

Environmental Product Declaration



renco
USA

RENCO

MCFR PROFILE



ASTM INTERNATIONAL

According to
EN 15804
ISO 21930
ISO 14025

1. General Information

Manufacturer Name:	RENCO – Manisa/Turkey Factory Dilek, D565, 45804 Saruhanlı/Manisa, Turkey
Program Operator:	ASTM International 100 Barr Harbor Drive West Conshohocken, PA 19428-2959, USA
Declaration Number:	EPD 251
Reference PCR:	ISO 21930: 2017
Date of Issuance:	September 1, 2021
End of Validity:	September 1, 2026
Product Name:	MCFR Profile
EPD Owner:	RENCO
Declared Unit:	1 kg of MCFR Profile
EPD Scope:	Cradle-to-gate (A1, A2, and A3)
Verification:	ISO 21930 serves as the core PCR. Independent verification of the declaration according to ISO 14025 and ISO 21930. <input type="checkbox"/> internal <input checked="" type="checkbox"/> external
LCA Reviewer and EPD Verifier:	Timothy S. Brooke ASTM International 

2. Product

2.1 Product Description

The declared product is MCFR Profiles. Mineral Composite Fiber Reinforced (MCFR) are a type of composite material (CM). CM's refer to products made from multiple materials with significantly different physical or chemical properties.

2.2 Application

MCFR Profiles are monoblock elements using in building systems. These blocks stack in a simple interlocking idea and are adhesively joined to form monolithic structures.

2.3 Technical Data

Table 1 provides technical data for MCFR Profiles.

Table 1: Technical Data		
Name	Value	Unit
Density	327.00	kg/m ³
Block Size	20 x 20 x 40	cm

2.4 Base Materials

Table 2 provides base materials data for MCFR Profiles.

Table 2: Product Ingredients		
Component	Ingredient Name	Value
MCFR Profile	E-Glass Single End Roving	55-65 %
	PET Recycling Resin	25-30 %
	Continuous Filament Mat	8-15 %
	ATH Aluminum Hydroxide	4.5-7 %
	Calcium Carbonate	3-4 %
	Other	<5 %

3. LCA Calculation Rules

3.1 Declared Unit

The declared unit is 1 kg MCFR Profiles produced at Renco's manufacturing facility in Turkey.

3.2 System Boundary

The system boundary for this study is limited to a cradle-to-gate focus. (see also Table 4):

A1 Raw material supply: Extraction, handling, and processing of input materials.

A2 Transportation: Transportation of all input materials from the suppliers to the gate of the manufacturing facility.

A3 Manufacturing: The preparation processes of MCFR Profile units at Renco's manufacturing facility. This phase also includes the operations of the manufacturing facility and all process emissions that occur at the production facility.

3.3 Estimates and Assumptions

All significant foreground data was gathered from the manufacturer based on measured values.

3.4 Cut-off Criteria

The cut-off criteria for all activity stage flows considered within the system boundary conform with ISO 21930: 2017 Section 7.1.8. Specifically, the cut-off criteria were applied as follows:

- All inputs and outputs for which data are available are included in the calculated effects and no collected core process data are excluded.
- A one percent cut-off is considered for renewable and non-renewable primary energy consumption and the total mass of inputs within a unit process. The sum of the total neglected flows does not exceed 5% of all energy consumption and mass of inputs.
- All flows known to contribute a significant impact or to uncertainty are included.
- The cut-off rules are not applied to hazardous and toxic material flows – all of which are included in the life cycle inventory.

No material or energy input or output was knowingly excluded from the system boundary.

3.5 Background Data and 3.6 Data Quality

Data was gathered for the primary material and energy inputs used in production for calendar year 2020. Table 3 describe each LCI data source for raw materials (A1), transportation (A2) and the core manufacture process (A3). Table 3 also includes a data quality assessment for on the basis of the technological, temporal, and geographical representativeness.

Table 3: Secondary Data Sources and Data Quality Assessment

A1: Raw Material Inputs

Inputs	LCI Data Source	Geography	Year	Data Quality Assessment
PET Recycled Resin	USLCI 2014: Recycled postconsumer PET pellet NREL/RNA U	Global	2014	Technology: very good Process models average global technology Time: very good Data is <10 years old Geography: very good Data is representative of global conditions.
Calcium Carbonate	IMA-NA Calcium Carbonate Life Cycle Assessment	North America	2016	Technology: very good Process models average global technology Time: very good Data is <5 years old Geography: fair Data is representative of global conditions.
Glass Roving and Matt	ecoinvent 3: Glass fibre {RoW} production Cut-off, U	Global	2018	Technology: very good Process models average global technology Time: very good Data is <5 years old Geography: very good Data is representative of global conditions.
ATH Aluminum Hydroxide	ecoinvent 3: Aluminium hydroxide {RoW} aluminium hydroxide production Cut-off, U	Global	2018	Technology: very good Process models average global technology Time: very good Data is <5 years old Geography: very good Data is representative of global conditions.
Peroxide	ecoinvent 3: Chemical, inorganic {GLO} production Cut-off, U	Global	2018	Technology: very good Process models average global technology Time: very good Data is <5 years old Geography: very good Data is representative of global conditions.
Pigment Paste	ecoinvent 3: Chemical, inorganic {GLO} production Cut-off, U	Global	2018	Technology: very good Process models average global technology Time: very good Data is <5 years old Geography: very good Data is representative of global conditions.

A2: Transportation				
Inputs	LCI Data Source	Geography	Year	Data Quality Assessment
Trucking	ecoinvent 3: Transport, freight, lorry 7.5-16 metric ton, EURO3 {GLO} market for Alloc Rec, U	Global	2018	Technology: very good Process models average global technology Time: good Data is <5 years old Geography: very good Data is representative of global conditions.
A3: Manufacturing				
Energy	LCI Data Source	Geography	Year	Data Quality Assessment
Electricity	Ortadoğu Enerji	Turkey	2021	Technology: very good Time: very good Geography: very good.
Ancillary Material	LCI Data Source	Geography	Year	Data Quality Assessment
Hydraulic fluid	ecoinvent 3: Diesel {RoW} diesel production, petroleum refinery operation Cut-off, U	Global	2018	Technology: very good Process models average global technology Time: good Data is <5 years old Geography: very good Data is representative of global conditions.
Packaging	LCI Data Source	Geography	Year	Data Quality Assessment
Wooden pallet	ecoinvent 3: EUR-flat pallet {GLO} market for Cut-off, U	Global	2018	Technology: very good Process models average global technology Time: very good Data is <5 years old Geography: very good Data is representative of global conditions.
Plastic packing	ecoinvent 3: Packaging film, low density polyethylene {RoW} production Cut-off, U	Global	2018	Technology: very good Process models average global technology Time: good Data is <5 years old Geography: very good Data is representative of global conditions.
Stretch film	ecoinvent 3: Packaging film, low density polyethylene {RoW} production Cut-off, U	Global	2018	Technology: very good Process models average global technology Time: good Data is <5 years old Geography: very good Data is representative of global conditions.

3.7 Period under Review

Data was gathered for the primary material and energy inputs used in the production for calendar year 2020.

3.8 Allocation

At Renco’s Turkey facility several MCFR products are produced. Since the primary data for manufacturing was only available on a facility level, the environmental load among the products produced is allocated according to its mass. For waste that is recycled, the ‘recycled content approach’ was chosen. The recycling of waste generated by the product system is cut off.

3.9 Comparability

This LCA was created using industry average data for upstream materials. Data variation can result from differences in supplier locations, manufacturing processes, manufacturing efficiency and fuel types used.

4. LCA Results

Life cycle impact assessment (LCIA) is the phase in which the set of results of the inventory analysis – the inventory flow table – is further processed and interpreted in terms of environmental impacts and resource use inventory metrics. Table 4 and 5 below summarizes the LCA results for the cradle-to-gate (A1-A3) product system.

Table 4: Description of the System Boundary (x: included in LCA; mnd: module not declared; mnr: module not declared)

Product			Construction Installation		Use							End-of-life				Benefits Beyond the System Boundary		
			Transport	Construction / Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	De-Construction/ Demolition	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling
Raw Material supply	Transport	Manufacturing	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	D	D
x	x	x	mnd	mnd	mnd	mnd	mnr	mnr	mnr	mnd	mnd	mnd	mnd	mnd	mnd	mnd	mnd	mnd

Table 5. Life Cycle Impact Assessment Results for 1kg MCFR Profile						
Environmental Indicator	Abbrev.	Units	Total	A1	A2	A3
Core Mandatory Impact Indicator						
Global warming potential	GWP	kg CO2-eq	2.00E+00	1.89E+00	5.66E-02	5.55E-02
Depletion potential of the stratospheric ozone layer	ODP	kg CFC-11-eq	1.28E-07	1.11E-07	1.34E-08	3.46E-09
Acidification potential of land and water	AP	kg SO2-eq	1.25E-02	1.19E-02	3.42E-04	2.63E-04
Eutrophication potential	EP	kg PO4-eq	6.43E-03	6.25E-03	6.78E-05	1.07E-04
Formation of tropospheric ozone	SFP	Kg O3-eq	1.84E-01	1.71E-01	8.79E-03	3.80E-03
Abiotic Depletion Potential for Fossil Resources	ADPF	MJ Surplus	2.35E+01	2.14E+01	8.40E-01	1.30E+00
Fossil Fuel Depletion	FFD	MJ Surplus	2.60E+00	2.31E+00	1.21E-01	1.73E-01
Use of Primary Resources						
Renewable primary energy carrier used as energy	RPRE	MJ	3.12E+00	1.64E+00	1.11E-02	1.47E+00
Renewable primary energy carrier used as material	RPRM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Non-renewable primary energy used as energy	NRPRE	MJ	2.72E+01	2.48E+01	9.07E-01	1.50E+00
Non-renewable primary energy used as material	NRPRM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Secondary Material, Secondary Fuel and Recovered Energy						
Use of secondary materials	SM	kg	8.00E-01	8.00E-01	0.00E+00	0.00E+00
Use of renewable secondary fuels	RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	NRSF	MJ	2.73E+00	0.00E+00	0.00E+00	2.73E+00
Recovered energy	RE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Mandatory Inventory Parameters						
Use of freshwater resources	FW	m3	2.13E-02	2.09E-02	1.45E-04	2.78E-04
Indicators Describing Waste						
Disposed of hazardous waste	HWD	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Disposed of non-hazardous waste	NHWD	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Disposed of high level radioactive waste	HLRW	m3	1.29E-09	1.23E-09	9.83E-12	4.91E-11
Disposed of low level radioactive waste	LLRW	m3	1.36E-08	1.09E-08	2.27E-09	4.43E-10
Components for reuse	CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	MFR	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported electrical energy (waste to energy)	EEE	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported thermal energy (waste to energy)	ETE	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00

5. Interpretation

Figure 1 shows the relative contribution to the cumulative impacts of the A1 through A3 phases of the cradle-to-gate life cycle. For MCFR Profiles, the raw material supply (A1) is the major contributor to the overall impact across the selected impact categories. This is since A1 incorporates all the upstream extraction and production of the chemical inputs. Transportation (A2) impacts are small in all declared product profiles (1.06 - 10.51%) The manufacturing (A3) is also small for most impact categories (1.67 – 5.54%).

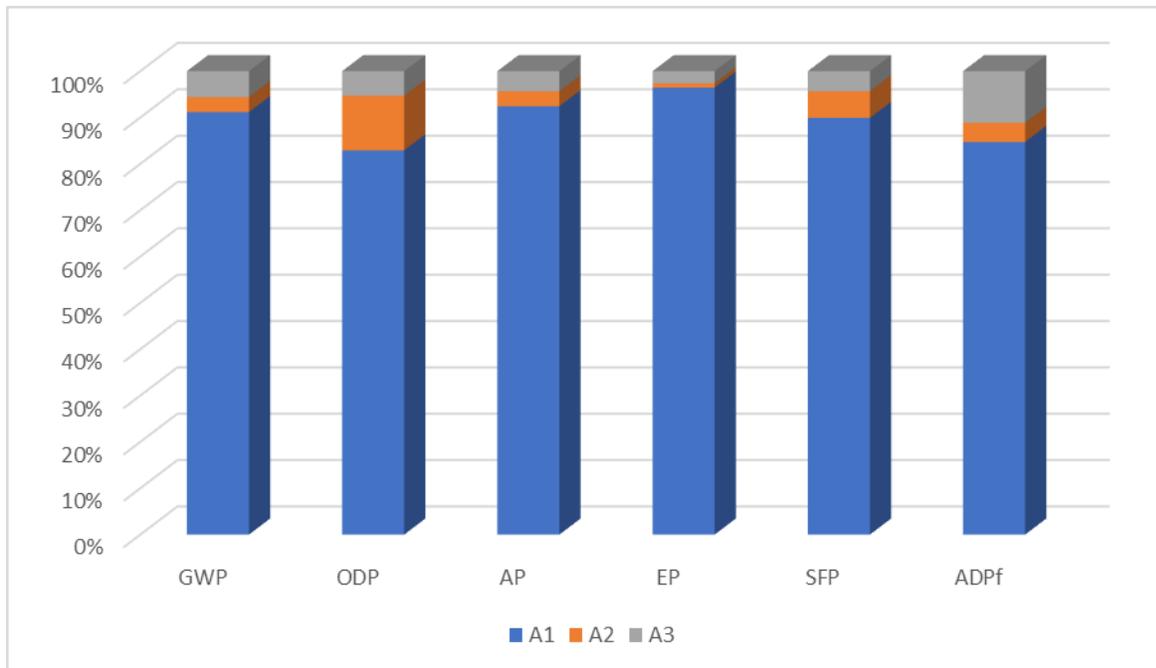


Figure 1. Contribution analysis for MCFR Profiles

6. References

1. Athena Institute: 2020 - A Cradle-to-Gate Life Cycle Assessment of MCFR Products Manufactured by RENCO
2. ISO 21930: 2017 Building construction – Sustainability in building construction – Environmental declaration of building products.
3. ISO 14025: 2006 Environmental labeling and declarations - Type III environmental declarations - Principles and procedures.
4. ISO 14044:2006/AMD 1:2017/ AMD 2:2020 - Environmental management - Life cycle assessment - Requirements and guidelines.
5. 14040:2006/AMD 1:2020 - Environmental management - Life cycle assessment - Principles and framework.