


IMnI ANNUAL REVIEW 2019



International Manganese Institute



The International Manganese Institute (IMnI) is a not-for-profit industry association that represents manganese ore and alloy producers, manufacturers of metallurgical products or chemical compounds, trading houses, industry service providers, companies involved in Mn business development, universities and research organizations around the world.

Founded in 1975, with headquarters in Paris, France, IMnI's mission is to provide vision and guidance to the Mn industry by promoting economic, social and environmental responsibility and sustainability to all stakeholders.

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MESSAGE FROM THE CHAIRMAN



“Demand for Manganese continued rising in 2019, but the industry is highly dependent on China”

*Esteban Rivero
(Corporate Vice President of Autlán)
was elected as IMnI Chairman in June 2018,
succeeding to Pedro Larrea (Ferroglobe).*

2019 will be remembered in the annals of the IMnI as a major milestone. It was a dynamic year filled with activities focused on delivering the high-quality services that our members have come to expect. From consolidating its presence around the world and improving communication between members, to launching a re-vamped website, the Institute continues to expand and evolve with the needs of the industry.

When I look and try to analyse the manganese market in 2019 I find a set of complex issues interacting in the sphere of China's outlook. On the demand side, global steel production continued to grow strongly in 2019; however, the vast majority of this growth occurred essentially in China. The rest of the world's steel production stagnated (North America and CIS) or contracted (Europe, South America, Africa and Oceania). As a key strengthening ingredient manganese alloy and ore consumption continued strong. Nevertheless, the Manganese sector is now highly dependent

on China's demand and -as in the steel sector- oversupply remains an issue for the manganese industry. These are big targets that marked our sector and IMnI members are committed to reduce over-capacity.

Considering the activities of the IMnI, I am pleased to report that the Institute probably had its most successful year in 2019. The Institute faces a strong position with eleven additional members and solid finances that allowed us to grow at a significant measure.

IMnI's Annual Conference has emerged as the Mn Ore and Mn Ferroalloy industries' premier event, each occurrence attracting an increasingly larger audience. The 2019 edition held in Vienna was the most popular conference to date, with participation hitting 204 attendees, who learnt from manganese experts and visited Eramet and Ferrolobe Manganese alloy plants in Dunkirk as well as OFZ's plant in Slovakia.



IMnI's 46th Annual Conference, scheduled from June 2 to 4 2020, will gather the global manganese community in Cape Town, South Africa, on the theme "South Africa at crossroads: diversified Manganese producer, or China's miner?" Registration has started (to register please click [here](#)), so do not miss this opportunity to learn from industry experts, connect with the Mn community and visit six manganese mines (South32's Mamatwan, UMK, Kudumane, Tshipi, Assmang's Gloria & Assmang's Nchwaning), a Mn alloy smelter (Transalloys), a Mn metal producer (Manganese Metal Company, MMC) and Transnet's Mn terminal at Port Elizabeth and Coega.

I will conclude my term as Chairman in Cape Town. May I take this opportunity to thank all our members and IMnI staff for their support over the past two years. I feel optimistic about the future since the Institute has become the lifeblood of the manganese industry and is well prepared to face the challenges that lie ahead.

Gracias!

Esteban RIVERO
IMnI Chairman

MESSAGE FROM THE EXECUTIVE DIRECTOR



"IMnI continued its development in 2019"

The IMnI services were beefed up in 2019, with new scientific studies conducted and new market research reports published. Communication was also improved with IMnI Members and the general public, with a new website and a new extranet developed. And 11 new Members joined the Institute in 2019.

IMnI now represents 82 Members – a record high since 2012 – including 21 Chinese companies. IMnI Members are major Manganese producers and industry service providers, committed to develop their industry and promote the benefits of Manganese, while remaining proactive on compliance. Thanks to the active and dedicated engagement of its four Committees - HSE, Statistics, EPD and China - as well as the valuable involvement of its staff, IMnI continues to be the global voice of the Manganese industry.

In 2019, IMnI commissioned several new scientific studies to fully understand the

effects of Manganese on humans and the environment. And in September, IMnI organised a Health, Safety & Environment (HSE) and Technical Workshop in Ningxia province, China, hosted by IMnI Member Ningxia Shengyan, offering the opportunity to over 60 delegates from 11 countries to exchange about reduction of dust emission and energy consumption, personal protection equipment (PPE) and furnace optimisation. The program included the visit of two local Manganese plants: Ningxia Shengyan (Mn alloy smelter) and Ningxia Tianyuan Manganese (TMI), the world's biggest Manganese metal producer. In view of the success of this event, another HSE & Technical Workshop is planned for 2020 in Asia.

IMnI Members benefit from the best market research available globally, collected directly from Manganese producers all over the world, and aggregated by the IMnI staff to ensure confidentiality of individual data. As



part of its mission to keep its Members updated on new projects and new Mn applications, IMnI published in 2019 a new report on Manganese sulphate producers in China, and new production figures of electrolytic manganese dioxide (EMD). Both Manganese sulphate and Manganese dioxide can be used to manufacture lithium-ion batteries.

A new showroom website was built in 2019, to better inform the public about the IMnI services, and to spread fair and accurate messages on Manganese. A new extranet was also developed for IMnI Members to provide easier and more efficient access to IMnI publications and services.

As for 2020, the IMnI is working on several new projects, new events in South Africa, China and India, to continue improving the value-proposition to IMnI Members, in terms of networking and events, market research, regulatory support and health, safety & environment (HSE).

Aloys d'HARBURE
IMnI Executive Director



IMnI's 45th Annual Conference takes place in Vienna.

IMnI in 2019

January – March

- IMnI hosts its 16th EPD (Electrolytic Products Division) Conference in Zhangjiajie, Hunan Province, China, on Thursday, March 7th, with its 3 Chinese industry organizations partners and the help of CITIC Dameng. The scope is expanded to include Mn chemicals other than electrolytic (Mn sulphate, trimanganese tetraoxide etc.), due to growing importance of Li-ion battery segment in the overall Mn market. The event is a major success once again, as it remains the premier global Mn Metal and Mn Dioxide Conference. The Conference is followed by a technical visit to two EMM plants: Hunan Orient Mining Company and Wuling Manganese plants.

- IMnI is again well represented at the Metal Bulletin's 20th Asian Ferro-alloys Conference, held in Hong Kong. The Mn session, moderated by Executive Direc-

tor Aloys d'Hambure, features James Choi, CEO & Chairman of Simpac, Jian Zhou, Chairman of Guangxi Guikang New Materials, Lei Fei, General Manager, Carbon Steel Alloys Department of China Minmetals Corporation and Edward Li, Deputy General Manager of Qunxian.

- IMnI's 12th Annual China Banquet attracts over 70 representatives from Chinese Mn companies to meet Western producers in Hong Kong. This yearly event aims to improve ties between Members and allows IMnI to send a special message to the Chinese companies. This edition is hosted jointly by Asia Minerals/Kudumane, Assmang, Autlán, Eramet Comilog Manganese, Glencore International AG, Ntsimbintle Mining, OM Holdings, South32, Tshipi é Ntle and United Manganese of Kalahari.

- Linze Hongxin Mineral Industry Company, Ningxia Jiyuan Metallurgical Group Co. Ltd. and Bosai Mine-

rals Group Co. Ltd. joined as Ordinary Members while Shanghai Qunxian International Trade Co., Ltd. and Sinosteel Resources Co., Ltd. joined as Affiliate Members.

April – June

- IMnI's 45th Annual Conference takes place in Vienna. Structured around the theme "Rethinking Manganese in Changing Times: New Directions for Europe", main speakers include: Robert Ward, Editorial Director of the Economist Intelligence Unit; Sebastien Leger, Partner of McKinsey & Company Inc. France, Denny Sabah, Business Development for Clarksons Platou, Anthony de Carvalho, Senior Economist of the OECD, Dennis Alvarenga, Head of Global and European Procurement Strategy, Digital Transformation for ArcelorMittal, Aloys d'Hambure, IMnI Executive Director, Kevin Fowkes, Managing Consultant for AlloyConsults, Pedro Larrea, CEO of Ferroglobe, Paul Desportes, Senior Vice-President Commercial Nickel and Manganese Mining

Divisions of Eramet, Kevin Fowkes, Managing Consultant for AlloyConsults, Jack Bedder, Director at Roskill, Dr. Ulrike Dydak, Professor of Health Sciences at Purdue University and Brandon Cline, IMnI HSE & Regulatory Affairs Manager. This year's conference is attended by a record of 200+ participants. Technical Tours to 3 manganese alloys plants (Eramet and Ferroglobe in France and OFZ in Slovakia) is a success with 60 delegates who participate to the visits. Generous sponsors include Asia Minerals, Assore, Autlán, Eramet, OFZ, South32 and United Manganese of Kalahari.

- Tata Steel Limited joined as Ordinary Member and Guangxi Hourong Trading Company as Affiliate Member.

45th ANNUAL CONFERENCE

June 10-12, 2019

Intercontinental Hotel Vienna



July – September

- IMnI partners with IFAPA to organize the 2019 International Ferroalloys Conference in New Delhi. Sandeep Kapur, Marketing Manager of South32 chairs the Manganese Alloys & Ore session and the speakers were Aloys d'Harambure, IMnI Executive Director, C.B. Atulkar, Executive Director (Tech) of MOIL Ltd., Paul Desportes, Sr. VP (Commercial) – Mining & Metal Division of Eramet Group and Gautam Kumar, Director of Asia Minerals Ltd.

- IMnI organizes a 2-day HSE and technical workshop on September 18-19 in Ningxia Province, hosted by IMnI Chinese member Ningxia Shengyan. 70 international delegates from 11 countries are in attendance. Discussions on health, safety and environment, improvement at manganese alloy smelters along with the visit of two manganese plants (Ningxia Shengyan and Ningxia Tianyuan Manganese) are part of the workshop program.

October – December

- Gulf Manganese Corporation Limited and Inner Mongolia Puyuan Ferroalloy Co., Ltd. joined as Ordinary Members, and Euro Manganese Inc. as a Mn Processor of Special Products.

- Aloys d'Harambure, IMnI Executive Director, moderates the Manganese session at Metal Bulletin 35th International Ferro-Alloys Conference in Budapest, and Jeff Watson, Executive VP of Sales and Marketing of Ferrolobe is invited to join the panel discussion.

Manganese in 2019

Quarter 1

- Chinese Hu-Cheng Mining company has embarked on the construction of Zambia's largest Manganese smelter
- Guyana Manganese Inc. to start a new manganese project in the northwest of Guyana
- Canadian Euro Manganese tables preliminary economic assessment for Czech tailings project
- Canada's American Manganese reaches a milestone as Kemetco starts sample testing at recycling pilot plant
- Aquila Resources wins the right to mine a deposit which holds an estimated 147.8 million mt of manganese ore in Northern Cape, South Africa
- Growing manganese metal capacity in Indonesia to shrink China's exports there
- Burkina Faso says Paris court dismissed 2.2 billion dollars claim over manganese mine contract
- MOIL is expected to begin production at its Parsoda manganese mine in the Nagpur district of Maharashtra state, India, by the end of April
- South African manganese ore exports hit 1.61-mln-tonne record in March

Quarter 2

- The US threatened to impose tariffs on some EU manganese alloys to put pressure on the EU to end Airbus subsidies
- US Bryah Resources signs \$7.3m man-

gane deal with OM Holdings for Bootu Creek mine in Australia

- Ghana's soaring manganese ore output boosts competition
- South32 examines options for its manganese alloy smelters in South Africa and Australia, including potentially selling or closing them
- South Africa still top seaborne manganese supplier, accounting for more than 35% of global production
- Perth-based Gulf Manganese expects to start direct shipping ore (DSO) manganese operations at its Kupang project in West Timor, Indonesia, in June, with exports to follow shortly thereafter
- Ferroglobe announces the sale of Spanish hydro facilities with one ferroalloys plant to TPG Sixth Street Partners
- Tshipi é Ntle Manganese Mining agree on Mn mining deal with South32 in South Africa
- Element 25 progressing pre-feasibility study on budget and on time for its Butcherbird Manganese Project in Western Australia
- Eramet is searching for about €640 millions in financing to fund expansion of its manganese mine in Gabon

Quarter 3

- Premier African Minerals announced a strategic loan of owners of \$1.35m to MN Holdings, the owner and operator of the Otjozondou manganese mining project in Namibia



- Gulf Manganese makes a move into Timor-Leste by acquiring a 20% interest in Iron Fortune
- Giyani receives environmental approvals for two Botswana manganese projects
- Vale put up manganese assets for sale in Brazil
- Ghana Manganese Company resume operation after 4 days of closure
- India's Mohashakti Ferro Alloys plans ferro-alloy plant at Jajpur in Odisha state by January 2020
- OM Holdings and Bryah Resources agreed to establish the Bryah Basin Manganese Joint Venture in Australia
- Musamu Resources is developing the Luongo Manganese project in Zambia
- India goes deep-sea mining for polymetallic and manganese nodules
- Ferroglobe completes Spanish asset sale
- The richest-known Mn deposit in North America, Emily manganese project moves one step further

- Transnet and Kalagadi Manganese cement partnership with Meca 2 contract in South Africa

- Giyani formally exits gold exploration in South Africa to focus on manganese projects

- Tshipi Borwa starts Mn exports from Luderitz in Namibia
- MOIL signed a detailed memorandum of understanding with Gujarat Mineral Development Corporation to take up joint exploration of manganese bearing areas in the western state of India

Quarter 4

- The federal government's Northern Australia may fund renewables-powered manganese metals projects in Western Australia
- BSBK Resources Limited/Green Core Enterprises Limited starts Mn ore production in Zambia
- South32 is considering selling its manganese alloy assets in South African and Tasmania
- SUYOG Natural Resources set a new Manganese mine in Mansa, Zambia
- Indian Maithan Alloys Ltd is looking to incorporate a wholly-owned subsidiary for its proposed greenfield project at Bankura
- Keras Resources' Nayega manganese project expected to start production in early 2020 in Togo
- Kalagadi Manganese supplies up to 1 Mtpa of beneficiated manganese with further potential to increase output mine in Hotazel in the Northern Cape

IMnI MARKET RESEARCH

"IMnI provides the most comprehensive manganese industry market research available."

Circulated on a monthly basis, [IMnI reports](#) examine both production and consumption, and the balance between the two, looking at the industry from both sides of the supply demand equation. The primary objective of these reports is to offer an analysis of the immediate past, which can provide the basis for Members to develop a greater understanding of their business.

IMnI Executive Director Aloys d'Harambure examines manganese ore and alloy consumption as they relate to the steel industry with the application of an industry model. This systematic approach provides increased accuracy to better understand and anticipate changes in the industry. A detailed analysis of IMnI data is also published on a monthly basis.

Our [China](#) and [Rest of the World Weekly Reports](#) summarise the most important news of the industry.

IMnI also issues [monthly trade matrices for Mn Ore, Alloys, EMM and EMD](#), [steel production statistics by country](#), and a [database of current and future manganese producers](#).

All IMnI data is available to IMnI Members via our website www.manganese.org

MESSAGE FROM THE STATISTICS COMMITTEE CHAIRMAN

"IMnI market research continues improving with more accurate reports sent to IMnI Members"

IMnI statistics and market research reports represent one of the most important services IMnI Members benefit from. Our statistics are considered the most accurate in the manganese community, as they are based on data collected on a monthly basis from major manganese ore, alloy and metal producers. Confidentiality for producers is ensured with a 6-month time-lag in production data by country, but production figures by region are published with a data time-lag of only 1 month (i.e. in January, December's data is published). IMnI reports analyse production, demand, but also inventory, imports and exports for several Manganese products.

In 2019, IMnI improved its trade matrices, which now show imports and exports by province in Australia, Japan, China, India and Brazil, in addition to statistics by country, allowing IMnI Members to run more detailed analysis of the Manganese market in these countries.

Because any market research analysis on Manganese requires field trips and discussions with producers, IMnI organised several technical visits in 2019, including in Dunkirk to visit Eramet and FerroGlobe, in Slovakia to visit OFZ, in China's Ningxia province to visit Ningxia Shengyan and Ningxia Tianyuan Manganese, and in Hunan province at Wuling Manganese. The IMnI staff also visited additional companies recently, including one of MOIL's underground mine in India, Arcelor Mittal in Luxemburg, and Liberty Steel in the UK.

A special report on Manganese sulphate production in China was also published, with production figures by company, and a breakdown between standard-grade and high-grade Mn sulphate production. We also published updated statistics for Electrolytic Manganese Dioxide (EMD) production, by grade (alkaline, lithium manganese oxide, and carbon-zinc grade), in China and in the rest of the world. A new extranet was also developed, where IMnI Members can access all IMnI reports and publications, including an Online Database of IMnI statistics, updated monthly.

Our database of Manganese producers now includes information on more than 2000 producers, future projects, consumers and industry service providers. Maps of Mn producers by country were also updated.

In the future, we plan to continue improving the quality of IMnI reports by publishing more information on Mn chemical producers, a growing sector of our industry.



Guillermo RECIO
IMnI STATISTICS
COMMITTEE
CHAIRMAN

STATISTICAL PACKAGES ARE AVAILABLE FOR NON-MEMBERS: ENQUIRE AT

stats@manganese.org

IMnI offers the most comprehensive and detailed statistics available on manganese

Manganese production, demand and inventory statistics collected directly from IMnI Members on a monthly basis

Monthly import and export data by country for manganese ore, silico-manganese, high-carbon and refined ferro-manganese, manganese metal and manganese dioxide.

Steel production report, country-by-country every month

Complete database of manganese producers and future projects, with filter by product and by country, with capacity.

MANGANESE MARKET OVERVIEW

"In 2019, the global Manganese industry became increasingly fragile, because of its growing dependence on China's steel sector"

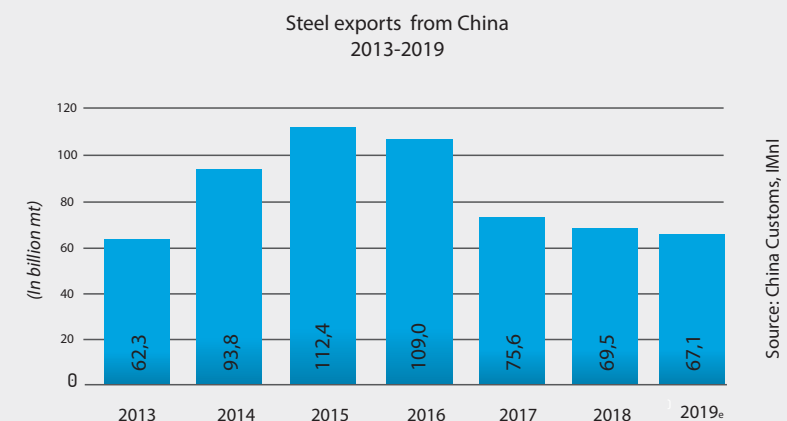
STEEL: Global steel production continued rising in 2019, but China accounted for most of this growth, while steelmakers in many other countries reduced output.

Global crude steel production continued increasing in 2019 for the second consecutive year, rising by 5.3% from 1.83 billion mt in 2018, to 1.88 billion mt in 2019, a new record high. Around 53 million additional tons were produced globally in 2019 compared to the previous year. In China, no less than 61 million additional tons were produced in 2019 compared to 2018, while production in the rest of the world contracted by 7.8 million tons, due to sluggish demand from downstream sectors, especially the automotive industry in Europe.

For the first time, China's production exceeded 1 billion mt in 2019, growing by 6.4% from 947 million mt in 2018, and now representing 54% of global output. China planned to cut steel capacity by 100 to 150

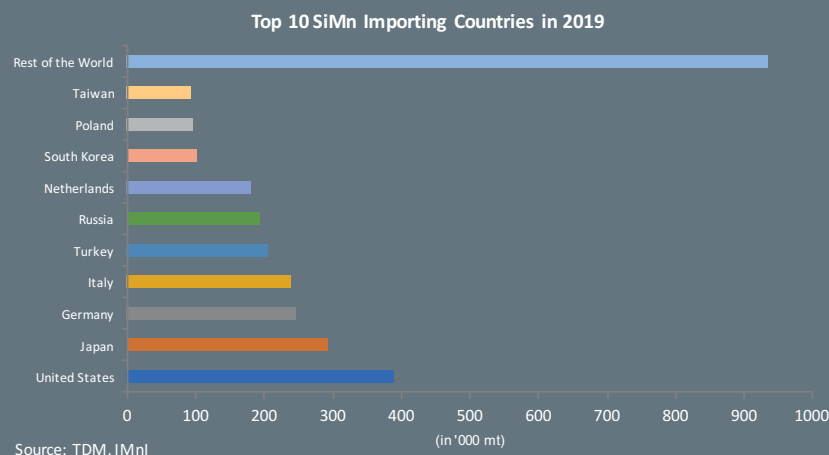
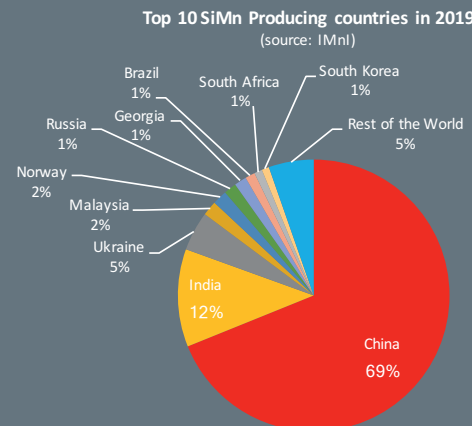
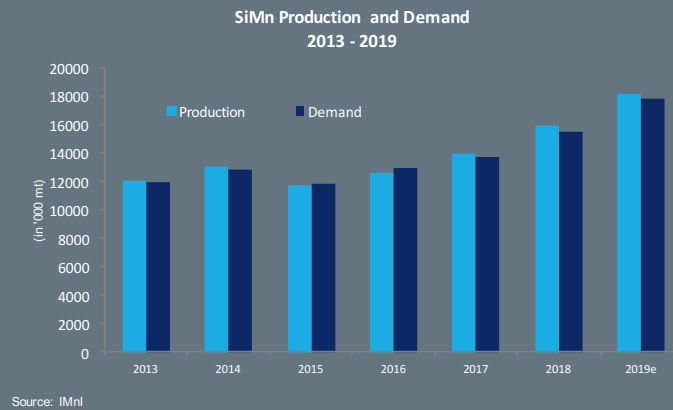
million mtpy by 2020, to reduce overcapacity and air pollution, and indeed all induction furnaces were closed over the last few years.

But larger steelmakers continue ramping up, although China's exports contracted for the fourth consecutive year in 2019, by 4% to 67.1 million mt. In the rest of the world, a few major steel-producing countries increased output in 2019, including Ukraine (+4%), the USA (+3%), the Middle East (+4%) and India (+4%), while production contracted in Europe (-4%), Brazil (-7%), Japan (-4%) and to a lesser extent South Korea (-0.1%), according to partial data published by World Steel Association. Steel production statistics by country are available [here](#) (for IMnI Members only).



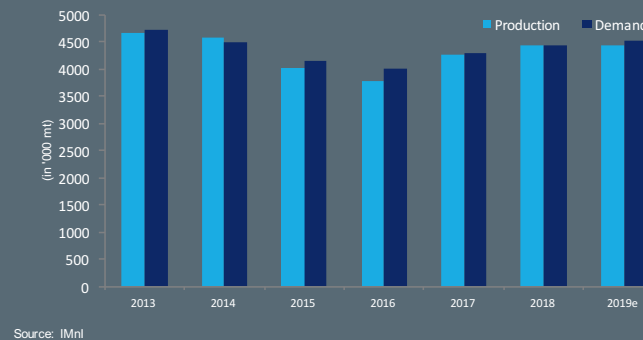
SiMn

Global SiMn production expanded significantly in 2019, for the fourth consecutive year, reaching 18.2 million mt, up by 14% from 15.9 million mt in 2018. The output growth was driven mainly by China (+23% from 2018), because of rising steel quality being produced by local mills, and because of the strong growth of China's steel output in 2019. Among the other biggest producers, SiMn production only expanded in Malaysia and South Africa, while it contracted in India, Ukraine, Norway, Russia, Georgia, Brazil and South Korea. China now accounts for a huge 69% of global silico-manganese production, followed by India with 12% and Ukraine (5%).



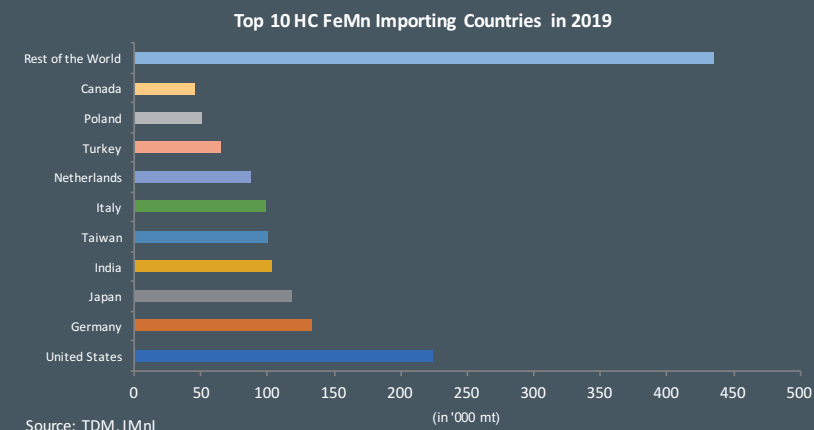
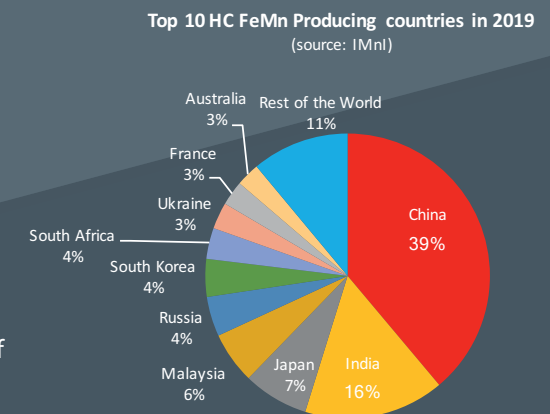
Statistics for production, demand, inventory and trade of Mn ore & alloy are available by region [here](#) (for IMnI Members only), and by country [here](#).

HC FeMn Production and Demand 2013 - 2019



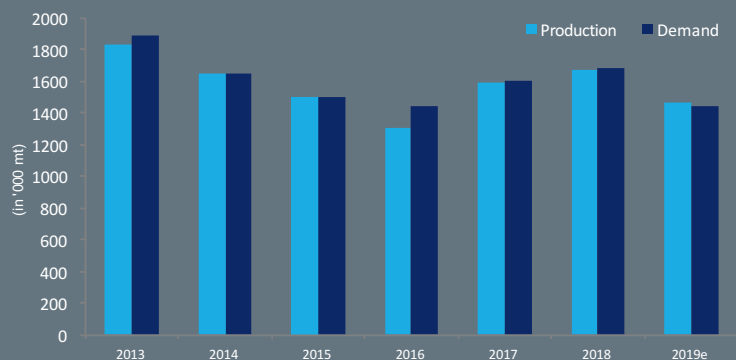
HC FeMn

The world's output of high-carbon ferro-manganese remained stable in 2019, around 4.4 million mt (only 0.2% higher than in 2018). Among the world's biggest producers, output expanded only in China (+7%, to 1.7 million mt), while it decreased in India, Malaysia, Russia, South Korea, South Africa, Ukraine, France and Australia (Japan's output remained stable in 2019). China now accounts for 39% of global HC FeMn production, followed by India (16%) and Japan (7%).



Statistics for production, demand, inventory and trade of Mn ore & alloy are available by region [here](#) (for IMnI Members only), and by country [here](#).

Ref FeMn Production and Demand
2013 - 2019

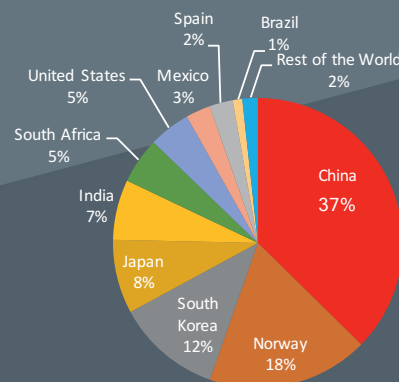


Source: IMnI

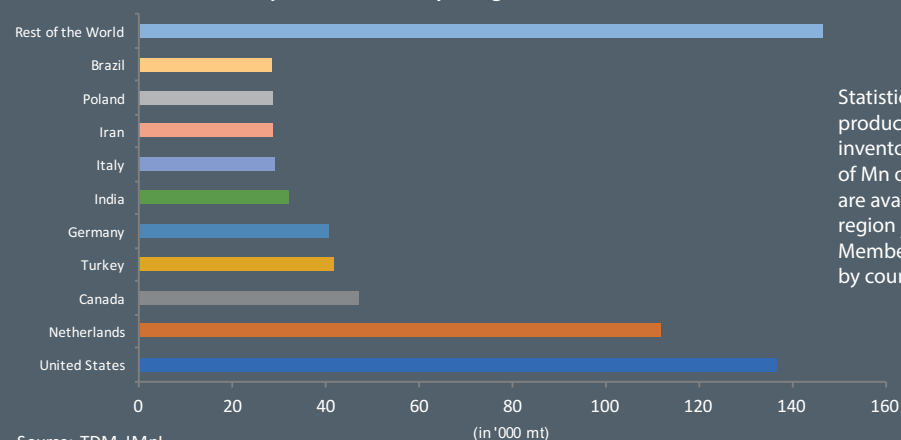
Ref FeMn

Global production of refined ferro-manganese contracted in 2019 1.46 million mt, from 1.66 million mt in 2018. Most of the production cut took place in China, where production contracted by 29% in 2019 according to IMnI estimates, based on data collected by local consultancy company CNFEOL. China now accounts for 37% of global refined FeMn production, followed by Norway (18%) and South Korea (12%).

Top 10 Ref FeMn Producing countries in 2019
(source: IMnI)



Top 10 Ref FeMn Importing Countries in 2019



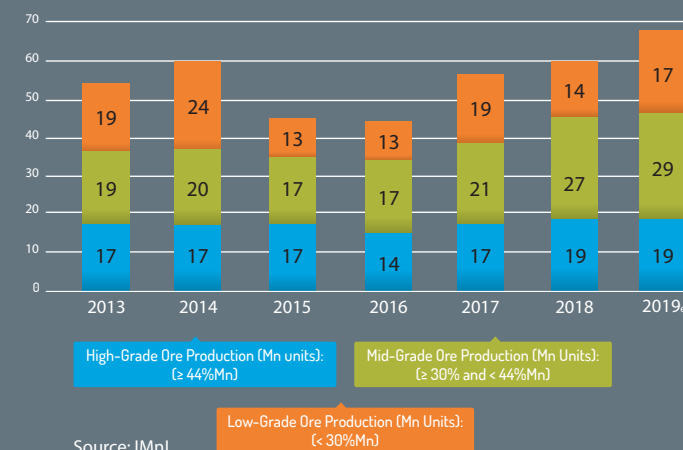
Statistics for production, demand, inventory and trade of Mn ore & alloy are available by region [here](#) (for IMnI Members only), and by country [here](#).

Source: TDM, IMnI

Mn Ore

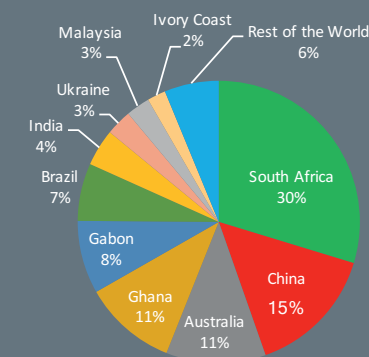
The world's output of Manganese ore reached 65.4 million wet mt in 2019, up by 9% from the previous year. Low grade supply grew faster (+27%) than mid-grade (+6%) and high grade (+2%). The major contributor to this increase was China (+20% in 2019), followed by Ghana (+42%), Ivory Coast (+58%), Brazil (+39%) and Gabon (+7%). Production contracted in Australia, India, Ukraine, Malaysia and the rest of the world. South Africa now accounts for 30% of global Mn ore production, followed by China (15%) and Australia (11%).

Global Mn Ore Production
2013-2019

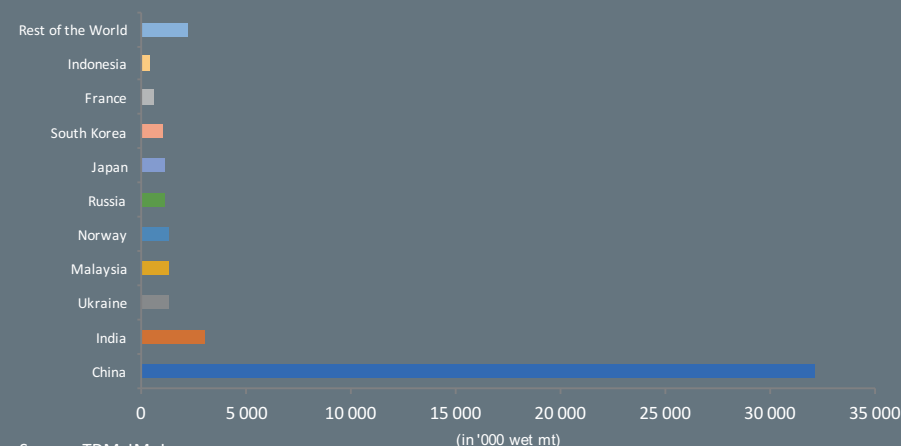


Source: IMnI

Top 10 Mn Ore Producing countries in 2019
(source: IMnI)



Top 10 Mn Ore Importing Countries in 2019

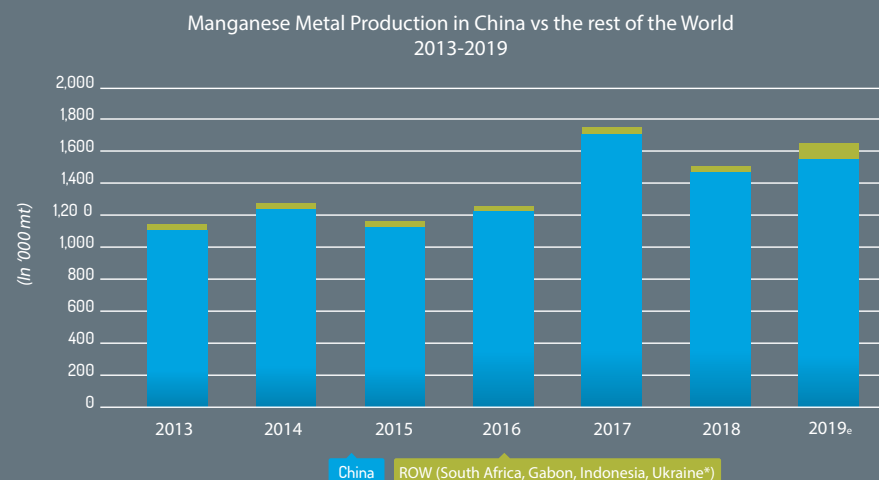


Source: TDM, IMnI

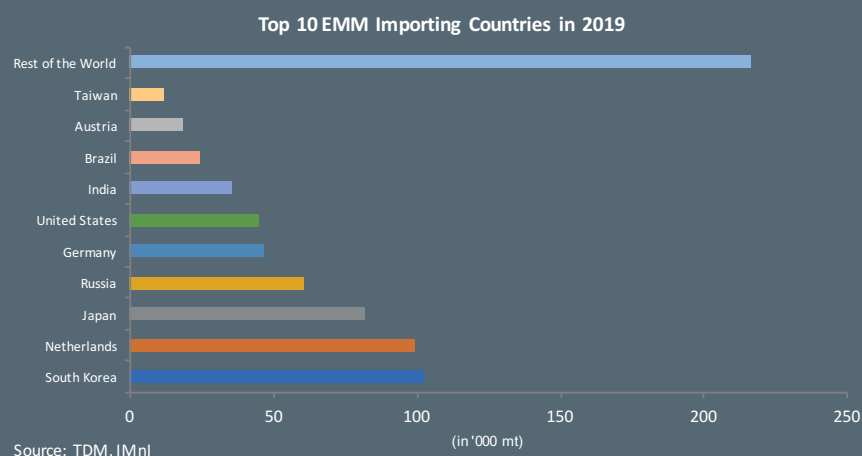
A database of manganese producers and future projects is available [here](#) (for IMnI Members only).

MANGANESE METAL

Manganese metal production rebounded in 2019, rising by 7% from 2018 to 1.625 million mt. Output growth was mostly due to Chinese producers (+4%), and to Tsingshan's new plant in Indonesia, which started production in Q4 2018, and continued ramping up in 2019. Production in South Africa remained stable year-on-year, but Gabon and Ukraine reduced output in 2019. China now accounts for 94% of global production.

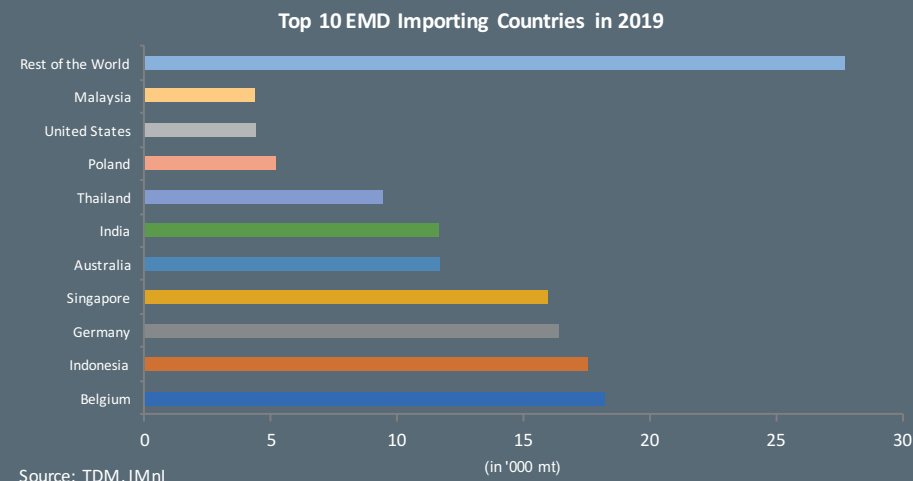


* Manganese metal produced at Privat's plant Zaporozhye in Ukraine aluminothermic manganese metal, not electrolytic

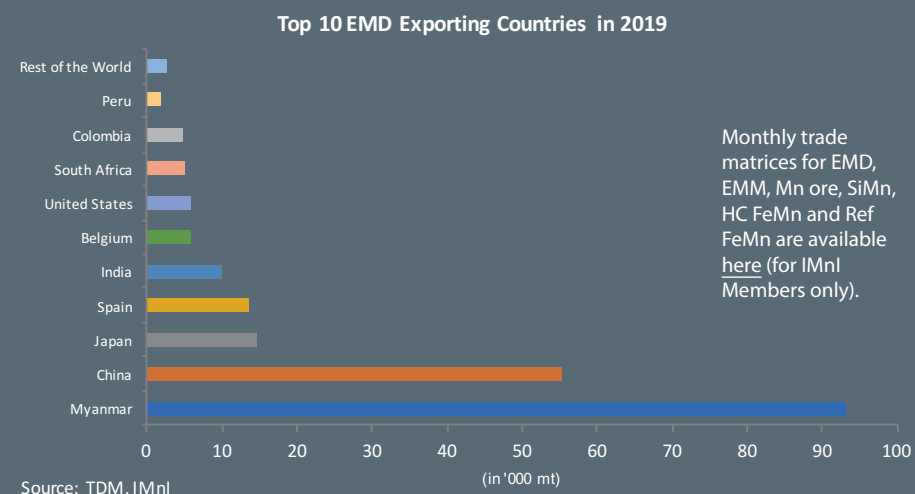


EMM production statistics are available [here](#) (for IMnI Members only):
 - by country in IMnI Monthly Manganese Metal Production Data
 - by province in China in IMnI Monthly Data – China

ELECTROLYTIC MANGANESE DIOXIDE (EMD)



Source: TDM, IMnI



Source: TDM, IMnI

Monthly trade matrices for EMD, EMM, Mn ore, SiMn, HC FeMn and Ref FeMn are available [here](#) (for IMnI Members only).



09:00 - 11:00

HSE Committee Meeting

HSE: Social Responsibility

The mission of the HSE Committee is to develop the IMnI as the platform for providing the Mn industry with guidance, tools and information that will allow it to anticipate occupational health, environment and safety demands whilst improving workers safety, sustainability and ensuring industry profitability. To support this mission, the committee answers three main objectives:

- To identify those HSE topics that can impact on the Mn industry and to provide answers.

- To establish and employ a global network that can provide appropriate HSE expertise to IMnI, when necessary.
- To provide relevant information and support to members enabling them to promote and pro-actively ensure their interests when faced with new regulatory demands.

MESSAGE FROM THE HSE COMMITTEE CHAIRMAN

"Blazing a clear path"

2019 was a foundational year for the HSE Committee with the objective of blazing a clear path forward to 2020 and beyond.

We continued our work with the MIG in preparations for the ever-delayed US Mn re-assessment. This led to the retainment of a second scientific consultant agency and preliminary engagement with the US Environmental Protection Agency (USEPA). A final push, to obtain the raw data from USEPA funded studies, will be made in 2020. Initial feedback from USEPA is promising. MIG, with IMnI support, will continue to prepare data for USEPA and the Mn re-assessment which most likely will be delayed into 2021.

The Manganism project, with Risk Sciences International (RSI), passed a vital milestone in 2019 with all foundational work being complete. 2020 will realize the draft diagnostic criteria, and RSI is set to publish multiple systematic reviews. As such, industry will be well poised going forwards and completion of the Manganism project will create a powerful guideline for industry, health practitioners and employees.

The HSE Committee also co-established the China Associations Coordination Group (CACG). This saw the signing of an agreement in early December with China's Ministry of Ecology and Environment (MEE) to develop risk assessments for metals. The work will help to harmonize China with other jurisdictions and create long-standing guidelines.

We have also strengthened IMnI's standing with the International Council on Mining and Metals (ICMM). IMnI took leadership over a

subgroup whose objective is to engage the USEPA and provide up to date data. Two tele-conferences were held in 2019 with another scheduled for early 2020. All participants have shared insights on how to successfully interact with the USEPA and methods of data sharing. The group has already brought forth some concessions by USEPA to emphasise when an assessment is extremely dated as well as the possible inclusion of non-USEPA data into their chemical database.

The HSE Committee looks forwards to the completion of many of the IMnI Studies projects in 2020 along with deliverables from RSI. All of the HSE Committee's projects have set an efficacious path for many years to come.



Rocklin REED
IMnI HSE COMMITTEE
CHAIRMAN



2019 REGULATORY HIGHLIGHTS



Quarter 1

- European Commission bans multiple metals including Mn in paper products
- United States Environmental Protection Agency (USEPA) hosted Toxic Substances Control Act (TSCA) inventory reporting webinar
- Taiwanese Ministry of Labor requires reporting of handling information priority management chemicals including Potassium permanganate, sodium permanganate and Manganese 2-methylcyclopentadienyl tricarbonyl
- USEPA officially announces that the Integrated Risk Information System (IRIS) Mn re-assessment is delayed at least to 2020
- US state of Iowa looks to ban Mn containing slags in road construction

Quarter 2

- Health Canada releases draft of Mn in drinking water guideline
- Canadian Mn drinking water guideline becomes final with a maximum acceptable concentration (MAC) of 0.12 mg/L (120 µg/L)
- European Chemicals Agency (ECHA) updates labeling classification of Mn₃O₄ to any mixture, including ores, containing 3% or more of Mn₃O₄ will now be considered as reproductive toxic category 2 (suspected developmental effects).
- Egypt proposes Mn migration limits in toys in line with the E.U. and ISO standards
- The European Committee for Standardization (CEN) published a new standard for migration of substances in toys with three categories
- Australia publishes Manganese: Human health tier II assessment

Quarter 3

- South Korea includes Mn in Clean Air Conservation Act revision as a volatile organic compound (VOC)
- Indian researchers have label Mn as an endocrine disruptor
- Canada Updates Mn assessment time frame including Manganese Draft Screening Assessment scheduled for Oct. 2020 to March 2021
- New Zealand updates national chemicals inventory including Mn compounds
- Turkey's textile market suffers from overexposure to potassium permanganate
- International Council on Mining and Metals warns that Digital tax to negatively impact mining sector
- Israel proposes updated Mn migration limits for toys
- American Conference of Governmental Industrial Hygienists (ACGIH) updated its list of substances for threshold limit values (TLVs). ACGIH will look at Mn in welding fumes

- Pennsylvania law makers are unilaterally proposing a strict 0.3 mg/L Mn limit for all surface waters
- USEPA announced it will delay the science transparency rule which requires that the regulatory science underlying EPA actions be made publicly available
- Canada looking to assess nano Mn oxides

Quarter 4

- California biomonitoring study detects Mn in all subjects
- The Gulf Cooperation Council (GCC) aligns toy safety with EU
- Swedish Work Environment Authority (AV) warns against Mn exposure
- Integrated Risk Information System (IRIS) funded for 2020

UPDATE ON HSE SPECIAL PROJECTS 2019

"Leading the charge with the best available science"

IMnI STUDIES

Relationship of hair manganese and internal tissue Mn accumulation as a biomarker for internal Mn dose responses

This project was funded late 2018 and is slated to finish in 2021. The Joint efforts of Albert Einstein College of Medicine and Purdue University will clearly demonstrate if the concentration of manganese found in hair can be representative of actual internal manganese accumulation following exposure. It will either validate or invalidate hair as being a reliable biomarker for Mn exposure. Hair is being relied upon in several external studies as evidence that environmental Mn exposure results in potential negative impacts. As of writing, the project is running on time and parts are ahead of schedule.

Can toenail Mn levels predict brain Mn levels?

Purdue University also received funding in late 2018 to confirm if toenails can predict actual Mn levels seen in the brain following workplace exposure in welders. The study protocol involves the collection of toenail samples as well as personal air samples from welders to determine a definitive time point when the toenails are representative of actual Mn levels found in brain using Magnetic Resonance Imaging (MRI). If successful, the work will provide a suitable solution for workplace biomonitoring. Toenail sample collection and air monitoring will continue for the duration of 2020. Professor Ulrike Dydak presented preliminary results from both her toenail project and the hair project above at the 2019 IMnI Annual Conference. The project is on time.

Investigation of metabolites related to manganese exposure in metalworkers using targeted mass spectrometry methods

Funded early in 2019 and slated to run for just over a year, the University of Washington will analyze urine metabolites of welders exposed to Mn fumes. Samples have already been collected and analyses are ongoing. A previous global metabolomics study has already identified 9 possible candidates that were correlated to Mn exposure. However, the metabolites could not be identified during this study. The IMnI funded project will seek to identify these metabolites and could lead to an extremely simple Mn workplace exposure biomonitoring tool. The project is on schedule.

Factors Impacting Zinc Cation Intercalation into Manganese Oxide Structures for Rechargeable Aqueous Zinc-Ion Batteries

This is currently the only non-health related IMnI study, which received funding mid-2019 and is scheduled to run for two years. A Canadian startup, Salient Energy, will look to continue the development of their Zinc-Manganese battery designed for large energy storage and fast charge and discharge rates. The group will work together with the University of Alberta. The work by Salient aims to bring manganese battery technology to power plants and wind turbines as well as shine a positive spotlight on Mn in the eyes of regulators. It will help the manganese community continue to lead in sustainability.

MANGANISM

Risk Sciences International continues to delivery on time for the Manganism Project which was originally commissioned early 2018. 2019 saw the delivery of 2 phases of the project instead of one as planned. In 2020, RSI will publish significant reviews that, as fate would have it, will also bolster work being conducted with the Manganese Interest Group. RSI will deliver the draft Clinical Diagnostic Criteria for Manganism in 2020 which is planned to be validated in 2021. The validated Criteria would provide possibly the strongest health protection yet for both workers and employers in the manganese industry.

MANGANESE INTEREST GROUP (MIG)

To balance negative industry impacts in the United States, the Manganese Interest Group (MIG) commissioned a review to evaluate the conclusions of studies funded by the US

Environmental Protection Agency (USEPA). The initial review has now been published and MIG has continued this path in 2019 by retaining a second scientific consultancy to conduct a follow-up systematic review and to directly engage the USEPA. During 2019, USEPA officially pushed back their manganese re-assessment to 2020 and indicators suggest that the delay is likely to go into 2021. IMnI will continue to work with and support the efforts of MIG in continually providing better science to USEPA in 2020. Additionally, MIG with IMnI support, will seek to obtain the raw data from USEPA funded studies so that conclusions and penalties based on these data can be verified by an independent third party.



ELECTROLYTIC PRODUCTS DIVISION (EPD)

THE IMnI ELECTROLYTIC PRODUCTS DIVISION (EPD):

- Focuses on electrolytic manganese metal (EMM), electrolytic manganese dioxide (EMD) and other manganese chemicals (MnSO₄, Mn₃O₄, MnO, etc.)
- Collects production and trade data on electrolytic products
- Provides coverage and weekly analysis of EMM and EMD markets in China through on the ground investigation by our IMnI China Representative
- Acts as a forum for discussion of industry matters, particularly those relating to health, safety, environment and regulatory affairs

THE IMnI ELECTROLYTIC PRODUCTS DIVISION (EPD)

“The EPD Conference: the premier global EPD event”

Global Electrolytic Mn Metal (EMM) continues to be almost exclusively produced in China, which accounts for over 94% of total world production. China produced an estimated 1.53 million mt of the metal in 2019 (+4% compared to 2018). Much of this output is used within the country to produce stainless steel 200 series (SS200) and speciality steel. China also exported around 444,000 mt of EMM in 2019, which is 4.5% less than in 2018, because Chinese company Tsingshan started producing EMM in Indonesia (for internal consumption at its Indonesia stainless steel mill), and therefore stopped importing EMM from China (in 2018, Indonesia imported 20,000 mt of EMM from China). Other applications for which EMM is a vital ingredient include aluminium and high-strength steels.

Electrolytic Mn Dioxide (EMD) is a major raw material for the production of alkaline batteries, an essential part of our daily lives. The EMD industry is smaller than that of Mn alloys and EMM, but no less important. Total annual production capacity is roughly 550K mt. IMnI EMD Members are present throughout the world, supplying major battery companies like Energizer and Duracell. Members include Citic Dameng in China, MOIL in India, Prince/Erachem in the USA & China, and Tosoh in Greece & Japan. IMnI represents a forum where EMD members can work

to strengthen the industry and ensure a sustainable future marketplace. At the beginning of 2019, IMnI published 2018 EMD production figures by grade and by country (for IMnI Members only), and an update with 2019 production figures will be published at the beginning of 2020.

The Electrolytic Products Division (EPD) hosted its 16th EPD Conference on Thursday, March 7, 2019 in Zhangjiajie, Hunan Province (China), with a technical tour on Friday, March 8 to visit EMM producer Wuling Manganese. Once again IMnI partnered with three Chinese industry organizations and the event proved to be the largest global EPD conference of the year with some 170 delegates in attendance. The program was filled with first rate international and domestic speakers, who covered market dynamics and trends within these industries. Major topics included:

- Environmental protection in China and its impact on the EMM/EMD industries
- NCM battery applications and market forecast
- Use of EMM, LC SiMn and M/LC FeMn in steel products
- China Mn ore industry update

The IMnI 17th EPD China Conference will be held on Thursday, March 12, 2020 in Chengdu, Sichuan province (China), with a technical tour on Friday, March 13 to visit EMM plant Zhongzhe.

For more information about IMnI conferences, contact us at: events@manganese.org

UPDATE ON THE CHINA COMMITTEE

The China Committee has 6 seats, and is chaired by Mr. Li Weijian, General Manager of Citic Dameng, who was elected in June 2017, in replacement of Mr. Jin Xiaoguang, Vice General Manager of Minmetals Development Co., Ltd.

With 7 new Chinese companies joining the IMnI in 2019, the China Committee now represents a total of 21 Chinese IMnI Members, including 10 producers of Mn alloys, 1 producer of electrolytic products and Manganese ore, and 10 major trading companies.

The Committee aims to assist IMnI in enlarging its membership base in China, to provide IMnI Members with accurate statistics on China, to facilitate the networking between Chinese companies and IMnI Members from the rest of the world, and to support Chinese Members in terms of HSE, market research and technical information.

The China Statistics sub-committee organised a meeting in Hangzhou in October 2019, animated by IMnI China Representative Ms. Eva Yang, to discuss the latest IMnI statistics. This event was attended by 26 companies, including most IMnI Chinese Members, and some Members from the rest of the world with offices in China.

In September 2019, the China Committee organised a Technical & HSE Workshop, in Ningxia province, which was hosted by Chinese IMnI Member Ningxia Shengyan. More than 60 delegates from 11 countries attended, to have technical discussions on energy consumption and furnace optimization, networking sessions, and technical visits of Ningxia Shengyan and Ningxia Tianyuan Manganese (TMI), the world's biggest Mn metal producer.



45th ANNUAL CONFERENCE June 10-12, 2019 Intercontinental Hotel Vienna



THE ANNUAL CONFERENCE IMnI's Premier Event

IMnI's 45th Annual Conference took place in Vienna on June 10-12, attracting 200+ delegates from 120 companies based in 34 countries.

Structured around the theme "Rethinking Manganese in Changing Times: New Directions for Europe", main speakers include: Robert Ward, Editorial Director of the Economist Intelligence Unit; Sebastien Leger, Partner of McKinsey & Company Inc. France, Denny Sabah, Business Development for Clarksons Platou, Anthony de Carvalho, Senior Economist of the OECD, Dennis Alvarenga, Head of Global and European Procurement Strategy, Digital Transformation for ArcelorMittal, Aloys d'Harambure, IMnI Executive Director, Kevin Fowkes, Managing Consultant for AlloyConsults, Pedro Larrea, CEO of Ferroglobe, Paul Desportes, Senior Vice-President Commercial Nickel

and Manganese Mining Divisions of Eramet, Jack Bedder, Director at Roskill, Dr. Ulrike Dydak, Professor of Health Sciences at Purdue University and Brandon Cline, IMnI HSE & Regulatory Affairs Manager.

Two panel discussions were part of the program: on global trade and steel on the first day and on manganese on the next day.

After the conference, technical tours to three manganese alloys plants (Eramet and Ferroglobe in France and OFZ in Slovakia) were a major success with 60 delegates who participated to the visit.

Generous sponsors included Asia Minerals, Assore, Autlán, Eramet, OFZ, South32 and United Manganese of Kalahari.

COMPANIES WHICH ATTENDED IN 2019



Abhijeet Ferrotech Limited
 Afro Minerals Trading AG
 Allied Petrochemical B.V.
 Alloys Consulting Luxembourg
 AlloysConsult
 ArcelorMittal Sourcing
 Argus Media
 Asia Minerals Limited
 Asia Minerals North America LLC
 Assore
 Barry Rogliano Salles
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 CITIC Commodities Pte Ltd.
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 Compagnie Minière du Littoral
 Compañía de Minas Buenaventura S.A.A.
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 CRU Group
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 DCM Alloys GmbH
 Demeka Mining Inc.
 DPRC SL
 E+ Plus Company
 Element 25 Limited
 Eramet Comilog Manganese
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 L&M Rohstoffhandelsgesellschaft mit beschränkter
 Haftung
 London Commodity Intelligence Bureau LTD
 Mali Manganese SA
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 OFZ, a.s.
 Oldendorff Carriers
 OM Holdings Ltd.
 Ore & Metal Company Ltd.
 Organisation for Economic Co-operation and
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 Oswal Minerals Limited
 POSCO
 Prince
 Prosperous Resources (HK) Limited
 Purdue University
 Quintal S.A.
 Radhika Metals & Minerals
 Ronly Ltd.
 Roskill
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 Turfes Alyaj Dis Ticaret Ltd
 Ultrabulk South Africa (Pty) Ltd.
 United Manganese of Kalahari (UMK)
 Vilmeks A.S.
 Voestalpine Rohstoffbeschaffungs GmbH
 World Metals & Alloys (FZC)
 Xiangxi Minmetals Co., Ltd.
 YASAI Resources LLP



IMnI 46TH ANNUAL CONFERENCE WILL BE HELD IN CAPE TOWN, SOUTH AFRICA ON JUNE 2-4, 2020

IMnI 46th Annual Conference, scheduled from June 2 to 4, 2020 will gather the global Manganese community in Cape Town, South Africa, on the theme "South Africa at crossroads: diversified Manganese producer or China's miner?". Registration has started and many delegates have already booked their seat, so do not miss the opportunity to learn from industry experts, connect with the Mn community and visit plants and mines in South Africa.

Sponsors to date for this event include Autlán, Asore, Kudumane Manganese (Pty) Ltd., South32, Transalloys (Pty) Ltd., Tshipi é Ntle Manganese Mining, United Manganese of Kalahari (UMK).

Optional technical tours are scheduled on Monday, June 1 and Friday, June 5 to Transnet Port Elizabeth & Coega, Manganese Metal Company (MMC) plant, Transalloys' plant, South32 Mamatwan, United Manganese of Kalahari (UMK) mine, Tshipi's mine, Kudumane Manganese's mine and Assmang's Gloria & Nchwaning mines.

For details and registration, click [here](#).

For more information about the IMnI and its Annual Conference, please contact events@manganese.org or follow us on [LinkedIn](#).

IMnI COMMITTEES

The life of the Institute is regulated by the work done by its committees. There are three standing committees: Health, Safety and the Environment (HSE), Statistics and the China Committee. They meet on average between two and four times a year, and are open to both Ordinary and Affiliate members. Each committee is chaired by a member, while the secretariat is handled by a permanent IMnI staffer. Each also has about a dozen members.

The China Committee has three Sub-Divisions: statistics, technical issues and regulatory affairs.

The Electrolytic Products Division (EPD) operates like a committee and is formed of producers of electrolytic manganese metal and electrolytic manganese dioxide.

Committees are the lifeblood of the IMnI, providing vision, ideas and direction to nourish its fundamental missions.

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Autlán
Autlán
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Eramet Comilog Manganese
Eramet Comilog Manganese
FerroAtlantica, S.A.
Guangxi Guikang New Materials, Co. Ltd.
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Maringá Ferro-Liga S.A.
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South32
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China Committee, Li Weijian, CITIC Dameng Mining Industries

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Fei Lei



Mukund P. Chaudhari



Ngee Tong Low



James Choi



Andrea Cornwell



Ezekiel Lotlhare



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INTERNATIONAL MANGANESE INSTITUTE

IMnI provides vision and guidance to the manganese industry by promoting economic, social and environmental responsibility and sustainability for all stakeholders.



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