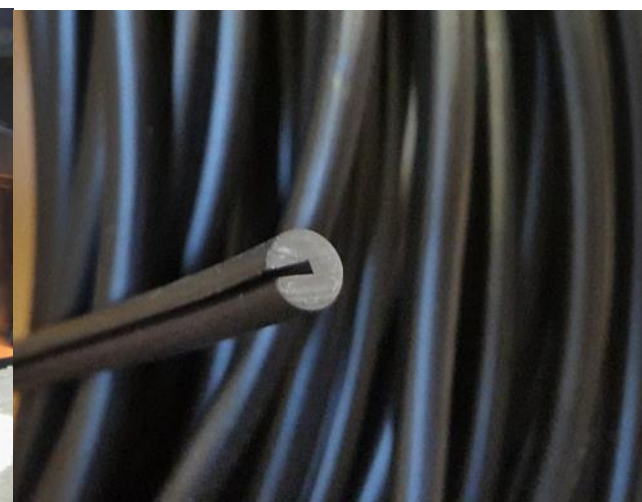


MAGFORUM 2018

Magnesium Minerals & Markets Conference

Grand Elysée Hotel, Hamburg — 17-19 June 2018





Welcome to Hamburg



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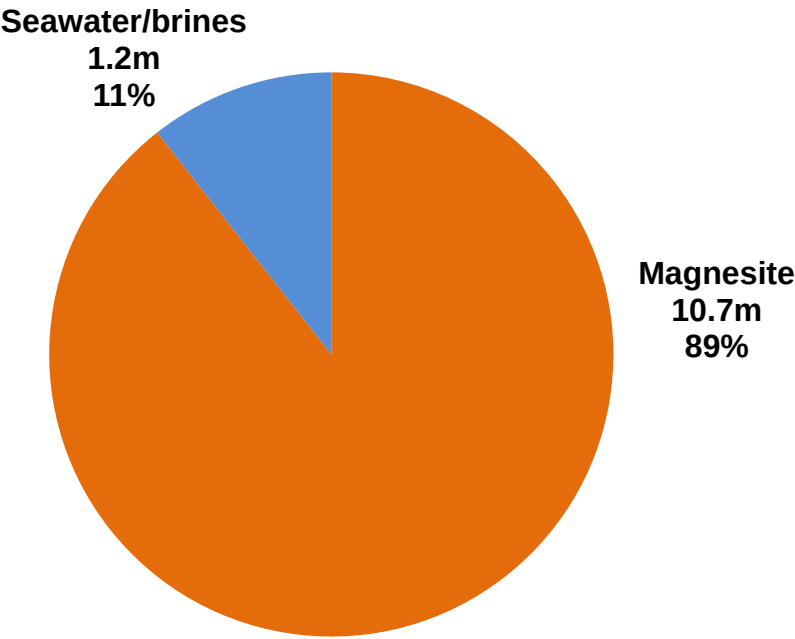
Roskill

The world of magnesia A world of diversity



Magnesia market highlights

World magnesia production capacity
11.9m tonnes MgO equivalent



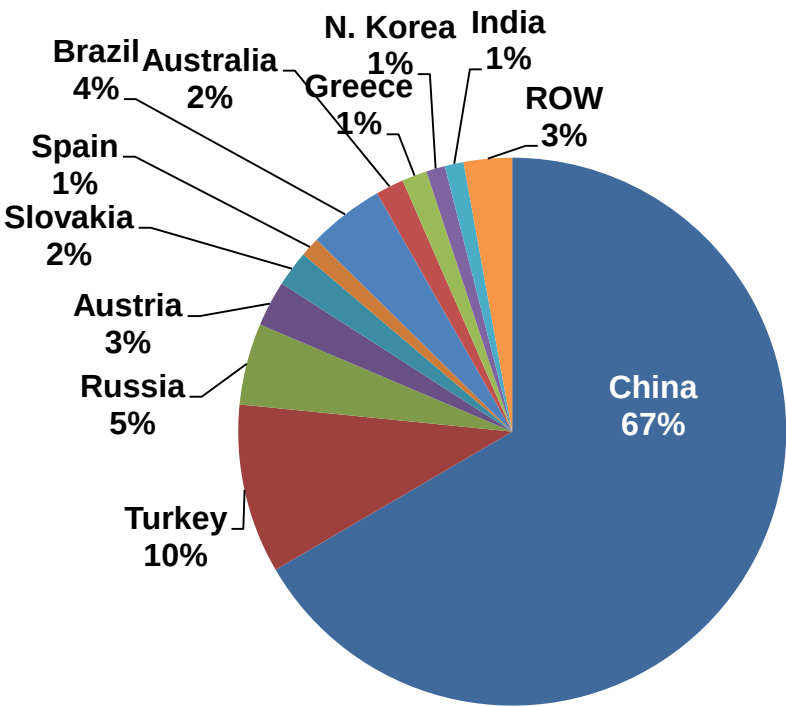
Source: USGS

Other natural MgO minerals

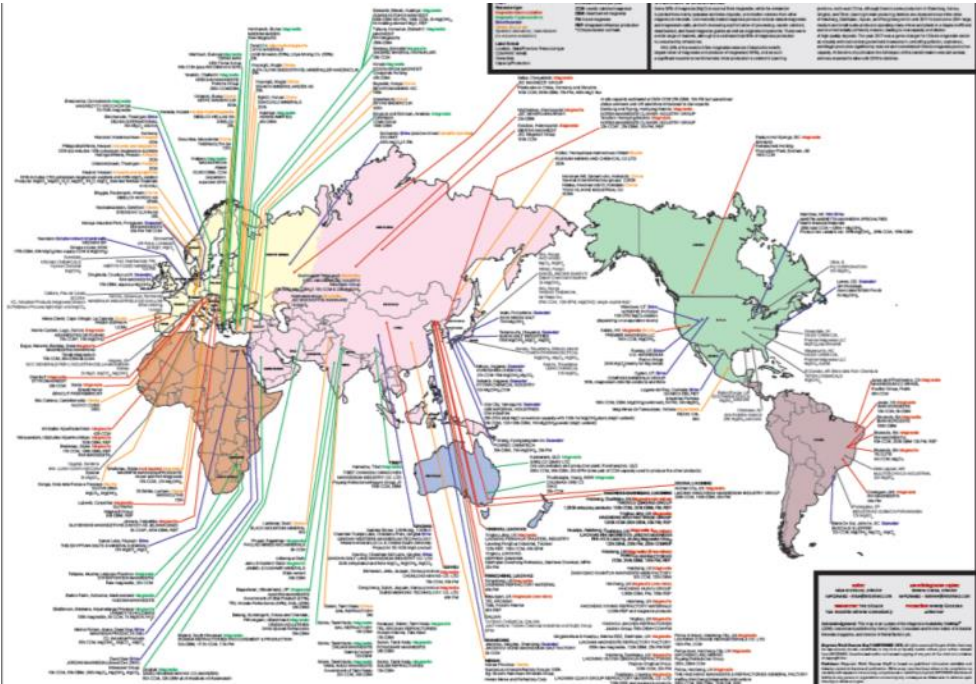
Bischofite	$MgCl_2 \cdot 6H_2O$
Carnallite	$KMgCl_3 \cdot 6H_2O$
<u>Kieserite</u>	$MgSO_4 \cdot H_2O$
<u>Dolomite</u>	$CaCO_3 \cdot MgCO_3$
<u>Brucite</u>	$Mg(OH)_2$
Huntite	$Mg_3Ca(CO_3)_4$
Hydromagnesite	$Mg_4(OH)_2(CO_3)_4 \cdot 4H_2O$
<u>Serpentinite</u>	$(Mg,Fe)_3Si_2O_5(OH)_4$
Olivine	Mg_2SiO_4
Dunite	>90% olivine
Nesquehonite	$MgCO_3 \cdot 3H_2O$
Periclase	MgO

Magnesia market highlights

World magnesite production
Total 27m tonnes

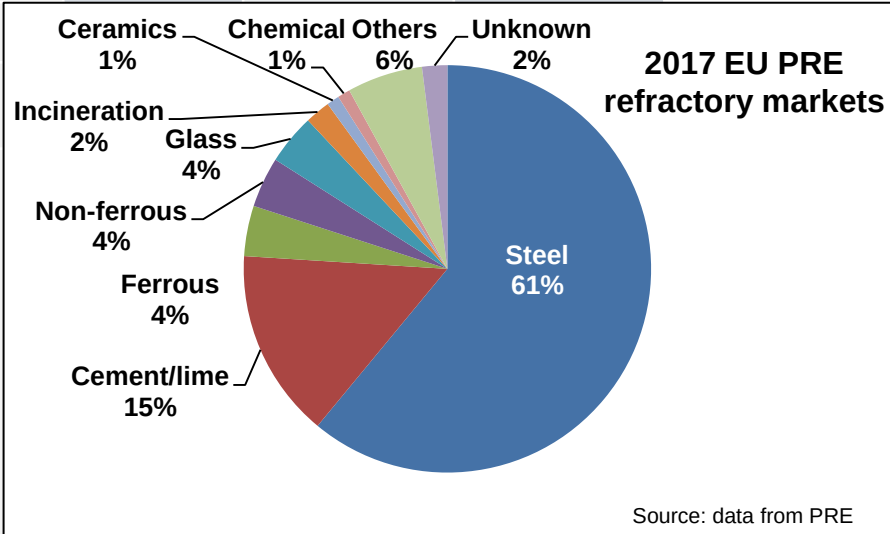
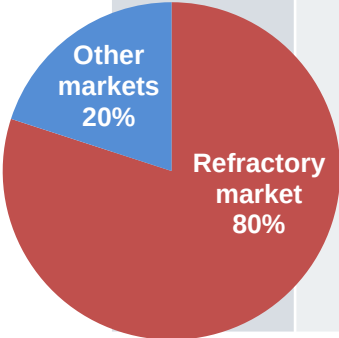


Source: data from USGS 2017



Magnesia market highlights

MAGNESIA MARKET APPLICATIONS SUMMARY						
Decreasing reactivity, increasing heat treatment, refractoriness, & price/tonne						
RAW MAGNESITE	700-1500°C			1500-2300°C	2800-3000°C	
	CAUSTIC CALCINED MAGNESIA			DEAD BURNED MAGNESIA	FUSED MAGNESIA	
	Synthetic CCM	Natural CCM		Refractory grade 93,95,97% MgO	Refractory grade 97%+ MgO	Electrical grade 97.0%+ MgO
Mg metal	HP FM electrical grade	Feedstock	DBM, FM	Refractories	Transformer steel	Cable insulation
Fertiliser	Mg metal	Magnesia cements	Insulation boards	bricks	coatings	Electrical elements
Glass	Mg chemicals		Sorel cement	gunning	Refractory bricks	UV sensors
Ceramics	Pharmaceuticals		Adhesives	mixes		Hi-tech ceramics
Rubber	Ceramics		Concrete/cement	castables		
Insulation	UHP MgO		Coatings	Welding		
Paper		Agriculture	Paints			
Plastics			Abrasive wheels			
Pigment		Environmental	Animal feed			
Surface coating			Fertiliser			
explosives			Water/waste			
Pesticide			FGD			
carrier			CCS			
Landscaping						
		Ceramics				
		Metallurgical flux				
		Plastic filler				
		Pesticide carrier				
		Designer ceramics				
		Foundry sand				
		Coatings				
		Absorbent				
		Dessicant				
		Flame retardant				
		Lubricant additive				
		Fuel additive				
		Slag conditioner				
		Hydrometallurgy				



Source: data from PRE

Magnesia market highlights

Key talking points

- China – supply shortages, rising prices, reforms, what's next?
- M&A
 - RHI Magnesita – restarting Normag
 - TIMAB acquires rest of Magna
 - Afarak acquires Magnohrom
 - Kumas for sale
- Potential new sources – Serbia, Greece, Turkey, Australia, Jordan, Pakistan
- Diversification into non-refractory markets



Programme – Monday Morning

INTRODUCTION & WELCOME ADDRESS

08.30 **Introduction**

Ismene Clarke, Director, INFORMED, UK

08.40 **Welcome Address**

Knut Breede, Managing Partner, Lehmann&Voss&Co., Germany

OVERVIEW & KENOTE PANEL DISCUSSION

08.50 **Magnesia Market Overview**

Moderator

Mike O'Driscoll, Director, INFORMED, UK

Panellists

- **Ted Dickson**, Consultant, TAK Industrial Mineral Consultancy, UK
- **Rainer Gaebel**, Managing Director, Refratechnik Holding GmbH, Germany
- **Rajah Jayendran**, Snr VP, Head of Operations Europe 2, RHI Magnesita, Austria
- **Jürgen Mannshardt**, Director Business Unit Magnesia, Lehmann&Voss&Co.KG
- **Michael Tsoukatos**, Business Dev Manager Grecian Magnesite SA, Greece

10.00 COFFEE



Status & outlook for the magnesia market

Moderator

Mike O'Driscoll

Director, INFORMED, UK

Panellists

Ted Dickson, Consultant, TAK Industrial Mineral Consultancy, UK

Rainer Gaebel, Managing Director, Refratechnik Holding GmbH, Germany

Rajah Jayendran, Snr VP, Head of Operations Europe 2, RHI Magnesita, Austria

Jürgen Mannshardt, Director Business Unit Magnesia, Lehmann&Voss&Co.KG

Michael Tsoukatos, Business Development Director, Grecian Magnesite SA, Greece



**Questions & comments welcome
from the audience**

Please state your name & affiliation

Programme – Monday Morning

KEYNOTES

- 11.00 **RHI Magnesita: 9 months after the merger**
Thomas Frömmer, Vice President Mining, Head of Raw Material Support, RHI Magnesita, Austria
- 11.30 **China: its role and influence on the magnesia market**
Alison Saxby, Director, Roskill Information Services Ltd, & Ted Dickson, TAK Industrial Minerals Consultancy, UK
- 12.00 **Magnesite beyond China: potential alternative sources**
Dr Ian Wilson, Consultant, UK

12.30 LUNCH

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Programme – Monday Afternoon

14.00 ROUNDTABLE NETWORKING SESSION

in the Spiegelsaal and the Bibliothek

Take your after-lunch coffee in a relaxed, informal networking and discussion session, share and gain insightful knowledge among your peers.

Hosted roundtables with themes

Please book your place at a table at the Registration Desk before 14.00.

Table No.	Theme	Host
1	China: influence on supply	Robin Steger, Managing Partner, & Andre Vollers, Marketing Manager, Minerals GmbH & Co., Germany
2	New/Alternative sources & projects	Dr Ian Wilson, Consultant
3	Processing I Calcination	Dr Christoph Beyer, VP Pyroprocessing Minerals, TK Industrial Solutions
4	Logistics	Robert van Muiden, OBA BulkTerminal
5	Refractory markets	Ted Dickson, Consultant
6	Speciality markets	Samantha Wietlisbach, Principal Analyst Chemicals, IHSMarkit
7	R&D/new product developments	Michael Tsoukatos, Grecian Magnesite



Programme – Monday Afternoon

SUPPLY | RESOURCES

- 15.30 **New magnesite resources in Iran**
Dr Ali Reza Ganji, Industrial Minerals Specialist, Iran
- 16.00 **MENA magnesite and dolomite developments**
Nicholas Gangutia, Ganmag Magnesite Solutions, Spain
- 16.30 **Russian brucite mining, processing, and market applications**
Henk Don, Managing Director, Europiren BV, the Netherlands
- 17.00 **A sea change & new challenges in magnesia**
Kenji Fujimoto, General Manager, Magnesia Division, Ube Material Industries Ltd, Japan

17.30 CLOSE OF DAY 1

19.00 RECEPTION at
Au Quai Restaurant
on the Elbe *sponsored by*

Lehmann & Voss & Co.



Bus departures from hotel to Reception

18.00 | 18.15

Bus departures from Reception to hotel

22.00 | 23.00 | 01.00

Chair



Gerry Clarke
Consultant

- Mine Geologist, graduated from University of Wales (Cardiff), Applied Mineralogist
- Lecturer in Economic Geology at Plymouth University
- Editor of *Industrial Minerals* magazine
- Executive Director of Metal Bulletin Plc
- Member of the Institute of Materials, Minerals and Mining
- Chartered Engineer.



Programme – Tuesday Morning

MARKETS

- 08.30 **High quality sintered magnesia and doloma for refractories**
Asim Bilge, Sales Specialist, Kümaş Refractories, Turkey
- 09.00 **Magnesium salts and markets outlook**
Johannes Bode, Head of Marketing & Product Management, K+S, Germany
- 09.30 **High value magnesia markets**
Samantha Wietlisbach, Principal Analyst Chemicals, IHSMarkit, Switzerland
- 10.00 **Magnesia additives used in mineral processing**
Steven Green, General Manager: Sales and Business Development, Protea Mining Chemicals, South Africa

10.30 COFFEE

Chair



Ted Dickson
Consultant

- BSc Geology from Edinburgh University; MSc Mineral Exploration from the Royal School of Mines, London
- American Editor of *Industrial Minerals* magazine
- Consultant >23 years specialising in market intelligence for the industrial minerals



Programme – Tuesday Morning

PROCESSING DEVELOPMENTS

- 11.00 **Serpentine: today's by-product, tomorrow's raw material source**
Beyhan Ozdemir, Managing Director, Mavi Prizma, Turkey
- 11.30 **Can dry sensor sorting substitute DMS in raw magnesite beneficiation? Technical approach and field experiences**
Jens-Michael Bergmann, Sales Manager Europe/MENA/India, Tomra Sorting Solutions, Germany
- 12.00 **Mineral processing technology for magnesia & dolomite: screening, washing pelletising, & recycling**
Jan Lampke, Senior Process Engineer – Mineral Processing, Haver Engineering GmbH, Germany

12.30 LUNCH & CLOSE OF CONFERENCE



Programme – Tuesday Afternoon

CARGO | TRANS | POOL



FIELD TRIP A

Tuesday PM 19 June

Container Port Hamburg | CTP

- 14.00 Bus departs hotel for Port of Hamburg tour
- 17.00 Arrival at CTP, Rellingen, presentation & tour
- 18.00 Refreshments and cocktails on roof terrace
- 20.00 Bus departs for Grand Elysee Hotel
- 20.30 Arrive Grand Elysee Hotel



Programme – Wednesday Morning



FIELD TRIP B

Wednesday AM 20 June

Kalikai Hamburg | K+S

- 07.45 Meet in hotel lobby
- 08.00 Depart by bus to the Landungsbrücken
- 08.30 Depart by barge from Landungsbrücken
- 10:00 Arrive Kali-Kai for presentation & tour
- 12.30 Lunch
- 14.00 Depart for Grand Elysee Hotel
- 14.30 Arrive Grand Elysee Hotel





Arciresa	Almatis	MagMacom	Refratechnik Ceramics GmbH
Asian Metal	AMI Trading	Magnesia GmbH	Refratechnik Holding GmbH
Baymag Inc	HarbisonWalker International	Magnesitas de Rubian S.A	RHI Magnesita
BSR Van Uden Stevedoring B.V.	Haver & Boecker	Magnesitas Navarras	Russian Mining Chemical Company
Buderus Edelstahl GmbH	HD Minerals SA	Magnesium do Brasil	Sibelco
Capital Refractories	Hebei Meishen Technology Co Ltd	Magnifin Magnesiaprodukte GmbH	SIM GmbH
Carl Spaeter GmbH	Horn & Co Group	Magus Marketing Pvt. Ltd	Sino Minmetals Co. Ltd
Clariant Produkte (Deutschland)	Huber Engineered Materials	Manaseer Trade	SMZ Jelsava
CMI Environment Minerals	I.H.S Markit	Martin Marietta Magnesia	Sojitz Corporation of the Americas
CMI Industry Metals	IBAR Nordeste Ltda	Specialties	Southern Minerals International
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Compound Resources PTY Ltd	Imperial Logistics	Consulting Mayerton Refractories	TAK Industrial Minerals
Consultant	Interminex Handelsges GmbH	Midegasa	Consultancy
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Demireller Mining A.S.	K+S Asia Pacific Pte.Ltd	Mineralmahlwerk Hamm GmbH	Thermolith SA
ECO2 Magnesia	K+S Kali GmbH	Mineralmahlwerk Westerwald Horn	Thyssenkrupp Industrial Solutions
EcoMagnesium Ltd	Kisuma Chemicals BV	Minerals GmbH & Co. GmbH	Thyssenkrupp Materials Trading
Emsa Teconologia Quimica	Komateq A.S	MIRTEC	TiFoR
Euronordic Logistics	Kon Chemical Solutions	Mogensen GmbH & Co. KG	Timab Magnesium
Europiren BV	Korab Resources Ltd	Nedmag B.V	Tomra Sorting GmbH
Feed Products & Service	Kümas Refractories	Normag GmbH	Trasteel Holding
Company	Kürzeder & März Bleichhilfsmittel	OBA Bulk Terminal Amsterdam	Trasteel International
Ferro Duo GmbH	Lazard SPRL	Orind Special Refractories Pvt.Ltd	Traxys Comets Europe
Ganmag Magnesite Solutions	LBH Netherlands B.V	Outokumpu Group	Turkmag Mining
Garrison Minerals	Lehmann&Voss&CO. KG	PK Rohstoffe GmbH	Ube Material Industries Ltd
German Mineral Resource	Lehvoss (Shanghai) Chemical	Possehl Erzkontor GmbH & Co KG	UBE Shipping & Logistics Ltd
Agency	LEHVOSS Nederland B.V	Premier Magnesia LLC	Venator Materials UK Ltd
Grecian Magnesite SA	LEHVOSS Nederland B.V	Protea Mining Chemicals	Vesuvius GmbH
Group Magnezit	M/S Monarch International	QMAG	Weerulin GmbH
	MAF Magnesite	REF Minerals	Xilolite
		Refratechnik Cement GmbH	ZM Ropczyce SA



MagForum is an excellent networking event. It's always an opportunity to meet and talk with peers to see what's happening in the magnesia world. Excellent, varied programme, roundtable session Was an excellent initiative.

Anthony McEneaney, Project Manager, RHI Magnesita, Ireland

I just wanted to take this opportunity of congratulating you on an excellent few days. The event surpassed my expectations. The round table was a very good idea.

Phil Coates, Sales and Product Development Director, Delamin, UK

I would like to congratulate you for the superb conference. I have enjoyed the great level of valuable information shared on all technical presentations. Organisation excelled again, in a nice city, nice hotel.

Emílio Lobato, Commercial Director, IBAR Nordeste Ltda, Brazil

There was a big concentration of magnesia players. A good programme, very interesting field trips and a good round table networking session.

Maros Reken, Managing Director, Komateq AS, Slovakia

Good programme and roundtable session. Very good organisation and lots of opportunities for business to business contacts.

Paul Boudreault, Business Development, ECO2 Magnesia, Canada

Many thanks for the excellent organisation of the MagForum in Hamburg. It has been a really successful event for us, we received already a lot of positive feedback from (potential) customers and suppliers.

Lennard Spliet, Sales Manager, Lehvoss Nederland, the Netherlands

Good programme and roundtable session. Don't see how it could be improved.

Chris Wragg, Group Supply Chain Manager, Capital Refractories, UK





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MAGNESIA

WORLD SOURCES

KEY
Statistics
• 2017 production: 10.5 million tonnes
• 2017 consumption: 10.5 million tonnes
• 2017 production: 10.5 million tonnes
• 2017 consumption: 10.5 million tonnes

OVERVIEW & CHINA BRIEF
China is a major producer of magnesite, with the country accounting for nearly 50% of the world's supply. The country's production is concentrated in the provinces of Shanxi, Inner Mongolia, and Henan. China's production is expected to increase significantly in the coming years, which will have a major impact on the global market.

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MAGNESIA

WORLD SOURCES MAP

PRIMARY WORLD SOURCES AND PRODUCTION CAPACITY OF KEY MAGNESIA RAW MATERIALS

Magnesite

Brucite

Caustic Calcined Magnesia

Huntite

Dead Burned Magnesia

Dunite

Fused Magnesia

Olivine

Magnesium Hydroxide

Kieserite

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- Flint Clay
- Garnet
- Silicon Carbide
- Bauxite
- Dead Burned Magnesia
- Fused Magnesia
- Graphite
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