

MAGNESITE

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The past year has been a surprisingly good one for the magnesia industry. The long-suffering refractory magnesia sector experienced an upsurge in demand and prices improved during the year. Stronger demand was primarily in response to the strong performance of the world's steel industry in 2000 and the subsequent increased demand for magnesia-based refractories. World steel output reached a record 847 Mt after a five-year period stuck in the 750-800 Mt range and overall levels have been maintained in the March quarter of 2001 with reduced production in North America balanced by growth elsewhere.

World magnesia markets continue to be influenced by events in China but for once some of these developments may be beneficial to Western producers and Chinese producers alike. The new unified Chinese magnesite/magnesia exporters group may be the vehicle with enough power to take the road out of the trade dispute quagmire. A process of concentration, consolidation and rationalisation has been taking place within both the magnesia industry and its main customer, the refractories industry, and has led to improved financial performance for many of the main players.

The emergence of RHI of Austria, Cookson of the UK, and Wulfrath of Germany as the three world basic refractory majors has had a marked effect on the magnesia market. RHI is a major producer of refractory magnesia through operations in Austria, Turkey and the US and is also the world's largest manufacturer of magnesia-based refractories through operations in Austria, Germany, the US, China, and elsewhere.

The Cookson Group and its Vesuvius division became a major magnesia producer in 1999 when it acquired Premier Refractories from

the Alpine group but is now in the process of shedding the magnesia-producing assets – which in any case are now mainly focused on non-refractory magnesia markets.

Meanwhile, the third major basic refractories grouping emerged through the merger between Wulfrath of Germany (now owned by the Lhoist Group of Belgium) and Baker Refractories of the US. The roots of both companies were in the manufacture of dolomite-based refractories but the new combined enterprise will be a major producer of magnesia-based refractories in Europe and North America. In recent years Baker Refractories has maintained a strategic alliance with the Australia magnesia producer, QMag.

Prices improved after several years of decline and a number of refractories companies with magnesia and magnesia refractories interests have reported much improved financial performance. At the same time the number of refractories companies operating has diminished considerably through merger and acquisition activity.

Many magnesia producers have sought deliverance from refractories decline in non-refractory magnesia markets, where growth prospects are higher and where the influence of low-priced Chinese magnesia is less of a problem. Notable growth sectors include environmental applications for magnesia and magnesium hydroxide – particularly water and waste treatment - and the magnesium metal market for natural magnesite.

China

China continues to dominate the world magnesia market, accounting for over 40% of world production for both dead-burned magnesia (DBM) and caustic-calcined magnesia (CCM) and over 80% of

electrofused magnesia production. China's total magnesia production is currently estimated to be of the order of 3.5 Mt/y – with an approximate split of around 2.4 Mt/y DBM, 650,000 t/y CCM and 450,000 t/y EFM. Exports for the past three years have totalled around 2.1 Mt/y – 1.2-1.4 Mt DBM, 500,000 t/y CCM, and 250,000 t/y EFM.

One of the major developments over the past year has been the formation of a powerful magnesite exporters' group – the Chinese Magnesite Export Association (CMEA). The process began with the formation of two groups in early 2000 - Jiayuan Magnesite Export Group and Huaxia Magnesia Products Export Group – and was prompted by the dissatisfaction of major producers at the low price regime forced on them by traders. The two groups were able to effect price rises of around US\$10/t during 2000 and further rises have been experienced in 2001. The CMEA was formally established in February 2001 and involves 23 companies including major players such as: Yingkou Qinghua, Huaziyu, Haicheng Xiyang, Haicheng Houying, Haicheng Pailou and Yingkou Huacheng.

Russia

Russia's magnesite, magnesia and basic refractories giant is Kombinat Magnezit with its operations at Satka, near Chelyabinsk in the southern Urals. The company has total burning capacity of over 2 Mt/y. Current levels of output are thought to be of the order of 2.5 Mt/y of beneficiated raw magnesite and 1.1 Mt/y of magnesia grain and powders, a large proportion of which is processed in basic brick and other refractory products.

Closures

The past two years have seen a number of closures of uneconomic magnesia operations – in the US (National Refractories), Italy (Seamag), the Slovak Republic (Magnatech), India (Birla Periclase) and Japan (Asahi Glass).

The latest closure concerns the National Refractories & Minerals seawater magnesia

plant at Moss Landing in California. In the past the plant had produced 150,000 t/y of refractory magnesia but in recent years has been more focused on the supply of magnesium hydroxide for environmental markets.

Magnatech was the company set up to operate the Hacava plant which had formerly been part of the state enterprise, Slovenska Magnezit Zavody. The plant used a chemical beneficiation technique to produce a very pure grade of magnesia from high iron natural magnesite. The product quality was excellent but the operating costs were too high.

Seamag was a company that set out to revive the original Sardamag plant at Sant' Antioco in Sardinia, Italy. Despite an engineering overhaul and revamp the plant was unable to make an impression on the market.

Birla Periclase was the seawater magnesia plant set up in India by Indian Rayon Industries. However, it was unable to operate at a profit in competition with Chinese EFM and closed in 1999 after operating for little over one year.

World Production of Natural Magnesite ('000 t)			
	1998	1999	2000
Australia	379	367	380
Austria	650	650	550
Brazil	1,200	1,100	1,100
Canada	200	200	200
China	8,500	8,500	9,000
Greece	650	650	620
India	355	360	360
North Korea	800	800	650
Russia	2,200	2,400	2,500
Serbia	60	50	50
Slovakia	878	850	800
Spain	500	500	500
Turkey	1,600	1,500	1,400
Others*	200	200	200
World Total	18,172	18,127	18,310

* Inc. the US, Colombia, South Africa, Zimbabwe, Poland, Pakistan, and Iran

Source: USGS, British Geological Survey, and author's estimates

Rationalisations

During the 1970s three of the world's largest seawater and brine magnesia operations were: Ube in Japan, Britmag in the UK and Martin Marietta in the US. Combined capacity of these plants once stood at over 900,000 t/y but major rationalisation programmes have been carried out with reductions to effective capacity and changes to product lines.

New Production

Later this year Jordan Magnesia Co. is scheduled to begin production of magnesia from Dead Sea brines at plant. The plant will use magnesium chloride brines produced as a by-product of potash processing operations from the operations of its parent company,

Arab Potash Co., and 50,000 t/y of DBM and 10,000 t/y of CCM is planned. Early in 2001 the company concluded a marketing and sales agreement with the Possehl group of Germany.

In Western Australia, Westmag announced plans to construct a 50,000 t/y magnesia plant at Port Hedland using magnesium chloride from salt bitterns which will be converted to magnesium hydroxide and magnesia using local dolomite.

Mergers and Acquisitions in Magnesia

During 2000 the Austrian producer Styromag (Steirische Magnesit Industrie) acquired Comag of Turkey, that country's leading

World Magnesite and Magnesia Production 2000			
Natural -- from Natural Magnesite			
Country	Magnesite	Magnesia	Companies
Australia	380	155	QMag
Austria	550	350	Radex
Brazil	1,100	350	Magnesita
Canada	270	90	Baymag
China	9,000	3,500	Liaoning Mag, Pailou, Xiyang, Qinhua
Greece	620	150	Grecian Magnesite
India	360	100	Dalmia, Burn Std, Tanmag, Almora
North Korea	650	180	NK Magnesite
Russia	3,000	1,100	Magnezit Satka
Slovakia	800	270	Slovmag Lubenik, SMZ Jelsava,
Spain	500	170	Mag Navarras, Mag Rubian
Turkey	1,400	345	Kumas, Manyezit, Comag
Others	320	110	Includes the US, Iran, Poland, S Africa
Total Natural	18,950	6,870	
Synthetic -- from Seawater and Brines			
UK		85	Britmag
Ireland		70	PremierPericlase
Netherlands		150	Nedmag
Italy		80	Sardamag/Cogema
Norway		15	NorskHydro
Israel		95	DeadSeaPericlase
US		360	MMarietta, RHI, NatRef, Premier
Mexico		85	QuimicadelRey, Mexico
Japan		150	Ube
SKorea		50	SamHwa
Total Synthetic		1,140	
Total Magnesia		8,010	

producer and exporter of caustic calcined magnesite. Comag operates quarries and a plant at Tavsanlı in the Eskişehir district of western Anatolia to produce 45,000 t/y of low-iron CCM for use in producing fused magnesite and construction products. Styromag has a similar-sized plant at Oberdorf, near Graz in Austria, producing higher-iron grades for animal feeds and construction applications.

Grecian Magnesite SA of Greece increased its influence as one of Europe's leading suppliers of DBM and CCM by taking over the Spanish company, Magnesitas Navarras (Magna), in an alliance with Timab Industries of France. Magna produces up to 125,000 t/y of DBM and CCM and also operates a plant to produce refractory masses.

The US fused magnesite producer Minco has re-emerged as an independent company after spending a short period as a member of the English China Clays group. The company was acquired by ECC in 1998 but was part of an enforced divestiture of assets when ECC was itself taken over by Imerys in 1999. The company was bought by a group of independent investors in August 2000. The company's plant at Midway, Tennessee, has a capacity to produce fused magnesite and fused silica of about 25,000 t/y. The company is one of four major companies producing electrical grades of fused magnesite. The

others are the UCM Group with operations in the UK and US, Tateho Chemical Industries of Japan, and TSL of the UK (part of the Saint Gobain group of France).

In 2000 RHI (Radex Heraklith Industriebeteiligungs AG) of Austria completed the acquisition of Harbison Walker Refractories (Global Industrial Technologies) for US\$500 million. Existing RHI businesses in North America included North American Refractories (Narco), VRD-Canada Inc., Tri-Star Refractories Inc., Intertex Inc, and Zircoa. All plants will now operate under the name of RHI Refractories America.

Meanwhile, Cookson Group plc sold its US magnesite business – which came with the acquisition of Premier Refractories – to Premier Chemicals. These are two locations – the magnesite mine and plant at Gabbs, Nevada (140,000 t/y CCM) and the seawater magnesite operation at Port St Joe, Florida (75,000 t/y CCM and 45,000 t/y magnesium hydroxide). The new company was set up by a team including members of the former management of Premier Refractories.

Martin Marietta is selling its refractories business to Minteq, the refractories arm of Mineral Technologies, which is a world leader in basic monolithic refractories. MM will retain the Manistee, Michigan plant, which will continue to produce refractory magnesite for

World Magnesite Prices - US\$/t cif Europe				
		May 1999	May 2000	May 2001
Dead-burned	First grade DBM1	240-350	200-300	180-220
	Chinese 94-95% MgO	115-125	130-150	115-135
	Chinese 90-92% MgO	100-110	120-130	105-120
Caustic	Industrial	280-320	300-375	180-220
	Agricultural	100-140	110-140	100-120
Electrofused	EFM1 (Australia, Canada)	550-600	600-800	700-800
	Chinese 97-98	350-500	350-500	320-350
	Chinese 95-96	250-325	270-330	290-350

Source: *Industrial Minerals*, author's estimates.

Minteq products but MM will now concentrate on the production and sale of magnesium hydroxide and chemical magnesias.

Magnesium Metal

At present only 200,000 t/y of natural magnesite is consumed in the production of magnesium metal – at the 43,000 t/y plant of Norsk Hydro at Becancour, Quebec, Canada. The plant has been based predominantly on raw magnesite imported from China although more recently shipments of raw magnesite from Australia and Spain have been made to the plant.

By 2004 the magnesite required for magnesium metal production could rise by a further 600,000 t/y as two magnesite-based projects in Australia are set to leave the blocks this year with a combined capacity of 140,000 t/y of magnesium metal. The new plants will be operated by Australian Magnesium Corp., (part of the Normandy group) at Stanwell in Queensland and by Samag (owned by Pima Mining) at Port Pirie in South Australia.