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(Part- II : Metals & Alloys)

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GOVERNMENT OF INDIA
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5 Copper

Copper is an important non-ferrous base metal having wide industrial applications, ranging from defence, space programme, railways, power cables, mint, telecommunication cables, etc. India is not self-sufficient in the production of copper ore. In addition to domestic production of ore and concentrates, India imports copper concentrates for its smelters. The domestic demand of copper and its alloys is met through domestic production, recycling of scrap and by imports.

Hindustan Copper Limited (HCL), a Public Sector Undertaking, is the only integrated company in the country that is involved in mining & beneficiation of ore and is engaged in smelting, refining and casting of refined copper.

Birla Copper (unit of Hindalco) and Sterlite Industries (India) Ltd, are the major copper producers in the Private Sector that mainly rely on imported copper concentrates. These companies own copper mines in other countries. Another Private Sector company, Jhagadia Copper Ltd, also produces copper based on secondary route.

RESOURCES

The total resources of copper ore as on 1.4.2013 as per UNFC system are estimated at 1.51 billion tonnes. Of these, 237.57 million tonnes (15.73%) fall under 'reserves' proved (STD111) and probable (STD121 & 122) categories) while the balance 1.27 billion tonnes (84.27%) are 'remaining resources' (under feasibility (STD211), pre-feasibility (STD221 & STD222), measured (STD331), indicated (STD332) and inferred (STD333) categories). Of the total ore resources, 2.64 million tonnes (0.17%) comprise ore containing 1.85% Cu or more and 681.6 million tonnes (45.11%) 1% to below 1.85% Cu grade. With regard to reserves, there were no reserves above 1.85% Cu grade. However, 628 million tonnes fall under 0.5% to below 1% Cu grade.

The total copper metal content in the resources is 12.22million tonnes of which 3 million tonnes constitute reserves.

Largest resources of copper ore to a tune of 809 million tonnes (53.55%) are in the state of Rajasthan followed by Jharkhand with 295.96 million tonnes (19.59%) and Madhya Pradesh with 287.67 million tonnes (19.04%). Copper resources in Andhra Pradesh, Gujarat, Haryana, Karnataka, Maharashtra, Meghalaya, Nagaland, Odisha, Sikkim, Tamil Nadu, Telangana, Uttarakhand and West Bengal accounted for remaining 7.82% of the total all India resources (Table-1).

EXPLORATION & DEVELOPMENT

Exploration were carried out by GSI for base metals during 2014-15 in the district of Cuddapah, Guntur in Andhra Pradesh, Pakke-Kessang area in Arunachal Pradesh, Mahendragarh district in Haryana, Chhindwara district in Madhya Pradesh, Chandrapur & Bhandara districts in Maharashtra and Alwar, Ajmer, Bhilwara, Jhunjhunu and Sikar districts in Rajasthan. Details of exploration activities conducted for copper in 2014-15 are furnished in Table-2.

Table - 1 : Reserves/Resources of Copper as on 1.4.2013 (P)
(By Grades/States)

(In '000 tonnes)

Grade/State	Reserves				Remaining Resources								Total Resources (A+B)
	Proved STD111	Probable		Total (A)	Feasibility STD211	Pre-feasibility		Measured STD331	Indicated STD332	Inferred STD333	Reconnaissance STD334	Total (B)	
		STD121	STD122			STD221	STD222						
All India : Total													
Ore	**40650**	**6521**	**190401**	**237573**	**53789**	**32161**	**61061**	**123569**	**233913**	**763892**	**5060**	**1273445**	**1511018**
Metal	**370.31**	**61.44**	**2565.22**	**2996.97**	**511.15**	**338**	**625.88**	**1589.19**	**2077.81**	**4064.35**	**15.18**	**9221.56**	**12218.53**
By Grades													
Ore with 1.85 % & above Cu	-	-	-	-	-	62	-	430	812.7	1336	-	2641	2641
Ore with 1.00 % to below 1.85 % Cu	3360	-	-	3360	46083	8021	2039	25189	85775	511139	-	678246	681606
Ore with (+) 0.50% to below 1.00% Cu	29746	6521	185859	222127	4331	24078	48769	97951	87715	143098	-	405942	628069
Ore with (-) 0.50% Cu	7544	-	4542	12086	3375	-	10253	-	59610	108318	5060	186616	198702
By States													
Andhra Pradesh													
Ore	-	-	-	-	686	-	105	-	5791	1000	-	7582	7582
Metal	-	-	-	-	6.88	-	1.05	-	97.45	8.32	-	113.7	113.7
Gujarat													
Ore	-	-	-	-	2470	3010	1380	129	-	7131	-	14120	14120
Metal	-	-	-	-	30.13	36.72	29.04	0.69	-	113.38	-	209.96	209.96
Haryana													
Ore	-	-	-	-	-	2230	-	-	-	30678	-	32908	32908
Metal	-	-	-	-	-	11.82	-	-	-	101.80	-	113.62	113.62
Jharkhand													
Ore	8303	6521	4310	19134	3765	23781	3168	98578	105811	41726	-	276828	295961
Metal	89.78	61.44	45.87	197.09	48.06	251.63	34.49	1150	1097.29	507.38	-	3088.85	3285.94
Karnataka													
Ore	-	-	342	342	826	1801	2039	1750	7597	20434	-	34457	34799
Metal	-	-	4.04	4.04	8.78	17.56	11.51	22.00	66.37	99.61	-	225.83	229.87
Madhya Pradesh													
Ore	9000	-	119631	128631	42466	-	35120	1510	550	79389	-	159035	287666
Metal	93.60	-	1629.98	1723.58	411.9	-	460.1	11.33	4.13	867.50	-	1754.96	3478.54

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Table - 1 : (Concld.)

Grade/State	Reserves				Remaining Resources								Total Resources (A+B)
	Proved STD111	Probable		Total (A)	Feasibility STD211	Pre-feasibility		Measured STD331	Indicated STD332	Inferred STD333	Reconnaissance STD334	Total (B)	
		STD121	STD122			STD221	STD222						
Maharashtra													
Ore	-	-	-	-	-	-	-	-	9399	3811	-	13210	13210
Metal	-	-	-	-	-	-	-	-	89.65	43.05	-	132.70	132.70
Meghalaya													
Ore	-	-	-	-	-	-	-	-	880	-	-	880	880
Metal	-	-	-	-	-	-	-	-	9.00	-	-	9.00	9.00
Nagaland													
Ore	-	-	-	-	-	-	-	-	-	2000	-	2000	2000
Metal	-	-	-	-	-	-	-	-	-	15.00	-	15.00	15.00
Odisha													
Ore	-	-	-	-	-	-	-	1420	2536	2095	-	6051	6051
Metal	-	-	-	-	-	-	-	21.69	21.06	20.69	-	63.44	63.44
Rajasthan													
Ore	23348	-	66119	89466	3566	228	19186	16513	100256	574818	5060	719628	809094
Metal	186.93	-	885.33	1072.26	5.4	3.29	88.78	320.48	686.60	2278.24	15.18	3397.97	4470.23
Sikkim													
Ore	-	-	-	-	-	445	63	300	-	150	-	958	958
Metal	-	-	-	-	-	7.86	0.91	8.47	-	4.23	-	21.47	21.47
Tamil Nadu													
Ore	-	-	-	-	-	-	-	200	590	-	-	790	790
Metal	-	-	-	-	-	-	-	1.08	2.73	-	-	3.81	3.81
Telangana													
Ore	-	-	-	-	666	-	-	-	-	-	-	666	666
Metal	-	-	-	-	9.12	-	-	-	-	-	-	9.12	9.12
Uttarakhand													
Ore	-	-	-	-	-	-	-	3170	390	660	-	4220	4220
Metal	-	-	-	-	-	-	-	53.45	1.44	5.15	-	60.04	60.04
West Bengal													
Ore	-	-	-	-	-	-	-	-	113	-	-	113	113
Metal	-	-	-	-	-	-	-	-	2.09	-	-	2.09	2.09

Figures rounded off.

Table – 2 : Details of Exploration Activities for Copper, 2014-15

Agency/ State/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks/ Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
Andhra Pradesh							
Cuddapah	Mangampeta	-	52	2	1600	-	A deep lithostratigraphic-cum-structural drilling and large scale mapping was carried out in this area. This area which forms a part of Cuddapah basins comprises of rocks of Rajampeta minor basin of Nallamalai Group. The first bore hole was drilled in the hinge of the synform of F1 fold in Mangampeta Barytes Mine near the old GSI borehole. Here the maximum thickness of barytes were recorded to check the occurrence of base metal below the bedded barytes horizon which is likely to occur in this type of deposit (Missisipian Valley Type and also to check for any other barytes bed other than the existing baryte bed. The Second bore hole was drilled 470 m due east of first bore hole along the dip direction to check the continuity of barytes bed which pinches out around 250 m due east of first bore hole.
Guntur	Karempudi block	-	-	-	-	-	In the western and central parts of this blocks, the dolomite band is sandwitched between phyllite with gradational contact both in up and down dip direction which are tightly folded with northern limb being overturned. An E-W trending dolomite band having about 24 m strike length and width up to 5 m having specks of chalcopyrite and galena was mapped at about 30 m SSW. The dolomite band having 6.5 km strike length which is located in the extreme northern part of the 50 km long Agnigundla mineralised belt of Cuddapah basin. The ENE-WSW trending northern limb of anticline of the dolomite band extends about 700 m long having 12 m thickness ; shows gradational contact with phyllite hosts basemetal mineralisation (mainly galena) within a 4.5 m zone in central

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Table – 2 (Contd.)

Agency/ State/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
							part. The central part of the dolomite is massive and has galena mineralisation in them. AAS analysis of dolomite from central part of the Trench-1 samples show up to a maximum of 1.9% Pb and 5804 ppm Zn. Pitting and trenching across an E-W trending dolomite band of about 24 m strike length and width up to 5 m shows incidence of disseminated chalcopyrite, galena and bornite which is about 30 m. XRD analyses of dolomite samples (Nos. KD-1/5X & K9/ x) from trench-1 in general given 67%-90% dolomite, 7-17% quartz, 1-6% muscovite etc. with ~1% Owyheeite (Pb7Ag2(Sb,Bi)8S20, 2% cerrusite (PbCO3) & 1% galena.
Guntur	Karempudi Khandrika block	1:2000	01	-	-	-	In the preliminary investigation for base metal and other associated mineralisation west of Karempudi to east of Khandrika area of Agnigundala mineral belt, a few gossanised bands in association with grey to black dolomite and chert are reported. In the area at 4 km NW of Remedicherla, the gossan is highly silicified and contains sulphide disseminations such as sphalerite, pyrite, chalcopyrite etc; a few silicified, brecciated and gossanised lensoidal chert bands are also reported in the area. The silicified and brecciated lensoidal chert bands occurs along the eastern margin of the purple dolomite which is in contact with shaly dolomite and are noticed at 2 km east of Domalugundam. These bands extend over a cumulative strike length of about 1 km having a maximum width up to 15 m. They are gossanised at a few places containing disseminated sulphides such as sphalerite, pyrite etc. Two potential zones for mineralisation are worked out in the area. First is a gossanised zone (1.75 km × 0.6 (Contd.)

Table – 2 (Contd.)

Agency/ State/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
							km) 4 km NW of Remedi-cherla. The chert lenses occur within the purple dolomite 2 km east of Domalugundam. These chert lenses having a maximum thickness of about 15 m are highly silicified and gossanised. Mineralisation was mostly observed in the chert bands associated with the dolomites. The chert bands are full of pyrite disseminations but a few specs of galena or chalcopyrite are also common.
Arunachal Pradesh							
Pakke-kessang area	Pakke-kessang area	LSM	-	51	-	-	Large scale mapping was done around this area, covering an area of 51 sq km, detailed mapping around Ningcho covering an area of 0.5 sq km was investigated. The mapped area consists of Palaeo-proterozoic rocks of Bomdila Group having metasedimentary enclaves of Khetabari Formation within the Ziro Gneiss. About 2-3 m wide sulphide rich zones with intermittent barren zones have been identified over an extent of 150 m wide zone within the garnetiferous-quartz-biotite schist interbanded with thin bands of ferruginous quartzite. The thickness of the quartzite bands ranges from 7 cm - 3 m. The main mineralised zone having 2 m wide oxidised band is 15 m wide and has been traced up to 60 m in strike continuity, whereas the entire zone having schistose quartzite and garnetiferous- quartz-mica schist is 30 m wide. The zone is marked by ferruginisation, limonitisation, sericitisation and malachite stains with few specks of chalcopyrite. Available analytical data of trench samples indicate 1502 ppm to 2498 ppm Cu, with an average of 0.196% Cu over a width of 6 m.
	Ningcho	DM	-	0.5	-	-	

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Table – 2 (Contd.)

Agency/ State/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
Haryana							
Mahendragarh	South of Beghopur	-	-	03	600	128	G4 stage investigation of copper mineralisation was taken up. Sulphide mineralisation i.e. chalcopyrite, pyrite and pyrrhotite was present as disseminations and specks along the foliation and fracture planes of quartz-biotite schist. EPMA studies of core samples confirm the presence of Ullmannite (NiSbS), Benavidesite (Pb4(Mn, Fe) Sb6S14) and Gudmundite (FeSbS). Association of Ullmannite and Gudmundite with the ore minerals indicate hydrothermal origin of sulphide mineralisation. Analytical results of core samples indicate the value of different elements as Cu <5-529 ppm, Pb <10-107 ppm, Zn <5-2360 ppm, Ni <10-398 ppm, Co <5-262 ppm. Total REE values in all 128 samples range from 51 to 477 ppm. Investigation has been completed.
-do-	NE of Islampur	-	-	03	601	158	G4 stage investigation of copper mineralisation was taken up. EPMA studies of core samples showed chalcopyrite veins in pyrrhotite, botryoidal pyrite, grains of sphalerite and small worm like galena hosted in chalcopyrite and pyrrhotite. Total 600.70 m drilling was completed on the basis of geophysical anomaly in three first level boreholes for a cumulative strike of 440 m to intersect the anomalies at 60 m vertically below the surface. Analytical results of 127 nos. of core samples indicate Cu values 4 ppm-1619 ppm, Pb values <10 ppm-98 ppm, Zn values 10 ppm-3251 ppm, Ag values <1ppm, Co values <5 ppm-354 ppm and Ni values <10 ppm-271 ppm. Investigation has been completed.

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Table – 2 (Contd.)

Agency/ State/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
Maharashtra							
Chandrapur	Bamni area block	-	50	-	-	67	Investigation G-4 revealed that the quartzofeldspathic biotite gneiss with amphibolites, known as Amgaon gneiss is the basement of the investigation area. A prominent quartz reef which intruded into the basement gneiss is exposed near Bamni and this is being mapped and sampled to establish the base metal and gold mineralisation. The quartz reef which is exposed in Bamni area trends N55°WS55°E for about 400 m in strike length with varying width from 2 m to 15 m. Chemical results of bed rock samples show the Cu values ranging from 30 ppm to 0.37 % while Pb varies from 73 ppm to 0.65% (one sample shows 1.12%) and Zn from 15 ppm to 0.63% (one sample shows 4.8%). Chemical analytical results of soil sample (65 nos.) show the Cu values ranging from 10 ppm to 150 ppm while Pb varies from 25 ppm to 600 ppm and Zn from 20 ppm to 125 ppm.
Chandrapur	Nai Dilli and Lal Heti areas	-	-	8	-	-	G3 stage investigation of copper and associated mineralisation was taken up to this blocks. Surficial evidence such as malachite staining and covellite as well as the occurrence of chalcopyrite and pyrite as observed in quartz vein indicate the hydrothermal activity in the area. In core samples of quartz chlorite veins, chalcopyrite and pyrite occur in the form of dissemination, veinlets and chunks. Four boreholes drilled in Nai Dilli and four in Lal Heti blocks. In Nai Dilli block, one mineralised zone having an average grade of 0.23% Cu value is demarcated. Total seven mineralised zones were demarcated with grade of Cu varying from 0.20% to 0.42%. The maximum gold value of 950 ppb is also recorded in one sample. In Lal Heti Block, one mineralised zone having an average grade of 0.20% Cu is demarcated and two mineralised zones were identified with Cu grade varying from 0.21 to 0.42%.

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Table – 2 (Contd.)

Agency/ State/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
Rajasthan							
Ajmer	Masuda Tehsil Hanutiya, Garvar, Sapola, Devpura, and Dhanikhera village	1:10000	51	-	-	304	Larger part of the mapped area falls in the Sandmata Complex and Mangalwar Complex of Bhilwara Supergroup. There is a series of 4-5 old-workings on the northwestern part of the Hanutiya metasedimentary sequence. Cherry-red encrustation of sulphide and yellowish stains of limonite occur in the mapped area. The strike of the zone of mineralisation is NE-SW which is parallel to the regional strike of rocks indicating structural control on mineralisation (axial traces of both F1 & F2 fold). Mineralisation is also associated with the silificication (low temperature hydrothermal alteration). The northeastern extension of already exploed Hanutiya block has been demarcated for possible zone of mineralisation based on the presence of profuse malachite stain,oxidation and gossanisation within the gritty conglomerate. The zone extends 350-400 m in strike, with a width from 100 m to 150 m distinctly in continuation of old working zone in the southwest. The litho-geochemical prospecting was carried out in the area to establish the anomalous zone of basemetal and gold mineralisation. One samples of slag from Hanutiya area resulted 2.6% Cu, two samples from sheared quartz vein from nearby Sapola analysed 0.37% Pb, 0.14% Cu and 0.24% Pb respectively. One samples from gritty conglomerate from the extension zone of already explored Hanutiya block yielded 2.6% Cu.
Alwar & Jaipur	Tehla-Khoh-Bighota	-	-	-	-	-	G4 stage investigation for basemetal and associated precious metals was taken up in Tehla-Khoh-Bighota area. Based on surface indications of mineralisation in the form of malachite stains and fresh sulphides, channel sampling was carried out the west of Palpur, West of Baldevgarh area, north of Baldevgarh area and west of Kho area. The analytical results of BRS samples show 0.21% Cu at west of Palpur, 0.34% Cu at NW of Tilwari-Dabkan area, 0.22% Cu from Doli-khan stone quarries SW of Palpur.

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Table – 2 (Contd.)

Agency/ State/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
Alwar	Mejorh-Bamanwas-Bisoni-block	-	-	-	-	-	G4 stage investigation for copper and associated precious metal was carried out. Based on surface indications of mineralisation in the form of malachite stains, fresh sulphides and old workings, three potential areas have been demarcated i.e. Angari block, Bisoni block and Mejorh block. The analytical results of the bedrock samples of the Angari block ranges Cu from 10 ppm to 0.18%. Investigation has been completed.
Alwar	Mandiyawas-Khera area Mandiyawas block	-	-	5	-	-	G3 stage investigation of copper and associated precious metals was carried out. Investigation was carried out in Mundiyawas Block to test the sub surface continuity of the Cu and associated precious metals. The rock types exposed are mica schist, quartzite, carbon phyllite, felsic meta-volcanics, dolomite and amphibole bearing dolomite and are traversed by quartz and calcite veins. Five boreholes drilled during 2014-15 intersected significant sulphide mineralisation in the form of specks, disseminations, stringers, fracture filling and occasional massive sulphides in the form of chalcopyrite, arsenopyrite, pyrrhotite and minor pyrite. Part analytical results show mineralisation between 198.0 – 203.0 m = 5.0 m × 3.66% Cu at 0.2% Cu cutoff with 19.11 g/t Ag, 200.0 – 202.40 m shows 2.40 m × 7.29% Cu (at 1.0% Cu cut off) with 33.64 g/t Ag.
Alwar	Mandiyawas-Khera area Khera SE-block	-	-	4	-	-	G3 stage exploration in Khera SE Block, Mundiyawas- Khera area, SE of the Khera main block. Sulphide mineralisation found in the form of significant sulphide mineralisation. In the form of occasional foliation parallel, specks, stringers, fracture and vein filled chalcopyrite and pyrrhotite. Part analytical results received show significant Cu mineralisation intersected as given below: Cu lodes at 0.2% Cu cut off:127.0-147.75= 20.75 m × 0.41%, 151.25-164.75= 13.50 m ×

(Contd.)

Table – 2 (Contd.)

Agency/ State/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
							0.34%, 169.30-171.30= 2.0 m × 0.30%, 175.30-178.30= 3.0 m × 0.21%, Cu lodes at 0.5% Cu cut off: 127.55 - 129.70 = 2.15 m × 0.50%, 139.25 - 147.25 = 8.00 m × 0.66%,157.15 - 160.25 = 3.10 m × 0.70%.
Alwar	Mandiyawas-Khera area Khera block	-	-	2	-	-	G-3 exploration by deep drilling was carried out to evaluate the depth continuity & grade of the one at deeper levels. Two boreholes drilled intersected light grey to dark grey coloured felsic meta volcanic with thin bands of felsic tuff, scapolite rich bands and thin cherty quartzite band sand tremolite bearing marble. A number of thin smoky quartz occurs at different depths along the borehole. Bluish quartz and clasts of feldspar present at places. Besides, zone of brecciation/fault zone observed with angular fragments set in finer matrix. The boreholes intersected sulphide mineralisation in the form of specks, disseminations, foliation parallel, vein filling, fracture filling and occasional massive chalcopyrite, arseno-pyrite and pyrrhotite.
Bhilwara	Kundiyan-Parmeshwarpura and Dhamana- Devariya blocks	-	-	-	-	452	G4 stage investigation for base metal was continued from 2013-14 and geochemical sampling on 100 m × 25 m grid pattern has been carried out. Mapping revealed two distinct lithounits exposed in the area, they are calc silicate and amphibole bearing calc silicate rock in the form of alternate bands, belonging to the Rewara Formation of Pur-Banera Group of rocks. The surface indications of sulphide mineralisation in the block found in the form of profuse malachite stains & disseminations of chalcopyrite, bornite and covellite in the exposed calc silicate and amphibole bearing calc silicate rock. Samples for petrochemical (12 nos.) and petrological studies were collected from the area.

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Table – 2 (Contd.)

Agency/ State/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
Bhilwara	Salampura and Dariba blocks	-	-	3	485	-	G4 stage investigation for base metal was taken up between Salampura and Dariba block in northern extension part of Salampura block, Pur-Banera Belt. Mineralisation in this block is associated with garnet-biotite-sericite schist, magnetite bearing calcareous schist, Banded Magnetite Quartzite (BMQ) and calc-silicate sequence. The presence of old working, oxidized and gossanized material and presence of BMQ are the important surface manifestations of mineralisation. Cu mineralized zone-I from 36.65 m to 40.65 m (4 m ×0.12% Cu); zone-II from 126.00 m to 130.30 m (4.30 m × 0.95% Cu); Pb+Zn mineralized zone-I from 64.15 m to 66.90 m (2.75 m × 1.0% Pb+Zn). This borehole was closed at depth of 164.65 m.
Jhunjhunu	Eastern Khetri Bokri & Malwali Prospects	1:2000	1.19	-	-	520	Metallotect, investigation was taken up for copper and associated minerals in gap area. The surface manifestations of mineralisation are development of gossans as observed at places in the fault zone, malachite staining within the thin discrete shear zone, malachite and azurite staining over magnetite quartzite and at places in calc-silicate body. The calc-silicate body shows mineralisation of chalcopyrite, pyrrhotite, pyrite and bornite associated with blotches of recrystallized calcite. Calc-silicate rocks and quartzite shows copper values from 20 ppm to 6616 ppm (0.66 %). A total of 3 nos. of bed rock samples have been assayed with over 0.10 % Cu.

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Table – 2 (Contd.)

Agency/ State/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
Sikar	West of Nanagawas area	-	-	10	1065.95	-	G3 stage investigation for base metal was taken up. Two mineralised zones MZ-I & MZ-II were delineated on surface. MZ-I in the northern part of mapped area, extending for about 450 m in strike length while MZ-II extends for about 800 m in strike length. A resource of 8.05 MT × 0.34% Cu (at 0.2% cut-off) has been estimated by cross section method. All the boreholes show thickening of zones with depth. Sulphide mineralisation occur in the form of disseminated, vein/ vug filled, fracture filled and stringers of bornite ($2Cu_2S•CuS•FeS$), chalcopyrite ($CuFeS_2$), covellite (CuS), Chalcocite (Cu_2S) and pyrite (FeS_2). Analytical results of borehole shows the following Cu lodes at 0.2% Cu cut- off 226.25 m to 232.50 m (6.25 m × 0.40% Cu), 237.80 m to 244.10 m (6.30 m × 0.28% Cu), 274.70 m to 279.75 m (5.05 m × 0.24% Cu), 288.86 m to 291.75 m (2.89 m × 0.20% Cu) and 293.90 m to 296.00 m (2.10 m × 0.31% Cu). Analytical results of borehole WNBH-12 shows the following Cu lodes at 0.2% Cu cut-off, 158.70 m to 171.85 m (13.15 m × 0.31% Cu), 180.20 m to 205.95 m (25.75 m × 0.22% Cu), 209.15 m to 225.65 m (16.50 m × 0.12% Cu) and 230.05 m to 232.00 m (1.95 m × 0.14% Cu).
Sikar	Southeast area Palaswala-ki Dhani block	-	-	-	961.5	107	G3 stage investigation for base metal was taken up. The bed rock sampling has been done at a 100 × 25 m grid. Three surface mineralised zones have been delineated on the studied area. Two zones (MZ-I & MZ-IA) are in the eastern part of the area and zone (MZ-II) is in western part of the study area. The zone MZ-I is the extension of the previously delineated mineralised zone on western limb, which is very thin and shows pinch and swell nature having 2 to 4 m width with 400 m strike length. The Zone (MZ-IA) is the eastern most zone having 250 m strike length and width (Contd.)

Table – 2 (Contd.)

Agency/ State/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
							varies from 2 to 10 m. The 3rd surface mineralised zone (MZ-II) has been delineated on the western part of the study area having about 200 m strike length with thickness varying between 10 to 15 m. The surface indications of mineralisation is in the form of malachite staining, intense ferruginisation, presence of occasional fresh sulphides of pyrite, chalco-pyrite, bornite and specularite associated chalcocite hosted within biotite rich marble, amphibole marble and dolomitic marble. It is noticed that the concentration of copper mineralisation is weak in all the boreholes.
Sikar	Mahawa North block	-	-	-	-	276	G4 stage investigation for base-metal was taken up in Mahawa North block. Sikar district. The evidences of sulphide mineralisation are present in lithounits belonging to Kushalgarh formation of the Ajabgarh Group of the Delhi Supergroup. The surface evidence of sulphide mineralisa-tion is present in the form of Malachite stains. 54 Cu m of trench was dug to check continuity of litho units under soil cover. The partial analytical results available so far indicate encouraging values for Copper. For channel sample the value of Copper ranges from 0.2% to 1.0%, whereas bedrock samples Cu values ranges from 0.2% to 0.88%.
Sikar	Southeast of Kharagbinjpur	1:2000	0.60	-	-	3	G4 stage investigation for basemetal was taken up in southeast of Kharagbinjpur. The potential area for mineralisation has been identified on the basis of surface evidences within the mapped area and detailed mapping has been carried out. In the northern part of the block, a surface mineralised zone defined by occurrence of disseminations of pyrite and chalcopyrite, in thin bands of ferruginised dolomitic marble without malachite staining. The zone is confined to the western limb of a mesoscopic fold and is exposed (Contd.)

Table – 2 (Concld.)

Agency/ State/ District	Location Area/ Block	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Meterage		
							discontinuously for a distance of about 1300 m, varying in thickness from 5 to 15 m. Three Grab samples collected from the northern part of these bands of 0.30 to 0.50 m in width showing Cu content 0.38%, 0.34% and 0.19%.
Sikar	Toda Ramliyas blocks,	-	-	6	1037.8	-	G3 stage investigation for basemetal was taken up during 2013-14 two mineralised zones were delineated on the surface, the one prominent zone was traced for about 1.5 km strike length with Cu values varying from 200 ppm to 10,000 ppm. The borehole TRBH-1 was drilled to a depth of 133.30 m and intersected sulphide mineralisation from 90.00 m 97.70 m and 101.10 m to 127.00 m with V.E. 0.1-0.2% Cu in the form of disseminations, stringers and veins of chalcopyrite, bornite, covellite, pyrite and specularite. The borehole TRBH-2 was drilled to a depth of 156.70 m and analytical results indicated copper lodes 60.45 - 68.35 = 7.9 m × 0.2% Cu and 94.30 - 103.22 = 8.92 × 0.31% Cu. The borehole TRBH-3 was drilled to a depth of 151.60 m and analytical results show a copper lode 119.20. 128.20 = 7 m × 0.62% Cu. Borehole TRBH-4 was drilled to a depth of 210.20 m and intersected sulphide mineralisation from 167.35 m to 200.05 m (V.E.0.1-0.2%), the borehole TRBH-5 was drilled to a depth of 210 m, which intersected sulphide mineralisation as expected at 180.25 m to 190.65 m (V.E.0.1-0.2% Cu). The borehole TRBH-6 was drilled to a depth of 176.20 m and didn't intersect any significant sulphide mineralisation.

PRODUCTION & PRICES

Copper Ore and Concentrates

The production of copper ore at 3.59 million tonnes in 2014-15 decreased by 5% as compared to that in the previous year.

The metal content in the ore produced in 2014-15 is reported as 28,381 tonnes as against 33,875 tonnes in 2013-14. During the year under review 3.51 million tonnes of ore was treated for obtaining copper concentrates as against 3.98 million tonnes in 2013-14 (Tables- 3 & 4).

Production of copper concentrates at 1,07,541 tonnes in 2014-15 decreased by about 23% as compared to that in the previous year. Madhya Pradesh the leading producer of copper concentrates, accounted for about 53% of the production during 2014-15, followed by Rajasthan with 41% and Jharkhand with 6% production. The number of reporting mines in 2014-15 were five wihch is same as in the previous year (Tables- 5 to 7).

Grade Analysis

During the year, copper content in the ore produced was 0.79% Cu against 0.90% in the year 2013-14. All India average metal content of ore treated during 2014-15 works out to 0.79% Cu and 0.89% Cu for 2014-15 and 2013-14 respectively.

Table – 3 : Principal Producer of Copper Concentrates, 2014-15

Name and address of the producer	Location of mine	
	State	District
Hindustan Copper Ltd, Tamra Bhavan, 1, Ashutosh Choudhury Avenue Post Box No. 10224, Kolkata – 700 019.	Jharkhand	Singhbhum (East)
	Madhya Pradesh	Balaghat
	Rajasthan	Jhunjhunu

The average copper content in the ore treated varies from State to State. It was 0.75% Cu in Madhya Pradesh, 0.80% Cu in Jharkhand and 0.89% Cu in Rajasthan. The average metal content in the concentrate produced works out to 23.13% Cu in 2014-15 as against 23.11% Cu in the previous year. The copper concentrate produced in Madhya Pradesh with 27.85% Cu in 2014-15 was of the highest grade in the country followed by Jharkhand 25.54% Cu and Rajasthan 16.67% Cu.

The average daily employment of labour in copper mines in 2014-15 was 3,470 as against 3,324 in the preceding year.

Copper Metal

Hindustan Copper Ltd produces copper metal from the ore produced at their captive mines. Sterlite Industries (India) Ltd and Hindalco Industries Ltd produce copper metal from imported copper concentrates (Table-8).

The production of copper blister decreased by 4% and copper continuous cast wire rods registered a increase of 19% in 2014-15 as compared to the previous year. The production of copper cathodes also increased by 19%. Production of copper electrolytic wire bars was not reported for more than five years (Tables-9 to 12). Prices of copper are furnished in the general review on 'Prices'.

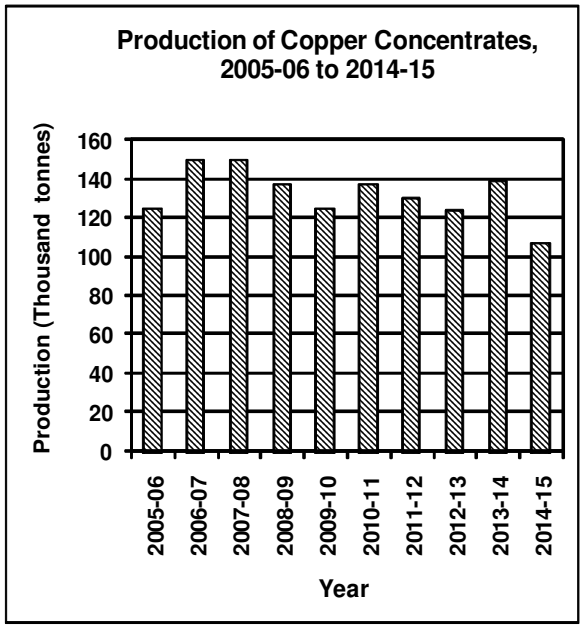


Table – 4 : Production of Copper Ore, 2013-14 and 2014-15 (By States)

(In tonnes)

State	2013-14			2014-15 (P)		
	Ore produced	Cu%	Metal content	Ore produced	Cu%	Metal content
India	**3777772**	**0.90**	**33875**	**3586028**	**0.79**	**28381**
Jharkhand	398537	0.90	3587	180496	0.84	1524
Madhya Pradesh	2376183	0.93	22122	2458132	0.76	18759
Rajasthan	1003052	0.81	8166	947400	0.85	8098

Table – 5 : Copper Ore Treated, 2013-14 and 2014-15 (By States)

(In tonnes)

State	2013-14			2014-15 (P)		
	Ore treated	Cu%	Metal content	Ore treated	Cu%	Metal content
India	**3981060**	**0.89**	**35527**	**3509002**	**0.79**	**27808**
Jharkhand	428880	0.90	3860	195030	0.80	1560
Madhya Pradesh	2522940	0.92	23186	2379427	0.75	17959
Rajasthan	1029240	0.82	8481	934545	0.89	8289

Table – 6 : Production of Copper Concentrates, 2012-13 to 2014-15 (By States)

(Quantity in tonnes; Value in ₹'000)

State	2012-13		2013-14		2014-15 (P)	
	Quantity	Value	Quantity	Value	Quantity	value
India	**123654**	**6288969**	**139307**	**6681011**	**107541**	**5445661**
Jharkhand	12769	428481	13742	475046	5902	198641
Madhya Pradesh	67640	2983988	79909	3355313	57489	2637081
Rajasthan	43245	2876500	45656	2850652	44150	2609939

Table – 7 : Production of Copper Concentrates, 2013-14 and 2014-15 (By Sector/States/Districts)

(Quantity in tonnes; Value in ₹'000)

State/District	No. of mines	2013-14			No. of mines	2014-15 (P)		
		Quantity	Cu %	Value		Quantity	Cu %	Value
India								
Public Sector	**5**	**139307**	**23.11**	**6681011**	**5**	**107541**	**-**	**5445661**
Jharkhand								
Singhbhum (East)	2	13742	25.87	475046	2	5902	-	198641
Madhya Pradesh								
Balaghat	1	79909	26.53	3355313	1	57489	-	2637081
Rajasthan								
Jhunjhunu	2	45656	16.29	2850652	2	44150	-	2609939

Table – 8 : Producers of Copper Metal, 2014-15

Name and address of the producer	Location	
	State	District
Hindustan Copper Ltd, Tamra Bhavan, 1,Ashutosh Chowdhury Avenue, Post Box No.10224, Kolkata-700 019.	Jharkhand Maharashtra	Singhbhum (East) Raigad
Hindalco Industries Ltd, Century Bhawan, Dr. Annie Besant Road, Mumbai –400 025, Maharashtra.	Gujarat	Bharuch
Sterlite Industries (India) Ltd, Copper Division 1/1/2, Chinchpada, Silvassa –396 830, Dadra & Nagar Haveli (UT).	Tamil Nadu Dadra & Nagar Haveli	Thoothukudi Chinchpada (Silvassa)

Table – 9 : Production of Copper Metal, 2012-13 to 2014-15

(Quantity in tonnes)

Year	Copper blister	Copper cathodes	Copper CCWR*
2012-13	17455	493519	285051
2013-14	17245	644193	282969
2014-15(P)	16471	765568	337713

**CCWR- Continuous Cast Wire Rods.*

Table – 10 : Production of Copper (Blister), 2013-14 and 2014-15 (By State/Plant)

(Quantity in tonnes)

State	Plant	2013-14		2014-15 (P)	
		Quantity	Value	Quantity	Value
India					
Jharkhand	Surda ICC	17245	N.A.	16471	N. A.

Table – 11 : Production of Copper (CCWR), 2013-14 and 2014-15 (By States/Plants)

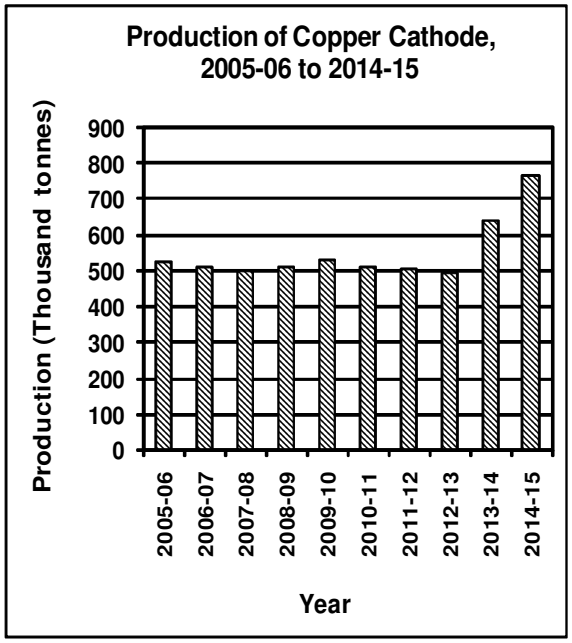
(Quantity in tonnes; Value in ₹'000)

State	Plant	2013-14		2014-15 (P)	
		Quantity	Value	Quantity	Value
India		**282969**	**127327534**	**337713**	**140373262**
Gujarat	Hindalco	145017	67755721	150562	66077672
Maharashtra	HCL Taloja	14898	7224613	16815	7480890
Tamil Nadu	Vedanta Ltd	22105	9364600	53397	20918300
Dadra Nagar Haveli	Vedanta Ltd	100949	42982600	116939	45896400

Table – 12 : Production of Copper (Cathodes), 2013-14 and 2014-15 (By States/Plants)

(Quantity in tonnes; Value in ₹'000)

State	Plant	2013-14		2014-15 (P)	
		Quantity	Value	Quantity	Value
India		**644193**	**279421469**	**765568**	**305302465**
Gujarat	Hindalco	332755	146099957	387952	157983898
Jharkhand	Surda ICC	17005	8165312	15243	6706067
Tamil Nadu	Vedanta Ltd.	151591	64411000	194019	75158300
Dadra Nagar Haveli	Vedanta Ltd.	142842	60745200	168354	65454200



MINING & MILLING

HCL's mines and plants are spread across four operating units, the Indian Copper Complex (ICC) at Ghatsila in Jharkhand, the Khetri Copper Complex (KCC) at Khetrinagar in Rajasthan, Malanjkhand Copper Project (MCP) at Malanjkhand in Madhya Pradesh and Taloja Copper Project (TCP) at Taloja in Maharashtra. HCL operates three underground mines and one opencast mine, with a combined ore production capacity of 3.5 million tonnes per year.

Malanjkhand Copper Project is the largest copper ore producing mine with 2.0 million tonnes production capacity per year. Khetri Copper Complex and Indian Copper Complex have production capacities 1.1 and 0.4 million tonnes per annum, respectively.

Hindustan Copper Ltd

Khetri Copper Complex (KCC), Khetrinagar, Jhunjhunu District, Rajasthan

The operation unit at Khetri Copper Complex (KCC) comprises two underground mines, namely, Khetri mine & Kolihan mine and one beneficiation plant. Earlier, KCC also had smelting and refining facility. But owing to economic consideration the Company had to suspend this operation w.e.f. December 2008. Mining methods adopted in Khetri and Kolihan underground mines of HCL are sub-level open stoping and blasthole stoping. In sub-level open stoping, sub-levels are developed at vertical intervals of 20 to 25 m and a crown level is developed 15 m below upper main level. Sub-level open stoping method has two variations, namely, longitudinal stoping and transverse stoping. Longitudinal stoping is adopted where the thickness of the orebody is small to moderate. In this method, an extraction drive is developed from the main footwall drive at extraction level and a trough drive is developed in the orebody along the strike. Draw points at 9 m interval are also developed from extraction drive connecting the trough drive. A slot raise is made from the main level to top of the ore block to be extracted. Slot crosscuts are made in the sub-levels and extraction level. The slot crosscut exposes the orebody from hangwall to the footwall. Parallel holes are drilled (115 mm or 57 mm diameter depending on the orebody width) in the slot crosscut and are blasted against the pre-face of the slot raise. This provides an opening throughout the height of ore covering the entire width of the orebody. Rings of holes, drilled in the trough drive and sub-levels, are blasted against pre-face of the slot. The broken ore falls into the trough where it is loaded into the track

mounted Gran-By cars by loading equipment such as LHD and Loaders.

In transverse stoping, the basic design remains the same. But, the development is done across the orebody and stoping advances from hangwall to the footwall. Slot drive is developed along strike.

Another mining method used is blasthole stoping method, wherein, a drill level is prepared between two main levels leaving a crown pillar of 9 to 15 m. Slot raise, slot, stope and rib pillar are drilled by Cubex 165 mm-dia-machine. Trough, sill and crown pillar drilling are done by BBC120F drifter machine. Sequence of blasting remains the same as in the sub-level open stoping method.

The proposed expansion of Khetri & Kolihan mine and development of Banwas deposit will increase the ore production from existing one million tonnes to 3.1 million tonnes per annum. The Engineering Procurement & Construction (EPC) agency for executing the Khetri mine expansion project had been appointed on 15.07.2011 and the work at site started from 16.9.2011. Development of Banwas deposit started in May, 2010 and the work was expected to be completed by 2015. In Kolihan mine, environment clearance for shaft sinking and creation of ore handling facilities below 0 mRL has been obtained on 02.02.2015. Action for floating tender is under process.

Indian Copper Complex (ICC), Ghatsila, East Singhbhum District, Jharkhand

The Indian Copper Complex (ICC) comprises mines, beneficiation plant and smelting & refining facility. India Resources Limited (IRL) of Monarch Gold Company Ltd, Australia, through its alliance with Hindustan Copper Ltd (HCL) operates the Surda Copper Mine and Mosabani Concentrator Plant. At present, IRL has a term contract with HCL which began in 2007 and is expected to be extended up to May 2017, as recommended by a committee of HCL and IRL executives for operating and maintaining Surda Copper Mine. Surda is one of the several copper deposits which has been mined since ancient time and it lies along the shear zone. The orebody of the mine has a strike length of 2.2 km and is currently at a maximum depth of 450 m. The width of the orebody varies from a few metres up to 60 m in thickness as the copper mineralisation occur in pinches and swells. Most of the mining is done by using horizontal cut-and-fill method. The extraction of ore, i.e., cut takes place by drilling and blasting which leaves void that needs to be filled with tailings to provide for platform so that mining activity could be taken up further to the next cut up. The mine operations of Surda mine have been stopped on 08.09.2014 due to state goverment orders persuant to Hon'ble Supreme Court judgment on operation of mines on deemed renewal basis.

Environment Clearance (EC) of Kendadih mine and Rakha mine for reopening of mines by MOEF & CC has been obtained on 20.01.2015, stage-I forest clearance obtained and stage-II is awaited.

HCL also issued Letter of Intent to the successful bidder on 08.11.2011 to develop new underground mine at Chapri-Sideshwar to produce 1.5 million tonnes of ore per annum. The work shall start after obtaining statutory clearences and restoration of the power facility at site. Chapri-Sideshwar is part of Rakha and Kendadih mining lease. Environmnent Clearnce of MOEF has been obtained on 20.01.2015. Satge-II forest clearance is awaited for Chapri- Sideshwar mine.

Malanjkhand Copper Project (MCP), Malanjkhand, Balaghat District, Madhya Pradesh

MCP has the largest copper ore producing open-pit mechanised mine in the country with an annual capacity to produce 2 million tonnes ore along with a matching concentrator plant. Prominent deposits in MCP are Malanjkhand, Shitalpani, Gidhri Dhorli, Jatta and Garhi Dongri. Currently, this mine contributes to around 70% of HCL's copper production. The deposit is estimated at average grade of 1.31% Cu with 0.45% cut-off grade. The strike length of the deposit is 2.6 km in North-South direction with a dip of 65^0 to 75^0 towards the East and the average width is 70-75 m. Mining is carried out by deployment of large capacity electric rope shovels having 10 m^3 bucket capacity and hydraulic excavators having 5-10 m^3 bucket capacity in combination with 60, 85 and

100 tonnes capacity dumpers. The bench height and diameter of blastholes is 12 m and 165 m respectively. Site Mixed Slurry explosives are used for primary blasting and Cartridge explosives are used for secondary/ pre-split blasting.

The Cabinet Committee on Economic Affairs (CCEA) had approved the investment of ₹1856.74 crore for the expansion of MCP from 2 million tonnes per annum to 5 million tonnes per annum by developing an underground mine below the existing opencast mine. To improve the physical condition, the company has redesined the Malanjkhand open pit mine in consultation with IIT Kharagpur. All the approval are in place, Environment Clearance (EC) and clearance from National Board for Wild Life (NBWL) have been obtained in 2014-15. The foundation stone laying of the project was held on 12.04.2015.

SMELTING

HCL has two smelting & refining plants at KCC and ICC with installed capacity of 31,000 tonnes and 20,500 tonnes cathode per annum, respectively. However, due to economic considerations the Company suspended KCC's smelting and refinery operation from December 2008. HCL also has one continuous casting plant of copper wire rod, namely, Taloja Copper Project (TCP) with 60,000 tonnes per annum capacity at Taloja, Maharashtra.

Apart from HCL, two other major players dominate the Indian Copper Industry, namely, M/s Hindalco and M/s Sterlite Industries which are under the Private Sector. M/s Hindalco at Dahej in Gujarat and M/s Sterlite Industries in Thoothukudi in Tamil Nadu have set up port-based smelting and refining plants which depend on imported copper concentrates either from their own mines at abroad or other overseas sources with annual production capacity of 500 thousand tonnes and 400 thousand tonnes, respectively. Besides, there are few small companies which produce Electrowon copper but their capacities are very low and production is inconsistent.

Jhagadia Copper Ltd (formerly SWIL Ltd) has operating plant with a capacity of 50,000 tonnes per annum copper cathodes and 20 thousand tonnes per annum of copper anode. The total installed capacity of copper smelter in the country is 1,001 thousand tonnes per annum. Details regarding capacity of copper smelter are given in Table-13.

Table – 13 : Capacity of Copper Smelters

(Quantity in '000 tonnes)

Smelter/Location	Annual Capacity
TOTAL	**1001.5**
1. Hindustan Copper Ltd	51.5
i) Khetri Copper Complex, Distt. Jhunjhunu, Rajasthan.	31
ii) Indian Copper Complex Distt. East Singhbhum, Jharkhand.	20.5
2. M/s. Sterlite Industries (India) Ltd, Thoothukudi, Tamil Nadu.	400
3. M/s. Hindalco Industries Ltd, Dahej, Distt. Bharuch, Gujarat.	500
4. M/s Hindustan copper Ltd., (Formerly Jhagadia Copper Ltd), Distt. Bharuch, Gujarat.	50

Besides, continuous cast wire rod plants are operated by HCL, sterlite and Hindalco. In addition, M/s TDT formerly Alchemist Metals Ltd, Rewari, Haryana and M/s Finolex also have continuous cast wire rod plants that are based on imported copper cathodes.

1. Hindustan Copper Ltd

i) *Khetri Copper Complex (KCC)*

The KCC smelter is located at Khetri in Jhunjhunu district, Rajasthan having a capacity of 31,000 tpy . In addition, KCC has sulphuric acid and phosphatic fertilizer plant facilities. At present, KCC's smelter has been closed owing to economic considerations since December, 2008.

ii) *Indian Copper Complex (ICC)*

ICC has the smelting & refining facility of 18,500 tonnes per annum capacity. Smelter is located at Ghatsila, East Singhbhum district, Jharkhand. In addition, the Complex consists of 8,400 tpy wire bar casting plant, 54,000 tpy sulphuric acid plant and a brass rolling mill. There is also a precious metal recovery plant for recovery of gold, silver, selenium, tellurium, nickel sulphate, copper sulphate etc. A pilot plant with a

capacity to produce one tonne nickel cathodes 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. Copper cathode production at ICC is less in 2014-15 as compared to previous year due to planned shutdown of Ghatsila Smelter & Refinery Plant for 75 days.

iii) *Taloja Copper Project (TCP)*

The plant with a capacity of 60,000 tonnes per annum continuous cast wire rods (CCWR) is located at Taloja in Maharashtra. It uses the SCR 2000 system of the world renowned South Wire Co., USA. It produces rods of 8 mm, 11 mm, 12.5 mm and 16 mm diameters and meet most precise standards conforming to ASTM B 49/98 &/ or IS 12444/1988. The Plant commenced commercial production in April 1991. The installed capacity could further be increased to 80,000 tpy in the future. The unit also undertakes tolling of cathodes.

The status of Private Sector smelter plants is as follows:

2. Sterlite Industries (India) Ltd

The Sterlite Industries (India) Ltd having an installed smelter capacity of 4,00,000 tonnes per annum copper anodes is located at Thoothukudi in coastal Tamil Nadu. It is based on 'Isasmelt' technology using imported concentrates. The Company is investing ₹3,300 crore for expansion to double its copper production capacity at the plant. After expansion the plant will be Asia's largest copper manufacturing facility in a single location. The Company has set up a copper refinery of 1,80,000 tpy copper cathodes capacity and 1,50,000 tpy rod mill at Chinchpada, Silvassa in the Union Territory of Dadra & Nagar Haveli. Anodes from Thoothukudi are refined at Silvassa for domestic market. The company has commenced copper cathode production which stood at 1,42,842 tonnes in 2014-15. Besides copper, the Company also manufactures sulphuric acid, phosphoric acid, gold and silver as by-products.

3. Hindalco Industries Ltd (Birla Copper)

The Company's smelter located at Dahej, Bharuch district, Gujarat, has a capacity of 5,00,000 tpy. The smelter is based on Outokumpu technology. The cathodes produced are mostly used for production of continuous cast wire rods. In the process of extraction of copper metal, sulphuric acid, phosphoric acid, gold and silver are also recovered as by-products. The entire requirement of copper concentrates was met through imports from many countries, namely, Chile, Australia, Indonesia, Papua New Guinea, Brazil, Peru and Canada.

4. Gujarat Copper Project (GCP)/ Jhagadia Copper Ltd (formerly SWIL Ltd)

HCL has acquired the assets of Jhagadia Copper Ltd (renamed as GCP) situated at 747, Jhagadia Industrial Estate, Bharuch, Gujarat through Asset Reconstruction Company (India) Ltd (ARCIL) during April 2015. The plant is designed to produce 50,000 tonnes LME A-grade cathode through secondary route based on Outokumpu Technology AB (formerly Bolidewn Contech AB), Sweden.

RECYCLING OF COPPER

Copper scrap is traded in the form of new scrap generated from copper smelters, copper workings as well as old scrap recovered from electrical motors, electronic equipment, cables, wires, utensils etc.

Copper is one of the most recycled metal of all the metals. The recycling of copper scrap is gaining importance worldwide simply because of the fact that recovery of copper metal from scrap requires much less energy than its recovery made from primary source. Besides, it enables conservation of natural resources.

In Indian condition, however, collection of scrap is in the Unorganised Sector and there is paucity of factual data in this regard. Still, as per the licences granted by Central Pollution Control Board as on 13.5.2010, there were 35 Units operating in different States with a combined capacity of 2.42 lakh tpy for handling different types of scrap.

In addition there are 132 Units with combined capacity of 5.17 lakh tpy which recover copper along with other metals. As per the estimates made in the recently published Market Survey on Copper by IBM, production of 1.07 lakh tpy of secondary copper was reported and all of which have been in Organised Sector, in the country.

USES

The per capita consumption of copper in India is currently at 0.5 kg which is very low in comparison to Russia 3.3 kg, China 5.4 kg, USA 5.5 kg, Italy 8.9 kg, Germany 13.6 kg and to that of 10 kg of developed nations. India's per capita consumption is likely to be moderate and has many strides to cover so as to match that of China. Electrical/Electronic Industry is by far the largest consumer of copper, where it is used in the form of cables, winding wires as it is the best non-precious metal conductor of electricity as it encounters much less resistance and is safe for electrical distribution system from high voltage transmission cables to micro-circuits. Copper also has relatively high creep strength as compared to other commonly used materials. In Electronic Industry, semi-conductor manufacturers have launched a revolutionary 'copper chip'. By using copper for circuitry in silicon chips, microprocessors are able to operate at higher speeds, using less energy. Copper heatsinks help remove heat from transistors and enable computer processors operate at peak efficiency. Copper is used in Construction Industry as plumbing, taps, valves and fittings components. In Transportation Industry, copper is used in various components. According to an estimate by ICSG, most cars contain an average of 20 kg copper and luxury & hybrid vehicles contain about 45 kg copper. Copper is extensively used in industrial machinery and equipment. It is used in a number of consumer products, such as, coinage, utensils, fixtures etc. Large quantities of copper are consumed in making copper-based alloys, such as, brass and bronze.

CONSUMPTION

As per the estimate of ICSG, the share of Electrical and Telecommunication Industry in total consumption is 56%, followed by Transport (8%), Consumer Durables (7%), Building & Construction (7%), General Engineering goods (6%) and other industries including Process Industries (16%). The apparent availability of copper for internal consumption in various industries have been computed on the basis of production of refined copper (cathodes) and from the imports and exports data of copper (refined). Copper is also traded in the form of alloys but have not been considered for arriving at apparent availability of copper. During 2014-15, the exports of refined copper was more than the imports and the availability of refined copper increased from 425,468 tonnes in 2013-14 to 435,153 tonnes in 2014-15 (Table-14).

Table – 14 : Apparent Availability of Copper for Domestic Consumption (Based on Production of Refined Copper, Imports and Exports)

(Quantity in tonnes)

Item	2013-14	2014-15 (P)
I) Total Production* (Cathodes)	644193	765568
II) Total Imports (copper refined)	37505	37610
III) Total Exports (copper refined)	256230	368025
IV) Apparent Availability	425468	435153

* *Primary.*

SUBSTITUTES

Copper is vulnerable for substitution on grounds of price, technical superiority or weight. Aluminium is used as substitute for copper in various products, such as, electrical power cables, electrical equipment, automobile radiators and cooling/refrigeration tubing. Optical fiber has substituted copper in some telecommunication applications and plastics too is used as substitute for copper in water pipe, plumbing, fixtures and many structural applications.

WORLD REVIEW

The world reserves of copper metal are assessed at 720 million tonnes of copper content. Chile has the largest share accounting for about 29.2% of world reserves followed by Australia (12.2%), Peru (11.4%), Mexico (6.4%), USA (4.6%) and China & Russia (4.2% each) (Table-15).

The world mine production of copper increased by 0.6% at 18.38 million tonnes in 2014. Chile continued to be the largest single producer of copper in 2014 with 31.28% share followed by China (8.9%), Peru (7.5%), USA (7.4%) and Australia (5.3%) (Table-16).

Table – 15 : World Reserves of Copper (By Principal Countries)

(Quantity in '000 tonnes of copper content)

Country	Reserves
World: Total (rounded)	**720000**
Australia	88000
Canada	11000
Chile	210000
China	30000
Congo (Kinshasa)	20000
Mexico	46000
Peru	82000
Russia	30000
USA	33000
Zambia	20000
Other countries	150000

Source: *Mineral Commodity Summaries, 2016.*

Table – 16 : World Mine Production of Copper (By Principal Countries)

(In '000 tonnes of metal content)

Country	2012	2013	2014
World: Total	**16832**	**18262**	**18381**
Australia	921	1001	970
Brazil	223	271	240
Canada	580	653	696
Chile	5434	5776	5750
China	1552	1681	1635
Congo, Dem.P.R.	620	922	1066
Indonesia	398	509	377
Iran	246	223	217
Kazakhstan	427	454	472
Mexico	500	480	515
Peru	1299	1376	1380
Poland	427	429	422
Russia[e]	720	720	720
USA	1170	1250	1370
Zambia	699	764	711
Other countries	1616	1753	1840

Source: *World Mineral Production, 2010-2014.*

World refined copper production was 22.92 million tonnes in the year 2014 which showed an increase of 8.7% from that of the previous year. China was the largest producer of refined copper with 7.96 million tonnes in the year 2014 (34.7% of world production) followed by Chile (11.90%), Japan (6.78%), USA (4.77%) and Russia (4.05%) etc.

The world consumption of refined copper was 22.80 million tonnes in the year 2014. China was the largest refined copper consuming country with 11.30 million tonnes (49.57% of world consumption) followed by USA (7.75%), Germany (5.1%), Japan (4.2%) and South Korea (3.3%).

International Copper Study Group (ICSG) estimated that world refined copper production would increase upto 23 million tonnes in 2016 and may further increase to 23.4 million tonnes in 2017. The ICSG expects world apparent demand in 2016 to remain essentially flat because China's apparent demand is expected to be flat (+0.5%). For 2017, the growth in world apparent demand is expected at around 1.8% with underlying Chinese Industrial demand growth expected at around 3%, while consumption in rest of the world is expected to increase by about 1%.

Canada

Canada's copper mine output increased by a reported 63,600 t (10%) owing to production increases at a number of mines. The most significant increase occurred at the Mount Milligan Mine, which began production in September 2013 and ramped up production to 29,300 t from 4,700 t in 2013 .

China

The significant increase in refined copper production in China correlated with a reported increase in smelting and refining capacity. In 2014, China reportedly added 650,000 t/yr of smelting capacity and 900,000 t/yr of refining capacity, with total capacities reaching 6.55 Mt/yr and 9.86 Mt/yr, respectvely. Imports of copper ores and concentrates into China increased to 11.8 Mt (3.3 Mt of contained copper) from 10.1 Mt (2.8 Mt of contained copper) in 2013 and from 7.8 Mt (2.2 Mt of contained copper) in 2012. In 2014, China also imported 3.9 Mt of copper and copper-alloy scrap (4.4 Mt in 2013), 3.6 Mt of refined copper (3.2 Mt in 2013), and 584,700 t of copper blister and anodes (628,900 t in 2013).

Congo (Kinshasa)

In 2014, mine output of copper increased by an estimated 6% (60,000 t) to 1.03 Mt.and refined production increased by an estimated 29% (200,000 t) to 890,000 t. Mine and refinery production both increased mainly owing to increased production at Katanga Mining Ltd.'s Kamoto Mine and Luilu refinery and at the Mutanda Mine. At the Kamoto Mine, production of copper in concentrate increased by 13% to 182,000 t, and production of cathode at the Luilu SX-EW facility increased by 16% to 158,000 t. The Mutanda Mine increased copper production to 197,100 t in 2014 from 150,600 t in 2013 owing to the ramping up of production to full capacity of 200,000 t/yr. The Mutanda Mine produced electrowon copper, although a small percentage may have been copper contained in concentrate.

Indonesia

In January 2014, the Government of Indonesia announced that exports of copper concentrate would be banned beginning in January 2017. In 2014, prior to the export ban, an export tax of 25% would be charged that would gradually increase to 60% by mid-2016. After January 2017, copper concentrates would need to be processed into metal before being exported. FCX was examining options for developing new copper smelting and refining capacity in Indonesia.

In April, Finders Resources Ltd. (Australia) commissioned a 3,000 t/yr SX-EW demonstration plant on Wetar Island. By year end, it had produced 1,400 t of copper and was in the process of building a 25,000 t/yr SX-EW facility. The company reported reserves of 8.9 Mt of ore grading 2.4% copper and projected mine production of 15,000 t of cathodes during the life of the mine.

Japan

Japan's refined production increased by 5% to 1.55 Mt in 2014 from 1.47 Mt in 2013, reportedly in response to strong domestic demand. Copper consumption in Japan was partially supported by infrastructure investments in the northeast region to rebuild damage from the 2011 earthquake and tsumani and in Tokyo to prepare for the 2020 Olympics. In 2014, Japan's smelters and refineries also benefited from relatively high treatment and refining charges (TC/RCs), the processing charges levied against the value of purchased or tolled concentrates. Pan Pacific Copper's TC/RCs for FCX's copper concentrates increased to $92 per metric tonne of concentrate in 2014 from $70 per metric tonne in 2013.

Zambia

Copper mine production in Zambia decreased by 7% mainly owing to decreased production at Barrick Gold Corp.'s (Canada) Lumwana Mine, first Quantum Ltd.'s (Canada) Kansanshi Mine and Vedanta Resources Plc's (United Kingdom) KCM Mines. At the Lumwana Mine, production decreased by 18% to 97,100 t from 118,000 t in 2013 owing mainly to the partial collapse of a conveyor that shut down concentrate production for most of the second quarter. Production at the Kansanshi Mine decreased by 3% to 262,300 t from 270,700 t in 2013 partly owing to smelter capacity constraints. Output at KCM Mines decreased by 14% to 120,400 t from 139,900 t in 2013 owing to remediation work at two shafts at the Konkola Mine.

Refinery production in Zambia decreased by 10% partly owing to decreased production by Mopani Copper Mines Plc [Glencore Plc (Switzerland), 73.1%]. Electrolytic cathode production by Mopani decreased by 13% to 185,100 t from 212,000 t in 2013, mainly owing to reduced processing of third party concentrates at its Mufultra smelter.

FOREIGN TRADE

Exports

The exports of copper from India is in various forms, such as, copper ore & concentrates, refined copper, copper & alloys, brass & bronze, scrap, cement copper, mattes and powder & flakes.

Export of copper ores and concentrates drastically decreased to only 1 tonne in 2014-15 as against 38,912 tonnes in 2013-14. Export of refined copper increased to 3,68,025 tonnes in 2014-15 from 2,56,230 tonnes in 2013-14. Export of refined copper was mainly to China (76%), Malaysia (8%), Mexico (6%) and UAE (4%). Export of copper and alloys (including brass & bronze) was at 4,59,468 tonnes in 2014-15 as against 3,33,082 tonnes in 2013-14. Exports of copper (scrap) were at 4,037 tonnes in 2014-15 as against 4,274 tonnes in 2013-14 (Tables-17 to 24).

Imports

The imports of copper in the country are in the form of copper ore & concentrates, refined copper, copper & alloys, brass & bronze, scrap, cement copper, mattes, blister, worked (bars, rods & plates) etc.

During the year 2014-15, imports of copper ores and concentrates decreased to 1.70 million tonnes as compared to 2.05 million tonnes in 2013-14. Chile with a share of 54% was the leading supplier followed by Australia (9%), Peru (8%), Indonesia (7%) and Brazil (5%). Imports of refined copper slightly increased in 2014-15 at 37,610 tonnes as against 37,505 tonnes in 2013-14. Congo (19%), Chile (18%), Malaysia (15%) and Zambia (11%) were the main supplier of refined copper. Out of total imports in 2014-15, copper & alloys comprised 2,98,966 tonnes and copper (scrap) 53,848 tonnes (Tables - 25 to 33).

Table – 17 : Exports of Copper Ores & Conc. (By Countries)

Country	2013-14		2014-15 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**38912**	**3349917**	**1**	**10**
Finland	-		1	9
UK	-	-	++	1
Other countries	38912	3349917	-	-

Table – 18 : Exports of Refined Copper (By Countries)

Country	2013-14		2014-15 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**256230**	**128975014**	**368025**	**149495704**
China	221164	112726939	280068	114722238
Malaysia	6621	3036733	31201	12135316
Mexico	14543	6307444	20756	8519295
UAE	1081	471616	16285	6537005
Singapore	++	66	6998	2558891
Vietnam	4044	2164126	5447	2216529
Saudi Arabia	-	-	2009	783990
Colombia	1535	683469	2047	764838
ChineseTaipei/ Taiwan	2705	1446750	1698	644955
Egypt	3356	1550141	998	402512
Other countries	1181	587730	518	210135

Table – 19 : Exports of Copper & Alloys (Including Brass & Bronze) : Total (By Countries)

Country	2013-14		2014-15 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**333082**	**171115615**	**459468**	**205662295**
China	229893	113996441	283808	115625197
UAE	14110	11248867	33701	23980906
Malaysia	8016	3739570	33318	13396122
Mexico	14646	6371921	20895	8604053
USA	11334	6377557	16996	8382561
Singapore	664	378712	8314	3857439
Saudi Arabia	4173	2373770	6334	3613374
UK	3731	1955191	3382	2348850
Germany	3404	1818667	4828	2329703
Vietnam	4073	2185202	5505	2243965
Other countries	39038	20669717	42387	21280125

Table – 20 : Exports of Copper (Scrap) (By Countries)

Country	2013-14		2014-15 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**4274**	**1477744**	**4037**	**1485483**
Germany	1140	395344	2064	730625
Japan	939	363847	566	209255
Spain	131	48639	344	148006
Philippines	40	15097	327	121767
China	393	167041	167	70095
Portugal	146	53049	146	55371
UK	-	-	92	34512
UAE	-	-	72	27689
Korea, Rep. of	783	290601	79	24039
Singapore	112	40110	43	16880
Other countries	590	104016	137	47244

Table – 21 : Exports of Copper & Alloys (By Countries)

Country	2013-14		2014-15 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**291593**	**144944444**	**417132**	**175342728**
China	228726	113493154	283161	115313807
Malaysia	6854	3153776	31924	12677913
UAE	5395	3314047	22789	11784905
Mexico	14609	6349202	20852	8571852
USA	3694	2434551	9690	4228566
Singapore	306	175189	7728	3171643
Vietnam	4061	2175352	5454	2222339
Saudi Arabia	2103	1075101	4404	2201638
Colombia	1874	917120	4542	1794328
Nepal	1508	587310	3011	1276861
Other countries	22463	11269642	23577	12098876

Table – 22 : Exports of Brass & Bronze (By Countries)

Country	2013-14		2014-15 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**36064**	**24295946**	**37019**	**28445803**
UAE	8584	7830591	10815	12161742
USA	7640	3942698	7303	4153259
Saudi Arabia	1732	1296222	1929	1411190
UK	2843	1380577	1764	1173209
Germany	1227	810868	1139	740245
Netherlands	933	476410	1160	702926
Singapore	231	140792	536	667959
Morocco	445	459637	476	613716
Malaysia	934	525529	860	569221
Iran	218	118063	484	332914
Other countries	11277	7314559	10553	5919422

Table – 23 : Exports of Brass & Bronze (Scrap) (By Countries)

Country	2013-14		2014-15 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**1053**	**328988**	**1228**	**355853**
Malaysia	228	60263	534	148988
Germany	25	6806	234	85068
China	159	40348	169	54577
Korea, Rep. of	-	-	118	31150
France	0	3	32	13382
Hong Kong	148	12973	98	10599
UAE	131	104229	25	6570
Oman	0	309	3	2237
Nepal	3	1415	3	1153
Singapore	2	1914	7	957
Other countries	357	100728	5	1172

Table – 24 : Exports of Copper (Cement Copper Precipitated) (By Countries)

Country	2013-14		2014-15 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**++**	**32**	**++**	**41**
Malta	-	-	**++**	41
Other countries	++	32	-	-

Table – 25 : Imports of Copper Ores & Concentrates (By Countries)

Country	2013-14		2014-15 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**2048240**	**332267404**	**1702247**	**285028249**
Chile	720126	129621894	927084	153102437
Australia	458304	70346127	157642	33691521
Indonesia	216439	43637934	115603	23463018
Peru	73061	11214712	131856	14129783
Canada	102210	14694481	87681	14062273
Brazil	131161	18921521	90929	14013835
Eritrea	-	-	63789	13016312
Botswana	1227	454085	24433	5011583
Lao, Pd. Rep.	12922	2240214	24724	3813330
Papua New Guinea	43200	6297135	21600	2945370
Other countries	289590	34839301	56906	7778787

Table – 26 : Imports of Refined Copper (By Countries)

Country	2013-14		2014-15 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**37505**	**16674310**	**37610**	**16010904**
Chile	345	155120	6710	3036702
Congo. P. Rep.	7470	3296883	7324	3014646
Malaysia	598	280733	5579	2347191
Zambia	18746	8342551	4041	1668149
Japan	429	221404	2998	1312243
China	2028	888451	2384	1003922
Tanzania	1182	538329	2156	944252
South Africa	411	177468	1842	782140
UAE	1758	744519	1513	615637
Congo, Dem. Rep.	1402	617849	1421	559883
Other countries	3136	1411003	1642	726139

Table – 27: Imports of Copper & Alloys (Including Brass & Bronze) : Total (By Countries)

Country	2013-14		2014-15 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**411649**	**176031866**	**490179**	**196576602**
UAE	96428	41085584	98410	39045124
Russia	47860	21798422	43485	18919023
Malaysia	28141	12799771	38274	16597263
Zambia	27802	12356490	34559	14216217
China	25685	11554988	28700	12448722
Germany	16631	7747248	24292	10210220
Saudi Arabia	22438	8479584	24854	8598667
Japan	6306	3568461	16579	7974627
Chile	9185	4551606	15890	6787523
Thailand	8227	3863312	14326	6711661
Other countries	122946	48226400	150810	55067555

Table – 28 : Imports of Copper & Alloys (By Countries)

Country	2013-14		2014-15 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**245712**	**116114787**	**298966**	**133578287**
UAE	62254	28040761	67094	28352754
Russia	47729	21731938	43450	18908540
Zambia	27802	12356490	34456	14173858
Malaysia	20410	9969961	29447	13620380
China	22441	10134968	24295	10590921
Chile	8979	4462417	15794	6752265
Japan	3327	1880615	13794	6413152
Thailand	5811	2920446	9933	5073604
Germany	4824	3467890	7649	4801092
Congo, P. Rep.	7470	3296883	10905	4463277
Other countries	34665	17852418	42149	20428444

Table – 29 : Imports of Copper (Scrap) (By Countries)

Country	2013-14		2014-15 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**56205**	**24219936**	**53848**	**21283695**
UAE	21241	9200702	16538	6603105
Saudi Arabia	13347	5815856	14021	5687812
Qatar	1580	692602	2774	1132558
Thailand	992	416814	2427	934945
Kuwait	3807	1706204	1834	749376
Malaysia	1662	710072	1462	594902
South Africa	660	287757	1675	538981
Jordan	865	381784	1055	408256
Bahrain	1238	557268	938	386121
USA	712	242353	1124	379274
Other countries	10101	4208524	10000	3868365

Table – 30 : Imports of Brass & Bronze (By Countries)

Country	2013-14		2014-15 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**22203**	**10457778**	**24359**	**10868131**
China	3155	1394065	4404	1857308
Malaysia	4229	1591671	5142	1769128
Germany	2547	1560682	2872	1650170
Japan	2979	1687845	2785	1561474
Nepal	1619	627945	1915	725542
Thailand	1137	455463	1572	589171
Chinese Taipei/Taiwan	934	356258	1237	498538
Korea, Rep. of	758	352295	788	357301
USA	555	297149	572	353854
UAE	1369	568821	890	325146
Other countries	2921	1565584	2182	1180499

Table – 31 : Imports of Brass & Bronze (Scrap) (By Countries)

Country	2013-14		2014-15 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**87529**	**25239365**	**113006**	**30846271**
UK	12958	3746028	19087	5103368
UAE	11564	3275300	13888	3764119
Germany	8518	2388075	12881	3442301
USA	4214	1307539	10044	2930298
Saudi Arabia	9033	2637478	10809	2901851
Poland	3784	1086671	4742	1248682
Switzerland	1880	541496	3383	919149
Spain	3199	896794	3325	891606
Netherland	1693	471883	2755	771296
Belgium	2351	671407	2467	686968
Other countries	28335	8216694	29625	8186633

Table – 32 : Imports of Copper (Cement Copper Precipitated) (By Countries)

Country	2013-14		2014-15 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	**++**	**1**	**5**	**3089**
Thailand	-	-	5	3009
Malaysia	-	-	++	80
Other countries	++	1	-	-

Table – 33 : Imports of Copper & Alloys (Excluding Brass & Bronze and Scrap) (By Items)

Item	2013-14		2014-15 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Items	**245712**	**116114787**	**298966**	**133578287**
Blister & Other Unrefined Copper	16776	7841388	37337	15279121
Copper & Alloys: worked (Bars, Rods, Plates, etc.)	48766	24042362	71533	33688427
Copper & Alloys: Worked, Nes	5858	4442143	6064	4866604
Copper & alloys: unwrought Excl, Brass & Bronze	1477	708177	1590	734872
Copper Mattes	5	3249	21	13652
Copper Powder & flakes	594	451776	653	457788
Copper Refined: Copper Worked	131361	60297978	132815	57843552
Electroplated Anode of Nickel	3341	1615432	11303	4638979
Master Alloys of Copper	29	37972	40	44388
Refined Copper	37505	16674310	37610	16010904

FUTURE OUTLOOK

With the liberalised policies of the Government, the Indian Copper Sector registered a quantum rise in production. The present installed capacity of refined copper has reached ten lakh tonnes per year. India's position has shifted from being a net importer of copper to a net exporter. The main demand for refined copper is in the Electrical and Electronic Sectors, Construction Sector, Consumer Durables and Transport Sector. The potential upcoming areas which are likely to boost the internal demand for copper are Infrastructure Development and Railways, Power Sector, especially Rural Electrification and Information Technology Sector. At the same time there are potential export markets for refined copper in the Middle-East and South-East Asian countries which could be further explored. However, growth in the Copper Sector is heavily dependent on demand from China.

As per the market survey carried out by Indian Bureau of Mines, the demand for copper by 2016-17 is estimated at one million tonnes based on sectorial growth of copper consumption.