

MAGNESITE



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MAGNESITE

(FINAL 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 as secondary deposits formed due to alteration of ultrabasic rocks (mostly serpentinite) 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.

RESOURCES

The total reserves/resources of magnesite as per NMI database, based on UNFC system, as on 1.4.2015 are 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 given in the review on Exploration & Development in "General Review".

PRODUCTION, STOCKS & PRICES

Production of magnesite in 2016-17 at 299 thousand tonnes decreased by 9% as compared to that in the previous year. There were 19 reporting mines in 2016-17 against 20 reporting mines in 2015-16. Five principal producers accounted for about 71% of the total output during the year 2016-17. About 54% of the total production of magnesite was contributed by public sector during 2016-17 as against 64% in the preceding year.

Tamil Nadu continued to be the major producing state with maximum contribution of 75% to the total output during 2016-17 followed by Uttarakhand (23%) and the remaining 2% was contributed by Karnataka.

Mine-head closing stock of magnesite for the year 2016-17 was 83 thousand tonnes as against 66 thousand tonnes in the previous year.

The average daily employment of labour in magnesite mines during the year was 1229 as against 1258 in the previous year (Tables- 2 to 5).

**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
Beneficial/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.

MAGNESITE

Table-2: Principal Producers of Magnesite, 2016-17

Name & address of producer	Location of mine	
	State	District
Tamil Nadu Magnesite Ltd , 5/53, Omalur Main Road, Jagirammalayam, Distt. Salem-636 302, Tamil Nadu.	Tamil Nadu	Salem
Sail Refractory Company Ltd , Post Bag No. 565 Suramangalam Post, Distt. Salem – 636 005, Tamil Nadu.	Tamil Nadu	Salem
S. Sundararajan, 5/22-A, Periyakollapatti Kannankuruchi, Post – Gorimedu, Distt. Salem -636 008, Tamil Nadu.	Tamil Nadu	Salem
Almora Magnesite Ltd , Village Matela, P.O. Billori, Distt. Bageshwar-263 630, Uttarakhand.	Uttarakhand	Bageshwar
N. B. Minerals Corporation, 6/575 Nawabi Road, Haldwani, Distt. Nainital – 263 139, Uttarakhand.	Uttarakhand	Pithoragarh

**Table – 3: Production of Magnesite, 2014-15 to 2016-17
(By States)**

(Qty in tonnes; Value in ` `000)

State	2014-15		2015-16		2016-17 (P)	
	Quantity	Value	Quantity	Value	Quantity	Value
India	285009	748792	327663	827072	299167	735655
Karnataka	9129	40910	8161	39962	8391	35562
Tamil Nadu	225694	637938	264913	705318	223424	612564
Uttarakhand	50186	69944	54589	81792	67352	87529

MAGNESITE

**Table – 4: Production of Magnesite, 2015-16 and 2016-17
(By Sectors/States/Districts)**

(Qty in tonnes; Value in `'000)

State/District	2015-16			2016-17 (P)		
	No. of mines	Quantity	Value	No. of mines	Quantity	Value
India	20	327663	827072	19	299167	735655
Public Sector	4	208979	479979	4	162851	399216
Private Sector	16	118684	347093	15	136316	336439
Karnataka	2	8161	39962	2	8391	35562
Mysuru	2	8161	39962	2	8391	35562
Tamil Nadu	15	264913	705318	14	223424	612564
Karur	2	1754	1754	1	811	1217
Namakkal	1	7935	10316	1	2555	3322
Salem	10	254346	691530	10	219897	607622
Tiruppur	2	878	1718	2	161	403
Uttarakhand	3	54589	81792	3	67352	87529
Bageshwar	1	36980	61128	1	31632	51186
Pithoragarh	2	17609	20664	2	35720	36343

**Table-5: Mine-head closing stocks of Magnesite,
2015-16 and 2016-17
(By States)**

(In tonnes)

State	2015-16	2016-17(P)
India	65950	83129
Jharkhand	-	1012
Karnataka	10543	11720
Tamil Nadu	54909	68090
Uttarakhand	498	2307

MINING AND MARKETING

Magnesite is being worked by opencast 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). These mines are semi-mechanised as well as mechanised and uses compressors, wagon drills, jackhammers, power shovels, loaders, dumpers, dozers and pumps. 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 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 magnesite 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 is 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

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.), SiO₂ 2.5% (max.) and CaO 1.5% (max.).

The BIS has prescribed the IS specification (14303-1995, Reaffirmed 2011) for magnesite for use in Refractory Industry. The said specification has laid down five grades of magnesite as follows:

Sl. No.	Constituent	Requirements, Percent				
		Grade 1	Grade 2	Grade 3	Grade 4	Grade 5
i)	MgO min.	45.00	43.00	42.50	45.00	43.00
ii)	CaO max.	0.75	0.75	0.75	2.00	2.00
iii)	Al ₂ O ₃ max.	0.50	0.50	0.50	0.50	0.50
iv)	Fe ₂ O ₃ max.	0.50	0.50	0.50	2.50	2.00
v)	SiO ₂ max.	2.00	3.00	4.00	1.00	2.00
vi)	Size*	25-75 mm	25-75 mm	25-75 mm	50-100 mm	50-100 mm

* Unless and otherwise agreed to.

Chemical Industry

The BIS specification (IS : 3607-1979, First Revision, Reaffirmed 2010) has prescribed the following specifications for magnesite for use in Chemical Industry:

Sl..No.	Characteristic	Requirement
i)	Loss on ignition, percent by mass, min.	48.0
ii)	Silica (as SiO ₂), percent by mass, max.	2.0
iii)	Alumina (as Al ₂ O ₃), percent by mass, max.	0.3
iv)	Iron Oxide (Fe ₂ O ₃), percent by mass, max.	0.4
v)	Magnesium (as MgO), percent by mass, min.	45.0
vi)	Calcium (as CaO), percent by mass, max.	1.0

CONSUMPTION

The consumption of magnesite in 2016-17 decreased to 172 thousand tonnes from 265 thousand tonnes as recorded in the previous year. About 86% consumption was reported for calcination purposes followed by 9% for ferroalloys purposes and 4% for refractories purposes. The Chemical Industry consumed magnesite predominantly for producing magnesium sulphate. Magnesite consumption pattern by industries is shown in Table - 6.

**Table – 6: Consumption* of Magnesite
2014-15 to 2016-17
(By Industries)**

Industry	(In tonnes)		
	2014-15	2015-16 (R)	2016-17(P)
All Industries	275300	265000	171900
Calcination	171400	155100	148300
Chemicals	2300	3000	1500
Ferroalloys	10700	14500	15400
Refractories	67500	69000	6700
Others (foundry, iron & steel, paper, etc.)	23400	23400	-

* Includes actual reported consumption and/or estimates made wherever required and due to paucity of data, coverage may not be complete.

Whereas the apparent consumption for magnesite was 352,403 tonnes in the year 2016-17.

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 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 produce calcined magnesite and one that produces fused magnesia (Table-7). By-product magnesium carbonate and other magnesium salts were also produced during salt manufacture from sea water. Dalmia Magnesite Corporation and Tamil Nadu Magnesite Ltd are one of the major producers, producing DBM and caustic calcined grades.

As per Annual Report of National Mineral Development Corporation (NMDC) 2016-17, 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

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)

project is pending with Ministry of Environment, Forest and Climate Change for Environment Clearance.

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.

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 15,274 tonnes production of magnesium chloride and 58 tonnes of by-product magnesium sulphate in 2016-17. 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 in 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 company. 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 7,800 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. The world reserves of magnesite is provided in Table-8.

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

(In '000 tonnes of magnesium oxide content)

Country	Reserves
World : Total (rounded)	7800000
Australia	320000
Austria	50000
Brazil	390000
China	1000000
Greece	280000
India*	90000
Korea, Dem. P.R.	1500000
Russia	2300000
Slovakia	120000
Spain	35000
Turkey	230000
USA	35000
Other countries	1400000

Source: Mineral Commodity Summaries, 2018.

**As Per NMI database, based on UNFC System, as on 1.4.2015, the total resources of magnesite in India are estimated at 394 million tonnes.*

The world production of magnesite was at 29.8 million tonnes in 2016. China continued to be the leading producer, accounting for about 64% production, followed by Turkey & Russia (9% each) and Brazil (4%). The world production of magnesite is furnished in Table-9. China, Turkey and Russia had the largest magnesite production capacity and accounted for about 82% 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 3.52 thousand tonnes of which about 72% is through electrolytic route and balance through silico-thermic route.

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

(In '000 tonnes)

Country	2014	2015	2016
World Total (rounded)	31700	30700	29800
Australia	612	681	489
Austria	754	703	566
Brazil ^c	1152	1150 ^e	1150 ^e
China ^e	20500	19000	19000
Greece	391	383	419
India	285	328	299
Iran	202	152	150 ^e
Korea, Dem. P.R. ^e	250	250	250
Netherlands ^a	286	258	266
Russia ^e	2600	2600	2600
Saudi Arabia	286	294	286
Slovakia	557	501	431 ^e
Spain	837	465	525
Turkey	2377	3335	2800 ^e
Other countries	565	586	595

Source: World Mineral Production, 2012-16, BGS.

e: Estimated a: Chloride produced from solution mining.

c: Including beneficiated and directly shipped material.

World production capacity for Caustic Calcined Magnesia was about 3.32 million tonnes/year and that of Dead Burnt Magnesite it is about 8.62 million tonnes/year. Worldwide, over 98% raw ore producers convert it 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.

Brazil

Magnesita Refratários SA dominates Dead Burnt Magnesite production from its Brumado operation, with production capacities of 3,20,000 tonnes/year. It also showed production of 60,000 tonnes/year Caustic Calcined Magnesia and 34,000 tonnes/year of fused magnesia. In Ceará state, Magnesium do

Brasil Ltd, mines magnesite at Jucás and Iguatu, and produces around 40,000 tonnes/year Caustic Calcined Magnesia at Iguatu.

Xilolite SA, a small company, has talc and magnesite deposit in Brumado. The Company has recently invested in installation of a new Multiple Hearth Furnace (MHF) for 92+% MgO Caustic Calcined Magnesia production. In addition to the above, Buschle & Lepper SA produces high purity Caustic Calcined Magnesia from sea water at Joinville.

Russia

Magnezit Group was developing a magnesite mine at the Talsky deposit in eastern Siberia. Magnezit Group, Moscow, has capacity of 80,000 tonnes/year high temperature shaft kiln to process briquetted calcined magnesia at its plant in Satka, Chelyabinsk and construction of furnace of 1,00,000 tonnes/year to produce Dead Burned Magnesite is under progress. Apart from this, setting up of 1,00,000 tonnes/year capacity to produce fused magnesia and 2,00,000 tonnes/year production capacity of Caustic Calcined Magnesia which are under implementation is likely to be completed by 2019.

Spain

Magnesitas Navarras S.A, Navarra was producing magnesite from its mine at Borobia and Zibeti deposits. The total reserves of these deposits are of the order of 57 million tonnes.

Turkey

Kumas Manyezit Sanyi A.S., Kutahya has the capacities to produce 2,75,000 tonnes/year of Dead Burnt Magnesite; 55,000 tonnes/year of Caustic Calcined Magnesia and 37,500 tonnes/year of fused magnesia.

RHI purchased a magnesite mine and adjacent processing facilities in Erzurum from Cihan Group. RHI has plans to reopen the mine and modernise the plant as well. Expansion of its sintered magnesia capacity from 60,000 tonnes/year to 1,00,000 tonnes/year is under progress.

Norway

RHI, Norway has the production capacity of 85,000 tonnes/year of fused magnesia that it converts from magnesia obtained from sea water in its fusion plant in Porsgrunn. The plant has recently scaled down its production to 30,000 tonnes/year due to low prices of the product.

Greece

Terna Mag S.A. did make progress with its construction plans of a multiple hearth furnace to produce Dead Burnt Magnesite at its Mantoudi plant. This will be commissioned in the near future and would increase DBM capacity to 90,000 tonnes/year. The Group in addition, also has a production capacity of 30,000 tonnes/year of Caustic Calcined Magnesia.

Nepal

The Nepalese government began activity seeking foreign investors to re-open magnesia production at Nepal Orind Magnesite's plant in Dolakha district, with a capacity of 65,000 tonnes per year.

China

The magnesite deposits are found in Dashiqiao, Haicheng, Xiuyan and Fengcheng in Liaoning Province. The country produced about 4.26 million tonnes of Caustic Calcined Magnesite, 3.81 million tonnes of Dead Burnt Magnesia and 1.59 million tonnes of fused magnesia during 2015.

FOREIGN TRADE

Exports

The exports of magnesite increased drastically to 8,065 tonnes in 2016-17 from 6,204 tonnes in the previous year. Exports were mainly to Malaysia (22%), UAE (15%), Iran (10%), Nepal (9%) and Bangladesh (8%). Out of the total exports in 2016-17, those of fused magnesia were 620 tonnes, non-calcined magnesite 597 tonnes, other magnesite 5,628 tonnes, magnesium oxide

1,150 tonnes and Dead Burnt Magnesite 70 tonnes. Exports of magnesium and scrap were 115 tonnes in 2016-17 as compared to 169 tonnes in the previous year. Exports were mainly to Uganda (32%), Brazil (23%) and Russia (17%) (Tables - 10 to 16).

Imports

Imports of magnesite drastically increased to 1,42,599 tonnes in 2016-17 from 1,18,788 tonnes in the previous year. Imports were mainly from China (23%), UAE (20%), Pakistan (18%), Turkey (11%), Australia (10%) and Ireland (8%). Out of the total imports in 2016-17, those of fused magnesia were 7,961 tonnes, calcined magnesite 11,062 tonnes, non-calcined 53,833 tonnes, Dead Burnt Magnesia 40,332 tonnes, other magnesite 13,862 tonnes and magnesium oxide 15,549 tonnes. Imports of magnesium and scrap increased to 25,029 tonnes in 2016-17 from 20,187 tonnes in the previous year. Imports were mainly from China (99%) (Tables-17 to 24).

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

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value ('000)	Qty (t)	Value ('000)
All Countries	6204	124464	8065	135150
UAE	1246	25496	1215	18683
Bangladesh	523	14291	613	16175
Malaysia	1515	11351	1801	12712
Singapore	285	11101	329	12008
Thailand	391	7490	751	11666
Ethiopia	57	1800	262	7161
Pakistan	122	5675	134	6700
Nepal	673	11098	759	6586
Iran	-	-	811	5515
Sudan	80	2738	286	5192
Other countries	1312	33424	1104	32752

MAGNESITE

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

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	708	28794	620	23858
Thailand	128	5880	150	6903
Bangladesh	151	3376	194	4449
Singapore	145	6515	92	4234
China	33	1583	73	3212
Pakistan	120	5569	52	2576
Chinese Taipei/ Taiwan	75	3208	52	2174
Mexico	++	6	5	251
UAE	++	10	2	53
Kuwait	-	-	++	3
Latvia	-	-	++	1
Other countries	56	2647	++	2

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

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	789	14604	597	13781
Sudan	75	2569	268	4634
Egypt	1	88	101	3328
Nepal	624	9764	122	3049
Cameroon	-	-	50	1661
Oman	25	353	50	628
Bangladesh	-	-	5	471
Kuwait	++	3	1	5
UAE	-	-	++	4
Qatar	++	1	++	1
Japan	40	1359	-	-
Other countries	24	467	-	-

**Table – 13: Exports of Magnesite:
Dead Burnt Magnesite
(By Countries)**

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	37	1322	70	2152
UAE	36	1259	47	1649
Oman	-	-	21	454
Indonesia	1	63	1	33
Kenya	-	-	1	16

**Table – 14: Exports of Magnesium Oxide
(By Countries)**

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	1268	38212	1150	34910
Singapore	140	4586	237	7774
Netherlands	200	4516	200	4201
Pakistan	2	105	82	4124
Italy	14	635	106	3934
UAE	250	7581	232	2935
Bangladesh	67	3153	49	1987
Nepal	49	1315	71	1761
Thailand	-	-	25	1139
UK	-	-	6	1022
Sri Lanka	51	1843	25	921
Other countries	495	14478	117	5112

**Table – 15 : Exports of Magnesium & Scrap
(By Countries)**

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	169	36843	115	14078
Brazil	-	-	26	2476
Russia	-	-	19	1882
Indonesia	3	940	4	1534
Bangladesh	-	-	2	1201
Saudi Arabia	18	3777	1	941
Uganda	40	605	37	846
USA	1	1336	++	811
Mexico	2	739	1	675
Iran	7	1289	1	671
Austria	++	431	++	573
Other countries	98	27726	24	2468

MAGNESITE

**Table – 16 : Exports of Magnesite (Other)
(By Countries)**

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	3402	41532	5628	60449
UAE	960	16646	934	14042
Malaysia	1515	11351	1801	12712
Bangladesh	305	7762	365	9268
Ethiopia	24	764	262	7161
Iran	-	-	811	5515
Thailand	263	1610	576	3624
USA	++	209	33	1856
Nepal	++	19	566	1776
Oman	-	-	65	1423
Kenya	24	630	48	986
Other countries	311	2541	167	2086

**Table – 17: Imports of Magnesite : Total
(By Countries)**

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	118788	3256840	142599	3089947
China	26860	863058	32831	856531
Australia	22835	881683	13871	550148
Ireland	9539	397918	10788	411173
Turkey	16022	432762	15158	384892
Japan	3545	208059	5194	304495
Pakistan	32857	143122	25656	102949
Netherlands	1562	61935	2357	88804
Israel	400	46924	501	61183
USA	767	59294	697	52179
UAE	++	40	27892	50129
Other countries	4401	162045	7654	227464

MAGNESITE

**Table – 18 : Imports of Magnesite (Fused)
(By Countries)**

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
All Countries	10348	430234	7961	335634
China	9993	421149	7688	326290
Turkey	97	4739	96	4727
Australia	258	4346	152	2499
Germany	-	-	12	929
Mexico	-	-	12	916
Belgium	-	-	1	189
Austria	-	-	++	81
Korea Rep. of.	-	-	++	3

**Table – 19: Imports of Magnesite (Non-calcined)
(By Countries)**

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
All Countries	33166	146403	53833	158425
Pakistan	32758	141339	25656	102949
UAE	-	-	27892	50098
Korea Dem. Rep.	288	3588	234	3406
Germany	-	-	20	1303
Greece	-	-	30	522
Japan	-	-	1	147
China	25	474	-	-
Philippines	69	442	-	-
Italy	20	438	-	-
South Africa	6	97	-	-
Other countries	++	25	-	-

**Table–20: Imports of Magnesite (Calcined)
(By Countries)**

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
All Countries	4019	146577	11062	259910
Ireland	3018	126801	4131	139069
Saudi Arabia	625	10920	2949	41025
Turkey	27	403	1718	34513
China	294	6401	762	14095
Spain	-	-	446	12215
Korea Dem. Rep.	-	-	670	8717
Netherlands	33	1679	81	4138
Belgium	-	-	269	4048
Japan	-	-	15	1561
Greece	-	-	21	529
Pakistan	22	373	-	-

**Table–21: Imports of Magnesite: Dead Burnt
Magnesia
(By Countries)**

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
All Countries	46306	1589859	40332	1218748
Australia	22469	872287	13694	546391
Turkey	12599	333027	11074	281338
China	4951	130827	10542	207283
Ireland	4979	206483	1961	79384
Netherlands	774	32113	1900	70421
Japan	-	-	400	13633
Slovak Rep.	50	1063	284	6662
Germany	-	-	208	4959
Greece	312	9147	150	4401
Brazil	75	1765	100	3072
Other countries	97	3147	19	1204

**Table-22: Imports of Magnesite (Other)
(By Countries)**

Country	2015-16 (R)		2016-17 (P)	
	Qty	Value	Qty	Value
	(t)	(` '000)	(t)	(` '000)
All Countries	9925	368077	13862	533572
Ireland	1542	64634	4696	192720
Japan	2344	94960	3475	138143
China	1473	60666	2464	100495
Turkey	2724	79719	1975	54676
Greece	652	21501	548	17634
Netherlands	755	28025	375	14063
Brazil	-	-	200	6137
Mexico	-	-	20	2714
Sweden	92	4888	70	2601
USA	42	3461	5	1674
Other countries	301	10223	34	2715

**Table – 23 : Imports of Magnesium Oxide
(By Countries)**

Country	2015-16 (R)		2016-17 (P)	
	Qty	Value	Qty	Value
	(t)	(` '000)	(t)	(` '000)
All Countries	15024	575690	15549	583658
China	10124	243541	11375	208368
Japan	1201	113099	1303	151011
Israel	400	46924	501	61183
USA	705	54096	673	49301
UK	238	33247	323	37931
Mexico	176	15650	351	27083
Greece	158	9552	236	14327
Germany	66	12755	47	9893
Turkey	575	14874	295	9638
Korea, Dem. Rep.	433	5579	321	4239
Other countries	948	26373	124	10684

**Table – 24 : Imports of Magnesium & Scrap
(By Countries)**

Country	2015-16 (R)		2016-17 (P)	
	Qty	Value	Qty	Value
	(t)	(` '000)	(t)	(` '000)
All Countries	20187	3054942	25029	3938055
China	19660	2879319	24711	3845753
Switzerland	31	21153	30	20581
UK	12	25232	4	15364
Austria	28	24026	4	9940
Australia	203	25052	76	9350
Hong Kong	168	51480	35	8407
Norway	-	-	48	6301
Turkey	++	14	23	6177
Thailand	++	47	27	4761
Nigeria	36	4606	32	4039
Other Countries	49	24013	39	7382

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 is of either containing high silica or high lime, the need for beneficiation concomitantly arises. Beneficiation methods of magnesite at economic cost that which could yield high-grade material is probably a viable way forward 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 too is concomitantly expected to rise, to meet the future demand significant steps to explore and exploit magnesite become essential. The apparent domestic demand of magnesite was estimated to touch 6,22,000 tonnes by 2016-17 at 9% growth rate as per the report of the Sub Group, Planning Commission of India, this demand in all probability is likely to rise further in the years beyond 2017.