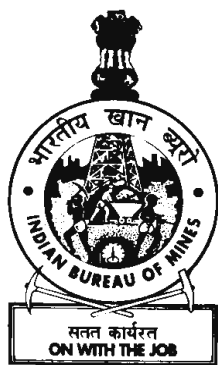


MINERAL-BASED INDUSTRIES



# Indian Minerals Yearbook 2012

(Part- I : General Reviews)

51<sup>st</sup> Edition

MINERAL-BASED INDUSTRIES

(FINAL RELEASE)

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# 7 Mineral-Based Industries

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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 certainly had impacted the Indian Mineral-based Industries as well.

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

## FERROUS METALS

India is poised for brownfield expansion of existing steel plants, backward integration of re-rollers, forward integration of DRI or pig iron producers and emergence of few greenfield projects. The National Steel Policy which (NSP) was announced in 2005 is being reviewed. 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 2011-12 stood at 73.42 million tonnes as against 66.62 in the previous year.

In view of the 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 intermediate product of smelting of iron ore with a high-carbon fuel such as coke and charcoal and is the basic raw material in foundry and casting industry for the manufacture of various types of castings required for engineering sector. Pig iron usually has very high carbon content of 3.5 to 4.5%. 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, especially in the post-liberalised period. Of the total 5.78 million tonnes production in 2011-12, the private sector accounts for over 90% of total production for sale of pig iron in the country. M/s Usha Martin Industries Ltd, M/s Jindal Steel & Power Ltd have 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 had integrated their MBF with energy optimising furnace to produce steel. Besides MBF, M/s JSW Steel Ltd (formerly Jindal Vijaynagar 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 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.

In 2011-12, about 5.78 million tonnes pig iron was produced against 5.68 million tonnes in 2010-11. Location and capacity of principal pig iron units in private sector are furnished in Table-2.

### 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 shot up substantially. Now, India has emerged as the largest producer of sponge iron in the world with the coal based route. The installed capacity of sponge iron increased from 1.52 million tonnes per annum in 1990-91 to 34.90 million tonnes per annum in 2011-12. The production also increased from 0.9 million tonnes in 1990-91 to 20.37 million tonnes in 2011-12.

Production of sponge iron in the country has also resulted in providing an alternative feed material to steel melting scrap which was hitherto imported in large quantities by the Electric Arc Furnace units and the Induction Furnace units for steel making.

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This has resulted in considerable saving in foreign exchange as well as alternate route for production of steel through EAF in the country. Out of the total sponge iron units, 3 are gas-based hot briquetted iron (HBI) units covering a capacity of 9.6 million tonnes per annum. The capacity of gas-

based sponge iron plant of Essar Steel Ltd, the world's largest sponge iron producer has increased to 6.8 million tpy. The coal based sponge iron capacity was 25.79 million tonnes. Plantwise details as available in respect of principal sponge iron units are furnished in Table-3.

**Table – 1 : Capacity and Production of Important Mineral-based Products, 2010-11 and 2011-12**

Mineral-based product	Unit of quantity	Annual Installed capacity	Production	
			2010-11	2011-12(P)
<b>Ferrous Metals</b>				
Hot metal	'000 tonnes	NA	42934	40960
Sponge iron	"	34900	25941	79770
Crude/liquid steel	"	72963	73792	78310
<b>Ferro-alloys</b>				
Ferro-chrome/Charge-chrome	"	1600	943	944
Ferro-manganese	"	2750	517	518
Silico-manganese	"	-	2011	2365
Ferro-silicon	"	250	89	90
Noble ferro-alloys	"	50	42	NA
<b>Non-ferrous Metals</b>				
Aluminium	"	1856.4	1654	1675
Copper #	"	1001.5	505	494
Lead (primary)	"	185	92	118
Zinc Ingots	"	917	784	704
<b>Asbestos-Cement Products</b>				
Asbestos sheets & accessories	'000 tonnes	NA	NA	NA
Asbestos-cement pressure pipes	"	150	NA	NA
<b>Refractories</b>				
	"	2015	1415	NA
<b>Cement</b>				
	million tonnes	296.5	230.63	272.00
<b>Ceramic</b>				
Ceramic tile	million sq m	2100	450	513 <sup>(e)</sup>
	('000 tonnes)			
Sanitaryware	'000 tonnes	196	530	583
Crockeryware (Potteryware)	"	343	85	92
<b>Fertilizers</b>				
Nitrogenous	"	12061	12576	12400(*)
Phosphatic	"	5659	4223	3876
<b>Chemicals</b>				
Aluminium fluoride	"	27	7.3	NA
Sulphuric acid	"	NA	NA	NA
Caustic soda	"	2647	2215	NA
Calcium carbide	"	142.4	66.39	NA
Soda ash	"	2951	2410	NA
Synthetic rutile	"	243	NA	NA
Titanium dioxide Pigment	"	75	52	NA
Red phosphorous	"	0.48	0.56	NA
<b>Petroleum Refinery Products</b>				
	"	193390**	190316	196707

Figures rounded off.

- Sources:**
1. Ministry of Steel Annual Report, 2011-12 and JPC Bulletins.
  2. Ministry of Commerce & Industry, Department of Industrial Policy & Promotion and Annual Report, 2011-12
  3. Ministry of Chemicals & Fertilizers, Department of Chemicals & Petrochemicals, Annual Report, 2011-12.
  4. Basic Statistics on Indian Petroleum & Natural Gas, 2011-12.
  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.
- \*\* Throughput capacity of refineries.  
# Production relates to copper cathodes figures rounded off.  
JPC Buletin, March, 2013.  
\* April-Dec., 2012.  
Dept of IPP, Ministry of Commerce & Industries MSMP - 2012-13.  
CSO New Delhi.

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

(In lakh tonnes)

Sl.No.	Unit	Location	Capacity
1.	Lanco Industries Ltd	Chittoor, Andhra Pradesh	2.25
2.	Sathavahana Ispat Ltd	Anantapur, Andhra Pradesh	1.20
3.	Jayaswal NECO Industries Ltd	Raipur, Chhattisgarh	7.50
4.	Sesa Goa Ltd	Bicholim, Goa	1.80
5.	Usha Martin Industries	Jamshedpur, Jharkhand	1.10
6.	JSW Steel Ltd	Bellary, Karnataka	7.20
7.	Kalyani Ferrous Industries Ltd	Koppal, Karnataka	1.20
8.	Kirloskar Ferrous Industries Ltd	Koppal, Karnataka	2.40
9.	KIOCL Ltd	Mangalore, Karnataka	2.27
10.	Usha Ispat Ltd	Redi, Maharashtra	3.00
11.	JSW Ispat Steel Ltd	Dolvi, Raigad, Maharashtra	20.00
12.	Kalinga Iron Works	Barbil, Keonjhar, Odisha	1.70
13.	Kajaria Iron Castings Ltd	Durgapur, West Bengal	1.10
14.	Electrosteel Castings Ltd	Khardah, West Bengal	1.10
15.	Tata Metaliks Ltd	Kharagpur, West Bengal	0.90
16.	Sona Alloys Pvt. Ltd	Satara, Maharashtra	3.14
17.	Aparant Iron & Steel Pvt. Ltd	Samguem, Goa	1.55

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

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

(In lakh tonnes)

Unit	Location	Capacity
<b>Gas-based</b>		
Essar Steel Ltd	Hazira, Gujarat	68.00
Welspun Maxsteel Ltd (formerly Vikram Ispat)	Salav, Raigad, Maharashtra	9.00
JSW Steel (formerly Ispat Industries Ltd)	Geetapuram, Dolvi, Raigad, Maharashtra	16.00
<b>Coal-based</b>		
Action Ispat & Power Pvt. Ltd	Marakuta & Pandaripathar, Jharsuguda, Odisha	2.50
Adhunik Metaliks Ltd	Chandrihariharpur, Sundergarh, Odisha	1.80
Alliance Integrated Metallics Ltd	Bemta, Raipur, Chhattisgarh	5.00
Anjani Steel Ltd	Ujalpur, Raigarh, Chhattisgarh	1.02
API Ispat Powertech Pvt. Ltd	IGC Siltara, Raipur, Chhattisgarh	1.05
Beekay Steel & Power Ltd	Uliburu, Barbil, Odisha	1.05
Bhushan Steel & Strips Ltd	Meramandali, Dhenkanal, Odisha	3.00
Bihar Sponge Iron Ltd	Chandil, Singhbhum, Jharkhand	2.10
Crest Steel & Power Pvt. Ltd	IGC Borai, Durg, Chhattisgarh	1.15
Deepak Steel & Power Ltd	Topadihi, Keonjhar, Odisha	1.44
Gallant Metal Ltd	Samakhilai, Kachchh, Gujarat	1.70
Global Hi-tech Industries Ltd	Gandhidham, Gujarat	1.05
Goa Sponge Iron & Power Ltd	Santona, Sanguem, Goa	1.00
Godawari Power & Ispat Ltd	IGC Siltara, Raipur, Chhattisgarh	4.95
Goldstar Steel & Alloys Ltd	Srirampuram, Vizianagaram, Andhra Pradesh	2.20

(Contd.)

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Table - 3 (Concl.)

Unit	Location	Capacity
Ind Synergy Ltd	Kotmar, Raigarh, Chhattisgarh	3.00
Jai Balaji Sponge Ltd	Baktarnagar, Raniganj, West Bengal	1.05
Jai Shri Balaji Steel Pvt. Ltd (HEG Ltd)	Borai, Durg, Chhattisgarh	1.20
Jayaswal Neco Ltd	IGC Siltara, Raipur, Chhattisgarh	2.55
Janki Corporation Ltd	Sidiginamola, Bellary, Karnataka	1.80
Jindal Steel & Power Ltd	Kharsia Road, Raigarh, Chhattisgarh	13.70
Lloyds Metals & Engineering Ltd	Ghuggus, Chandrapur, Maharashtra	2.70
Mastek Steels Pvt. Ltd	Holakundi, Bellary, Karnataka	1.05
MGM Steels Ltd	Chintapokhri, Dhenkanal, Odisha	1.00
Monnet Ispat Energy Ltd	Chandkhuri Marg, Hasaud, Raipur, Chhattisgarh	3.00
Monnet Ispat & Energy Ltd	Naharpalli, Raigarh, Chhattisgarh	5.00
MSP Steel & Power Ltd	Jamgaon, Raigarh, Chhattisgarh	1.92
Nalwa Steel & Power Ltd	Taraimal, Raipur, Chhattisgarh	1.98
Nova Iron & Steel Ltd	Dagori, Bilaspur, Chhattisgarh	1.50
OCL Iron & Steel Ltd	Lamloi, Sundergarh, Odisha	1.20
Orissa Sponge Iron Ltd	Palaspanga, Keonjhar, Odisha	2.50
Prakash Industries Ltd	Champa, Jangir Champa, Chhattisgarh	4.50
Rungta Mines Ltd	Karakola and Kamando, Sundergarh, Odisha	3.30
Sarda Energy & Minerals Ltd	IGC Siltara, Raipur, Chhattisgarh	2.10
Scaw Industries Pvt. Ltd	Gundichapara, Dhenkanal, Odisha	1.00
Shivshakti Steel Ltd	Chakradharpur, Raigarh, Chhattisgarh	1.00
Shri Bajrang Power & Ispat Ltd	Urla, Raipur, Chhattisgarh	2.10
Shraddha Ispat Pvt. Ltd	Santona, Sanguem, Goa	1.28
Shyam Sel Ltd	Dewabdighi, Burdwan, West Bengal	1.00
Singhal Enterprises Pvt. Ltd	Taraimal, Bilaspur, Chhattisgarh	1.94
Sree Metaliks Ltd	Loidapada, Keonjhar, Odisha	1.74
S.K.S. Ispat & Power Ltd	Raipur, Chhattisgarh	2.70
Sunflag Iron & Steel Co Ltd	Bhandara, Maharashtra	1.50
Sunil Ispat & Power Ltd	IGC Siltara, Raipur, Chhattisgarh	1.15
Sunil Sponge Iron Ltd	Chiraipani, Raigarh, Chhattisgarh	1.05
Tata Sponge Iron (Ipitata Sponge)	Joda, Keonjhar, Odisha	3.90
Topworth Steel Pvt. Ltd	IGC Borai, Durg, Chhattisgarh	1.65
Vandana Global Ltd	IGC Siltara, Raipur, Chhattisgarh	2.16
Vallabh Steels Ltd	Sahnewal, Ludhiana, Punjab	1.20
Visa Steels Ltd	KIC, Jajpur Road, Odisha	3.00
Zoom Vallabh Steels Ltd	Dughda, Saraikela-Kharswan, Jharkhand	1.20

*I.G.C.: Industrial Growth Centre.*

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

### Finished Steel/Saleable Steel

Provisional data indicates a total finished steel consumption during 2011-12 at 65.61 million tonnes, as against 59.34 million tonnes in previous year. China has been an important export destination for Indian steel. Exports and imports are fluctuating.

Some significant facts on Indian steel industry 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 working group on steel for the 12th Plan has projected that crude steel capacity in the country is likely to be 140 million tonnes by 2016-17. NSP 2005 is presently under review and Ministry of Steel has formulated a Committee in May 2012 to review the existing National Steel Policy, keeping in mind the rapid development in the domestic steel industry as well as stable growth of Indian economy.
2. The total estimated volume of exports of finished steel increased to 4.04 million tonnes from 3.64 million tonnes and the imports increased to 6.83 million tonnes from 6.66 million tonnes.

The finished steel production for sale has grown from a mere 1.1 million tonnes in 1951 to 73.42 million tonnes in 2011-12. The growth in the steel sector in the initial decades since Independence was mainly in the public sector units set up during this period. The situation changed dramatically in the decade 1990-2000 with growth originating mostly in the private sector. Details about capacity and production of crude steel by main producers are furnished in Table-4.

### Public Sector

#### *Steel Authority of India Ltd (SAIL)*

SAIL, a public sector company, operates five integrated steel plants at Bhilai in Chhattisgarh, Bokaro in Jharkhand, Durgapur & Burnpur in West Bengal and Rourkela in Odisha. SAIL plants recorded crude steel production during the year 2011-12 of 13.06 million tonnes and 13.51 million tonnes during the year 2010-11.

SAIL plans to set up 3 million tonnes/year capacity steel plant in Mangolia & Indonesia, aiming to spread its wings beyond the country.

The assets of erstwhile Malvika Steel at Jagdishpur, district Sultanpur, Uttar Pradesh were acquired & registered by SAIL in June 2010 & SAIL is building a high-tech steel making facility at its Jagdishpur unit.

The expansion and modernisation programme of SAIL is underway at all its steel plants to

enhance the hot metal production capacity. The proposed production built-up is envisaged to go up to 23.5 million tonnes in a phased manner for hot metal and 21.4 million tonnes for crude steel and 20.2 million tonnes for saleable steel.

#### *Rashtriya Ispat Nigam Ltd (RINL)*

Rashtriya Ispat Nigam Ltd (Vishakapatnam Steel Plant), a public sector company, has the first shore-based integrated steel plant commissioned in 1992 at Vishakapatnam, Andhra Pradesh. The installed capacity for the production of liquid steel and saleable steel was over 3 million tonnes each. The expansion of RINL for enhancing liquid steel capacity to 6.3 million tonnes is over and commissioning of various project is underway.

#### *Neelachal Ispat Nigam Ltd (NINL)*

NINL, a joint venture company promoted by MMTC and Government of Odisha is the largest exporter of saleable pig iron from the country and supplier of LAM coke to most of the SAIL's plants. It has set up 1.1 million tpy integrated steel plant at Kalinganagar, Duburi, Jajpur district, Odisha. 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). NINL has its own captive iron ore mine which is under development with a 2.5 million tpy raw material handling system (RMHS).

### Private Sector

The private sector continued to play a dominant role in the production of steel and growth of steel industry in the country. The performance of major private sector producers is summarised below:

The private sector units consist of both major steel producers on one hand and relatively smaller & medium scale units such as sponge iron plants, mini-blast furnace units, electric arc furnaces, induction furnaces, re-rolling mills, cold rolling mills and coating units on the other. They not only play an important role in production of primary and secondary steel, but also contribute substantial value addition in terms of quality, innovation and cost effectiveness.

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

(In '000 tonnes)

Producer	Annual Installed (capacity (Crude/liquid steel)	Production	
		2010-11	2011-12(P)
<b>Public Sector</b>			
<b>SAIL</b>			
Bhilai Steel Plant, Bhilai, Dist. Durg, Chhattisgarh	4900	3574	3279
Rourkela Steel Plant, Rourkela, Dist. Sundergarh, Odisha	2200	1994	2041
Durgapur Steel Plant, Durgapur, Dist. Burdwan, West Bengal	1900	673	621
Bokaro Steel Plant, Bokaro, Dist. Bokaro, Jharkhand	3600	3344	3128
IISCO Steel Plant, Burnpur, Dist. Burdwan, West Bengal	300	328	219
Alloy Steel Plant; Durgapur Dist. Burdwan, West Bengal	200	51	46
Salem Steel Plant, Salem, Dist. Salem, Tamil Nadu	100	273	151
Visvesvaraya Iron & Steel Plant, Bhadravati, Dist. Shimoga, Karnataka	100	84	68
<b>Total : SAIL</b>	<b>13300</b>	<b>10321</b>	<b>9553</b>
<b>RINL</b>			
Visakhapatnam <sup>(e)</sup> Steel Project, Dist. Visakhapatnam, Andhra Pradesh	3000	2928	2928
<b>Total : Public Sector</b>		<b>13249</b>	<b>12481</b>
<b>Private Sector</b>			
Tata Steel Ltd, Jamshedpur, Dist. Singhbhum, Jharkhand	6800	5157	5450
JSW Steel Ltd, Vijayanagar, Karnataka	6800	7666	NA
JSW Ispat Steel Ltd, Dolvi, Maharashtra	3000	NA	NA*
ESSAR Steel Ltd, Hazira, Gujarat	4600	NA	NA
JSPL, Raigarh, Chhattisgarh	3000	1585	6149
<b>Other Producers</b>		<b>39349</b>	<b>9683</b>

Figures rounded off.

Source: Annual Reports of Ministry of Steel, 2011-12 and individual producers.

\* As per the Annual Report, JSW Ispat Steel Ltd reported 2679 thousand tonnes production during July 2011-June 2012 period (12 months).



***Tata Steel Ltd (formerly TISCO)***

The company has been rechristened as Tata Steel Ltd (TSL). Tata Steel is the world's 7th largest steel maker and has completed 100 years (10th December 2011) for its Jamshedpur Steel plant.

Tata Steel has an integrated steel plant having an annual crude steel production capacity of 6.8 million tonnes after its brownfield expansion in first phase located at Jamshedpur, Jharkhand, which was expected to increase further to 9.7 million tonnes by 2012-13.

The company has also embarked upon setting up various greenfield projects too. The project at Kalinganagar in Odisha envisages setting up of a 6 million tpy capacity integrated steel plant in two phases of 3 million tpy each. It is expected to commission the first phase of 3.5 million tonnes plant at Kalinganagar by March 2014. MoUs have been signed with the Government of Chhattisgarh to set up a 7.0 million tpy capacity steel plant at Jagdalpur in Bastar region of Chhattisgarh 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- Saraikela area. The plants are to be set up subject to raw material linkages and receipt of all approvals. Tata Steel by 2014 would have a global steel capacity of 33.5 million tonnes.

***JSW Steel Ltd***

Erstwhile, Jindal Vijayanagar Steel Ltd (JVSL) has conceived a technologically modern and efficient integrated steel plant of 6.8 million tpy capacity and is a part of US\$ 6.5 billion O.P. Jindal Group. The plant adopts a process route consisting broadly of iron ore beneficiation-pelletisation-sintering-coke making iron making through BF as well as Corex process, which entails steel making through BOF- continuous casting of slabs- hot strip rolling-cold rolling mills. JSW Steel Ltd has an installed crude steel capacity of 6.8 million tpy, which is being expanded to 9.6 million tonnes per year with value added products constituting 1.8 million tpy spread across four locations: Toranagallu (Vijayanagar Works), Salem (Salem Works), Vasind and Tarapur (downstream units). Vijayanagar works has

integrated operations from beneficiation plant to 0.9 million tpy Cold Rolling Mill Complex. The slabs and HR coil produced at Vijayanagar works are further processed in downstream units at Vasind and Tarapur into value added facilities: cold rolling (1.0 million tpy), hot dip galvanising (HDG) (0.9 million tpy), colour coating (0.1 million tpy), CRCA products (0.1 million tpy) and hot rolled plates (0.3 million tpy). 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. Vijayanagar 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.

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 capacity each 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. JSW Steel offers the entire gamut of steel products and it is one of the lowest cost steel producers in the world. By 2020, the company aims to produce 34 million tonnes annually.

SISCOL is merged with 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 plans to enhance the capacity of the plant located near Mettur, Tamil Nadu, from existing 0.3 million tpy to 2.0 million tpy on availability of iron ore. The company also intends to set up a one million tpy slag grinding unit.



***Jindal Steel & Power Ltd (JSPL), Raigarh***

The sponge iron plant at Raigarh, Chhattisgarh has capacity of 1.37 million tpy and 3 million tonnes tpy steel melting shop in addition to 2.5 lakh tpy capacity sinter plant, 8 lakh tpy coke oven plant and 12.5 lakh tpy blast furnace. This is the world's largest coal-based sponge iron facility. The crude steel capacity of JSPL is 3 million tpy with proposed expansion of capacity to 6 million tonnes at Raigarh, Chhattisgarh. A new steel shop (SMS-II) has been set up comprising two EAFs, a continuous caster, a billet caster, etc. Capacity expansion to 7 million tpy underway at Raigarh plant includes: 6 million tpy gas-based DRI plant (based on coal gasification), 4000 cu m blast furnace, 3 million tpy steel melting shop with EF route and 4 million tpy through BOF route along with 4 million tpy hot metal. Besides, thin slab caster, hot strip mill, cement plant (to consume BF slag) and additional 540 MW power plant are also planned. As a part of expansion, JSPL is setting up a 6 million tonnes integrated steel plant at Angul in Odisha and 6 million tonnes integrated steel plant at Patratu in Jharkhand. It is planned to implement these projects in phases. JSPL is setting up a 10 million tpy pellet plant at Barbil, Odisha utilising huge iron ore fines lying with various iron ore mines.

***Jindal Stainless Ltd***

The company has a fully integrated stainless steel plant at Hisar in Haryana with a largest capacity of 800,000 tpy. The ferro-alloys plant of the company is located at Jindalnagar, Kothavasala in district Vizianagaram, Andhra Pradesh. The plant has 40,000 tpy high carbon ferro-chrome capacity and caters to domestic markets and developed countries. The company is also setting up a greenfield integrated stainless steel plant at Kalinganagar in Jajpur district in Odisha for production of ferro-alloys and stainless steel. The project will comprise 1.6 million tpy fully integrated stainless steel plant, a 500 MW captive power plant and a coke oven battery. The production from ferro-chrome furnace has been stabilised.

JSW Steels Ltd is the largest private sector steel manufacturer, in terms of installed capacity and is one of the lowest cost steel producer in the world. By 2020, the company aims to produce 34 million tonnes of steel annually with greenfield integrated steel plants coming up in West Bengal and Jharkhand.

***Essar Steel Limited (ESL)***

The company has a 6.8 million tpy gas-based sponge iron plant at Hazira, Gujarat. The state-of-the-art hot-rolled coil (HRC) steel plant had a capacity of 10 million tpy. The complex also houses a cold-rolled coil plant of 1.4 million tpy capacity. The company has cold rolling plant of 0.6 million tonnes per annum capacity & 0.5 million tonnes per annum galvanising plant at Pune. It is the largest fully integrated manufacturer of high quality flat steel products in western India. The company enjoys an edge 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 combined annual cargo handling capacity of all terminals would be 150 million tonnes. The company has embarked upon procurement of DRI plant equipment, EAF with accessories, corex plant equipment, etc. from global suppliers with a view to expand present capacity. The company has proposed greenfield project capacity of 6 million tonnes, 3.2 million tonnes & 6 million tonnes in the states of Odisha, Chhattisgarh and Jharkhand, respectively. The construction of 12 million tonnes per annum pellet plant at Paradip, Odisha is being continued and the 6 million tonnes per year plant has become operational in April 2012. Post commissioning, the company will have a total pelletisation capacity of 20 million tonnes per annum as it already has 8 million tonnes per annum pellet plant at Vizag in Andhra Pradesh. The company has 8 million tonnes per annum iron ore beneficiation plant at Bailadila in Chhattisgarh, which supplies iron ore slurry through pipe line (267 km) to its pellet plant at Visakhapatnam (8 million tonnes per

annum) which in turn supplies pellets to steel plant at Hazira. The company also has 12 million tonnes per annum iron ore beneficiation plant at Dabuna in Joda-Barbil area in Odisha.

In January 2012, the company has completed its expansion project and achieved a production capacity of 10 million tonnes per annum at Hazira. This makes Essar Steel the fourth largest flat steel producer at single location globally & the largest in India.

### ***JSW Ispat Steel Ltd (formerly Ispat Industries Ltd)***

JSW Ispat Steel 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 company had recently commissioned 2.24 million tpy capacity sintering plant at Dolvi complex. The company has a total installed capacity of 14.3 million tpy. 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.

### ***Bhushan Power & Steel Ltd (BPSL)***

Bhushan Power & Steel Ltd, is a fully integrated 2.3 million tonnes per annum steel making company with state-of-the-art plants at Chandigarh, Derabassi, Kolkata and Odisha in the country. It has its first integrated Steel Plant in Sambalpur district of Odisha in operation with a total capacity of 0.68 million tpy DRI kilns; 0.70 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. The company has 38 MW powerplant and a coal washery.

The current configuration of Integrated Steel Plant at Odisha is to manufacture 2.30 million tpy steel through Blast Furnaces of 1008 m<sup>3</sup> of 0.70 million tpy, with sinter plant of 1.00 million tpy. DRI Sponge kilns of 1.40 million tpy, one coke oven plant of 0.45 million tpy, CSP plant (HR Mill) of 1.70 million tpy, wire Rod & Bar Mill of 0.45 million tpy and Billet caster. Presently, the company is manufacturing Sponge iron, Billets, Pig iron, HR Coils and CR coils/sheets in Odisha plant.

### ***Bhushan Steel Ltd***

The company was earlier known as Bhushan Steel and Strips Ltd, is engaged in steel making and processing and allied activities. Currently, the company is implementing an integrated steel plant with 3 million tpy capacity and will further enhance the steel capacity to 6 million tpy. The company is a source for vivid variety of products like cold rolled steel, galvanised coil & sheets, colour coated coils, Galume sheets & coils (Al-Zn coated first time in India), Billets, sponge iron, wire rod, etc. The company has three manufacturing units each at Sahibabad in Gaziabad district of Uttar Pradesh, Meramandali in Dhenkanal district, Odisha and at Khopoli in Raigad district of Maharashtra.

### ***Monnet Ispat & Energy Ltd (MIEL)***

The company is operating plant at Raipur in Chhattisgarh with 1.0 million tpy of finished steel and at Raigarh with 1.0 million tpy of sponge iron. The company is in the process of expanding its Raigarh Steel Complex to 3 million tpy. 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 greenfield 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 greenfield projects, viz, a 2 million tpy fully integrated steel plant in Angul, Odisha, where the work for Phase I is already under progress, and another one million tpy steel plant in Bokaro,

Jharkhand. These plants will enhance the capacity to 5 million tpy.

Performance of the EAF/IF industry is summarised below:

### **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 47 working units with 25.76 million tpy capacity and the production is reported at 18.54 million tonnes during 2011-12.

### **Induction Furnace**

There are about 1321 units during 2011-12 with an installed capacity of 31.02 million tpy which produced about 24.01 million tonnes steel in 2011-12.

### **Modernisation and Other Capital Schemes**

The Board of SAIL has given in principle approval 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. Other proposed expansions of hot metal capacities include: Bokaro - 7.44 million tpy; Rourkela - 4.50 million tpy; Durgapur - 3.50 million tpy; IISCO plant - 2.91 million tpy; and VISL - 0.33 million tpy.

### ***New Steel Projects***

The National Steel Policy announced in November 2005 is a basic blue print for the growth of a self-reliant and globally competitive steel sector with a long term objective to ensure modern and efficient steel industry of world standards, catering to diversified steel demand. Pohang Steel Company (POSCO) is setting up 12 million tpy capacity steel plant in Odisha. Final clearance and approval from the Environment Ministry was accorded in 2011 to the Government of Odisha to give 1,253 ha (3100 acres) of forest to POSCO for its plant, with a condition to regenerate an equal area of forest in an area decided by Odisha as well as paying for lands and ensuring the project

will not be detrimental to ecology & local livelihood. Other new steel plants for which MoUs have been signed, include: Kalinganagar, Odisha (6 million tpy); Bastar, Chhattisgarh (5 million tpy) and Manoharpur/Saraikella, Jharkhand (12 million tpy) of Tata Steel; Odisha (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 ₹40,000 crore mega steel project in Jharkhand and a similar project in Odisha. 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) company is operating 0.5 million tpy special steel plant, and 400,000 tpy coke oven plant at Kalinganagar, Jajpur, Odisha. 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 and 425,000 tpy iron plant at Kalinganagar, Jajpur district, Odisha. The company also has chrome ore beneficiation plant and chrome ore grinding plant of one lakh tpy capacity, each. Visa steel has signed an MoU with the Govt. of Chhattisgarh for setting up a 2.5 million tonnes integrated carbon steel plant at Kotarlia in Raigarh district. Land acquisition process is underway.

### ***National Mineral Development Corp. Ltd (NMDC)***

NMDC Ltd is a 'Navratna' public sector company under the Ministry of Steel, Govt. of India. Infrastructural works related to NMDC's iron & steel plant (NISP) near Nagarnar, Jagdalpur, Bastar district, Chhattisgarh are in progress. There was no agreement on contractual terms & conditions with TPE, Moscow for construction of Romelt shop based on Romelt technology. Action

## MINERAL-BASED INDUSTRIES

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, through a joint venture with Russia's Severstal. NMDC is in the process of expanding its business through forward integration in both Greenfield and Brownfield projects by setting up (a) 2.0 million tpy pellet plant at Nagarnar in Chhattisgarh (b) 1.2 million tpy pellet plant at Donimalai in Karnataka (c) 0.36 million tpy BHJ ore beneficiation plant at Donimalai, Karnataka. NMDC is in a process of securing mining leases for iron ore in the states of Jharkhand and Karnataka and also looking forward for leases/buying properties from foreign countries. Sponge Iron India Ltd has been merged with NMDC Ltd with effect from 1.7.2010.

### KIOCL Ltd

KIOCL Ltd (formerly Kudremukh Iron Ore Company Limited) was renamed with effect from 22.1.2009. In addition to its present 2.275 lakh tpy pig iron plant with 350 cubic meter, BF capacity at Panambur, New Mangalore port 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 partner for an integrated steel plant to be set up in Karnataka. The pellet plant operated at Mangalore has 3.5 million tonnes capacity and is now exporting iron ore pellets to China and for domestic units such as JSW Ispat Steel Ltd, SAIL, Rashtriya Ispat Nigam Ltd. After the mining was stopped at Kudremukh w.e.f. 31.12.2005, the pellet plant is being operated with hematite iron ore purchased from NMDC. The company also has plans to create permanent railway siding facility at Mangalore.

## FERRO-ALLOYS

The Indian Ferro-alloy Industry was established during the second Five-year plan as

an ancillary industry to cater to the growing needs of the domestic steel industry. As a de-oxidant and alloying agent, Ferro-alloys are in demand for crude steel & alloy steel production.

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 156 units (including three 100% export-oriented units) having an estimated annual installed capacity of over 5.15 million tonnes, against which the production in 2011-12 was about 3 million tonnes. The industry has already surplus capacity against the domestic demand. About 25 to 30% production is usually exported. India is an established regular exporter of silico-manganese and high-carbon ferro-chrome. The capacity and production of ferro-alloys are furnished in Tables - 5 and 6, respectively. The details about ferro-alloys are discussed in Ferro-alloys Review.

**Table – 5 : Capacity of Ferro-alloys Industry**

(In tonnes per annum)

Ferro-alloys	Units (No.)	Installed capacity
<b>Total</b>	<b>156</b>	<b>5150000</b>
<b>Bulk Ferro-alloys : Total</b>	<b>119</b>	<b>5100000</b>
Manganese alloys	64	3160000
Chrome alloys	26	1690000
Ferro-silicon	29	250000
<b>Noble Ferro-alloys : Total</b>	<b>37<sup>(e)</sup></b>	<b>50000<sup>(e)</sup></b>

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

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**Table – 6 : Production of Ferro-alloys  
2010-2011 and 2011-12**

(In tonnes)

Product	Production	
	2010-11(R)	2011-12(P)
<b>Total</b>	<b>2796913</b>	<b>3000397</b>
<b>Bulk Ferro-alloys : Total</b>	<b>2762918</b>	<b>2958784</b>
Ferro-manganese	402017	446733
Silico-manganese	1242139	1478403
Ferro-silicon	115164	127092
Ferro-chrome/Charge-chrome	1003598	906556
<b>Noble Ferro-alloys : Total</b>	<b>33995</b>	<b>41613</b>
Ferro-molybdenum	3090	4362
Ferro-tungsten	150	225
Ferro-vanadium	1521	2459
Ferro-silico-zirconium	118	130
Ferro-silicon-magnesium	19079	24452
Ferro-nickel-magnesium	237	272
Ferro-aluminium	7538	7393
Ferro-titanium	2172	2217
Ferro-boron	90	103

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

**Table – 7 : Capacity of Charge-Chrome Plants**

Plant	Location	Installed Capacity (tpy)
Ferro-Alloys Corp. Ltd	Randia, Dist. Bhadrak, Odisha.	65,000
Tata Steel Ltd	Bamniral, Dist. Kendujhar, Odisha.	55,000
Indian Charge Chrome Ltd	Choudwar, Dist. Cuttack, Odisha.	62,500
<b>Total</b>		<b>182,500</b>

## Bulk Ferro-alloys

### *Ferro-manganese and Silico-manganese*

Ferro-manganese is the most important ferro-alloy used in the steel industry. Total installed capacity of 31.60 lakh tonnes was in operation in the country. Out of these, 11 were major plants.

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.

Chandrapur Alloys Ltd (formerly Maharashtra Electros melt Ltd), a subsidiary of SAIL, (w.e.f 12.7.2011) situated in Chandrapur, Maharashtra, is a major producer of ferro-manganese and silico-manganese and other ferro-alloys for captive use of SAIL's plants in the country. The latest technological development being the state-of-the-art "layer casting technology for casting molten ferro-alloys and ferro-alloys processing unit (Crusher)," first of its kind in India.

### *Ferro-chrome and Charge-chrome*

The total combined capacity of ferro-chrome and charge-chrome is around 16 lakh tpy producing about 9.07 lakh tonnes of ferro-chrome/charge-chrome in the country. 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 182,500 tpy. All the three plants are 100% export- oriented units. FACOR is planning to set up a 500,000 tpy stainless steel plant to further integrate the present ferro-chrome production. Plantwise capacity of charge-chrome is given in Table-7. The 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 too. VISA steel has entered into a joint venture with Baosteel Resources Co. Ltd, forming a joint venture company, VISA BAO Ltd, to set up a 100,000 tpy ferro-chrome plant in Odisha in which VISA Steel is to hold 65% stake.

### *Ferro-silicon*

The capacity was 2.50 lakh tpy producing around 127 thousand tonnes of ferro-silicon in 2011-12.

Besides, ferro-alloys are also produced by small-scale units.



### Noble Ferro-alloys

Noble Ferro-alloys are one of the vital inputs required for producing special types of steel & alloy. The total capacity was 50,000 tpy 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-alloy, 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 the then Union Carbide Ltd (now Eveready Ltd) at Thane, Maharashtra, having a capacity of 2,500 tpy. 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 later one is closed due to uneconomic conditions. 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 at Dongri Buzurg had produced 805 tonnes EMD in 2010-11 and 714 tonnes EMD in 2011-12. 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 five companies with a total installed capacity of 1.856 million tpy in operation. NALCO, the only public sector company in aluminium & alumina segment has an installed capacity of 460,000 tpy at Angul. NALCO has signed an MoU with Odisha Industrial Infrastructure Development Corporation (IDCO) to set up an aluminium park at Angul in Joint Venture. The new joint venture company had been named "Angul Aluminium Park Ltd" and it

will set up an aluminium downstream & ancillary complex over an area of 200 acres. BALCO has an installed capacity of 3.5 lakh tpy at Korba. Three companies with four plants in the private sector have a total capacity of 12.56 lakh tpy in operation. One unit at Korba of BALCO and the plant of MALCO were not in operation, totalling 1.40 lakh tpy of non-operational capacity.

The production of aluminium in 2011-12 was 16.54 lakh tonnes. The information on installed capacity and production of aluminium in 2010-11 and 2011-12 is given in Table-8. The projected aluminium production at the end of 12th Plan period would be 4.7 million tonnes.

**Table – 8 : Capacity and Production of Aluminium, 2010-11 and 2011-12**

Producer	Annual Capacity	Production	
		2010-11	2011-12(P)
<b>Total</b>	<b>1905</b>	<b>1626</b>	<b>1663</b>
<b>Public Sector</b>			
National Aluminium Co. Ltd (Angul)	460	444	413
<b>Private Sector</b>			
Bharat Aluminium Co. Ltd	350*	253	247
Hindalco Industries Ltd	555	544	582
Madras Aluminium Co. Ltd	40#	-	-
Vedanta Aluminium Ltd (Jharsuguda)	500	385	421

*Figures rounded off.*

*Source: Information received from individual plants Annual Reports*

*\*Korba Plant-1 (BALCO) capacity of 100 thousand tonnes per year is non-operational.*

*# Plant is lying closed.*

Larsen & Toubro Ltd has plans to increase smelting capacity of their proposed aluminium plant in Odisha 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 alumina producers in the country, their capacities and production is given in Table-9. The production of alumina was 39.31 lakh tonnes in 2011-12. NALCO became one



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of the largest producers of alumina in Asia, with the expansion of alumina refinery capacity to 1.575 million tpy. With the second phase of expansion of alumina refinery by another 525,000 metric tonnes, the total capacity now stands at 2.1 million tpy. By 2014-15, in the 3rd phase of expansion, the capacity will be enhanced to 2.975 million tonnes.

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 viability report of the project has been prepared and formalities for acquiring land were in progress. The company has 50,000 tpy bauxite calcination at village Gadshisha in Gujarat.

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. The production of alumina by the end of 12<sup>th</sup> plan period is projected at 13.3 million tonnes.

**Table – 9 : Capacity and Production of Alumina, 2010-11 and 2011-12**

(In '000 tonnes)			
Producer	Annual Capacity	Production	
		2010-11	2011-12(P)
<b>Total</b>	<b>4885</b>	<b>3577</b>	<b>3931</b>
<b>Public Sector</b>			
National Aluminium Co. Ltd (Damanjodi)	2100	1516	1648
<b>Private Sector</b>			
Bharat Aluminium Co. Ltd	200#	Nil	Nil
Hindalco Industries Ltd	1500	1354	1355
Madras Aluminium Co. Ltd	85#	Nil	Nil
Vedanta Aluminium Ltd (Lanjigarh)	1000	707	928

*Figures rounded off.*

**Source:** Information received from individual plants/ Annual reports.

# Plants remained non-operational during the year.

### **National Aluminium Co. Ltd**

The present capacity of bauxite mines of 4.8 million tpy, is being expanded to 6.3 million tpy in 2nd phase expansion. Alumina refinery

capacity is augmented to 2.1 million tonnes per annum and smelter to 4.6 lakh tpy. The second phase of expansion of bauxite mines and alumina refinery to 6.325 million and 2.275 million tpy, by upgrading 4th line to 700,000 tonnes, respectively, is underway. The plant was in process of stabilisation. 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 captive power plant is being expanded from 960 MW to 1,200 MW. 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, with 42 lakh tpy bauxite capacity mines. NALCO proposes to build a 5 lakh tpy aluminium smelter and 1260 MW power plant near Brajarajnagar, Jharsuguda district, Odisha. NALCO is planning to set up one million tonne alumina refinery in Gujarat, based on supply of bauxite from Kachchh region by Gujarat Mineral Development Corporation. Preparation of detailed project report has been started. It has also signed MoU with Nuclear Power Corporation of India Ltd (NPCIL) for establishment of Nuclear Power Plant (two units of 700 MW each) at Kakrapar in joint venture mode in Gujarat. The construction work had already started and the project was scheduled to be commissioned by December, 2015. NALCO has also entered into new business of wind power generation with the establishment of 50.4 MW wind power plant at Gandikota in Andhra Pradesh and 47.6 MW plant is to be set up in Rajasthan and one more plant in NALCO's own mined out area at Panchpatmali in Koraput district, Odisha.

### **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. BALCO is now a private sector company with an integrated alumina/aluminium complex at Korba in Bilaspur district in Chhattisgarh. The company has two captive bauxite mines, one at Mainpat and other at Bodai Daldali. It operates alumina plant with 2 lakh tpy capacity based on Hungarian technology and aluminium smelter of one lakh tpy capacity. The work on expansion from 2.50 lakh tpy to 3.50 lakh tpy smelter capacity was completed along with 810 MW Captive Thermal Power Plant (CPP) with

## MINERAL-BASED INDUSTRIES

an average unit cost of about ₹ 1.55 which is one of the lowest in the industry. Work on the new 325,000 tpy aluminium smelter was in progress. 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 semi-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 of 550,000 tpy smelter project; and a 1,200 MW captive power project is underway.

### ***Hindalco Industries Ltd***

Hindalco Industries Ltd is Asia's largest integrated primary producer of aluminium, and a Mini Ratna Govt. of India Enterprise under the administrative control of the Ministry of Mines. With the completion of brownfield expansion, the capacity of Renukoot aluminium smelter is raised to 345,000 tpy, alumina refinery to 700,000 tpy. The Company has 55 kg per year capacity of gallium recovery at Renukoot. The Company has two captive power plants at Renusagar & Hirakud with total generation capacity of about 1109 MW. Hindalco is implementing 1.5 million tonnes capacity Alumina Project in Rayagada district, Odisha under the aegis of Utkal Alumina Limited, a joint venture with Alcan of Canada. The land & all the statutory clearances have been obtained and mining lease for bauxite was also obtained at Kodingamali. The 1.5 million tpy alumina refinery in Odisha is in an advanced stage of implementation. The company is planning a 359,000 tpy aluminium smelter near Bargawan in Sidhi district with 900 MW CPP in Mahan, Madhya Pradesh. The site work is in full swing. A coal block has already been allotted in joint venture with the Essar Power. The Jharkhand aluminium project with 359,000 tpy capacity smelter and a 900 MW power plant has started and land acquisition & environmental clearance process has begun. The company has applied for a coal block at Latehar. The company's Aditya Alumina & Aluminium Project with 1.5 million tpy alumina refinery at Kansariguda and 359,000 tpy aluminium smelter at Lapanga capacity along with 900 MW CPP is in progress.

All the business of INDAL, including Aluminium Foils Division at Kollur, Andhra Pradesh has been transferred by way of demerger

to Hindalco. The Company has completed expansion of Muri refinery from 110,000 tpy to achieve 450,000 tpy alumina capacity, with backward integration of new bauxite mines in Odisha and Jharkhand. The further augmentation of the smelting capacity at Hirakud to 1.61 lakh tpy was completed through Prebake technology. Further expansion to 213,000 tpy is continued. With the commissioning of the second 100 MW captive power plant at Hirakud, dependence on grid power is eliminated resulting in significant cost savings. Similarly, Belgaum refinery is to be expanded from 350,000 tpy to 650,000 tpy. However, the plans are on hold awaiting government approval relating to bauxite mines. Special alumina capacity at this plant is expanded to 138,000 tpy and is to be further raised to 316,000 tpy. The company produces approximately 120 grades of speciality alumina products.

### ***Vedanta Group***

The alumina refinery at Lanjigarh, district Kalahandi has 1.0 million tpy capacity and is located close to bauxite mines in Kalahandi district. It is expected to reach 5 million tpy capacity in near future. However, further work on the refinery expansion project at Lanjigarh has been put on hold as per the directives of the Ministry of Environment & Forests. The 500,000 tpy capacity smelter with a 9x135 MW coal-based captive power project at Jharsuguda in Sambalpur district was commissioned in May 2008. The company intends to fully integrate the aluminium smelting capacity to 2.6 million tonnes per year in near future. Pechiney Aluminium Engineering of France is the technical collaborator. The new 1.25 million tonnes per annum aluminium smelter in Jharsuguda and 325 thousand tonnes aluminium smelter at Korba are in progress.

### ***Ashapura Group***

Ashapura group is one of the significant global players in bauxite & bentonite. Ashapura Minchem will set up an alumina complex at Ratnagiri, Maharashtra. The project has been granted 'Mega Project' status by Maharashtra Government and the proposed project will have 5 lakh tpy alumina refinery and 1.5 lakh tpy aluminium smelter and a 330 MW captive power plant. The company plans to export alumina to Middle East countries.

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### Cadmium

Cadmium (99.95 min) is obtained as a by-product from zinc smelters of HZL at Debari, Visakhapatnam, Chanderiya and of BZL, Binanipuram. These together have an annual capacity of 913 tonnes. These are casted in the form of pencils weighing from 250 g to 500 g. The capacity and production of cadmium are furnished in Table-10.

**Table – 10 : Capacity and Production of Cadmium**

Producer	Annual capacity	Production	
		(In tonnes)	
		2010-2011	2011-12(P)
<b>Total</b>	<b>913</b>	<b>550</b>	<b>449</b>
HZL	833	493	392
Binani Zinc Ltd	80	57	57

### Copper

HCL, a public sector company, was the only integrated primary refined copper producer till 1997. The other two producers of primary copper now are Hindalco Industries Ltd and Sterlite Industries of Vedanta Group, having annual capacities of 500,000 tonnes and 400,000 tonnes of refined copper, respectively. The total installed capacity is thus 1,001,500 tpy. The other two smelters of Metdist and Jhagadia Copper Ltd (formerly SWIL) had total capacity of 2 lakh tpy. Details regarding capacity and production are given in Table-11.

Production of refined copper (cathodes) in 2010-11 and 2011-12 was 512,120 tonnes and 504,680 tonnes (provisional), respectively.

**Table – 11 : Capacity and Production of Copper**

Producer	Annual capacity	Production*	
		(In '000 tonnes)	
		2010-11	2011-12(P)
<b>Total</b>	<b>1001.5</b>	<b>512.12</b>	<b>504.68</b>
Hindustan Copper Ltd**	51.5	13.65	18.20
Sterlite Industries (India) Ltd	400	162.71	156.43
Hindalco Industries Ltd	500	335.76	330.05
Jhagadia Copper Ltd (formerly SWIL)	50	-	-

Figures rounded off.

\* Relates to Copper cathodes.

\*\* Metal capacity. However, the cathode capacity of HCL is 49,500 tonnes.

As per the Working Group report the future copper demand by 2015-16 is projected at 1.2 million tonnes as against projected production of 1.35 million tonnes of refined copper at GDP growth rate of 8%.

### *Hindustan Copper Ltd*

Hindustan Copper Ltd is a Mini Ratna Govt. of India Enterprise under the administrative control of the Ministry of Mines. Copper is produced at two smelters of HCL at Indian Copper Complex (ICC), Ghatsila, East Singhbhum district in Jharkhand and Khetri Copper Complex (KCC), Khetrinagar, Jhunjhunu district Rajasthan. The aggregate capacity of the two smelters for copper cathode production is 51,500 tpy. Refinery at ICC also has a Wire Bar Casting Plant with a capacity of 8,400 tpy and a Brass Rolling Mill for manufacturing brass sheets by using copper produced at ICC. The aggregate installed capacity of wire bars is 39,400 tpy and wire rod capacity is 60,000 tpy at HCL. It has also a precious metal recovery plant for the recovery of gold, silver, selenium, tellurium and nickel sulphate and copper sulphate at Ghatsila. Trials are also going on for recovering cobalt, nickel & copper powder from converter slag. A pilot plant with a capacity to produce one tonne nickel cathode per month was also set up at ICC. The plant is currently being scaled up to a production capacity of 5 tonnes per month of nickel cathodes. The company has prepared action plan to expand its mining capacity from existing level of 3.4 million tonnes/annum to 12.4 million tonnes per annum by 2016-17.

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

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

## MINERAL-BASED INDUSTRIES

### ***Sterlite Industries (India) Ltd (SIIL)***

It is India's largest non-ferrous metals and mining company with interests and operations in aluminium, copper, zinc, lead & power. The smelter and refinery of Sterlite Industries (India) Ltd are located at Thoothukudi in coastal belt of Tamil Nadu and Silvassa, Dadra & Nagar Haveli and has a total installed capacity of 4 lakh tpy each. The unit is based on 'ISASMELT' technology from MIM, Australia, using imported concentrates. A Cathode Refinery of 205,000 tpy capacity and 90,000 tpy Copper Rod Plant have been built at Thoothukudi with a view to making exports from the nearby port. The 180,000 tpy copper cathode refinery of Sterlite is located in Chinchpada at Silvassa in the Union Territory of Dadra & Nagar Haveli for catering to domestic market along with a 150,000 tpy rod mill. The copper anodes at Sterlite are refined into cathodes at Silvassa for domestic markets, while anodes are refined to cathode at Thoothukudi 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 Rods (CCR) in India. The CCR plants have total annual capacity of 268,000 tpy. The company has sulphuric acid plant of 1.3 million tpy and phosphoric acid plant of 230,000 tpy.

### ***Hindalco Industries Ltd (Birla Copper)***

The company's three copper smelters located at Dahej, Lakhigam, Bharuch district, Gujarat has an installed capacity of 500 thousand tpy. The copper operations consist of producing copper through smelting, refining copper from imported copper concentrates and converting refined copper cathode into continuous cast rod. It is now one of the world's largest smelters at a single location. It is based on Outokumpu technology. The company also produces continuous cast copper rods (CCR) with an annual capacity of 97,200 tonnes. In the process of extraction of copper metal, by-products 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), silver (150 tpy) and selenium. 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 secondary route. It is located at Jhagadia in Bharuch district, 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. It started operations and had not produced copper cathodes in 2010-11 and 2011-12. The precious metals like gold, silver, platinum, palladium, etc. were also recovered as part of anode slime during refinery. The refinery is based on ISA-Technology from Mount ISA Mines Ltd, Australia.

### **Recycling of Copper**

As per the estimates made in the recently published Market Survey on Copper by IBM, production of 106,573 tonnes of copper has been reported as secondary copper in the organised sector.

### **Lead**

The total installed capacity of lead smelting was 185,000 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 May 2003 due to economic non-viability. The total production of primary lead in the country in 2010-11 and 2011-12 was 57,294 tonnes and 92,100 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.

## MINERAL-BASED INDUSTRIES

### Zinc

India has a total installed zinc capacity of 917,000 tpy distributed between HZL smelters at Debari, Visakhapatnam, Chanderiya, Dariba and Binani Zinc Ltd's (BZL) plant at Alwaye in Kerala. HZL's Dariba hydro-zinc smelter with 210,000 tpy capacity was commissioned in March 2010. BZL has an annual installed capacity of 38,000 tonnes zinc along with 80 tonnes cadmium and about 53,000 tonnes sulphuric acid.

Debari and Vizag zinc smelters of HZL have a capacity of 88,000 tpy and 56,000 tpy, respectively. The primary product of Debari and Vizag smelter is high grade zinc and recovery of cadmium as by-product. Chanderiya smelter complex with a total capacity of 525,000 tpy 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: 518 tonnes silver, 740 tonnes cadmium ingots, 2,100 tonnes copper cathode and 1.74 million

tonnes 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. The domestic production of zinc ingots by HZL in 2010-11 and 2011-12 was about 740,000 tonnes and 784,000 tonnes, respectively.

Besides, there are secondary zinc producing units in unorganised sector with capacity of 45,000 tpy. However, production related data from these units is not available.

The data on total capacity and production of primary lead and zinc in 2010-11 and 2011-12 are furnished in Table-12.

As per the Working Group report for 12th Five Year Plan of Planning Commission, the total demand for zinc and lead in India by 2016-17 is projected as 880,000 tonnes and 568,000 tonnes, respectively.

**Table – 12 : Capacity and Production of Primary Lead and Zinc Ingots**

(In tonnes)

Producer	Lead capacity (tpy)	Production		Zinc capacity (tpy)	Production	
		2010-11	2011-12(P)		2010-11	2011-12(P)
Hindustan Zinc Ltd	185,000	57294	92100	879000	712471	758717
Binani Zinc Ltd	–	–	-	38000	27931	24930
<b>Total</b>	<b>185,000</b>	<b>57294</b>	<b>92100</b>	<b>917000</b>	<b>740402</b>	<b>783647</b>

*Source: Annual Report, HZL, 2010-11 and 2011-12.*



**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 belt discs, wheels, sheets, blocks, rods & loose grains. A large number of units exist in unorganised sector. However, important producers of coated abrasives are Grindwell Norton Ltd, Mora, Uran, Raigad district, Maharashtra; Flexoplast Abrasives (India) Ltd, Aurangabad, Maharashtra; Associated Abrasives Ltd, Nashik, Maharashtra; Carborundum Universal Ltd, Chennai, Tamil Nadu; Cutfast Abrasives Tools Pvt. Ltd, Chennai, Tamil Nadu; John Oakey and Mohan Ltd, Gaziabad, Uttar Pradesh. Important producers of bonded abrasives (grinding wheels) are Associated Abrasives Ltd, Nashik, Maharashtra; Carborundum Universal Ltd, Chennai, Tamil Nadu; Cutfast Abrasives Tools Pvt. Ltd, Chennai, Tamil Nadu and K. L. Thirani & Company Ltd, Kolkata, West Bengal.

**Silicon Carbide**

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

**CEMENT**

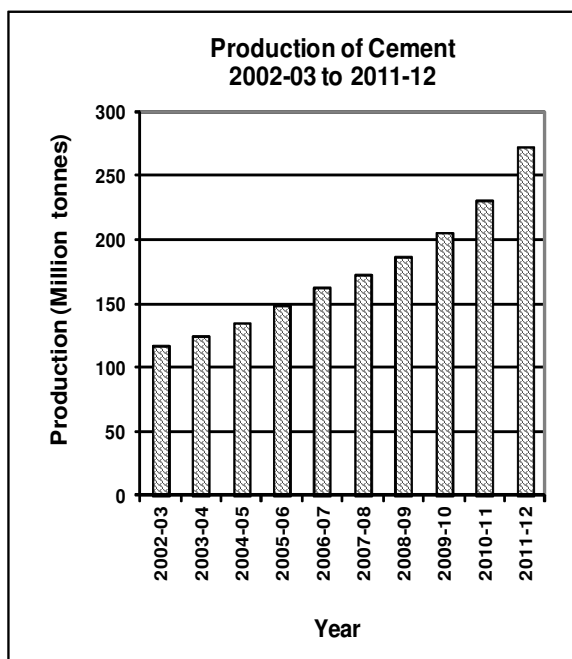
Cement, which is a key infrastructure industry, recorded an exponential growth with the introduction of partial decontrol in 1982 culminating in total decontrol in 1989 and delicensing of the industry and policy reforms in 1991. India is the second largest manufacturer of cement in the world. In 2011-12, the cement industry comprised 171 large cement plants with an annual installed capacity of about 296.5 million tonnes. There were about 350 operating mini/white cement plants with an estimated capacity of about 11 million tonnes per annum. Thus, total installed capacity of cement in the country is about 300 million tonnes per annum. Three cement plants having total capacity of 990,000 tpy and producing

white cement were also functional. Most of these capacities are modern and based on the energy efficient dry process technology. The number of plants and capacity is more in southern region (Andhra Pradesh, Tamil Nadu, Karnataka and Kerala) of the country. Cement Corporation of India Ltd (CCI), a Central Public Sector undertaking is operating three units at Bokajan, Rajban and Tandur units, the rest 7 are non-operational due to various reasons. The company was revived in light of public sector policy under National Common Minimum Programme (NCMP) and restructuring/revival plan approved by the Government is under implementation. Technology upgradation of Tandur unit and expansion of Bokajan has been taken up for implementation as a part of the sanctioned scheme. There were 5 large cement plants owned by various State Government Undertakings. There were as many as 112 plants with a million tonnes or more capacity. The total estimated production of cement (all kinds) in 2011-12 was about 230.6 million tonnes, including about 6 million tonnes from mini and white cement plants. The cement industry has thus recorded a positive growth. JSW Cement is having 0.7 million tpy grinding facility to produce Portland Slag Cement (PSL) and Granulated Blast Furnace Slag (GBS) adjacent to JSW Cement plant, Vijaynagar, Bellary district of Karnataka.

The Cement Industry produces a variety of cement to suit a host of applications. Cement Industry which was branded as a highest polluter of environment, now meets better pollution standards and contributes to environmental cleanliness by consuming fly ash from thermal power plants and slag produced by steel manufacturing units.

The Working Group on Cement Industry constituted by Planning Commission for the 12th Plan period has projected a demand growth for cement at the rate of 10.75% per annum based on expected 9% GDP growth rate. The additional cement capacity requirement during 12th Plan is projected as 139.7 million tpy by 2017. The annual capacity and production of cement by the end of 12th Plan are estimated at 479.3 million tonnes and 407.4 million tonnes, respectively, with 85% capacity utilisation.





## ASBESTOS-CEMENT PRODUCTS

The installed capacity of asbestos-cement pressure pipes in the organised sector was 149,640 tpy. Production capacity of asbestos cement sheets was not available. The production of asbestos-cement sheets and accessories in 2010-11 was about 2.43 million tonnes and that of asbestos-cement pressure pipes was about 149.6 thousand tonnes during the same period. Data for 2011-12 was not available.

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 Reddi 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, Thrissur district, Kerala; Konark Cement and Asbestos Industries Ltd at Bhubaneswar in Odisha; Shri Digvijay Cement Co.

Ltd, Digvijaynagar, Ahmedabad in Gujarat; Uttar Pradesh Asbestos Ltd, Mohanlalganj, Lucknow district, Uttar Pradesh; Assam Asbestos Ltd, Bonda, Narangi, Guwahati district, Assam; Utkal Asbestos Ltd, Dhenkanal in Odisha 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 Bareli in Uttar Pradesh produced only asbestos pressure pipes.

## REFRACTORY INDUSTRY

Steel industry comprises the biggest group of customers for this industry, which consumes about 70-80% of total refractory production, 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. Bharat Refractories Ltd (BRL), a Govt. of India Undertaking, having four units and engaged in the manufacture & supply of various kinds of refractories not only to the integrated steel plants but also to the smaller steel plants is being merged with SAIL with some major relief and concessions. The Salem Refractory Unit of Burn Standard Co. Ltd (BSCL) became a wholly owned subsidiary of SAIL w.e.f. December 16th 2011. The Unit has now been named as SAIL Refractory Co. Ltd (SRCL).

With the modernisation and renovation of the steel plants, requirements for various types of refractories have undergone revolutionary 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 special refractories has brought down the consumption of refractories per tonne of steel production. However, the customers are benefited by way of improved performance, lower shut down time and savings on energy. 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/tonne of crude steel as compared to 6-8 kg/tonne of crude steel in advanced countries.

The price and supply of imported raw materials are subjected to international demand and supply situation and most of the refractory makers are completely dependent on imported raw materials, especially for making high-end products.

IRMA has entered into a formal collaboration with JPC for making demand forecast of refractories as well as crude steel as a part of 12th Five Year Plan for Steel & Allied Industries. The estimated annual installed capacity of different kinds of refractories and production is given in Table-13.

TRL Krosaki refractories Ltd, has commissioned a state-of-the-art new Taphole clay plant of 18,000 tpa capacity at Belpahar in Odisha. The plant will produce both tar-based/resin based clay for blast furnaces.

**Table – 13 : Annual Installed Capacity and Production of Refractories, 2011-12 (By Types)**

Refractory item	Annual capacity	Production	
		2010-11	2011-12
Firebricks refractories	560	322	316
High alumina refractories	554	315	350
Silica refractories	58	67	63
Basic refractories	454	235	242
Special products	46	54	61
Others (incl. Monolithics)	343	352	383
<b>Total</b>	<b>2015</b>	<b>1345</b>	<b>1415</b>

*Source: Indian Refractory Makers' Association (IRMA) journal.*

## CERAMIC & GLASS INDUSTRY

### Ceramic Industry

Ceramic industry in India is about 100 years old. India ranks 5th in world in terms of production of ceramics and 445 million sq metres of ceramic tiles were produced in 2011-12 as against global production of 9,000 sq m. Ceramic products are made from clay and felspar and are manufactured in large and small-scale sectors with wide variations in type, range, quality and standard. Ceramic items have properties, such as glassy smooth finish, high thermal shock resistance, poor thermal 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 major industries include Kajaria Ceramics, Somani Ceramics, Asian Granite India, Orient Ceramics & Industries, Nitco, Regency Ceramics, Euro Ceramics, Bell Ceramics, etc. The per capita consumption of ceramic tiles in the country was about 0.3 sq m compared to 2 sq m in China & 5-6 sq m in Europe. Ceramics Technological Institute (CTI), Bengaluru, a National Level Institute for R & D in BHEL has an objective to support the Indian Ceramic industry in modernising its technology and to develop new products of advanced ceramics. Areas of research are nano-technology, separation technology, microwave processing, etc.

### 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 third in the world in production of ceramic tiles. India produced 600 million sq m of glazed tiles/ceramic tiles in 2011-12. There were 16 units in the organised sector with an installed capacity of 21 lakh tonnes accounting for about 2.5% of world ceramic tile production besides about 200 units in SSI sector. The domestic ceramic tile industry has been growing at about 15% per annum. Indian tiles are

competitive in the international market and are being exported to East and West Asian countries. Both traditional methods of manufacturing (tunnel) and the latest single fast firing methods are deployed in manufacturing.

### ***Sanitaryware***

Sanitarywares 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 around 210 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. The major industries include Hindustan Sanitary Industries Ltd, Roca Bathroom Products, Cera Sanitaryware, Neycer India, etc.

### ***Potteryware***

Potteryware is an age old handicraft in the country signifying crockery and tableware, 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 1,400 plants with a capacity of 3 lakh tpy. Out of these, over 600 units are located in Uttar Pradesh.

### **Glass Industry**

Glass industry is delicensed and manufacturing units are spread all over India. The large-scale producers are located mostly at Mumbai, Kolkata, Bengaluru, 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. There is considerable scope in demand for glass fibre products, particularly due to growth in petrochemical sector, solar products, packaging industry and allied products. Glass industry in India remained in the form of cottage industry till the beginning of 20th century. First glass plant in India was set up in August 1908 by freedom fighter 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, glass city of India continues to be a place of master craftsmen and entrepreneurs, manufacturing a wide 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 major players include Saint-Gobain Glass India, Asahi India Glass, Gujarat Guardian, Alembic glass Industries Ltd, etc.

The per capita consumption of glass in India is about 0.4 kg, compared to 3.5 kg in a country like 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 hollow-ware, tableware, flat glass (including float, sheet, figured, wired and safety, mirror glass), vacuum flasks, refills, laboratory glassware, fibre glass, hollow-ware containers, etc.

### ***Glass Container and Hollow-ware***

Presently, 43 units in the organised sector are engaged in the manufacture of glass containers and hollow-wares, with an installed capacity of around 15 lakh tonnes per year. Glass containers are ideal packaging medium, but are being replaced by other packaging materials like plastic, PET, aluminium and tetrapack. The per capita consumption of container glass in India is 1.4 kg compared to 27.5 kg in USA & 10.2 kg in Japan. The major producers include Hindustan National Glass & Industries, Piramal Glass, Haldyu Glass Gujarat, La Opala RG, Mohan Meakin, Gujarat glass, Associated Glass Industries (AGI), etc. Out of these, there are 8 float glass lines with total installed capacity of 4700 tonnes/day.

### ***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***

Silica sand, dolomite, limestone are some of the mineral ingredients used in flat glass. The term flat glass includes float glass, sheet glass or plate glass, figured and wired glass. These are further processed into mirror, toughened glass, laminated glass, double glazing, etched glass, glass door, etc. Thirteen units in flat glass sector had a total production capacity of 135 million sq m. Out of these, there are 8 float glass lines with total installed capacity of 4700 t/day. Hindustan National Glass and Industries Ltd, (HNG) is setting up a new plant at Naidupeta in Andhra Pradesh and expanding its capacity at its Nashik (Maharashtra) plant to add 1000 t/day capacity by December, 2014 from its existing capacity of 3000 t/day. The major consumers are Architectural (85%), Automotive (10%). The per capita consumption of float glass in India is 0.88 kg as against 12 kg in China, 9 kg in Thailand, 13 kg in Malaysia, 4 kg in Indonesia. There has been growing acceptability of the Indian flat glass products in the global market.

***Vacuum Flasks and Refills***

There were eight units in the organised sector for the manufacture of vacuum flasks and refills, with an installed capacity of 36 million numbers per annum.

***Fibre Glass (Glass-reinforced plastic)***

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

**GRANITE INDUSTRY**

Granite is used in monuments, building slabs, tiles, surface plates, etc. Over 160 varieties of granite with exotic colours/shades 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 under Section 3(e) of MMDR Act, 1957, and as per Section 15 of MMDR Act, 1957, all powers to make rules and grant of Mineral Concessions for minor minerals have been given to the concerned State Government. Granite Conservation and Development Rules, 1999 were notified separately on 1.6.1999 for ensuring systematic/scientific exploitation and conservation of granite resources of the country.

Granite is a non-scheduled industry and the processing of granite is an age-old phenomenon started in 1930s. The mining and processing techniques of granite adopted in the country have improved over the years. 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 granite exports during 2011-12 was 4.6 million tonnes as against 4.5 million tonnes in 2010-11. Aro Granite Industries, Pokarna Tamil Nadu Minerals, Madhav Marbles & Granites Limited are some of the major players.

**CHEMICALS****Caustic Soda (Sodium hydroxide)**

Caustic soda is a basic inorganic chemical prepared by electrolysis of salt brine and 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 of caustic soda in 2011-12 was 3.246 million tonnes. The major Indian producers are Gujarat Alkalies & Chemicals, Grasim Industries, DCM Shriram Consolidated, DCW, Reliance Industries, Aditya Birla Chemicals (India), etc. NALCO is also proposing caustic soda plant of 2 lakh tonnes per annum capacity at Dahej, Gujarat in joint venture with Gujarat Alkali and Chemicals Ltd, (GACL).

### 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, metallurgical industries and desalination plants and in the preparation of a host of chemicals. Soda ash is an essential ingredient in the manufacture of detergent, soap, sodium salts and dyes. The major soda ash producers are Tata Chemicals, Gujarat Heavy Chemicals Ltd, Nirma, Saurashtra Chemicals, DCW, etc. The manufacture of soda ash in India started in 1932 at Dhrangadhra in Gujarat with installed capacity of 50 tpd.

### Bleaching Powder (Chlorinated lime)

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

### Calcium Carbide

Calcium carbide is used in the manufacture of acetylene gas for rubber, synthetic and plastic industry. It is also used as a raw material for manufacturing various rubber goods. It is self-reinforcing filler. It is also used for cutting & welding of metals.

### 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. However, no production has been reported since 2004-05 onwards. Jhagadia Copper Ltd (formerly SWIL Ltd) has plans to recover nickel sulphate at its copper metal plant at Jhagadia, Bharuch district, Gujarat. Tuticorin plant of sterlite has developed innovative method to produce pure commercial grade nickel sulphate from electrolyte by solvent crystallisation. The pilot-scale trials are in progress.

### Synthetic Cryolite ( $\text{Na}_3\text{AlF}_6$ )

Navin Fluorine Industries, Bhestan, Gujarat, is an important producer of synthetic cryolite. Other producers are Tanfac Industries Ltd, Cuddalore, Tamil Nadu; (Aditya Birla Group) and

Adarsh Chemicals and Fertilizers Ltd, Udhna, Gujarat. GMDC, Gujarat has 500 tpd fluorite beneficiation plant at Village Kadipani to produce 96%  $\text{CaF}_2$  Acid grade & 90%  $\text{CaF}_2$  metallurgical grade concentrate. The acid grade finds use in Aluminium fluoride, synthetic rutile & fluorine chemicals.

### 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 Thoothukudi, Tamil Nadu. Important units producing aluminium fluoride were Navin Fluorine Industries, Maya Rasayan Ltd, Mumbai, Tanfac Industries Ltd, SPIC and Aegis Chemical Industries Ltd. The total production of aluminium fluoride in 2011-12 was about 7300 tonnes against an installed capacity of about 27 thousand tpy.

### Titanium Dioxide

Four plants have reported an installed capacity of 243 thousand tpy to produce synthetic rutile, while other four plants have total installed capacity of about 75 thousand tpy to produce titanium dioxide pigment. Production of titanium dioxide pigment was estimated at 50 thousand and 52 thousand tonnes, respectively, during 2010-11 and 2011-12. IREL has not reported synthetic rutile production in recent years. Production of  $\text{TiO}_2$  pigment by VVTi Pigments during 2010-11 is also not available. IREL has now initiated process to set up a 10,000 tpy titanium sponge plant at OSCOM, Odisha. KMML has set up a 500 tpy sponge plant with DMRL technology in 2011. The installed capacity and production of synthetic rutile/ titanium dioxide pigment during 2009-10 to 2011-12 is given in Table-14.

### 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.



MINERAL-BASED INDUSTRIES

**Table –14 : Installed Capacity and Production of Synthetic Rutile/Titanium Dioxide Pigment, 2009-10 to 2011-12**

(In tonnes)

Plant	Location	Specification	Installed capacity (tpy)	Production		
				2009-10	2010-11	2011-12
<b>Total</b>			<b>243000</b> (Synthetic rutile)	<b>70584</b>	<b>80936</b>	<b>75331</b>
			<b>84600</b> (TiO <sub>2</sub> Pigment)	<b>64108</b>	<b>64393</b>	<b>54768</b>
IREL	Orissa Sands Complex, Distt. Ganjam, Odisha.	90.5% TiO <sub>2</sub> (min)	100000 (Synthetic rutile)	-	-	-
KMML	Chavara, Distt. Kollam, Kerala.	92%-93% TiO <sub>2</sub>	40000@ (TiO <sub>2</sub> -Chloride Process)	35931	36879	29117
DCW Ltd	Sahupuram, Distt. Thoothukudi, Tamil Nadu.	95% TiO <sub>2</sub>	48000 (Synthetic rutile)	36384	44761	47331
CMRL	Edayar, Distt. Ernakulam, Kerala.	96.5% TiO <sub>2</sub>	45000 (Synthetic rutile)	34200	36175	28000
TTPL	Kochuveli, Distt. Thiruvananthapuram, Kerala.	97.5% TiO <sub>2</sub>	16000 (TiO <sub>2</sub> -Sulphate Process)	15273	15749	12701
VVTi Pigments Pvt. Ltd* (formerly Kilburn Chemicals)	Thoothukudi, Tamil Nadu.	98% TiO <sub>2</sub> (min)	25000 (TiO <sub>2</sub> -Sulphate Process)	12460	11441	12122
Kolmak Chemicals Ltd	Kalyani, Distt. Nadia, West Bengal.	NA	3600 (TiO <sub>2</sub> -Sulphate Process)	444	324	828

*Source: Department of Atomic Energy, Mumbai and individual companies.*

*Note: KMML captively consumes synthetic rutile while CMRL and DCW export synthetic rutile.*

*\* Including kilburn chemicals. @ Under expansion to 60,000 tpy capacity.*

## Phosphoric Acid

RSMML has put up a beneficiation plant for processing 9 lakh tonnes of low grade ore per annum at Jhamarkotra, Rajasthan. Important units producing phosphoric acid of various grades such as pharma grade, food grade, technical grade, analytical reagent grade, etc. were Gujarat State Fertilizer Company, Vadodara, Gujarat; Fertilizers and Chemicals Travancore Ltd (FACT), Udyogmandal, Kochi, Kerala; Sterlite Industries India Ltd (Vedanta); HCL, Khetri, Rajasthan; HZL, Udaipur, Rajasthan; Southern Petrochemical Industries Corp. Ltd, Thoothukudi, Tamil Nadu; EID Parry (India) Ltd, Ennore, Tamil Nadu; Star Chemical Ltd, Mumbai, Haldia, West Bengal; Ballarpur Industries Ltd, Karwar, Karnataka; Hindalco Industries Ltd, Dahej, Gujarat; and Paradeep Phosphates Ltd, Paradeep, Odisha. Some of the important uses are in the manufacture of phosphatic fertilizers, agricultural feed, waxes, polishes, soaps and detergents, waste water treatment, tea-leaf processing, sugar refining, anodising & stabilising agent.

## Ferro-phosphorus (FeP)

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

## Red Phosphorus

Star Chemicals (Bombay) Pvt. Ltd and United Phosphorus Ltd, Gujarat are the leading manufacturers and suppliers of the red phosphorous in the country, mainly consumed in the match industry for making strike plate of match box. Besides, it has applications in agriculture industry as fumigant, making pesticides, phosphoric acid, semi-conductors and also as flame retardant for polymers. It is also used in pharmaceuticals for synthesis of drugs. The production level was estimated at 500 tonnes in 2010-11 as against the installed capacity of 1700 tonnes.



## Borax

Borax is used as a component of glass, ingredient in enamel glazes, pottery & ceramics. Borax was manufactured by Borax Morarji Ltd, Ambarnath, Maharashtra. The plant has an installed capacity of 25,000 tpy borax and 8,000 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. Indo-Borax & Chemical Ltd also operates borax and boric acid plants at Pithampur, Madhya Pradesh. The capacity of the plant, however, is not available. As a thumb rule, for one tonne production of boric acid, about 2 tonnes of boro-gypsum is produced. However, boro-gypsum requires ready market for its disposal.

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

## CHEMICAL FERTILIZERS

There are 56 large size fertilizer units in the country manufacturing a wide range of nitrogenous, phosphatic and complex fertilizers. 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 installed capacity of chemical fertilizers in terms of nitrogen (N) and phosphatic ( $P_2O_5$ ) nutrients was 12.06 million tpy and 5.66 million tpy, respectively, as on 31.3.2012 (Table-15). 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 Basin. 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 5 to 10% 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.

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

Sector/Nutrient	Capacity as on 31.3.2012	Production ('000 tonnes)	
		2010-11	2011-12(e)
<b>Nitrogen (N)</b>	<b>12061</b>	<b>12175</b>	<b>12577</b>
Public sector	3498	3167	3234
Co-operative sector	3169	3459	3486
Private sector	5394	5531	5857
<b>Phosphates (P)</b>	<b>5659</b>	<b>4223</b>	<b>4432</b>
Public sector	433	227	249
Co-operative sector	1713	1288	1366
Private sector	3513	2708	2817

*Figures rounded off individually.*

*Source: Ministry of Chemicals and Fertilizers, Deptt. of Fertilizers, Annual Report, 2011-12.*

## MINERAL-BASED INDUSTRIES

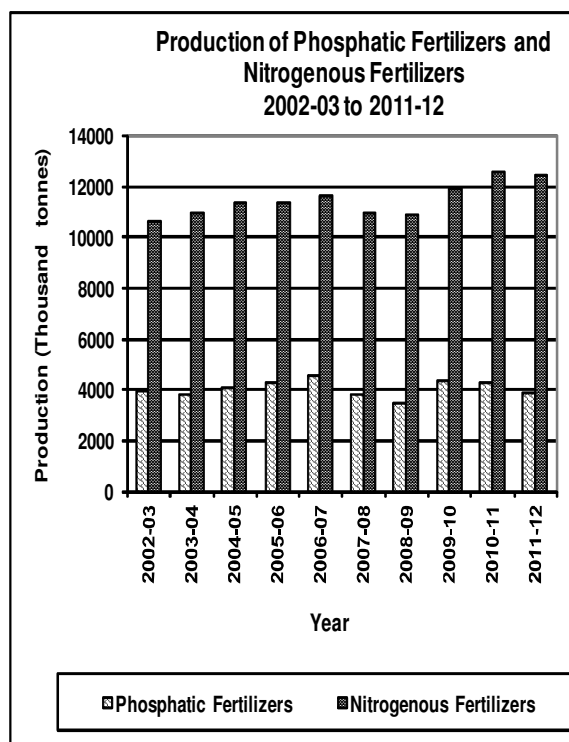
Out of the 56 large plants, 30 units produced urea, 21 units produced diammonium phosphate (DAP) and complex fertilizers, 9 units produced ammonium sulphate (AS) as by-product. Besides, 5 units produced calcium ammonium nitrate (CAN) and other low analysis straight nitrogenous fertilizers (Table-16). Besides, there were 72 small and medium-scale units in operation, producing single superphosphate (SSP).

### Paper & Paper Board Industry

The Indian paper industry is among the top 15 global players with a projected demand of 14 million tonnes by 2015-16. 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. Paper industry is based on 30% by wood & chemical based industry, 32% by agro-residue and the remaining by recycled fibre based industry. The production of paper and paper board is estimated at approximately 8 million tonnes for the year 2011-12. As a thumb rule, in paper industry, cost of energy is nearly 25% of cost of production and hence, energy management is an important aspect in paper industry. Import of pulp and paper products is likely to show a growing trend. 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 and also play vital role in quality control.

### PAINT & ALLIED PRODUCTS INDUSTRY

The paint & allied products industry comprises paints, enamels, varnishes, pigments, printing inks, etc. Approximately, 60% of the production is contributed by the organised sector. The total Indian paint demand by 2013 is projected as 2.7 million tonnes and the main market is expected for decorative coatings. 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.

With large number of residential and commercial projects underway, the outlook for Indian paint industry appears brighter.

### PETROLEUM REFINERIES

There were 21 refineries operating in the country (18 in public/joint sector and three in private sector). Out of the 18 public/joint sector refineries, 7 were owned by Indian Oil Corporation Ltd (IOCL), two by Chennai Petroleum Corporation Ltd (CPCL), a subsidiary of IOCL; two each by Hindustan Petroleum Corporation Ltd (HPCL); and Bharat Petroleum Corporation Ltd (BPCL), one by 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 & ONGC.

MINERAL-BASED INDUSTRIES

**Table – 16 : Principal Fertilizer Plants**

Sl. No.	Plant	Location
<b>Public Sector</b>		
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 (Odisha)
7.	Hindustan Copper Ltd	Khetrinagar (Rajasthan)
<b>Private Sector Large Units</b>		
8.	Gujarat State Fertilizers Co. Ltd	Vadodara and Sikka I & II (Gujarat)
9.	Shriram Fertilizers & Chemicals	Kota (Rajasthan)
10.	DIL (Duncan Industries Ltd)	Kanpur (Uttar Pradesh)
11.	Zuari Agro Chemicals Ltd	Zuari Nagar (Goa)
12.	Coromandal Fertilizers Ltd	Visakhapatnam and Kakinada (Andhra Pradesh), Ennore (Tamil Nadu)
13.	Mangalore Chemicals & Fertilizers Limited	Mangalore (Karnataka)
14.	Gujarat Narmada Valley Fertilizers Company Limited	Bharuch (Gujarat)
15.	Southern Petrochemicals Industrial Corp.	Thoothukudi (Tamil Nadu)
16.	Tata Chemicals Ltd	Haldia (West Bengal), Babrala (Uttar Pradesh)
17.	Punjab National Fertilizers and Chemicals Ltd	Nangal (Punjab)
18.	Deepak Fertilizers & Petrochemicals Corporation	Taloja ( Maharashtra)
19.	Tuticorin Alkali	Thoothukudi ( Tamil Nadu)
20.	Indo-Gulf Fertilizers & Chemicals Corp. Ltd	Jagdishpur (Uttar Pradesh)
21.	Nagarjuna Fertilizers & Chemicals Limited	Kakinada I & II (Andhra Pradesh)
22.	Godavari Fertilizers & Chemicals Ltd	Kakinada (Andhra Pradesh)
23.	Hin. Ind. Ltd	Dahej (Gujarat)
24.	Chambal Fertilizers & Chemicals Ltd	Gadepan I & II (Rajasthan)
25.	KSF Ltd	Shahjahanpur (Uttar Pradesh)
26.	Paradeep Phosphates Ltd	Paradeep (Odisha)
<b>Co-operative Sector</b>		
27.	Indian Farmers' Fertilizers Co-operative Ltd	Kalol and Kandla (Gujarat), Aonla I & II, Phulpur I & II (Uttar Pradesh), Paradeep (Odisha)
28.	Krishak Bharti Co-operative Ltd	Hazira (Gujarat)

## MINERAL-BASED INDUSTRIES

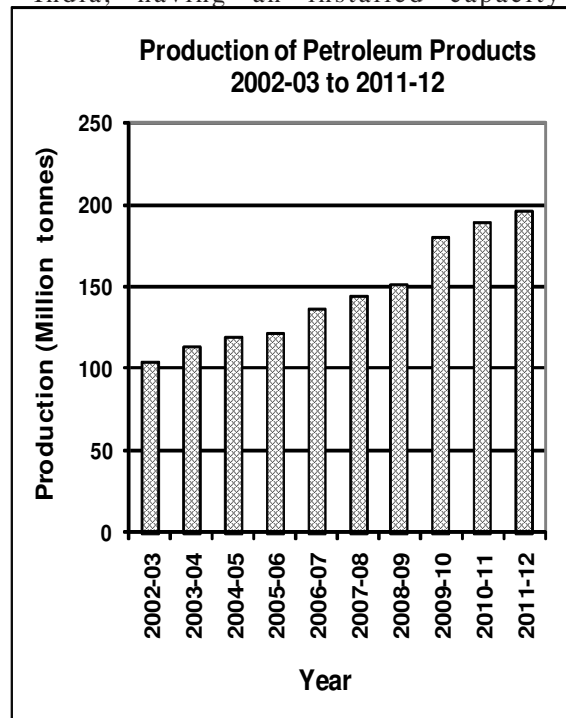
There are two refineries in the joint venture; viz, Mangalore Refinery & Petrochemicals Ltd (MRPL) and Bharat Oman Refineries Ltd. Installed capacity and crude throughputs of refineries are given in Table-17.

The total refining capacity in the country as on 1.4.2012 is around 193.4 million tpy, out of which 116.89 million tonnes is in public sector. The total crude throughput increased to 211.4 million tonnes in 2011-12 from 206 million tonnes in 2010-11. Production of petroleum products from crude oil was 147.2 million tonnes in 2011-12 (up to December 2011). Besides, 5.33 million tonnes LPG was produced from natural gas in 2011-12 (up to December, 2011). The total exports of petroleum products during 2011-12 were 46.2 million tonnes (up to December, 2011). Import of petroleum products during the same period was 11.26 million tonnes. During 2011-12, crude oil production in the country was at 38.1 million tonnes, while the natural gas (utilised) production was at 47,559 million cubic metres (m cu m). Imports of crude oil during 2011-12 was 125.59 million tonnes (up to December, 2011). LNG is also being imported to bridge the gap of demand and supply of natural gas.

India has a near self-sufficiency in the refinery sector. In the next five years, the following additional refining capacities are reportedly expected to come on stream: (i) 15.0 million - IOCL, Paradeep, (ii) 1.4 million - HPCL, Mumbai, (iii) 7.5 million - HPCL, Vizag, (iv) 9.0 million - Mittal, Bhatinda. 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. Essar's 10.5 million tpy capacity at Vadinar is set to expand to 12 million tpy after debottlenecking. CPCL's capacity at Manali is being expanded to 11.2 million tpy from 9.5 million tpy.

## FOUNDRY

There are more than 5,000 foundry units in India, having an installed capacity of



MINERAL-BASED INDUSTRIES

**Table – 17 : Installed Capacity and Crude Throughputs in Refineries**

(In '000 tonnes)

Refinery	Annual installed capacity (as on 1.4.2012)	Refinery Crude throughput		
		2009-10	2010-11(R)	2011-12(P)
<b>Total</b>	<b>213070</b>	<b>192768</b>	<b>206003</b>	<b>211424</b>
<b>Public/Joint Sector</b>	<b>135070</b>	<b>112117</b>	<b>115310</b>	<b>120906</b>
IOCL, Guwahati, Assam	1000	1078	1118	1058
IOCL, Barauni, Bihar	6000	6184	6207	5730
IOCL, Koyali, Gujarat	13700	13206	13561	14253
IOCL, Haldia, West Bengal	7500	5686	6878	8072
IOCL, Mathura, Uttar Pradesh	8000	8107	8880	8202
IOCL, Diboi, Assam	650	600	651	622
IOCL, Panipat, Haryana	15000	13615	13660	15496
BPCL, Mumbai, Maharashtra	12000	12516	13020	13355
BPCL (formerly KRL), Kochi, Kerala	9500	7875	8699	9472
Bharat Oman Refineries Ltd, Bina @	6000	-	-	-
HPCL, Mumbai, Maharashtra	6500	6965	6638	7520
HPCL, Vizag, Andhra Pradesh	8300	8796	8200	8682
HPCL, Bathinda	9000	-	-	-
CPCL, Manali, Tamil Nadu	10500	9580	10104	9953
CPCL, Narimanam, Tamil Nadu	1000	517	703	611
BRPL, Bongaigaon, Assam	2350	2220	2008	2188
MRPL, Mangalore, Karnataka	15000	12498	12662	12798
NRL, Numaligarh, Assam	3000	2619	2252	2825
ONGC, Tatipaka, Andhra Pradesh	70	55	69	69
<b>Private Sector</b>	<b>78000</b>	<b>80651</b>	<b>90692</b>	<b>90515</b>
RIL, Jamnagar, Gujarat	33000	34415	34517	35423
RIL (SEZ), Jamnagar, Gujarat*	27000	32735	41302	41449
Essar Oil Ltd, Vadinar, Gujarat	18000	13501	14873	13643

**Source:** Indian Petroleum and Natural Gas Statistics, 2011-12, Ministry of Petroleum & Natural Gas, (A.R. 2011-12) Government of India.

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

@ Commissioned on 1.4.2011. BORL is a Joint venture company promoted by BPCL with Oman Oil Company Ltd (OOCL).

\* Commissioned on 25.12.2008; production started from January, 2009.

\*\* HPCL of Mittal Energy Investment Pvt. Ltd, a Joint Venture, Bathinda commissioned in April 2012.