

MAGFORUM 2019



Magnesium Minerals & Markets Conference
Occidental Bilbao, 13-15 May 2019

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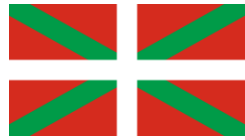


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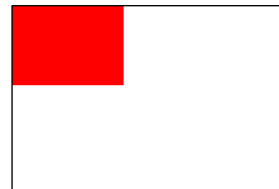




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Source



**The world of magnesia
A world of diversity**



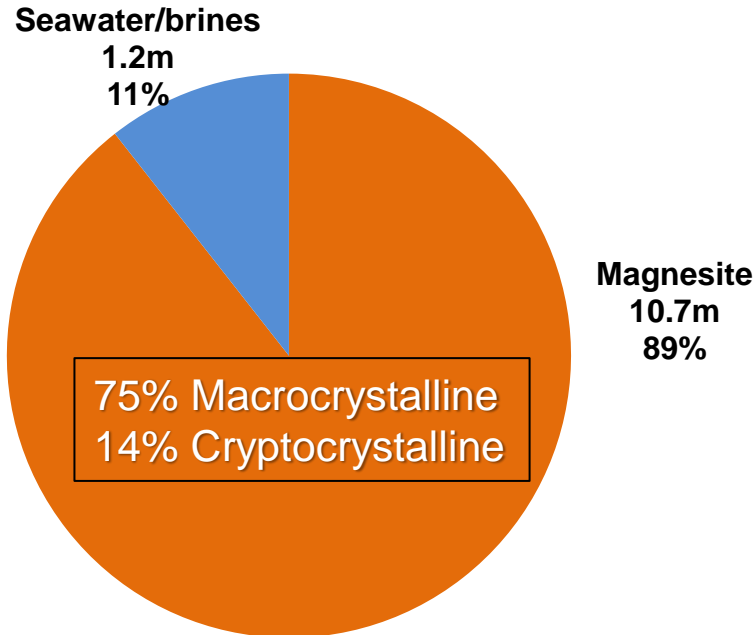
Grade

Market



Magnesia source diversity

World magnesia production capacity
11.9m tonnes MgO equivalent



Source: USGS; Ian Wilson

Magnesite $MgCO_3$

Macrocrystalline(sparry): coarse (cms; 90% world resources); carbonate rock host



Large magnesite crystals at Satka, Russia

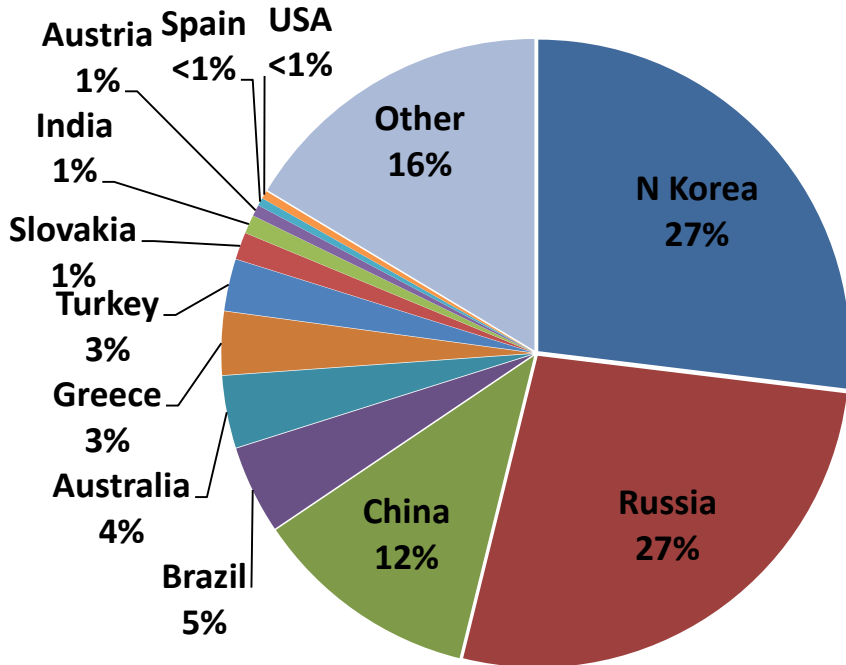
Cryptocrystalline: fine (microns; 10%); ultramafic or fresh sedimentary rock host



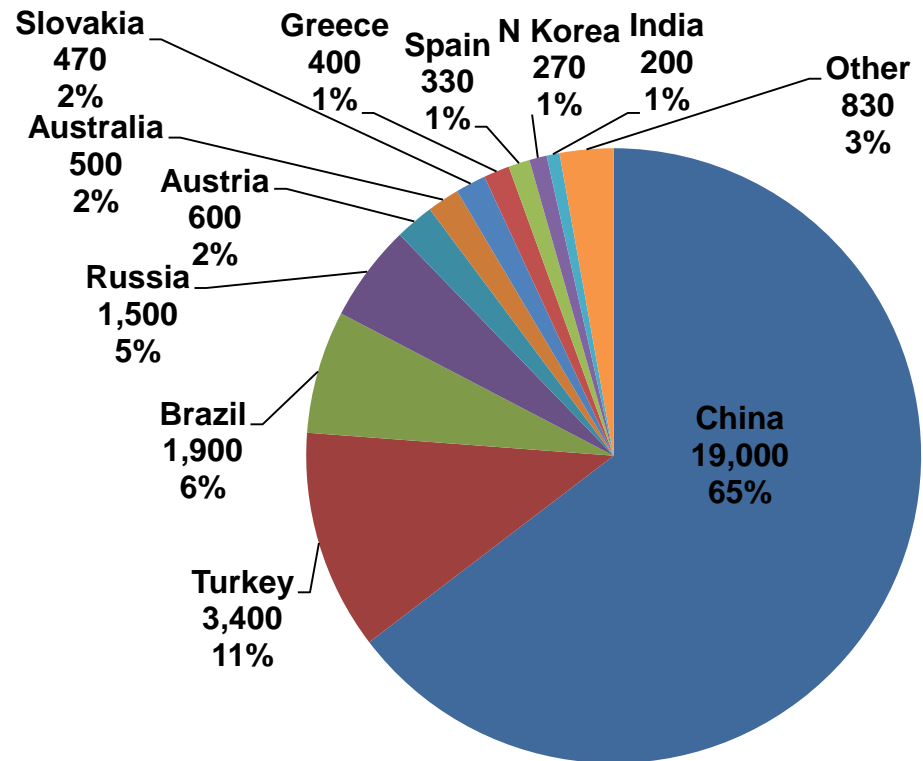
Cryptocrystalline magnesite within serpentinite stockwork, Kütahya, Turkey

Magnesia source diversity

World magnesite reserves
8.5bn. tonnes



World magnesite production
29m. tonnes



Source: data from USGS 2019



Magnesia source diversity

Other natural MgO minerals

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



Sibelco's huntite-hydromagnesite mine in Kozani, Greece



Pasek Minerale's dunite mine, La Coruña, Spain



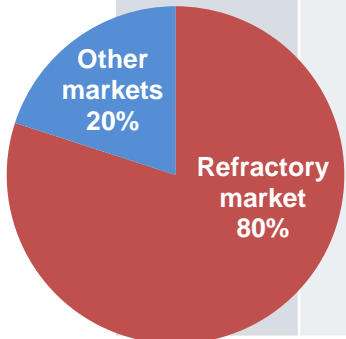
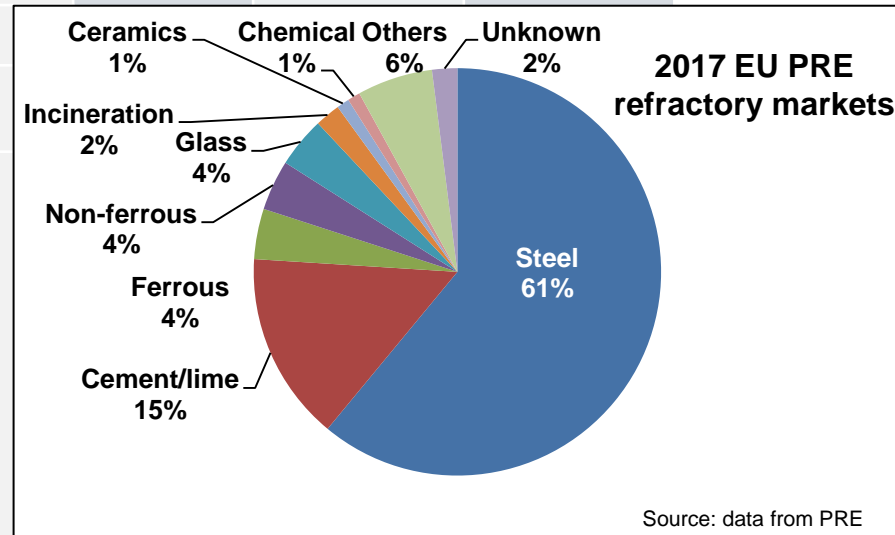
Magnesia grade diversity

		Increasing price US\$/tonne
		China FOB pricing
<p>Increasing temp.°C heat treatment</p> <p>Decreasing reactivity</p> <p>Increasing refractoriness</p> <p>Increasing energy cost</p>	<p><i>Scale of magnesia grade processing</i></p> <p>2,800-3,000°C electrofused magnesia 96-98% MgO</p>	\$600-1,000
	<p>1,500-2,300°C dead burned magnesia 90-97.5% MgO</p>	\$200-920
	<p>1,000-1,500°C hard burned caustic calcined magnesia</p>	\$150-250
	<p>700-1,050°C light burned caustic calcined magnesia</p>	



Magnesia market diversity

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



Magnesia market trends

Key developments:

- China
- Industry response
- Market
- Outlook

**For MagForum 2019 report & pictures
please go to:**

Magnesia market meets in Bilbao



Programme – Tuesday Morning

INTRODUCTION & OVERVIEWS

- 09.00 **Introduction**
Ismene Clarke, Director, & Mike O'Driscoll, IMFORMED, UK
- 09.30 **MAGNA: From the mine to the steel mill**
Javier Creixell, General Manager & Guillaume Bonnet, Sales General Manager, Magnesitas Navarras, Spain
- 10.00 **Global magnesia supply review**
Alison Saxby, Director, Roskill Holdings, UK

10.30 COFFEE

REFRACTORIES MARKET | PANEL DISCUSSION

- 11.30 **Can we survive without magnesite?**
Jose Cruz Zirion, Procurement & Logistics Director, Sidenor, Spain
- 12.00 **Overview of magnesia refractories in lime production**
Wes Gabler, Global Category Manager, Procurement, Lhoist, USA
- 12.30 **Magnesia Market Outlook**
Moderator: Mike O'Driscoll, Director, IMFORMED, UK
- Panellists:
- Gustavo Franco*, Chief Sales Officer,
RHI Magnesita, Austria
- Dr Michael Frej*, Managing Director,
Refratechnik Holding GmbH, Germany
- Alison Saxby*, Director Operations,
Roskill Information Services Ltd, UK
- Michael Tsoukatos*, Development Director,
Grecian Magnesite SA, Greece

13.00 LUNCH



Programme – Tuesday Afternoon







Roundtable Networking Session

14.30-16.30 Tuesday 14 May

Location: Arriaga 1



No.	Theme	Host
1.	China: influence on supply	<i>Alison Saxby,</i> Director, Roskill Holdings
2.	New/Alt. sources/projects	<i>Nicolás Gangutia,</i> Managing Director, Ganmag
3.	Processing	<i>Phil Hodgson,</i> CEO & Mark Sceats, Chief Scientist, Calix Ltd
4.	Refractory market	<i>Guillaume Bonnet,</i> Sales General Manager, MAGNA
5.	Speciality market	<i>Samantha Wietlisbach,</i> Principal Analyst Chemicals, I.H.S. Markit
6.	R&D/new product developments	<i>Michael Tsoukatos,</i> Development Director, Grecian Magnesite

-  Themed and Hosted Roundtables
-  Flexibility to change tables anytime
-  Take post-lunch coffee in relaxed, informal networking and discussion session
-  Share and gain insightful knowledge among your peers as well as getting to know each other

Programme – Tuesday Evening

19.00 **Evening Reception at the
Real Club Marítimo del Abra |
Real Sporting Club**
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Buses depart Occidental Hotel: 18.30, 18.40, 18.50 (duration 20mins)

Buses depart Yacht Club: 21.00, 21.30, 22.00

There is a direct Metro (Line 1) to Bilbao centre, every 7mins,
duration 35mins (map on the App)



Programme – Wednesday Morning

OUTLOOK | STRATEGY | NEW SOURCES

- 09.00 **The future of the magnesia world**
Gustavo Franco, Chief Sales Officer, RHI Magnesita, Austria
- 09.30 **Fundamentals of the magnesite business: key factors for success**
Nicolás Gangutia, Managing Director, Ganmag, Spain
- 10.00 **The EcoMag synthetic magnesia project: magnesium hydroxide, hydrotalcite, & other high purity grades**
Dr Tam Tran, Chief Technology Officer, EcoMag Ltd, Australia
- 10.30 **Development and outlook for Jordan magnesia**
Ahmad M. Samara, Sales Manager & Mohammed Al-Heyarat,
Plant Manager, Manaseer Magnesia, Jordan

11.00 COFFEE

SPAIN | CHINA

- 12.00 **Spain's magnesite resources, production and markets**
Manuel Regueiro, Chief of External Affairs & Communication,
Geological Survey of Spain
- 12.30 **Chinese magnesia supply and price trends**
Vincent Wong, Business Manager, Refractories Window, China

13.00 LUNCH



Programme – Wednesday Afternoon

CHEMICALS MARKET | PROCESSING

- 14.00 **Overview of magnesium chemicals market: review of the downstream markets for magnesium hydroxide, sulphate & chloride**
Samantha Wietlisbach, Principal Analyst Chemicals, IHS Markit, Switzerland
- 14.30 **The Calix Process: update on applications for very high surface area MgO & direct separation of process CO2 emissions**
Dr Phil Hodgson, Managing Director & CEO, & Dr Mark Sceats, Executive Director & Chief Scientist, Calix Ltd, Australia
- 15.00 **High capacity sorting of magnesite**
Jens-Michael Bergmann, Area Sales Manager Europe, MENA, India, TOMRA Sorting GmbH, Germany

15.30 CLOSE OF CONFERENCE



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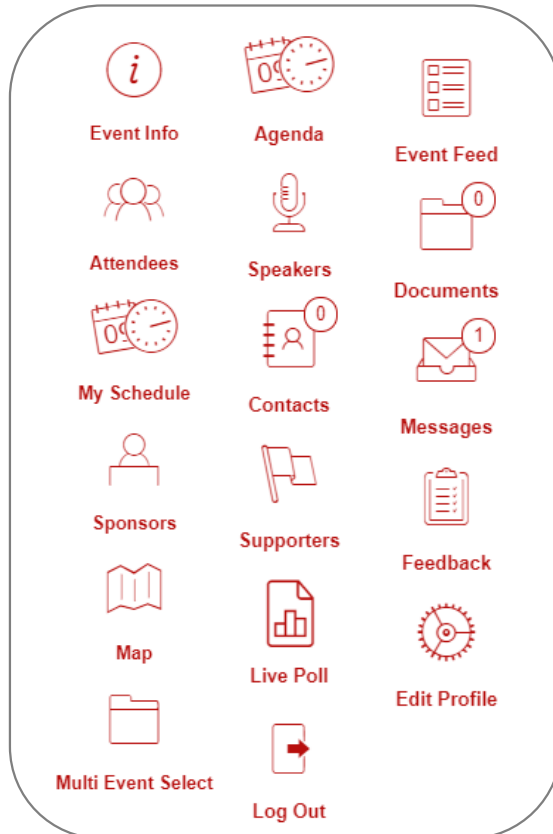


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Key features

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Arciresa	Kisuma Chemicals BV	REF Minerals
Baymag Inc	KOMATEQ A.S	Refractories Window
Bosai Europe GmbH	KON Chemical Solutions E.U	Refractarios Kelsen
Bras Del Port S.A	Kuerzeder & Maerz	Refratechnik Ceramics GmbH
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Calcinor	LEHVOSS Nederland B.V	Roskill Information Services Ltd
Calix Ltd	Lhoist USA	Rotterdam Bulk Logistics
Capital Refractories	Lincoln Electric Company	Rusal
Carl Spaeter GmbH	M.A.F Magnesite	Russian Mining Chemical Company LLC
Cermatpro Ltd	Ma'aden Industrial Minerals Company	S.I.M Sobirey GmbH
Chenming GmbH	Magnesia GmbH	Saint-Gobain Research Paris
CMI	Magnesitas de Rubian S.A	Saint-Gobain Research Provence
Cofermin Rohstoffe GmbH & Co KG	Magnesitas Navarras	Servicios Administrativos Peñoles, SA. De C.V
Cometals/Traxys	Magnezit Group Europe GmbH	Sidenor
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Duferco SA	Manaseer Magnesia	Southern Minerals Int'l Trading Ltd
ECO2 Magnesia	Mareneco Ltd	Styromagnesit Steir Magnesitind. GmbH
EcoMag Ltd	Martin Marietta Magnesia Specialties	Tanisho & Co. Ltd
Euronordic Logistics	Mayerton Refractories	Tenova Key Technologies Industriebau GmbH
Europiren B.V	Midegasa	Ternamag SA
Fanglin Minerals Ltd	Millenis	ThyssenKrupp Industrial Solutions AG
Ferro Duo GmbH	Mineralmahlwerk Hamm GmbH	ThyssenKrupp Materials Trading GmbH
Ganmag Magnesite Solutions	Mineralmahlwerk Westerwald Horn GmbH	TiFor B.V
Garrison Minerals LLC	Minerals GmbH & Co. KG	Timab Magnesium
IGME Geological Survey of Spain	Minersa Group	Titan Cement Company S.A
Grecian Magnesite SA	Monarch International	Tomra Sorting GmbH
H.D.Minerals SA	Nedmag B.V	Traxys Cometals Europe
HarbisonWalker International	Niche Fused Magnesia Ltd	TYK Corporation
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I.H.S Markit	Pasek Minerale	Vesuvius
Ian Wilson Consultancy Ltd	Penoles Metals & Chemicals Inc	Weerulin GmbH
	Poittemill	ZM Ropczyce SA

A fantastic event. We had a great opportunity to find partnerships, players, and distributors worldwide. Presentations were fantastic and contemporaneous about new processes, world magnesia production and markets.

Salvelino Nunes, Technical Manager, Buschle & Lepper, Brazil

Congratulations on an excellent MagForum once again enjoyed by all. The presentations covered a wide range of subjects with, for me, a unique experience of taking part in a vote from our mobiles on likely magnesia prices in a year's time being shown on the screen. Organisation was good and a plenty of time to have discussions during the coffee and lunch breaks. Look forward to the next MagForum.

Dr Ian Wilson, Consultant, UK

Excellent organisation and programme. I learned a lot and was able to make many great connections.

Jenny Warburton, General Manager, HarbisonWalker International, China

Brilliant place, easy registration, excellent programme and roundtables.

Tony Crimmins, CEO, EcoMag, Australia

Good programme, a lot of information, and a good meeting point.

Roman Gazur, Commercial Director, SMZ Jelsava, Slovakia

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Hilton Houston Post Oak, Houston, 10-12 June 2019

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Alcron Hotel, Prague
21-23 October 2019

INDIAN MINERALS & MARKETS **FORUM** 2019

JW Marriott Mumbai Juhu,
18-20 November 2019
(Field Trip 21-22 November 2019)

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INDIAN MINERALS & MARKETS FORUM 2019

JW Marriott Mumbai Juhu,
18-20 November 2019
(Field Trip 21-22 November 2019)



Speakers include:

The climate & outlook for mineral project investment & development in India

John Evans, Managing Director, Tractus Asia Ltd, Thailand

Refractory raw materials supply & demand in India

Hakimuddin Ali, Chairman Imerys India & Director Business Development & Strategy, Africa and Middle East, India

Overview of supply and demand of India's refractories

Sameer Nagpal, CEO-Refractories, Dalmia OCL Ltd, India

Influencing factors impacting India's refractories market

Anirbandip Dasgupta, Senior Executive Officer, Indian Refractory Makers Association, India

Refractory recycling market and products in India

Vatsal Dhandharia, Proprietor, Global Recycling, India

Minerals for the electrification of India

Dr Richard Flook, Managing Director, Mosman Resources, Australia

Graphite developments, markets & India's mineral challenge

Shishir Poddar, Managing Director, Tirupati Graphite PLC, UK

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MAGNESIA
WORLD SOURCES MAP

PRIMARY WORLD SOURCES AND PRODUCTION CAPACITY OF KEY MAGNESIA RAW MATERIALS



KEY INFORMATION

- Production capacity: 2018 (in million metric tons)
- Production capacity: 2017 (in million metric tons)
- Production capacity: 2016 (in million metric tons)
- Production capacity: 2015 (in million metric tons)
- Production capacity: 2014 (in million metric tons)
- Production capacity: 2013 (in million metric tons)
- Production capacity: 2012 (in million metric tons)
- Production capacity: 2011 (in million metric tons)
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- Production capacity: 1984 (in million metric tons)
- Production capacity: 1983 (in million metric tons)
- Production capacity: 1982 (in million metric tons)
- Production capacity: 1981 (in million metric tons)
- Production capacity: 1980 (in million metric tons)

OVERVIEW & CHINA BRIEF

China is the largest producer of magnesium in the world, accounting for 70% of the total production. The country's production capacity has increased significantly in recent years, driven by government support and investment in the sector. However, the industry faces challenges such as environmental concerns and overcapacity. The Chinese government has implemented measures to address these issues, including increasing the production capacity of key magnesium raw materials and promoting the development of high-quality products. The industry is expected to continue to grow, but it will face increasing competition from other major producers like the United States and Russia.

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