Relative positioning: Magnesia producers adjust to new industry conditions

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Published: Monday, 27 April 2015

With declining refractories consumption in key consuming sectors like steel and cement manufacturing, the balance of supply against demand is worrying many in the magnesia industry. Josie Shillito, Reporter, looks at the global trading picture and examines how magnesia companies are shifting their positions to adjust to new market dynamics.

Magnesia consumption is linked to a handful of generally steady end markets. As a key refractory mineral, its usage is correlated to steel and cement manufacturing, while as an ingredient in markets ranging from flame retardants and water treatment to human medicine and animal feed, small but stable annual demand volumes keep the industry ticking over.

Despite resting on well-established core markets, companies producing magnesia face challenges – not least in boosting margins, when their principal customer, the steel industry, is experiencing flat demand.

According to the World Steel Association (worldsteel), the non-profit industry body that tracks global steel output, world steel production grew by just 1.14% to 1.64bn tonnes between 2013 and 2014, compared with a global GDP growth of 3.89%. Against even recent historical growth statistics, GDP has slowed down markedly. The steel capacity that was built up to keep pace with more strident economic demand (between 2010 and 2011, GDP growth was still as high as 10.7%) is in many cases now surplus to requirement.

With steel production decelerating overall, magnesia producers like Brazil’s Magnesita Refratarios are looking to growth areas that still exist within this end market.

For Magnesita, areas of steelmaking that are still expanding their need for magnesia are stainless steel and mini mills in North America.

Other magnesia companies, like Canada-based junior, MGX Minerals, are throwing in their lots with non-metallic industries, such as the fertiliser and wall board markets.

Careful currency arbitrage and expansion in the services segments of their businesses also enabled the sales of some of the world’s magnesia producers to outperform steel industry production in 2014. But the question is remains, how long can magnesia producers dodge the steel headwind for?

Global magnesite resources are estimated to be 12bn tonnes, but reserves in actively producing countries are just 2.4bn tonnes.

James St. John
Magnesia’s markets

Magnesia’s various forms, from crude magnesite, to deadburned (DBM), fused (FM) and caustic calcined magnesia (CCM), magnesium hydroxide (MDH), magnesium chloride and synthetic magnesium sulphate, all feed into different markets.

The principal driver for DBM and FM is the refractories industry, which is linked with steel and other metal production, as well as cement and glass.

However, although refractories are by far the single largest consuming segment for magnesia, this industry does not currently account for the majority of magnesium compound consumption in key markets like the US. According to the US Geological Survey (USGS), around 48% of the magnesium compounds consumed in the US in 2014 were used for refractories. The remaining 52% was used in agricultural, chemical, construction, environmental and industrial applications.

Magnesia, fused, 98% MgO, lump, FOB China, $/tonne

Even prices for high grade FM, which is gaining preference in refractories applications owing to its superior quality and performance characteristics, have fallen in the last year in line with weaker demand and overcapacity.

Source: IM Prices Database

Refractories

Since 2013, refractories have accounted for less than 50% of magnesium compounds consumed in the US. Although steel production in the US increased by 1.9% to 121.2m tonnes between 2013 and 2014, the use of higher quality FM-based refractories resulted in decreased refractory consumption per tonne of steel produced. This trend looks set to continue and become more pronounced as demands on steel quality increase and the technology used to make the steel improves.

Increased consumption of magnesium compounds for animal feed supplements, deicing, dust control, fertiliser, flue gas treatment and waste water treatment are also contributing to the shift in end use distribution.

Consumption of magnesium compounds in the US was 570,000 tonnes in 2014, compared with 506,000 tonnes in 2013; 485,000 tonnes in 2012; and 602,000 tonnes in 2011; according to the USGS.

DBM was being replaced with FM in some steel furnaces in 2014, the USGS said. This is because FM has superior properties to DBM in some refractory applications, owing to higher magnesia content, higher density and larger crystal size. Meanwhile, alumina, chromite and silica substitute for magnesia in some refractory applications.

USGS figures show that global consumption of all refractories was 10% lower in 2013 than in 2012, while magnesia brick consumption in China in 2013 was 16% lower than in 2012. Slower economic growth in China and the production of higher quality refractories and more advanced manufacturing techniques also decreased magnesia consumption.

Slowing GDP growth in China has been accepted as a challenge by the magnesia industry. Between 2012 and 2013, China’s GDP grew 12.3%, down from 12.4% between 2011 and 2012. These figures were significantly weaker than the expansion rates of 23.4% seen between 2011 and 2012 and 18.8% between 2010 and 2011.

The Chinese government has announced a growth target of around 7% for 2015 – the lowest increase in GDP since 1990.

Slowing economic growth has weakened domestic demand for magnesia from the steel, cement and glass manufacturing sectors. According to the China Refractory Association, refractory product output reached just under 28m tonnes in 2014, down 4.5% year on year (y-o-y) and the smallest volume since 2004 (see pp26-27).

"One of the major trends in the industry has been the improvement in performance of refractories, which is leading to a lower specific consumption of refractories per tonne of steel produced [to a global average of 15kg/tonne of steel]," said Alison Saxby, director of Roskill Information Services’ Industrial Minerals Research business.

"The region where this trend is having most impact is China, where specific consumption is currently over 20kg but is predicted to decline fairly rapidly over the next five years to come closer to the global average.”

Further industrial consolidation and new regulations introduced by the Chinese government in order to promote a more sophisticated refractories manufacturing sector will also have an effect on Chinese consumption of magnesia.

Chinese magnesia exports January 2014 - February 2015 (tonnes)

Source: China Customs

Other markets

In the CCM industry, the consumption drivers are mainly agriculture, environmental and chemical applications. This includes speciality fertilisers, dairy farming, animal nutrition, wastewater treatment, chemicals, rubber, cement and food, as well as steel fluxing, flame retardants and feedstock purposes.

In 2013, environmental applications made up 50% of US consumption of CCM, with agriculture consuming 41% and chemical intermediates taking up 8%, according to the USGS.

MDH is used principally for water treatment (see pp45-49), then as a chemical intermediate, in medicines and pharmaceuticals and in fertiliser. Magnesium sulphate is used in chemicals, fertiliser, pulp and paper, rubber, pharmaceuticals and water treatment. Magnesium chloride brines are mainly used for road dust and ice control.

In 2013, US CCM imports increased by 17% y-o-y and apparent consumption increased by 8%, USGS data shows.
This is in comparison to refractory magnesia (DBM and FM), for which net imports for consumption fell by 29% and apparent consumption in the US declined by 22%.

For MGX Minerals, magnesia’s non-refractory applications present better growth prospects than those linked to struggling industrial metals and materials sectors.

"The main growth we see in magnesia is fertiliser and wall board," MGX’s CEO, Jared Lazerson, told IM

World fertiliser demand is expected to reach 200m tonnes by 2018/2019, rising by an average of 1.8% per annum between 2011 and 2018, according to the International Fertilizer Industry Association’s outlook for the market until 2018. The highest growth rates are forecast in Latin America, at 3.7% per annum, where cultivated land area is expanding steadily, followed by Africa, at 3.4% and West Asia, at 3.1%.

Wall board uses magnesium oxide and its consumption is linked to the construction industry. World construction industry output grew by 4.5% to reach a value of $7.5 trillion over 2013, according to statistics portal, Statista.

Although construction industry growth has slowed, there is a second reason why both fertilisers and wall board are growth areas, according to MGX Minerals. "These are mass market mass tonnage products that have very few constraints in terms of grade and impurities," Lazerson told IM.

However, Lazerson believes that the margins will come from the DBM market, even if this is not a growth market currently, because of the lack of substitute materials that can offer the same performance in refractories.

"The DBM market will remain the high margin market and may be augmented by new refractory applications. There are few materials that can be used to replace magnesia in refractory brick," said Lazerson.

Magnesita Refratarios still believes there is growth to be hamessed in the refractories market, as long as the company positions itself correctly. According to the company’s full year 2014 results, North America’s stainless steel and mini mills markets continue to offer opportunities for the Brazil-based producer.

"The volume [of refractory products] sold in North America (ex-Mexico and ex-integrated mills) grew by 8.2% [in 2014], driven by good performance in the stainless steel segment, and market share gains in both stainless and mini mills," the company said in its results statement.

"We remain very optimistic about our opportunity set in North America, especially in sales to the integrated mills. We believe that the steel industry in North America should become our largest market in 2015," said Magnesita’s CEO, Octavio Pereira Lopes.

A mini mill is traditionally a secondary steel producer, obtaining most of its iron from scrap steel, recycled from used automobiles, or byproducts of manufacturing. They use an electric arc furnace (EAF), a device that can be stopped and started easily, allowing mini mills to follow market demand, operating on 24 hour schedules when demand is high and cutting back when sales are lower.

The recycling of steel scrap plays an important role in the conservation of energy and US mini mills are the US’ largest recyclers, according to Eric Stuart, vice president of the Steel Manufacturers Association.

"Mini mills are the major growth component of the North American steel industry," said Stuart.

The mini mill share of US steel production has grown from 10% in the 1960s to roughly two-thirds of production today, according to Stuart.

"National economic security is a core reason for the US to have a viable, strong domestic steel industry. US EAF steel producers are an essential component of that security. That is precisely why US policy should clearly recognise the value of, and needs to ensure the continued viability of, the US supply of ferrous scrap," he said.

North America’s recovery in the stainless steel market is particularly strong when compared to other countries around the world. In 2014, North American stainless steel performed well and grew by 5% y-o-y, according to Magnesita. This is compared to steel growth of just 1.14% on a global basis, according to the worldsteel.

Other markets where sales performed well were Mexico, Eastern Europe and Asia excluding China, said Magnesita.

"Growth markets accounted for almost half of the sales growth and represented 29% of sales to the steel industry in 2014," the company said.

However, despite the relatively positive economic outlook for the US, the country’s steel industry has been hit by imports, reduced demand from the energy sector, a strong US dollar and high inventories in the first quarter of 2015, according to Roskill’s Saxby.

"This could reflect on refractories demand if this is sustained," she said.

Global magnesia trade in 2014 (millions of tonnes)
Global magnesia supply

China dominates global magnesia supply, producing 69% of the world total in 2013, according to the USGS. Together with Turkey and Russia, the three countries accounted for 80% of world magnesia production in 2013. Seawater and natural brines accounted for about 69% of US magnesium compounds production in 2014, which was valued at $251m in total.

Resources from which magnesium compounds can be recovered are virtually unlimited and are globally widespread, according to the USGS, although economically viable sources are less common.

Identified world resources of magnesite total 12bn tonnes, while total reserves in the countries listed as actively producing the ore is estimated at 2.4bn tonnes, the 2014 USGS data shows. Figures for reserves of other sources of magnesium compounds are less concrete. The USGS states that resources of brucite amount to several million tonnes. Resources of dolomite, forsterite, magnesium-bearing evaporite minerals, and magnesia-bearing brines are estimated to constitute a resource in billions of tonnes. MDH, meanwhile, can be recovered from seawater, of which supply is theoretically virtually unlimited.

In total, the USGS estimates that around 7.3m tonnes magnesite was produced in 2013. This comprises: 4.9m tonnes from China; 400,000 tonnes from Russia; 320,000 tonnes from the US; 300,000 tonnes from Turkey; 280,000 tonnes from Spain; 200,000 tonnes from Austria; 200,000 tonnes from Slovakia; 130,000 tonnes from Australia; 115,000 tonnes from Greece; 80,000 tonnes from North Korea; 60,000 tonnes from India; and 150,000 tonnes from other countries in the world.

This figure is a 1.15% increase on the total magnesite production from 2012, which came in at 7.2m tonnes, according to USGS estimates.

Russia is home to the largest magnesite reserves (see pp38-40), with around 650m tonnes of identified magnesia present, although the country only extracted 0.06% of that in 2014, producing 400,000 tonnes last year.

In contrast, the US harbours just 10m tonnes magnesite. However, the country produced 3.2% of those reserves last year, or 320,000 tonnes, the highest ratio of production to reserves in the world in 2014.

All of the countries surveyed by the USGS increased their production of magnesite between 2013 and 2014, apart from Austria, where production fell by 20,000 tonnes y-o-y to 200,000 tonnes.

Austrian magnesia and refractories producer RHI AG has reduced its production of FM in response to low prices.

"Noting that magnesia demand for refractories has been subdued in 2014 and continuing into 2015, it appears that there is sufficient capacity for high grade DBM and FM for the medium term," said Saxby.
The problem is too much supply at a time when consumption is shrinking. In China, producers with large inventories of magnesia to clear have been forcing down prices of magnesia in tenders to supply steel makers with refractory materials, according to discussions at the China Refractory Association annual general meeting (AGM) held at the end of March 2015.

Magnesia prices according to the IM Prices Database have fallen over the past two years in line with this pressure. DBM (94-95%, FOB China magnesia) was priced at $350-390/tonne in April 2015, compared with prices of $450-480/tonne in April 2013. For the lower grade DBM (90%, lump, FOB China), prices have dropped to $270-290/tonne from $320-350/tonne over the same period.

For FM, the price of high grade material (98% MgO, lump, FOB China) has fallen from $1,023-1,100/tonne in April 2013 to $950-1,000/tonne in April 2015. Lower grade FM (97% MgO, lump, FOB China) has fallen from $890-1,000/tonne to $850-940/tonne over the same period.

The price pressure created by too much inventory has left producers in China with unsustainably narrow margins on their production. Some magnesia producers claimed at the China Refractory Association AGM that their margins were now less than 5%. In comparison, Brazil’s Magnesita Refratarios’ margins in 2014 were 13.5%, according to the company. Magnesita said that this represented a drop from the previous year’s margins of 14.9%, but the level is nonetheless significantly higher than the margins claimed by Chinese producers, where fierce competition and ‘price wars’ are adding to the pressure of overcapacity.

Margins at US-based Martin Marietta Magnesia Specialties in 2014 were 35.8%, meanwhile. Although this is down y-o-y, it still dwarves those of Chinese producers.

"In China, refractory markets are being hit by overcapacity combined with slowing demand as (…) Chinese steel production stutters, suffering from overcapacity, excess supply and fading prices," explained Saxby.

Chinese regulation is also affecting the margins of magnesia producers. New enforced policies on the environment and on health and safety regulation means that companies will have to invest in new, environmentally friendly equipment, and upgrade existing dangerous practices to comply with regulation. At a time of meagre profit levels, many are resisting the pressure to make the necessary changes.

Mistakes in government policies have cost the industry dearly. In Liaoning province in 2014, all industrial companies were forced to switch to two-stage coal gas generation furnaces at a cost of several million renminbi in order to improve air quality.

However, when it was later discovered that groundwater in the region had become contaminated by waste effluent from the furnaces, a costly switch back to natural gas power supply is now expected.

Oversupply has been dealt with differently in Europe. RHI said in its 2014 results statement that it would reduce the production of FM at its Porsgrunn plant in Norway due to low prices.

The company also announced plans to shut down production at its German magnesia raw material site, saying that this will be assigned to other plants.

RHI made $1.721bn in revenues in 2014, down slightly from 1.754bn in 2013 and 1.835bn in 2012, according to the company’s results.

While Europe-based companies are exerting self-imposed supply discipline in response to market conditions, industry observers in China have remarked that top down action is needed to tackle the problem of overproduction there. At present, the sector is characterised by infighting, with producers seeking to run competitors out of business as well as looking to export markets to offload surplus production for which there is no demand domestically.

Elsewhere, development of magnesite deposits in Australia and Canada and the recent expansion of processing capacity in Australia, Brazil, Iran, the Netherlands, Norway, Russia and Turkey may increase supplies of magnesium compounds outside of China, according to the USGS.

This could add pressure to prices for globally traded material, however some of this additional capacity is likely to be intended as part of vertical integration plans for refractory and other magnesia product suppliers, giving these manufacturers greater control over supply, prices and quality of raw materials.

New or reopened production capacity has also provided consumers with an alternative to FM produced in China, according to the USGS.

In Greece, Terna Mag SA shipped its first magnesite order to Italy in February. The shipment of 2,500 tonnes was part of its broader €100m ($106.7m*, or $124.5m at the time of the announcement) investment plan to revive mining activities in the country’s Mantoudi region. The company said it expects to produce 450,000 tpa magnesia in 2018, of which 100,000 tpa will be CCM and 35,000 tpa will be DBM.

In Russia, the leading magnesia producer, Magnezit Group, recently commissioned a new FM furnace with a capacity...
In Japan, Ube Material Industries told IM in September 2014 that it is planning to expand its capacity by 8% by 2017. The Ube, Yamaguchi-based company said that it would continue to focus on niche markets, including non-refractory applications such as water treatment, although it also produces a range of DBM products.

Headwinds

Just as with any raw material reliant on supply and demand, magnesia is susceptible to headwinds and risks. For companies producing into the market, and for those consuming, positioning a business so that it can weather these challenges as and when they arise is key to offsetting any negative impact.

The principal headwind facing magnesia producers is the decreased demand for refractory products, which, in turn, is linked to global economic development. Despite the flat production of steel worldwide, companies like Magnesita and Martin Marietta’s Magnesia Specialties business have delivered y-o-y sales growth.

Revenues in Martin Marietta’s magnesium segment brought in $58.2m for Q4 2014, up $100,000 from the same quarter the previous year. For the full year, the company recorded net sales of $236.1m, up from $225.6m in 2013.

"The Magnesia Specialties business is sensitive to changes in domestic steel capacity utilisation and the absolute price and fluctuations in the cost of natural gas," the company cautioned.

"In addition, availability of rail cars and locomotives affects the company’s ability to move dolomitic lime, a key raw material for magnesia chemicals, to both the company’s plant in Manistee, Michigan, and customers," it added.

"The availability of trucks, drivers and railcars to transport the company’s product, particularly in markets experiencing high growth and increased demand, is also a risk and pressures the associated costs."

Austria’s RHI, which is reducing its magnesia capacity to stave off low prices, has also adjusted its business model in other ways to position itself against decreased refractories demand.

The company has decided to stop purchasing raw materials for its applications in the industrial business and opted to produce them in house instead, using the facilities previously used to produce magnesia.

"[Raw materials] will be produced at the American site starting in the year 2015 in order to improve capacity utilisation," said the report accompanying RHI’s 2014 results.

Magnesita has also managed to outperform slow refractories demand. Group sales were up 8.1% on 2013, with volumes of refractories sold climbing 4.1% to 1.03m tonnes over the year.

The Brazilian company also grew its services business to compensate for the soft refractories demand. Revenue from the services segment grew by 36.7% in the year, to Brazilian real (R$) 165m ($54.8m*), accounting for 5.8% of Magnesita’s consolidated revenue in 2014, according to the company’s 2014 results.

Boosted by the Reframec acquisition in June 2013, services rendered to industrial clients grew by more than 100% in the year, both in Brazil and South America outside Brazil.

Service revenue also outperformed in the steel industry, increasing 17% in the year, driven by a strong performance in North America.

By positioning themselves in sectors other than refractories, these companies have been able to perform strongly relative to less well situated peers.

In spite of the glut of magnesia, concerns about the availability of raw materials have lead several refractory producers to secure captive sources of magnesia in recent years, according to the USGS.

In August 2013, RHI offered to purchase a magnesite mine and adjacent processing facilities in Erzurum in Turkey from Cihan Group, and the acquisition was nearing completion in April 2014.

RHI planned to reopen the mine and expand and modernise the plant, increasing sintered magnesia capacity to 100,000 tpa from 60,000 tpa. The deal collapsed in October 2014, however, when RHI halted its purchase of the rights to the project, as contractual conditions required by Magnesit Anonim Sirketi, RHI’s Turkish subsidiary, were not met by the 30 September 2014 deadline.

RHI, which currently operates magnesite deposits in Austria, Italy, Turkey, Ireland, Norway and China, declined to disclose at the time whether it would be pursuing further acquisitions. However, the USGS expects that more magnesia consumers will buy up raw-material suppliers within the foreseeable future.

Outlook

"Generally I think supply [of magnesia] is fairly good, and demand will increase modestly, tied to the steel industry," said Lee Bray, mineral commodity specialist at USGS.
"The wildcard is, how will Europe’s economy improve over the next few years? If the situation with Greece implodes, it could have a negative effect on the steel industry, which will have an effect on magnesia consumption. For China, new environmental regulations may see some smaller operations shut down, which in turn could cut off some supply from Chinese production. However, according to Bray "any shut down of the smaller operations will be offset by the expansion of the larger mines".

In 2014, Germany was the largest importer of magnesite, buying 525,172 tonnes, mostly from the Netherlands, which is a trading post rather than a major supplier, according to global trade statistics consultancy Tradeviews. Following shortly after were Japan and the US, with 420,536 and 392,089 tonnes imported, respectively, with both countries being supplied principally from China.

China itself imported 159,759 tonnes magnesia, most of which (133,658 tonnes) came from the People’s Republic of Korea.

China was the world’s biggest exporter, sending out 1.9m tonnes of magnesite in 2014. However, in recent years, the country has not met its export quota and China still has spare export capacity, clarified Bray.

*Conversions made April 2015*