Indian Minerals Yearbook 2019

(Part- I : General Reviews)

58th Edition

MINERAL-BASED INDUSTRIES

(ADVANCE RELEASE)

GOVERNMENT OF INDIA
MINISTRY OF MINES
INDIAN BUREAU OF MINES

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7 Mineral-based Industries

Minerals are vital raw materials for many basic industries and are major components for growth and industrial development. The management of mineral resources, hence, has to be closely integrated with the overall strategy for development and exploitation of minerals, with an aim towards long-term national goals. In tune with the Economic Liberalisation Policy adopted in July 1991, the National Mineral Policy announced in March 1993 has opened the Mineral Sector for private entrepreneurs, both domestic and foreign. The changing global scenario necessitated revision in the National Mineral Policy which led to notifying of, National Mineral Policy 2019, with an objective to have more effective, meaningful and implementable policy for more transparency, better regulation and enforcement, balanced social and economic growth as well as sustainable mining practices.

The National Mineral Exploration Policy (NMEP) approved by Government of India in June, 2016, aims at accelerating the exploration activity in the country through enhanced participation of the Private Sector and these policy initiatives are expected to bring about a turnaround to the entire Mineral Sector across the country.

Capacity and production of important mineral-based products are detailed in Table-1.

FERROUS METALS

India is poised for brownfield expansion of existing steel plants, backward integration of re-rollers, forward integration of DRI or pig iron producers unfolding of a few greenfield projects. The National Steel Policy 2017 projected a target of 300 million tonnes of domestic steel production by 2030. The total production of finished steel for sale during 2018-19 stood at 101.29 million tonnes of which the contribution of SAIL, RINL, TSL, ESL, JSWL & JSPL stood at 55%.

In view of the long-term demand projection for steel, the Government adopted a two-pronged strategy for increasing steel production in the country through modernisation and expansion of existing Public Sector steel plants in the country and encouraging creation of new steel capacities in Private Sector.

Pig Iron

Pig iron is one of the basic raw materials required by the Foundry & Casting Industry for manufacturing various types of castings for the engineering section. The main sources of pig iron have traditionally been the integrated steel plants of SAIL besides plants of Tata Steel Ltd and Rashtriya Ispat Nigam Ltd. Domestic production of pig iron lags behind and is not in tandem with the demand. Efforts were, therefore, made to increase pig iron manufacturing facilities in the Secondary Sector. In 2018-19, about 6.41 million tonnes of pig iron was produced for sale in the country as compared to 5.73 million tonnes in the previous year. Plant-wise capacity details as available in respect of major pig iron units are furnished in Table-2

Sponge Iron

Commercial production of sponge iron in India commenced in 1980. Sponge Iron India Ltd was first to set-up a plant in 1980 at Palwancha district Khammam in Telangana.

In the last few years, combined use of hot metal and sponge iron in electric arc furnace have been in practice for production of liquid steel. Consequently, production of sponge iron too went up, substantially. The installed capacity of sponge iron in 2018-19 was 46.56 million tonnes and the production was 34.70 million tonnes as compared to 30.51 million tonnes in the previous year. Plant-wise details as available in respect of major sponge iron units are furnished in Table-3.

Table – 1 : Capacity and Production of Important Mineral-based Products, 2017-18 to 2018-19

Mineral-based product	Unit of quantity	Annual Installed capacity	Production	
			2017-18	2018-19 (P)
Ferrous Metals				
Sponge iron	million tonnes	49.62	30.51	34.70
Crude/liquid steel	"	130.08	103.13	110.92
Ferroalloys				
Ferrochrome/Chargechrome	'000 tonnes	1690	944	944
Ferromanganese	"	3160	518	518
Silicomanganese	"	-	311	345
Ferrosilicon	"	250	90	90
Ferromolybdenum	tonnes	-	1205	1003
Ferrotitanium	"	-	281	118
Ferrovanadium	"	-	1331	1013
Ferroaluminium	"	-	4423	2752
Non-ferrous Metals				
Aluminium	million tonnes	4.10	3.39	3.69
Copper #	'000 tonnes	1001.5	788	830
Lead (primary)	"	201	168	198
Zinc Ingots	"	881	791	696
Silver	tonnes	600	628	751
Cement	million tonnes	557	298	337
Fertilizers$				
Complex Fertilizer	lakh tonnes	70.33	79.66	90.38
SSP	"	120.85	39.10	40.76
Urea	"	207.54	240.23	242.51
DAP	"	80.89	43.65	50.36
Chemicals**				
Aluminium fluoride	'000 tonnes	25.60	8.14	7.5
Caustic soda	"	3297	2594	2742
Calcium carbide	"	112	85.02	87.3
Soda ash	"	3086	2613	2989
Titanium dioxide pigment	"	82.50	58.46	57.82
Red phosphorus	"	1.68	0.88	1.03
Crude Throughputs in Refineries	"	247566	251935	257205

Figures rounded off.

Sources: *1. Ministry of Steel, Annual Report, 2019-20 and JPC Bulletins.*

2. Ministry of Commerce & Industry, Department of Industrial Policy & Promotion and Annual Report, 2018-19.

3. Ministry of Chemicals & Fertilizers, Department of Chemicals & Petrochemicals, Annual Report, 2018-19.

4. Ministry of Petroleum and Natural Gas, PNG Statistics 2018-19.

6. Information received from individual plants in Organised Sector.

7. MSMP - March 2019

 # : Production relates to copper cathodes (figures rounded off).

*** : Department of chemicals and petro-chemicals.*

$: Source Department of Fertilizer.

Table – 2 : Location and Capacity of Principal Pig Iron Units

(In lakh tonnes)

Sl.No.	Unit	Location	Capacity
1.	Jayaswal NECO Industries Ltd	Raipur, Chhattisgarh	6.50
2.	Vedanta Ltd	Amona, Goa	7.42
3.	Usha Martin Industries	Jamshedpur, Jharkhand	6.00
4.	JSW Steel Ltd	Vijaynagar, Dolvi & Salem	180.00
5.	Steel Authority of India Ltd	Bhilai, Bokaro, Durgapur, Burnpur, Rourkela, Bhadravati	235.00
6.	Rashtriya Ispat Nigam Ltd	Visakhapatnam, Andhra Pradesh	65.00
7.	Monnet Ispat Ltd	Raigarh, Chhattisgarh	7.00
8.	MESCO Steel Ltd	Kalinganagar, Odisha	4.50
9.	Jai Balaji Industries Ltd	Durgapur, West Bengal	5.09
10.	JSPL	Raigarh, Chhattisgarh	20.00
11.	Neelaanchal Ispat Nigam Ltd	Kalinganagar, Odisha	11.00

Source: *MCDR Returns (Form-O), Website of concerned company, Iron & Steel Review, JPC Bulletin and Ministry of Steel.*

Table – 3 : Capacities of Principal Sponge Iron (DRI) Plants

(In lakh tonnes)

Unit	Location	Capacity
Gas-based		
Essar Steel Ltd	Hazira, Gujarat	68.0
JSW Steel Ltd (Salav) (formerly Welspun Maxsteel Ltd)	Salav, Raigad, Maharashtra	9.00
JSW Steel (formerly Ispat Industries Ltd)	Geetapuram, Dolvi, Raigad, Maharashtra	16.00
Coal-based		
Alliance Integrated Metallics Ltd	Bemta, Raipur, Chhattisgarh	5.00
Godawari Power & Ispat Ltd	IGC Siltara, Raipur, Chhattisgarh	4.95
Ind Synergy Ltd	Kotmar, Raigarh, Chhattisgarh	3.00
Monnet Ispat Energy Ltd	Chandkhuri Marg, Hasaud, Raipur, Chhattisgarh	3.00
Monnet Ispat & Energy Ltd	Naharpalli, Raigarh, Chhattisgarh	5.00
Prakash Industries Ltd	Champa, Janj-gir-Champa, Chhattisgarh	4.50
Rungta Mines Ltd	Karakola and Kamando, Sundergarh, Odisha	4.20
Rashmi Cement Ltd	Barbil, Kendujhar, Odisha	3.60
Tata Sponge Iron Ltd (Ipitata Sponge)	Joda, Kendujhar, Odisha	3.90
Visa Steels Ltd	KIC, Jajpur Road, Odisha	3.00

I.G.C.: Industrial Growth Centre.
Source: *Sponge Iron Manufacturers' Association (SIMA) and individual plants.*

Finished Steel/Saleable Steel

Some significant facts on Indian Steel Industry are as follows:

1. The National Steel Policy (NSP) was announced in 2017. The New Steel Policy, 2017 aspires to achieve 300 million tonnes of steel making capacity by 2030.
2. The total exports of finished steel including CR sheet decreased to 4.52 million tonnes in 2018-19 from 5.94 million tonnes in 2017-18 and the imports increased to 4.24 million tonnes in 2018-19 from 4.16 million tonnes in 2017-18.

Details about capacity and production of crude liquid steel & hot metal by main producers are furnished in Table-4.

Steel Companies in Public Sector

Steel Authority of India Ltd (SAIL)

SAIL is a Public Sector Company that operates five integrated steel plants at Bhilai in Chhattisgarh, Bokaro in Jharkhand, Durgapur & Burnpur in West Bengal and Rourkela in Odisha. SAIL has three special and alloy steel plants viz Alloy Steel Plant at Durgapur (West Bengal), Salem Steel Plant at Salem (Tamil Nadu) Visvesvaraya Iron & Steel Plant at Bhadravati (Karnataka). Crude steel production from SAIL plants during the year 2018-19 was 16.26 million tonnes as against 15.02 million tonnes during the year 2017-18.

Steel Authority of India Ltd undertook modernisation & expansion of its integrated Steel plants at Bhilai, Bokaro, Rourkela, Durgapur, Burnpur and Salem Steel Plants. The modernisation & expansion plan envisaged would enhance the Crude Steel capacity from 12.8 Million Tonnes Per Annum (MTPA) to 21.4 MTPA, the cumulative expenditure towards modernisation & expansion plan till March'19 was ₹.69,255 crore and this includes the expenditure of ₹..2,009 crore incurred during the financial year 2018-19. The modernisation & expansion of Steel plants at Rourkela, Burnpur, Durgapur, Bokaro and Salem has been completed and various facilities are under operation, stabilisation and ramp up.The modernisation & expansion of Rourkela Steel Plant and IISCO Steel Plant has been dedicated to the Nation by the Hon'ble Prime Minister on 01.04.2018 and 10.05.2018, respectively. At Bhilai Steel Plant, major facilities under modernisation & expansion have been completed except one caster & one converter in SMS-III and the integrated process route is in operation, stabilisation & ramp-up.The Hon'ble Prime Minister of India dedicated the Modernised and Expanded Bhilai Steel Plant to the Nation on 14.06.2018.

With the completion of modernisation of major units, the focus during the year was on completion of the various supporting/ auxiliary facilities required for achieving 7.3 Mtpa production and other projects. RINL was also entered into with M/s KIOCL for setting up a pellet plant project at Visakhapatnam with a capacity of 2.0 Mtpa. Formation of joint venture is under process.

National Mineral Development Corporation (NMDC)

NMDC is setting up a 3.0 MTPA Greenfield Integrated Steel Plant at Nagarnar, Bastar District in Chhattisgarh. This plant is now close to completion with production expected during financial year 2021.

NMDC has taken up an ambitious project of laying slurry pipeline from Bailadila to Jagdalpur and further up to Visakhapatnam. The capacity of the line would be 15 MTPA and this will be associated with facilities like beneficiation plant at Kirandul & Bacheli and the pellet plant at Nagarnar and Vizag.

NMDC strategic management plan, 'Vision 2025' is to take the Company's total iron ore production capacity from 43 MTPA to 67 MTPA, with a judicious mix of Greenfield and Brownfield expansions of earmarked assets.

Major Steel Companies in Private Sector

Tata Steel Ltd (formerly, TISCO)

The Company has been rechristened as Tata Steel Ltd (TSL). The Company has an integrated steel plant located at Jamshedpur, Jharkhand, with annual crude steel making capacity of 13 million tonnes and variety of finishing mills. TSL has produced 13.23 million tonnes of crude steel in 2018-19 as compared to 12.46 million tonnes in 2017-18.

The production of total saleable steel in 2018-19 was 12.98 million tonnes as against 12.24 million tonnes in 2017-18. In 2018,Tata steel acquired Bhushan steel Ltd (now renamed as Tata Steel BSL Ltd). Tata Steel group also acquire Usha Martin Steel business through one of its subsidiaries. In the financial year 2018-19, the Company initiated as mtpa expansion project at Kalinganagar.

JSW Steel Ltd

JSW Steel Ltd's combined installed capacity of its plants at Karnataka, Tamil Nadu and Maharashtra of crude steel was 18 million tpy with value-added products constituting 1.8 million tpy spread across six locations-Toranagallu (Vijayanagar Works), Salem (Salem Works), Vasind, Tarapur (downstream units), Dolvi and Kalmeshwar (Maharashtra). Vijayanagar Works by its existing operations produces flat and long steel products; Salem Works has its focus only in long products while the downstream units produce CR/galvanised, colour-coated, value-added flat products.

JSW Steel has initiated a strategic capex plan of ₹.48,715 crore through financial year 2021-22 towards augmenting the installed capacity to 24 mtpa. The steel making capacity at Dolvi Works will be increased from existing 5 mtpa to 10 mtpa and was expected to be commissioned by June 2020

Table – 4 : Capacity and Production of Hot Metal and Crude/Liquid Steel, 2017-18 and 2018-19 (By Principal Producers)

(In '000 tonnes)

Unit	Annual installed capacity		Production			
	Hot metal	Crude/Liquid steel	Hot metal		Crude/Liquid steel	
			2017-18	2018-19	2017-18	2018-19 (P)
Public Sector						
Bokaro Steel Plant (Jharkhand)			4046	4209	3694	3833
Bhilai Steel Plant (Chhattisgarh)			4280	4752	4072	4447
Rourkela Steel Plant (Odisha)			3320	3836	3220	3658
Durgapur Steel Plant (West Bengal)	17105	19132	2282	2515	2042	2219
IISCO Steel Plant, Burnpur (West Bengal)			2055	2200	1801	1888
Visvesvaraya Iron & Steel Plant (Karnataka)			_	_	_	_
Salem Steel Plant (Tamil Nadu)			_	_	97	117
Alloy Steel Plant, Durgapur (West Bengal)			_	_	96	101
Rashtriya Ispat Nigam Ltd (Andhra Pradesh)	7500	6300	5132	5770	4731	5233
Private Sector						
JSW Steel Ltd	16500	18000	15011	15477	16407	16743
Tata Steel Ltd (Jharkhand)	12600	13000	13855	14236	12459	13228
Essar Steel Ltd (Gujarat)	3490	10000	3002	3257	6753	6813
Jindal Steel & Power Ltd (Chhattisgarh)	5325	8600	3147	5042	4014	5254
Others	17958	67204	11886	13083	43745	47388

Source: *Ministry of Steel, Annual Report, 2018-19 & 2019-20 and JPC Bulletin on Iron & Steel, April, 2019 and Annual Statistics,2018-19.*

The Company has enhanced the total capacity to 12 million tpy at Vijayanagar Works. Salem Works is India's largest special Steel plant with 1MTPA capacity and produces about 850 special grades of steel.

Jindal Steel & Power Ltd (JSPL)

JSPL has manufacturing facilities for steel products in three locations; Raigarh in Chhattisgarh, Angul in Odisha and Patratu in Jharkhand. It has also set up a rail and universal beam plant. The sponge iron plant at Raigarh, Chhattisgarh, has capacity of 1.37 million tpy. Facilities at Raigarh also include a Sinter plant of 2.84 MTPA and Steel melt shop of 3.25 MTPA.

JSPL has successfully completed Angul Greenfield project with installation of 6 MTPA integrated steel plant in Odisha along with successful commissioning of 4,554 cu.m blast furnace and 1 MTPA coke oven along with 250 tonnes per heat BOF.

Performance of the BF/BOF & EAF/IF Industry is summarised below:

Basic Oxygen Furnace (BOF)

Presently, there are around 17 Basic Oxygen Furnace units with an installed capacity of 50.84 million tonnes. The production of steel through this route was around 49.45 million tonnes (45%).

Electric Arc Furnace (including corex & MBF/EOF)

Steel produced in the Electric Arc Furnace (including corex & MBF/EOF) is mostly by recycling of steel scrap using Electric Arc Furnace (EAF). Presently, there are more than 47 EAF based steel plants that are operational in the country with an aggregate working capacity of around 37.57 million tonnes per annum. The production of steel through EAF route and IF route was around 28.48 million tonnes (26%) and 32.99 million tonnes (29%), respectively.

The recent developments in EAF technology, viz, to increase oxygen consumption, to reduce power consumption and to reduce tap time have led to increase in metal production. The development of thin slab casting has made EAF route more productive. This route enables slab strips rolling at lesser cost, facilitating production of cheaper strips/sheets than those that can be achieved through BF/BOF route.

Induction Furnace (IF)

Presently, in India, EAF based industries are yet to switch over to induction furnace route. An induction furnace is an electrical furnace in which heat is generated through electro-magnetic induction in an electrically conductive medium. Induction furnaces use steel melting scraps, sponge iron and pig iron/cast iron. On an average, the proportion of these items is 40% sponge iron + 10% cast iron or pig iron and the remaining is steel melting scraps. There are around 1,126 ground induction furnaces with an aggregate working capacity of about 39.53 million tonnes.

FERROALLOYS

The Indian Ferroalloy Industry was established during the second Five-year plan as an ancillary Industry to cater to the growing needs of the domestic Steel Industry. As a deoxidant and alloying agent, ferroalloys are in demand for crude steel and alloy steel production.

Bulk ferroalloys of high-carbon category are produced by large-scale industries. The Noble ferro-alloys are of low-carbon category and include ferro-vanadium, ferrotungsten, ferroniobium, ferro-molybdenum and ferrotitanium. There are also a number of units under the Small-scale Sector for the manufacture of ferroalloys, particularly ferrosilicon, ferrochrome and ferromanganese.

India is the net exporter of ferroalloys. About 25% to 30% production is usually exported. India is an established regular exporter of high-carbon ferro-manganese, silicomanganese and highcarbon ferrochrome.

RINMOIL Ferro Alloys Pvt. Ltd (RINMOIL) is a 50:50 joint venture company between RINL and MOIL incorporated on 29.07.2009 to set up Ferroalloy manufacturing unit in Visakhapatnam. The project is yet to be implemented due to high power tariffs in the State of Andhra Pradesh. The Company has been exploring the possibility of locating the plant in Bobbili or Visakhapatnam or Gumgaon, considering the present market scenario and to avail advantage of logistics & power incentives declared for Vidarbha region in the State of Maharashtra. The capacity of India Feroalloys Industry is furnished in Table-5. The details about ferroalloys are discussed in the Review on Ferroalloy in Vol.II of this publication (IMYB).

Table – 5 : Capacity of Ferro-alloys Industry

(In tonnes per annum)

Ferro-alloys	Installed capacity
Total	**5150000**
Bulk Ferro-alloys : Total	**5100000**
Manganese alloys	3160000
Chrome alloys	1690000
Ferro silicon	250000
Noble Ferro-alloys : Total	**50000**[e]

***Source**:Indian Ferro-alloys Producers' Association (IFAPA), Mumbai.*

Bulk Ferro-alloys

Ferromanganese and Silicomanganese

The country's total installed capacity for ferromanganese is around 42 lakh tonnes.

The total consumption for bulk ferroalloys accounts for over 98% of all ferroalloys. Also about 80% of total ferroalloys production is used in steel making, while the balance is used for the manufacture of casting, superalloys, aerospace and other special applications.

The total production of ferromanganese and silicomanganese was 5,18,000 tonnes and 3,45,291 tonnes in the year 2018-19, respectively as compared 518,000 tonnes and 311,326 tonnes respectively in the previous year. The production ferromanganese reported by MOIL was at 11,003 tonnes as against the 10,573 tonnes in the previous year.

Ferrochrome and Charge chrome

The total combined capacity of ferrochrome and charge chrome is around 16 lakh tpy. Stainless and Alloy-steel Industry are the chief consumers of ferro-chrome.

The total production of ferrochrome in 2018-19 was about 9,44,000 tonnes, and was the same as that in 2017-18.

Noble Ferroalloys

Noble Ferroalloys are one of the vital inputs required for producing special types of steel & alloy. The total capacity of noble ferroalloys, was 50,000 tpy and they majorly include ferromolybdenum, ferro-vanadium, ferrotungsten, ferrotitanium, ferro-silico-magnesium, ferroaluminium, ferro-boron, etc. Mishra Dhatu Nigam (A Govt. of India Undertaking), with a capacity of 2,729 tpy produced different types of super-alloy, chiefly, cobalt, molybdenum, titanium and tungsten-based super-alloys and products. The production of various noble ferro-alloys is furnished in Table-6.

Table – 6 : Production of Noble Ferro-alloys

Ferro-alloy	Quantity (in tonnes)
Ferromolybdenum	1003
Ferrotitanium	118
Ferrovanadium	1013
Ferroaluminium	2752

Electrolytic Manganese Dioxide (EMD)

EMD is consumed along with natural manganese dioxide for the manufacture of dry battery cells. There are two units, one owned by MOIL in Bhandara district of Maharashtra, having a capacity of 1,000 tpy and the other by the then Union Carbide Ltd (now Eveready Ltd) at Thane, Maharashtra, having a capacity of 2,500 tpy. MOIL has undertaken capacity expansion of the existing EMD plant to 2,000 tpy in view of the good demand for EMD in the domestic market. The capacity of the plant was increased from 1,000 tpy to 1,500 tpy during 2018-19. The production of EMD by MOIL was 992 tonnes in 2018-19 as against 875 tonnes in 2017-18.

NON-FERROUS METALS

Aluminium

There were four companies with a total installed capacity of 4.1 million tonnes in operation. NALCO, the only Public Sector Company in aluminium & alumina segment, has an installed capacity of 0.46 million tpy at Angul. BALCO has an installed capacity of 0.57 million tpy at Korba. The three companies with six plants in the Private Sector have a total capacity of 3.6 million tpy in operation. One unit at Korba of BALCO and a plant of MALCO have suspended operations.

The production of aluminium in 2018-19 was 3.69 million tonnes as compared to 3.40 million tonnes in the previous year. The installed capacity and production of aluminium in 2017-18 and 2018-19 are enumerated in Table-7.

Alumina

The production of alumina was 6.15 million tonnes in 2018-19 as compared to 6.11 million tonnes in the previous year. The details of alumina producers in the country, their capacities and production are provided in Table-8.

Hindalco's Renukoot Integrated Smelter uses alumina produced in their plant for producing aluminium.

Table – 7 : Capacity and Production of Aluminium, 2017-18 and 2018-19

(In million tonnes)

Producer	Annual Capacity	Production	
		2017-18	2018-19 (P)
Total	**4.1**	**3.40**	**3.69**
Public Sector			
National Aluminium Co. Ltd (Angul)	0.46	0.42	0.44
Private Sector			
Bharat Aluminium Co. Ltd (Korba)	0.57	0.57	0.57
Hindalco Industries Ltd	1.28	1.29	1.29
Vedanta Aluminium Ltd (Jharsuguda)	1.75	1.11	1.39

Figures rounded off.
Source: *Information received from individual plants/ Annual reports*
MALCO Plant is closed since December 2008, hence it is removed from the table.

Table – 8 : Capacity and Production of Alumina, 2017-18 and 2018-19

(In million tonnes)

Producer	Annual Capacity	Production	
		2017-18	2018-19 (P)
Total	**7.56**	**6.11**	**6.45**
Public Sector			
National Aluminium Co. Ltd (Damanjodi)	2.275	2.08	2.11
Private Sector			
Bharat Aluminium Co. Ltd	0.200#	Nil	Nil
Hindalco Industries Ltd	3.000	2.82	2.84
Vedanta Aluminium Ltd (Lanjigarh)	2.000	1.21	1.50

Figures rounded off.
Source: Information received from individual plants/ Annual Reports.
 # Plants remained non-operational during the year.
MALCO Plant is closed since December 2008, hence it is removed from the table.

National Aluminium Co. Ltd

The Company has a 22.75 lakh tpa Alumina Refinery located at Damanjodi in Koraput distt. of Odisha and 4.60 lakh tpa Aluminium Smelter & 1200 MW Captive Power Plant located at Angul, Odisha. The surplus alumina that remains after internal consumption is sold to third parties in the export market and a small portion is also sold to the domestic market. ***NALCO is in the process of setting up of its 5th Stream in its existing Alumina Refinery which shall add 1.0 million tonnes to its existing installed capacity of 2.275 million tonnes per year.*** The Company also plans to develop a 42 lakh tpy bauxite mine and 14 lakh tpy alumina refinery complex in Andhra Pradesh. The Company has port facilities at Visakhapatnam to export alumina at the rate of 1.4 million tpy.

Vedanta Group

BALCO is a Private Sector Company with an integrated alumina/aluminium complex at Korba in Bilaspur district in Chhattisgarh. The Company has two captive bauxite mines. The Company's two alumina refineries are located at Korba, Chhattisgarh and Lanjigarh, Odisha, with an installed capacities of 2.0 lakh tpy and 20.0 lakh tpy, respectively. The total capacity of the Korba and Jharsuguda smelter is 0.57 million tpy and 1.7 million tpy, with total smelter capacity of 23.20 lakh tpy, respectively. The Company also has the capacities to produce ingots, wire-rods billets, bushbars and rolled products. The state-of-the art alumina refinery at Lanjigarh, feeds the aluminium smelters at Jharsuguda and BALCO and forms a crucial link in the value chain.

Hindalco Industries Ltd

Hindalco Industries Ltd has a total aluminium production capacity of around 1.28 million tonnes. Hindalco's plans to expand alumina refinery capacity at Belagavi from 3.5 lakh tpy to 6.5 lakh tpy are on hold, awaiting Government approval related to bauxite mines.

Hindalco Aluminium smelting operations are located at Renukoot (Uttar Pradesh), Aditya Aluminium (Odisha), Mahan Aluminium (Madhya Pradesh) and Hirakud (Odisha). Aditya and Mahan Aluminium smelters are operating on state-of-the-art AP36 technology. In addition to aluminium, Renukoot (Uttar Pradesh), Intergrated Aluminium

Complex also produces semi-fabricated products viz. conductor redraw rods, sheet, extrusion, etc. Hindalco's plants are equipped with sophisticated rolling mills and finishing equipment.The plants are located at Hirakud (Odisha), Belur (West Bengal), Mouda (Maharashtra), Renukoot (Uttar Pradesh) and Taloja (Maharashtra). Hindalco's finished products include, alumina, primary aluminium in the form of ingots, billets & wire rods, value-added products, such as, rolled products, extrusion and foils. Hindalco is the largest manufacturer of entire range of Flat Rolled Products. The Hirakud Flat Rolled Products (FRP), produce rolled products, extrusions products and wire rods. Hindalco has a conductor redraw capacity of 56,400 tpy at Renukoot plant and sheet rolling capacity of 2,05,000 tpy spread over at Renukoot (80,000 tpy), Belur (45,000 tpy), Taloja (50,000 tpy) and Mauda (30,000 tpy) plants. The Company also has two plants for aluminium extrusion with capacity of 31,000 tpy (comprising units at Renukoot with 23,000 tpy capacity and Alupurum (Kerala) with 8,000 tpy capacity.

Hindalco's foil unit located at Silvassa (Dadra & Nagar Haveli) has an installed capacity of 30,000 tpy and produces foils with thickness varying from 9 microns to 200 microns. Kollur plant in district Medak (Andhra Pradesh) has capacity of 4,000 tpy and produces an array of high-quality foils, from cigarette and blister foil to lidding foil of thickness ranging from 50 to 7 microns.

Utkal Alumina (Odisha) with an installed capacity of 1.5 million tpy alumina refining, as continues to be the most economical and efficient alumina producing plant globally. Utkal alumina sources bauxite from Baphlimali Bauxite Deposit in Odisha.The Company has set up 3.60 lakh tpy aluminium smelter at Bargawan. The other integrated aluminium project, namely, Aditya Alumina & Aluminium Project, alumina refinery at Koraput, 3.60 lakh tpy aluminium smelter was set-up at Lapanga, Odisha. A joint venture agreement on bauxite mines was signed with OMC. Another greenfield project, viz. Jharkhand Aluminium Project at Sonahatu, entails setting up of a 7.20 lakh tpy aluminium smelter.

Recycling: Aluminium is recyclable without any loss of properties and comsumes only 5% of the total energy requirement compared with primary metal production. At present, in the Organised Sector, only Hindalco operates 25,000 tpy capacity recycling plant at Taloja in Maharashtra.

Cadmium

Cadmium (99.95 min.) is obtained as a by-product from zinc smelters of HZL at Debari, Visakhapatnam, Chanderiya and of BZL, Binanipuram. These together have an annual capacity of 913 tonnes. These by-products of cadmium are cast in the form of pencils weighing from 250 g to 500 g. In India, cadmium is consumed in industries like paint, glass and chemicals. No cadmium production is reported in 2018-19, however the production of cadmium was 47 tonnes in 2017-18.

Copper

The production of copper ore at 4.13 million tonnes in 2018-19 increased by 12% as compared to that in the previous year. The metal content in the ore produced in 2018-19 works out to 36,169 tonnes as against 33,239 tonnes in 2017-18

Hindustan Copper Ltd produces copper metal from the ore produced at their captive mines. Sterlite Industries (India) Ltd and Hindalco Industries Ltd produce copper metal from imported copper concentrates. Details regarding capacity and production of copper are furnished in Table-9.

Production of refined copper (cathodes) in 2017-18 and 2018-19 was 830 thousand tonnes and 454 thousand tonnes, respectively.

Table – 9 : Capacity and Production of Copper (Cathodes)

(In '000 tonnes)

Producer	State	Annual capacity	Production	
			2017-18	2018-19 (P)
Total		**1001.5**	**830**	**454**
Hindustan Copper Ltd**	Jharkhand	51.5	13.78	13.78
Vedanta Ltd	Dadra & Nagar	400	403	90
Hindalco Industries Ltd	Gujarat	500	414	351
Jhagadia Copper Ltd (formerly SWIL)	Gujarat	50	-	-

Figures rounded off.

*** Metal capacity. However, the cathode capacity of HCL is 51,500 tonnes.*

Hindustan Copper Ltd

Hindustan Copper Ltd is a Mini Ratna Government of India Enterprise under the administrative control of the Ministry of Mines. Copper is produced at two smelters of HCL at Indian Copper Complex (ICC), Ghatsila, East Singhbhum district in Jharkhand and Khetri Copper Complex (KCC), Khetrinagar, district Jhunjhunu, Rajasthan. The aggregate capacity of the two smelters for copper cathode production is 51,500 tpy. Refinery at ICC also has a Wire Bar Casting Plant with a capacity of 8,400 tpy and a Brass Rolling Mill that manufactures brass sheets by using copper produced at ICC. The aggregate installed capacity of wire bars is 39,400 tpy and wire rod capacity is 60,000 tpy at HCL. It also has a precious metal recovery plant for the recovery of gold, silver, selenium, tellurium and nickel sulphate and copper sulphate at Ghatsila. Though HCL has an installed capacity of 390 tonnes in respect of nickel sulphate, no production of nickel sulphate was reported since 2004-05.

The capacity of Khetri Copper Complex (KCC) smelter is 31,000 tpy. However, HCL has shut down the Khetri smelting refining plant due to economic reasons. KCC has a concentrator plant at Khetri in Jhunjhunu district, Rajasthan, having a capacity of 2.02 million tpy. KCC & ICC Ghatsila, Jharkhand with 1.55 million tpy each and Malanjkhand, Madhya Pradesh with two million tpy capacity also operate sulphuric acid plant.

Chhattisgarh Copper Ltd (CCL) established in the year 2018 is a joint venture Company between Hindustan Copper Ltd and Chhattisgarh Mineral Development Corporation Ltd The Company was established for exploration, mining and beneficiation of copper and its associated minerals in the State of Chhattisgarh.

Continuous Cast Copper Wire Rods Project, (TCP) Taloja, Maharashtra: This project has a capacity of 60,000 tpy continuous cast copper wire rods (CCWR). The plant is based on the Southwire SCR-2000 technology of the USA, which uses natural gas as fuel and imported copper cathodes.

Vedanta Ltd. (Sterlite copper)

Vedanta Ltd is India's largest Mining Company with interests and operations in iron ore, aluminium, copper, zinc, lead and power. The smelter and refinery of Sterlite Industries (India) Ltd are located at Thoothukudi in coastal belt of Tamil Nadu and Silvassa, Dadra & Nagar Haveli and has a total installed capacity of 4 lakh tpy each. The Unit is based on 'ISASMELT' technology from MIM, Australia, using imported concentrates. A Cathode Refinery of 2,05,000 tpy capacity and 90,000 tpy Copper Rod Plant have been built at Thoothukudi with a view to undertaking export operations from the nearby port. Sterlite closed its operations at Thoothukudi plant w.e.f May, 2018 on the State government order. The 1,80,000 tpy copper cathode refinery of Sterlite is located in Chinchpada at Silvassa in the Union Territory of Dadra & Nagar Haveli which predominantly caters to the domestic market and also has a 1,50,000 tpy rod mill. The copper anodes at Sterlite were refined into cathodes at Silvassa for domestic markets, while anodes were refined to cathodes at Thoothukudi itself for exports. The technology for refineries and Continuous Cast Copper Rod Plant is of MIM, Australia and Continuous Properzi, Italy, respectively. The imported copper concentrates for smelters are obtained from captive mines in Australia through long-term contracts with producers in Chile and Indonesia, as also through spot purchases. The Company is the largest producer of Continuous Cast Copper Rods (CCR) in India. The CCR plants have total annual capacity of 2,68,000 tpy. The Company has sulphuric acid plant of 1.3 million tpy and phosphoric acid plant of 2,30,000 tpy.

Hindalco Industries Ltd (Birla Copper)

The Company's copper smelters located at Dahej, Lakhigam, district Bharuch, Gujarat, has an installed capacity of 5,00,000 tpy. The copper operation consists of producing copper through smelting, refining copper from imported copper concentrates and converting refined copper cathode into continuous cast rod. It is now one of the world's largest smelter at a single location. It is based on Outokumpu Technology. The Company also produces continuous cast copper rods (CCR) with an annual capacity of 97,200 tonnes. In the process of extraction of copper metal, by-products are recovered and include sulphuric acid (1.67 million tpy), phosphoric acid (1,80,000 tpy), di-ammonium phosphate (DAP) & complex fertilizers (4,00,000 tpy), gold (15 tpy) and silver (150 tpy). The entire requirement of copper concentrates is met through imports.

Gujarat Copper Project (formerly Jhagadia Copper Ltd)

Gujarat Copper Project is located at Jhagadia in Bharuch district, Gujarat. HCL acquired the assets of Jhagadia Copper Ltd and renamed it as GCP. It is a scrap-based electrolytic smelter that produces cathodes with a capacity of 50,000 tpy and additional 20,000 tpy of copper anodes. The plant was in technical collaboration with Outokumpu Technology (formerly Boliden Contech AB), Sweden. The precious metals like gold, silver, platinum, palladium, etc. are also recovered as part of anode slime during the refinery process. The refinery is based on ISA-Technology from Mount ISA Mines Ltd, Australia.

Lead

The total installed capacity of primary lead smelting was 2,05,000 tpy. The smelting capacity of HZL for lead is distributed between two smelters at Chanderiya (85,000 tpy) and Dariba (1,20,000 tpy). Primary lead was produced entirely by HZL at lead-zinc smelter at Chanderiya, district Chittorgarh, and Rajpura-Dariba Plant, district Udaipur, Rajasthan.

There are a number of secondary producing units in the Organised and Unorganised Sector. Lead acid batteries are the major consumer of Lead metal in the country. The production of lead acid batteries by the Units in the organised sector in 2018- 19 was 1,46,806.28 thousand tonnes.

Zinc

HZL is the major producer of Zinc. The smelting capacity of HZL for zinc is distributed between three smelters at Debari (88,000 tpy), Chanderiya (5,58,000 tpy) and Dariba (2,34,000 tpy). Edyar Zinc Ltd's plant at Binanipuram, Kerala, has a capacity of 38,000 tpy. Thus, the smelting capacity for zinc in the country is 9,18,000 tpy.

The primary product of Debari and Vizag smelters is high-grade zinc, while cadmium is recovered as by-product. Chanderiya smelter complex with a total capacity of 5,58,000 tpy of zinc is the world's largest single location zinc smelting complex. Besides lead and zinc, HZL also produces silver as by-products at its Pant Nagar plant in Uttarakhand whose capacity is 800 tonnes per year. The data on total capacity and production of primary lead and zinc ingots in 2017-18 and 2018-19 are furnished in Table-10.

Table – 10 : Capacity and Production of Primary Lead and Zinc Ingots

(In tonnes)

Producer	Lead capacity (tpy)	Production		Zinc capacity (tpy)	Production	
		2017-18	2018-19 (P)		2017-18	2018-19 (P)
Hindustan Zinc Ltd	205000	168245	197839	880000	791461	696283
Edayar Zinc Ltd. (formerly, Binani Zinc Ltd.)	-	-	-	38000	-	-
Total	**205000**	**168245**	**197839**	**918000**	**791461**	**696283**

ABRASIVES

Natural abrasives, which include calcite, emery, diamond, zircon, corrundum, novaculite, pumice, etc. are generally sold as dressed stones. Synthetic abrasives include borazon, ceramic, dry ice, glass powder, silica carbide, etc. Commercial abrasives are manufactured in many shapes as bonded or coated abrasives including belt discs, wheels, sheets, blocks, rods and loose grains. A large number of units exist in the Unorganised Sector. However, important producers of coated abrasives were: Grindwell Norton Ltd, Mora, Uran, district Raigad, Maharashtra; Flexoplast Abrasives (India) Ltd, Aurangabad, Maharashtra; Associated Abrasives Ltd, Nashik, Maharashtra; Carborundum Universal Ltd, Chennai, Tamil Nadu; Cutfast Abrasives Tools Pvt. Ltd, Chennai, Tamil Nadu; and John Oakey and Mohan Ltd, Ghaziabad, Uttar Pradesh. Important producers of bonded abrasives (grinding wheels) are Associated Abrasives Ltd, Nashik, Maharashtra; Carborundum Universal Ltd, Chennai, Tamil Nadu; Cutfast Abrasives Tools Pvt. Ltd, Chennai, Tamil Nadu; and K.L. Thirani & Company Ltd, Kolkata, West Bengal.

Silicon Carbide (SiC)

Silicon Carbide (SiC) is a synthetic material most commonly produced by the so called Archean process in electrical resistance furnaces. SiC does not occur naturally except in some types of pre-solar metorites, along with diamonds. SiC can be produced either in black colour or green colour depending on the raw material. SiC products have applications in metallurgical refractories, abrasives, slurry wire sawing, and for technical ceramics.

Major producers of silicon carbide are: Grindwell Norton Ltd, Renigunta, Andhra Pradesh and at Bengaluru, Karnataka; Indian Metals & Carbide Ltd, Therubali, Odisha; Carborundum Universal Ltd, Tiruvottiyur, district Chennai, Tamil Nadu; and Speedfam (India) Pvt. Ltd, Navi Mumbai, Maharashtra.

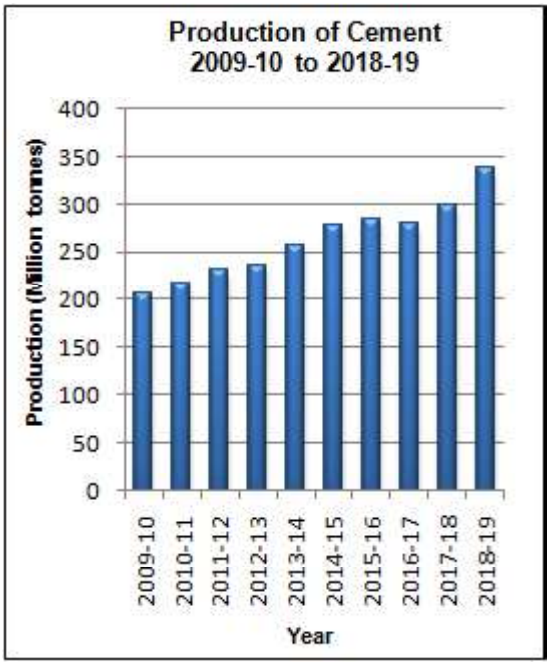
CEMENT

The Cement Industry which is one of the key infrastructure industries recorded exponential growth pattern in successive years since the introduction of partial decontrol in 1982, total decontrol in 1989 and post delicencing of the Industry and Policy Reforms initiated in 1991.

As per DIPP, the total installed capacity of Indian Cement Industry is about 537 million tonnes. At present the capacity utilisation is low and idle capacity of the cement is around 170 million tonnes. The Cement Industry comprises around 215 large cement plants manufacturing all types of cement in the country. Cement consumption in India is around 240 kg per capita against global average of 530 kg per capita, which shows significant growth potential for the Industry. The total production of cement (all kinds) in 2018-19 was about 337.32 million tonnes as compared to 297.71 million tonnes in the previous year. The Cement Industry produces a variety of cement, such as, Ordinary Portland Cement (OPC) Portland Pozzolana Cement (PPC), Portland Blast Furnace Slag Cement (PBFC), Oil Well Cement, White Cement, etc. to suit a host of applications. India's cement demand is expected to reach 550-600 million tonnes per annum by 2025.

ASBESTOS-CEMENT PRODUCTS

The installed capacity of asbestos-cement pressure pipes in the Organised Sector was about 1,49,640 tpy. Production capacity of asbestos cement sheets was not available. By virtue of the high tensile strength and bonding properties with cement, it is used in the manfacture of fibre cement products.



Industries that deal with asbestos-cement products include Everest Building Products Ltd which has units located at Kymore in Madhya Pradesh and at Podanur in Tamil Nadu. Similarly, Hyderabad Industries Ltd has three plants at Sanatnagar, RangaReddy district in Andhra Pradesh; Jasidih in Jharkhand; and Ballabhgarh in Haryana. Ramco Industries Ltd has three plants at Arakkonam, district Vellore, Tamil Nadu; Karur in district Dharwad, Karnataka; and Maksi in district Shajapur, Madhya Pradesh. Southern Asbestos Cement Ltd has two plants at Karur in district Dharwad, Karnataka; and Arakkonam, district Vellore in Tamil Nadu. Shree Pipes Ltd Hamirgarh, district Bhilwara, Rajasthan; Malabar Building Products Ltd, Malakunnathukavu, district Thrissur, Kerala; Konark Cement and Asbestos Industries Ltd at Bhubaneswar in Odisha; Shri Digvijay Cement Co. Ltd, Digvijaynagar, Ahmedabad in Gujarat; Uttar Pradesh Asbestos Ltd, Mohanlalganj, district Lucknow, Uttar Pradesh; Assam Asbestos Ltd, Bonda, Narangi, district Guwahati, Assam; Utkal Asbestos Ltd, Dhenkanal in Odisha; and Visaka Asbestos, Pattencheru (Medak) in Andhra Pradesh are some of the other industries that produce asbestos cement products.

Besides, Swastik Industries, Pune, in Maharashtra; Kalani Asbestos, a Division of Kalani Industries Pvt. Ltd, Pitampur, district Dhar in Madhya Pradesh; Tamil Nadu Asbestos (Pipes), a unit of Tamil Nadu Cement Corp. Ltd, Mayanur, district Tiruchirapalli in Tamil Nadu; and Ganga Asbestos

Cement Ltd, Raebareli in Uttar Pradesh produced only asbestos pressure pipes. The present status of all these asbestos cement units is not available with Indian Bureau of Mines.

REFRACTORY INDUSTRY

Refractory Units fall under Medium and Small-scale Sectors. Steel Industry is the biggest group of customers of this Industry, which consumes about 70% of total refractory production, followed by 12% in Cement, 5-6% in non-ferrous, 3% in Glass and balance in other industries. There are more than 100 refractories in India, out of which around 14 are major, 33 are medium-sized and the rest are relatively smaller in respect of production. The estimated annual installed capacity of all types of refractory was 2,015 thousand tonnes and the production in 2018-19 of all types of refractories was 1,116 thousand tonnes as compared to 1,107 thousand tonnes in 2017-18. Bharat Refractories Ltd (BRL), a Govt. of India Undertaking, has four units that are engaged in the manufacture and supply of various kinds of refractories not only to the integrated steel plants but also to smaller steel plants. The important refractory producers are Calderys India Refractories Ltd, Associated Ceramic Ltd, Dalmia Bharat Ltd, IFGL Refractories Ltd, Orient Refractories Ltd, TRL Krosaki Refractories Ltd, Vesuvius India Ltd, Maithan Ceramic Ltd, National Refractories, etc.

With the modernisation and renovation of steel plants, the requirements for various types of refractories have undergone revolutionary changes. The stress is now on for more sophisticated products like precast monolithics. The domestic Refractory Industry, taking cue of this change, has acquired the technical know-how for production of sophisticated refractories, such as, magnesia carbon bricks, new generation sliding-gate plate refractories, for ladles, gunning materials and castables. Manufacture of carbon bonded silicon carbide crucible and clay graphite foundry products is continuously done with constant upgradation for production of improved products. The use of these special refractories has brought down the consumption of refractories per tonne of steel production. However, the customers are benefited by way of improved performance, lower shut down time and savings on energy. The specific consumption of refractories at present in integrated steel plants varies from 8 to 10 kg/tonne of crude steel as compared to 6-8 kg/tonne of crude steel in advanced countries.

The price and supply of imported raw materials are subjected to international demand and supply situation and most of the refractory makers are completely dependent on imported raw materials, especially for making high-end products. Refractory production in India during 2017-18 & 2018-19 is furnished in Table-11.

Table – 11: Refractory Production in India, 2017-18 and 2018-19

(In tonnes)

Item	Production	
	2017-18	2018-19
Total	**1107159**	**1116074**
Fireclay Bricks & Shapes	224937	216335
High Alumina Bricks & Shapes	215444	195210
Silica Bricks & Shapes	45990	72236
Basic Bricks & Shapes	189689	195214
Monolitics/ Castables/ Pre-cast Blocks	317419	317454
Special Products	60730	66084
Others	52950	53542

Source: IRMA Journal

CERAMIC & GLASS INDUSTRY

Ceramic Industry

Ceramic Industry in India is about 100 years old. India ranks 8th in world in terms of production of ceramics, which is around 2.5 % of global output (as per Morbi Ceramic association). As per ICCTAS, 750 million sq. metres of ceramic tiles were estimated to be produced as against the global production of about 11,913 million sq. m. The main product segments are the Wall tile, Floor tile, Vitrified tile and Industrial tile segments. The market shares (in value terms) are 20%, 23% 50% and 7% for Wall, Floor, Vitrified and Industrial tiles respectively. Ceramic products are made from clay and felspar and are manufactured in Large and Small-scale Sectors with wide variations in type, range, quality and standard. Ceramic items have properties, such as, glassy smooth finish, high thermal shock resistance, poor thermal electrical conductivity, high abrasion resistance, acid resistance and weather resistance. During the last two decades, there has been a phenomenal growth in the field of ceramics to meet specific demands of the industry, such as, high alumina ceramics, cutting tools and other structural ceramics.The state-of-the-art technology of international standards are adopted for production

of high quality, ceramic goods in the country. The major industries include Kajaria Ceramics, Somani Ceramics, Asian Granite India, Orient Ceramics & Industries, Nitco, Regency Ceramics, Euro Ceramics, Bell Ceramics, etc. The per capita consumption of ceramic tiles in the country was about 0.50 sq. m which is comparatively lower as compared to 2.6 sq. m in China and 5-6 sq. m in Europe. Ceramics Technological Institute (CTI), Bengaluru, a National Level Institute for R&D in BHEL, offers the much-needed technical support for product development by enabling the Indian Ceramic Industry to adopt a modernised technology for development of new and advanced ceramics. Areas of research are nano-technology, separation technology, microwave processing, etc.

Ceramic Tiles

Following the development and growth of the Building Industry, ceramic glazed tiles producing industries too flourished considerably during the last decade. As per ICCTAS, there were 14 units in the National Sector, which accounted for 40% of production of ceramic tiles. Besides, there are about 200 units in Regional Sector, which accounted for 60% of production of ceramic tiles. The domestic Ceramic Tile Industry has been growing at about 15% per annum. Indian tiles are competitive in the international market and are chiefly exported to East and West Asian countries. In India, both traditional methods of manufacturing (tunnel) as well as the latest single fast firing methods are in vogue in manufacturing of ceramic tiles.

Sanitarywares

The India's sanitarywares installed capacity is already in excess of 40 million pieces/year, India is the world's second largest sanitaryware producer after China. Around 75% of the country's entire production comes from Gujarat. The basic raw materials for sanitaryware are felspar, ball clay, kaolin and quartz. There were 7 units with installed capacity of 143 thousand tpy in the Organised Sector, while around 210 plants with a capacity of 53,000 tpy exist in the Small-scale Sector. Some units have either been closed or merged with the other existing ones. This Industry has been reporting a growth rate of about 10% per annum. The major manufacturers of sanitaryware include Hindustan Sanitaryware Industries Ltd, Parryware Roca Bathroom Products, Cera Sanitaryware, Neycer India, Kohler India, Toto, RAK Ceramics India, Duravit Sanitaryware Pvt. Ltd, Golf Ceramics, etc.

Potterywares

Potterywares include crockery and tableware and its manufacturers are a part of an age old handicraft industry in the country. Produced both in the Large-scale and the Small-scale Sectors, there were 16 units in the Organised Sector with a total installed capacity of about 43,000 tpy, while in the Small-scale Sector, there were over 1,400 plants with a capacity of 3 lakh tpy. Out of these, over 600 units are located in Uttar Pradesh.

Glass Industry

The Glass Industry includes manufacturing unit that makes glass products, such as, glass containers and hollow-wares, tablewares, flat glass (including float, sheet, figured, wired and safety, mirror glass), speciality glass (such as, electronics, optics, lighting, ophthalmic lenses) vacuum flasks, refills, laboratory glasswares, fibre glass, kitchen glassware, glass bangles, etc. Principal raw materials used in the manufacture of glass are silica sand, soda ash, calcite, dolomite, etc.

Glass Industry comes under the category of delicensed industry and manufacturing units are spread all over India. The large-scale producers are located mostly at Mumbai, Kolkata, Bengaluru, Hyderabad and in Gujarat and are equipped mostly with modern melting furnace technology. The Medium and Small-scale Industries, on the other hand, include cottage industries that still use outdated technology for production of glass products. The share of Organised Sector in the Glass industry is dominant at about 55% whereas, the Unorganised sector accounts for about 45%. There is considerable scope and demand for glass fibre products, particularly due to growth in Petrochemical Sector, solar products, packaging industry and allied products. Glass Industry in India remained in the form of Cottage Industry till the beginning of 20th century. First glass plant in India was set-up in August 1908 by freedom fighter & Bharat Ratna Lokmanya Bal Gangadhar Tilak at Talegaon in the state of Maharashtra. Glass Industry in India has made a steady progress since then, particularly after independence. Firozabad, known as glass city of India, continues to be a place of master craftsmen and entrepreneurs, where traditional processes are still used for production of a wide variety of glass items. About, 70% of the total glass production in the Unorganised Sector in the country is contributed by Firozabad Glass Industry.

The production in terms of quantity/value of Sheet Glass, Fibre Glass, Glass Bangles and Glassware during 2018-19 was 91,748.07 thousand square metres, 1,16,743.29 tonnes, 39.76 `crore, 3973.05 `crore respectively.

The per capita consumption of glass in India is about 1.1 kg, which is on the lower side when compared to 15 kg in China. Indian Glass market is estimated to increase at a CAGR of 15% in future. Most of the glass demand in India comes from container glass which accounts for 50% of country's glass consumption by value. The market share of Indian Glass Industry consists of architectural (45%), automative (15%), value- added glass (15%), mirrors (10%) & furniture segment (15%).

Glass Containers and Hollow-wares

About 43 units in the Organised Sector are engaged in the manufacture of glass containers and hollow-wares, with an installed capacity of around 9,305 tonnes per day. Glass containers are ideal packaging medium, but are increasingly being replaced by other packaging materials like plastic, PET, aluminium and tetrapack. The per capita consumption of container glass in India is 1.8 kg as compared to 27.5 kg in USA and 9 kg in China. The major producers include Hindustan National Glass & Industries, Piramal Glass, Haldyu Glass Gujarat, La Opala RG, Mohan Meakin, Gujarat Glass, Associated Glass Industries (AGI), etc.

Laboratory Glasswares

There were six units in this Sector which manufacture neutral glass tubing, laboratory glasswares and chemical process equipment. The installed capacity of neutral glass tubing was 46,600 tpy. The data on production are not available. The demand for neutral glass tubing has not picked up due to sizeable switch over from glass items to plastic items.

Flat Glass

Silica sand, dolomite, limestone are some of the mineral ingredients used in the manufacture of flat glass. The term flat glass includes float glass, sheet glass or plate glass, figured and wired glass. These are further processed into mirror, toughened glass, laminated glass, double glazing, etched glass, glass doors, etc. The total capacity of Flat Glass Industry in India is about 5,473 tonnes per day, out of which the installed capacity of major producers was 5,235 tonnes per day (i.e. , 96% of the total installed capacity). Hindustan National Glass and Industries Ltd, (HNG) has a new plant being set-up at Naidupeta in Andhra Pradesh and is undertaking expansion of capacity at its Nashik (Maharashtra) plant to 4,395 tonnes per day. The major consumers of flat glass are Architectural (80%) and Automotive (15%). The per capita consumption of float glass in India is 0.88 kg as against 12 kg in China, 9 kg in Thailand, 13 kg in Malaysia and 4 kg in Indonesia. There has been growing acceptability of the Indian flat glass products in the global market.

Vacuum Flasks and Refills

There were eight units in the Organised Sector that manufacture vacuum flasks and refills, with an installed capacity of 36 million numbers per annum.

Fibre Glass (Glass-reinforced plastic)

Silica sand, limestone, kaolin, fluorspar, dolomite, etc. are some of the important minerals used in manufacturing fibre glass. Fibre glass is highly capital and technology-intensive Industry. Fibre glass is lighter than aluminium but stronger than steel. Moreover, being an inorganic material, it does not pose any health hazard. There are five units with production capacity of 55,000 tpy, while the production hovered around 39 thousand tonnes. Presently, India exports about 80% of its glass fibre production.

GRANITE INDUSTRY

Major production of granite in raw as well as processed form is generally from Andhra Pradesh, Rajasthan, Karnataka, Tamil Nadu and Gujarat. Granite is used in monuments, building slabs, tiles, surface plates, etc. Over 160 varieties of granite with exotic colours/shades have been identified as products that could be exported after processing.

Granite is a minor mineral as defined under Section 3(e) of MMDR Act, 1957, and as per Section 15 of MMDR Act, 1957, all powers to make rules and grant of Mineral Concessions for minor minerals have been entrusted with concerned State Government. Granite Conservation and Development Rules, 1999 were notified separately on 1.6.1999 for ensuring systematic/scientific exploitation and conservation of granite resources of the country. The deposits are dispersed widely in all parts of the country. Major production of granite in raw as well as in processed form is generally from Andhra Pradesh, Rajasthan, Karnataka, Tamil Nadu and Gujarat.

Granite is a Non-scheduled Industry and the processing of granite is a phenomenon that was started in 1930s. The mining and processing techniques of granite adopted in the country have improved over the years. Looking at its export potential, the Government of India has been encouraging setting up of 100% EOU in this Sector to promote export of value-added granite products. The production of granite from 6 States (Kerla, Goa, Telangana, Gujarat and Andhra Pradesh) was arrived at 2.88 million cu. m during the year 2018-19. Exports of granite are freely allowed. The export of total granite (crude or roughly trimmed) during 2018-19 was 6.09 million tonnes.

CHEMICALS

Caustic Soda (Sodium hydroxide)

Caustic soda is a basic inorganic chemical prepared by electrolysis of salt brine and is consumed in Textile, Organic chemicals, Alumina, Paper & Pulp, Soaps & Detergents, Inorganic chemicals and for water treatment. In 2017, these sectors accounted for almost 76.1% of the demand in the country.

A significant quantity of caustic soda is used in the manufacture of other inorganic chemicals and dyestuffs, in metallurgical operations and in petroleum refining. The production of caustic soda was 29.25 lakh tonnes against the total installed capacity of 33.36 lakh tonnes in 2018-19 as compared to 27.42 lakh tonnes in the previous year. The major Indian producers are Gujarat Alkalies & Chemicals, Grasim Industries, Nirma, Shriram Alkali & Chemicals, Reliance Industries, Aditya Birla Chemicals (India), etc. Aditya Birla Management Corp. Pvt Ltd, Gujarat Alkalies & Chemicals Ltd, DCM Shriram Ltd, Nirma Ltd and Reliance Industries Ltd. together accounted for 57.6% of the total Caustic Soda capacity in India in 2017. Some of the major upcoming projects are GACL-NALCO Alkalies & Chemicals Dahej Caustic Soda Plant, Kutch Chemical Industries Gandhidham Caustic Soda Plant and Gujarat Alkalies & Chemicals Bhavnagar Caustic Soda Plant, with a capacity of 0.270 mtpa, 0.216 mtpa and 0.198 mtpa, respectively. India's Caustic Soda Plant capacity is forecasted to grow at a compound annual growth rate (CAGR) of 6.1% from 2017 to 2022, according to Global Data a leading data and analytics company.

Soda Ash

Soda ash is an important chemical used widely as a raw material in the manufacture of glass and glassware, sodium silicate, textile, paper & pulp, in metallurgical industries, desalination plants and in the preparation of a host of chemicals. Soda ash is an essential ingredient in the manufacture of detergent, soap, sodium salts and dyes. The major soda ash producers are Tata Chemicals, Gujarat Heavy Chemicals Ltd, Nirma, Saurashtra Chemicals, DCW, etc. The manufacture of soda ash in India started in 1932 at Dhrangadhra in Gujarat with installed capacity of 50 tpd.

RSPL Jamnagar Greenfield Soda Ash Plant, Gujarat, is a project that involves construction of a greenfield soda ash plant with a production capacity of 5,00,000 tonnes of light soda ash per year at Village Kuranga in Dwarka, district Jamnagar.

The installed capacity of soda ash was 34.64 lakh tonnes. The production of soda ash during the year 2018-19 was 30.48 lakh tonnes as compared to 29.90 lakh tonnes in the previous year.

Calcium Carbide

Calcium carbide is used in the manufacture of flammable acetylene gas for Rubber, Synthetic and Plastic Industry. It is used as a raw material for manufacturing various rubber goods. It is self-reinforcing filler. It is also used for cutting & welding of metals besides its use in manufacturing various chemical substances. The major Indian producers are Birla Carbide, TECIL, ICML and Panyam.

The installed capacity of calcium carbide was 1.12 lakh mtpa. The production of calcium carbide during the year 2018-19 was 0.83 lakh tonnes as compared to 0.87 lakh tonnes in the previous year.

Synthetic Cryolite (Na_3AlF_6)

Navin Fluorine Industries, Bhestan, Gujarat, is an important producer of synthetic cryolite. Other producers are Tanfac Industries Ltd, Cuddalore, Tamil Nadu; (Aditya Birla Group) and Adarsh Chemicals and Fertilizers Ltd, Udhna, Gujarat. GMDC, Gujarat has 500 tpd fluorite beneficiation plant at Village Kadipani that produces 96% CaF_2 acid-grade & 90% CaF_2 metallurgical grade concentrate. The acid-grade finds use in aluminium fluoride, synthetic rutile and fluorine chemicals.

Aluminium Fluoride

The important units that produce aluminium fluoride include Navin Fluorine Industries, Maya Rasayan Ltd, Mumbai, Tanfac Industries Ltd, SPIC and Aegis Chemical Industries Ltd. The installed capacity of aluminium fluoride was about 25,600 tpy. The production of aluminium

fluoride during the year 2018-19 was 5,700 tonnes as compared to 7,510 tonnes in the previous year.

Titanium Dioxide

Titanium Dioxide (T_iO_2) is a chemically inert white pigment used in a wide range of consumer products from paints, paper and toothpaste to plastics and cement. The key raw materials used in the production of T_iO_2 are ilmenite and rutile found mainly in coastal regions of Tamil Nadu, Kerala, Andhra Pradesh and Odisha. Anatase and rutile are the two major types of T_iO_2 which are manufactured by the sulphate and chloride process, respectively. The 4 key players in the Indian Titanium Dioxide Industry are Kerala Minerals and Metals Limited (KMML), Travancore Titanium Products Limited (TTPL), Kilburn Chemicals (VVTi Pigments Ltd) and Kolmak Chemicals Ltd. According to the recently published Tech Sci Research report " India Titanium Di-Oxide Market Study, 2011-2025", the Titanium di-oxide Market in India is projected to exhibit a CAGR of 3.98% during 2016-2025, owing to broad growing applications of titanium di-oxide in paints, rubbers, plastics, textiles, cosmetics, pare & printings, etc. As per Ministry of Chemicals & Fertilizers the production of titanium di-oxide was 57.06 thousand tonnes in 2018-19 against the installed capacity of 82.50 thousand tonnes as compared to 57.82 thousand tonnes in the previous year.

Sulphuric Acid

There were 140 (130 sulphur based and 10 smelter gas-based) units with an annual capacity of more than 12 million tonnes that manufacture sulphuric acid in the Organised Sector based on sulphur as a raw material. In addition, sulphuric acid is also recovered at HCL, Hindalco & Sterlite and at HZL & BZL during lead-zinc smelting.

Phosphoric Acid

Important units that produce phosphoric acid of various grades, such as, pharma-grade, food-grade, technical-grade, analytical reagent grade, etc. include Gujarat State Fertilizer Company, Vadodara, Gujarat; Fertilizers and Chemicals Travancore Ltd (FACT), Udyogmandal, Kochi, Kerala; Sterlite Industries India Ltd (Vedanta); HCL, Khetri, Rajasthan; HZL, Udaipur, Rajasthan; Southern Petrochemical Industries Corp. Ltd, Thoothukudi, Tamil Nadu; EID Parry (India) Ltd, Ennore, Tamil Nadu; Star Chemical Ltd, Mumbai, Haldia, West Bengal; Ballarpur Industries Ltd, Karwar, Karnataka; Hindalco Industries Ltd, Dahej, Gujarat; and Paradeep Phosphates Ltd, Paradeep, Odisha. The important uses of phosphoric acid are in the manufacture of phosphatic fertilizers, agricultural feed, waxes, polishes, soaps & detergents, and in waste water treatment, tea-leaf processing, sugar refining, as well as anodising & stabilising agent. According to Tech Sci Research report, "India Phosphoric Acid Market by Type, by application, competition forecast and opportunities, 2011-2021", Phosphoric acid (H_3PO_4) market in India is projected to grow at a CAGR of 7.2% during 2016-2021, on account of increasing demand for phosphoric acid in various applications including fertilizer, sugar, oil, detergent, food & beverage, etc.

Ferro-phosphorus (FeP)

Ferro-phosphorus is obtained as a by-product during steel manufacturing, during the production of yellow phosphorus or is smelt by phosphate rock & ferro-rock in blast furnace. It is used as an ingredient in high strength low-alloy steel, foundry products, as de-oxidiser in Metallurgy Industry & as a brake liner with 23% minimum phosphorus and 1% maximum carbon. Ferro-phosphorus is also used as a drying agent and as an additive in metallic paints.

Red Phosphorus

Star Chemicals (Bombay) Pvt. Ltd and United Phosphorus Ltd, Gujarat are the leading manufacturers and suppliers of red phosphorus in the country. It is mainly consumed in the Match Industry for making strike plate of match box. Besides, in Agriculture Industry, it is used as fumigant and in the making of pesticides. Red phosphorus finds application in the manufacture of phosphoric acid, semi-conductors and also as flame retardant for polymers. It is also used in pharmaceuticals for synthesis of drugs. The installed capacity of red phosphorus was 1.68 thousand tpy. The production of red phosphorus during the year 2018-19 was 1.03 thousand tpy as compared to 0.88 thousand tonnes in the previous year.

Borax

Borax is used as a component of glass, ingredient in enamel glazes, pottery & ceramics. The main manufacturers of borax is Borax Morarji Ltd with an installed capacity of 24,000 tpy at Dahej, GIDC in the State of Gujarat. The plant uses imported crude sodium borate concentrates (rasorite) and crude

calcium borate (colemanite) as these are not produced indigenously. Indo-Borax & Chemical Ltd also operates borax and boric acid plants at Pithampur, Madhya Pradesh. As a thumb rule, for one tonne production of boric acid about 2 tonnes of boro-gypsum is produced. However, boro-gypsum does not have ready market for its disposal.

Besides the above listed chemicals, activated bleaching earth, fluorochemicals, alumina ferric and sodium silicofluoride were the other mineral-based products.

CHEMICAL FERTILIZERS

In India, the Agricultural Sector plays a vital role in the economic development of the country as securing food for 1.2 billion plus population is amammoth task. To maximise agricultural output, it is imperative that better agricultural methods, and greater, but judicious use of fertilizers be put to effect. The application of fertilizers has been known well over a hundred years, but the use of chemical fertilizer started in the beginning of this century. The first phosphate fertilizer plant in India went on stream in 1906. Since then, the Phosphatic Fertilizer Industry has grown considerably, but, the growth has not been able to keep pace with the ever increasing demand.

Presently, there are around 31 units manufacturing urea, 12 units for DAP, 20 units for Complex fertilizers and 110 unit for SSP in India.

As per Fertilizer Association of India, the total installed capacity of P_2O_5 almost stood at 7.31 million tonnes. The major raw materials for Single Super Phosphate (SSP) are rock phosphate and sulphur. Besides containing 14%-16% phosphorous, Single Super Phosphate (SSP) also contains 11%-12% sulphur and 16%-21% calcium. This provides an advantage in the form of improving agricultural productivity since large areas in the country are deficient in sulphur and calcium.

Different types of straight and complex fertilizers are manufactured from rock phosphate, such as, SSP, DAP, nitrophosphate, urea ammonium phosphate etc. In the year 2017-18, the consumption of straight fertilizer and complex fertilizer contributed about 8% and 92% of total P_2O_5 in the country. However, the trend is towards the production of complex fertilizers having the total P_2O_5 in water soluble form along with other nutrients.

In the absence of commercially exploitable resources of potash in the country, the entire demand of potassic fertilizers is met through imports. The capacity and production of different types of fertilizers are provided in Table-12.

The principal list of fertilizer plants is furnished in Table-13.

Types of fertilizers produced in India are detailed below:

A) Straight Nitrogenous Fertilizers:
1) Ammonium Sulphate (AS)
2) Calcium Ammonium Nitrate (CAN)
3) Ammonium Chloride
4) Urea

B) Straight Phosphatic Fertilizers:
1) Single Super Phosphate (SSP)
2) Triple Super Phosphate (TSP)

C) NP/NPK Complex Fertilizers:
1) Urea Ammonium Phosphate
2) Ammonium Phosphate Sulphate
3) Diammonium Phosphate (DAP)
4) Mono Ammonium Phosphate (MAP)
5) Nitro Phosphate
6) Nitro Phosphate with Potash
7) NP/NPK

Source: *Department of Fertilizers.*

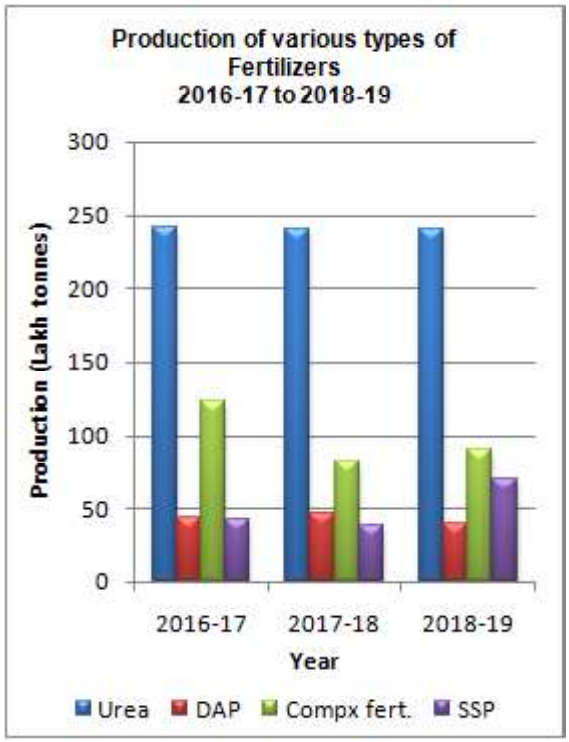


Table – 12 : Installed Capacity and Production of Various Types of Fertilizers

(In lakh tonnes)

Products	No. of Units	Installed Capacity (as on 01.04.2018)	Production	
			2017-18	2018-19 (E)
Urea	32	207.54	240.23	240
DAP	21	80.89	46.50	38.99
Complex Fertilizers		70.33	82.54	89.98
SSP	110	120.85	38.75	69.09

Source: *Annual Report 2018-19 Department of Fertilizer.*

Table – 13 : Principal Fertilizer Plants

Sl. No.	Plant	Location
Public Sector		
1.	National Fertilizer Ltd	Nangal- I & II and Bhatinda (Punjab), Panipat (Haryana), Vijaipur, Vijaipur Expansion (Madhya Pradesh)
2.	Brahmaputra Valley Fertilizer Corp. Ltd	Namrup- II and III (Assam)
3.	Fertilizers & Chemicals Travancore Ltd	Udyogmandal and Cochin-II (Kerala)
4.	Rashtriya Chemicals & Fertilizers Ltd	Trombay and Trombay IV, V and Thal (Maharashtra)
5.	Madras Fertilizers Ltd	Chennai (Tamil Nadu)
6.	Steel Authority of India Ltd	Rourkela (Odisha)
7.	Hindustan Fertilizer Corp. Ltd	Khetrinagar (Rajasthan)
Private Sector Large Units		
8.	Gujarat State Fertilizers Co. Ltd	Vadodara and Sikka I & II (Gujarat)
9.	Shriram Fertilizers & Chemicals	Kota (Rajasthan)
10.	DIL (Duncan Industries Ltd)	Kanpur (Uttar Pradesh)
11.	Zuari Agro Chemicals Ltd	Zuari Nagar (Goa)
12.	Coromandal Fertilizers Ltd	Visakhapatnam and Kakinada (Andhra Pradesh), Ennore (Tamil Nadu)
13.	Mangalore Chemicals & Fertilizers Ltd	Mangaluru (Karnataka)
14.	Gujarat Narmada Valley Fertilizers Company Ltd	Bharuch (Gujarat)
15.	Southern Petrochemicals Industrial Corp.	Thoothukudi (Tamil Nadu)
16.	Tata Chemicals Ltd	Haldia (West Bengal), Babrala (Uttar Pradesh)
17.	Punjab National Fertilizers and Chemicals Ltd	Nangal (Punjab)
18.	Deepak Fertilizers & Petrochemicals Corporation	Taloja (Maharashtra)
19.	Tuticorin Alkali	Thoothukudi (Tamil Nadu)
20.	Indo-Gulf Fertilizers & Chemicals Corp. Ltd	Jagdishpur (Uttar Pradesh)
21.	Nagarjuna Fertilizers & Chemicals Ltd	Kakinada I & II (Andhra Pradesh)
22.	Godavari Fertilizers & Chemicals Ltd	Kakinada (Andhra Pradesh)
23.	Hin. Ind. Ltd	Dahej (Gujarat)
24.	Chambal Fertilizers & Chemicals Ltd	Gadepan I & II kota (Rajasthan)
25.	KSF Ltd	Shahjahanpur (Uttar Pradesh)
26.	Paradeep Phosphates Ltd	Paradeep (Odisha)
Co-operative Sector		
27.	Indian Farmers' Fertilizers Co-operative Ltd	Kalol and Kandla (Gujarat), Aonla I & II, Phulpur I & II (Uttar Pradesh), Paradeep (Odisha)
28.	Krishak Bharti Co-operative Ltd	Hazira (Gujarat)

PAPER & PAPER BOARD INDUSTRY

The Indian Paper Industry accounts for about 4.29% of the world's total production of paper. There are around 850 units which are manufacturing pulp, paper, paper board and newsprint with an installed capacity of nearly 27 million tonnes out of which 4.72 million tonnes are lying idle. As on date around 501 mills are in operation with a total operating capacity of around 21.81million tonnes. In the year 2018-19 the total capacity utilisation stood at around 90% and the total consumption of paper, paperboard, and newsprint stood at 21.123 million tonnes. the total production for the year of 2018-19, stood at 19.364. As per forecast model, it is projected that in 2019-20 production of paper, paperboard and newsprint would be around 19.9 million tonnes. The Indian Paper Industry is in a fragmented structure, consisting of small, medium and large paper mills having capacity ranging from 5 to 2,000 tonnes per day. The Sector uses wood, agro residues and waste paper as input substrates for production. Presently, in the total production, the share of wood, agro and waste paper based mills stand at 19%, 8% and 73%, respectively. Domestic paper and paperboard segment produces all the main varieties of paper that are in demand in the market viz. writing and printing (35%), packaging grade paper (55%), newsprint (6%) and others/ specialty paper (<4 %). The production of paper and paper board was about 18.31 million tonnes in the year 2018-19. During the year 2018-19, 1.89 million tonnes of paper and paper board were imported and about 1.89 million tonnes of paper and paper board were exported. The Newsprint Sector in the country is governed by the Newsprint Control Order (NCO), 2004. At present, there are 124 mills registered under the Schedule to the NCO. However, due to prevalent market conditions, only 62 mills are under production with an operating capacity of 1.59 million tonnes, which accounts for 63% of the total capacity of 2.5 million tonnes registered under the schedule. The domestic production of newsprint dropped from 1.37 million tonnes in 2017-18 to 1.05 million tonnes in 2018-19. The per capita consumption of paper in India is 15.75 kg, which is far behind the global average of 53 kg in 2018. As a thumb rule, in Paper Industry, cost of energy is nearly 25% of the cost of production. Hence, energy management is an important aspect in this Sector. Minerals like china clay, limestone, talc, salt, sulphur, etc. besides coal as fuel are used for purposes such as filler, coating & surface sizing, etc., in this Industry and also play vital role in quality control.

PAINT & ALLIED PRODUCTS INDUSTRY

The Paint & Allied Products Industry comprises paints, enamels, varnishes, pigments, synthetic resins, printing inks, etc. Approximately, 65% of the production is contributed by the Organised Sector. The per capita consumption of paint in India is around 4 kg.

The Indian Paint Industry is expected to grow at a rate of 12-13% annually. India is self-sufficient in the production of paints. Barytes, bentonite, calcite, china clay, mica powder, rutile, talc/steatite/ soapstone, ochre, silica & dolomite powder are some of the important minerals consumed in the Paint Industry.

The production of paints (all types), printing ink and varnish (all types) during 2018-19 was 8,09,200.27 tonnes, 1,96,923.18 tonnes and 35,833.52 tonnes respectively.

PETROLEUM REFINERIES

There were 23 refineries operating in the country (20 in Public/Joint Sector and 3 in Private Sector). India has emerged as second largest refiner in Asia after China.

Installed capacity and crude throughputs of refineries are provided in Table-14.

The total refining capacity in the country as on 01.04.2019 is around 249.366 million tpy. The total crude throughput increased to 257.205 million tonnes in 2018-19 from 252 million tonnes in 2017-18. Production of petroleum products from crude oil was 262.36 million tonnes in 2018-19 as against 254.40 million tonne in 2017-18. Import of petroleum crude was 226 million tonnes in 2018-19 as against 220 million tonnes in 2017-18. During 2018-19, crude oil production in the country was at 34.20 million tonnes, while the natural gas production was at 32.87 billion cubic metres (BCM).

The details of capacity expansion and development are reflected in the Review on Petroleum and Natural Gas in Vol-III, IMYB, 2019.

Table – 14 : Installed Capacity and Crude Throughputs in Refineries

(In '000 tonnes)

Refinery	Annual installed capacity (as on 01.04.2019)	Refinery Crude throughput		
		2016 -17	2017 -18	2018-19 (P)
Total	**249366**	**245362**	**251935**	**257205**
Public/Private Sector & Subsidiaries	**142066**	**137388**	**145234**	**150976**
IOCL, Guwahati, Assam	1000	864	1024	863
IOCL, Barauni, Bihar	6000	6526	5819	6661
IOCL, Koyali, Gujarat	13700	13994	13811	13505
IOCL, Haldia, West Bengal	7500	7689	7655	7965
IOCL, Mathura, Uttar Pradesh	8000	9230	9240	9737
IOCL, Digboi, Assam	650	533	666	676
IOCL, Bongaigaon, Assam	2350	2486	2402	2513
IOCL, Panipat, Haryana	15000	15638	15654	15281
IOCL, Paradip, Odisha	15000	8230	12730	14616
BPCL, Mumbai, Maharashtra	12000	13541	14054	14773
BPCL (formerly KRL), Kochi, Kerala	15500	11820	14095	16051
HPCL, Mumbai, Maharashtra	7500	8510	8641	8671
HPCL, Vizag, Andhra Pradesh	8300	9335	9635	9773
CPCL, Manali, Tamil Nadu	10500	9725	10289	10271
CPCL, Nagapattinam, Tamil Nadu	1000	531	500	423
MRPL, Mangaluru, Karnataka	15000	15965	16130	16231
NRL, Numaligarh Refinery Ltd. Assam	3000	2683	2809	2900
ONGC, Tatipaka, Andhra Pradesh	66	86	80	66
Joint Venture	**19100**	**16882**	**15538**	**18189**
Bharat Oman Refineries Ltd, Bina	7800	6360	6708	5716
HMEL Mittal energy Ltd. Bhatinda	11300	10521	8830	12473
Private Sector	**88200**	**91093**	**91163**	**88041**
RIL, Jamnagar, Gujarat	33000	32823	33153	31752
RIL, Jamnagar (SEZ), Gujarat	35200	37351	37317	37393
Nyara Energy Ltd., (NEL) Vadinar, Gujarat	20000	20919	20693	18896

Source: *Indian Petroleum and Natural Gas Statistcis 2018-19*

[*] *Ministry of Petroleum & Natural Gas Government of India.*

[@] *Bharat Oman Refineries Ltd (BORL) is a Joint Venture Company Promoted by BPCL and Oman Oil Company Ltd (OOCL).*

[#] *HPCL Mittal Energy Ltd. is a Joint Venture Company Promoted by HPCL and Mittal Energy Investment Pvt. Ltd.*

Note: *(i) CPCL and BRPL are subsidiaries of IOCL: NRL of BPCL: and MRPL of ONGC.*

(ii) Crude throughput in terms of crude oil processed.

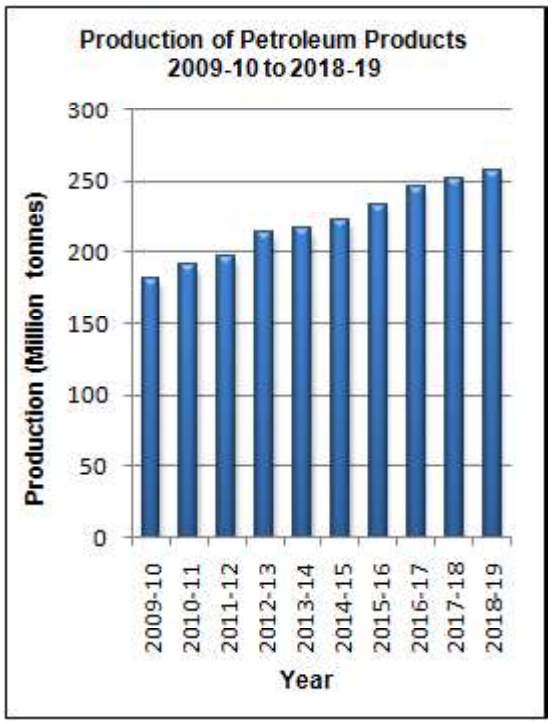
(iii) Total may not tally due to rounding off.

FOUNDRY

The Indian Foundry Sub-sector is the key feeder to the Engineering Industry. Foundry Industry, on the advice of National Manufacturing Competitiveness Council (NMCC), New Delhi, under Department of Industrial Policy & Promotion, Ministry of Commerce and Industry, has prepared draft Vision Document 2020 in which it is envisaged that there must be doubling of production with enhanced energy efficiency, technological modernisation and greenfield expansion to realise the goals envisioned.

Indian Foundry Industry is the third largest in the world. This Industry is now well -established in the country and is spread across a wide spectrum consisting of large, medium, small and tiny sectors.

Typically, each foundry cluster is known to cater to specific end-use markets. The Coimbatore cluster is famous for pump-sets castings; Kolhapur and Belgaum cluster for automotive castings; Rajkot cluster for diesel engine castings and Butala-Jalandhar cluster mainly for machine parts and agricultural implements. Advanced countries like USA, Japan, Germany are unlikely to add much capacity due to stringent pollution control norms there. India can thus have a dominant presence in this field and can become an important casting supplier to the world.



Although intermediate mineral-based products like pig iron, scrap of metals and ferroalloys, etc. are main inputs for foundry, minerals like bentonite, coke, coal, fireclay, fluorite, iron ore, limestone, silica sand, zircon flour, etc. are also being consumed by the Foundry Industry.

The production of cast iron castings in 2016-17 and 2017-18 was 1119.19 thousand tonnes and 555.61 thousand tonnes respectively.