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MAGNESITE

(ADVANCE RELEASE)

GOVERNMENT OF INDIA
MINISTRY OF MINES
INDIAN BUREAU OF MINES

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19 Magnesite

Magnesite ($MgCO_3$) is a carbonate of magnesium. It is usually found repeated as an alteration product of serpentine ultramafic rocks and other magnesium-rich rock types formed by replacement of dolomite and dolomitic limestone, as bedded deposits and as irregular veins. Magnesite deposits in India, generally occur as crystalline mass, amorphous and massive. Calcium and silica are the most common impurities found in magnesite along with Fe_2O_3 and Al_2O_3. It is a very important mineral for the manufacture of basic refractories, which could be largely used in the Steel Industry. In commerce, the term 'magnesite' refers not only to the mineral, but also to many products, obtained by calcining the natural carbonate, e.g., caustic magnesite (magnesia obtained by calcining crude magnesite at comparatively low temperatures, 700 to 1,000 °C, and retaining 2 to 7% CO_2 as carbonate) and dead-burnt or refractory magnesite (magnesia obtained by calcining magnesite at high temperatures, 1,500 to 1,800 °C, usually containing less than 0.5% CO_2). Pure magnesite calcined at still higher temperatures (1,600–1,800 °C) to expel carbon dioxide completely is termed as 'periclase' (MgO) in the trade. The dead burnt magnesite and fused magnesia are used in Refractory Industry to manufacture various refractory products. The caustic magnesia or low calcined magnesite is used as animal feed stuff and in the manufacture of oxichloride cement. The Refractory Industry is the major consumer of magnesite.

RESERVES/RESOURCES

The total reserves/resources of magnesite as per NMI database, based on UNFC system, as on 1.4.2015 is about 394 million tonnes of which Reserves and Remaining Resources are 82 million tonnes and 312 million tonnes, respectively. Substantial quantities of resources are established in Uttarakhand (59%), followed by Tamil Nadu (25%) and Rajasthan (14%). Resources are also located in Andhra Pradesh, Himachal Pradesh, Jammu & Kashmir, Karnataka and Kerala.

Occurrences of magnesite in Tamil Nadu are low in lime and high in silica, whereas those of Uttarakhand are high in lime and low in silica. The Gradewise and Statewise reserves and resources of magnesite are furnished in Table - 1.

EXPLORATION & DEVELOPMENT

The exploration and development details, if any, are covered in the Review on Exploration & Development under "General Review".

PRODUCTION

Production of magnesite in 2019-20 at 98 thousand tonnes decreased by 33% as compared to 147 thousand tonnes in the previous year. There were 12 reporting mines in 2019-20 as against 11 reporting mines in 2018-19. Five principal producers accounted for about 96% of the total output during the year 2019-20. Out of total production about 64% of magnesite was contributed by the Private Sector and the remaining 36% by Public Sector during 2019-20.

Tamil Nadu is the major producing State with maximum contribution of 47% to the total output during 2019-20 followed by Uttarakhand and Karnataka.

Mine-head closing stocks of magnesite for the year 2019-20 was 58 thousand tonnes as against 80 thousand tonnes in the previous year.

The average daily employment of labour in magnesite mines during the year was 690 as against 811 in the previous year (Tables- 2 to 5).

MINING AND MARKETING

Magnesite is being worked by open-cast method by developing benches. In Salem area (Tamil Nadu), magnesite is found chiefly as encrustations, veins and stringers in ultrabasic rocks like dunite and peridotite. Stringers and veins occur irregularly in fractures of rocks giving rise to different patterns. Veins are broken and magnesite is sorted out manually. Major magnesite producing mines in Salem area belong to Tamil Nadu Magnesite Ltd (TANMAG a State Government Undertaking), Ponkumar Magnesite Mines, Mysore Minerals, Dalmia Magnesite Corporation (a Private Sector Enterprise) and SAIL Refractory Co. Ltd (a Central Government Undertaking).

Table – 1 : Reserves/Resources of Magnesite as on 1.4.2015
(By Grades/States)

(In '000 tonnes)

	Reserves				Remaining Resources								Total Resources (A+B)
	Proved STD111	Probable		Total (A)	Feasibility STD211	Pre-feasibility		Measured STD331	Indicated STD332	Inferred STD333	Reconnaissance STD334	Total (B)	
		STD121	STD122			STD221	STD222						
All India : Total	**77867**	**165**	**4244**	**82276**	**6210**	**9345**	**45574**	**59010**	**59652**	**131707**	**213**	**311711**	**393988**
By Grades													
High Grade	-	-	-	-	3217	-	3	2	-	26	-	3249	3249
Medium Grade	75021	40	4113	79174	1223	6463	11506	64	109	7954	-	27318	106492
Beneficiable/Low	2701	125	122	2949	595	540	673	648	31558	117667	168	151850	154799
High & Medium Mixed	-	-	-	-	6	173	2059	-	-	100	-	2339	2339
Medium & Low Mixed	-	-	-	-	-	429	29237	58271	27766	207	-	115910	115910
Others	146	-	-	146	1168	1698	2090	24	-	2501	-	7480	7626
Unclassified	-	-	-	-	-	-	-	-	-	83	-	83	83
Not-known	-	-	8	8	-	43	7	-	219	3170	45	3482	3491
By States													
Andhra Pradesh	-	-	-	-	-	-	-	-	-	80	-	80	80
Himachal Pradesh	-	-	-	-	-	-	-	-	-	298	-	298	298
Jammu & Kashmir	-	-	-	-	3210	740	-	-	-	150	45	4145	4145
Karnataka	1264	125	-	1389	566	190	391	88	10	3179	168	4592	5981
Kerala	-	-	-	-	-	-	-	2	-	38	-	40	40
Rajasthan	-	-	-	-	912	1589	2121	-	149	49033	-	53804	53804
Tamil Nadu	73499	40	38	73577	499	6224	11529	17	737	5643	-	24649	98226
Uttarakhand	3104	-	4206	7310	1023	602	31534	58902	58756	73287	-	224103	231413

Figures rounded off

Table-2: Principal Producers of Magnesite, 2019-20

Name & address of producer	Location of mine	
	State	District
Almora Magnesite Ltd, Village Matela, P.O. Billori, Distt Bageshwar-263 630, Uttarakhand.	Uttarakhand	Bageshwar
S. Sundararajan, 5/22-A, Periyakollapatti Kannankuruchi, Post – Gorimedu, Distt Salem -636 008, Tamil Nadu.	Tamil Nadu	Salem
India Magnesia Product Limited, No. 11/239, Ramakrishna Road, Balaji Towers, 3rd floor, Distt Salem – 636 007, Tamil Nadu.	Tamil Nadu	Salem
N.B.Minerals Corporation 6/575 Navabi Road Haldawani Distt Nainital -263 139 Uttarakhand	Uttarakhand	Pithoragarh
N.Rajashekar Talooru Magnesite Mines Taloor Village, Jayapura Hobli, Mysuru-571 311 Karnataka	Karnataka	Mysuru

Table – 3: Production of Magnesite, 2017-18 to 2019-20 (By States)

(Qty in tonnes; Value in ₹'000)

State	2017-18		2018-19		2019-20 (P)	
	Quantity	Value	Quantity	Value	Quantity	Value
India	**195055**	**593650**	**146875**	**408287**	**97684**	**350252**
Karnataka	8419	42682	9108	56368	7198	46553
Tamil Nadu	122430	444771	50644	198355	46276	198587
Uttarakhand	64206	106197	87123	153564	44210	105112

Table – 4: Production of Magnesite, 2018-19 and 2019-20 (By Sectors/States/Districts)

(Qty in tonnes; Value in ₹'000)

State/District	2018-19			2019-20 (P)		
	No. of mines	Quantity	Value	No. of mines	Quantity	Value
India	**11**	**146875**	**408287**	**12**	**97684**	**350252**
Public Sector	5	40861	98563	6	34957	83300
Private Sector	6	106014	309724	6	62727	266952
Karnataka	**3**	**9108**	**56368**	**3**	**7198**	**46553**
Mysuru	3	9108	56368	3	7198	46553
Tamil Nadu	**5**	**50644**	**198355**	**6**	**46276**	**198587**
Salem	5	50644	198355	6	46276	198587
Uttarakhand	**3**	**87123**	**153564**	**3**	**44210**	**105112**
Bageshwar	1	33420	68979	1	32759	66226
Pithoragarh	2	53703	84585	2	11451	38886

Table-5: Mine-head Closing Stocks of Magnesite, 2018-19 & 2019-20 (By States)

(In tonnes)

State	2018-19	2019-20 (P)
India	**79963**	**58143**
Jharkhand	1012	1012
Karnataka	5649	5506
Rajasthan*	30	*
Tamil Nadu	71531	49210
Uttarakhand	1741	2415

** : Return not received for the year 2019-20.*

These mines are semi-mechanised as well as mechanised and uses compressors, wagon drills, jackhammers, power shovels, loaders, dumpers, dozers and pumps in their mining operations. Normally, Ammonium Nitrate Fuel Oil (ANFO) Mixture with high explosives as booster is used for blasting. The powder factor may go up to 10. The blasted rock or run-of-mine material containing 25 to 30% magnesite is subjected to manual sorting.

The hand-picked crude magnesite is further subjected to sorting and dressing in the dressing yard. Magnesite lumps which are not considered fit for dressing (containing 10 to 20% silica) constitute 2 to 6% of the run-of-mine. These lumps are hand-picked and stacked separately as rejects. The remaining material is further dressed to obtain usable magnesite containing less than 3% silica. The usable magnesite hardly constitutes 4 to 8% of blasted rocks even though run-of-mine contains 20 to 30% magnesite. In Uttarakhand, Almora Magnesite Ltd and N.B. Minerals Corporation are the important producers having mines in Bageshwar and Nainital districts, respectively.

Magnesite is marketed generally after calcination, that is, after converting it into lightly calcined or caustic magnesite and dead-burnt variety.

At TANMAG, the recovery of magnesite from blasted earth is about one in fourteen. After picking the magnesite, the remaining reject material is removed by mechanical operation using HEMM. TANMAG's annual crude magnesite production capacity is in the range of 75,000 to 1,00,000 tonnes.

USES AND SPECIFICATIONS

The major proportion (about 98%) of magnesite mined is used for conversion into calcined form which finds many applications. The other industries where raw magnestite is used are mosaic tiles, electrodes, chemicals and manufacture of magnesium metal. Magnesite is also used in fertilizers and by Food Processing Industry. As per the Industries Department, Govt. of Tamil Nadu, Policy Note 2016-17, about 2.7 tonnes of raw magnesite and 220 litres of furnace oil is required to produce one tonne of Dead Burnt Magnesite (DBM). Raw magnesite is dead-burnt for making basic refractory bricks, basic refractory mortars, ramming mass, tar/pitch impregnated magnesite, magnesia-carbon bricks, slide-gate plates and other refractories. As per the Industries Department, Govt. of Tamil Nadu, Policy Note 2016-17, about 2.7 tonnes of raw magnesite and 140 litres of furnace oil are required to produce one tonne of Caustic Calcined Magnesite (CCM). Caustic Calcined Magnesite is used in manufacturing sorel cement (magnesium oxychloride), castable refractories and extraction of magnesium metal. It is also the source material for manufacture of magnesium compounds like magnesium sulphate (Epsom salt) and other salts used in Paper and Pharmaceutical Industries. In Paper Industry, magnesium bisulphate produced from magnesite is used as cooking liquor for preparing pulp. It is also used in Textile, Rubber, Glass, Ceramic Industries and as animal feed stuff. Fused magnesia finds application as insulating material in tubular heating elements in Electrical Industry and refractory brick linings in steel furnaces.

Refractory Industry

Refractory Industry is one of the major consumers of magnesite in India. In the manufacture of refractories, deleterious constituents are SiO_2, CaO, Fe_2O_3 and Al_2O_3. The permissible limits for these

constituents are governed by its end-use. The refractory bricks are made from Dead Burnt Magnesite by judicious blending of different types of raw magnesite before dead-burning or of different qualities of Dead Burnt Magnesite prior to brick making.

Indian steel plants use domestic DBM bricks containing up to 5% silica and 2.5% maximum CaO. By and large, Indian refractory makers prefer magnesite for making high-grade DBM containing MgO 45.5% (min.), SiO_2 2.5% (max.) and CaO 1.5% (max.).

Chemical Industry

The BIS has prescribed specification - IS : 3607-1979, First Revision, Reaffirmed 2010, for magnesite to be used in Chemical Industry.

CONSUMPTION

The consumption of magnesite in 2019-20 decreased to about 180 thousand tonnes from 195 thousand tonnes as recorded in the previous year. About 46% consumption was reported for calcination purposes followed by 38% for refractory purposes and 8% for ferroalloys purposes. The Chemical Industry consumed magnesite predominantly for producing magnesium sulphate. Magnesite consumption pattern by industries is shown in Table - 6.

The BIS has prescribed the IS specification (14303-1995, Reaffirmed 2011) for magnesite for use in Refractory Industry.

Table – 6: Estimated Consumption* of Magnesite 2017-18 to 2019-20 (By Industries)

(In tonnes)

Industry	2017-18	2018-19(R)	2019-20(P)
All Industries	**247800**	**194700**	**179900**
Calcination	67600	58200	83300
Chemicals	6200	13100	12700
Ferroalloys	12000	17600	13600
Refractories	137000	80700	68500
Others (foundry, iron & steel, paper,etc.)	25000	25100	1800

Figures rounded off.

** Includes actual reported consumption and/or estimates made from dispatches (as reported in form 'F'/'H', under Rule-45 of MCDR; 2017/1988) wherever required and due to paucity of data, coverage may not be complete.*

INDUSTRY

Dead Burnt Magnesite (DBM)

Raw magnesite when calcined at temperatures in the range of 1,660–1,800 °C in the rotary kiln, carbon dioxide gets expelled completely and a dense product 'Dead Burnt Magnesite' is obtained. Dead Burnt Magnesite refers to the magnesite that is chemically unreactive or 'dead', therefore, enabling it to be used in brick making or monolithic hearths without undue difficulty arising out of hydration or shrinkage.

Caustic Calcined Magnesite (CCM)

Low calcined magnesite also known as Caustic Calcined Magnesite is obtained by calcining magnesite in a shaft or rotary kiln at temperature ranging between 800 °C and 1000 °C. The incomplete dissociation, causes retention of 8 to 10% carbon dioxide as carbonate. Low calcined magnesia when mixed with water forms a feebly plastic paste. Industries like paper, rubber, ceramic, asbestos products, glass, etc. use caustic magnesia.

Fused Magnesia

Fused magnesia is produced by the fusion of the high-grade magnesite in Higgin's or electric arc tilt furnaces between 2,500 °C and 3,000 °C. It is resistant to the action of molten metals, basic slags and fluxes and high temperatures. It is used in the form of moulded vessels and as compressed material for covering resistant elements of the furnaces used in the melting of lead, tin, etc.

As per the available information, presently there are seven major plants that manufacture Dead Burnt Magnesite, while there are four plants that produce calcined magnesite and one that produces fused magnesia (Table-7). By-product magnesium carbonate and other magnesium salts were also produced during salt manufacturing from sea water. Dalmia Magnesite Corporation and Tamil Nadu Magnesite Ltd are the major producers of DBM and caustic calcined grades.

As per Annual Report of National Mineral Development Corporation (NMDC) 2018-19, J & K Mineral Development Corporation Ltd, a subsidiary of NMDC has decided to set up a 30,000

TPA DBM plant at Panthal, Jammu. The Ministry of Environment, Forest and Climate Change granted Environment Clearance vide letter dated 03.05.2011. However MoEF vide their letter dated 28.10.2016 had withdrawn the EC granted earlier status is maintained.

Sea Water Magnesia (SWM)

Sea water or lake bitterns is an alternative source to obtain magnesia by chemical reaction. The main raw materials required other than sea water are dolomite or limestone, fresh water and sulphuric acid. The magnesia content of sea water is about 0.2%, and even by enrichment with dolomite, around 300 kilograms sea water need to be processed to obtain one kilogram of magnesia. The sea water magnesia can be used to manufacture Dead Burnt Magnesite, caustic magnesia and other magnesium compounds.

Table - 7: Manufacturing Plants of Dead Burnt Magnesite (DBM), Calcined Magnesite, etc.

Name of the plant	Location	Installed capacity (tpy)
Tamil Nadu Magnesite Ltd (TANMAG)	Salem, Tamil Nadu	30,000 (DBM) 19,500 (calcined magnesite)
Ramakrishna Magnesite Mines (Two Units)	-do-	21,600 (calcined magnesite)
SAIL Refractory Co. Ltd (Formerly, Burn Standard Co.Ltd)	-do-	54,000 (DBM) 18,000 (Calcined magnesite)
Dalmia Magnesite Corporation	-do-	72,000 (DBM)
Sri Ponkumar Magnesite Ltd	-do-	26,500 (DBM)
Almora Magnesite Ltd	Bageshwar, Uttarakhand	24,000 (DBM)
Minerals & Refractories	Haldwani, Uttarakhand	3,000 (DBM)
Hansaflon Plastochem Ltd	NA	1,500 (Fused magnesia)

Marine By-products

Carbonates, chlorides and sulphates of magnesium are obtained as by-products in the production of common salt by solar evaporation. Salt Commissioner, Jaipur, reported 8,101 tonnes production of magnesium chloride and 24 tonnes of by-product magnesium sulphate in 2018-19. The production is normally reported from the salt pans in Jamnagar-Gandhidham, Gujarat.

Magnesium Metal

Magnesium metal is a fairly strong, silvery-white, light-weight metal (about one-third lighter than aluminium). It is traditionally produced in ingot form of approximately 7 kg each with purity close to 99.9%. Its chief applications are, in die casting (alloyed with zinc), to remove sulphur in the production of iron and steel, for production of titanium in the Kroll process. The other application field of magnesium is in electronic devices. Defence equipment and nuclear reactor materials also consume magnesium.

Magnesium technology and its commercial production in India are still at its infancy. India has developed silico-thermic reduction process as well as fused salt electrolytic process, with capacity of 600 t/year for each process. However, the cost of production is very high as compared to the landed cost of imported magnesium metal. Hence, its production has been stopped by one of the companies. The production is only about 15–20% of the rated capacity.

TRADE POLICY

As per the Foreign Trade Policy (FTP) 2015-20, exports and imports of all grades and varieties of magnesite under Heading No. 2519 are allowed freely.

WORLD REVIEW

The world reserves of magnesite were 7,600 million tonnes in terms of magnesium oxide content, excluding large resources of magnesium-bearing substitutes, such as, dolomite, brucite and olivine. Further, magnesium compounds could be recovered economically from well & lake brines and from sea water. The latter, which contains 0.13% magnesium by weight, was a major source of magnesium metal and its compounds. Out of the total world reserves, the major share was that of Russia (30%) followed by China (13%), Australia (4%) and Turkey (3%) (Table-8).

The world production of magnesite was at 29.70 million tonnes in 2019. China continued to be the leading producer accounting for about 64% production, followed by Russia (9%) and Turkey (7%) and Brazil (6%). The world production of magnesite is furnished in Table-9. China, Turkey and Russia had the largest magnesite production

Table – 8: World Reserves of Magnesite (By Principal Countries)

(In '000 tonnes of magnesium oxide (MgO) content)

Country	Reserves
World : Total (rounded off)	**7600000**
Australia	320000*
Austria	49000
Brazil	200000
China	1000000
Greece	280000
India	82000
Russia	2300000
Slovakia	370000
Spain	35000
Turkey	205000
USA	35000
Other countries	2700000

***Source**: USGS, Mineral Commodity Summaries, 2021*

**For Australia, Joint Ore Reserves Committee-compliant reserves were 37 million tonnes*

Table–9: World Production of Magnesite (By Principal Countries)

(In tonnes)

Country	2017	2018	2019
World Total (rounded off)	**29900000**	**29400000**	**29700000**
China[e]	19000000	18500000	19000000
Russia[e]	2600000	2600000	2600000
Turkey	1694071	1958847	2000000
Brazil[C]	2034000	1700000	1700000
Austria	730482	808239	800000
Spain	788991	738994	634580
Slovakia	610000	615500	615200
Australia[d]	234704	288069	433712
Greece	499381	464689	365792
Other countries	1663891	1721715	1589803

***Source:** BGS, World Mineral Production, 2015-19.*
** Estimated a: Years ended 20th March following that stated*
b: Officially described as magnesitic dolomite and brucite
c: Including beneficiated and directly shipped material
d: Year ended 30 June of that stated
e: Year ending 31st March following that stated.
f: Chloride produced from solution mining
g: Magnesium chloride

capacity and accounted for about 85% of the total world production. The largest capacity of magnesite processing facilities in the world are in China and Russia. These countries accounted for about two-third of world magnesia from magnesite production capacity.

World capacity of primary magnesium production is about 2 million during 2017.

World production capacity for Caustic Calcined Magnesia was about 3.32 million tonnes/year and that of Dead Burnt Magnesite was about 8.62 million t/yr. Worldwide, over 98% raw ore producers convert DBM to magnesia for commercial application, mainly in Refractory Industry (75%) based on both the sintered and fused forms generally called DBM and Electrofused Magnesia (EFM), respectively, for lining furnaces used in steel production, non-ferrous metals, cement, glass, ceramic and petrochemicals. Primary producers of magnesium metal and alloys were China, USA and Russia. The consuming market segments are aluminium alloying, die-casting and desulphurisation.

To provide a generalised view of the development in various countries, the country-wise description sourced from the latest available publication of magnesium metal Minerals Yearbook 'USGS' 2018 is furnished below.

Australia

Latrobe Magnesium Ltd. was conducting a bankable feasibility study for a 3,000-t/yr primary magnesium plant in the Latrobe Valley, Victoria, which would use fly ash having a high magnesium content as the feed material. The bankable feasibility study was expected to be completed by June 2019. Construction was expected to begin in December 2019 and take about 1 year to complete once started. Future expansion to 40,000 t/yr was being considered.

Canada

On October 22, an explosion and fire took place at Meridian's diecasting plant in Strathmore, Ontario, but damage to the plant was minimal. The plant was shut down for less than a week.

Quebec, to produce magnesium from asbestos mine tailings. Construction was expected to start in 2020 and be completed in about 18 months. The capacity of the first module would be 5,000 t/yr, and expansion to 50,000 t/yr was planned. In 2017, magnesium production started from a 25-kilogram-per-day pilot plant to produce ingot samples for testing by potential customers.

Mag One Products Inc. continued planning for the construction of a smelter near Danville, Quebec, to produce magnesium from asbestos mine tailings. The plant would have an initial capacity of 5,000 t/yr; total production capacity would be scaled to market demand. The plant would also have the capability to produce high-purity magnesium compounds with ferronickel and high-purity silica as byproducts. Aconstruction schedule was not available.

West High Yield Resources Inc. was preparing a mine permit application for its proposed Record Ridge project in British Columbia. The company proposed building a mine and smelter to produce magnesium from a serpentine deposit. In June 2017, West High Yield presented the results of a micro-plant test prepared by Drinkard Metalox, Inc. (Charlotte, NC). Drinkard Metalox developed a nitric acid leach extraction process that could achieve a magnesium recovery rate of 98% and allow the production of multiple salable products such as magnesium nitrate, high-grade magnesium oxide, and nickel hydroxide.

China

China produced 860,000 t of magnesium in 2018, 8% less than that in 2017. Magnesium consumption in China was estimated to be 4,50,000 tonnes, 7% more than that in 2017. In 2018, total magnesium product exports from China were 4,10,000 t, 11% less than those in 2017.

Stricter environmental regulations for magnesium smelters and associated industries were cited for decreased production throughout the year. Ningxia Hui Autonomous Region started conducting stricter enforcement of environmental regulations in June. Some coal mines decreased production in the last quarter of the year citing environmental regulations, which increased production costs and decreased output at some magnesium producers. Coal and magnesium producers in Shaanxi Province were particularly affected by these actions. Shaanxi Province was the leading producer of magnesium in China and a major producer of coal, which was used to power the magnesium smelters. Through the end of October, magnesium production decreased in Ningxia Hui Autonomous Region (58%), Shaanxi Province (9%), and Shanxi Province (34%) compared with production for the same period in 2017.

Century Sunshine Group Holdings Ltd. (Hong Kong) continued increasing the capacity of its smelter in Hami, Xinjiang Uyghur Autonomous Region, to 45,000 t/yr from 15,000 t/yr. Dates for the completion and commissioning of the new capacity were not projected and would be dependent on market conditions.

Qinghai Salt Lake Magnesium Co. Ltd. continued the startup of its 1,00,000-t/yr smelter in Golmud, Qinghai Province, that produced magnesium from lake brines. Construction was completed, and trial runs were conducted in mid-2016. Commercial production started in October 2017, but technical issues interrupted the rampup. By May 2018, the smelter was delivering molten magnesium to Magontec Ltd. (Australia) at its 56,000-t/yr casthouse adjacent to the smelter.

Turkey

In May, Esan Eczac1ba_1 Endüstriyel Hammaddeler San. ve Tic. A.S. shut down production from its 15,000-t/yr smelter in Eskisehir. High production costs and currency valuations were cited as the causes for the shutdown.

FOREIGN TRADE

Exports

The export of magnesite decreased marginaly by 13% to 5,459 tonnes in 2019-20 from 6,273 tonnes in the preceding year. Exports were mainly to Malaysia (38%), Bangladesh (12%), Saudi Arabia (10%), Ethiopia (8%), Singapore (5%) and China & Netherlands (3% each). Out of the total exports in 2019-20, those of fused magnesia were

at 56 tonnes as compared to 31 tonnes in the preceding year, non-calcined magnesite were at 76 tonnes as compared to 357 tonned; other magnesite 2,453 tonnes as compared to 2,118 tonnes; and magnesium oxide 2,153 tonnes as compared to 3,197 tonnes in the preceding year. Exports of Magnesium and scrap were at 2,376 tonnes in the year 2019-20 as compared to 996 tonnes in the preceding year. Exports were mainly to USA (88%), Bhutan & Republic of Korea (3% each) and Brazil (2%).The total export of magnesium powder and flakes in 2019-20 was 12 tonnes as compared to 4 tonnes in the preceding year. Magnesium & alloys wrought was only 1 tonne during 2019-20 as compared to 2 tonnes in the preceding year (10 to 22).

Imports

The imports of magnesite (total) decreased substantially by 21% to 3,65,054 tonnes in 2019-20 from 4,64,367 tonnes in the year 2018-19. Imports were mainly from China (57%), UAE (17%), Australia (8%), Turkey (7%) and Ireland (4%) . Out of the total imports in 2019-20, those of fused magnesia were at 16,325 tonnes as compared to 21,130 tonnes in the preceding year; non-calcined magnesite were at 63,874 tonnes as compared to 1,15,540 tonnes; other magnesite 18,056 tonnes as compared to 98,589 tonnes; magnesium oxide 55,765 tonnes as compared to 48,881 tonnes; and Dead Burnt Magnesite were at 16,04,66 tonnes as compared to 1,44,069 tonnes in the year 2018-19. Imports of Magnesium & scrap were at 16,493 tonnes as compared to 19,856 tonnes in the preceding year. Imports were mainly from China (93%) and Hong Kong (5%). The total imports of all countries in the year 2019-20 for magnesite powder and flakes were at 3,879 tonnes as compared to 2,757 tonnes in 2018-19. The imports of Magnisium & alloys wrought were at 264 tonnes during 2019-20 as compared to 342 tonnes in the preceding year (Tables-23 to 32).

Table – 10: Exports of Magnesite : Total (By Countries)

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**6273**	**204287**	**5459**	**147075**
Bangladesh	552	18693	652	21290
Malaysia	802	7565	2092	17726
Thailand	402	18949	245	14391
Ethiopia	371	12650	447	14322
Singapore	605	27903	294	13320
Saudi Arabia	568	15104	535	12083
China	128	8997	176	11534
UK	59	11972	34	7308
Netherlands	250	5471	175	3617
Italy	92	3578	90	3538
Other countries	2444	73404	719	27946

Figures rounded off

Table – 11: Exports of Magnesia (Fused) (By Countries)

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**31**	**1798**	**56**	**2692**
China	-	-	15	1859
Saudi Arabia	-	-	40	599
UAE	++	135	++	93
Bangladesh	++	4	++	52
Turkey	++	10	++	42
USA	++	8	++	9
Vietnam	++	4	++	8
South Africa	-	-	++	8
Peru	-	-	++	7
Iraq	++	18	++	5
Other countries	31	1619	++	10

Figures rounded off

Table–12: Exports of Magnesite (Calcined) (By Countries)

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**62**	**1671**	**36**	**1111**
Nepal	13	406	23	703
USA	-	-	2	203
Nigeria	-	-	10	163
Uganda	-	-	1	22
Spain	9	44	++	19
Germany	-	-	++	1
Japan	40	1213	-	-
Malaysia	++	8	-	-
China	++	++	-	-

Figures rounded off

Table–13: Exports of Magnesite (Non-calcined) (By Countries)

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**357**	**7843**	**76**	**1633**
Bangladesh	244	4671	72	1355
Egypt	7	283	1	128
Vietnam	15	717	1	48
Kenya	++	2	++	31
Saudi Arabia	-	-	1	23
Myanmar	-	-	++	21
Nepal	10	284	++	10
UK	1	11	++	10
Jordan	-	-	++	4
Iraq	-	-	++	2
Other countries	80	1875	-	-

Figures rounded off

Table – 14: Exports of Magnesite: Dead Burnt Magnesite (By Countries)

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**508**	**13946**	**685**	**10666**
Saudi Arabia	424	11782	430	10254
Australia	1	38	5	220
Bangladesh	-	-	250	157
UAE	-	-	++	30
USA	14	384	++	4
Turkey	-	-	++	++
Germany	-	-	++	++
Oman	49	1180	-	-
Japan	20	562	-	-

Figures rounded off

Table – 15: Exports of Magnesium Oxide (By Countries)

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**3197**	**139427**	**2153**	**103448**
Bangladesh	120	7561	226	15427
Ethiopia	370	12616	447	14322
Thailand	398	18815	235	13984
Singapore	594	27389	294	13320
China	98	5422	151	8777
UK	57	11955	34	7298
Netherlands	250	5471	175	3617
Italy	92	3578	90	3538
Cameroon	-	-	77	2530
Nepal	47	1683	59	1974
Other countries	1171	44936	366	18662

Figures rounded off

Table – 16: Exports of Magnesium & Scrap (By Countries)

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**996**	**116662**	**2376**	**294363**
USA	496	53135	2090	236443
Bhutan	74	13219	79	15388
UAE	10	2534	33	10444
Korea, Rep.of	99	9826	61	5999
Bangladesh	37	871	10	4552
Brazil	71	7159	52	4494
Germany	++	728	++	4037
Nepal	16	3017	4	2911
Kenya	1	159	8	2269
Taiwan	63	5340	20	2084
Other countries	129	20673	18	5741

Figures rounded off

Table – 17 : Exports of Magnesite (Other) (By Countries)

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**2118**	**39602**	**2453**	**27524**
Malaysia	800	7510	2092	17702
Bangladesh	187	6457	104	4300
UAE	333	4808	135	1565
China	30	3575	10	899
Saudi Arabia	140	3185	60	884
USA	-	-	6	640
Thailand	3	131	10	407
Sudan	371	7783	15	403
Sri Lanka	5	239	6	238
Nepal	12	418	6	204
Other countries	237	5496	9	282

Figures rounded off

Table-18: Exports of Magnesium Powders and Flakes (By Countries)

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**4**	**2401**	**12**	**5475**
Bangladesh	-	-	10	4552
Indonesia	-	-	1	511
Malaysia	3	1216	1	171
UAE	-	-	++	66
Kenya	-	-	++	66
Korea, Rep.of	-	-	++	41
Peru	-	-	++	19
Taiwan	-	-	++	15
Zimbabwe	++	19	++	9
Bulgaria	-	-	++	9
Other countries	1	1166	++	16

Figures rounded off

Table-19: Exports of Magnesium & Alloys Wrought (By Countries)

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**2**	**1010**	**1**	**1096**
UK	++	87	++	489
Australia	-	-	++	345
Bhutan	-	-	1	199
Austria	-	-	++	32
Brunei	-	-	++	17
Botswana	-	-	++	13
Egypt	1	109	++	1
UAE	++	574	-	-
Taiwan	-	138	-	-
Pakistan	++	34	-	-
Other countries	1	68	-	-

Figures rounded off

Table-20: Exports of Magnesium & Alloys NES (By Countries)

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**156**	**16591**	**394**	**48875**
USA	80	6719	361	40123
Germany	++	728	++	4037
Brazil	20	1786	20	1762
Kenya	-	-	3	847
Peru	++	58	2	681
Bhutan	16	3175	2	485
Russia	++	87	++	244
Sri Lanka	2	540	1	222
Malaysia	1	150	1	162
Nigeria	++	1	3	109
Other countries	38	3347	++	202

Figures rounded off

Table-21: Exports of Magnesium Wire (By Countries)

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**++**	**1094**	**1**	**1106**
USA	++	452	++	710
Australia	++	303	1	169
Saudi Arabia	++	5	++	132
Malaysia	++	65	++	33
New Zealand	++	14	++	17
South Africa	++	19	++	15
Israel	++	11	++	11
Zimbabwe	++	1	++	9
Sweden	++	-	++	5
UAE	++	13	++	5
Other countries	++	212	++	++

Figures rounded off

Table-22: Exports of Magnesium & Scrap (By Countries)

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**834**	**95566**	**1967**	**237811**
USA	416	45953	1729	195610
Bhutan	58	10044	76	14704
UAE	10	1947	33	10374
Korea, Rep.of	99	9710	61	5958
Nepal	16	3007	4	2908
Brazil	51	5373	32	2733
Taiwan	63	5202	20	2070
Kenya	1	159	5	1355
Sri Lanka	2	329	5	896
China	-	-	3	802
Other countries	119	13842	++	402

Figures rounded off

Table – 23: Imports of Magnesite : Total (By Countries)

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All countries	**464367**	**11120844**	**365054**	**9468162**
China	173797	4739202	208474	3883021
Australia	24465	1916888	28420	2075811
Ireland	25455	1641284	15608	1215987
Turkey	25415	972809	24927	857499
Japan	3224	324520	2423	257552
Netherlands	4777	251705	4018	252247
UAE	50647	91957	60512	159866
Saudi Arabia	1093	40188	5039	122907
Greece	3349	99190	2823	104463
Hong Kong	1661	41575	3578	74349
Other countries	150484	1001525	9233	464461

Figures rounded off

Table – 24: Imports of Magnesia (Fused) (By Countries)

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**21130**	**1630685**	**16325**	**823312**
China	20769	1599633	14957	728865
UK	4	1010	207	26797
Austria	-	-	711	23089
Germany	144	10382	241	18682
Mexico	40	6162	80	12741
Hong Kong	50	5228	91	7655
Japan	-	-	30	3210
Austria	1	269	5	1445
Belgium	1	334	3	689
USA	-	-	++	118
Other countries	120	7666	++	21

Figures rounded off

Table – 25: Imports of Magnesite (Non-calcined) (By Countries)

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**115540**	**390976**	**63874**	**185152**
UAE	40621	76304	57885	137363
Greece	319	7079	422	15126
Iran	197	760	1507	8242
Turkey	-	-	946	8011
China	324	4396	1277	7088
Pakistan	74078	302420	1389	3738
Japan	++	17	16	2741
Oman	-	-	247	1254
Hong Kong	-	-	125	683
South Africa	-	-	5	422
Other countries	-	-	55	486

Figures rounded off

Table–26: Imports of Magnesite (Calcined) (By Countries)

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**36157**	**1542203**	**50568**	**1645694**
Ireland	20922	1259572	14164	1107007
China	13063	168101	31062	341863
Saudi Arabia	184	7398	3644	95404
Austria	730	58343	506	37031
Belgium	65	4916	422	33509
Turkey	125	4355	96	7936
Greece	254	9064	170	6301
Spain	204	6716	154	4995
Japan	32	3369	44	4782
Brazil	-	-	60	2499
Other countries	578	20369	245	4368

Figures rounded off

Table–27: Imports of Magnesite: Dead Burnt Magnesia (By Countries)

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**144069**	**4911911**	**160466**	**5018484**
Australia	21581	1691413	27709	2052384
China	90049	1952186	102537	1842108
Turkey	24198	949066	23083	833405
Netherlands	3460	186315	2881	176447
Hong Kong	1483	28816	2679	56716
Brazil	-	-	325	19206
Greece	757	23732	371	11854
Singapore	1500	27309	600	11134
USA	20	1601	121	10087
UAE	-	-	107	3341
Other countries	1021	51475	54	1801

Figures rounded off

Table–28: Imports of Magnesite (Other) (By Countries)

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**98589**	**1208817**	**18056**	**587186**
China	6235	136828	8831	233407
Ireland	4532	381712	1443	108979
Netherlands	1050	50549	1122	74544
Greece	1765	46842	1513	50352
Japan	1446	94093	654	44403
Korea, Rep.of	-	-	496	24743
UAE	10026	15648	2518	19113
Turkey	972	11722	802	8147
Czech Republic	40	1677	160	6716
Hong Kong	-	-	250	3403
Other countries	72523	469744	267	13378

Figures rounded off

Table – 29 : Imports of Magnesium & Scrap (By Countries)

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**19856**	**3582594**	**16493**	**2943565**
China	17901	3237278	15393	2762151
Hong Kong	1828	324705	744	127596
UAE	-	-	140	23489
Taiwan	-	-	75	12234
Singapore	-	-	29	4868
Netherlands	-	-	24	4701
Bolivia	-	-	25	4493
Malaysia	-	-	61	3507
Japan	1	669	1	323
Poland	++	139	1	154
Other countries	125	19803	++	48

Figures rounded off

Table –30 : Imports of Magnesium Oxide (By Countries)

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**48881**	**1436254**	**55765**	**1208334**
China	43357	878058	49810	729691
Japan	1746	227040	1679	202417
Israel	552	78553	516	70725
Mexico	930	76183	619	55781
Saudi Arabia	482	14106	1388	27168
USA	449	36532	326	24817
Belgium	21	1780	115	24584
Greece	254	12473	347	20829
Germany	285	31653	131	18128
UK	253	30383	95	13807
Other countries	552	49492	739	20388

Figures rounded off

Table – 31 : Imports of Magnesium & Alloys:Wrought (By Countries)

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**342**	**82736**	**264**	**72811**
China	283	69367	241	68561
Hong Kong	58	13369	20	3717
Italy	--	--	3	518
Germany	--	--	++	15

Figures rounded off

Table – 32 : Imports of Magnesium & Alloys NES (By Countries)

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**4934**	**930838**	**4045**	**768816**
China	4927	907934	4037	733445
UK	1	17253	1	26611
Taiwan	-	-	1	3162
Austria	1	757	2	2553
Spain	++	2	2	721
Italy	3	1728	1	515
USA	++	399	++	494
Japan	++	219	++	470
Germany	++	399	++	352
Malaysia	-	-	++	352
Other countries	2	2147	++	141

Figures rounded off

FUTURE OUTLOOK

The Refractory Industry that consumes magnesite to a large extent is experiencing a range of challenges. However, in India, the demand for refractories is not only promising but also encouraging as it rides on the prospects of the Cement and Steel Industries, the growth of which is projected to show an upward trend in the near future. The demand for magnesite is, therefore, likely to grow correspondingly.

As Indian magnesite generally contains either high silica or high lime, the need for beneficiation concomitantly arises.

Beneficiation methods of magnesite at economic cost which could yield high-grade material is probably a viable way to meet the demand for magnesite in the future.

India's Refractory Industry is set to continue its expansion and is likely to benefit from the Government's series of measures pitched specifically to stimulate the infrastructure development in the country. As the demand for magnesite is expected to rise, significant steps to explore and exploit magnesite to meet the future demand would be the right way forward.

Table – 33: Imports of Magnesium Powder & Flakes (By Countries)

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**2757**	**545581**	**3879**	**723333**
China	2733	514956	3835	675021
France	19	18352	44	47520
Japan	++	28	++	588
Germany	4	9941	++	124
UK	-	-	++	48
USA	-	-	++	29
Switzerland	1	1977	++	3
Korea, Rep.of	++	327	-	-

Figures rounded off