

COPPER



Indian Minerals Yearbook 2017

(Part- II : Metals & Alloys)

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**GOVERNMENT OF INDIA
MINISTRY OF MINES
INDIAN BUREAU OF MINES**

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5 Copper

Copper is a soft, malleable, and ductile metal with very high thermal and electrical conductivity. copper is one of the few metals that occurs in nature in directly usable metallic form (native metals) and 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 for 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.

Hindalco Industries Ltd and Vedanta Limited are the major copper producers in the Private Sector that mainly rely on imported copper concentrates. These companies own copper mines in other countries.

RESERVES/ RESOURCES

The total reserves/resources of copper ore as on 1.4.2015 as per NMI database based on UNFC system are estimated at 1.51 billion tonnes. Of these, 207.77 million tonnes (13.74%) fall under

'reserves category' while the balance 1.30 billion tonnes (86.25%) are 'Remaining resources' category. Gradewise there are no reserves with 1.85% or more copper grade. However, 203.83 million tonnes reserves fall under 1% to below 1.85% Cu grade. Of the total ore resources 8.28 million tonnes (0.55%) comprise ore containing 1.85% Cu or more and 657.92 million tonnes (43.53%) resources fall under 1% to below 1.85% Cu grade.

The total metal content out of the total copper resources is 12.16 million tonnes of which 2.73 million tonnes constitute reserves.

Largest reserves/resources of copper ore to a tune of 813 million tonnes (53.81%) are in the state of Rajasthan followed by Jharkhand with 295 million tonnes (19.54%) and Madhya Pradesh with 283 million tonnes (18.75%). Copper reserves/resources in Andhra Pradesh, Gujarat, Haryana, Karnataka, Maharashtra, Meghalaya, Nagaland, Odisha, Sikkim, Tamil Nadu, Telangana, Uttarakhand and West Bengal accounted for remaining 7.9% of the total all India resources (Table-1).

EXPLORATION & DEVELOPMENT

The exploration & development of copper is furnished in the review on "Exploration & Development" in "General Reviews".

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**Table - 1: Reserves/Resources of Copper as on 1.4.2015
(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	162972	-	44796	207767	44925	31090	59209	158300	232654	772912	4640	1303730	
Metal	2127.9	-	606.72	2734.62	382.18	324.55	585.42	1950.87	2050.98	4100.36	29.17	9423.53	
By Grades													
Ore with 1.85% & Above Cu	-	-	-	-	-	62	-	2520	2645	2186	870	8283	
Ore With 1.00 % to below 1.85 % Cu	159595	-	44238	203834	30883	28798	42311	130591	78410	143098	-	454091	
Ore with (+)0.50% to below 1.00% Cu	3376	-	557	3934	3124	2230	2103	25189	91989	525510	3620	653764	
Ore with (-)0.50% Cu	-	-	-	-	10919	-	14795	-	59610	102118	150	187592	
Metal	2127.9	-	606.72	2734.62	382.18	324.55	585.42	1950.87	2050.98	4100.36	29.17	9423.53	
By States													
Andhra Pradesh													
Ore	-	-	-	-	686	-	105	-	5791	1000	-	7582	
Metal	-	-	-	-	6.88	-	1.05	-	97.45	8.32	-	113.7	
Arunachal Pradesh													
Ore	-	-	-	-	-	-	-	-	-	-	10	10	
Metal	-	-	-	-	-	-	-	-	-	-	0.02	0.02	
Gujarat													
Ore	-	-	-	-	2470	3010	1380	129	-	7131	-	14120	
Metal	-	-	-	-	30.13	36.72	29.04	0.69	-	113.38	-	209.96	
Haryana													
Ore	-	-	-	-	-	2230	-	-	-	30678	-	32908	
Metal	-	-	-	-	-	11.82	-	-	-	101.8	-	113.62	
Jharkhand													
Ore	5374	-	1940	7314	13195	24511	3990	101168	103484	41726	-	288074	
Metal	61.33	-	20.54	81.87	142.08	255.74	45.92	1183.99	1058.42	507.38	-	3193.53	
Karnataka													
Ore	314	-	557	872	64	-	2445	1750	6833	22701	-	33793	
Metal	3.52	-	4.19	7.71	0.49	-	16.04	22	65.77	117.49	-	221.79	
Madhya Pradesh													
Ore	141950	-	12580	154530	17400	-	-	31560	550	79389	-	128899	
Metal	1887.93	-	148.44	2036.37	189.66	-	-	320.84	4.13	867.5	-	1382.13	

(Contd.)

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Table - 1: (Concl.d.)

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	4841	150	14390	
Metal	-	-	-	-	-	-	-	-	89.65	47.48	0.54	137.67	
Meghalaya													
Ore	-	-	-	-	-	-	-	-	880	-	-	880	
Metal	-	-	-	-	-	-	-	-	9	-	-	9.00	
Nagaland													
Ore	-	-	-	-	-	-	-	-	-	2000	-	2000	
Metal	-	-	-	-	-	-	-	-	-	15.00	-	15.00	
Odisha													
Ore	-	-	-	-	-	-	-	1420	2536	2095	-	6051	
Metal	-	-	-	-	-	-	-	21.69	21.06	20.69	-	63.44	
Rajasthan													
Ore	15333	29718	45051	11110	228	51226	18603	102088	580541	4480	768276	813327	
Metal	175.12	433.55	608.67	12.94	3.29	492.46	338.66	699.24	2291.94	28.61	3867.14	4475.81	
Sikkim													
Ore	-	-	-	-	-	63	300	-	-	150	-	958	
Metal	-	-	-	-	-	0.91	8.47	-	-	4.23	-	21.47	
Tamil Nadu													
Ore	-	-	-	-	-	-	200	590	-	-	-	790	
Metal	-	-	-	-	-	-	1.08	2.73	-	-	-	3.81	
Telangana													
Ore	-	-	-	-	-	666	-	-	-	-	-	666	
Metal	-	-	-	-	-	9.12	-	-	-	-	-	9.12	
Uttarakhand													
Ore	-	-	-	-	-	-	3170	390	660	-	-	4220	
Metal	-	-	-	-	-	-	53.45	1.44	5.15	-	-	60.04	
West Bengal													
Ore	-	-	-	-	-	-	-	113	-	-	-	113	
Metal	-	-	-	-	-	-	-	2.09	-	-	-	2.09	

Figures rounded off.

PRODUCTION & PRICES

Copper Ore and Concentrates

The production of copper ore at 3.85 million tonnes in 2016-17 decreased by 2% as compared to that in the previous year.

The metal content in the ore produced in 2016-17 works out to 33,673 tonnes as against 34,535 tonnes in 2015-16. During the year under review, 3.83 million tonnes of ore was treated for obtaining copper concentrates as against 3.9 million tonnes in 2015-16 (Tables - 2, 3 & 4).

Production of copper concentrates at 1,34,788 tonnes in 2016-17 decreased by about 11% as compared to that in the previous year. Madhya Pradesh was the leading producer state of copper concentrates accounting for about 51% of the production during 2016-17, followed by Rajasthan with 42% and Jharkhand with 7% production. The number of reporting mines in 2015-16 was five as same as in the previous year (Tables- 5 to 6).

Grade Analysis

During the year, the average copper content in the ore produced was 0.88% Cu as same as that in the year 2015-16. All India average metal

content of ore treated during 2016-17 works out to 0.87% Cu and 0.89% Cu for 2015-16. The average copper content in the ore treated varies from state to state. It was 0.87% Cu in Jharkhand, 0.80% Cu in Madhya Pradesh and 1.01% Cu in Rajasthan. The average metal content in the concentrate produced works out to 23.74% Cu in 2016-17 as against 21.40% Cu in the previous year.

The average daily employment of labour in copper mines in 2016-17 was 2,820 as against 3,285 in the preceding year.

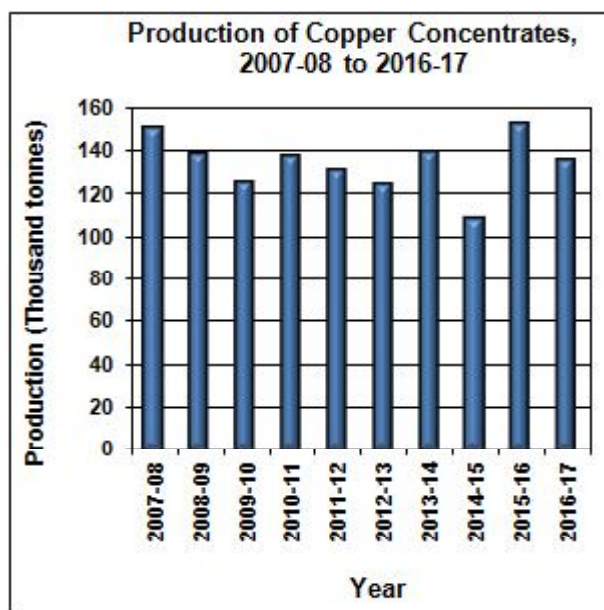
Copper Metal

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-7).

The production of copper blister decreased by 10% and copper continuous cast wire rods registered a decrease of 5% in 2016-17 as compared to the previous year. The production of copper cathodes also marginally decreased by 0.3 percent. Production of copper electrolytic wire bars was not reported for more than seven years (Tables-8 to 11). Prices of copper are furnished in the General Review on 'Prices'.

Table – 2: Principal Producer of Copper Concentrates, 2016-17

Name and address of the producer	Location of mine	
	State	District
Hindustan Copper Ltd, Tamra Bhavan, 1, Ashutosh Choudhury Avenue, Kolkata – 700 019. West Bengal.	Jharkhand	Singhbhum (East)
	Madhya Pradesh	Balaghat
	Rajasthan	Jhunjhunu



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**Table – 3: Production of Copper Ore, 2015-16 and 2016-17
(By States)**

(In tonnes)

State	2015-16			2016-17 (P)		
	Ore produced	Cu%	Metal content	Ore produced	Cu%	Metal content
India	3907823	0.88	34535	3846427	0.88	33673
Jharkhand	267251	0.88	2342	313856	0.87	2732
Madhya Pradesh	2536580	0.81	20546	2415330	0.81	19617
Rajasthan	1103992	1.06	11647	1117241	1.01	11324

**Table – 4: Copper Ore Treated, 2015-16 and 2016-17
(By States)**

(In tonnes)

State	2015-16			2016-17 (P)		
	Ore treated	Cu%	Metal content	Ore treated	Cu%	Metal content
India	3891715	0.89	34754	3832066	0.87	33160
Jharkhand	267145	0.88	2351	313101	0.87	2725
Madhya Pradesh	2507415	0.82	20561	2406210	0.80	19181
Rajasthan	1117155	1.06	11842	1112755	1.01	11254

**Table – 5: Production of Copper Concentrates, 2014-15 to 2016-17
(By States)**

(Quantity in tonnes; Value in `'000)

State	2014-15		2015-16		2016-17 (P)	
	Quantity	Value	Quantity	Value	Quantity	Value
India	107604	5289409	151837	6548318	134788	6403534
Jharkhand	5903	198641	8574	286142	9803	334348
Madhya Pradesh	57551	2480829	79281	3315629	68187	3023674
Rajasthan	44150	2609939	63982	2946547	56798	3045512

**Table – 6: Production of Copper Concentrates, 2015-16 and 2016-17
(By Sector/States/Districts)**

(Quantity in tonnes; Value in `'000)

State/District	No. of mines	2015-16		No. of mines	2016-17 (P)	
		Quantity	Value		Quantity	Value
India	5	151837	6548318	5	134788	6403534
Public Sector	5	151837	6548318	5	134788	6403534
Jharkhand	2	8574	286142	2	9803	334348
Singhbhum (East)	2	8574	286142	2	9803	334348
Madhya Pradesh	1	79281	3315629	1	68187	3023674
Balaghat	1	79281	3315629	1	68187	3023674
Rajasthan	2	63982	2946547	2	56798	3045512
Jhunjhunu	2	63982	2946547	2	56798	3045512

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Table – 7: Producers of Copper Metal, 2016-17

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, West Bengal.	Jharkhand	Singhbhum (East)
	Maharashtra	Raigad
Hindalco Industries Ltd, Century Bhawan, Dr. Annie Besant Road, Mumbai -400 030, Maharashtra.	Gujarat	Bharuch
Vedanta Ltd, Sesa Ghor, 20 EDC Complex, Patto, Panaji - 403 001, Goa.	Tamil Nadu	Thoothukudi
	Dadra & Nagar Haveli	Chinchpada (Silvassa)

Table – 8: Production of Copper Metal, 2014-15 to 2016-17

(In tonnes)

Year	Copper blister	Copper cathodes	Copper Electrolytic Wirebars	Copper CCWR
2014-15	16471	765568	-	337713
2015-16	16692	790372	-	389587
2016-17 (P)	14956	787657	-	371917

Table – 9: Production of Copper (Blister), 2015-16 and 2016-17 (By State/Plant)

(Quantity in tonnes)

State	Plant	2015-16		2016-17 (P)	
		Quantity	Value	Quantity	Value
India		16692	N.A.	14956	N.A.
Jharkhand	Surda ICC	16692	N.A.	14956	N.A.

Table – 10: Production of Copper (CCWR), 2015-16 and 2016-17 (By States/Plants)

(Quantity in tonnes; Value in `'000)

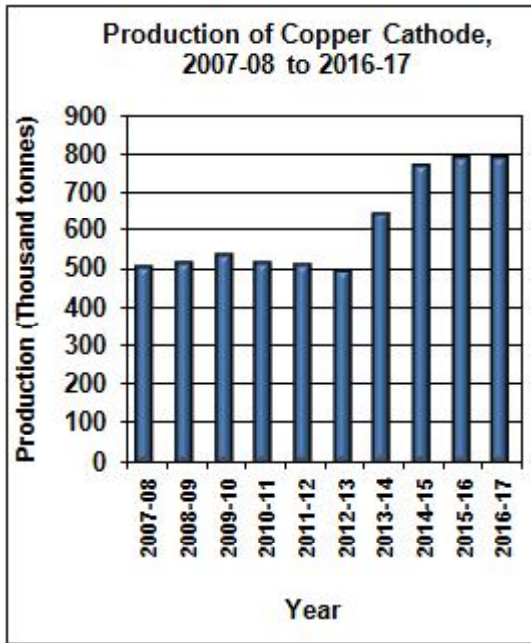
State	Plant	2015-16		2016-17 (P)	
		Quantity	Value	Quantity	Value
India		389587	135417380	371917	130233969
Gujarat	Hindalco	157514	59164704	147328	55157621
Maharashtra	HCL Taloja	21274	8087176	17059	6604148
Tamil Nadu	Vedanta Ltd	68684	22297900	71178	23499400
Dadra Nagar Haveli	Vedanta Ltd	142115	45867600	136352	44972800

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Table – 11: Production of Copper (Cathodes), 2015-16 and 2016-17 (By States/Plants)

(Quantity in tonnes; Value in `'000)

State	Plant	2015-16		2016-17 (P)	
		Quantity	Value	Quantity	Value
India		790372	265282521	787657	268895193
Gujarat	Hindalco	389301	135830439	377381	133930306
Jharkhand	Surda ICC	17026	6351282	7544	2798787
Tamil Nadu	Vedanta Ltd	201865	64792400	216119	70792800
Dadra Nagar Haveli	Vedanta Ltd	182180	58308400	186613	61373300



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.

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 about 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.

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 diameter 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 tonne 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. Independent waste handling system commissioned, deepening of production and service shaft had been initiated. During execution, bad ground / fault plane encountered at (-) 120 mRL near production shaft. Contract period ended on 14.1.2017. New contract for tacking bad ground for deepening of the existing shaft and other related activities are under process.

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. Further 2000 m of Diamond drilling work has been undertaken to establish the ore body at depth.

In the year 2016-17, the following underground mining operations as per the Annual Return were carried out in Kolihan mine. They are - Driving in ore 621 m, Cross Cutting/Footwall Drives (in barren) 739 m, Raising 186 m, Stope preparation 1567 m, etc.

In the year 2016-17, the following underground mining operations as per the Annual Return were carried out in Khetri mine. They are - Driving in ore 217 m, Cross Cutting/Footwall Drives (in barren) 650 m, Winzing 34 m, Raising 487 m, Shaft sinking 11 m, Stope preparation 1934 m, etc.

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 occurs 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 government orders pursuant to Hon'ble Supreme Court judgement on operation of mines on deemed renewal basis. Terms of References were received from Ministry of Environment & Forests (MoEF). Public hearing for Environment Clearance was held on 15.12.2015. Final EIA report prepared and being uploaded to MoEF website. The Plan envisages increase in the depth of the mine and enhancement of production capacity from 0.4 million tonnes per annum to 0.9 million tonnes per annum. On 19-20 September 2016, Expert Appraisal Committee of Ministry of Environment, Forest and Climate Change (MoEFCC) has recommended the proposal for Environment Clearance subject to clarification regarding forest clearance for forest land involved in underground mining. Matter is under scrutiny at Forest Clearance division of MoEFCC.

Company initiated action to re-open closed mines at Singhbhum Copper Belt of ICC namely, Kendadih and Rakha mines to produce 0.21 million tonnes and 1.5 million tonnes of ore per annum, respectively. Mine-wise status is given below:

1. Kendadih mine: The contract for reopening and allied mine development has been awarded to the successful bidder on 4.2.2012. Environmental clearance from MoEFCC obtained on 20.1.2015, Stage II FC for the project has been obtained on 28.11.2016.

2. Rakha mine: Considering the change in market scenario, the Company will implement the project through a mine developer-and-operator route. Environmental Clearance of Rakha mining lease obtained on 1.8.2014, Stage - II Forest Clearance for the project has been obtained on 15.9.2016.

3. Chapri Sideshwar (Jharkhand): Considering the change in market scenario, the Company will implement the project through a mine developer and operator route. Environmental clearance has been obtained on 1.8.2014, stage-II Forest Clearance obtained. Chapri-Sideshwar mine falls within the Rakha and Kedadih mining lease.

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 65⁰ to 75⁰ degree 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 m³ bucket capacity and hydraulic excavators having 5-10 m³ bucket capacity in combination with 60, 85 and 100 tonnes capacity

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

In the year 2016-17, the following opencast mining operations were carried out in the mine. They are - 1. in ore - Number of Benches 18, Average height 12 m, Depth of the deepest working from adjacent ground 240 m, and 2. in Overburden/Waste - Number of Benches 8, Average height 12 m, Depth of the deepest working from adjacent ground 240 m, etc.

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 redesigned 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. Sinking of north ventilation shaft and south ventilation shaft has commenced during the year. The activities are progressing to complete the project on schedule time of March 2020.

In the year 2016-17, the following underground mining operations were carried out in the mine. They are - Driving in ore 678 m, Shaft sinking 90 m, etc.

SMELTING

HCL has two smelting & refining plants at KCC and ICC with installed capacity of cathode 31,000 tonnes and 20,500 tonnes 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, Hindalco and 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 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 a plant with a capacity of 50,000 tonnes per annum copper cathodes. The total installed capacity of copper smelter in the country is one million tonne per annum. Details regarding capacity of copper smelter are given in Table-12.

Besides, continuous cast wire rod plants are operated by HCL, Sterlite and Hindalco. In addition, TDT formerly Alchemist Metals Ltd, Rewari, Haryana and 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 due to economic considerations since December, 2008.

ii) Indian Copper Complex (ICC)

ICC has the smelting & refining facility of 20,500 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

Table – 12 : 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. Sterlite Industries (India) Ltd, Thoothukudi, Tamil Nadu.	400
3. Hindalco Industries Ltd, Dahej, Distt. Bharuch, Gujarat.	500
4. Hindustan copper Ltd., (Formerly Jhagadia Copper Ltd), Distt. Bharuch, Gujarat.	50

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 shut down of Ghatsila Smelter & Refinery Plant for 75 days.

iii) 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 Bolidewen Contech AB), Sweden.

iv) 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.

v) New Development

The Company has plans to set up a plant of capacity 1.0 lakh tonne per annum to manufacture copper cathode through cost effective hydro-metallurgy technology. The site of the project has been finalised and investment in the project is ` 3,025 crore. The investment proposal after approval of the Board has been sent to the Ministry of Mines to obtain CCEA approval.

The Company has awarded contract to install and commission a commercial scale plant of capacity 3.3 million tonnes per annum at Malanjkhanda at cost of ` 200 crore to extract valuable minerals and metals from copper ore tailings.

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. Sterlite copper has two units in Silvassa in the Union Territory of Dadra & Nagar Haveli where it operates two copper Rods plants (one in Chinchpada and another in Piparia). Anodes from Thoothukudi are refined at Silvassa for domestic

market. 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.

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 metals 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 during the year 2016 is at 0.6 kg which is very low in comparison to countries like Russia 3.3 kg, China 5.4 kg, USA 5.5 kg, Italy 8.9 kg and Germany 13.6 kg. The average per capita consumption of copper in developed nations works out to 10 kgs. 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 2016-17, the exports of refined copper was more than the imports, and the availability of refined copper decreased from 5,03,263 tonnes in 2015-16 to 4,85,670 tonnes in 2016-17 (Table-13).

Table – 13: Apparent Availability of Copper for Domestic Consumption (Based on Production of Refined Copper, Imports and Exports)

(Quantity in tonnes)

Item	2015-16	2016-17(P)
I) Total Production* (Cathodes)	790372	787657
II) Total Imports (copper refined)	32492	35306
III) Total Exports (copper refined)	319601	337293
IV) Apparent Availability	503263	485670

* 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 fibre has substituted copper in some telecommunication applications and plastics are 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 790 million tonnes of copper content. Chile has the largest share, accounting for about 22% of world reserves, followed by Australia (11%), Peru (10%), Mexico & USA (6% each) and China (3%) (Table-14).

The world mine production of copper increased by 6.70% at 20.70 million tonnes in 2016 as compared to 19.40 million tonnes during previous year. Chile continued to be the largest single producer of copper in 2016 with 26.83% share followed by Peru (11.37%), China (8.94%), USA (7.06%) and Congo, Dem. P. R. (4.95%) (Table-15).

**Table – 14: World Reserves of Copper
(By Principal Countries)**

(Quantity in '000 tonnes of copper content)

Country	Reserves
World: Total (rounded off)	790000
Australia	88000
Canada	11000
Chile	170000
China	27000
Congo (Kinshasa)	20000
Indonesia	26000
Mexico	46000
Peru	81000
USA	45000
Zambia	20000
Other countries	260000

Source: Mineral Commodity Summaries, 2018.

**Table – 15: World Mine Production of Copper
(By Principal Countries)**

(In '000 tonnes of metal content)

Country	2014	2015	2016
World Total (rounded)	18600	19400	20700
Australia	979	996	948
Brazil	301	359	338
Canada	673	715	708
Chile	5761	5772	5553
China	1777	1770	1850
Congo, Dem. P.R.	1030	1039	1024
Indonesia	377	577	786
Iran	217	246	289
Kazakhstan	472	474	475
Mexico	515	594	766
Mongolia	252	314	508
Peru	1378	1701	2354
Poland	421	426	424
Russia	692	711	685
USA	1385	1416	1462
Zambia	707	719	774
Other countries	1636	1591	1751

Source: World Mineral Production, 2012-16.

World refined copper production was 23.05 million tonnes in the year 2015 which showed an increase of 0.6% from that of the previous year. China was the largest producer of refined copper with 7.96 million tonnes in the year 2015 (34.5% of world production) followed by Chile (11.6%), Japan (6.4%), USA (4.9%), and Russia (3.8%), etc.

The world consumption of refined copper was 22.65 million tonnes in the year 2015. China is the largest refined copper consuming country with 11.35 million tonnes (50.1% of world consumption) followed by USA (7.5%), Germany (5.4%), Japan (4.4%), and South Korea (3.1%).

International Copper Study Group (ICSG) estimated that world refined copper production would increase up to 23.6 million tonnes in 2017 and may further increase to 24.6 million tonnes in 2018. The ICSG expects world apparent demand in 2017 to remain essentially flat because China's apparent demand is expected to be flat (+0.5%). For 2017, the apparent growth in world demand is expected at around 1% with underlying Chinese Industrial demand growth expected at around 1%.

Argentina

Mine production at Argentina's only copper mine, the Alumbra Mine decreased by 40% to 61,800 tonnes in 2015 from 103,000 tonnes in previous year. Goldcorp cited higher gypsum content of ore, lower grindability of ore, and high stripping activity at the Bajo el Durazno pit as the reasons for the decrease in production.

Brazil

Copper mine production in Brazil increased significantly to 1,55,000 tonnes due to a 58% increase in copper output at the Salobo Mine (Vale S.A.) from 98,000 tonnes in 2014. Vale completed a mine and concentrator expansion project at Salobo in the first half of 2014, which doubled the mine's production capacity of copper in concentrate to 2,00,000 tonnes per annum.

Chile

The National Copper Corporation of Chile, a Chilean state-owned company, operated seven mines that produced a combined total of 1.7 million tonne of mined copper and accounted for 30% of total mined copper production in Chile. The Escondida

Mine (BHP Billiton Ltd, 57.5%; Rio Tinto plc, 30%; consortiums of Japanese of total mined copper production in Chile. The rest of Chile's mined copper output came from 17 other mines. The Ministro Hales Mine (Codelco), which began production in 2013, ramped up production by 69% to 2,38,000 tonnes in 2015 from 1,41,000 tonnes in 2014. In its second year of production, the Sierra Gorda Mine (KGHM International Ltd, 55%; Sumitomo Metal Mining, 31.5%; Sumitomo Corp., 13.5%) increased output to 87,900 tonnes from 12,700 tonnes in 2014. These production increases were partially offset by smaller decreases in output at a number of mines. Refined copper production decreased by 2% (41,000 tonnes) to 2.69 million tonnes due to a 4% decrease in electrowon production, which was partially offset by a 3% increase in electrolytically refined copper production

China

Mined copper output in China decreased by 4% in 2015 compared with that of 2014 as mines with higher production costs reduced output after copper prices fell midway through 2015. Smelter and refined copper production, however, increased by 6% and 4%, respectively, owing to increase in smelting capacity during the previous years. In response to falling copper prices, 10 leading Chinese copper producers agreed to cut refined copper production in 2016 by 3,50,000 tonnes. The copper producers also announced that they would close high-cost and outdated operations over the next several years and proposed that the Government of China undertake programme to support the copper industry, such as purchasing surplus copper production and suspending the issuance of licenses for new copper smelters.

Indonesia

Mine production in Indonesia increased by 54% owing to increased production at PT Freeport Indonesia's mines in the Grasberg minerals district and at PT Newmont Nusa Tenggara's Batu Hijau Mine. PT-FI increased production by 16% in 2015 from that of 2014 to 3,41,000 tonnes of recoverable copper (2,95,000 tonnes in 2014 and 4,21,000 tonnes in 2013). Production was interrupted in 2014 in response to a Government-

imposed export tax. In January 2014, the Government of Indonesia announced that exports of copper concentrate would be banned beginning in January 2017 and, from that time on, copper concentrates would need to be processed into metal before being exported. It was also announced that before January 2017, a gradually increasing export duty would be applied to copper concentrate.

PT-FI agreed to develop new copper smelting capacity in Indonesia and provided a \$115 million assurance bond to go towards the development of a copper smelter. PTNNT more than tripled mined copper output to 2,24,000 tonnes in 2015 (71,000 tonnes in 2014 and 73,000 tonnes in 2013) mainly due to higher ore grades as the company accessed phase 6 ore for the first full year and higher metal recovery and throughput.

In April 2014, Finders Resources Ltd (Australia) commissioned a 3,000 tonnes per annum SX-EW demonstration plant on Wetar Island and was in the process of building a 25,000 tonnes per annum SX-EW facility. By year end 2014, Finders Resources produced 1,400 tonnes of copper at Wetar, and in 2015 it produced 1,200 tonnes. The company projected that the mine would produce 1,55,000 tonnes of cathodes over a 10.5 years mine life.

In 2015, electrolytically refined copper production at PT Smelting (Mitsubishi Materials Corp., 60.5%; PT-FI, 25%; Mitsubishi Corporation Unimetals Ltd, 9.5%; JX Nippon Mining and Metals Corp., 5%), which was Indonesia's only electrolytic refinery, decreased by 14% to 1,98,000 tonnes from 2,32,000 tonnes in 2014. Operations at PT Smelting were suspended from July to September 2015 for maintenance work and, once production restarted, output was only 80% of capacity until November so that repairs could be made to an acid plant cooling tower.

Kazakhstan

The 1,00,000 tonnes (33%) increase in refinery production was thought to be a result of increased refinery production at the Zhezkazgan refinery, although reported production data were not available for that refinery for 2015. In October 2014, Kazakhmys plc (United Kingdom) completed restructuring that included selling some of its assets in Kazakhstan, including the Zhezkazgan

refinery to Cuprum Holding (the Netherlands). At that time, Kazakhmys changed its name to KAZ Minerals plc.

Mexico

The Buenavista Mine (Southern Copper Corp.) increased copper in concentrate output by 22% to 1,62,000 tonnes and electrowon output by 31% to 1,23,000 tonnes in 2015 and accounted for 58,000 tonnes of the 79,000 tonnes increase in total mine production in Mexico. Production increased at Buenavista as a result of a capital investment program, which added a third SX-EW plant in June 2014 and a new concentrator that began production in September 2015.

Mongolia

Oyu Tolgoi produced 2,02,000 tonnes of copper in 2015, 36% more than that in 2014 as the mine continued to ramp up production. Turquoise Hill forecast the mine's copper production to range between 1,75,000 and 1,95,000 tonnes in 2016.

Peru

The Antamina Mine (BHPBilliton, 33.75%; Glencore, 33.75%; Teck Resources Ltd, 22.5%; Mitsubishi Corp., 10%) increased copper in concentrate production by 13% to 3,91,000 tonnes in 2015 from 3,45,000 tonnes in 2014 due to higher mill throughput. Output of copper in concentrate at the Antapaccay Mine (Glencore) increased by 21% to 2,02,000 tonnes in 2015 from 1,67,000 tonnes in 2014 due to the restart of the Tintaya mill in May 2015. The Cerro Verde Mine (FCX, 53.56%; SMM Cerro Verde Netherlands B.V., 21.0%; Compania de Minas Buenaventura S.A.A., 19.58%; other shareholders, 5.86%) increased production of combined copper in concentrate and electrowon copper by 9% to 2,47,000 tonnes from 2,27,000 tonnes in 2014 due to the completion of a mine expansion project in September 2015. The Toromocho Mine (Chinalco Mining Corporation International), which was commissioned in 2013, ramped up production of copper in concentrate by 159% to 1,82,000 tonnes of copper in concentrate in 2015 compared with 70,300 tonnes in 2014.

The Constancia Mine (HudBay Minerals Inc.) began commercial production in the second quarter of 2015 and produced 1,06,000 tonnes of copper concentrate by year end. Hud Bay purchased the Constancia project in 2011, and the company projected that the mine would produce an average of 82,000 tonnes per annum of copper in concentrate over a mine life of 22 years.

FOREIGN TRADE

Exports

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

Exports of copper ores and concentrates almost doubled to 22,711 tonnes in 2016-17 as compared to 11,432 tonnes in 2015-16. China was the sole exporter country. Exports of refined copper increased to 3,37,293 tonnes in 2016-17 from 3,19,601 tonnes in 2015-16. Export of refined copper mainly to China (36.63%), Singapore (16.86%) and Malaysia (16.60%). Export of copper and alloys (including brass & bronze) was at 4,50,292 tonnes in 2016-17 as against 4,15,782 tonnes in 2015-16. Export of copper (scrap) were at 3,164 tonnes in 2016-17 as against 3,091 tonnes in 2015-16 (Tables-16 to 23).

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 2016-17, imports of copper ores and concentrates drastically decreased to 1.14 million tonnes as compared to 1.89 million tonnes in 2015-16. Chile with a share of 32.91% was the leading supplier followed by Indonesia (19.79%), Australia (15.40%), Peru (12.60%),

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Canada (6.19%) and Brazil (4.35%). Imports of refined copper increased in 2016-17 to 35,306 tonnes as against 32,492 tonnes in 2015-16. , Congo P Rep. (46%), Malaysia (16%) Japan (13%), Zambia (7%) and South Africa (6%) were the main supplier of refined copper. Out of total imports in 2016-17, copper & alloys comprised 4,58,731 tonnes and copper (scrap) 46,137 tonnes. (Tables - 24 to 32).

**Table – 16: Exports of Copper Ores & Conc.
(By Countries)**

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
All Countries	11432	712919	22711	1054322
China	11431	712910	22708	1053908
Iran	-	-	1	259
Germany	-	-	1	80
France	-	-	1	75
Finland	1	7	-	-
Netherlands	++	2	-	-

**Table – 17: Exports of Refined Copper
(By Countries)**

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
All Countries	319601	111740622	337293	118216457
China	213971	73875814	123559	44639441
Chinese Taipei/ Taiwan	8631	3053794	52639	19069114
Singapore	22496	7917257	56856	18986365
Malaysia	38307	14400164	56004	18403986
Korea, Rep. of	300	115681	12078	4792148
Oman	3618	1327689	9304	3066585
Indonesia	-	-	8581	2895268
Saudi Arabia	4791	1621523	8079	2602009
UAE	19271	6521045	6074	2277248
Thailand	3897	1435772	2163	810624
Other countries	4319	1471883	1956	673669

**Table – 18: Exports of Copper & Alloys
(Including Brass & Bronze) : Total
(By Countries)**

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
All Countries	415782	161726801	450292	175766074
China	219655	74889851	138202	47102679
UAE	31542	17012138	25350	20578523
Singapore	23650	8952773	57642	19664483
Chinese Taipei/ Taiwan	8996	3204767	52964	19200257
Malaysia	39840	15032550	57594	19021965
USA	15051	9369921	17965	9376545
Korea, Rep. of	5633	591035	18476	5851238
Saudi Arabia	9094	4329165	13584	5577875
Oman	4517	1757611	10317	3549517
Indonesia	305	109004	9091	3089042
Other countries	57499	26477986	49107	22753950

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**Table – 19: Exports of Copper (Scrap)
(By Countries)**

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	3091	985339	3164	900303
Japan	588	188585	1139	315049
Germany	882	241284	544	150515
Spain	74	25739	402	119087
UAE	411	133217	301	91833
Israel	-	-	264	78700
UK	127	42014	165	50051
Korea Rep. of	43	13110	139	37601
Italy	51	14602	84	23506
Portugal	77	20435	49	13913
China	317	122160	24	5456
Other countries	521	184193	53	14592

**Table – 20: Exports of Copper & Alloys
(By Countries)**

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	379489	137136898	405326	143055151
China	219031	74575742	135446	45990422
Singapore	22915	8112141	57141	19116972
Chinese Taipei/ Taiwan	8786	3123530	52703	19102409
Malaysia	38729	14638505	56233	18524545
UAE	23978	9443533	13213	6254424
Korea, Rep. of	5368	520555	16568	5167368
USA	7986	4699994	11266	4924768
Saudi Arabia	7074	2788028	11734	4143823
Oman	4291	1632560	10124	3440365
Indonesia	221	75232	9054	3071742
Other countries	41110	17527078	31844	13318313

**Table – 21: Exports of Brass & Bronze
(By Countries)**

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	31917	23316757	40008	31407198
UAE	7135	7431763	11834	14231800
USA	7065	4669604	6699	4451699
Saudi Arabia	2020	1540773	1850	1433997
UK	1836	1269442	1703	1254272
China	307	191949	2615	1081505
Germany	1201	754453	1334	814111
Netherlands	1145	625498	1118	658186
Korea Rep. of	25	15893	1423	571511
Singapore	728	836968	501	547433
Iran	469	311553	758	510668
Other countries	9986	5668861	10173	5852016

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

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	1285	287807	1794	403422
Malaysia	686	157850	900	207347
Korea, Rep. of	197	41477	346	74758
Germany	190	57121	245	70658
China	-	-	117	25296
Hong Kong	165	16051	142	15526
UK	++	2	42	9128
UAE	18	3625	2	466
Singapore	7	3664	++	78
USA	-	-	++	78
Saudi Arabia	++	160	++	55
Other countries	22	7857	++	32

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**Table – 23: Exports of Copper
(Cement Copper Precipitated)
(By Countries)**

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
All Countries	13	7520	-	-
Thailand	13	7520	-	-

**Table – 24: Imports of Copper Ores & Concentrates
(By Countries)**

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
All Countries	1886199	262965391	1143216	182986972
Chile	730694	105454397	376236	61146504
Indonesia	252949	41733553	226271	40834076
Australia	198170	28087129	176152	23801022
Peru	92409	12129995	144013	23246802
Brazil	155803	16930280	49733	8390173
Lao, PD. Rep	32792	3536507	59854	5466185
Saudi Arabia	11980	1372734	31964	4863230
Canada	148448	20068679	20805	4395782
Congo D. Rep	-	-	9476	2858617
Argentina	-	-	21680	2707538
Other countries	262954	33652117	27032	5277043

**Table – 25: Imports of Refined Copper
(By Countries)**

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
All Countries	32492	12201780	35306	12084110
Congo P. Rep.	5820	2233127	16376	5519317
Malaysia	5274	1940834	5708	1987003
Japan	10253	3741835	4514	1621931
Zambia	127	46117	2565	872425
South Africa	1104	378353	2196	715081
UAE	2003	674863	850	276297
Congo Dem. Rep.	562	220972	590	192616
Tanzania	1052	370113	410	131303
Singapore	184	75305	350	128619
Austria	332	137838	315	119613
Other countries	5781	2382424	1432	519905

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**Table – 26: Imports of Copper & Alloys
(Including Brass & Bronze) : Total
(By Countries)**

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
All Countries	619885	215201921	656057	227236243
Zambia	92613	29168207	132854	44747179
UAE	103616	35718559	97165	33224694
Malaysia	62469	23118170	68925	25538020
Vietnam	19030	7544338	36835	14114933
China	25628	10695518	28584	11683375
Thailand	18613	7620399	27904	11068633
Indonesia	13356	5098353	24701	9299286
Saudi Arabia	27640	8743978	27511	8126334
Germany	24852	9255582	21308	7598868
USA	18791	6208609	20113	6286676
Other countries	213277	72030208	170157	55548245

**Table – 27: Imports of Copper & Alloys
(By Countries)**

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
All Countries	409387	154428567	458731	171225797
Zambia	92613	29168207	132851	44746445
UAE	74221	26960949	72455	26197412
Malaysia	50031	19599606	58835	22624684
Vietnam	18973	7515706	36681	14057756
Thailand	14813	6277670	25928	10379003
China	19396	8947454	23876	9561975
Indonesia	13110	5020359	24427	9197849
Congo P Rep	11718	4371386	16376	5519317
Russia	51462	18873619	12661	4379379
Korea, Rep. of	4713	2050640	8088	3237994
Other countries	58337	25642971	46553	21323983

COPPER

**Table – 28: Imports of Copper (Scrap)
(By Countries)**

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
All Countries	58777	20062952	46137	15209011
Saudi Arabia	18057	6390121	14881	5134172
UAE	17634	5848600	12657	4129670
Qatar	2765	992525	2086	745027
Kuwait	3248	1098283	1435	491982
Malaysia	1655	563674	1411	484721
UK	884	273692	1595	439018
Togo	292	103326	1166	376527
Ghana	542	190047	1083	366413
South Africa	2034	672616	1131	366136
USA	1110	289136	914	283745
Other countries	10556	3640932	7778	2391600

**Table – 29: Imports of Brass & Bronze
(By Countries)**

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
All Countries	28597	10903116	26101	10969804
China	6232	1748064	4688	2116859
Malaysia	6163	1859814	6108	1804191
Japan	1695	914233	3459	1745615
Germany	2703	1403098	2604	1375479
Thailand	1562	559871	1790	631806
Korea, Rep. of	1404	593798	1351	590799
Nepal	1828	625746	1625	531153
USA	2075	1040727	297	402361
Chinese Taipei/Taiwan	1409	463600	918	321218
Italy	315	197030	355	207537
Other countries	3211	1497135	2906	1242786

COPPER

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

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
All Countries	123124	29807286	125088	29831631
UK	22668	5395901	20297	4684078
USA	14005	3557830	17328	4278925
Germany	13787	3260318	13323	3051222
Saudi Arabia	9577	2351164	12515	2952276
UAE	11406	2787642	11509	2705336
Netherlands	3979	956415	4708	1138399
Poland	3363	778739	4628	1067462
Finland	1648	418062	1711	1017978
South Africa	2478	599880	3730	857733
Malaysia	4620	1095076	2571	624424
Other countries	35593	8606259	32768	7453798

**Table – 31: Imports of Copper (Cement Copper Precipitated)
(By Countries)**

Country	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
All Countries	-	-	++	31
USA	-	-	++	30
Singapore	-	-	++	1

COPPER

**Table – 32: Imports of Copper & Alloys
(Excluding Brass & Bronze and Scrap)
(By Items)**

Item	2015-16 (R)		2016-17 (P)	
	Qty (t)	Value (` '000)	Qty (t)	Value (` '000)
All items	409387	154428567	458731	171225797
Blister & Other Unrefined Copper	88791	27906081	80545	27811649
Copper & Alloys :Worked (Bars,Rods,Plates,Etc)	72470	31265623	78930	32285049
Copper & Alloys :Worked,Nes	6340	5322649	4798	4359813
Copper Alloys:Unwrought Excl. Brass & Bronze	1600	628065	1466	562290
Copper Mattes	15	9810	110	27517
Copper Powder & Flakes	748	471735	769	484164
Copper Refined Copper Worked	187673	70001299	202335	74734803
Electroplated Anode Of Nickel	19026	6582214	54452	18847191
Master Alloys Of Copper	232	39310	20	29211
Refined Copper	32492	12201781	35306	12084110

FUTURE OUTLOOK

HCL, a sole public sector company has taken up an expansion projects of its mines namely Malanjhand, Khetri, Kolihan, etc.e as well as extraction of copper metal & other associated metals from ores and tailing also which is going to be completed by 2020. Further, increased urbanisation in India from 30% to 34% by 2020 and beyond is likely to push the demand for copper higher. Thus, copper demand in India should grow at 6% to 7% per annum over the coming two decades. It will be continuously met by a combination of improving technology, exploration of newer deposits and recycling, as

copper does not lose any of its physical and chemical properties on recycling. As per Government publication "Technology Roadmap Materials", India could be the 2nd largest copper market by 2025, with a market size of 2.7 million tonnes pegged Government of India has as the Electrical Sector growth rate at 12-15%, Transport Sector at growth rate of 45%, Air conditioning & Refining Sector at 10% growth rate and other newer sector (copper motor rotor, medical gas supply, water meters, desalination, tubing in geothermal heat pumps, solar heating system, etc.) at 15% growth rate.