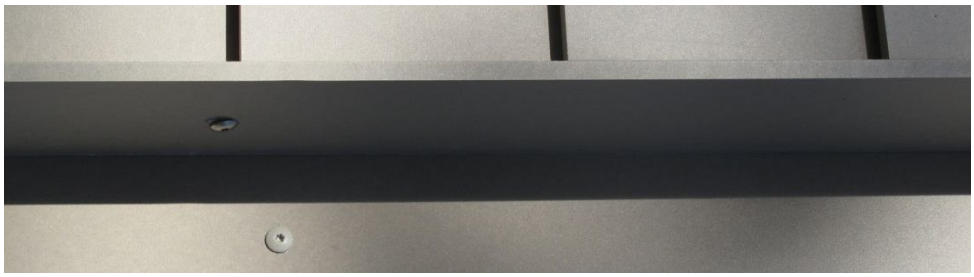
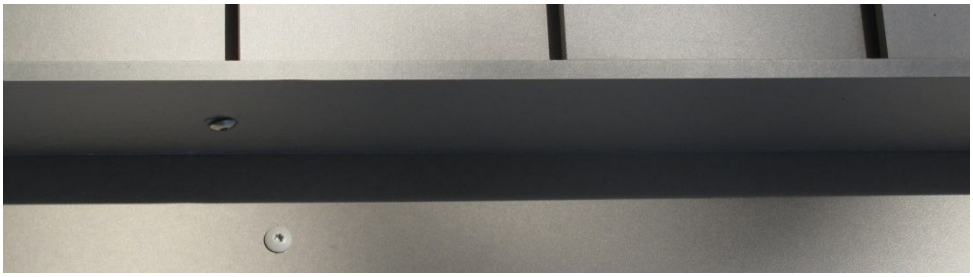


Summary

Environmental Product Declaration

Institute Construction and Environment **www.bau-umwelt.com**	**Program holder**
Cembrit Holding A/S Sohngårdsholmsvej 2 P O Box 750, DK-9100 Aalborg Denmark	**Declaration holder**
EPD-CEM-2012111-E	**Declaration number**
Fibre Cement Flatboard Products This declaration is an environmental product declaration according to ISO 14025 and describes the specific environmental impacts of the building products mentioned. It is intended to foster the sustainable development of environmental and health friendly compatible construction. All relevant environmental data is contained in this validated declaration. The declaration is based on the PCR document “Fibre Cement“, 2007.	**Declared Building Products**
This validated declaration entitles the use of the label of the Institute for Construction and Environment (IBU). This exclusively applies to the mentioned products, three years from the date of issue. The declaration holder is liable for the basic information and verifications.	**Validity**
The **declaration** is complete and contains in detailed form: - Product definition and physical data - Information about raw materials and origin - Specifications on manufacturing the product - Notes on product processing - Information on product in use, singular effects and end of life - LCA results - Evidence and verifications	**Content of the declaration**
24 March, 2012	**Date of Issue**
Prof. Dr.-Ing. Horst J. Bossenmayer (President of the Institute Construction and Environment)	**Signatures**
This declaration, and the rules on which it is based, have been verified by the independent Advisory Board (SVA) according to ISO 14025.	**Verification of the Declaration**
Prof. Dr.-Ing. Hans-Wolf Reinhardt (Chairman of the SVA)	Dr. Birgit Grahl (Verifier appointed by the SVA) **Signatures**



Summary

Environmental Product Declaration

Product description

The declared products are flat boards made of air cured fibre cement. The declaration includes the Cembrit Raw, and the Cembrit True, Fusion, Edge and Metro façade boards.This represents all of the cement flatboards manufactured by Cembrit.

Cembrit Raw is an untreated naturally cured cladding board with a smooth surface.

URBANNATURE range: Cembrit True is a through coloured board with a transparent coating. Cembrit Fusion is a through coloured board with a translucent coating. Cembrit Edge is a grey board with a translucent coating. Cembrit Metro is a grey board with an opaque coating. All coated boards have a transparent coating on the backside.

Applications

Cembrit façade boards are intended for installation as cladding on wooden or metal sub constructions, including ventilated facades, attics, weatherboards, window elements, eaves and roof edges, balconies, prefabricated façade elements.

Scope of the LCA

The Life Cycle Assessment (LCA) was performed according to ISO 14040/14044 corresponding to the requirements of the guidelines concerning Type III declarations of the Institute for Construction and Environment (IBU). Specific industrial data from Cembrit Holding A/S as well as data from the data base "GaBi 4" is used as the data basis. The LCA comprises raw materials, pre-products and energy consumption, pre-product transportation and the actual production phase of fibre cement products. Also included is the production, transportation and end of life of the packaging materials.

Results of the LCA

Flatboard Products

Parameter	Unit per tonne	Uncoated Product	Coated Product
Primary energy, non-renewable	[MJ]	8.33E+03	9.24E+03
Primary energy, renewable	[MJ]	3.14E+03	3.26E+03
Secondary fuels, non-renewable	[MJ]	2.59E+02	2.59E+02
Secondary fuels, renewable	[MJ]	3.41E-02	3.56E-02
Global Warming Potential (GWP 100 year)	[kg CO_2-eqv.]	6.77E+02	7.24E+02
Ozone Depletion Potential (ODP)	[kg R11-eqv.]	5.87E-05	6.56E-05
Acidification Potential (AP)	[kg SO_2-eqv.]	1.70E+00	1.80E+00
Eutrophication Potential (EP)	[kg PO_4^{3-}-eqv.]	2.73E-01	2.82E-01
Photochemical Ozone Creation Potential (POCP)	[kg C_2H_4-eqv.]	1.64E-01	1.75E-01

Issued by: Cembrit Holding A/S
In cooperation with PE INTERNATIONAL, London, UK

PE INTERNATIONAL
EXPERTS IN SUSTAINABILITY

Evidence and verifications

In addition, the results of the following verifications are also described in the Environmental Product Declaration:

- Eluate analysis: In accordance with Dutch Soil Decree, as stated in BRL 5071, as described in the amendment of 14 November 2008.

Scope of validity

This document applies to fibre cement products manufactured by Cembrit Holding A/S plant in Finland. Data for all Flatboard Products has been used to produce the Environmental Product Declaration.

1 Product definition

Product definition

The products are flat boards of various dimensions made of fibre cement.

Coatings: Flatboard Products from Cembrit are commonly provided with a water-based coating, but some products are provided uncoated. The declaration includes all coated and uncoated Cembrit fibre cement products.

Annual production data was used apportioned by mass.

Application

Cembrit façade boards are intended for installation as cladding on wooden or metal sub constructions. They can be used within ventilated facades, attics, weatherboards, window elements, eaves and roof edges, balconies, prefabricated façade elements.

Placing on the market/ Codes of practice

EN 12467:2004 Fibre-cement flat sheets – Product specification and test methods.

- Approval by DIBt, Zulassung Z-31.4-165 issued in January 2011
- Approval by CSTB 166-93-88 issued on 29 March 2011

Quality control

The site producing Flatboard Products has certification to ISO 9001.

CE declaration of conformity according to provisions of EN 12467

CE declaration of conformity with the relevant provisions of the Construction Products Directive (CPD 89/106/EU).

- Finland: Bureau Veritas Certification Finland, Certificate No FIHSK80359A

External control of the products is executed by MPA Bau, Hannover, Germany and by CSTB – Centre Scientifique et Technique du Bâtiment, France.

Delivery status, properties

		Cembrit Raw	Cembrit Edge, Metro, True, Fusion
Width max	mm	1250	1250
Length max	mm	3050	3050
Thickness	mm	6, 8, 10	8

Constructional data

Structural data (EN 12467)

Properties	Unit	Value
Apparent density	Kg/m^3	≥1700 kg/m^3
Average density	Kg/m^3	
Dry bending strength with grain	MPa	24
Dry bending strength across grain	MPa	18
Dry E-module with grain	GPa	8
Dry E-module across grain	GPa	7
Thermal conductivity	W/m K	0.4
Water vapour diffusion pressure loss coefficient μ acc. to DIN 4108 T4	μ	80 (Raw) 140 (painted)
Equilibrium moisture content at 23 °C, 80 % humidity	%	~10
Coefficient of thermal expansion	mm/m K	0.008
Wet-dry-wet (max)	mm/m	3

Fire Protection Requirements

Building material class A2 according to DIN 4102 “non-combustible” and A2-s1,d0 according to EN 13501-1 “non-combustible”.
The following “Reaction to fire” classification reports have been issued by MPA Bau, Hannover

- 093007.1
- 101819.1
- 102038
- 093008.1

2 Basic materials

Base materials primary products

Input (Base materials in % by weight, dry mass)	Flatboard Products
Portland Cement, type CEM II	55-60%
Inert filler (limestone, mica)	30%
Cellulose	5-10%
PVA	0.5%
Pigments	0-0.5%
Pozzolanic Filler	2-5%

WATER: An average of 0.6 m^3 of water are used in the direct manufacture of each tonne of product, around 44% of which is treated water.

Due to the evaporable water content of the finished product of about 12%, and water chemically bonded to the cement (equal to 12.5% of cement by mass), only approximately 840 kg of base materials are used to produce 1 tonne of the final product.

Auxiliary substances / additives

Coatings are manufactured on site or bought in. Coatings are water-based acrylic, and use predominantly iron oxide pigments.

Material explanation

- **Portland Cement**: Manufactured according to DIN EN 197-1, is produced from limestone and marl as well as quartz sand and iron ore is extracted from limestone marl. The raw material is crushed, dried and calcinated to clinker and then ground to form cement. Manufacturing data for cement has been provided by European cement manufacturers.
- **Inert filler: a** filler to optimize product properties such as deformation properties and material bonding.
- **Cellulose**: fibres such as those to produce paper. Used as process fibre for assuring collection of the powder materials during the filtration process (see product manufacture). Basic length of 0,5-3 mm.
- **PVA fibres**: Synthetic Poly-Vinyl-Alcohol (PVA) organic fibre with fibre length of 4-6mm. The PVA is the reinforcement fibre of the Fibre Cement
- **Pozzolanic Filler**: filler with pozzolanic behaviour, used for improving product performance.
- **Water**: Water from a range of sources including ground water, rivers and treated water is used for production.

Raw material extraction and origin

The majority of the mineral materials come from domestic deposits/producers. Cellulose is sourced from Scandinavia. PVA fibres are sourced from Asia. All base materials are bought in. Average transport distance from the base material extraction/production site to the Cembrit factory is around 920 km, of which around 135 km by road and 785 km by continental shipping.

Availability of raw materials

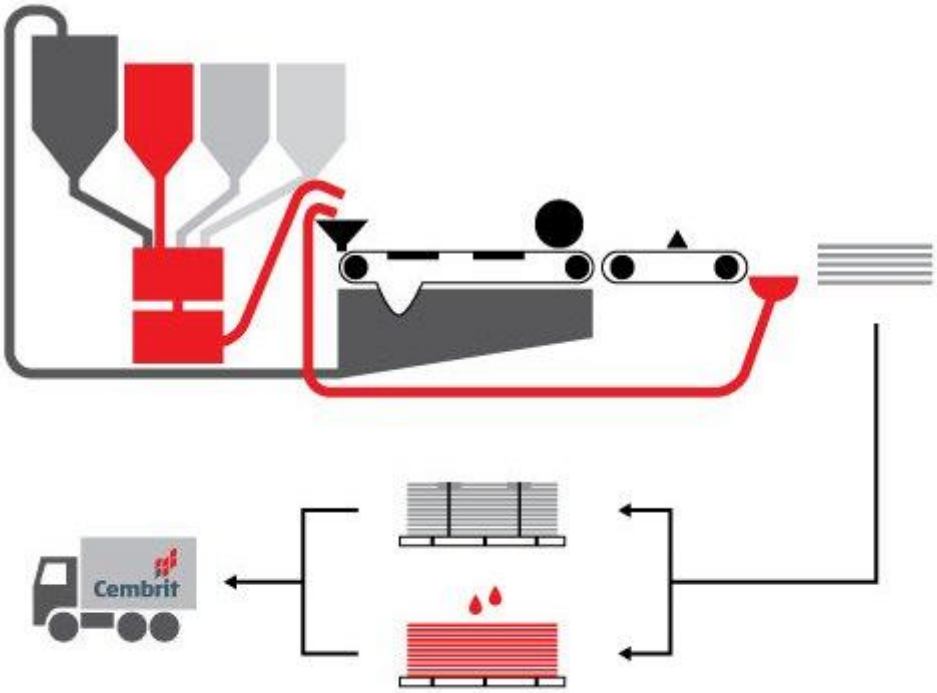
Fibre cement mainly consists of mineral raw materials and pre-products for which, based on current knowledge, there is no resource scarcity. Cellulose for the fibre cement is sourced from FSC sources (FSC Chain of Custody Certification: Oy Metsa Botnia AB, BV Certificate BV-COC-953926 – BV-CW-953926.

3 Product manufacturing

Manufacturing the building product

Cembrit boards are produced according to a flow-on method which is automated to a certain extent: The base materials are processed into a homogeneous mixture with water and transferred to an endlessly rotating felt from which part of the water is evacuated. From there it reaches a format roll which is gradually covered by a thickening layer of fibre cement. Once the required material thickness is reached, the fibre cement layer, still moist and mouldable, is unwound and taken from the roll.

The fibre cement „green“ board is cut, remaining leftovers are returned to the manufacturing process so that no waste is produced. The cut „green“ board is piled up and compressed under high pressure. The boards are then stored for curing and temporarily deposited in storage. The storage period lasts about four weeks.



The boards are coated on both sides with a transparent layer of high quality acrylic paint. The backside gets a second transparent layer by roller coating. The front side gets a second pigmented layer by spray coating.

Environmental protection production

The company operates an environmental management system to ISO 14001:2004.

- Bureau Veritas Certification Finland, Certificate No FIHSK91422B

4 Product processing

Processing recommendations

If required, the boards can be delivered cut to size ready for installation.

Cutting on site may be done with normal slow or fast running hand tools or stationary equipment. When using fast running tools effective dust exhaustion must be employed. All boards may be cut with a circular saw or a jigsaw equipped with a carbide or diamond tipped blade. Sharp edges are made with fast running diamond tipped tools.

Holes are drilled from the front side with a hard-metal drill at 1500 rpm. After cutting or drilling remove all dust from the surface to avoid possible staining.

Environmental and Labour protection

Rules and Standards of the local Government Safety Organisation apply. When processing the mentioned products the usual labour protection measures are to be followed. Attention should be paid to the dust developing during the processing which can cause a slight alkaline reaction (pH value: ca. 12).

E.g. Festool dust extractor CTH26E is able to handle dust with MAC values < 0.1 mg/m³. According to German regulation TRGS 900 (Technische Regeln für Gefahrstoffe) the limit for general dust is 6 mg/m3.

Based on current knowledge, hazards to water, air and soil will not arise from installing fibre cement board according to its intended use. . Testing to the Dutch Soil Decree, as stated in BRL 5071, as described in the amendment of 14 November 2008 demonstrates this for water and soil.

Additional products

Additional products for the implementation of the mentioned products necessary for construction are:

Wood, steel and aluminium constructions including the necessary mounting and linking material as well as the fixing material (rivets, screws) and joint underlays made from EPDM may be required. Evaluating these additional products is not the subject of this declaration. When selecting the additional products necessary for the construction it is essential to make sure that these do not influence the described attributes of environmental compatibility of the mentioned construction products in a negative way.

Occupational safety

Compliance with the generally recognized rules of technology secures normally a flawless technical execution. Cembrit installation instructions relating to these requirements are to be considered as well.

Rules and Standards of the local Government Safety Organisation apply. When processing the mentioned products the usual labour protection measures are to be followed according to Cembrit information. Attention should be paid to the dust developing during the processing which can cause a slight alkaline reaction (pH value: ca. 12).

Environmental protection

Based on current knowledge, hazards to water, air and soil will not arise from installing fibre cement board according to its intended use. Testing to the Dutch Soil Decree, as stated in BRL 5071, as described in the amendment of 14 November 2008 demonstrates this for water and soil.

Residual material

At the building site, accumulating cut segments and packaging is to be collected separately. The regulations of the local disposal authorities as well as the indications mentioned in point 6 “End of life” are to be followed.

Packaging

Flatboard Products PE film, foam foil, cardboard sheets, wooden pallets and plastic strips are used as packaging materials.

In case of mono-material collection, the removal of recyclable polyethylene foils can be performed by local actors according to legislations.

Reusable pallets can be returned to the building material suppliers and are reimbursed (deposit system). The suppliers give them back to the factory.

Disposal of product packaging from the construction site has been modelled based on typical practice in Germany and included in this declaration.

5 Condition when in use

Constituent parts

Fibre cement: By setting (hydration) the cement-water-mixture, cement stone (calcium-silicate hydrate) develops with embedded fibres and filling materials as well as the smallest air voids. Fibre cement typically contains ca. 12 % water and a volume fraction of ca. 30 % air (contained in the micro voids).

Carbonation: Free lime from the cement reacts with carbon dioxide from the surrounding air over long time periods to form calcium carbonate (carbonation).

The coating materials are bound as solids due to the hot coating in the use stage. The water used in coatings evaporates.

Effects on environment and health

Environment-health

Based on current knowledge, hazards to water, air and soil will not arise from installing fibre cement board according to its intended use.

Health protection:

During normal usage and usage of the building products according to their intended purpose, no health damages have been diagnosed due to the applied basic materials and their performance during the use stage.

Useful life

After curing fibre cement products can be used with almost no limits when observing intended use as well as local rules and regulations.

6 Singular effects

Fire

Flatboard products, both painted and unpainted comply with building material class A2-s1 d0 according to DIN/ EN 13501-1 i.e. “non-combustible”.

• **Smoke emission/ density of the smoke:** The smoke emission coming from burning the mentioned products (coating) is very low “s1”.

• **Alteration of the condition of aggregation (dripping-off while burning):** The poly vinyl alcohol fibres integrated into the concrete gradually lose their stability when surrounding building material is burning “d0”.

This points to an unproblematic behaviour (no explosion) of fibre cement in case of fire. A burning dripping/ drop-off of the colour coating or of the fibre cement does not occur.

• **Fumes:** Classification according to DIN/EN 13501-1 : 2001-02: Smoke production “s1”

Water

No contents whatsoever are washed out which could be hazardous to water. The pH-value is alkaline (pH ≥ 12).
Intron Report: A850950/R20100098/RZw/Nbe, Issued 25 March 2010 - Testing covered leaching due to inorganic components (15 metals and 4 anions) and composition of organic components. „All components fulfil the requirements from the BRL 5701 and the Soil Quality Decree.“ „The fibre cement from Cembrit complies with the environmental requirements from the BRL 1103 / BRL 5071.

7 End of life phase

Disassembly

Cembrit Flatboard Products can be removed in a non-destructive way by unscrewing.

Reuse

The dismantled products can be reinserted in an undamaged state according to their original intended use.

Closed-loop recycling

In case of mono-material separation, the mentioned uncoated as well as coated fibre cement products can optionally be re-pulverised and recycled as additive in the production of fibre cement (material recycling).

Open-loop recycling

In case of mono-material separation, the mentioned uncoated as well as coated fibre cement products are also suitable for reclamation as padding and filling material in underground engineering, road construction or antinoise barrier for example (material reutilisation).

Disposal

Fibre cement: Remnants of the mentioned fibre cement products as well as remnants from demolition on the building site can be deposited without difficulties on dumps belonging to dump category I due to their mainly mineral contents without pre-treatment: This only applies in case the above mentioned recycling possibilities are not practicable.

Waste code: 170101 (Concrete) according to the European Waste Catalogue.

Packaging:

Information on the end of life stage of packaging is provided in section 3.

8 Life cycle assessment

The life cycle assessment of CEMBRIT fibre cement product was carried out in accordance with ISO 14040 principles. The approach and methodology taken is detailed in the sections below.Information on system definition and modeling of the life cycle is provided below.

The following finished products of fibre cement have been distinguished:

- Flatboard Facade boards

8.1 Information on system definition and modelling of the life cycle

Declared Unit

1 tonne has been selected as the analysed and declared unit, based on the average production for the year 2009.

System boundaries

System boundaries for the production are drawn from the resource production to the manufacture and onwards delivery to a typical construction site in Germany i.e. a cradle-to-site LCA. The end of life of the packaging material has also been included.

Assumptions and estimations

Some assumptions were made regarding background datasets due to lack of precise data. In some cases, country specific datasets were not available and in other cases, specific datasets were not available. Proxies were chosen from PE International's GaBi database based on expert opinion and the list of dataset proxies used is given below:

- Combustion of LPG; proxy Thermal energy from propane
- White cement; proxy Clinker cement
- Virgin cellulose fibre(unbleached and bleached); proxy Kraftliner (brown)
- Mica; proxy Kaolin
- Silicate dust; proxy Silicate fume (from ferro-silicon mix)
- Back coat; proxy Water-borne paint, industry black
- Acrylic paint; proxy Water-borne paint, industry black
- Antiblock; proxy Water-borne paint, industry black
- Primer; proxy Water-borne paint, industry black
- Paint pigments,; Proxy Iron oxide

Country specific power grid mixes are used for each site. The percentage share of power sources for each power grid mix was estimated from 2008 International Energy Agency Statistics (http://www.iea.org/stats/index.asp)

The weight of the same given amount of coated and uncoated fibre cement products is assumed to be identical.

Cut-off criteria

The cut off criteria for this assessment was to discount material and energy flows that contributed less than 1% of the mass and energy totals respectively on the input side. Thus, all significant data (>1%) from the production data acquisition have been considered, i.e. all base material used, utilised thermal energy, internal fuel consumption and electric power consumption etc. Neglected inputs are estimated to be less than 2% in total. On the output side, all material flows which exit the system and whose environmental effects are greater than 1% of the total impact of a considered impact category are recorded i.e. direct production waste, and all effluent measurements available.

Machines, facilities and other capital goods required during production have been excluded from the assessment.

Transports	Transport of base materials has been taken into account. The typical transport distance from the base material extraction/production site to the Cembrit factory is around 920 km, of which around 135 km by road and 785 km by continental shipping. Average transportation distances for products transported to Germany are around 1080 km of which 220 km are by ship and the remainder by road. Frankfurt was selected as a representative location in Germany and distances were calculated by using online tools.
Period under consideration	The primary data used in this assessment are annual data for the operations of the analysed sites for 2009.
Background data	Secondary/background data to account for the production of base materials used in the manufacturing process as well as energy consumption have been taken from PE International GaBi databases (GaBi 2010, http://documentation.gabi-software.com/).
Data quality	Primary data is less than 3 years old. All of the primary data for the products covered under this assessment was acquired directly from the production sites. Primary data supplied was carefully vetted for plausibility and can be classified as being good. Secondary/back ground datasets were taken from PE International GaBi databases. These datasets mostly come from industrial sources, are consistent in terms of methodological boundary conditions and are supplied as aggregated processes. PE International is renowned for the quality of its GaBi datasets and more information regarding data quality can be found at http://documentation.gabi-software.com/.
Allocation	The outputs of the production system being assessed are products which are more or less identical in terms of material composition, mass and value. As such, no allocation has been applied to the system overall.
Thermal recycling of wastes and packaging	The avoided burdens approach was taken when accounting for the end of life fate of certain waste materials arising from the production of the fibre cement product. The LCA model assumes that oil sludge and wooden pallets are incinerated with energy recovery at the end of life of these production wastes. Thermal energy produced from incineration is credited against an EU 25 thermal energy from natural gas i.e. avoiding the production of a said amount of thermal energy from fossils. The incineration process also produces electricity and this is treated in the same way in general, with credits being applied against the specific country power grid mix of the site in question.

Information on use stage

The scope of the LCA in this assessment is “cradle to site”. Thus, there was no requirement to detail the use stage considerations of the fibre cement product.

Information on disposal stage (Option 1)

The scope of the LCA in this assessment is “cradle to site”. Thus, there was no requirement to detail the end of life/disposal considerations of the fibre cement product.

8.2 Description of the assessment results and analysis

The following aggregation factors of the life cycle inventory analysis (energy and wastes) have been declared:

- Primary energy non renewable,

- Primary energy renewable,
- Energies from secondary combustibles,
- Rubble/ waste dump commodities,
- Commercial waste similar to domestic waste,
- Special wastes.

The consumption of material resources and consumption of water has been indicated.

Where relevant, impacts have been differentiated between the following stages of production;

- Binders – cradle to gate impacts from the manufacture of cement and other pozzolanic inputs
- Coatings – cradle to gate impacts from the manufacture of coatings including on site manufacture of coatings and impacts from the base materials used for coatings
- Other Base Materials – cradle to gate impacts from the manufacture of other base materials (not binders or coatings)
- Product Manufacture – impacts from the production and use of energy and water on site
- Transport – impacts from the transport of binders, coatings and base materials to the Cembrit sites.
- Packaging – cradle to gate impacts from the manufacture of packaging for the Cembrit products and also the end of life has been included
- Waste Treatment/disposal – impacts from the treatment and disposal of wastes arising at the Cembrit sites.
- Transport to site – transport to a typical construction site in Frankfurt.

Primary energy

Figure 1 below shows the primary energy consumption (renewable and non-renewable) for the production of 1 tonne of Cembrit Flatboard Products and Figure 2 shows the breakdown of non-renewable energy by source.

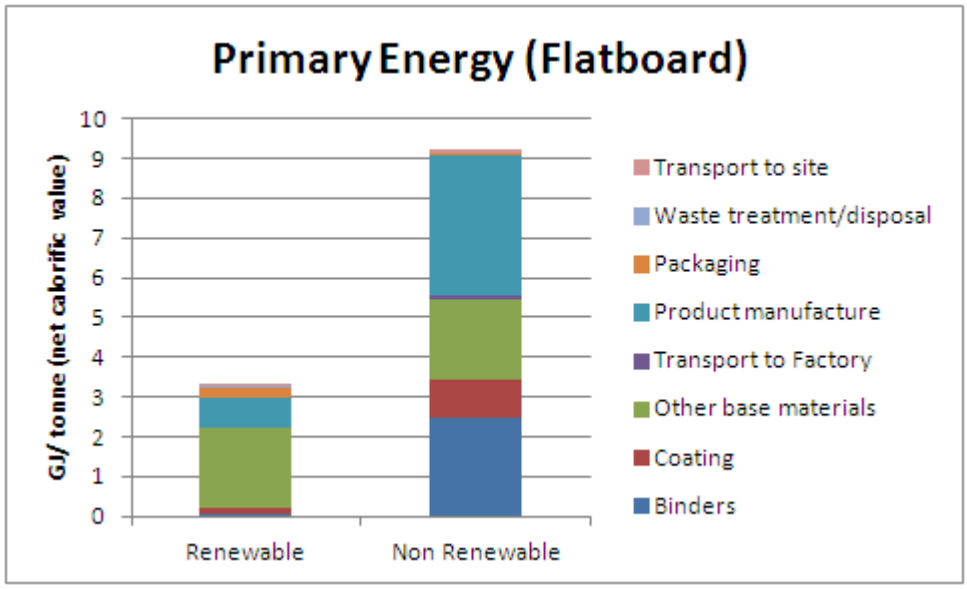


Figure 1: Primary energy consumption (GJ)

Primary Energy Cons-umption (GJ/tonne)	Binders	Coating	Other Base materials	Transport	Product manufacture	Packaging	Waste treatment/ disposal	Transport to site	TOTAL
Non-renewable	2.50	0.909	2.06	0.060	3.56	0.022	0.043	0.09	**9.24**
Renewable	0.069	0.114	2.04	0.0001	0.744	0.282	0.0015	0.0001	**3.25**

Table 8-1: Primary Energy Consumption

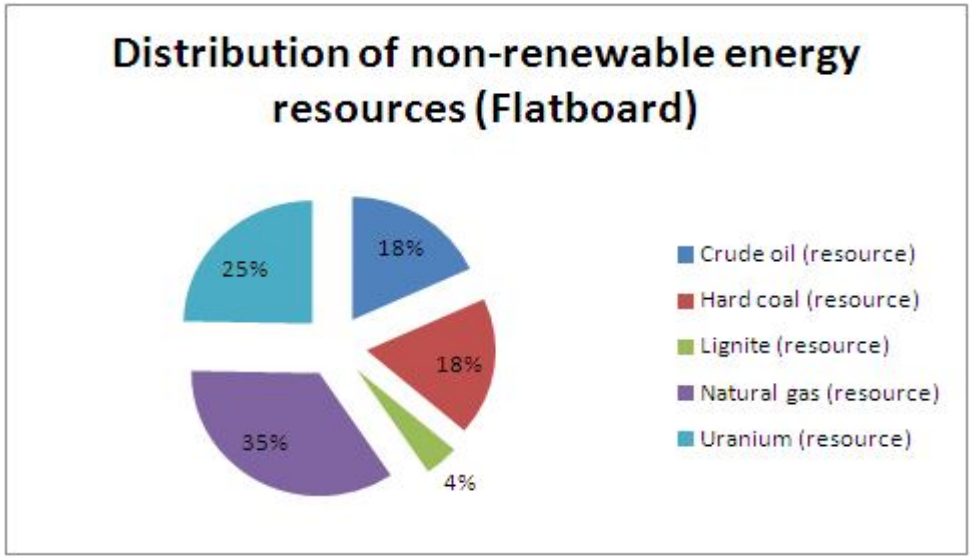


Figure 2: Non-renewable energy consumption by share of energy source

Secondary fuels

Figure 3 shows the use of secondary fuel consumption which is mainly from the use of secondary fuels during manufacture of cement.

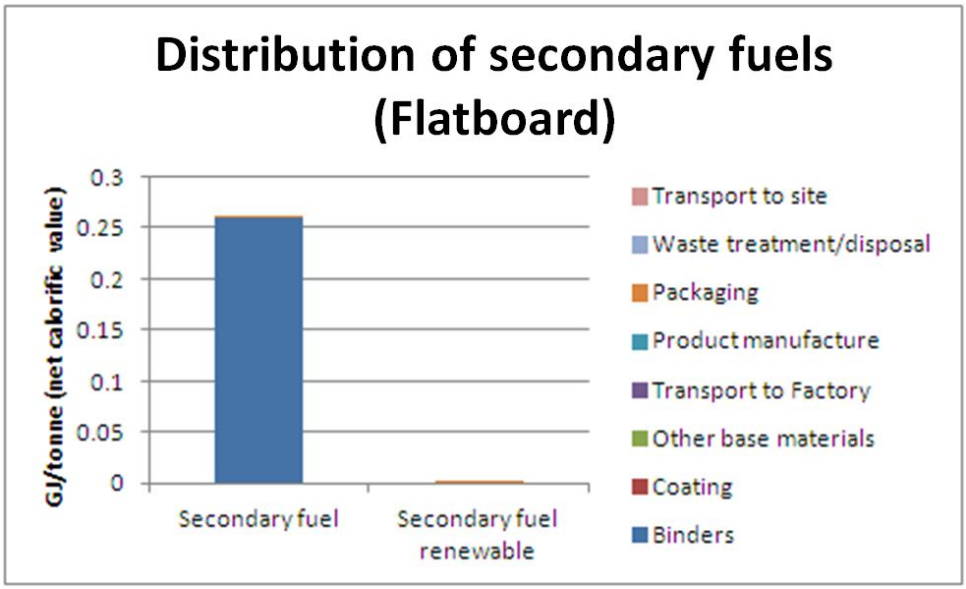


Figure 3: Secondary fuels consumption by process

Water utilisation

Water consumption by process stage is shown in Figure 4. Most water is consumed in the production of base materials, and the product manufacturing process itself. Some water consumption is avoided through the recycling of waste water.

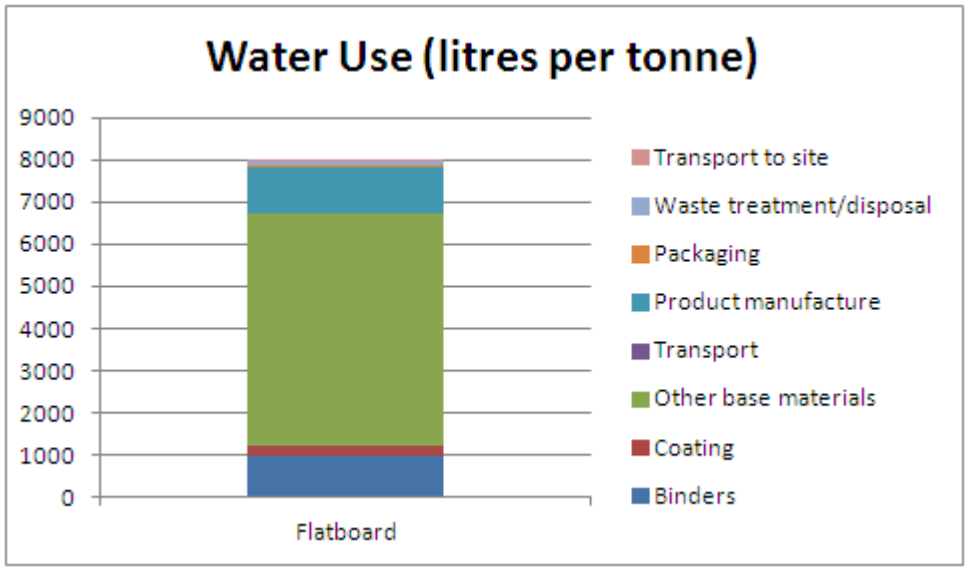


Figure 4: Water consumption by process (kg or litres per tonne)

	Binders	Coating	Other Base materials	Transport	Product manu-facture	Packaging	Waste treatment/ disposal	Transport to site	TOTAL
Litres/tonne product	970	255	5475	1	1110	38	91	1	**7910**

Table 8-2: Water use by process

Wastes

The table below details five categories of waste and the quantities of each that is associated with the production of 1 tonne of coated flatboard product and through its supply chain.

Waste categories	Amount, kg/ tonne of coated flatboard product
Consumer waste	1.92
Hazardous waste	4.55
Radioactive waste	0.822
Stockpile goods	1072

Table 7-3: Waste arising per tonne coated flatboard product

Impact assessment

In line with EPD requirements the LCA considered the following impacts

- Global Warming Potential (GWP)
- Ozone Depletion Potential (ODP)
- Acidification Potential (AP)

- Eutrophication Potential (EP)
- Photochemical Ozone Creation Potential (POCP)

The table below gives the absolute contributions of the production of 1 tonne of coated CEMBRIT flatboard product to the individual environmental impact categories, broken down into contributions from binders, coatings, packaging, product manufacture, base materials, transport and waste treatment/disposal.

Impact category	Unit	Binders	Coatings	Other Base Materials	Transport to Factory	Product Manu-facturing	Packaging	Waste treatment/ disposal	Transport to site	TOTAL
Global Warming Potential (GWP 100 years)	kg CO2 equiv.	4.66E+02	4.72E+01	1.85E+01	4.52E+00	1.62E+02	-2.76E+01	4.70E+01	6.36E+00	7.24E+02
Ozone Depletion Potential (ODP)	kg R11 equiv.	1.10E-05	6.89E-06	9.43E-06	8.49E-09	3.81E-05	9.67E-08	5.03E-08	1.27E-08	6.56E-05
Acidification Potential (AP)	kg SO2 equiv.	9.75E-01	9.79E-02	3.53E-01	8.20E-02	2.05E-01	5.67E-03	2.22E-02	5.98E-02	1.80E+00
Eutrophication potential (EP)	kg phosphate equiv.	1.23E-01	9.07E-03	8.96E-02	1.04E-02	2.46E-02	8.76E-04	1.19E-02	1.17E-02	2.82E-01
Photochemical. Ozone Creation Potential (POCP)	kg ethene equiv.	8.98E-02	1.09E-02	4.16E-02	4.86E-03	2.04E-02	1.22E-03	2.65E-03	3.85E-03	1.75E-01

Table 7-4: Absolute contributions of the production of 1 tonne of CEMBRIT Flatboard Product

The chart below gives the relative contributions of the production of 1 tonne of CEMBRIT Flatboard Products to the individual environmental impact categories, broken down into contributions from binders, coatings, packaging, product manufacture, base materials, transport and waste treatment/disposal

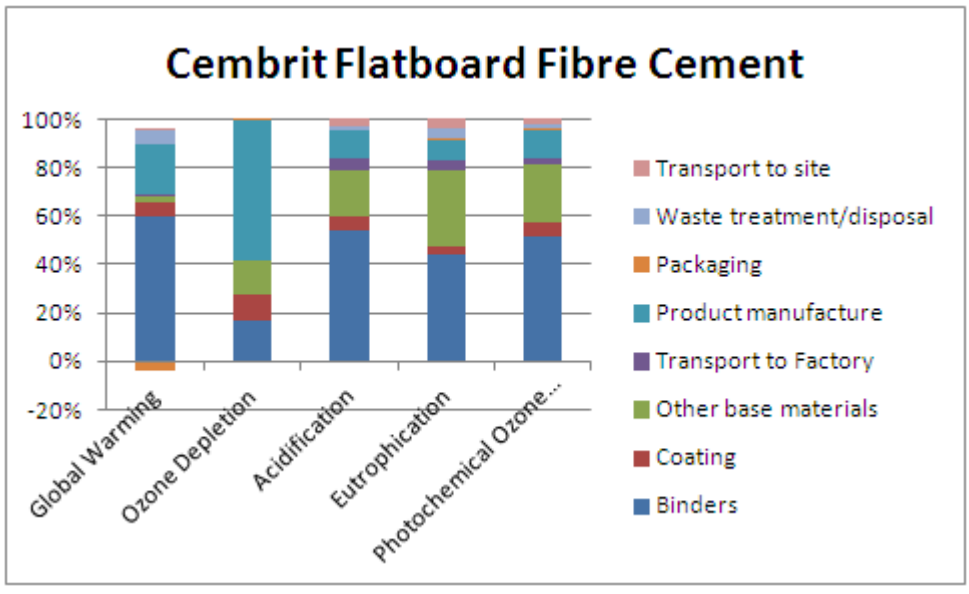


Figure 5: Relative contributions of individual product stages to the environmental impacts of the production of 1 tonne of CEMBRIT Flatboard Products

9 Evidence

9.1 Fire

Flatboard Products

Building material class A2 according to DIN 4102 “non-combustible” and A2-s1,d0 according to EN 13501-1 “non-combustible”.

- MPA Bau Hannover. Reaction to Fire classification reports Nos. 093007.1, 101818.1, 102038, 093008.1

9.2 Leaching

Testing to the Dutch Soil Decree, as stated in BRL 5071, as described in the amendment of 14 November 2008.

- Intron Report: A850950/R20100098/RZw/Nbe, Issued 25 March 2010 - Testing covered leaching due to inorganic components (15 metals and 4 anions) and composition of organic components. „All components fulfil the requirements from the BRL 5701 and the Soil Quality Decree.“ „The fibre cement from Cembrit complies with the environmental requirements from the BRL 1103 / BRL 5071.

9.3 EN 12467: 2004

EN 12467:2004 Fibre-cement flat sheets – Product specification and test methods.

- Approval by DIBt, Zulassung Z-31.4-165 issued on 7 January 2011 covering Cembrit Raw and the Urbannature range.

9.4 ISO 9001: 2008

- Finland: Bureau Veritas Certification Finland, Certificate No FIHSK80359A.

9.5 ISO 14001: 2004

- Finland: Bureau Veritas Certification Finland, Certificate No FIHSK91422B.

10 PCR-document and verification

This declaration is based on the Product Category Rules – Fibre Cement

Review of the PCR-Documents by the Committee of Experts. Chairman of the Committee of Experts: Prof. Dr.-Ing. Hans-Wolf Reinhardt
Independent verification of the declaration according to ISO 14025: ☐ internal ☒ external
Validation of the declaration: Dr. Birgit Grahl

11 References

/Institut Bauen und Umwelt/ Leitfaden für die Formulierung der produktgruppen-spezifischen Anforderungen der Umwelt-Produktdeklarationen (Typ III) für Bauprodukte, www.bau-umwelt.com

/GaBi 4 2009/ GaBi 4: Software und Datenbank zur Ganzheitlichen Bilanzierung. LBP, Universität Stuttgart und PE International, 2001-2009.

Standards and laws

/ISO 14025/ ISO 14025: 2006 Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures

/ISO 14040/ ISO 14040:2006 Environmental management -- Life cycle assessment -- Principles and framework

/ISO 14044/	ISO 14044:2006 Environmental management -- Life cycle assessment -- Requirements and guidelines
EN 12467	EN 12467:2004 Fibre-cement flat sheets – Product specification and test methods.
/ISO 9001/	ISO 9001: 2008 Quality management systems. Requirements
/ISO 14001/	ISO 14001: 2004 Environmental management systems. Requirements with guidance for use
EN 197-1	EN 197-1: 2007 Cement. Composition, specifications and conformity criteria for common cements
EN 13501-1	EN 13501-1: 2007 Fire classification of construction products and building elements. Classification using test data from reaction to fire tests

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