Indian Minerals Yearbook 2018

(Part- II :Metals and Alloys)

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COPPER

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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 the 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 and development details, if any, are given in the review on "Exploration & Development" in "General Reviews".

PRODUCTION & PRICES

Copper Ore and Concentrates

The production of copper ore at 3.68 million tonnes in 2017-18 decreased by 4% as compared to that in the previous year.

The metal content in the ore produced in 2017-18 works out to 33,359 tonnes as against 33,582 tonnes in 2016-17. During the year under review, 3.70 million tonnes of ore was treated for obtaining copper concentrates as against 3.83 million tonnes in 2016-17 (Tables - 2 to 4).

Production of copper concentrates at 1,41,863 tonnes in 2017-18 increased by about 5% as compared to that in the previous year. Madhya Pradesh was the leading producer state of copper concentrates, accounting for about 53% of the production during 2017-18, followed by Rajasthan with 43% and Jharkhand with 4 percent. The number of reporting mines in 2017-18 was five as same as in the previous year (Tables- 5 & 6).

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**	**1511498**
Metal	**2127.9**	**-**	**606.72**	**2734.62**	**382.18**	**324.55**	**585.42**	**1950.87**	**2050.98**	**4100.36**	**29.17**	**9423.53**	**12158.15**
By Grades													
Ore with 1.85% & Above Cu	-	-	-	-	-	62	-	2520	2645	2186	870	8283	8283
Ore With 1.00 % to below 1.85 % Cu	159595	-	44238	203834	30883	28798	42311	130591	78410	143098	-	454091	657925
Ore with (+)0.50% to below 1.00% Cu	3376	-	557	3934	3124	2230	2103	25189	91989	525510	3620	653764	657698
Ore with (-)0.50% Cu	-	-	-	-	10919	-	14795	-	59610	102118	150	187592	187592
Metal	2127.9	-	606.72	2734.62	382.18	324.55	585.42	1950.87	2050.98	4100.36	29.17	9423.53	12158.15
By States													
Andhra Pradesh													
Ore	-	-	-	-	686	-	105	-	5791	1000	-	7582	7582
Metal	-	-	-	-	6.88	-	1.05	-	97.45	8.32	-	113.7	113.7
Arunachal Pradesh													
Ore	-	-	-	-	-	-	-	-	-	-	10	10	10
Metal	-	-	-	-	-	-	-	-	-	-	0.02	0.02	0.02
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	-	-	-	101.8	-	113.62	113.62
Jharkhand													
Ore	5374	-	1940	7314	13195	24511	3990	101168	103484	41726	-	288074	295389
Metal	61.33	-	20.54	81.87	142.08	255.74	45.92	1183.99	1058.42	507.38	-	3193.53	3275.4
Karnataka													
Ore	314	-	557	872	64	-	2445	1750	6833	22701	-	33793	34665
Metal	3.52	-	4.19	7.71	0.49	-	16.04	22	65.77	117.49	-	221.79	229.5
Madhya Pradesh													
Ore	141950	-	12580	154530	17400	-	-	31560	550	79389	-	128899	283429
Metal	1887.93	-	148.44	2036.37	189.66	-	-	320.84	4.13	867.5	-	1382.13	3418.5

(Contd.)

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	4841	150	14390	14390
Metal	-	-	-	-	-	-	-	-	89.65	47.48	0.54	137.67	137.67
Meghalaya													
Ore	-	-	-	-	-	-	-	-	880	-	-	880	880
Metal	-	-	-	-	-	-	-	-	9	-	-	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	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	-	-	-	-	-	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.

Grade Analysis

During the year 2017-18, the average copper content in the ore produced was 0.91% Cu as against 0.87% in the previous year. All India average metal content of ore treated during the year works out to 0.91% Cu in 2017-18 as compared to 0.87% Cu for 2016-17. The copper content in the ore treated varies from state to state. In 2017-18 it was 0.84% Cu in Jharkhand, 0.88% Cu in Madhya Pradesh and 0.97% Cu in Rajasthan. The average metal content in the concentrate produced works out to 22.43% Cu in 2017-18 as against 22.01% Cu in the previous year.

The average daily employment of labour in copper mines in 2017-18 was 2,586 as against 2,791 in the preceding year.

Copper Metal

Hindustan Copper Ltd produces copper metal from the ore produced at their captive mines. Vedanta Limited (formerly known as Sterlite Industries (India) Ltd.) and Hindalco Industries Ltd produce copper metal from imported copper concentrates (Table-7).

The production of copper blister decreased by 2% and copper continuous cast wire rods registered an increase of 2% in 2017-18 as compared to the previous year. The production of copper cathodes increased by 5%. 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: Producer of Copper Concentrates, 2017-18

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

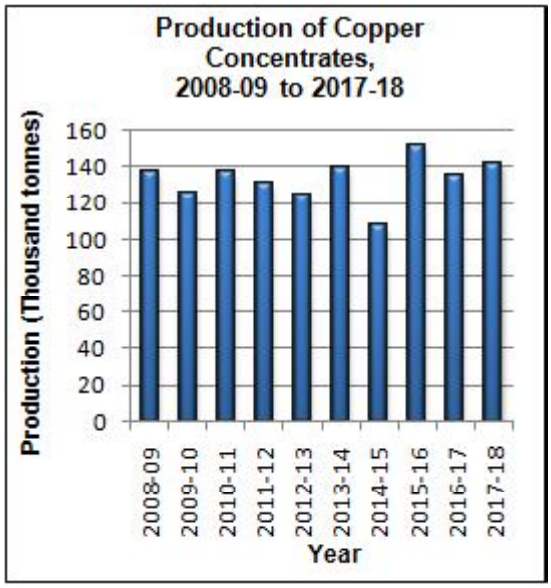


Table – 3: Production of Copper Ore, 2016-17 and 2017-18 (By States)

(In tonnes)

State	2016-17			2017-18 (P)		
	Ore produced	Cu%	Metal content	Ore produced	Cu%	Metal content
India	**3846427**	**0.87**	**33582**	**3678846**	**0.91**	**33359**
Jharkhand	313856	0.87	2719	178700	0.84	1507
Madhya Pradesh	2415330	0.81	19564	2339035	0.88	20643
Rajasthan	1117241	1.01	11299	1161111	0.97	11209

Table – 4: Copper Ore Treated, 2016-17 and 2017-18 (By States)

(In tonnes)

State	2016-17			2017-18		
	Ore treated	Cu%	Metal content	Ore treated	Cu%	Metal content
India	**3826066**	**0.87**	**33164**	**3697916**	**0.91**	**33509**
Jharkhand	313101	0.87	2724	167006	0.85	1420
Madhya Pradesh	2400210	0.80	19201	2372110	0.88	20887
Rajasthan	1112755	1.01	11239	1158800	0.97	11202

Table – 5: Production of Copper Concentrates, 2015-16 to 2017-18 (By States)

(Quantity in tonnes; Value in `'000)

State	2015-16		2016-17		2017-18	
	Quantity	Value	Quantity	Value	Quantity	Value
India	**151837**	**6548318**	**134787**	**6506133**	**141863**	**7742763**
Jharkhand	8574	286142	9802	332320	5072	173106
Madhya Pradesh	79281	3315629	68187	3128301	75479	3522250
Rajasthan	63982	2946547	56798	3045512	61312	4047407

Table – 6: Production of Copper Concentrates, 2016-17 and 2017-18 (By Sector/States/Districts)

(Quantity in tonnes; Value in `'000)

State/District	2016-17			2017-18		
	No. of mines	Quantity	Value	No. of mines	Quantity	Value
India	**5**	**134787**	**6506133**	**5**	**141863**	**7742763**
Public Sector	5	134787	6506133	5	141863	7742763
Jharkhand	**2**	**9802**	**332320**	**2**	**5072**	**173106**
Singhbhum (East)	2	9802	332320	2	5072	173106
Madhya Pradesh	**1**	**68187**	**3128301**	**1**	**75479**	**3522250**
Balaghat	1	68187	3128301	1	75479	3522250
Rajasthan	**2**	**56798**	**3045512**	**2**	**61312**	**4047407**
Jhunjhunu	2	56798	3045512	2	61312	4047407

Table – 7: Producers of Copper Metal, 2017-18

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 Maharashtra	Singhbhum (East) 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 Dadra & Nagar Haveli	Thoothukudi Chinchpada (Silvassa)

Table – 8: Production of Copper Metal, 2015-16 to 2017-18

(In tonnes)

Year	Copper blister	Copper cathodes	Copper Electrolytic Wirebars	Copper CCWR
2015-16	16692	790372	-	389587
2016-17	14956	787657	-	371917
2017-18 (P)	14611	830524	-	380489

Table – 9: Production of Copper (Blister), 2016-17 and 2017-18 (By State/Plant)

(Quantity in tonnes; Value in `'000)

State	Plant	2016-17		2017-18 (P)	
		Quantity	Value	Quantity	Value
India		**14956**	**N.A.**	**14611**	**N.A.**
Jharkhand	Surda ICC	14956	N.A.	14611	N.A.

Table – 10: Production of Copper (CCWR), 2016-17 and 2017-18 (By States/Plants)

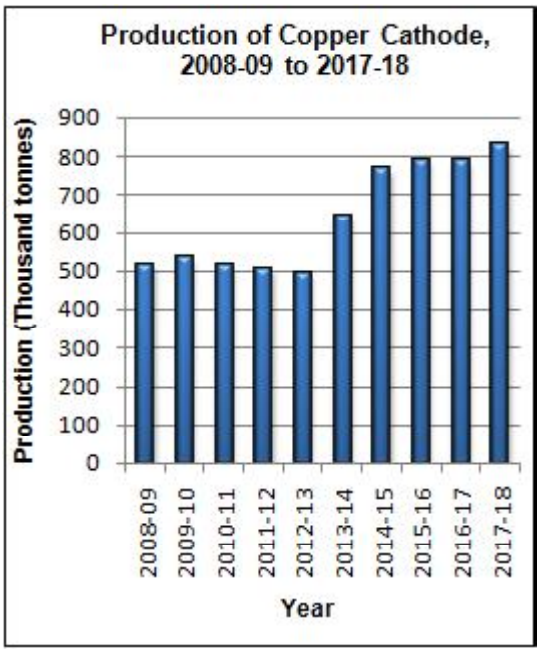
(Quantity in tonnes; Value in `'000)

State	Plant	2016-17		2017-18	
		Quantity	Value	Quantity	Value
India		**371917**	**130233969**	**380489**	**160838279**
Gujarat	Hindalco	147328	55157621	155720	68686752
Maharashtra	HCL Taloja	17059	6604148	22233	10050727
Tamil Nadu	Vedanta Ltd	71178	23499400	67205	27176700
Dadra & Nagar Haveli	Vedanta Ltd	136352	44972800	135331	54924100

Table – 11: Production of Copper (Cathodes), 2016-17 and 2017-18 (By States/Plants)

(Quantity in tonnes; Value in `'000)

State	Plant	2016-17		2017-18 (P)	
		Quantity	Value	Quantity	Value
India		**787657**	**268895193**	**830524**	**342132570**
Gujarat	Hindalco	377381	133930306	413808	173741540
Jharkhand	Surda ICC	7544	2798787	13280	6059130
Tamil Nadu	Vedanta Ltd	216119	70792800	217020	87126300
Dadra & Nagar Haveli	Vedanta Ltd	186613	61373300	186416	75205600



MINING & MILLING

HCL's mines and plants are spread across five 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, Taloja Copper Project (TCP) at Taloja in Maharashtra and Gujarat Copper Project (GCP) at Jhagadia in Gujarat. HCL operates four 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.

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 9m 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 diameter machine. Trough, sill and crown pillar drilling are done by drifter machine. Sequence of blasting remains the same as in the sub-level open stoping method.

The proposed expansion of Khetri and Kolihan mine and development of Banwas deposit will increase ore production from existing 1.1 to 5.0 million tonnes per annum in two phases. Mine wise status is given below:

At Kolihan mine, additional shaft sinking & creation of ore handling facilities below 0 mRL environmental clearance obtained on 2.2.2015. Further, 2000m of Diamond drilling work has been under taken to establish the ore body at depth and tendering activities has also been undertaken.

At Khetri mine, the Engineering Procurement & Construction agency for executing the Khetri mine expansion project had started the work on 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 (-)120mRL near production shaft and other related activities are under process.

At Banwas Mine, Mine construction work has been completed in February, 2017. The Company has appointed M/s SMS Nagpur mine developer and operation agency for long term operation of the Banwas where production ramped up has commenced.

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

The Indian Copper Complex (ICC) comprises mines, beneficiation plant and smelting & refining facility. 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 Plan envisages increase in the depth of the mine and enhancement of production capacity from 0.4 million tonnes per annum to 1.0 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 2.5 million tonnes of ore per annum, respectively. Mine-wise status is given below:

Kendadih mine was re-opened in December, 2017 after all the mining equipping work including mine dewatering work was completed. Mine development work is in progress and Environmental clearance from MoEFCC obtained on 20.1.2015, Stage II F C for the project has been obtained on 28.11.2016.

At Rakha mine, considering the change in market scenario, the Company will implement the project through a EPC 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.

Chapri-Sideshwar mine falls within the Rakha and Kedadih mining lease area. The project is under tendering stage which is to be implemented on EPC route.

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 64% 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 are 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.

At Malanjkhand Copper Project, work is under progress to expand the production capacity of Malanjkhand mine from present 2 million tonnes per annum to 5 million tonnes per annum (2^{nd} phase to 8 million tonnes per annum by FY 23-24) by developing an underground mine below the existing open cast mine at an estimated cost of `1856.74 crore (upto ` 2900 crore in 2^{nd} phase). All the approval are in place, Environment Clearance and approval of National Board for Wild Life have been obtained in 2014-15 and EPC contractor for implementation of the project has been appointed. Scheduled Completion date is April, 2020. Progress so far, sinking of Service Shaft has been completed and production Shaft is up to 643 meters. The development work of North Decline and South Decline is upto 2025 meters and 1308 meters respectively.

SMELTING

HCL has two primary 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 has one secondary copper smelter in Bharuch district, Gujarat and is capable of producing 50,000 tonnes per annum of copper cathode conforming to LME-A grade. 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.

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. Company-wise the details of copper smelters and refineries are given below:

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 tonnes refined copper per annum. 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 tonnes per annum wire bar casting plant, 54,000 tonnes per annum 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. In 2017-18, Copper cathode production at ICC was 13.3 thousand tonnes which is 76% more than previous year.

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 at through secondary route based on Outokumpu Technology AB (formerly Bolidewn 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, 16 mm and 19.6 mm diameters and meets most precise standards conforming to ASTM B 49/2010 &/ or IS 12444/1988. The plant commenced commercial production in April 1991. The installed capacity could further be increased to 80,000 tonnes per annum 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 tonnes 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 proposal is under scrutiny of the Ministry.

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

The company is in advance stage of erection of Copper Ore Tailing (COT) recovery facility of capacity 3.3 million tonnes per annum to recover the valuable metals and minerals from the tailing and reduce the mass in the existing tailing storage facility (TSF) so as to extend active life of TSF and unlock the value in the waste/ Tailing at Malajkhand Copper Project(MCP). A contract has been awarded for the construction of the plant on EPC mode at a cost of ` 200 crore. It was expected that the plant would be commissioned by June, 2018.

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. Sterlite Copper Plant at Tuticorin has been closed since May, 2018 on State Govt. order.

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,Canada, Saudi Arabia and Mexico, etc.

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 13.05.2010, there were 35 units operating in different states with a combined capacity of 2.42 lakh per annum for handling different types of scrap.

In addition, there are 132 units with combined capacity of 5.17 lakh tonnes per annum which recover copper along with other metals. As per the estimates made recently published Market Survey on Copper by IBM, production of 1.07 lakh tonnes per annum of secondary copper was reported and all of which have been in organised sector in the country. capacity of 2.42 lakh per annum for handling different types of scrap.

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USES

The per capita consumption of copper in India during the year 2017 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 nation as works out to 10 kg. 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 speeds using less energy, and 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 has 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 has not been considered for arriving at apparent availability of copper. During 2017-18, the exports of refined copper were more than the imports, and the availability of refined copper increased from 4,85,670 tonnes in 2016-17 to 4,96,214 tonnes in 2017-18 (Table-13).

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

(Quantity in tonnes)

Item	2016-17	2017-18 (P)
I) Total Production* (Cathodes)	787657	830524
II) Total Imports (copper refined)	35306	44244
III) Total Exports (copper refined)	337293	378554
IV) Apparent Availability	485670	496214

* *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 830 million tonnes of copper content. Chile has the largest share, accounting for about 20% of world reserves, followed by Australia (11%), Peru (10%), Russia (7%), Indonesia, Mexico & USA (6% each) and China (3%) (Table-14).

The world mine production of copper decreased by 2.41% at 20.2 million tonnes of metal content in 2017 as compared to 20.7 million tonnes of metal content during previous year. Chile continued to be the largest single producer of copper in 2017 with 27% share followed by Peru (12%), China (8%), USA (6%) and Congo, Dem. R. (5%) (Table-15).

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

(Quantity in '000 tonnes of copper content)

Country	Reserves
World: Total (rounded off)	**830000**
Australia[a]	88000
Chile	170000
China	26000
Congo (Kinshasa)	20000
Indonesia	51000
Mexico	50000
Peru	83000
Russia	61000
USA	48000
Zambia	19000
Other countries	210000

Source: *Mineral Commodity Summaries, 2019, USGS*

(a) For Australia, Joint Ore Reserves Committee Compliant reserves were about 24 million tonnes.

World refined copper production was 23.4 million tonnes in the year 2017 which showed an increase of 1.4% from that of the previous year. China was the largest producer of refined copper with 8.9 million tonnes in the year 2017 (38% of world production) followed by Chile (10%), Japan (6%), USA (5%), and Russia (4%), etc.

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

(In '000 tonnes of metal content)

Country	2015	2016	2017
World Total	**19400**	**20700**	**20200**
Australia	996	948	860
Brazil	359	338	384
Canada	715	693	595
Chile	5772	5553	5504
China	1712	1900	1706
Congo, Dem.R.	1039	1024	1095
Indonesia	579	728	622
Iran	246	289	296
Kazakhstan	474	475	545
Mexico	594	766	742
Mongolia	318	516	475
Peru	1701	2354	2446
Poland	426	424	420
Russia	711	702	705
USA	1416	1462	1290
Zambia	711	763	797
Other countries	1631	1765	1718

Source: *World Mineral Production, 2013-17, BGS.*

The world consumption of refined copper was 23.3 million tonnes in the year 2017. China is the largest refined copper consuming country with 11.8 million tonnes (51% of world consumption) followed by USA (8%), Germany (5%), Japan (4%), and Korea Rep. of. (3%).

International Copper Study Group (ICSG) estimated that world refined copper production would increase up to 24.8 million tonnes in 2019 and may further increase to 26.2 million tonnes in 2020. The ICSG expects world apparent demand is expected to increase by 2% in 2019 and 1.5% in 2020. Sustain growth in copper demand is expected to continue because copper is essential to economic activity and even more so to the modern technological society. Infrastructure development in major countries such as China and India and the global trend towards cleaner energy will continue to support copper demand.

Generalised view of the development in various countries is presented below with information on the country-wise description sourced from latest available publication of Minerals Yearbook of 'USGS' 2015.

Argentina

Mine production at Argentina's only copper mine, the Alumbrera 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 tonnes 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 to 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 undertakes 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 more than doubled to 61,005 tonnes in 2017-18 as compared to 22,711 tonnes in 2016-17. China was the major exporter country (Almost 100%). Exports of refined copper increased to 3,78,554 tonnes in 2017-18 from 3,37,293 tonnes in 2016-17. Export of refined copper mainly to China (63%), Malaysia (11%), Korea, Rep. of (7%) and Singapore & UAE (6% each). Export of copper and alloys (including brass & bronze) was at 5,11,463 tonnes in 2017-18 as against 4,50,292 tonnes in 2016-17. Export of copper (scrap) was at 3,272 tonnes in 2017-18 as against 3,164 tonnes in 2016-17 (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 2017-18, imports of copper ores and concentrates increased to 1.49 million tonnes as compared to 1.14 million tonnes in 2016-17. Chile with a share of 43% was the leading supplier followed by Peru (14%), Indonesia (12%), Brazil & Canada (8% each), Australia (7%), etc. Imports of refined copper increased in 2017-18 to 44,244 tonnes as against 35,306 tonnes in 2016-17. Japan was the leading supplier of refined copper with share of 57% followed by Congo P Rep. (18%), Malaysia (11%), Zambia (5%), etc. Out of total imports in 2017-18, copper & alloys comprised 5,32,741 tonnes and copper (scrap) 45,834 tonnes (Tables - 24 to 32).

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

Country	2016-17		2017-18	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**22711**	**1054322**	**61005**	**3805458**
China	22708	1053908	60731	3798071
Korea, Rep. of	-	-	274	7371
USA	-	-	++	16
France	1	75	-	-
Germany	1	80	-	-
Iran	1	259	-	-

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

Country	2016-17		2017-18	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**337293**	**118216457**	**378554**	**157011314**
China	123559	44639441	236828	98721533
Malaysia	56004	18403986	42474	17194340
Korea, Rep. of	12078	4792148	26851	11775801
Singapore	56856	18986365	23561	9659099
UAE	6074	2277248	23078	9159993
Chinese Taipei/ Taiwan	52639	19069114	16006	6530180
Indonesia	8581	2895268	6050	2406601
Oman	9304	3066585	2447	1040045
Bangladesh	1475	510610	977	400569
Thailand	2163	810624	175	77657
Other countries	8560	2765068	107	45496

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

Country	2016-17		2017-18	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**450292**	**175766074**	**511463**	**220349207**
China	138202	47102679	249401	99836983
UAE	25350	20578523	35347	21926882
Malaysia	57594	19021965	51699	18052340
Qatar	372	251492	31215	13378353
Korea, Rep. of	18476	5851238	32022	12397828
Singapore	57642	19664483	24377	9830065
USA	17965	9376545	16847	9723789
Chinese Taipei/ Taiwan	52964	19200257	16107	6592094
Indonesia	9091	3089042	6758	2797787
Nepal	5506	1989771	5745	2385657
Other countries	67130	29640079	41945	23427429

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

Country	2016-17		2017-18	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**3164**	**900303**	**3272**	**1084927**
Japan	1139	315049	954	302125
UAE	301	91833	615	227108
Germany	544	150515	661	203924
Spain	402	119087	455	167624
Israel	264	78700	199	61525
UK	165	50051	107	33311
Korea, Rep. of	139	37601	76	31044
Italy	84	23506	29	11138
Nepal	1	192	29	9368
Poland	-	-	25	9071
Other countries	125	33769	122	28689

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

Country	2016-17		2017-18	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**405326**	**143055151**	**471914**	**191304773**
China	135446	45990422	248098	99357331
Malaysia	56233	18524545	50176	17436668
Qatar	235	132724	31106	13282748
Korea, Rep. of	16568	5167368	31379	12184428
UAE	13213	6254424	26399	10736238
Singapore	57141	19116972	24193	9758754
Chinese Taipei/ Taiwan	52703	19102409	16021	6560172
USA	11266	4924768	10075	5207103
Indonesia	9054	3071742	6253	2517645
Nepal	5197	1842808	5320	2185029
Other countries	48270	18926969	22894	12078657

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

Country	2016-17		2017-18	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**40008**	**31407198**	**34231**	**27441691**
UAE	11834	14231800	8322	10960830
USA	6699	4451699	6768	4516024
Saudi Arabia	1850	1433997	1510	1169392
UK	1703	1254272	1542	1143428
Germany	1334	814111	1219	863695
Iran	758	510668	936	611076
Netherlands	1118	658186	1055	608155
Oman	182	105546	1013	538900
China	2615	1081505	1127	473232
Malaysia	461	290073	501	345390
Other countries	11454	6575341	10238	6211569

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

Country	2016-17		2017-18	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**1794**	**403422**	**2046**	**517816**
Malaysia	900	207347	1022	270282
Korea, Rep. of	346	74758	539	148198
Germany	245	70658	163	56363
Hong Kong	142	15526	66	12755
Belgium	-	-	23	8004
Japan	++	8	21	6438
China	117	25296	176	6420
Nepal	++	24	14	3078
UAE	2	466	11	2706
Singapore	++	78	6	1772
Other countries	42	9261	5	1800

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

Country	2016-17		2017-18	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	-	-	**161**	**7083**
Korea, Rep. of	-	-	161	7083

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

Country	2016-17		2017-18	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**1143216**	**182986972**	**1488163**	**278344776**
Chile	376236	61146504	647799	112132002
Indonesia	226271	40834076	178387	46663852
Peru	144013	23246802	213016	34171949
Brazil	49733	8390173	115118	24417207
Australia	176152	23801022	107367	21945154
Canada	20805	4395782	114698	18327932
Congo, Dem. P. R.	9476	2858617	17936	6392204
Saudi Arabia	31964	4863230	47240	6081640
Papua N GNA/Guinea	2714	783917	19783	3163476
Mexico	9791	2586883	4866	2147164
Other countries	96061	10079966	21953	2902196

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

Country	2016-17		2017-18	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**35306**	**12084110**	**44244**	**19039893**
Japan	4514	1621931	25091	11084779
Congo, Peo. Rep.	16376	5519317	8187	3406804
Malaysia	5708	1987003	4792	1942967
Zambia	2565	872425	2115	918370
Germany	291	110933	632	272308
South Africa	2196	715081	617	259152
UAE	850	276297	490	192216
Austria	315	119613	422	186790
Mauritius	74	27498	401	147631
Chile	98	33999	329	128834
Other countries	2319	800013	1168	500042

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

Country	2016-17		2017-18	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**656057**	**227236243**	**2313328**	**290730516**
Zambia	132854	44747179	142264	57272366
UAE	97165	33224694	87621	35530867
Malaysia	68925	25538020	79310	35159555
Vietnam	36835	14114933	60729	27392019
Thailand	27904	11068633	54412	15499790
Japan	10259	4739541	32861	15498143
China	28584	11683375	37498	14226377
Indonesia	24701	9299286	26851	11711816
Germany	21308	7598868	21089	8673325
Saudi Arabia	27511	8126334	25284	8644705
Other countries	180011	57095380	1745409	61121553

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

Country	2016-17		2017-18	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**458731**	**171225797**	**532741**	**224760487**
Zambia	132851	44746445	142251	57268699
Malaysia	58835	22624684	68252	31497495
UAE	72455	26197412	64873	28429752
Vietnam	36681	14057756	60696	27373025
Thailand	25928	10379003	51869	14476147
Japan	6773	2987604	28372	13074740
China	23876	9561975	32411	11648105
Indonesia	24427	9197849	26383	11504350
Philippines	3769	2417128	8273	4847586
Germany	5018	3085684	6208	3882894
Other countries	68091	25970257	43153	20757694

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

Country	2016-17		2017-18	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**46137**	**15209011**	**45834**	**16741422**
Saudi Arabia	14881	5134172	13332	5337235
UAE	12657	4129670	10369	3585835
Qatar	2086	745027	5124	1964661
Kuwait	1435	491982	2635	1005721
UK	1595	439018	1487	441428
Kenya	405	142316	1005	402979
Baharain	659	222880	1020	394224
Malaysia	1411	484721	930	370427
Bangladesh	54	21554	785	327484
USA	914	283745	1034	307116
Other countries	10040	3113926	8113	2604312

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

Country	2016-17		2017-18	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**26101**	**10969804**	**1606156**	**14320509**
China	4688	2116859	5020	2556717
Japan	3459	1745615	4489	2423403
Malaysia	6108	1804191	7050	2418358
Germany	2604	1375479	2724	1593100
Korea, Rep. of	1351	590799	2391	1070096
Thailand	1790	631806	2314	947300
Nepal	1625	531153	1342	529885
USA	297	402361	322	488399
Chinese Taipei/Taiwan	918	321218	939	407946
Italy	355	207537	496	287503
Other countries	2906	1242786	1579069	1597802

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

Country	2016-17		2017-18	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**125088**	**29831631**	**128597**	**34908098**
UK	20297	4684078	17802	4800433
USA	17328	4278925	16132	4461960
UAE	11509	2705336	12194	3446796
Saudi Arabia	12515	2952276	11867	3266447
Germany	13323	3051222	11778	3118315
Netherlands	4708	1138399	5443	1519390
South Africa	3730	857733	4005	1118934
Poland	4628	1067462	4266	1111345
Bangladesh	1112	326117	3101	971155
Switzerland	2629	621025	3336	904685
Other countries	33309	8149058	38673	10188638

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

Country	2016-17		2017-18	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All Countries	**++**	**31**	**-**	**-**
Singapore	++	1	-	-
USA	++	30	-	-

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

Item	2016-17		2017-18	
	Qty (t)	Value (`'000)	Qty (t)	Value (`'000)
All items	**458731**	**171225797**	**532741**	**224760487**
Blister & Other Unrefined Copper	80545	27811649	71677	29409938
Copper & Alloys :Worked (Bars,Rods,Plates,Etc)	78930	32285049	92595	40235976
Copper & Alloys :Worked,Nes	4798	4359813	9144	6751543
Copper Alloys:Unwrought Excl. Brass & Bronze	1466	562290	1373	627617
Copper Mattes	110	27517	272	90654
Copper Powder & Flakes	769	484164	790	533898
Copper Refined Copper Worked	202335	74734803	235009	95816119
Electroplated Anode Of Nickel	54452	18847191	77588	32202897
Master Alloys Of Copper	20	29211	49	51952
Refined Copper	35306	12084110	44244	19039893

FUTURE OUTLOOK

HCL, a sole public sector company has taken up an expansion projects of its mines namely Malanjkhand, Khetri, Kolihan, etc. To increase production, HCL has chalked out an expansion plan to increase mine production from 3.8 to 20.0 million tonnes per annum in next six years with a capital layout of Rs.5,500 crore. Copper demand in India is expected to grow at 6-7% due to increased thrust of Govt. of India towards "make in India" and "Smart City" programmes and increased investment in railways, power, defence and infrastructure sectors which will drive the demand of copper in the country. Demand is expected to show significant growth considering the initiatives such as development of industrial corridors, smart city project, housing for all Indians by 2022, National Highway development project, Rail project, defence production policy to encourage indigenous manufacture, India energy plan 2022 100GW solar, 32GW wind, 260GW thermal & nuclear, 62 GW hydro. In addition to this, there is plan for green energy corridor for transmission of renewable energy. The per capita copper consumption in India is expected to increase from the current level of 0.6 kg to 1 kg by 2025. The per capita copper consumption of china is 6 kg and world average is 2.7 kg.

The market for Electric Vehicles (EV) is expected to witness growth in coming years as government incentives continue around the world. Copper is essential to EV technology and its supporting infrastructure. The evolving market will have a substantial impact on copper demand. The increase in the electric vehicles in the market will significantly impact copper. The projected demand for copper due to electric vehicles is expected to increase by 1.7 million tonnes by 2027.