Environmental Product Declaration

In accordance with ISO 14040, 14025, 14044 and EN 15804 for:

Cem-FIL® AR Glass fibers (1 kg)

Owens Corning

Issue date:	2021-03-16
Validity date:	2021-03-17
Geographical scope:	Europe

1. General Information

This document applies to 1kg of Cem-FIL® AR Glass fibers manufactured by Owens Corning at Taishan FiberGlas in Tai'an City, China. This Environmental Product Declaration is in accordance with ISO 14040 [1], 14025 [2] and 14044 Standards [3], the NEN-EN 15804:2012+A2:2019 [4] and the Dutch Norm NMD Bepalingsmethode 1.0 [5]. The LCA tool Mobius version 0.8.367 by Ecochain has been used in the preparation of this report [6].

As this EPD represents the results according to the NMD Bepalingsmethode 1.0 and to the EN-15804+A2, the result chapter contains two separate chapters with results according to the two standards. Chapter 4.1 represents the results according to the NMD Bepalingsmethode 1.0 (containing set 1 of the results) and Chapter 4.2 represents the results according to the EN-15804+A2, which is also the 'set 2' of results that is required for reporting according to the NMD Bepalingsmethode 1.0.

Declaration of the Reviewer, Harry van Ewijk, SGS Search, on March 17th 2021:

SGS Search is recognized by the NMD and can therefore provide verification for this LCA. The LCA is verified according to the NMD-verification protocol and complies to the requirements set in the ISO 14040, ISO 14044, ISO 14025, EN 15804+A2:2019 and the Dutch SBK Bepalingsmethode 1.0 including July 2020 amendment.

Best regards,

SGS Search Consultancy, Harry van Ewijk

2. Company and product information

2.1 Company description

Owens Corning is an American Company of 19 000 employees over 33 countries. 2019 revenues is 7.2 billion US$. Owens Corning operates in 3 different businesses: Building Insulation, Roofing and Composites.

Owens corning values are:

- Living safely
- Winning with customers
- Leading in quality
- Expanding our impact through sustainability
- Turning knowledge into value
- Striving to be better, every day

Owens Corning is the inventor and the worldwide Leader of glass fibers for the reinforcement of composites with about 25% of market share.

The pillars of the development of Owens Corning Composites Business are Windmill Blades, Alternatives composite solutions for Infrastructures and Building & Construction thanks the use of glass mat.

Since some years, Owens Corning increase his focus on Sustainability and lower environmental impact Activities on both the production of its products and their applications.

2.2 Product specification

The Cem-FIL® AR Glass Fibers (also known as Anti-Crak® AR Glass fibers, ARcotex® AR Glass fiber or Slurry-FIL® AR Glass fiber) is a glass fiber. This is a material consisting of numerous extremely fine filaments of glass that are obtained by the melting of various mineral raw materials and the extrusion of the molten glass through platinium plates named bushing which are pierced with thousands very small holes. Each hole, named tip, draws one fine filament.

The glass fiber is coated with a specific chemical preparation during its forming and the roles of which are:

- to be a forming aid.
- to glue more or less the fine filaments together.
- to be an application process aid.
- to help the bonding between the surface of the glass and the reinforced matrix

Further characteristics are:

- The glass fiber bundle can gather between 100 and 8000 filaments.
- The glass fibers can be presented either in discontinue fibers with length from 3 up to 50 mm chop strands, or in continuous doffs or rolls, named “rovings”, depending the final application process.
- The glass fiber is generally described by: its linear density (g/km or tex), its filament diameter and its length (mm) if chop strand.
- The glass fibers for the reinforcement of mortar and concrete are made with a specific composition of silica, lime, soda, alumina and zircon to withstand the strong alkali environment of the concrete.
- Two dimensions reinforcements like mat, veil or fabrics can be made from simple glass fibers rovings.
- Cem-FIL® AR Glass Fibers have a density close to the fresh concrete one, and thanks to that, the dispersion and the distribution in the concrete is homogeneous without floating or sinking effects, helping to optimize the thickness and the performances of the concrete structure.

2.3 Base materials

The base raw materials for the Cem-FIL® AR Glass fibers are:

- Silicious sand – 60-70%
- Socium Carbonate – 20-30%
- Zirconium sand – 20-30%
- Quick Lime – 10-5%

The recipe contains no hazardous substances. In accordance with current knowledge, this product contains no substances of very high concern (SVHC) on the /REACH Candidate List/ published by the European Chemicals Agency in a concentration exceeding 0.1 % (by unit weight).

2.4 Manufacturing

The Cem-FIL® AR Glass fibers are manufactured in the following steps:

- A mix of finely powered mineral raw materials are molten in a furnace at temperature > 1600°C and the molten glass is driven to a series of platinum based plates with thousands holes, named bushing. The molten glass is extruded through the holes at controlled temperature (about 1350°C), viscosity and speed to create filaments with constant diameter (picture A, figure 2).
- The filaments are cooled down, coated with the sizing (a specific chemical preparation diluted in water) and then they are gathered in bundles and pulled thanks a pulling device than can be a chopper or a winding machine (picture B, figure 2).
- Then the glass fibers are dried in an oven to remove the processing water and a downstream step may take place depending the final commercial presentation and application before the packaging.

Production waste is treated at an external waste treatment plant. The Cem-FIL® AR Glass fibers are manufactured in continuous processes as illustrated in figure 1 and 2.

2.5 Product Application

The Cem-FIL® AR Glass fibers are used as material for reinforcement for mortar and concrete.

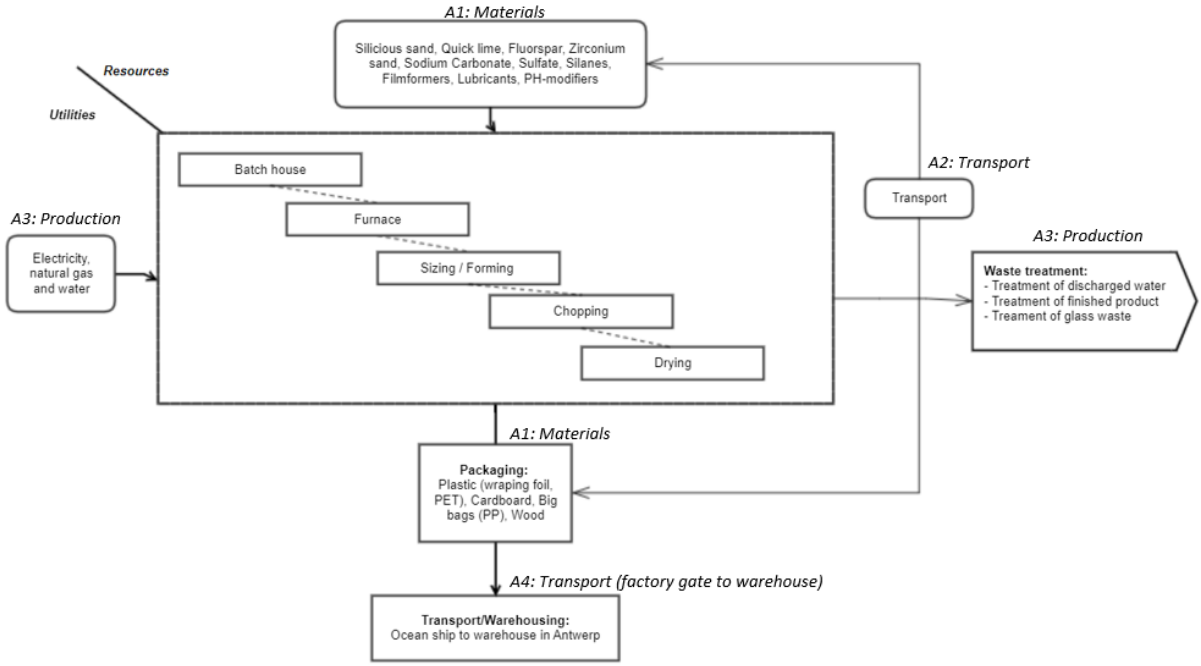

FIGURE 1: PROCESS TREE OF 1KG OF CEM-FIL® AR GLASS FIBERS.

FIGURE 2: PRODUCTION PROCESS OF THE CEM-FIL® AR GLASS FIBERS (LEFT: PICTURE A; RIGHT: PICTURE B)

3. Functional unit

3.1 Functional Unit

The functional unit has been defined as follows: *the production of 1 kg Cem-FIL® AR Glass fibers*

Description	Value	Unit
Declared unit	1	kg

3.2 System boundary

Type of EPD: Cradle to gate

The system boundaries of the EPD follow the modular construction system described by EN 15804. The LCA takes into account the following modules:

3.2.1 Production stage (A1-A3)

This includes three modules, A1, A2 and A3, concerning the extraction and processing of raw materials, transport and manufacturing, respectively. The impact of the Cem-FIL® AR Glass fibers is modelled up until the warehouse in Antwerp. The reason for this is that all Cem-FIL® AR Glass fibers used in Europe are transported to the warehouse in Antwerp first.

3.3 Data quality and allocation

To simulate the product stage, data recorded by Owens Corning from the production year 2019. All other relevant background data sets were taken from generic data not older than 10 years.

The primary data provided by Owens Corning derive from the production plant: Taishan FiberGlas (Dawenkou Industrial Zone, Manzhuang Town, Taian City, Shandong Province, P.R.C.) All background data records were retrieved from the Ecoinvent database (Version 3.5).

3.3.1 Cut-off criteria

All data was taken into account (e.g. recipe constituents, thermal energy used, electricity used). Transport expenses were considered for all inputs and outputs. The manufacturing of the production machines and systems and associated infrastructure was not taken into account in the LCA.

3.3.2 Allocation rules

In a life cycle assessment, it is often the case that the environmental burden must be divided over multiple product systems. This can occur in four cases:

1. The production of multiple products within one production process (multi-output);
2. The treatment of multiple products/resources within one production process (multi-input);
3. The use of secondary materials;
4. Reuse of materials.

There have not been encountered any allocation issues as all four cases above do not apply for the Cem-FIL® AR Glass fibers. Case 1 and 2 do not apply as product specific data has been retrieved from the production plant. Furthermore, there has not been any use of secondary materials or reuse of materials, which make case 3 and also not applicable in this situation.

3.3.3 Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to EN 15804 and the building context, respectively the product-specific characteristics of performance, are taken into account.

4. LCA: Results

The results displayed below apply to 1 kg of Cem-FIL® AR Glass fibers.

Description of the system boundary (X = Included in LCA; MND = Module Not declared)																
Product stage			Construction process stage		Use Stage							End of life stage				Benefits and loads beyond the system boundaries
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-recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X[1]	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

4.1. LCA: Results – According to the NMD bepalingsmethode 1.0 (set 1)

The results displayed below apply to 1 kg of Cem-FIL® AR Glass fibers.

TABLE 1: RESULTS OF THE CEM-FIL® AR GLASS FIBERS ACCORDING TO THE NMD BEPALINGSMETHODE V1.0 – SET 1 - ENVIRONMENTAL IMPACT CATEGORIES

Environmental impact	Unit	A1	A2	A3	A4 (Transport to Antwerp)	Total (incl. transport to Antwerp)
ECI / MKI	Euro	0,17	0,01	0,14	0,05	0,36
ADPE	kg Sb eq	6,65E-06	1,22E-07	3,34E-07	5,35E-08	7,16E-06
ADPF	kg Sb eq	9,51E-03	3,93E-04	1,22E-02	1,66E-03	2,38E-02
GWP	kg CO2 eq	1,29	0,05	1,61	0,24	3,19
ODP	kg CFC-11 eq	6,99E-08	9,66E-09	9,51E-08	3,83E-08	2,13E-07
POCP	kg C2H4 eq	6,79E-04	3,75E-05	4,20E-04	2,62E-04	1,40E-03
AP	kg SO2 eq	7,83E-03	4,25E-04	3,36E-03	5,05E-03	1,67E-02
EP	kg PO4--- eq	1,15E-03	5,85E-05	3,63E-04	4,55E-04	2,03E-03
HTP	kg 1,4-DB eq	6,21E-01	2,25E-02	3,43E-01	1,12E-01	1,10E+00
FAETP	kg 1,4-DB eq	1,03E-02	5,92E-04	2,68E-02	1,95E-03	3,97E-02
MAETP	kg 1,4-DB eq	3,95E+01	2,23E+00	8,26E+01	9,39E+00	1,34E+02
TETP	kg 1,4-DB eq	2,10E-03	7,61E-05	2,32E-03	3,51E-04	4,85E-03

ECI = Environmental Costs Indicator [euro]; ADPE = Abiotic depletion potential for non-fossil resources [kg Sb-eq]; ADPF = Abiotic depletion potential for fossil resources [kg Sb-eq]; GWP = Global warming potential [kg CO2-eq] [kg CO2-eq]; ODP = Depletion potential of the stratospheric ozone layer [kg CFC-11-eq]; POCP = Formation potential of tropospheric ozone photochemical oxidants [kg ethene-eq]; AP = Acidication potential of land and water [kg SO2-eq]; EP = Eutrophication potential [kg PO43−-eq]; HTP = Human toxicity potential [kg 1,4-DB-eq];

[1] Transport in A4 is considered up until the storage location in Antwerp.

FAETP = Freshwater aquatic ecotoxicity potential [kg 1,4-DB-eq]; MAETP = Marine aquatic ecotoxicity potential [kg 1,4-DB-eq]; TETP = Terrestrial ecotoxicity potential [kg1,4-DB-eq].

TABLE 2: RESULTS OF THE CEM-FIL® AR GLASS FIBERS ACCORDING TO THE NMD BEPALINGSMETHODE V1.0 – SET 1 - RESOURCE USES

Resource use	Unit	A1	A2	A3	A4 (Transport to Antwerp)	Total (incl. transport to Antwerp)
PERT	MJ	4,28E+00	1,07E-02	4,70E-01	7,95E-02	4,84E+00
PENRT	MJ	1,83E+01	8,72E-01	2,32E+01	3,68E+00	4,61E+01
PET	MJ	2,26E+01	8,83E-01	2,37E+01	3,76E+00	5,09E+01
FW	m3	9,82E-03	1,42E-04	-2,30E-03	6,46E-04	8,31E-03

PERT = Total use of renewable primary energy resources [MJ]; PENRT = Total use of non-renewable primary energy resources [MJ]; PET = Total energy [MJ]; FW = Use of net fresh water [m3].

TABLE 3: RESULTS OF THE CEM-FIL® AR GLASS FIBERS ACCORDING TO THE NMD BEPALINGSMETHODE V1.0 – SET 1 - OUTPUT FLOW AND WASTE CATEGORIES

Output flow and waste categories	Unit	A1	A2	A3	A4 (Transport to Antwerp)	Total (incl. transport to Antwerp)
HWD	kg	2,66E-05	5,14E-07	2,36E-05	2,04E-06	5,27E-05
NHWD	kg	1,71E-01	4,00E-02	1,49E-01	5,45E-03	3,65E-01
RWD	kg	3,94E-05	5,49E-06	4,52E-06	2,26E-05	7,20E-05

HWD = Hazardous waste disposed [kg]; NHWD = Non-hazardous waste disposed [kg]; RWD = Radioactive waste disposed [kg].

4.2. LCA: Results – According to EN15804+A2[2]

The results displayed below apply to 1 kg of Cem-FIL® AR Glass fibers.

TABLE 4: RESULTS OF THE CEM-FIL® AR GLASS FIBERS - CORE ENVIRONMENTAL IMPACT CATEGORIES - ACCORDING TO THE EN15804+A2 / NMD BEPALINGSMETHODE V1.0 – SET 2

Environmental Impact	Unit	A1	A2	A3	A4 (Transport to Antwerp)	Total (incl. transport to Antwerp)
GWP-total	kg CO2 eq.	1,16	0,05	1,64	0,24	3,10
GWP-fossil	kg CO2 eq.	1,31E+00	5,39E-02	1,65E+00	2,43E-01	3,26E+00
GWP-biogenic[3]	kg CO2 eq.	-1,50E-01	2,41E-05	-4,39E-03	2,45E-04	-1,54E-01
GWP-luluc	kg CO2 eq.	8,37E-04	1,87E-05	1,08E-04	1,28E-04	1,09E-03
ODP	kg CFC 11 eq.	8,11E-08	1,21E-08	1,15E-07	4,76E-08	2,55E-07
AP	mol H+ eq.	1,01E-02	5,39E-04	4,09E-03	6,15E-03	2,09E-02
EP-freshwater	kg P eq.	1,15E-04	8,30E-07	1,76E-05	4,07E-06	1,37E-04
EP-marine	kg N eq.	1,48E-03	1,43E-04	8,60E-04	1,21E-03	3,69E-03
EP-terrestrial	mol N eq.	2,47E-02	1,59E-03	9,08E-03	1,36E-02	4,90E-02
POCP	kg NMVOC eq.	4,82E-03	4,39E-04	2,80E-03	3,57E-03	1,16E-02
ADP-minerals&metals	kg Sb eq.	6,65E-06	1,22E-07	3,34E-07	5,34E-08	7,16E-06
ADP-fossil	MJ, net calorific value	1,72E+01	8,22E-01	2,12E+01	3,46E+00	4,26E+01
WDP	m3 world eq. deprived	1,12E+00	6,51E-03	6,75E-02	2,84E-02	1,23E+00

[2] Also Set 2 for the Bepalingsmethode 1.0

[3] The GWP-biogenic in A3 needed to be corrected manually. An explanation is given in chapter 5.

GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; GWP total = Global Warming Potential Total; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption.

TABLE 5: RESULTS OF THE CEM-FIL® AR GLASS FIBERS - ADDITIONAL ENVIRONMENTAL IMPACT CATEGORIES AND INDICATORS ACCORDING TO THE EN15804+A2 / NMD BEPALINGSMETHODE V1.0 – SET 2

Impact category (Additional)	Unit	A1	A2	A3	A4 (Transport to Antwerp)	Total (incl. transport to Antwerp)
PM	Disease incidence	1,09E-07	4,17E-09	4,41E-08	7,31E-09	1,65E-07
IRP	kBq U235 eq.	3,59E-02	3,53E-03	4,97E-03	1,56E-02	6,00E-02
ETP-fw	CTUe	6,29E+01	5,82E-01	2,03E+01	2,33E+00	8,61E+01
HTP-c	CTUh	7,56E-10	2,15E-11	5,20E-10	7,77E-11	1,38E-09
HTP-nc	CTUh	1,96E-08	6,82E-10	1,80E-08	1,74E-09	4,01E-08
SQP	Pt.	2,73E+01	5,71E-01	1,54E+00	5,41E-01	2,99E+01

PM = Particulate matter emissions, potential incidence of disease due to PM emissions; IRP = Ionising radiation, human health, potential human exposure efficiency relative to U235; ETP-fw = Ecotoxicity (frewhwater), potential Comparative Toxic Unit for ecosystems; HTP-c = Human toxicity, cancer effects, potential Comparative Toxic Unit for humans; HTP-nc = Human toxicity, non-cancer effects, Potential Comparative Toxic Unit for humans; SQP = Land use related impact / soil quality, Potential soil quality index.

TABLE 6: RESULTS OF THE CEM-FIL® AR GLASS FIBERS - PARAMETERS DESCRIBING RESOURCES USE - ACCORDING TO THE EN15804+A2 / NMD BEPALINGSMETHODE V1.0 – SET 2

Resource use	Unit	A1	A2	A3	A4 (Transport to Antwerp)	Total (incl. transport to Antwerp)
PERE	MJ	4,28E+00	1,07E-02	4,70E-01	7,95E-02	4,84E+00
PERM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	4,28E+00	1,07E-02	4,70E-01	7,95E-02	4,84E+00
PENRE	MJ	1,83E+01	8,72E-01	2,32E+01	3,68E+00	4,61E+01
PENRM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	1,83E+01	8,72E-01	2,32E+01	3,68E+00	4,61E+01
SM	Kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	M^3	9,82E-03	1,42E-04	-2,30E-03	6,46E-04	8,31E-03
RSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water.

TABLE 7: RESULTS OF THE CEM-FIL® AR GLASS FIBERS - OTHER ENVIRONMENTAL INFORMATION DESCRIBING WASTE CATEGORIES AND OUTPUT FLOWS ACCORDING TO THE EN15804+A2 / NMD BEPALINGSMETHODE V1.0 – SET 2

Waste categories and output flows	Unit	A1	A2	A3	A4 (Transport to Antwerp)	Total (incl. transport to Antwerp)
HW	Kg	2,66E-05	5,14E-07	2,36E-05	2,04E-06	5,27E-05
NHW	Kg	1,71E-01	4,00E-02	1,49E-01	5,45E-03	3,65E-01
RW	Kg	3,94E-05	5,49E-06	4,52E-06	2,26E-05	7,20E-05
CR	Kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MR	Kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MER	Kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EE	MJ per energy carrier	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

HW = Hazardous waste; NHW = Non-hazardous waste; RW = Radioactive waste; CR = Components for re-use; MR = Materials for recycling; MER = Materials for energy recovery; EE = Exported Energy.

5. Information on biogenic carbon

In accordance with the EN15804+A2 this chapter reports on the biogenic carbon content in 1 kg of the Cem-FIL® AR Glass Fibers for the negative scores of GWP-biogenic for A1 and A3. The biogenic carbon content is shown in table 19. The biogenic carbon content needs to be taken into consideration when using this data for further calculations as the balance over the whole lifecycle (A1-D) should be 0 for the GWP-biogenic. 1 kg of biogenic carbon is equivalent to 44/12 kg of CO_2.

TABLE 8: BIOGENIC CARBON CONTENT

Part of the product	GWP-biogenic	Unit (expressed per functional unit)	Biogenic carbon content	Unit (expressed per functional unit)
A1: Product	-	kg CO2-eq.	-	Kg C
A1: Packaging	-1,50E-01	kg CO2-eq.	-4,09E-02	Kg C
A2	-	kg CO2-eq.	-	Kg C
A3	-	kg CO2-eq.	-	Kg C
A4 (transport to Antwerp)	-	kg CO2-eq.	-	Kg C

Furthermore, within the results a correction needed to be made. Within the calculations a negative GWP-biogenic within A3 was encountered with a number of -4,39E-03 kg CO2 eq. which is equivalent to a biogenic carbon content of -1,20E-03. The manual correction has been made due to two reasons. 1) A negative GWP-biogenic in A3 is not in accordance with the EN15804+A2 as this takes into account that in the complete lifecycle the negative GWP-biogenic is compromised in the later stages of the LCA, by for example waste treatment in the later stages (C-D). This is not possible for the negative GWP-biogenic in the A3 phase, and 2) The negative GWP-biogenic is due to the use of wood material in the Ecoinvent 3.5 reference used for the Chinese electricity mix. It is unlikely that hat wood will not be further treated in the rest of its lifecycle and therefore it is unlikely for the carbon will keep being sequestrated in the wood and the GWP-biogenic will keep being negative. Hence, the GWP-biogenic for A3 is set to 0.

6. LCA: Interpretation

In this chapter, the 'hot spots' within the LCA study are shown. Figure 3 provides information on how separate items contribute to the overall climate change (GWP-total according to the EN15804+A2 / Set 2 in kg CO2 eq.) impact of 1 kg of Cem-FIL® AR Glass fibers.

The production process (A3) accounts for the biggest share of the impact of Cem-FIL® AR Glass fibers. This is mainly due to the use of natural gas (36%) and the use of electricity (for forming/chopping and upstream combined – 17%) during the production process. Furthermore, the material input (A1) is the second biggest share. Mainly the use of Sodium Carbonate (13%) and Zirconium Sand (14%) account for a substantial share of impact.

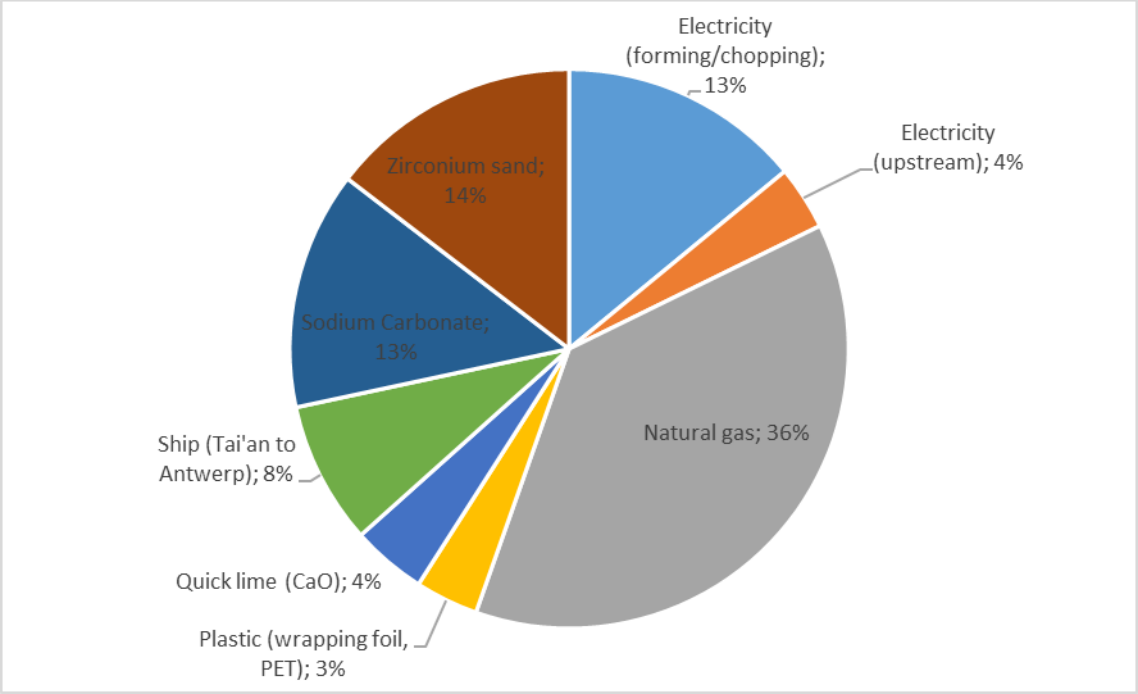

FIGURE 3: HOTSPOT ANALYSIS OF 1 KG CEM-FIL® AR GLASS FIBERS

7. Programme-related information and verification

Product category rules (PCR): • *EN 15804:* A2:2019 (Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products).	
Independent verification of the declaration and data:	
☐ EPD Process Certification (internal)	☑ EPD Verification (external)
Third party verifier: Harry van Ewijk SGS Search Petroleumhavenweg 8 1041 AC Amsterdam The Netherlands	

8. Contact information

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LCA author:	EcoChain Technologies B.V. H.J.E. Wenckebachweg 123 1096 AM Amsterdam The Netherlands

9. References

[1] 'Environmental management - Life cycle assessment – Principles and Framework', International Organization for Standardization, ISO14040:2006.

[2] 'Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures', International Organization for Standardization, ISO14025:2006.

[3] 'Environmental management - Life cycle assessment - Requirements and guidelines', International Organization for Standardization, ISO14044:2006.

[4] 'NEN-EN 15804+A2: Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products', NEN-EN 15804:2012+A2:2019.

[5] 'SBK Bepalingsmethode Milieuprestatie Bouwwerken Versie 1.0 (juli 2020)'. Stichting Nationale Milieudatabase.

[6] Mobius 0.8.367 – 2020, web: http://mobius.ecochain.com.