

7 Mineral-based Industries

Minerals are vital raw materials for many basic industries and are major inputs in industrial development. The management of mineral resources, hence, has to be closely integrated with the overall strategy of development and exploitation of minerals, which is to be guided by the long-term national goals. In tune with the Economic Liberalisation Policy, adopted in July 1991, the new National Mineral Policy was announced in March 1993, fully opening up the mineral sector for private entrepreneurs, both domestic and foreign. Keeping in view the changing global scenario, the National Mineral Policy is revised in 2008 to spell out the different elements of policy for the development of mineral resources of the country. However, the recent global financial recession will certainly have impact on Indian Mineral-based Industries as well. Capacity and production of important mineral-based products are given in Table-1.

FERROUS METALS

India is poised with brownfield expansion of existing steel plants, backward integration of re-rollers, forward integration of DRI or pig iron producers and emergence of few greenfield projects. The National Steel Policy (NSP) was announced in 2005 with the aim to provide a road map of growth and development for the Indian Steel Industry. The NSP has set up a target of 110 million tonnes of domestic steel production by 2020.

Total production of finished steel for sale during 2007-08 stood at 56.08 million tonnes showing a growth of 6.8% over the previous year. Iron & steel exports decreased by 2.08% as it reached at 8.25 million tonnes in 2007-08. Iron & steel imports were at an estimated 11.70 million tonnes and increased by 17.7%.

In the context of long-term demand projection of 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 the basic raw material in foundry and casting industry for the manufacture of various types of castings required for engineering sector. The main sources of pig iron have traditionally been the integrated steel plants of SAIL besides plants of Tata Steel and Rashtriya Ispat Nigam Ltd. The domestic production of pig iron did not keep pace with the demand. Efforts were, therefore, made to increase pig iron manufacturing facilities in the secondary sector.

As a result of various policy initiatives taken by the Government, private sector showed considerable interest in setting up new pig iron units in the post-liberalised period. The gross pig iron manufacturing capacity in the secondary sector was approximately 4.83 million tonnes per annum. Of the total 5,314 million tonnes production in 2007-08, 4.38 million tonnes was reported by the private sector. This has resulted in drastic change in the contribution of private/secondary sector units from merely 8% in 1991-92 to about 83% by 2007-08. M/s Usha Martin Industries Ltd, M/s Jindal Steel & Power Ltd and M/s Ispat Industries Ltd had integrated mini-blast furnaces (MBF) for manufacture of steel through electric arc furnace (EAF). M/s Hospet Steel (a joint venture of Kalyani and Mukand) and M/s Southern Iron & Steel Co. Ltd (now JSW Steel Ltd) had integrated their MBF with energy optimising furnace to produce steel. Besides MBF, M/s Jindal Vijaynagar Steel Ltd (now JSW Steel Ltd) had commissioned a Corex Plant (alternate to conventional MBF/BF) along with downstream basic oxygen furnace (BOF) for steel making, to supplement production of pig iron. The KIOCL had commissioned the 2.05 lakh tpy pig iron plant in 2005-06. The company is now in the process of setting up a 100,000 tpy capacity ductile iron spun pipe plant. The pig iron industry is facing problem of rising production cost due to price-escalation of imported metallurgical coke. Location and capacity of important pig iron units in private sector are furnished in Table-2.

MINERAL-BASED INDUSTRIES

Table – 1 : Capacity and Production of Important Mineral-based Products, 2006-07 and 2007-08

Mineral-based product	Unit of quantity	Annual Installed capacity	Production	
			2006-07	2007-08(p)
Ferrous Metals				
Hot metal	'000 tonnes	36760	34667	36758
Sponge iron	"	30900	18345	20376
Crude/liquid steel	"	59850	50817	53857
Ferro-alloys				
Ferro-chrome/Charge-chrome	"	1300	801	949
Ferro-manganese	"	2100	297	391
Silico-manganese	"	NAS	783	911
Ferro-silicon	"	200	93	84
Noble ferro-alloys	"	40	28	30
Non-ferrous Metals				
Aluminium	"	1196	1114	1240
Copper #	"	997.5	786.4	785.1
Lead	"	85	45	58
Zinc	"	619	381	457
Asbestos-Cement Products				
Asbestos sheets & accessories	'000 tonnes	NA	2083	2299
Asbestos-cement pressure pipes	"	212	150	150
Refractories				
	"	2013	1089	1270
Cement				
	Million tonnes	209.40	161.66	174.32
Ceramic				
Glazed/ceramic tile	'000 tonnes	2100	1340	1365
Sanitaryware	"	184	251.6 [@]	365.7
Crockeryware	"	43	39.2 [@]	58.8
HT insulators	"	44	41	55
Glass				
Flat glass (float, sheet, figured/red glass)	(Million sq m)	135	667 [@]	917
Vacuum flask and refills	Million no.	36	NA	NA
Laboratory glassware	Tonnes	46600	NA	NA
Glass fibre	"	55000	NA	NA
Glass hollowware and container	'000 tonnes	1500	804	917
Fertilizers				
Nitrogenous	"	12061	11577	11122
Phosphatic	"	5659	4518	4069
Chemicals				
Aluminium fluoride	"	20.6	20.3	21.9
Sulphuric acid	"	6000	7156	6569
Caustic soda	"	2295	1914	2176
Calcium carbide	"	142.4	91.9	114.3
Soda ash	"	2651	2078	2083
Titanium dioxide	"	242	118.7 ^(e)	118.4
Petroleum Refinery Products				
	"	148968**	146551	156103

- Source:** 1. Annual Statistics, 2007-08, JPC and Annual Report, 2007-08, Ministry of Steel.
2. Ministry of Commerce & Industry, Department of Industrial Policy & Promotion and Annual Report, 2006-07.
3. Ministry of Chemicals & Fertilizers, Department of Chemicals & Petrochemicals, Annual Report, 2007-08.
4. Basic Statistics on Indian Petroleum & Natural Gas, 2006-07.
5. Indian Ferro Alloys Producers' Association (IFAPA), Mumbai.
6. Cement Manufacturers' Association.
7. Indian Refractory Makers' Association, Kolkata.
8. Department of Atomic Energy.
9. Information received from individual plants in organised sector.
- * Saleable steel capacity of major plants; production includes EAF and IF units.
** Throughput capacity of refineries.
@ Production up to December 2007.
Production relates to copper cathodes and wire rods.

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Table – 2 : Location and Capacity of Principal Pig Iron Units in Private/Secondary Sector

(In lakh tonnes)

Sl.No.	Unit	Location	Annual capacity
1.	Lanco Industries Ltd	Chittoor, Andhra Pradesh	1.50
2.	Sathavahana Ispat Ltd	Anantapur, Andhra Pradesh	1.20
3.	Jaiswal NECO Ltd (Nagpur Alloy Castings)	Raipur, Chhattisgarh	3.50
4.	Sesa Goa Ltd	Bicholim, Goa	1.80
5.	Usha Martin Industries	Jamshedpur, Jharkhand	1.10
6.	Kudremukh Iron Ore Co. Ltd	Mangalore, Karnataka	2.05
7.	Jindal Vijaynagar Steel Ltd	Bellary, Karnataka	7.20
8.	Kalyani Ferrous Industries Ltd	Koppal, Karnataka	1.20
9.	Kirloskar Ferrous Industries Ltd	Koppal, Karnataka	2.40
10.	Usha Ispat Ltd	Redi, Maharashtra	3.00
11.	Ispat Metalics India Ltd	Dolvi, Raigad, Maharashtra	20.00
12.	Kalinga Iron Works	Barbil, Keonjhar, Orissa	1.40
13.	Electrosteel Castings Ltd	Khurdah, West Bengal	1.10
14.	Tata Metaliks Ltd	Kharagpur, West Bengal	0.90
15.	Kajaria Iron Castings Ltd	Durgapur, West Bengal	1.10

Source : Development Commissioner for Iron & Steel, Ministry of Steel, Kolkata and individual plants.

Sponge Iron

During early 1990s, sponge iron industry had been specially promoted so as to provide an alternative to steel melting scrap which was increasingly becoming scarce. Due to combined use of hot metal and sponge iron in electric arc furnace for production of liquid steel during the last few years, sponge iron production went up substantially. Now, India has emerged as the largest producer of sponge iron in the world. The installed capacity of sponge iron increased from 1.52 million tonnes per annum in 1990-91 to 31 million tonnes per annum in 2007-08. The production also increased from 0.9 million tonnes in 1990-91 to 20.38 million tonnes in 2007-08.

Production of sponge iron in the country has resulted in providing an alternative feed material to steel melting scrap which was earlier imported in large quantities by the Electric Arc Furnace units and the Induction Furnace units for steel making. This has resulted in considerable saving in foreign exchange as well as alternate route for production of steel through EAF in the country. Presently, about 324 sponge iron units are installed in the country. Out of this, there are 3 gas-based hot briquetted iron (HBI) units covering a capacity of 8 million tonnes per annum. The capacity of gas-based sponge iron plant of Essar Steel Ltd, the world's largest sponge iron producer, has gone up to 5.5 million tpy. Plantwise details as available in respect of important sponge iron units, are furnished in Table-3.

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Table – 3 : Location and Capacity of Important Sponge Iron (DRI) Plants

(In lakh tonnes)

Sl. No.	Company	Location	Annual capacity
Gas-based			
1.	Essar Steel Ltd.	Hazira, Surat, Gujarat	55.00
2.	Vikram Ispat	Salav, Raigad, Maharashtra	9.00
3.	Ispat Industries Ltd.	Geetapuram, Dolvi, Raigad, Maharashtra	16.00
Coal-based			
1.	GSAL (India) Ltd.	Srirampuram, Vizianagaram, Andhra Pradesh	2.20
2.	HEG Ltd.	Borai, Durg, Chhattisgarh	1.20
3.	Jindal Steel & Power Ltd.	Kharsia Road, Raigarh, Chhattisgarh	13.70
4.	Monnet Ispat & Energy Ltd.	Chandkhuri Marg, Hasaud, Raipur, Chhattisgarh	3.00
5.	Prakash Industries Ltd.	Champa, Jangir Champa, Chhattisgarh	4.50
6.	Sarda Energy & Minerals Ltd.	Siltara, Raipur, Chhattisgarh	3.60
7.	Alliance Integrated Metaliks Ltd.	Bemta, Raipur, Chhattisgarh	5.00
8.	Godawari Ispat & Power Ltd.	Siltara, Raipur, Chhattisgarh	4.95
9.	Shri Bajrang Power & Ispat Ltd.	Urla, Raipur, Chhattisgarh	2.10
10.	Ind Synergy Ltd.	Kotmar, Raigarh, Chhattisgarh	3.00
11.	Nova Iron & Steel Ltd.	Dagori, Bilaspur, Chhattisgarh	1.50
12.	Nalwa Sponge Iron Ltd.	Taraimal, Raigarh, Chhattisgarh	1.98
13.	Singhal Enterprises Pvt. Ltd.	Taraimal, Raigarh, Chhattisgarh	1.94
14.	Global Hi-Tech Industries Ltd.	Gandhidham, Gujarat	1.05
15.	Bihar Sponge Iron Ltd.	Chandil, Singhbhum, Jharkhand	1.86
16.	Sunflag Iron & Steel Co. Ltd.	Bhandara, Maharashtra	1.50
17.	Lloyds Metals & Engineers Ltd.	Ghugus, Chandrapur, Maharashtra	2.70
18.	Orissa Sponge Iron Ltd.	Palasapenga, Keonjhar, Orissa	2.50
19.	Tata Sponge Iron Ltd. (Ipitata Sponge)	Joda, Keonjhar, Orissa	3.90
20.	Sree Metaliks Ltd.	Loidapada, Keonjhar, Orissa	1.74
21.	Action Ispat & Power Pvt. Ltd.	Marakuta & Pandaripathar, Jharsuguda, Orissa	2.50
22.	Adhunik Metaliks Ltd.	Chadrihariharpur, Sundergarh, Orissa	1.80
23.	OCL India Ltd.	Lamloi, Sundergarh, Orissa	1.20
24.	Scaw Industries Pvt. Ltd.	Gundichapada, Dhenkanal, Orissa	1.00
25.	Vallabh Steels Ltd.	Sahnewal, Ludhiana, Punjab	1.20
26.	Jai Balaji Sponge Ltd.	Baktarnagar, Raniganj, West Bengal	1.05
27.	Shyam Sel Ltd.	Dewabdighi, Burdwan, West Bengal	1.00
28.	Sunil Ispat & Power Ltd.	Chhattisgarh	1.15
29.	Goa Sponge & Power Ltd.	Goa	1.00
30.	Jaiswals NECO Ltd.	Raipur, Chhattisgarh	6.5
31.	Rungta Mines Ltd.	Orissa	1.50
32.	SKS Ispat Ltd.	Raipur, Chhattisgarh	2.70

Source: Sponge Iron Manufacturers Association (SIMA) and individual plants.

MINERAL-BASED INDUSTRIES

Finished Steel/Saleable Steel

With the onset of liberalisation, steel industry is now gearing up, not only to domestic competition, but also to global competition in terms of product range, quality and price. Provisional data indicates a strong 11.41% growth in total finished steel consumption during 2007-08. However, growth in production for sale remained subdued at 6.8%. Steel prices remained firm backed by rising prices of key raw materials raising concerns at many forum. India has become self-sufficient in iron and steel materials in the last 5-6 years. China has been an important export destination for Indian steel. Some significant achievements made are as follows:

1. The National Steel Policy (NSP) was announced in 2005. The NSP has set up a

target of 110 million tonnes of domestic steel production by 2019-20. The policy envisages encouragement of investment in steel sector by removing the bottlenecks.

2. The Indian steel industry recorded a production of 56.08 million tonnes of finished steel for sale in 2007-08, an increase of 6.6% over the previous year.
3. India ranked 5th largest producer of crude steel in the world in 2007-08.
4. The total volume of exports of finished steel (including CR sheets) was estimated at 4.19 million tonnes, 4.5% more than the previous year.

Details about capacity and production of finished steel by principal producers are furnished in Table-4.

**Table – 4 : Installed Capacity and Production of Finished Steel (for sale)
(By Principal Producers)**

(In '000 tonnes)

Producer	Annual installed capacity	Production		
		2005-06	2006-07	2007-08
Total Production (for sale)	-	46566	52529	56075
SAIL				
Bhilai Steel Plant, Bhilai, Dist. Durg, Chhattisgarh	3153*	3238	3232	3603
Rourkela Steel Plant, Rourkela, Dist. Sundergarh, Orissa	1671*	1606	1939	2059
Durgapur Steel Plant, Durgapur, Dist. Burdwan, West Bengal	1870*	676	707	685
Bokaro Steel Plant, Bokaro, Dist. Bokaro, Jharkhand	3780	3504	3612	3592
IISCO Steel Plant, Burnpur, Dist. Burdwan, West Bengal	481	259	316	316
Alloy Steel Plant, Durgapur, Dist. Burdwan, West Bengal	179*	27	29	30
Salem Steel Plant, Salem, Dist. Salem, Tamil Nadu	320*	171	183	231
Visvesvaraya Iron & Steel Plant, Bhadravati, Dist. Shimoga, Karnataka	130	131	131	133
RINL				
Visakhapatnam Steel Project, Dist. Visakhapatnam, Andhra Pradesh	2656*	2980	3042	2899
(Less) Own consumption/interplant transfer	-	7	15	27
Total : Public Sector	-	12585	13176	13521
Major Private Sector				
Tata Steel Ltd, Jamshedpur, Dist. Singhbhum, Jharkhand	4808	3821	4423	4472
Jindal Vijayanagar Steel Ltd, Dist. Bellary, Karnataka (Now JSW Steel Ltd)	2000**	3658	3739	4768
Jindal Steel & Power Ltd, Dist. Raigarh, Chhattisgarh	1150	288	425	706
Ispat Industries Ltd, Dolvi, Dist. Raigad, Maharashtra	3000@	2646	3276	3280
Essar Steel Ltd, Hazira, Dist. Surat, Gujarat	4600	3074	4501	4130
Secondary Producers	-	25275	28418	30332
(Less) Own consumption/interplant transfer	-	4649	5117	5250
Total : Private Sector	-	33981	39353	42554

Source: Annual Statistics, 2007-08, Joint Plant Committee, Kolkata.

* Saleable steel ** Steel ingots/ ccm blooms/Cast Steel. @ Hot rolled coil

Public Sector

Steel Authority of India Ltd (SAIL)

SAIL, a public sector company, operates four integrated steel plants at Bhilai in Chhattisgarh, Bokaro in Jharkhand, Durgapur in West Bengal and Rourkela in Orissa. Besides, another integrated steel plant IISCO at Burnpur is owned by SAIL. IISCO was earlier a subsidiary of SAIL. Its merger with SAIL was approved in June 2005 and became effective in February 2006. The total installed capacity of SAIL for the production of crude steel and finished steel was 12.84 million tonnes and 11.53 million tonnes, respectively. SAIL plants recorded highest ever hot metal & crude steel production during the year 2007-08, which was 15.2 million tonnes and 14 million tonnes respectively and the saleable steel production to the tune of about 13 million tonnes during the same period.

In line with the recent acceleration of economic growth of the nation, SAIL is rapidly augmenting its production capacities. SAIL has embarked upon an expansion plan for raising annual steel making capacity of 26 million tonnes per annum against the present capacity of 14.6 million tonnes. The modernisation is expected to be completed progressively by December 2010. SAIL's corporate vision for growth up to 2011 for hot metal is 26.2 million tonnes.

Rashtriya Ispat Nigam Ltd (RINL)

Rashtriya Ispat Nigam Ltd (Visakhapatnam Steel Plant), a public sector company, has the first shore-based integrated steel plant commissioned in 1992 at Visakhapatnam, Andhra Pradesh. The installed capacity for the production of liquid steel and saleable steel was over 3 million tonnes, each. The Government has approved the expansion plan of RINL for enhancing liquid steel capacity to 6.3 million tonnes by 2009-10. In 2007-08, the plant produced 2.9 million tonnes finished steel.

Neelachal Ispat Nigam Ltd (NINL)

NINL, a joint venture company promoted by MMTC and Government of Orissa has set up a 1.1 million tpy integrated steel plant at Kalinganagar, Duburi, Jajpur district, Orissa. The first phase is already commissioned and is

presently producing pig iron through BF route with 1.1 million tpy hot metal capacity. Other operating facilities include a coke oven battery (0.81 million tpy), a sinter plant (1.71 million tpy), slag granulation plant (0.3 million tpy), a gas-based captive power plant with total 62.5 MW capacity and an ammonium sulphate plant (12,750 tpy). Expansion and addition of facilities in Phase-2 presently under implementation comprise pig iron for sale (153 thousand tpy), a BOF and a ladle furnace of 110-t capacity each, continuous billet caster and a bar & rod mill. The production capacity after Phase-2 will be-pig iron for sale (153 thousand tpy), wire rods (0.3 million tpy), billets for sale (175 thousand tpy), and straight, rounds & square bars (0.4 million tpy).

As per the recommendations of the committee of Secretaries, an empowered committee was constituted in January 2006 to oversee the modalities of the merger of NINL by SAIL. SAIL Board accorded approval for acquiring equity share capital of NINL through cash payment and subsequently merging it with SAIL.

Private Sector

The private sector continued to play a dominant role in the production of steel in the country. The contribution of private sector in finished steel production increased substantially to about 76% in 2007-08 as against 71% in 2003-04. The performance of major private sector producers is summarised below:

Tata Steel Ltd

Tata Steel has an integrated steel plant having an annual crude steel production capacity of 6.8 million tonnes located at Jamshedpur, Jharkhand. In 2007-08, Tata Steel has achieved a production of 4.86 million tonnes of saleable steel and 5.01 million tonnes of crude steel.

The company has embarked upon setting up various greenfield projects. The project at Kalinganagar in Orissa envisages setting up of a 6 million tpy capacity integrated steel plant in two phases of 3 million tpy, each. The first phase is expected to be commissioned by 2010. A few MoUs have been signed with the Government of

Chhattisgarh to set up a 5 million tpy capacity steel plant at Jagdalapur in Bastar region in 2 phases and with Government of Jharkhand for a 12 million tpy steel plant in 2 phases of 6 million tpy each in Manoharpur- Saraikella area. The plants are to be set up subject to raw materials linkage and receipt of all approvals.

JSW Steels Ltd

JSW Steel Ltd has an installed crude steel capacity of 4.8 million tpy with value added products constituting 1.8 million tpy spread across four locations; Toranagallu (Vijaynagar Works), Salem (Salem Works), Vasind and Tarapur (downstream units). Vijaynagar works has integrated operations from beneficiation plant to 1 million tpy Cold Rolling Mill Complex. The slabs and HR coil produced at Vijaynagar works are further processed in downstream units at Vasind and Tarapur into value added HR plates, CR, galvanised, galvalume and colour coated products. The Salem works has an integrated manufacturing facility with an overall crude steel capacity of 1 million tpy, comprising of sinter plant, blast furnace, EOF, billet caster, bloom caster and rolling with associated facilities such as coke oven, power plant, oxygen plant, etc. Vijaynagar Works' existing operations produce flat steel products, Salem Works' focus is only on long products and the downstream units produce CR/galvanised, colour coated, value added flat products. The company commissioned the expansion project at Vijaynagar works increasing the capacity from 3.8 million tpy to 6.8 million tpy in February, 2009.

Company has planned to increase the total capacity to 10 million tpy at Vijaynagar works by 2010-11. Two subsidiaries of the company M/s JSW Bengal Steel Ltd and M/s JSW Jharkhand Steel Ltd are incorporated to set up greenfield steel plants with 10 million tpy (each) capacity in West Bengal and Jharkhand, respectively. The company is in possession of required land in West Bengal while in Jharkhand it has obtained a mining lease for iron ore and also got the mining plan approved.

Jindal Steel & Power Ltd (JSPL)

The sponge iron plant at Raigarh, Chhattisgarh has capacity of 1.37 million tpy. Facilities at Raigarh also include following capacities : steel -3 million tonnes (Rail and structurals - 0.75 million tonnes, plates - 1.00 million tonnes and slabs, rounds, blooms and billets - 1.25 million tonnes) hot metal - 1.5 million tonnes and captive power plant - 340 MW. The company has captive coal mines at Dongamahua in Raigarh district, Chhattisgarh and coal washing unit with capacity of 6 million tonnes per year to wash 47-48% coal ash to 26%.

As a part of expansion, JSPL is setting up a 12.5 million tonnes integrated steel plant at Angul in Orissa, 11 million tonnes integrated steel plant at Patratu, Jharkhand and 7 million tonnes steel plant at Raigarh, Chhattisgarh. It is planned to implement these projects in phases.

Jindal Stainless Ltd

The company has a fully integrated stainless steel plant at Hissar in Haryana with a capacity of 600,000 tpy which is now expanded to 720,000 tpy.

Southern Iron & Steel Co. Ltd (SISCOL)

SISCOL is a JSW Group company producing hot metal and pig iron (foundry and basic grades) through mini blast furnace. For steel making, the company has installed an energy optimising furnace (EOF) and a ladle furnace of 30-t capacity each, besides a continuous casting machine to cast billets/blooms. Additionally, the company also has a bar & rod mill of 300,000 tpy capacity and a captive power plant of 7.7 MW. There is also a 425 tpd sinter plant to feed the blast furnace. The company now plans to enhance the capacity of the plant located near Mettur, Tamil Nadu, from existing 0.3 million tpy to one million tpy at an investment of Rs.1,350 crore and further to 2 million tpy at investment of about Rs.3,000 crore, on availability of iron ore. The company also intends to set up a one million tpy slag grinding unit.

Essar Steel Limited (ESL)

The company has a 5.1 million tpy gas-based HBI plant at Hazira, Gujarat. The state-of-the-art hot-rolled coil (HRC) steel plant with a capacity of 4.6 million tpy is being expanded to 9 million tpy. The complex also houses a cold-rolled coil plant of 1.4 million tpy capacity. There are plans to increase slab capacity from 5.5 million tpy to 8.5 million tpy. It is the largest fully integrated manufacturer of high quality flat steel products in western India. The company enjoys a decided advantage with respect to its port-based location, which helps in bringing in raw materials and rendering better service to domestic and export customers. The company has a captive port capable of handling up to 8 million tpy cargo with modern handling equipment like barges and floating cranes. The company has proposed green field project capacity of 6 million tonnes, 3 million tonnes and 6 million tonnes in the states of Orissa, Chhattisgarh and Jharkhand, respectively.

Ispat Industries Ltd (IIL)

Ispat Industries Ltd with its associated companies has set up one of the largest integrated steel plants in the private sector in India at Dolvi, Raigad district in Maharashtra, having a capacity to produce 3 million tpy of hot-rolled coils (HRC). IIL also has sponge iron and pig iron plant of 1.6 million tpy and 2 million tpy capacity, respectively, in the Dolvi Complex. The integrated steel plant is based on the electric arc furnace route to produce steel by using modern Twin Shell Electric Arc Furnace and CONARC process. The company has combined the use of hot metal and DRI (sponge iron) in the electric arc furnace for production of liquid steel for the first time in India. For downstream casting and rolling of the liquid steel, it has incorporated state-of-the-art compact strip production (CSP) process installed for the first time in India. The process yields high quality and specifically very thin grades of HRC. The company has proposed brownfield expansion project of 5 million tonnes of crude steel capacity and 2.8 million tonnes greenfield proposed capacity in the state of Jharkhand.

Bhushan Power & Steel Ltd (BSPL)

Bhushan Power & Steel Ltd, although a new entrant in integrated steel making has over 35 years of experience in the steel sector, being a part of the erstwhile Bhushan Steel Group. Its first integrated Steel Plant in Sambalpur district of Orissa is in operation with a total capacity of 0.68 million tpy DRI kilns; 0.80 million tpy blast furnace; 0.45 million tpy coke oven plant; 1 million tpy sinter plant; 1.2 million tpy steel making facility and 0.9 million tpy HR mill. The company has further plans to add sponge iron capacity of 1.02 million tpy and one million tpy of hot metal production by the year 2010.

Monnet Isapt & Energy Ltd (MIEL)

The company is operating plant at Raipur in Chhattisgarh with 0.3 million tpy of finished steel and at Raigarh with 0.50 million tpy of sponge iron. The company is in the process of expanding its Raigarh Steel Complex. The entire facility will be integrated with primary steel manufacturing of one million tpy each of hot metal and DRI. It is setting up a 1.5 million tpy plant with a combination of plates, wire rods and also for catering to the high end construction sector. It has also plans to set up a 2 million tpy fully integrated steel plant in Angul, Orissa where the work for Phase I is already under progress. It has plans to set up another one million tpy steel plant in Hazaribagh, Jharkhand.

**Electric Arc Furnace Industry
(Mini Steel Plants)**

Electric arc furnace industry (mini steel plants) has been playing an important role in overall production of steel in the country. There were 190 electric arc furnaces in the country with an integrated capacity of 14.09 million tpy, out of which only 36 units having an aggregate capacity of 13.81 million tpy were reportedly working. Rising costs of inputs, upward revision in the electricity tariffs, power shortage and funds were the main reasons stated for this situation. Production of secondary steel reported by the electric arc furnace units is given in Table-5..

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Table – 5 : Secondary Steel Production from Electric Arc Furnace Industry

(In million tonnes)			
Category	2005-06	2006-07	2007-08
Total	8.43	9.88	10.80
Mild steel	4.31	5.06	6.05
Medium/ High carbon steel	1.50	1.76	2.72
Alloy steel	1.53	1.80	1.16
Stainless steel	0.92	1.08	0.69
Others	0.04	0.05	0.05
Total estimated	0.13	0.13	0.13

Source : Ministry of Steel, Annual Report, 2008-09.

Induction Furnace

About 1,020 units were under operation with a capacity of 22.18 million tpy. The production reported in 2006-07 at 15.39 million tonnes rose to 16.93 million tonnes in 2007-08.

Modernisation and Capital Scheme

The Board of SAIL has given in principle to a proposal for modernisation and capacity expansion of Bhilai Steel Plant to 7.5 million tonnes of hot metal and 7 million tonnes of crude steel per annum. The proposal includes: a) Installation of a new blast furnace, b) A new 7 metre tall coke oven battery and a new sinter machine, c) Phasing out of ingot route with 100% continuous casting by adding a new steel melting shop of 4 million tonnes capacity, d) Installation of a universal beam mill of 1 million capacity, e) Addition of a new bar & roll mill of 0.9 million tonne capacity, f) Installation of a new universal rail mill of 1.2 million tonnes capacity, and g) capacity expansion of Plate mill to 1.42 million tonnes.

The hot metal production capacity at Bokaro is likely to touch 7.44 million tonnes by 2010-11 from 4.59 million tonnes in 2006-07. The facilities as planned for expansion include a) new Steel Melting Shop Complex (SMS III) with an installed annual capacity of 3.8 million tonnes crude steel, b) Cold Rolling Mills Complex of 1.2 million tpy capacity and c) Rebuilding of three coke oven batteries.

The hot metal production from RSP is to reach to 4.50 million tonnes by 2010-11 from 2.12 million tonnes 2006-07. The progress at RSP includes (a) New half coke oven battery (0.23 million tpy), (b) New Sinter plant (3.9 million tpy), (c) New blast furnace (1.6 million tpy), (d) Third BOF converter (150 tonnes), (e) Third slab caster in SMS II, (f) Upgradation of Hot Strip Mill and Plate Mill, (g) New CRNO Line (0.1 million tonne) and (h) New Pipe Coating Plant (0.06 million tonne).

DSP's hot metal production is projected to touch 3.50 million tonnes by 2010-11 from 2.06 million tonnes in 2006-07. The new facilities as planned are : a) New Sinter Plant b) Bloom-cum-Round Caster, c) Medium Structural Mill, d) Additional finishing Mill and e) New Bar and Rod Mill (0.6 million tonne).

IISCO Steel Plant is set to undergo modernisation cum expansion through which its hot metal production capacity will be raised to 2.91 million tonnes by 2011-12.

New Steel Projects

After the announcement of the Industrial Policy in 1991 and various other policy initiatives taken by the Government, substantial interest has been shown by several entrepreneurs in setting up new steel plants. Pohang Steel Company (POSCO) is planning to set up 12 million tpy capacity steel plant in Orissa. An MoU has been signed by SAIL with POSCO for a strategic alliance. Other new steel plants for which MoUs have been signed include: Kalinganagar, Orissa (6 million tpy); Bastar, Chhattisgarh (5 million tpy) and Manoharpur/Saraikella, Jharkhand (12 million tpy) of Tata Steel; Orissa (6 million tpy) and Jharkhand (5 million tpy) of Jindal Steel & Power Ltd. Besides, Bhushan Steel is reported to be setting up a 2 million tpy plant in West Bengal with a likely expansion to 5 million tpy in next five years, along with a 500 thousand tpy cold rolling mill and galvanising unit for production of autograde steel. JSW Bengal Steel is in the process of setting up a 3 million tpy steel project in West Bengal. Arcelor Mittal has tentatively selected 3 sites for its Rs. 40,000 crore mega steel project in Jharkhand and a similar project in Orissa. JSW Steel is set to start its new

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2.8 million tonnes per annum Blast Furnace at its Vijaynagar works by 2009. With the setting up of these new steel plants, contribution of private sector units is gradually increasing and this trend is expected to continue in the years to come.

Visa Steel Ltd (VSL) was implementing 0.5 million tpy integrated special and stainless steel plant, and 400,000 tpy coke oven plant. The expansion plans include: 50,000 tpy ferro-chrome plant, a 3 lakh tpy coal-based sponge iron plant using Lurgi technology and an integrated 0.5 million tpy special and stainless steel plant at Kalinganagar, Jajpur district, Orissa. The company also has chrome ore beneficiation plant and chrome ore grinding plant of one lakh tpy capacity, each.

National Mineral Development Corp. Ltd (NMDC)

Infrastructural works related to NMDC's, iron & steel plant (NISP) near Nagarnar, Jagdalpur, Bastar district, Chhattisgarh are continuing. There was no agreement on contractual terms & conditions with TPE, Moscow for construction of Romelt shop based on Romelt technology. Action for selection of suitable alternative technology is on hand. The 3 million tonnes integrated steel plant will be backed by development of iron ore deposits in the same state. NMDC is also considering the techno-economic feasibility of setting up a two million tpy steel plant in Karnataka.

Kudremukh Iron Ore Co. Ltd (KIOCL)

In addition to its present pig iron plant at Panambur and the ductile iron spun pipe (DISP) project of 100,000 tpy capacity, the company was also in the process of selecting a joint venture equity partner for an integrated steel plant to be set up in Karnataka.

FERRO-ALLOYS

Ferro-alloys are essential inputs in production of ordinary steel, alloy steel and special steel. Broad-banding facility permits the ferro-alloys producers to shift their production

from one ferro-alloy to another within its overall capacity depending on the market condition. With the liberalisation policy and delicensing in July 1991, it was possible for ferro-alloy producers to increase the production depending on indigenous and foreign demands. Bulk ferro-alloys of high carbon category were produced by large-scale industries. The noble ferro-alloys are of low carbon category and include ferro-vanadium, ferro-tungsten, ferro-niobium, ferro-molybdenum and ferro-titanium. There are also a number of units under the small-scale sector for the manufacture of ferro-alloys, particularly ferro-silicon, ferro-chrome and ferro-manganese.

There were about 158 units (including four 100% export-oriented units) in the organised sector, (excluding SSI units) having an annual installed capacity of over 3.64 million tonnes, against which the production in 2007-08 was about 2.36 million tonnes. The industry has already surplus capacity against the domestic demand. About 25 to 40% production is usually exported. During the year 2007-08 about 9 lakh tonnes of ferro-alloys were exported registering about 72% growth over the year 2006-07. As it is a highly power-intensive industry, the capacity utilisation has been around 65% during 2007-08. The capacity and production of ferro-alloys are furnished in Tables 6 and 7, respectively. The details about ferro-alloys are discussed in Ferro-Alloys review.

Table – 6 : Capacity of Ferro-alloys Industry

(In tonnes per annum)		
Ferro alloys	Units (No.)	Installed capacity
Total	158	3640000
Bulk Ferro-alloys	118	3600000
Manganese alloys	63	2100000
Chrome alloys	26	1300000
Ferro-silicon	29	200000
Noble Ferro Alloys	40(e)	40000(e)

Source : Indian Ferro Alloys Producers' Association (IFAPA), Mumbai.

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**Table - 7 : Production of Ferro-alloys
2006-07 and 2007-08**

(In tonnes)

Product	Production	
	2006-07	2007-08
Bulk Ferro Alloys : Total	1973688	2334929
Ferro-manganese	296726	391210
Silico-manganese	782962	911402
Ferro-silicon	92632	83716
Ferro-chrome/Charge-chrome	801368	948601
Noble Ferro Alloys : Total	27763	29685
Ferro-molybdenum	3120	2899
Ferro-tungsten	54	51
Ferro-vanadium	1139	1585
Ferro-silicon- zirconium	178	109
Ferro-silicon- magnesium	11387	13525
Ferro-nickel-magnesium	97	122
Ferro-aluminium	9947	9377
Ferro-titanium	1761	1937
Ferro-boron	80	80

Source : Indian Ferro-Alloys Producers' Association (IFAPA), Mumbai & Steel Insights, Kolkata.

Bulk Ferro-alloys

Ferro-manganese and Silico-manganese

Ferro-manganese is the most important ferro-alloy used in the steel industry. A total of 63 ferro-manganese units were in operation in the country with a total installed capacity of 21 lakh tonnes. Out of these, 11 were major plants, having a cumulative installed capacity of 3.78 lakh tonnes. Silico-manganese has gained more importance than ferro-manganese in the recent past.

MOIL has constructed a plant for direct utilisation of manganese ore fines to produce ferro-manganese. The plant having 10,000 tpy capacity is located near Balaghat manganese mines in Madhya Pradesh. The company has signed a Memorandum of Understanding (MoU) for an agglomeration plant to utilise high grade (49% Mn) fines at Balaghat mines on a joint venture basis. The total production of ferro-manganese by MOIL was 11,130 tonnes in 2007-08 .

Maharashtra Electros melt Ltd (MEL), a subsidiary of SAIL, situated in Chandrapur, Maharashtra, was a major producer of ferro-manganese and silico-manganese in the country. It was also diversifying production into other ferro-alloys. Present installed capacity of MEL is 100,000 tpy equivalent ferro-manganese.

Ferro-chrome and Charge-chrome

The total combined capacity of ferro-chrome and charge-chrome is around 11.64 lakh tpy. Stainless and alloy-steel industry is the chief consumer of ferro-chrome.

The charge-chrome plants of Tata Steel, FACOR and Indian Charge-chrome Ltd have a total charge-chrome capacity of 162,500 tpy. All the three plants are 100% export- oriented units. FACOR is planning to set up a 500,000 tpy stainless steel plant at a cost of Rs. 2,500 crore to forward integrate the present ferro-chrome production. Plantwise capacity of charge-chrome is given in Table-8. Charge-chrome contains 50 to 60% chromium and 6 to 8% carbon. While chromium used in some alloy steels can be replaced by nickel, cobalt, columbium, vanadium or molybdenum, it is indispensable in the manufacture of stainless steel. Because of high cost and lower performance standards of nickel, cobalt, columbium, etc., chromium is preferred in alloy units also.

Table – 8 : Capacity of Charge-chrome Plants

Plant	Location	Installed Capacity (tpy)
Ferro-Alloys Corp. Ltd	Randia, Dist. Bhadrak, Orissa.	50,000
Tata Steel Ltd	Bamnival, Dist. Kendujhar, Orissa.	50,000
Indian Charge Chrome Ltd	Choudwar, Dist. Cuttack, Orissa.	62,500
Total		162,500

Ferro-silicon

There were about 29 plants with 2 lakh tpy capacity producing ferro-silicon in the country. Besides, ferro-alloys are also produced by small-scale units.

Noble Ferro-alloys

There were total 40 units of which about ten units reported production of noble ferro-alloys, such as ferro-molybdenum, ferro-vanadium, ferro-tungsten, ferro-titanium, ferro-silico magnesium, ferro-aluminium, ferro-boron etc. Mishra Dhatu Nigam (A Govt. of India Undertaking), with a capacity of 2,729 tpy produced different types of super-alloys, chiefly cobalt, molybdenum, titanium and tungsten-based super-alloys and products. Noble ferro-alloys are mainly produced through alumino thermic process. Most of these units are in unorganised sector.

Electrolytic Manganese Dioxide (EMD)

EMD is consumed along with natural manganese dioxide during manufacturing dry battery cells. There were two units, one owned by MOIL in Bhandara district of Maharashtra, having a capacity of 1,000 tpy and the other by Union Carbide Ltd at Thane, Maharashtra, having a capacity of 2,500 tpy. MOIL has undertaken capacity expansion of the existing plant to 1,500 tpy, in view of the good demand for EMD in the domestic market. The plant of MOIL has produced 1,112 tonnes EMD in 2007-08 compared to 1,312 tonnes in 2006-07 exceeding the capacity utilisation in both the years.

The company has plans to set up 10,000 tpy capacity electrolytic manganese metal (EMM) plant and 5,000 tpy capacity potassium permanganate plant, for diversification of value-added products.

NON-FERROUS METALS**Aluminium**

There were four companies with a total installed capacity of 1.196 million tpy in operation. NALCO, a public sector company, has an installed capacity of 345,000 tpy at Angul while BALCO a joint sector company, has an installed capacity

of 3.5 lakh tpy at Korba. The smelter was expanded with a new 250,000 tpy smelter taking the total smelting capacity at BALCO to 350,000 tpy. Two companies with four plants in the private sector have a total capacity over 500,000 tpy. The production of aluminium in 2006-07 at 11.14 lakh tonnes increased to 12.40 lakh tonnes in 2007-08. The information on installed capacity and production of aluminium in 2006-07 and 2007-08 is given in Table-9.

Table – 9 : Capacity and Production of Aluminium, 2006-07 and 2007-08

Producer	Annual Capacity	Production	
		2006-07	2007-08
Total	1196	1113.8	1239.6
Public Sector			
National Aluminium Co.	345	358.7	361.9
Joint Sector			
Bharat Aluminium Co. Ltd	350	283.8	362.3
Private Sector			
Hindalco Industries Ltd	461	433.7	477.7
Madras Aluminium Co. Ltd	40	37.6	37.7

Source : Information received from individual plants.

Larsen & Toubro Ltd has decided to increase smelting capacity of their proposed aluminium plant in Orissa from 0.22 million tonnes per annum to 0.44 million tonnes per annum. L & T has formed a joint venture with Dubai Aluminium for its project.

Alumina

The information about capacities and production of alumina producers in the country, is given in Table-10. NALCO became one of the largest producers of alumina in Asia, with the expansion of alumina refinery capacity to 1.575 million tpy and also established itself as a star performer in global alumina and aluminium production and exports.

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GMDC has planned to set up a 0.75 million tpy alumina plant and a company, namely, Gujarat Alumina & Bauxite Ltd has been formed. The final decision regarding the selection of the joint venture partner is pending with the Government of Gujarat. The viability report of the project has been prepared and formalities for acquiring land are in progress.

Hindalco's Renukoot integrated smelter uses alumina produced in their plant for producing aluminium. Expansion of its Muri Refinery from 110,000 tpy to 450,000 tpy was completed on schedule.

Table – 10 : Capacity and Production of Alumina 2006-07 and 2007-08

Producer	Capacity	Production	
		(In '000 tonnes)	
		2006-07	2007-08
Total	3020	2810.8	3053.2
Public Sector			
National Aluminium Co.	1575	1308.5	1569.3
Joint Sector			
Bharat Aluminium Co. Ltd	200	222.4	217.2
Private Sector			
Hindalco Industries Ltd	1160	1203.0	1192.7
Madras Aluminium Co. Ltd	85	76.9	74.0

Source : Information received from individual plants.

National Aluminium Co. Ltd

The present capacity of bauxite mines is 4.8 million tpy, that of alumina refinery 15.75 lakh tpy and smelter 3.45 lakh tpy. The second phase of expansion of bauxite mines and alumina refinery to 6.325 million and 2.275 million tpy, respectively, is underway. The company also produces special grade alumina and hydrate as also TPA detergent grade zeolite. These plants with 26,000 tpy and 10,000 tpy capacity, respectively, are integrated with the main stream at Damanjodi refinery. The second phase expansion of NALCO's smelter to 460,000 tpy and captive power plant from 960 MW to 1,200 MW is underway. The company also

proposes to set up 1.4 million tpy alumina refinery near Vizag, Andhra Pradesh based on rights over two bauxite blocks in Andhra Pradesh.

NALCO is understood to have received a conditional approval of Government for a second greenfield aluminium project in Orissa. The project is to be set up at a cost of Rs. 16,000 crore with a proposed smelter capacity of 5 lakh tpy located in Jharsuguda district, along with a 1,250 MW captive power plant.

Bharat Aluminium Co. Ltd

The Government of India disinvested its 51% equity in BALCO along with the transfer of management control in favour of M/s Sterlite Industries (India) Ltd. Now, BALCO is a joint sector company with an integrated alumina/aluminium complex at Korba in Bilaspur district in Chhattisgarh. It operates alumina plant with 2 lakh tpy capacity based on Hungarian technology and aluminium smelter of one lakh tpy capacity based on Vertical Stud Soderburg (VSS) technology to produce aluminium from alumina. The work on expansion from 2.50 lakh tpy to 3.50 lakh tpy smelter capacity was completed, along with 810 MW Captive Power Plant (CPP) and other units. The downstream production facilities of BALCO included 111,500 tpy wire rods, 72,500 tpy rolled products, 8,000 tpy extrusions, 9,000 tpy other semi-finished products, etc. BALCO has another aluminium semis unit at Bidhanbag, near Asansol in West Bengal. It has an installed capacity of 6,400 tpy which includes extruded and rolled products, foils and conductors. The company is in an advanced stage of planning for a brownfield 650,000 tpy smelter project; and a 1,200 MW captive power project is underway.

Hindalco Industries Ltd

With the completion of brownfield expansion, the capacity of Renukoot aluminium smelter is raised to 345,000 tpy, alumina refinery to 685,000 tpy (under further expansion to 700,000 tpy). The Company has two captive power plants at Renuagar & Hirakud with total

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generation capacity of approx. 1109 MW. Hindalco is pursuing the implementation of a global-sized Alumina Project in Rayagada distt. Orissa under the aegis of Utkal Alumina Limited, a joint venture with Alcan of Canada by January 2011. The land has been acquired and mining lease for bauxite obtained located at Kodingamali. The one million tpy to 1.5 million tpy alumina refinery in Orissa is in an advanced stage of take-off. The company is planning a 359,000 tpy smelter near Bargawan in Sidhi distt. with 750 MW CPP in Mahan, Madhya Pradesh, for which MoU has been signed with the State Government. A coal block has already been allotted in joint venture with the Essar Power. An MoU has also been signed with Government of Jharkhand for a proposed 359,000 tpy capacity smelter and a 900 MW power plant. The company has applied for a coal block at Latehar. The company's Aditya Aluminium Project with 1.5 million tpy alumina, 325,000 tpy aluminium capacity and 750 MW CPP is also on schedule. The commissioning is expected by September 2011.

All the business of INDAL, other than Aluminium Foils Division at Kollur, Andhra Pradesh had been transferred by way of demerger to Hindalco, w.e.f. 7th March, 2005. The Company had undertaken expansion of Muri Refinery from 110,000 tpy to achieve 450,000 tpy alumina capacity with backward integration of new bauxite mines in Orissa and Jharkhand. The further augmentation of the smelting capacity at Hirakud to 100,000 tpy was completed through Prebake technology. Phase-II of expansion to 143,000 tpy was on course. With the commissioning of the second 100 MW captive power plant at Hirakud, dependence on grid power is eliminated resulting in significant cost savings. An additional 100 MW power plant added in the year 2008. Similarly, Belgaum Refinery is to be expanded from 350,000 tpy to 650,000 tpy. However, the plans are on hold awaiting government's approval relating to bauxite mines. Special alumina capacity at this plant is to be expanded to 127,000 tpy. At present, special alumina capacity is 106,000 tpy. The company produce approximately 110 grades of speciality alumina products.

Vedanta Group

Vedanta Alumina Ltd has commissioned greenfield alumina refinery at Lanjigarh, district Kalahandi, Orissa, in March 2007, at an investment of Rs. 4,000 crore. The refinery with 1 million tpy capacity is located close to bauxite mines in Kalahandi district. The 500,000 tpy capacity smelter with a 9x135 MW coal-based captive power project coming up at Jharsuguda in Sambalpur district was commissioned in May 2008. Pechiney Aluminium Engineering of France is the technical collaborator.

Ashapura Group

Ashapura Minchem will soon set up an alumina complex with an investment of Rs. 4,200 crore at Ratnagiri in Maharashtra. The project has been granted 'Mega Project' status by the State Government and the proposed project will have 5 lakh tpa alumina refinery and 1.5 lakh tpa aluminium smelter and a 330 MW captive power plant. The company plans to export alumina to Middle East Countries.

Cadmium

Cadmium (99.95 min) is obtained as a by-product from zinc smelters of HZL at Debari, Visakhapatnam, Chanderiya and of BZL at Binanipuram. These together have an annual capacity of 913 tonnes. The capacity and production of cadmium is furnished in Table - 11.

Table – 11 : Capacity and Production of Cadmium

Producer	Annual Capacity	Production	
		2006-07	2007-08
HZL	833	418	539
Binani Zinc Ltd	80.3	63	50
Total	913.3	481	589

Copper

The indigenous mining activity among the primary copper producers is limited to only Hindustan Copper Ltd (HCL). The other primary copper producers in the private sector import the copper for their smelters. The installed capacity for refined copper production at HCL's two integrated smelters is around 47,500 tpy. The other two producers of primary copper now are M/s Hindalco Industries Ltd, and Sterlite Industries of Vedanta Group, having capacities of 500,000 tonnes and 400,000 tonnes of refined copper, respectively. The total installed capacity is thus 997,500 tpy. The other two smelters of Metdist and Jhagadia Copper Ltd (formerly SWIL) having a total capacity of 2 lakh tpy were under installation, the latter having become operational with 50,000 tpy capacity. Details regarding capacity and production are given in Table-12.

Production of refined copper (cathodes) in 2006-07 and 2007-08 was 510,623 tonnes and 501,485 tonnes, respectively.

Table – 12 : Capacity and Production of Copper

(In '000 tonnes)

Producer	Annual capacity	Production	
		2006-07	2007-08
Total	997.5	510.7	501.4
Hindustan Copper Ltd	47.5	38.6	44.7
Sterlite Industries (India) Ltd	400.0	167.8	129.2
Hindalco Industries Ltd	500.0	290.4	320.9
Jhagadia Copper Ltd (formerly SWIL)	50.0	13.9	6.6

Source: Annual Reports, 2007-08.

Hindustan Copper Ltd

Copper is produced at two smelters of HCL at ICC, Ghatsila in Jharkhand and Khetri in Rajasthan. The aggregate capacity of the two smelters for copper cathode production is 47,500 tpy. Refinery at ICC also has a Wire Bar Casting Plant with a capacity of 84,000 tpy and a Brass Rolling Mill for manufacturing brass sheets by using copper produced at ICC. It has also a precious metal recovery plant for the recovery of gold, silver, selenium, tellurium and nickel sulphate and copper sulphate at Ghatsila.

The capacity of Khetri Copper Complex (KCC) smelter is 31,000 tpy. KCC has a concentrator plant at Khetri in Jhunjhunu district, Rajasthan, having a capacity of 2.02 million tpy. KCC also has a sulphuric acid plant.

Continuous Cast Copper Wire Rods Project, Talaja, Maharashtra : This project has a capacity of 60,000 tpy continuous cast copper wire rods. The plant is based on the world renowned Southwire SCR-2000 technology of the USA, which uses natural gas as fuel and imported copper cathodes. In 2006-07, production was 43,736 tonnes.

Sterlite Industries (India) Ltd (SIIL)

The smelter of Sterlite Industries (India) Ltd is located at Tuticorin in the coastal belt of Tamil Nadu and has an installed capacity of 4 lakh tpy. The unit is based on 'ISA SMELT' technology from MIM, Australia, using imported concentrates. A Cathode Refinery of 205,000 tpy capacity and 90,000 tpy Copper Rod Plant have been built at Tuticorin with a view to making exports from the nearby port. The 195,000 tpy copper cathode refinery of Sterlite is located in Chinchpada at Silvassa in Dadra & Nagar Haveli for catering to domestic market along with a 150,000 tpy rod mill. The total capacity of cathode refineries and smelter stand at 4 lakh tpy each. Out of the total 4 lakh tpy each capacity of copper anodes and cathodes at Sterlite, 195,000 tpy anodes are refined into cathodes at Silvassa for domestic markets, while remaining 205,000 tpy anodes are refined to cathode at Tuticorin itself for exports. The technology for refineries and Continuous Cast Copper Rod Plant is derived from 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 (CCR) rods in India. The CCR plants have total annual capacity of 2,40,000 tonnes. The company is now seeking world class technology for recovery of minor metals from copper concentrates and copper smelter by-products. The company has sulphuric acid plant of 1600 tpd and phosphoric acid plant of 180,000 tpy.

Hindalco Industries Ltd

The company's three copper smelters, located at Dahej, Lakhigam, Bharuch district, Gujarat has an installed capacity of 500 thousand tpy. The copper operations consists of producing copper through smelting, refining copper from 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. Production of CCR during 2006-07 and 2007-08 was 109.0 thousand tonnes and 139.7 thousand tonnes, respectively. In the process of extraction of copper metal, by-products being recovered and their annual installed capacities are: sulphuric acid (1.67 million tpy), phosphoric acid (180,000 tpy), Di-Ammonium phosphate (DAP) & complex fertilizers (400,000 tpy), gold (15 tpy) and silver (150 tpy). The entire requirement of copper concentrates is being met through imports supported by company's two copper mines in Australia.

Jhagadia Copper Ltd (formerly SWIL Ltd)

The company is the largest producer of LME grade 'A' copper cathodes using mainly secondary route. It is located at Jhagadia in Bharuch district in Gujarat. It is a scrap-based electrolytic smelter to make 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 plant started operations and had produced 13.9 and 6.6 thousand tonnes copper cathodes in 2006-07 and 2007-08, respectively. The precious metals like gold, silver, platinum, palladium etc. are also recovered as part of anode slime during refinery.

METDIST Industries Ltd.

The company is in the process of setting up a 150,000 tpy copper smelter and refinery complex at Rampara-Rajula in Amreli district, Gujarat, with technical collaboration of Mitsubishi, Japan.

Lead

The total installed capacity of lead smelting was 85,000 tpy excluding secondary lead which was 24,000 tpy. Primary lead was produced entirely by HZL at lead-zinc smelter at Chanderiya, Chittorgarh district, Rajasthan. Tundoo lead smelter, Dhanbad district, Jharkhand, with capacity of 8,000 tpy was decommissioned by HZL in 2004 due to economic non-viability. The total production of primary lead in the country in 2006-07 and 2007-08 was 44,627 tonnes and 58,246 tonnes, respectively.

Secondary lead capacity is held by the Indian Lead Pvt. Ltd at its two units at Thane in Maharashtra and Kalipark in West Bengal. The installed capacity of these two plants was 24,000 tpy. There are a number of other secondary producing units in organised and unorganised sector of which production of secondary lead was not available.

Zinc

India has a total installed zinc capacity of 707,000 tpy distributed between HZL smelters at Debari, Visakhapatnam, Chanderiya and Binani Zinc Ltd's (BZL) plant at Alwaye in Kerala. BZL has an annual installed capacity of 38 thousand tonnes zinc along with 80.3 tonnes cadmium and about 53,000 tonnes sulphuric acid.

HZL was acquired by M/s Sterlite Industries (India) Ltd in 2002, when Government of India disinvested its 26% stake in the equity capital of HZL along with transfer of management control.

Debari and Vizag zinc smelters of HZL have a capacity of 88,000 tpy and 56,000 tpy, respectively. At Chanderiya, the zinc smelter has 525,000 tpy capacity after 80,000 tpy zinc debottlenecking completed at Chanderiya smelter complex and 8,000 tpy at Debari Zinc Smelter in April 2008. Chanderiya Smelter Complex with a total capacity of 525,000 tonnes of zinc is the world's largest single location zinc smelting complex. Besides lead and zinc, HZL is also producing silver, cadmium, copper and sulphuric acid as by-products. The annual installed capacities for these by-products are 132 tonnes silver, 833 tonnes cadmium ingots, 2,100 tonnes copper cathode and 1,280,996 tonnes

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sulphuric acid. The Visakhapatnam Zinc Smelter, apart from utilising imported concentrates, can process sludge, containing about 16% zinc, arising out of the existing zinc smelters at Debari and Alwaye. HZL had undertaken Phase-II expansion projects, which include 170,000 tpy hydro metallurgical zinc smelting plant and matching mine expansion and one 80 MW captive power plant. All these projects have been successfully completed in 2008.

The domestic production of zinc ingots in 2006-07 and 2007-08 was 380,945 tonnes and 457,075 tonnes, respectively.

Besides, there are secondary zinc producing units in unorganised sector with capacity of 45,000 tpy. However, production from these units is not available. The data on present capacity and production of primary lead and zinc in 2006-07 and 2007-08 are furnished in Table-13.

Table – 13 : Capacity and Production of Primary Lead and Zinc

Producer	Lead capacity (tpy)	Production		Zinc capacity (tpy)	Production	
		2006-07	2007-08		2006-07	2007-08
		Hindustan Zinc Ltd	85,000		44627	58246
Binani Zinc Ltd	-	-	-	38000	32624	31905
Total	85,000	44627	58246	707000	380945	457075

(In tonnes)

New Projects

The Government of India had approved setting up a new zinc smelter of 100,000 tpy capacity at Kapasan in Chittorgarh district, Rajasthan by HZL. The company has announced to set up a 210,000 tpy, hydrometallurgical zinc smelting plant and 100,000 tpy lead plant at Rajpura Dariba. The company will also add 2 x 80 MW captive power plants at Rajpura Dariba. These projects are to be operational by 2010. Silver production is also expected to increase to 500 tpy.

ABRASIVES

Natural abrasives, which include calcite, emery, diamond, zircon, corundum, 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 belts discs, wheels, sheets, blocks, rods & loose grains. Important producers of coated abrasives are Grindwell Norton Ltd, Mora, Uran, Raigad district, Maharashtra; Flexoplast Abrasives

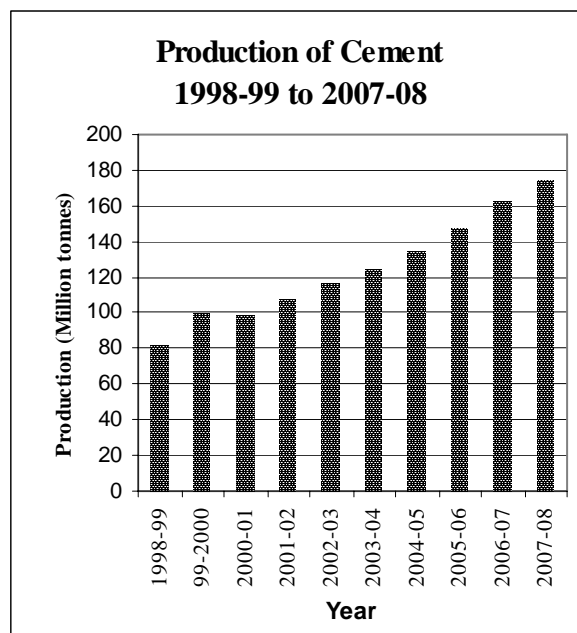
(India) Ltd, Aurangabad, Maharashtra; Associated Abrasives Ltd, Nasik, Maharashtra; Carborundum Universal Ltd, Chennai, Tamil Nadu; Cutfast Abrasives Tools Pvt. Ltd, Chennai, Tamil Nadu; John Oakey and Mohan Ltd, Gaziabad, Uttar Pradesh; and K. L. Thirani & Company Ltd, Kolkata. Important producers of bonded abrasives (grinding wheels) are Grindwell Norton Ltd, Mora, Uran, Raigad district, Maharashtra; Associated Abrasives Ltd, Nasik, Maharashtra; Carborundum Universal Ltd., Chennai, Tamil Nadu; Cutfast Abrasives Tools Pvt. Ltd, Chennai, Tamil Nadu; Industrial Abrasives Co-operative Society Ltd, Mumbai, Maharashtra; and K. L. Thirani & Company Ltd, Kolkata, West Bengal.

Silicon Carbide

Major producers of silicon carbide are Grindwell Norton Ltd, Renugunta, Andhra Pradesh and Bangalore, Karnataka; Indian Metals & Carbide Ltd, Therubali, Orissa; and Carborundum Universal Ltd, Tiruvottiyur, Chengalput district, Tamil Nadu.

CEMENT

Cement, which is a key infrastructure industry, has been growing since the decontrol of price and distribution on the 1st March 1989 and several policy reforms thereafter including delicensing of the industry on 25th July 1991. In 2007-08, the cement industry comprised 140 large cement plants with an installed capacity of about 198.30 million tonnes and about 206 operating mini-cement plants with an estimated capacity of about 11.10 million tonnes per annum. Thus total cement installed capacity in the country is about 209.40 million tonnes per annum. Three cement plants having total capacity of 890,000 tpy producing white cement were also functional. In 2007-08, a total of 21 million tonnes cement capacity had been added in the private sector through expansion of existing cement plants. The number of plants and capacity is more in southern region (Andhra Pradesh, Tamil Nadu, Karnataka and Kerala) of the country, followed by western region (Gujarat and Maharashtra). The CCI, a Central Public Sector Undertaking, has 10 units with a total capacity of about 3.8 million tonnes. These 10 units are spread over 8 States/Union Territories located at Mandhar and Akaltara in Chhatisgarh, Nayagaon in Madhya Pradesh, Kurkunta in Karnataka, Bokajan in Assam, Rajban in Himachal Pradesh, Adilabad & Tandur in Andhra Pradesh, Charkhi Dadri in Haryana and Delhi grinding unit in Delhi. Most of these plants are non-operational due to various reasons and the company became sick and was referred to BIFR. The company was reviewed in the light of public sector policy under National Common Minimum Programme (NCMP) and restructuring/revival plan approved by the Govt. is under implementation. There were 10 large cement plants owned by various State Government Undertakings. The production of cement (all kinds) in 2006-07 was 161.66 million tonnes which increased to 174.32 million tonnes in 2007-08. The cement industry has thus recorded a positive growth of about 7.83% in production. However, during the year 2008, the increase in ocean freight and firming up of imported coal prices restricted the further growth of cement industry.



The Cement Industry was going ahead with modernisation and upgradation of technology particularly in energy conservation. The country is self sufficient in cement. India exports cement including white cement and clinker. The total exports of cement during 2006-07 and 2007-08 were about 4.82 million and 3.42 million tonnes, respectively.

The growth in construction and infrastructural activities in the country has ushered a fresh wave of consolidation in the industry. The Working Group on Cement Industry constituted by Planning Commission for the 11th Plan period has projected a demand growth for cement at the rate of 11.5% per annum based on expected 9% GDP growth rate. The additional cement capacity during 11th Plan is projected as 112 million tpy - 80 million from greenfield plants and 32 million through brownfield expansions and technology upgradation. The annual capacity and production of cement by end of 11th Plan are estimated at 320 million and 269 million tonnes, respectively. The domestic cement industry may not keep promise of adding targeted capacities due to problems like land acquisition, equipment supply delay, liquidity crunch and more importantly the unexpected slow growth rate in cement demand with squeezing margins and

pricing under pressure in the recent global recession. Under the circumstances, the year 2008-09 and 2009-10 will see tougher times than what the industry witnessed in the previous years.

ASBESTOS-CEMENT PRODUCTS

The installed capacity of asbestos-cement pressure pipes in the organised sector was 212,000 tpy. Production capacity of asbestos cement sheets was not available. The production of asbestos-cement sheets and accessories in 2007-08 was about 2.3 million tonnes. The production of asbestos-cement pressure pipes was about 150 thousand tonnes during the same period.

The operating units comprised four units of Everest Building Products Ltd located at Kymore in Madhya Pradesh, Mulund in Maharashtra, Podanur in Tamil Nadu and Kolkata in West Bengal; three plants of Hyderabad Industries Ltd at Sanatnagar, Ranga Reddy district in Andhra Pradesh, Jasidih in Jharkhand and Ballabgarh in Haryana; three units of Ramco Industries Ltd at Arakkonam, North Arcot district, Tamil Nadu, Karur in Dharwad district, Karnataka and Maksi in Shajapur district, Madhya Pradesh; two units of Southern Asbestos Cement Ltd at Karur in Dharwad district, Karnataka and Arakkonam, North Arcot district in Tamil Nadu; Shree Pipes Ltd Hamirgarh, Bhilwara district, Rajasthan; Malabar Building Products Ltd Malakunnathukavu, Trichur district, Kerala; Konark Cement and Asbestos Industries Ltd at Bhubaneswar in Orissa; Shri Digvijay Cement Co. Ltd, Digvijaynagar, Ahmedabad in Gujarat; Uttar Pradesh Asbestos Ltd, Mohanlalganj, Lucknow district, Uttar Pradesh; Assam Asbestos Ltd, Bonda, Narangi, Guwahati district, Assam; Utkal Asbestos Ltd, Dhenkanal in Orissa and Visaka Asbestos, Pattencheru (Medak) in Andhra Pradesh.

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

Tiruchirapalli district in Tamil Nadu; and Ganga Asbestos Cement Ltd, Rae Bareilly in Uttar Pradesh produced only asbestos pressure pipes.

REFRACTORY INDUSTRY

Steel industry comprises the biggest group of customers for this industry, followed by aluminium, power and cement. Refractory units fall in medium and small-scale sectors. This industry has been facing recession mainly because of shift in demand from conventional refractories to sophisticated refractories.

With the modernisation and renovation of the steel plants, requirements for various types of refractories have undergone changes. The stress is now on more sophisticated products like precast monolithics. The domestic refractory industry, anticipating this change, has obtained technical know-how for the 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 continue to be further upgraded for improvement in the products. The use of these 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. About 30 kg refractory was consumed per tonne of liquid steel a decade ago has now come down to around 7-8 kg per tonne of crude steel by some leading players. The specific consumption of refractories at present in integrated steel plants varies from 8 to 19 kg/tcs as compared to 6-8 kg/tcs in advanced countries.

The total production of refractory items as per IRMA in 2006-07 and 2007-08 was 1.09 million and 1.27 million tonnes, respectively. Exports of refractories during the same period were 325 thousand tonnes and 519 thousand tonnes, respectively, while imports during the same period were placed at 232 thousand tonnes and 190 thousand tonnes, respectively. The estimated annual installed capacity of different kinds of refractories is given in Table-14.

MINERAL-BASED INDUSTRIES

Table – 14 : Annual Installed Capacity of Refractories (By Types)
(In '000 tonnes)

Refractory item	Annual capacity
Firebricks refractories	560
High alumina refractories	553
Silica refractories	57
Basic refractories	454
Special products	46
Others(incl.LCC/ULCC)	343
Total	2013

Source : Indian Refractory Makers' Association (IRMA).

CERAMIC & GLASS INDUSTRY

Ceramic Industry

Ceramic industry in India is about 100 years old and by now, it has formed a sizeable industrial base. It comprises ceramic tiles, sanitaryware and crockery items. It has been growing at the rate of about 10% per annum. Ceramic products are made from clay and felspar and are manufactured in large and small-scale sectors with wide variations in type, size, quality and standard. Ceramic items have excellent properties, such as glassy smooth finish, high thermal shock resistance, poor thermal and 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 industry, such as high alumina ceramics, cutting tools and other structural ceramics. The state-of-the-art ceramic goods are being manufactured in the country and the technology adopted is of international standard. The per capita consumption of ceramic tiles in the country was about 0.3 sq m compared to 2 sq m in China and 5-6 sq m in Europe.

Ceramic Tiles

Ceramic tile is a common consumer item. Following the development and growth of the building industry, ceramic glazed tiles industry is on the threshold of rapid growth/expansion and its demand has increased considerably during the last decade. India ranked seventh in the world in

production of ceramic tiles. India produced 220 million sq m ceramic tiles out of global production of 6,400 million sq m in 2006-07. There were 16 units in the organised sector with an installed capacity of 21 lakhs metric tonnes and about 200 units in SSI sector accounting for about 2.5% world ceramic tile production. Production of ceramic tiles in 2007-08 was estimated to be 290 million square metres (about 1.36 million tonnes).

The domestic ceramic tile industry has been growing at about 12% per annum. Indian tiles are competitive in the international market and are being exported to East and West Asian countries.

Sanitaryware

Sanitaryware are ceramic products used for hygienic services, like wash basins. The basic raw materials for sanitaryware are felspar, ball clay, kaolin and quartz. There were 7 units having an installed capacity of 143 thousand tpy in the organised sector and over 200 plants covering a capacity of 53,000 tpy in small-scale sector. Some units have either been closed or merged with the existing units. This industry has been showing a growth rate of about 5% per annum. Estimated production of sanitaryware in 2007-08 was 366 thousand tonnes.

Potteryware

Potteryware signifying crockery and tableware are 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. In the small-scale sector, there were over 1,200 plants with a capacity of 3 lakh tpy. Estimated production of potteryware in 2007-08 was about 59 thousand tonnes in the organised sector.

Besides, production of High Tension insulators was 55.3 thousand tonnes in 2007-08.

Glass Industry

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 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, a glass city of India continues to be a place of master craftsmen and entrepreneurs, manufacturing a vast variety of glass items by the traditional process. Side by side, the country has the most modern plants producing glass containers, float glass etc. by the use of latest technology.

The per capita consumption of glass in India is about 0.4 kg compared to 3.5 kg in Indonesia. Principal raw materials used in the manufacture of glass are silica sand, soda ash, calcite, dolomite, etc.

The glass industry comprises glass containers and hollowware, tableware, flat glass (including float, sheet, figured, wired and safety glass), vacuum flasks, refills, laboratory glassware, fibre glass, etc. Glass industry is delicensed and manufacturing units are spread all over India. The large-scale producers are located mostly at Mumbai, Kolkata, Bangalore, Hyderabad and in Gujarat. They are equipped mostly with modern melting furnace technology, whereas the medium and small-scale industries including cottage industries are still using outdated technology.

Glass Container and Hollowware

Presently, 43 units in the organised sector are engaged in the manufacture of glass containers and hollowwares, with an installed capacity of around 15 lakh tonnes per year. The production in 2006-07 and 2007-08 was 8.04 lakh tonnes and 9.17 lakh tonnes, respectively. Glass containers are ideal packaging medium, but are being replaced by other packaging materials like plastic, PET, aluminium and tetrapack.

Laboratory Glassware

There were six units in this sector which comprises neutral glass tubing, laboratory glassware 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 natural glass tubing has not picked up due to sizeable switch over from glass items to plastic items.

Flat Glass

The term flat glass includes float glass, sheet glass, figured and wired glass. These are further processed into mirror, toughened glass, laminated glass, double glazing, etched glass, glass doors, etc. Thirteen units in flat glass sector had a total production capacity of 135 million sq m. Production of flat glass in 2007-08 was 9.17 lakh tonnes. Both, sheet and float glasses are being exported.

Vacuum Flasks and Refills

There were eight units in the organised sector for the manufacture of vacuum flasks and refills, with an installed capacity of 36 million numbers per annum. However, data on production are not available. This product is facing survival problems due to competition from international market.

Fibre Glass

Fibre glass is highly capital and technology-intensive industry. The present demand is about 22,000 tonnes. Fibre glass is lighter than aluminium but stronger than steel. Moreover, being an inorganic material, it does not pose any health hazard. Five units had a production capacity of 55,000 tpy. However, data on production are not available.

Others

Production of other glass items in 2007-08 was as follows (in numbers) : glass lamps - 431 million, fluorescent tubes - 215 million, autolamps - 73.2 million and television picture tubes - 6.5 million.

GRANITE INDUSTRY

Granite is used in monuments, building slabs, tiles, surface plates, etc. Over 160 varieties of granite have been identified for processing as products for exports and the deposits are dispersed widely in all parts of the country.

Granite is a minor mineral as defined in MMDR Act, 1957. Granite Conservation and Development Rules, 1999 were notified separately on 1.6.1999 for ensuring systematic/scientific mining, development and conservation of valuable granite assets of the country.

MINERAL-BASED INDUSTRIES

Granite is a non-scheduled industry. Entrepreneurs are required to submit only Industrial Entrepreneur Memorandum to Secretariat for industrial assistance. 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. Exports of granite are freely allowed. The total value of granite exports during 2006-07 and 2007-08 was Rs. 4,725 crore and 4,287 crore, respectively.

CHEMICALS

Caustic Soda

Caustic soda is a basic inorganic chemical used in the manufacture of pulp and paper, viscose rayon, textile, vanaspati and other chemicals and aluminium extraction. A significant quantity of caustic soda is used in the manufacture of other inorganic chemicals and dyestuffs, in metallurgical operations and in petroleum refining. Capacity and production of caustic soda reported by 40 units in 2007-08 was 2.65 million tonnes and 2.05 million tonnes, respectively.

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 and pulp and in the preparation of a host of chemicals. Washermen use it largely as a washing material in laundries as also in households. The manufacture of Soda Ash in India started in 1932 at Dhrangadhra in Gujarat with installed capacity of 50 tpd. Installed capacity and production of soda ash in 2007-08 was 2.95 million tonnes and 2.06 million tonnes, respectively, covering 6 units.

Bleaching Powder

Seven units were engaged in producing stable bleaching powder. There were three units engaged in the manufacture of liquid bleaching powder.

Calcium Carbide

The annual capacity and production of calcium carbide was reported at 142,350 tonnes

and 97,414 tonnes, respectively, in 2007-08 by 2 units. Calcium carbide is used in the manufacture of acetylene gas. It is also used as a raw material for manufacturing various rubber goods. It is a self-reinforcing filler.

Nickel Sulphate

Ghatsila copper smelter of HCL produces nickel sulphate as a by-product from electrolytic copper spent solutions. The annual capacity of HCL smelter for the production of nickel sulphate is 390 tonnes. In 2002-03 and 2003-04, HCL produced 75 tonnes and 10 tonnes nickel sulphate, respectively. Since then, no production has been reported. Other manufacturers were Phonics Chemicals Works (Pvt.) Ltd, Mumbai; Kesar Sugar Works, Mumbai; Ronuk Industries, Mumbai; Sen & Pandit Industries, Kolkata; Arim Metals Industries Pvt. Ltd, Kolkata; and Shambhunath & Sons, Amritsar, Punjab. Jhagadia Copper Ltd (formerly SWIL Ltd) has plans to recover nickel sulphate at its copper metal plant at Jhagadia, Bharuch district, Gujarat. The copper metal plant has started operations.

Synthetic Cryolite(Na_3AlF_6)

Navin Fluorine Industries, Bhestan, Gujarat, is an important producer of synthetic cryolite. Other producers are FACT, Udyogmandal, Cochin, Kerala; Tanfac Industries Ltd, Cuddalore, Tamil Nadu; Dharamsi Morarji Chemicals Co., Ambarnath, Mumbai and Adarsh Chemicals and Fertilizers Ltd, Udhana, Gujarat.

Aluminium Fluoride

Sterlite Industries (I) Ltd's copper division is in the process of setting up a 13,000 tpy aluminium fluoride plant through hydrofluorosilicic acid route with a joint venture partner, in and around Tuticorin, Tamil Nadu. Important units producing aluminium fluoride were Navin Fluorine Industries, Dharamsi Morarji Chemicals Ltd, Tanfac Industries Ltd, SPIC and Aegis Chemicals Industries Ltd. The total production of aluminium fluoride in 2007-08 was 19,434 tonnes against an installed capacity of about 27,210 tonnes by 2 units.

Titanium Dioxide

Five plants with an installed capacity of 242 thousand tpy produce titanium dioxide. These are IREL, Ganjam district, Orissa (100,000 tpy); KMML, Chavara, Kerala (40,000 tpy); DCW Ltd, Sahapuram, Tamil Nadu (42,000 tpy); Cochin Minerals & Rutile Ltd, Kerala (36,000 tpy); and Travancore Titanium Products Ltd, Thiruvananthapuram, Kerala (24,000 tpy). The production of titanium dioxide in 2006-07 was 118,672 tonnes and 118,422 tonnes in 2007-08. IREL has not reported production in recent years. However, KMML has reported production of about 36 thousand tonnes and 38 thousand tonnes in 2006-07 and 2007-08, respectively. IREL has now initiated process to set up a 10,000 tpy titanium sponge plant at OSCOM, Orissa.

Sulphuric Acid

There were 104 units with an annual capacity of more than 6 million tonnes per annum, manufacturing sulphuric acid in the organised sector based on sulphur as a raw material. In addition, it is also recovered during copper smelting by HCL, Hindalco and Sterlite and during lead-zinc smelting by HZL and BZL. The total production of sulphuric acid in 2006-07 and 2007-08 was 7.16 million tonnes and 6.57 million tonnes, respectively.

Phosphoric Acid

Important units producing phosphoric acid of various grades such as pharma grade, food grade, technical grade, analytical reagent grade etc. were Coromandel Fertilizers Co. Ltd, Visakhapatnam, Andhra Pradesh; Gujarat State Fertilizer Company, Vadodara, Gujarat; Fertilizers and Chemicals Travancore Ltd (FACT), Udyogmandal, Kochi, Kerala; Albright Morarji and Pandit Ltd, Ambarnath, Maharashtra; Rashtriya Chemicals & Fertilizers Ltd (RCF), Trombay, Maharashtra; Fertilizer Corp. of India (FCI), Sindri, Jharkhand; HCL, Khetri, Rajasthan; HZL, Udaipur, Rajasthan; Southern Petrochemical Industries Corp. Ltd, Tuticorin, Tamil Nadu; EID Parry (India) Ltd, Ennore, Tamil Nadu; Star Chemical Ltd, Haldia, West Bengal; Ballarpur Industries Ltd, Karwar, Karnataka; Hindalco Industries Ltd, Dahej, Gujarat; and Paradeep Phosphates Ltd, Paradeep, Orissa.

Red Phosphorus

Star Chemicals (Bombay) Pvt. Ltd is the leading manufacturer & supplier of the Red Phosphorus in the country mainly consumed in the match industry. The installed capacity for production of red phosphorus in the country was 1,700 tonnes. Production was estimated at 540 tonnes and 630 tonnes, respectively, in 2006-07 and 2007-08.

Borax

Borax was manufactured by Borax Morarji Ltd, Ambarnath, Maharashtra. The plant has an installed capacity of 17,000 tpy borax and 6,000 tpy boric acid. The plant is based on imported crude sodium borate concentrates (rasorite) and crude calcium borate (colemanite) which are not available indigenously and hence imported. National Peroxide Ltd, Kalyan, Maharashtra, has 1,200 tpy combined installed capacity to produce other boron compounds; namely, sodium perborate - tetrahydrate and monohydrate.

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

CHEMICAL FERTILIZERS

There are 56 large size fertilizer units in the country manufacturing a wide range of nitrogenous, phosphatic and complex fertilizers. Out of these, 28 units produced urea, 21 units produced diammonium phosphate (DAP) and complex fertilizers, 5 units produced low analysis straight nitrogenous fertilizers and 9 plants produced ammonium sulphate as by-product. Besides, there were 72 small and medium-scale units, in operation, producing single superphosphate (SSP). The installed capacity of phosphatic nutrient was 56.59 lakh tonnes and that of nitrogenous fertilizer was 120.61 lakh tonnes of nitrogen as on 31.1.2008. Total production of nitrogenous and phosphatic fertilizers in 2006-07 was about 115.78 lakh tonnes and 45.18 lakh tonnes, respectively and that during 2007-08 was estimated at 111.22 lakh tonnes and 40.69 lakh tonnes, respectively (Tables - 15 and 16).

MINERAL-BASED INDUSTRIES

Table - 15 : Capacity and Production of Nitrogenous and Phosphatic Fertilizers (By Sectors)

('000 tonnes)

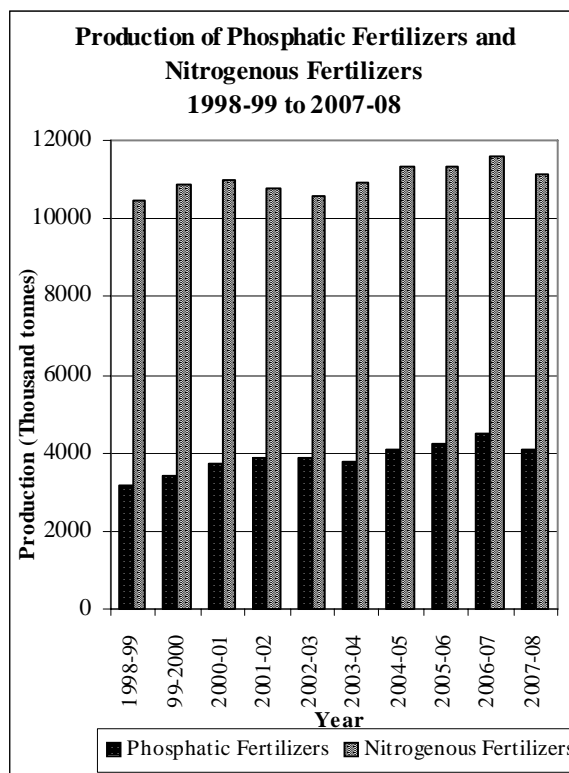
Sector/Nutrient	Capacity as on 31.1.2008	Production	
		2006-07	2007-08(e)
Nitrogen (N)	12061	11577	11122
Public sector	3498	3047	2925
Co-operative sector	3169	3004	3070
Private sector	5394	5526	5127
Phosphates (P)	5659	4518	4069
Public sector	433	233	183
Co-operative sector	1713	1130	1041
Private sector	3513	3155	2845

Source : Ministry of Chemicals and Fertilizers, Annual Report, 2007-08.

The Government of India has been consistently pursuing policies conducive to increase the availability and consumption of fertilizers in the country and, as a result, India became the third largest fertilizer producer in the world. The overall consumption of fertilizers in terms of nutrients (viz, N, P & K) is about 168 lakh tonnes per annum.

Indigenous raw materials are available mainly for nitrogenous fertilizers in the country. Prior to 1980, nitrogenous fertilizer plants were based mainly on naphtha as feedstock. During 1978 to 1982, a number of fuel oil/LSHS-based ammonia-urea plants were also set up. A number of gas-based ammonia-urea plants were set up in 1985. The natural gas was obtained from Bombay High and South Bassein (Vasai). Recently, a number of expansion projects have come up with dual feed facility using both naphtha and gas.

In case of phosphatic fertilizers, indigenous rock phosphate supplies meet only 35-40% of the total requirement of P_2O_5 . The domestic requirement is therefore, supplemented by imported rock phosphate and sulphur, as also by



imported intermediate products; viz, ammonia and phosphoric acid, and to some extent by finished fertilizers.

In the absence of commercially exploitable resources of potash in the country, the entire demand of potassic fertilizers is met through imports. The fertilizer plant operators in the country have fully absorbed and assimilated the latest technological developments incorporating environment-friendly process technology and are in a position to operate and maintain the plants at their optimum levels on international standards in terms of capacity utilisation, specific energy consumption and pollution standards. The fertilizer industry is carrying out de-bottlenecking and energy saving schemes in the existing plants to enhance capacity and to reduce specific energy consumption. Companies are also planning to convert existing naphtha-based fertilizer plants to liquified natural gas (LNG)/natural gas (NG)-based ones.

MINERAL-BASED INDUSTRIES

Table – 16 : Important Fertilizer Plants

Sl. No.	Plant	Location
Public Sector		
1.	National Fertilizer Ltd	Nangal-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 Limited	Udyogmandal and Cochin-II (Kerala)
4.	Rashtriya Chemicals & Fertilizers Limited	Trombay and Trombay IV, V and Thal (Maharashtra)
5.	Madras Fertilizers Ltd	Chennai (Tamil Nadu)
6.	Steel Authority of India Ltd	Rourkela (Orissa)
7.	Hindustan Copper Ltd	Khetrinagar (Rajasthan)
8.	FCI Aravali Gypsum & Minerals India Ltd	Jodhpur (Rajasthan)
9.	Brahmaputra Valley Fertilizer Corporation Ltd	Guwahati (Assam)
Private Sector Large Units		
10.	Gujarat State Fertilizers Co. Ltd	Vadodara and Sikka I & II (Gujarat)
11.	Shriram Fertilizers & Chemicals	Kota (Rajasthan)
12.	DIL (Duncan Industries Ltd)	Kanpur (Uttar Pradesh)
13.	Zuari Agro Chemicals Ltd	Zuari Nagar (Goa)
14.	Coromandal Fertilizers Ltd	Visakhapatnam (Andhra Pradesh), Ennore (Tamil Nadu)
15.	Mangalore Chemicals & Fertilizers Limited	Mangalore (Karnataka)
16.	Gujarat Narmada Valley Fertilizers Company Limited	Bharuch (Gujarat)
17.	Southern Petrochemicals Industrial Corp	Tuticorin (Tamil Nadu)
18.	EID Parry India Ltd	Ennore and Ranipet (Tamil Nadu)
19.	Tata Chemicals Ltd	Haldia (West Bengal), Babrala (Uttar Pradesh)
20.	Punjab National Fertilizers and Chemicals Ltd	Nangal (Punjab)
21.	Deepak Fertilizers & Petrochemicals Corporation	Taloja (Maharashtra)
22.	Tuticorin Alkali	Tuticorin (Tamil Nadu)
23.	Indo-Gulf Fertilizers & Chemicals Corp. Ltd	Jagdishpur (Uttar Pradesh)
24.	Nagarjuna Fertilizers & Chemicals Limited	Kakinada I & II (Andhra Pradesh)
25.	Godavari Fertilizers & Chemicals Ltd	Kakinada (Andhra Pradesh)
26.	Siwalik Fertilizers Ltd	Railmajra, Ropar dist. (Punjab)
27.	The Phosphate Co. Ltd	Rishra, Hoogly dist. (West Bengal)
28.	Chambal Fertilizers & Chemicals Ltd	Gadepan I & II (Rajasthan)
29.	KSF Ltd	Shahjahanpur (Uttar Pradesh)
30.	Paradeep Phosphates Ltd	Paradeep (Orissa)
Co-operative Sector		
31.	Indian Farmers' Fertilizers Co-operative Ltd	Kalol and Kandla (Gujarat), Aonla I & II, Phulpur I & II 2 (Uttar Pradesh), Paradeep (Orissa)
32.	Krishak Bharti Co-operative Ltd	Hazira (Gujarat)

Paper & Paper Board Industry

There are about 666 units manufacturing pulp, paper, paper board and news print. The total installed capacity is nearly 89 lakh tonnes. The Indian paper industry is in a fragmental structure, consisting of small, medium and large paper mills, having capacities ranging from 5 to 800 tonnes per day. The production from paper industry (paper, paper board and bleached newsprint) during 2006-07 and 2007-08 was reported at 5.17 million tonnes and 5.30 million tonnes, respectively. Although paper industry is based on 30% by wood based industry, 32% by agri-residue based and the remaining by recycled fibre based industry, minerals like china clay, limestone, talc, salt, sulphur, etc. besides coal as fuel are used as filler, coating and surface sizing, etc. in this industry.

PAINTS & ALLIED PRODUCTS INDUSTRY

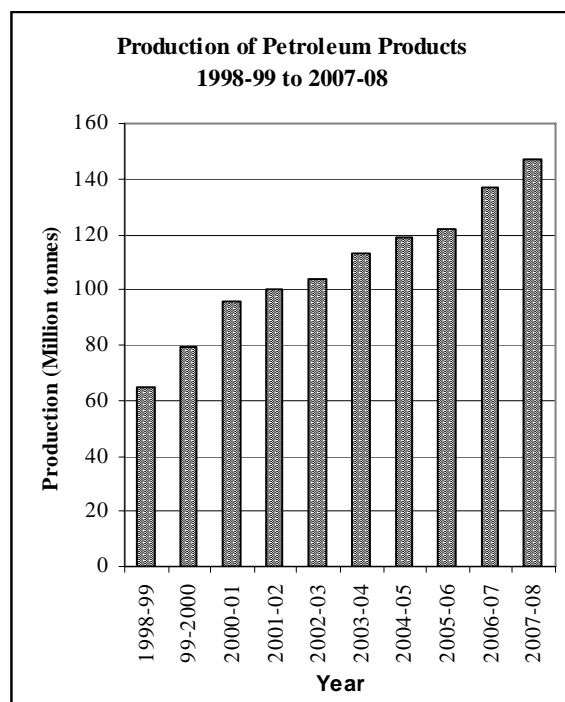
The paints and allied products industry comprises paints, enamels, varnishes, pigments, printing inks, etc. Approximately 60% of the production is contributed by the organised sector. During the year 2007-08, the production of paints, enamels and varnishes was estimated to be 5.42 lakh tonnes. India is self-sufficient in the production of paints. Barytes, bentonite, calcite, china clay, mica powder, rutile, talc/steatite, ochre, silica & dolomite powder are some of the important minerals consumed in paint industry.

PETROLEUM REFINERIES

There were 19 refineries operating in the country, 17 in public sector (including one in joint

sector) and two in private sector). Out of the 16 public sector refineries, 7 were owned by Indian Oil Corporation Ltd (IOCL), two by Chennai Petroleum Corporation Ltd (CPCL), a subsidiary of IOCL; two by Hindustan Petroleum Corporation Ltd (HPCL); and one each by Bharat Petroleum Corporation Ltd (BPCL) and Oil & Natural Gas Corporation Ltd, one each by Bongaigaon Refinery & Petrochemicals Ltd (BRPL), a subsidiary of IOCL; Numaligarh Refineries Ltd (NRL), a subsidiary of BPCL; and ONGC. The private sector refineries belong to Reliance Industries Ltd and Essar Oil Ltd. There is one refinery in the joint venture; viz, Mangalore Refinery & Petrochemicals Ltd (MRPL).

Installed capacity and crude throughputs of refineries are given in Table-17.



MINERAL-BASED INDUSTRIES

Table – 17 : Installed Capacity and Crude Throughputs in Refineries

(In '000 tonnes)

Refinery	Annual installed capacity (as on 1.4.2008)	Refinery Crude throughput		
		2005-06	2006-07	2007-08(p)
Total	148968	130109	146551	156103
Public/Joint Sector	105468	96946	108172	112541
IOCL, Guwahati, Assam	1000	864	839	920
IOCL, Barauni, Bihar	6000	5553	5469	5634
IOCL, Koyali, Gujarat	13700	11543	12953	13714
IOCL, Haldia, West Bengal	6000	5502	5836	5715
IOCL, Mathura, Uttar Pradesh	8000	7938	8883	8033
IOCL, Dibgoi, Assam	650	615	586	564
IOCL, Panipat, Haryana	12000	6507	9435	12821
BPCL, Mumbai, Maharashtra	12000	10298	12030	12746
HPCL, Mumbai, Maharashtra	5500	6249	7419	7409
HPCL, Vizag, Andhra Pradesh	7500	7980	9377	9409
KRL, Kochi, Kerala	7500	6939	7742	8134
CPCL, Manali, Tamil Nadu	9500	9680	9784	9802
CPCL, Narimanam, Tamil Nadu	1000	682	618	464
BRPL, Bongaigaon, Assam	2350	2356	2067	2020
MRPL, Mangalore, Karnataka	9690	12014	12536	12525
NRL, Numaligarh, Assam	3000	2133	2504	2568
ONGC, Tatipaka, Andhra Pradesh	78	93	94	63
Private Sector	43500	33163	38379	43562
RPL, Jamnagar, Gujarat	33000	33163	36616	36934
Essar Oil Ltd.*, Vadinar, Gujarat	10500	-	1763	6631

* Commissioned on 24.11.2006.

Note : CPCL and BRPL are subsidiaries of IOC, KRL, NRL of BPCL and MRPL of ONGC.

Source: Basic Statistics on Indian Petroleum and Natural Gas, 2007-08, Ministry of Petroleum & Natural Gas, Government of India.

MINERAL-BASED INDUSTRIES

The total refining capacity in the country as on 1.4.2008 is around 149 million tpy. The total crude throughput increased to 156.10 million tonnes in 2007-08 from 146.55 million tonnes in 2006-07. Production of petroleum products from crude oil & natural gas also increased to 146.99 million tonnes in 2007-08 from 137.35 million tonnes in 2006-07. The total exports of petroleum products during 2006-07 and 2007-08 were 33.62 million tonnes and 39.33 million tonnes, respectively. Import of petroleum products during the same period was 17.66 million tonnes and 22.72 million tonnes, respectively. During 2007-08, crude oil production in the country was at 34.12 million tonnes and is 0.4% higher than 33.99 million tonnes produced in 2006-07 and the natural gas production at 32.3 billion cubic metres in 2007-08 as against 31.7 billion cubic metres during the year 2006-07.

India has a near self-sufficiency in the refinery sector. In the next five years, the following additional refining capacities totalling about 112 million tpy are reportedly expected to come on stream: (i) 1.5 million - IOCL, Haldia, (ii) 3.0 million - IOCL, Panipat, (iii) 15.0 million - IOCL, Paradeep, (iv) 2.4 million - HPCL, Mumbai, (v) 7.5 million - HPCL, Vizag, (vi) 9.0 million - Mittal, Bhatinda, (vii) 6.0 million - BPCL, Bina, (viii) 2.0 million - BPCL, Kochi, (ix) 1.7 million - CPCL, Chennai, (x) 5.31 million - MRPL,

Mangalore, (xi) 0.08 million - ONGC, Tatipaka, (xii) 29.0 million - RIL, Jamnagar, (xiii) 23.5 million - Essar, Vadinar and (xiv) 6.0 million - Nagarjuna, Cuddalore. There are also reports of the LN Mittal Group signing an MoU with HPCL, Total (of France), GAIL and OIL for jointly developing a 15 million tpy refinery-cum-petrochemicals complex in Visakhapatnam at a cost of \$ 6 billion.

FOUNDRY

There are more than 5,000 foundry units in India, having an installed capacity of approx. 7.5 million tonnes/annum. However, the majority of the foundry unit falls under the category of small-scale industry. Typically, each foundry cluster is known to cater to the specific end-use markets. The Coimbatore cluster is famous for pump-set castings; Kolhapur and Belgaum cluster for automotive castings and Rajkot cluster for diesel engine castings; Butalu-Jalandhar cluster mainly for machine parts and agricultural implements.

Although intermediate mineral-based products like pig iron scrap of metals and ferro-alloys, etc. are main inputs for foundry, minerals like bentonite, coke, coal, fireclay, fluorite, iron ore, limestone, silica sand, zircon flour, etc. are being consumed in some of these foundry industries.