Magnesia focus

MagForum 2017 analysed the latest magnesia issues and markets, as well as spotting any potential newcomers to the industry

Beautiful Kraków was the location and backdrop to IMFORMED's MagForum 2017, held from 11-14 June at the Radisson Blu Hotel in Poland.

The networking event attracted 190 attendees who were treated to panel discussions, an organised field trip and 23 presentations covering the full spectrum of magnesia mineral supply and demand.

China issues dominate the market

Following an introduction to the magnesia market by Mike O'Driscoll, IMFORMED director and welcome address from Jerzy Gdula, sales director at ZM Ropczyce, all eyes and ears were on the panel for nearly an hour of thought provoking discussion on the industry's most pressing issues.

The panel discussion, with participation from the audience, was dominated by the significant influence of China on the magnesia market and the latest issues arising there.

These included the demise of the export licence system, government controls on pollution in Liaoning and restrictions on dynamite provision negatively impacting output, China's relationship with the WTO, the structure of the domestic magnesia sector, infrastructure, and the steel industry.

"There is much anxiety and confusion. It was China then, and China now." summed up Michael Tsoukatos, business development director at Grecian Magnesite SA. This was echoed by Andreas Kriegl, head of raw materials supply, RHI AG, Austria, who considered that "we are still in the middle of the game."

Evandro De Souza, marketing director for overseas markets, ZM Ropczyce, considered that we may need to await until the end of 2017 or even early 2018 for things to settle down and take stock of the situation.

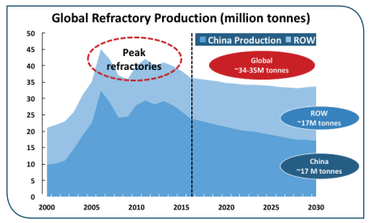
James King, a UK steel consultant, highlighted the relevance and comparisons within the steel industry, opining that while output was rising, steel prices were too low. He also reminded that refractories were still perceived as "not a critical cost, at just $5-6/tonne of steel production" – despite, of course, the use of refractories being imperative for successful steel production.

Refractory market and magnesia use evolution

In 'The changing face of the global refractories industry', Dr Richard Flook, managing principal at Mosman Resources Ltd, Australia, covered a wide range of factors shaping the refractories industry today and tomorrow, including mega trends, materials engineering, energy, economy, china, steel, and cement.

Flook considered that the industry had reached 'peak refractories' and refractory customer issues would focus on decarbonisation in steel, cement and glass; alternative fuels; pollution; china; customer competition; composites for light weighting; customer overcapacity; low profitability/ automation; and decreasing specific consumption.

Refractory producer actions of the future would be centred on cost reductions; automation; recycling; consolidation (China and elsewhere); innovation; monolithics; 3D printing of shapes; clean steel; and increased flexibility and ability to identify and respond to customer's changing needs.



Evandro De Souza presented 'Magnesia in refractories' and took delegates through how, why, and which types of magnesia were applied in refractories, noting limitations and modifications for use.

Of great interest was de Souza's review of ZMR's ongoing project, supported by the EU and Polish Ministry of Development, in evaluating the use of alternative and recycled magnesia sources as potential feedstock raw material for CCM manufacture for ZMR's in-house fused magnesia production.

Several sources were assessed including magnesium carbonate and magnesium hydroxide obtained from the manufacturing process of chemical fertilisers, enriched domestic magnesites, and magnesium hydroxide obtained from desalination of Polish coal mine waters.

"The most prospective technology was the manufacture of calcined MgO from coal mine waters," said de Souza. Estimated content of magnesia in the coal waters is some 300tpd of magnesia.

Fused magnesia aggregates based on CCM derived from coal waters have been successfully tested in magnesia-carbon refractories in slag lining zones of steel ladles, electric arc furnaces, and oxygen converters.

De Souza concluded, "Next steps are the evaluation of investment needed, and feasibility study for the industrial scale production of MgO aggregates from coal mine waters in Poland, and evaluation of the positive impact of such an initiative in the environment and local economy."

Supply trends: new sources in the pipeline

As ever, there is always high interest regarding new sources of supply coming onto the market, and particularly in light of the shortages emanating from China at present.

'Development of a magnesite company in the Middle East' by Nicolas Gangutia, managing director, Ganmag Magnesite Solutions of Spain, revealed the latest plans to rejuvenate the long running magnesite project of Industrial Minerals, Ma'aden, exploiting the Zarghat and Jabal Rukham deposits in Saudi Arabia.

At present, 36,000tpa of CCM is produced from the plant at Madinah, which hosts a 40,000tpa capacity MHF with integrated milling, and until June 2017, a dormant 32,000tpa capacity pressurised vertical shaft kiln and integrated mixing plant.

Ganmag's action plan is to increase production, develop markets and products, decrease costs, and increase reserves. This includes production of DBM starting in June 2017, leading to a planned output level of 32,000tpa of low SiO_2, 93-98% MgO, and 3.00-3.30 g/cm^3 DBM.

Gangutia acknowledged delays in restarting the VSK owing to a "huge refractory problem" and confirmed that all the repairs of the original bad design in control air, fuel flows, and discharge system are now ready and in working order.

Furthermore, the new mixing plant is to be on-stream in July 2017 and producing 36,000 tpa monolithics using DBM..

Moving on to Australia, Andrej Karpinski, executive chairman of Korab Resources, presented an interesting paper entitled 'Development of the Winchester magnesite deposit, Northern Territory, Australia'. Korab Resources, a subsidiary of AusMag, is focused on commercialising the Winchester magnesite deposit located near Darwin in the Northern Territory.

AusMag has a heads of agreement signed for a 1.5 million tonne offtake (300,000 tpa year over five years) and is in advanced discussions with several other parties.

Karpinski emphasised that the initial focus is on just producing raw magnesite, with a very low CAPEX required of US$3m, and the project is just 85km from Darwin port.

"The mine can operate at a profit with magnesium carbonate prices as low as US$40/t." said Karpinski.

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Tony Crimmins, executive chairman of EcoMag, Australia, presented the paper 'Recovering high purity magnesium compounds from salar brines and bitterns'.

With Korea Chemical and CNU, EcoMag has established a $US10m World Class 300 Project over 2017-2021 to produce 5-10 tonnes each of >99.5% pure hydrated magnesium carbonate (HMC), hard burned magnesia (HBM) and magnesium hydroxide (MDH) recovered from waste bitterns discharged from salt works and potash mining (each in Western Australia), and salar brines (in South America).

Magnesium in salar (Li, K) brines

Resources (developers)	Li	K	Mg	Ca	B	Mg/Li
(Resources with Li grades <400 mg/L are considered uneconomical)	mg/L	mg/L	mg/L	mg/L	mg/L	mass ratio
Hombre Muerto, **Argentina** (FMC)	744	7404	1020	636	420	1.37
Rincon, **Argentina** (ADY Resources, Sentient)	397	7513	3419	494	331	8.60
Olaroz, **Argentina** (Orocobre, Lithium America)	796	6600	2289	416	822	2.88
Salinas Grande, **Argentina** (Daijin Resources, Orocobre)	775	9289	2117	1450	232	2.73
Cauchari, **Argentina** (Orocobre)	618	5127	1770	401	1360	2.86
Uyuni, **Bolivia** (none)	424	8719	7872	557	242	18.6
Silver Peak, Nevada, **USA** (Pure Energy, Lithium America et al.)	245–600	5655	352	213	85	1.43

Crimmins highlighted the intense interest in developing South American salars for lithium production, but which also includes the removal of magnesium in order to improve lithium recovery, thus exposing a potentially new source of magnesia as lithium exploitation gains momentum.

Favourable magnesium concentrations were compared between South American salars and Australian potash deposits already in production.

In a separate paper 'Synthesising low carbon footprint, high quality magnesia', Paul Boudreault, business development, ECO2Magnesia, Canada, explained how from carbon capture and storage technology Sigma Devtech had derived a method of producing high quality magnesium carbonate from serpentinite tailings in Quebec, from which high purity CCM and DBM has been successfully manufactured, and that Eco2Magnesia had been formed to commercialise this.

At present, a feasibility study has been completed envisaging preliminary engineering for 60,000-120,000 tonnes magnesia production.

The project is ready for DEMO Plant implementation during 2017-2018, along with technology showcase, R&D platform, and commencement of market development. A full scale plant is scheduled for 2018-2019.

Market trends: steel and industrial applications

'The prospects for steel production' presentation by James King, a UK steel consultant, covered the types of steel products and the structure of the industry, He explored recent trends in production, costs and prices, the factors determining steel consumption and total crude steel production.

Production by steelmaking process to 2035 and requirements for metallic materials by type of process to 2035 also featured, and the importance of refractories as a cost factor for steel producers.

King said, "Refractories are a minor cost for a steel producer. When profit margins are only a few dollars per tonne, every dollar counts, so there will be continued interest in reducing the consumption of refractories and using cheaper materials wherever technically possible."

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Sonja Larissegger, technical marketing manager at RHI, Austria, explained the different welding processes and how DBM maybe used in fluxes and electrodes in her paper "Dead burned magnesia qualities for the welding industry." RHI offers two grades of DBM for welding, sourced from Turkey and Austria, based on cryptocrystalline and macrocrystalline magnesites, respectively.

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