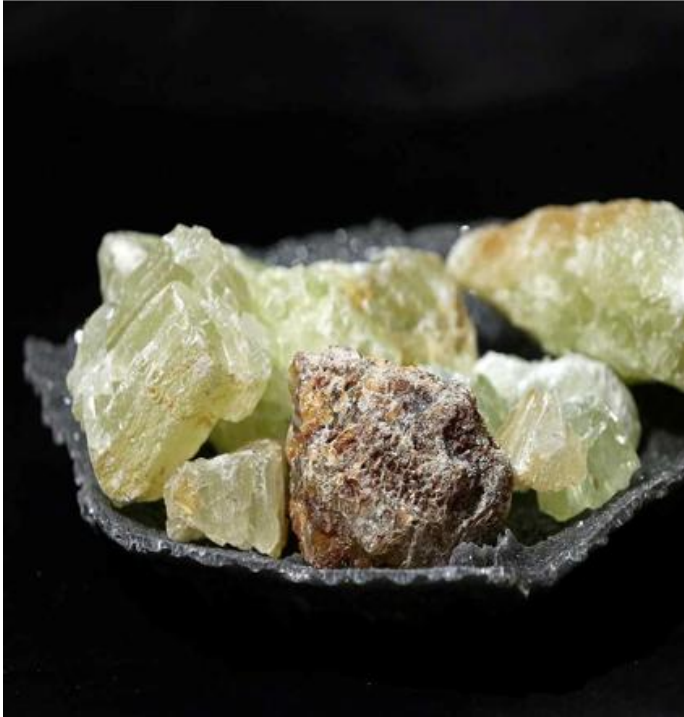


ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021



Programme
The International EPD

Licensee
EPD Türkiye

EPD Registration
number
EPD-IES-0016637

Version Date
2025-01-10

Validity Date
2030-01-09

Geographical Scope
Türkiye

An EPD maybe updated or depublished if conditions change. To find the latest version of the EPD and to confirm its validity, see www.environdec.com.

Programme Information

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www.epdturkey.org
info@epdturkey.org

Accountabilities for PCR, LCA and independent, third-party verification
Product Category Rules (PCR)
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): PCR 2019:14 Construction Product 1.3.4, Valid until: 2025 – 06- 20 UN CPC Code: 153 Sands, pebbles, gravel, broken or crushed stone, natural bitumen and asphalt
Life Cycle Assessment (LCA)
LCA accountability: Greenlife Danışmanlık Müh. Eğt. Ve Tas. Hiz. Tic. Ltd. Şti.
Third-party verification
External and independent ('third-party') verification of the declaration and data, according to ISO 14025:2006, via:
<input checked="" type="checkbox"/> EPD verification through an individual EPD verification Third-party verifier: Hudai Kara PhD, Metsims Sustainability Consulting, Oxford, U.K.
Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier:
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

About KÜMAŞ

KÜMAŞ Magnesite Inc.

KÜMAŞ Magnesite Inc., founded in 1972, specializes in producing sintered magnesite, basic refractory bricks, and mortar using natural magnesite ore from the Kütahya-Eskişehir-Bilecik region. The company began producing sintered magnesite in 1976 and became an integrated organization with the addition of a brick factory in 1990. In 2008, they expanded to producing fused magnesite.

Today, KÜMAŞ provides sintered magnesite, fused magnesite, fused oxychrome, and calcined magnesite derivatives as industrial raw materials. Additionally, it manufactures magnesite, dolomite, and alumina-based refractory bricks and mortars at its integrated brick and mortar plants. Located on the Kütahya Province, Eskişehir Road 9th Km, KÜMAŞ operates over a total area of 695,270 m², with 68,561 m² dedicated to closed facilities. Their product range includes "Sintered Magnesite, Calcined Magnesite, Fused Magnesite, Kures Powder, and Refractory Bricks and Mortar."



KÜMAŞ Magnesite Inc. Production site

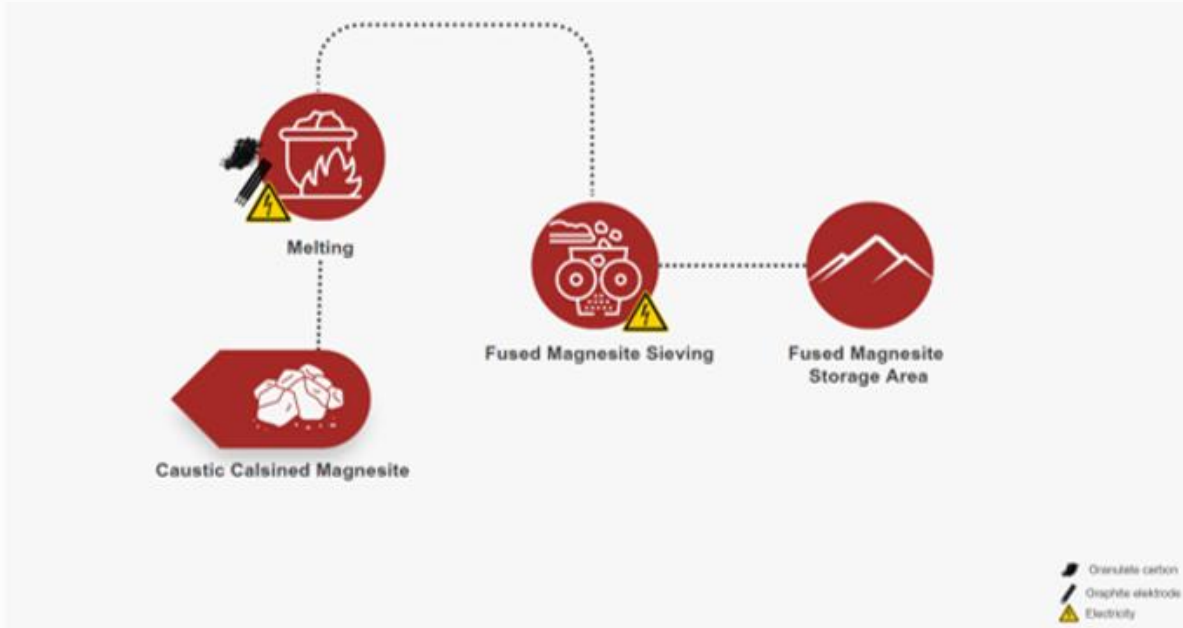
Owner of EPD: KÜMAŞ Magnesite Inc.

Adress of production site: Eskişehir Karayolu 9 km. Merkez, Kütahya/ Türkiye

Product Information

Fused Magnesite Manufacturing

The production flow chart of fused magnesite is shown below.



Production flow chart of fused magnesite

The ore processed in the Ore Enrichment section is transported to silos via conveyor belts and then fed into rotary furnace. In the furnace, depending on production parameters, the ore remains for 8-11 hours, turning into sinter before being transferred to rotary coolers. The sinter from the cooler undergoes screening at two screening plants to separate dust and large particles. Samples taken during screening are subjected to laboratory analysis and allocated to appropriate sections based on material properties. Products from the sinter storage are packaged and sold in various forms. While products from Kures are packaged and sold, kures dust is sent to the briquetting plant and then forwarded to melting.

Fused magnesite is obtained by melting previously calcined raw ore at a temperature of 3000°C. Material in the Smelting Plant is melted to achieve the fused. After the crucible is opened, the material, which has been reduced in size in crushers, goes through sorting and screening processes to become a final product. The fused magnesite is sent to the Refractory and Mortar Production Department for refractory production.

Product Information

Fused Magnesite

Fused Magnesite is obtained by melting the previously calcined raw ore at 3000°C with a second heat treatment. KÜMAŞ uses the double-step method to produce high purity and high density fused magnesite from caustic calcined magnesite (CCM), a form of magnesium oxide derived from the caustic calcined magnesite.

Thanks to the impurity and high crystal diameter widths provided by the double step application, the products are widely used in all industrial applications requiring high refractoriness.



Physical Properties	%of mass per declared functional unit	
Crystal Size	700 µm	
Bulk Density (4-8 mesh)	3.47 g/cm ³	ASTM C357 – 07
Grain Size	5 -40 mm	ISO 2591 - 1

Content Declaration

Product Content	Mass, kg	Post-consumer recycled material, mass-% of product	Biogenic material, mass-% of product	Biogenic material, kg C/product
MgO	950-990	0.00	0.00	0.00
Cement	10-50	0.00	0.00	0.00
Total	1000	0.00	0.00	0.00

Due to confidentiality, only a range is provided.

Packaging materials	Mass, kg	Mass-% (versus the product)	Biogenic material, kg C/product
Big Bag	0.10	0.01	0.00
Total	0.10	0.01	0.00

No substances that are listed in the “Candidate List of Substances of very high concern for authorization” are contained in the declared unit.

LCA Information

Declared unit: 1 tonne of Fused Magnesite

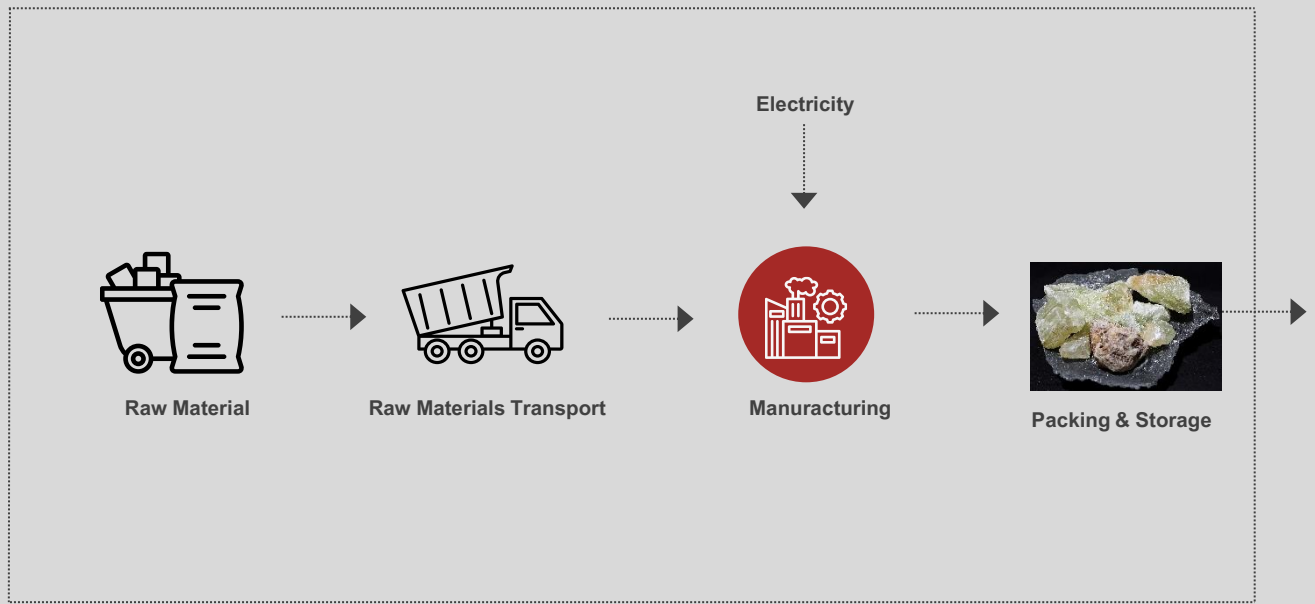
Conversion factor: 1

Reference service life: NA

Database(s) and LCA software used: Ecoinvent 3.9.1 SimaPro 9.5.0.2.

Characterization factors used: EN 15804 method based on EF 3.1 normalization and weight values, published in July 2022, were used.

System Boundary



Cut-Off Criteria

The system boundaries of the fused magnesite product of Kümaş Magnesite Inc. prepared according to EN 15804 standard are from cradle to gate, starting from the extraction of raw materials from the mine, all raw materials, transportation of raw materials, production processes and packaging used at the end of production.

LCA Information

	Product Stage			Construction Process Stage		Use Stage							End of life Stage				Resource Recovery Stage
	Raw Material	Raw Material Transport	Manufacturing	Transport to Plant	Construction / Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	Deconstruction / Demolition	Transport to Disposal Site	Waste Processing	Disposal	Future reuse, recycling or energy recovery potential
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Module Declared	X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Geography	GLO	GLO	TR	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Share of specific data	85%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation-products	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation-sites	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-

X = Included in LCA, MND = Module Not Declared

LCA Information

A1 Raw Material Supply

Dead burnt magnesite and caustic calcined cagnasite which are the main raw materials of fused magnesite in raw material supply, are produced by Kümaş Magnesite. Other cement products and packaging products are purchased. All products are included in the life cycle analysis.

A2 Raw Material Transport

The transport of raw materials and packaging used was calculated as the weighted average of the purchase data. The purchased products were transported by road and sea. For road transport, >32 metric ton EURO 6 lorry data was used and for sea transport, container ship data was used.

A3 Manufacturing

Annual weighted average method was used to calculate the amount of energy consumed in production. Electricity is used in the production of the product. Electricity is taken from the electricity grid of the production site of Türkiye. Pallets and plastic bags used for transport in production are also included in the system.

Electricity data used in LCA model

Electricity Data: Residual mix is calculated from «Electricity, medium voltage {TR}| market for electricity, medium voltage | Cut-off, S» by excluding renewable energy generation. The composition of the residual mix was then 62.7% coal, 36.6% natural gas, and 0.7% oil. GWP-GHG value of the used electricity data is 0.79 kg CO₂/kWh.

LCA RESULTS

Mandatory impact category indicators according to EN 15804+A2

Environmental Impacts for 1 tonne of Fused Magnesite		
Indicator	Unit	A1 – A3
GWP - Total	kg CO2 eq.	5.28E+03
GWP - Fossil	kg CO2 eq.	5.25E+03
GWP - Biogenic	kg CO2 eq.	0.00E+00
GWP - luluc	kg CO2 eq.	2.92E+01
ODP	kg CFC11 eq	3.40E-05
AP	mol H+ eq	2.30E+01
EP-freshwater	kg P eq	3.02E+00
EP-marine	kg N eq	4.16E+00
EP-terrestrial	mol N eq	3.96E+01
POCP	kg NMVOC eq	1.23E+01
ADP minerals&metals*	kg Sb eq	5.35E-03
ADP fossil*	MJ	6.83E+04
WDP	m3 depriv.	1.42E+03

GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; 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

LCA RESULTS

Additional mandatory and voluntary impact category indicators

Environmental Impacts for 1 tonne of Fused Magnesite		
Indicator	Unit	A1 – A3
GWP-GHG ¹	kg CO2 eq	5.29E+03

Resource use indicators

Environmental Impacts for 1 tonne of Fused Magnesite		
Indicator	Unit	A1 – A3
PERE	MJ	1.34E+03
PERM	MJ	0.00E+00
PERT	MJ	1.34E+03
PENRE	MJ	6.83E+04
PENRM	MJ	4.10E+00
PENRT	MJ	6.83E+04
SM	kg	3.00E-02
RSF	MJ	0.00E+00
NRSF	MJ	0.00E+00
FW	m ³	1.48E+02

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 re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

1 This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO2 is set to zero.

LCA RESULTS

Waste indicators

Indicator	Unit	A1 - A3
Hazardous waste disposed	kg	1.82E+01
Non-hazardous waste disposed	kg	1.87E+02
Radioactive waste disposed	kg	0.00E+00

Output flow indicators

Indicator	Unit	A1 - A3
Components for re-use	kg	0.00E+00
Material for recycling	kg	0.00E+00
Materials for energy	kg	0.00E+00
Exported energy, electricity	MJ	0.00E+00
Exported energy, thermal	MJ	0.00E+00

REFERENCES

GPI / General Programme Instructions of the International EPD® System. Version 4.0.

EN ISO 14001/ Environmental Management Systems - Requirements

ISO 14020: 2000 / Environmental Labels and Declarations - General principles

EN 15804:2012+A2:2019 / AC: 2021 Sustainability of construction works - Environmental Product Declarations - Core rules for the product category of construction products

ISO 14025 / DIN EN ISO 14025:2009-11: Environmental labels and declarations - Type III environmental declarations — Principles and procedures

ISO 14040/44 / DIN EN ISO 14040: 2006-10, Environmental management - Life cycle assessment - Principles and framework (ISO14040:2006) and Requirements and guidelines (ISO 14044:2006)

PCR for Construction Products The International EPD System, 2019:14 Version 1.3.4.

The International EPD® System / The International EPD® System is a programme for type III environmental declarations, maintaining a system to verify and register EPD®s as well as keeping a library of EPD®s and PCRs in accordance with ISO 14025. www.environdec.com

Ecoinvent / Ecoinvent Centre, www.ecoinvent.org

SimaPro / SimaPro LCA Software, Pré Consultants, the Netherlands, www.pre-sustainability.com

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Program Operator



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