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Indian Minerals Yearbook 2020 (Part- II :Metals and Alloys)

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

Indira Bhavan, Civil Lines,
NAGPUR – 440 001

PHONE/FAX NO. (0712) 2565471
PBX : (0712) 2562649, 2560544, 2560648
E-MAIL : cme@ibm.gov.in
Website: www.ibm.gov.in

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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 (13.75%) fall under 'Reserves category' while the balance 1.30 billion tonnes (86.25%) are placed under '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 the remaining 7.9% of the total All India resources (Table-1).

EXPLORATION & DEVELOPMENT

The exploration and development details, if any, are covered in the Review on "Exploration & Development" under "General Reviews".

PRODUCTION & PRICES

Copper Ore and Concentrates

The production of copper ore at 3.95 million tonnes in 2019-20 decreased by 4% as compared to that in the previous year.

The metal content in the ore produced in 2019-20 works out to 29,771 tonnes as against 36,123 tonnes in 2018-19. During the year under review, 3.88 million tonnes of ore were treated for obtaining copper concentrates as against 3.99 million tonnes in 2018-19 (Tables - 2 to 4).

Production of copper concentrates at 1,24,692 tonnes in 2019-20 decreased by about 13% as compared to that in the previous year. Madhya Pradesh was the leading producer State of copper concentrates accounting for about 52% of the production during 2019-20, followed by Rajasthan with 42% and Jharkhand with 6 per cent. The number of reporting mines was five in both the years, i.e., 2018-19 and 2019-20 (Tables-5 & 6).

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**Table - 1: Reserves/Resources of Copper as on 1.4.2015
(By Grades/Stages)**

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	5073.8	-	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)

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Table - 1: (Concl'd)

Grade/State	Proved STD111	Reserves				Remaining Resources						Total Resources
		Probable (A)	Total STD211	Feasibility	Pre-feasibility		Measured STD332	Indicated STD333	Inferred STD334	Reconnaissance (B)	Total (A+B)	
					STD21	STD122						
Maharashtra												
Ore	-	-	-	-	-	-	9399	4841	150	14390	14390	14390
Metal	-	-	-	-	-	-	89.65	47.48	0.54	137.67	137.67	137.67
Meghalaya												
Ore	-	-	-	-	-	-	880	-	-	880	880	880
Metal	-	-	-	-	-	-	9	-	-	9.00	9.00	9.00
Nagaland												
Ore	-	-	-	-	-	-	-	2000	-	2000	2000	2000
Metal	-	-	-	-	-	-	-	15.00	-	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
Metal	175.12	-	433.55	608.67	12.94	3.29	492.46	338.66	699.24	2291.94	28.61	3867.14
Sikkim												
Ore	-	-	-	-	-	445	63	300	-	150	-	958
Metal	-	-	-	-	-	7.86	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

Grade Analysis

During the year 2019-20, the average copper content in the ore produced was 0.75% Cu as against 0.87% in the previous year. All India average metal content of ore treated during the year works out to 0.76% Cu and 0.89% Cu for 2019-20 and 2018-19, respectively. The copper content in the ore treated varies from State to State. It was 0.78% Cu in Jharkhand, 0.70% Cu in Madhya Pradesh and 0.87% Cu in Rajasthan. The average metal content in the concentrate produced works out to 21.58% Cu in 2019-20 as against 22.58% Cu in the previous year.

The average daily employment of labour in copper mines in 2019-20 was 3,842 as against 3,449 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 70% and copper continuous cast wire rods registered a decrease of 1% only in 2019-20 as compared to the previous year. The production of copper cathodes decreased by 10%. 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, 2019-20

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

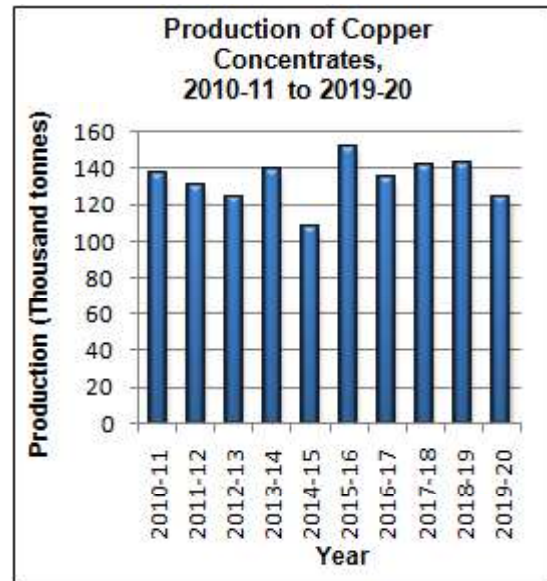


Table – 3: Production of Copper Ore, 2018-19 and 2019-20 (By States)

(In tonnes)

State	2018-19			2019-20 (P)		
	Ore produced	Cu%	Metal content	Ore produced	Cu%	Metal content
India	4134702	0.87	36123	3952418	0.75	29771
Jharkhand	242977	0.79	1923	288423	0.78	2252
Madhya Pradesh	2542159	0.84	21249	2544472	0.70	17784
Rajasthan	1349566	0.96	12951	1119523	0.87	9735

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**Table – 4: Copper Ore Treated, 2018-19 and 2019-20
(By States)**

(In tonnes)

State	2018-19			2019-20 (P)		
	Ore treated	Cu%	Metal content	Ore treated	Cu%	Metal content
India	3985067	0.89	35422	3879453	0.76	29350
Jharkhand	233192	0.79	1847	269568	0.78	2105
Madhya Pradesh	2442975	0.86	21010	2479185	0.70	17371
Rajasthan	1308900	0.96	12565	1130700	0.87	9874

**Table – 5: Production of Copper Concentrates, 2017-18 to 2019-20
(By States)**

(Quantity in tonnes; Value in ₹'000)

State	2017-18		2018-19		2019-20 (P)	
	Quantity	Value	Quantity	Value	Quantity	Value
India	141988	7706612	143668	8846151	124692	8445828
Jharkhand	5072	173106	6594	529620	7766	601558
Madhya Pradesh	75604	3486098	70999	4000290	65094	4750125
Rajasthan	61312	4047407	66075	4316241	51832	3094145

**Table – 6: Production of Copper Concentrates, 2018-19 and 2019-20
(By Sector/States/Districts)**

(Quantity in tonnes; Value in ₹'000)

State/District	2018-19			2019-20 (P)		
	No. of mines	Quantity	Value	No. of mines	Quantity	Value
India	5	143668	8846151	5	124692	8445828
Public Sector	5	143668	8846151	5	124692	8445828
Jharkhand	2	6594	529620	2	7766	601558
Singhbhum (East)	2	6594	529620	2	7766	601558
Madhya Pradesh	1	70999	4000290	1	65094	4750125
Balaghat	1	70999	4000290	1	65094	4750125
Rajasthan	2	66075	4316241	2	51832	3094145
Jhunjhunu	2	66075	4316241	2	51832	3094145

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Table – 7: Producers of Copper Metal, 2019-20

Name and address of the producer	Location	
	State	District
Hindustan Copper Ltd, Tamra Bhavan, II, Ashutosh Chowdhury Avenue, Post Box No.10224, Kolkata-700 019, West Bengal.	Jharkhand	Singhbhum (East)
Hindalco Industries Ltd, Century Bhawan, Dr Annie Besant Road, Mumbai –400 030, Maharashtra.	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, 2017-18 to 2019-20

(In tonnes)

Year	Copper blister	Copper cathodes	Copper Electrolytic Wirebars	Copper CCWR
2017-18	14611	830524	-	380489
2018-19	13293	454337	-	354146
2019-20 (P)	3997	408003	-	349475

**Table – 9: Production of Copper (Blister), 2018-19 and 2019-20
(By State/Plant)**

(Quantity in tonnes; Value in ₹'000)

State	Plant	2018-19		2019-20 (P)	
		Quantity	Value	Quantity	Value
India		13293	N.A.	3997	N.A.
Jharkhand	Surda ICC	13293	N.A.	3997	N.A.

**Table – 10: Production of Copper (CCWR), 2018-19 and 2019-20
(By States/Plants)**

(Quantity in tonnes; Value in ₹'000)

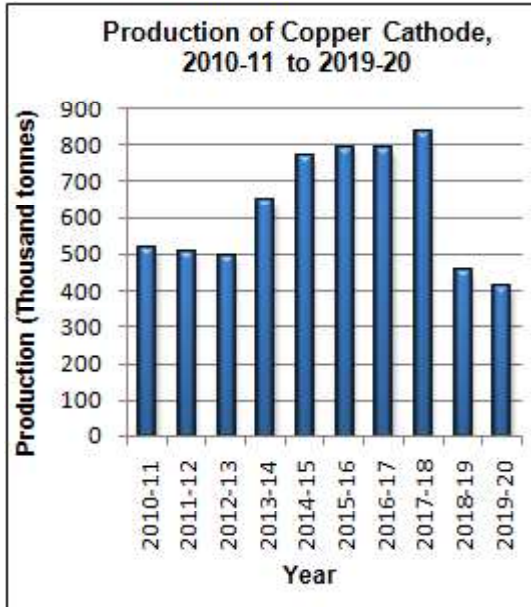
State	Plant	2018-19		2019-20 (P)	
		Quantity	Value	Quantity	Value
India		354146	165324812	349475	155090811
Gujarat	Hindalco	228894	107543400	245108	108804500
Maharashtra	HCL Taloja	14059	6662412	4153	1884911
Tamil Nadu	Vedanta Ltd	2279	1057600	-	-
Dadra & Nagar Haveli	Vedanta Ltd	108914	50061400	100214	44401400

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Table – 11: Production of Copper (Cathodes), 2018-19 and 2019-20 (By States/Plants)

(Quantity in tonnes; Value in ₹'000)

State	Plant	2018-19		2019-20 (P)	
		Quantity	Value	Quantity	Value
India		454337	207019308	408003	176011710
Gujarat	Hindalco	351041	160060400	325567	139788500
Jharkhand	Surda ICC	13782	6441908	4948	2225010
Tamil Nadu	Vedanta Ltd	2870	1305200	-	-
Dadra & Nagar Haveli	Vedanta Ltd	86644	39211800	77488	33998200



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, Malanjkhanda Copper Project (MCP) at Malanjkhanda 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.

Malanjkhanda Copper Project (MCP) 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 3.0 and 4.35 million tonnes per annum, respectively.

Hindustan Copper Ltd

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

The operation unit at Khetri Copper Complex (KCC) comprises two underground mines, namely, Khetri mine & Kolihan mine and one beneficiation plant. Earlier, KCC also had smelting and refining facility. But owing to economic consideration, the Company had to suspend this operation w.e.f. December 2008. Mining methods adopted in Khetri and Kolihan underground mines of HCL are sub-level open stoping and blasthole stoping. In sub-level open stoping, sub-levels are developed at vertical intervals of 20 to 25 m and a crown level is developed 15 m below upper main level. Sub-level open stoping method has two variations, namely, longitudinal stoping and transverse stoping. Longitudinal stoping is adopted where the thickness of the orebody is small to moderate. In this method, an extraction drive is developed from the main footwall drive at extraction level and a trough drive is developed in the orebody along the strike. Draw points at 9-m interval are also developed from extraction drive connecting the trough drive. A slot raise is made from the main level to top of the ore block to be extracted. Slot crosscuts are made in the sub-levels and extraction level. The slot crosscut exposes the orebody from hangwall to the footwall. Parallel holes are drilled (115 mm or 57 mm diameter depending on the orebody width) in the slot crosscut and are blasted against the pre-face of the slot raise. This provides an opening throughout the height of the 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 the 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 the existing 1.1 to 5.0 million tonnes per annum in two phases. Mine-wise status is described below:

At Kolihan mine, environmental clearance for shaft sinking & creation of ore handling facilities below 0 mRL (meter reduced level) to augment the production capacity to 1.5 MTPA was obtained on 2.2.2015. To establish the ore bodies at depth, 1,650 m of Diamond drilling work was undertaken. In 2019-20, a total of 308.4 m of drilling have been completed. Further drilling has been undertaken to establish mineralisation corresponding to (-) 120 mRL and 6,298 meter of surface exploratory drilling have been completed in 2019 -20. Further drilling is in progress. After proving of continuity of ore body in depth, proposal will be undertaken.

At Khetri mine, contract was awarded during 2011-12 to augment ore production capacity of Khetri mine from 0.5 MTPA to 1.5 MTPA under Phase II through deepening of existing shaft and other related activities. However, during execution of the contract, the work was badly affected at the initial stage due to extremely bad ground / fault zone encountered while making approach cross cut to reach below the existing Production Shaft area for setting up winding arrangement for sinking of shaft further. Despite many efforts made by the contractor the problem persisted and finally the contract was terminated in January, 2017 as per terms and conditions of the contract.

At Banwas Mine, mine construction work got completed in February, 2017. The Company has appointed contractual agency for ore production, the contractual agency has produced 2,43,942 tonnes of ore in FY 2019-20 and the target production ramp will be achieved by 2023-24.

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 & Department of Mines & Geology, Government of Jharkhand.

The 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 furnished as below:

Kendadih mine was re-opened in December, 2017 after all the mine-related equipping work including mine dewatering was completed. Mine development work is in progress. Equipment were mobilised in a phased manner and mine had production of 43,200 MT

of ore during 2019-20 was to have been treated in Mosaboni Concentrator Plant.

At Rakha mine, considering the change in market scenario, the Company proposes to implement the project through a EPC route and has plans to augment production capacity to 1.5 MTPA of ore by reopening and expanding the closed Rakha mine. Environmental Clearance of Rakha mining lease was obtained on 1.8.2014 and 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. All mine plans and schedules were updated. The EC and Stage II FC for Kedadih was obtained in the year 2015 and 2017, respectively. Tender floated by the Company for mine development and production from Chapri mine was discharged despite several attempts due to high price quoted by bidders and poor response. In view of this, the Company is exploring to engage contractor through MDO (Mine Developer-cum-Operator) route for re-opening and expansion of Rakha Copper Mine. Development of a new underground mine at Chapri-Sideshwar and erection & commissioning of a new Concentrator Plant at ICC is in progress and the process of floating tender for engagement of MDO agency is underway. Meanwhile, surface exploratory drilling has been undertaken at Chapri Block of Rakha Mining Lease and 5,243.5 m of drilling has been done during the year 2019-20. The Company envisages augmentation of ore production capacity in 1st phase to 12.2 MTPA by 2028-29 in stages. The Company will take up enhancement of ore production capacity to 20.2 MTPA in 2nd phase after successful completion of 12.2 million tonnes per annum capacity plan.

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° to 75° 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 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 (2nd 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 ₹1,856.74 crore (up to ₹ 2,900 crore in 2nd phase). All the approvals 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 and a contract for ore production from developing underground mine through decline has been awarded in July, 2019 and it is expected that production will commence in 2020-21. Sinking of Service Shaft (665.5 m) and Production Shaft (693.6 m) have been completed during May, 2018 and October, 2018, respectively. The development work of North Decline and South Decline has been completed up to 2,975 m and 2,103 m respectively. The development work of North and South Ventilation shaft has been completed up to 372 m and 475 m respectively.

Extraction of Minerals from Copper Ore Tails (MP):

The Company is in advance stage of erection of Copper Ore Tailing (COT) recovery facility of capacity 3.3 million tonnes per annum that which would enable 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 Malanjkhand Copper Project (MCP). The project besides generating additional revenue to the Company will also help to mitigate the risk to the environment. It is expected that the plant will be commissioned during the FY 2019-20.

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 a 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 reflected in Table-12. Company-wise details of copper smelters and refineries are given below:

1. Hindustan Copper Ltd

a) Khetri Copper Complex (KCC)

The KCC smelter, located at Khetri in Jhunjhunu district, Rajasthan, had a capacity of 31,000 tonnes refined copper per annum. In addition, KCC has sulphuric acid and phosphatic fertilizer plant facilities. KCC's smelter halted its operations due to economic considerations since December, 2008.

Operations of Khetri concentrator plant during the year was affected due to acute water shortage. Action to ensure supply of water from Kumbharam

project of Government of Rajasthan has been taken in addition to ensuring intake of water from extra bore well.

b) 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 2019-20, copper cathode production at ICC was 4,948 tonnes, which is less by 64% as compared to 13,782 tonnes in the preceding year.

c) Gujarat Copper Project (GCP)/ Jhagadia Copper Ltd (formerly SWIL Ltd)

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

Gujarat Copper Project of the Company consists of three units, namely, Anode Furnace (Smelter), Refinery and Kaldo Furnace valuing ` 27,214.50 lakh as on March 31, 2019. The Anode Furnace and Refinery unit has been commissioned in October 2016 while Kaldo unit is yet to be commissioned. Since commissioning, the Anode Furnace and Refinery units are being operated at a sub-optimal level for want of feedstock. GCP being a secondary smelter, the feedstock are copper scrap, copper blister, liberator cathode etc. The Company has not been able to source these materials in the required quantity resulting in sub-optimal operations.

d) Talaja Copper Project (TCP)

The plant with a capacity of 60,000 tonnes per annum continuous cast wire rods (CCWR) is located at Talaja 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.

e) Joint Venture with Chhattisgarh Copper Limited (CCL)

CCL was established on 21.05.2018 as a Joint Venture Company between Hindustan Copper Ltd and Chhattisgarh Mineral Development Corporation Ltd for exploration, mining and beneficiation of copper and its CCMDC associated minerals in the State of Chhattisgarh. The shareholding of HCL and CMDC is in the ratio of 74:26. CCL is a subsidiary company of HCL. After incorporation and examining the geological information available, the Company has identified two blocks, i.e. Bodal Block (21.7559 km) and Hiddar Block (about 28 sq. km located at District Rajnandgaon. The Company has submitted application for area reservation for above blocks in the month of July, 2018 to the Ministry of Mines & Govt. of Chhattisgarh.

During the year, HCL has not made any additional investment in its subsidiary viz. Chhattisgarh Copper Ltd (CCL). The total paid up capital of CCL as on 31.3.2020 is ₹.25 Lakhs out of which 74% equity is held by HCL and remaining 26% is held by Chhattisgarh Mineral Development Corporation Ltd.

f) 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 hydrometallurgy 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

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

been sent to the Ministry of Mines to obtain CCEA approval. The proposal is under scrutiny of the Ministry.

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.

Information in respect of Subsidiary, Associate and Joint Venture

During the year, HCL has invested ₹75 Lakhs in the equity shares of Khanij Bidesh India Ltd (KABIL), a JV company between NALCO, HCL and MECL incorporated on 8.8.2019 with the objective to identify, acquire, develop, process and make commercial use of strategic and other minerals in overseas locations for

supply in India and boost “Make in India” campaign. The shareholding of NALCO, HCL and MECL in the JV Company is in the ratio of 40:30:30.

2. Sterlite Industries (India) Ltd

The Sterlite Industries (India) Ltd a prominent Private Sector plant, has an installed smelter capacity of 4,00,000 tonnes per annum copper anodes and 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 Thoothukudi has been closed since May, 2018 on State Govt. order.

3. Hindalco Industries Ltd (Birla Copper)

The Company with smelter facility 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, Peru, Canada, Saudi Arabia, 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 in the Market Survey on Copper published by IBM, production of 1.07 lakh tonnes per annum of secondary copper was reported and all of which have been from the Organised Sector in the country.

USES

The per capita consumption of copper in India during the year 2019-20 is at 0.5 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 works out to be 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 ICSG the world Copper Factbook 2020 most cars contain an average of 23 kg copper and luxury & hybrid vehicles contain about 40 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 2019-20, the imports of refined copper were more than the exports. The availability of refined copper increased from 4,98,710 tonnes in 2018-19 to 5,23,008 tonnes in 2019-20 (Table-13).

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

Item	(Quantity in tonnes)	
	2018-19	2019-20 (P)
I) Total Production* (Cathodes)	454337	408003
II) Total Imports (copper refined)	92290	151964
III) Total Exports (copper refined)	47917	36959
IV) Apparent Availability	498710	523008

* 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 870 million tonnes of copper content. Chile has the largest share, accounting for about 23% of world reserves, followed by Peru (11%), Australia (10%) Russia (7%), Mexico & USA (6% each), Poland (4%) and China (3%) Congo (Kinshasa), Kazakhstan & Zambia (2% each). Remaining about 23% was contributed by other countries (Table-14).

The world mine production of copper increased slightly by 0.5% at 20.7 million tonnes of metal content in 2019 as compared to 20.6 million tonnes of metal content during previous year. Chile continued to be the largest single producer of copper in 2019 with 28% share followed by Peru (12%), China (8%), Dem. Rep. of Congo, (7%) and USA (6%) (Table-15).

As per BGS world refined copper production was 24.1 million tonnes in the year 2019 which showed an increase of 1.26% from 23.80 million tonnes in the previous year. China was the largest producer of refined copper with 9.78 million tonnes in the year 2019 (41% of world production) followed by Chile (9%), Japan 1.49 million tonnes (6%), Dem. Rep. of Congo 1.16 million tonnes (5%) and USA & Russia (4% each), etc.

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 Republic of Korea (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 to increase by 2% in 2019 and 1.5% in 2020.

COPPER

Sustained growth in copper demand 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 countrywise description sourced from latest available publication of Minerals Yearbook of 'USGS' 2017.

Australia

Refined copper production in Australia decreased by 19% to 3,86,000 t in 2017 from 4,75,000 t (revised) in 2016, owing primarily to major maintenance at the smelters associated with the country's two leading copper mines. BHPGroup (Australia) produced 1,42,000 t of copper cathode at the Olympic Dam complex, 16% less than 1,69,000 t in 2016, and Glencore plc (Switzerland) produced 2,27,000 t (including from third-party materials) at the Mount Isa complex, down by 17% from 2,76,000 t.

Mined copper production in Australia declined by 9% in 2017, to 8,60,000 t from 9,48,000 t in 2016. Output of mined copper was predominantly affected by smelter maintenance at Mount Isa and Olympic Dam, as well as an earthquake that disrupted operations at the Cadia Valley Mine, owned by Newcrest Mining Ltd (Australia). Production of copper at Cadia Valley fell by 23% to 56,100 t in 2017 from 73,200 t registered during the previous year.

Brazil

In 2017, output of mined copper increased by 16% to an estimated 3,90,000 t from 3,38,000 t in 2016. Production at the three leading copper mines in Brazil was as follows: the Salobo Mine [owned by Vale S.A. (Brazil)] – 1,93,000 t (1,76,000 t in 2016); the Sossego Mine (Vale) – 99,700 t (92,600 t in 2016); and the Chapada Mine [Yamana Gold Inc.(Canada)] – 57,700 t (52,400 t in 2016). The combined production from these three operations increased by 30,000 t in 2017 as compared with output in 2016 and was equivalent to 90% of the country's estimated mined copper total. Yamana Gold attributed higher copper production at Chapada to increased copper recovery and ore-processing rates.

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

(Quantity in '000 tonnes of copper content)	
Country	Reserves
World: Total (rounded off)	870000
Australia ^(a)	88000
Canada	9000
China	26000
Chile	200000
Congo (Kinshasa)	19000
Germany	2000
Kazakhstan	20,000
Mexico	53000
Peru	92000
Poland	32000
Russia	61000
USA	48000
Zambia	21000
Other countries	200000

Source: USGS, Mineral Commodity Summaries, 2021, (a): For Australia, Joint Ore Reserves Committee Compliant reserves were about 22 million tonnes.

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

(In tonnes of metal content)			
Country	2017	2018	2019
World Total	20000000	20600000	20700000
(rounded off)			
Chile	5503500	5831600	5787400
Peru	2445585	2437035	2455440
China	1706400	1615234	1683700
Congo, Dem. Rep. of	1094638	1225227	1420386
USA	1260000	1220000	1260000
Australia	849121	910896	934055
Russia	762300	871700	813600
Zambia	786731	851089	797518
Mexico	742246	696580	768542
Other countries	4882137	4933938	4756143

Source: BGS, World Mineral Production, 2015-19.

Refined copper production in Brazil fell by 28% to 1,63,000 t in 2017 from 2,26,000 t in 2016. Paranapanema S.A. (Brazil) reported primary refined copper output of 1,43,000 t, a decrease of 37% from that in 2016. The Company cited limited availability of credit to finance operations and maintenance shutdowns as reasons for the decline.

Canada

Production of mined copper in Canada was 5,95,000 t in 2017, 14% lower than 6,93,000 t in 2016. The combined output of the country's two leading copper mining operations, Vale's Sudbury complex and Teck Resources Ltd's (Canada) Highland Valley Mine, decreased by 49,800 t. At Sudbury, production declined because of unscheduled maintenance at the Coleman Mine and the termination of mining at the Stobie Mine. At Highland Valley, production fell as a result of temporary decreases in copper grades and recoveries, as anticipated in the mine plan. Output also declined significantly (by 15,100 t) at Capstone's Minto Mine, where ore grades were lower owing to mine sequencing changes implemented during 2017 to extend the mine life.

Chile

In 2017, 9 of the 20 leading copper mines in the world were located in Chile, which has been the leading global producer of mined copper since 1982. Output of mined copper declined slightly to 5.50 Mt from 5.55 Mt in 2016. At the Escondida Mine (the first-ranked copper mine by production in 2017, majority-owned by BHP), production decreased by 8% to 9,03,000 t from 9,79,000 t in 2016 because of a 43-day labor strike in February and March. At the Collahuasi Mine [second-ranked, majority-owned by Anglo American plc (United Kingdom) and Glencore], output was 5,24,000 t in 2017, up by 3% from 5,07,000 t, owing to higher ore grades and consistent mill throughput rates following planned maintenance in the second quarter. Majority-owner Anglo American increased production slightly to 3,08,000 t from 3,07,000 t at the Los Bronces Mine (14th-ranked), where higher ore grades were mostly offset by a mechanical failure at the processing plant in the third and fourth quarters. At the Los Pelambres Mine [11th-ranked, majority-owned by Antofagasta plc (United Kingdom)], copper production fell by 3% to

3,44,000 t from 3,55,000 t in 2016 as a result of lower ore grades. In 2017, the state-owned Corporación Nacional del Cobre de Chile (Codelco) operated 7 mines in the country, 5 of which were ranked among the 20 leading global copper mines, and produced 1.73 Mt of copper, slightly higher than 1.71 Mt in 2016. The Company cited slightly higher copper recovery and processing rates as the reasons for the increase.

Refined copper production in Chile was 2.43 Mt in 2017, a decline of, 183,000 t (7%) from 2.61 Mt in 2016. Production of copper cathodes was affected by disruptions at Codelco's Chuquibambilla smelter (one of the leading global facilities by capacity), where planned maintenance lasted for 80 days instead of the expected 55 days because of technical issues, and at the state-owned Empresa Nacional de Minería's Paipote smelter, where operations were suspended for 26 days from December 12, 2017, through January 7, 2018, owing to a labor strike. Codelco did not report refined copper production in 2017, but the company's refined sales fell by roughly 1,60,000 t (11%) to 1.33 Mt from 1.50 Mt in 2016. Refined copper output at the Escondida electrowinning facility decreased by 74,100 t (24%) in 2017 compared with that in 2016 because of a 43-day worker strike.

Indonesia

Production of mined copper in Indonesia was 6,22,000 t in 2017, 1,06,000 t (15%) lower than 7,28,000 t in 2016. At the Grasberg Mine (fifth-ranked, majority-owned by Freeport), copper production decreased by about 36,000 t (7%), to 4,46,000 t in 2017 from 4,82,000 t in 2016, owing to multiple disruptions. Freeport's licence to export copper concentrates from Indonesia got expired, and operations at Grasberg were halted after the storage warehouse reached capacity. Mining resumed at a lower production rate when the Gresik smelter restarted following a worker strike, and began to ramp up to full capacity when the Company received a permit for the resumption of copper concentrate exports. Freeport reached a tentative agreement with the Government of Indonesia to construct a copper smelter in the country within 5 years and divest 51% of its ownership of Grasberg to local entities. In return,

the Company's licence to operate the mine would be extended from 2021 to 2041. Freeport was also permitted to export copper concentrates, and negotiations on a final agreement were underway. Operations at the Grasberg Mine in 2017 also were affected by a prolonged strike, involving approximately 5,000 unionised employees, in protest of workforce layoffs during the export dispute.

In 2017, PT Medco Energi Internasional Tbk (Indonesia) produced 1,31,000 t of copper at the Batu Hijau Mine, a decline of 86,000 t (40%) from 2,17,000 t in 2016. The Company began development work on a new ore body, with first production expected in 2020 or early 2021. During the development project, PT Medco expected to focus operations on the processing of lower grade stockpiled ore.

Kazakhstan

Output of mined copper in Kazakhstan rose by 94,700 t (20%) in 2017, to 5,62,000 t from 4,68,000 t (revised) in 2016, as the Aktogay and Bozshakol Mines, owned by KAZ Minerals plc (United Kingdom), continued to ramp up to full production capacity. Commercial production of 20.6 [ADVANCE RELEASE] U.S. GEOLOGICAL SURVEY MINERALS YEARBOOK—2017 copper at Aktogay and Bozshakol commenced in 2016 and 2017, respectively. In 2017, KAZ Minerals increased mine output from that in 2016 by 75,200 t at Aktogay and by 55,700 t at Bozshakol.

Peru

In 2017, 3 of the 20 leading copper mines in the world were located in Peru. Owing to significantly higher output at the Las Bambas Mine [sixth-ranked, majority-owned by MMG Ltd (Australia)], production of mined copper in Peru rose by 4% to 2.45 Mt from 2.35 Mt in 2016. Las Bambas operated for its first full year in 2017 following the start of commercial production in July 2016; output at the mine increased by 37% to 4,54,000 t in 2017 from 3,30,000 t in 2016. The increased production at Las Bambas was partially offset by decreases in production from other leading copper mines in Peru. At the Cerro Verde Mine (third-ranked, majority-owned by Freeport), copper production fell by 4% to 4,82,000 t from 5,03,000 t in 2016, primarily reflecting lower copper recovery rates. At the Antamina Mine (ninth-ranked, majority-owned by

BHP and Glencore), processing of higher volumes of polymetallic ore resulted in a slight production decline in 2017, to 4,23,000 t from 4,31,000 t. At Glencore's Antapaccay Mine, copper output decreased by 6% to 2,07,000 t from 2,20,000 t in 2016 because of lower ore grades.

Russia

Refined copper production rose by 11% in 2017, to 9,56,000 t from 8,61,000 t in 2016. PJSC MMC Norilsk Nickel (Russia), which operates multiple refineries that account for roughly 40% of the refined copper capacity in Russia, reported salable metals output (predominantly consisting of refined copper with some copper contained in concentrates) of 3,88,000 t from its Russian operations, an increase of 37,000 t (11%) from that in 2016. The Company attributed the higher production to processing of third-party concentrates. At the Kyshtym refinery, Russian Copper Company ZAO increased production of copper cathodes by 5% to 1,28,000 t.

FOREIGN TRADE

Exports

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

Exports of copper ores & concentrates increased considerably by 17% to 2,12,659 tonnes during 2019-20 from 1,81,642 tonnes in 2018-19. The export were mainly to China (75%) followed by Malaysia (14%), Taiwan (10%) and Rep. of Korea (1%) on the other hand. Exports of refined copper decreased substantially by 23% to 36,959 tonnes in 2019-20 from 47,917 tonnes in 2018-19. Exports of refined copper were mainly to China (96%) and Bangladesh (3%). The total exports of copper & alloys (including brass & bronze) were at 1,41,010 tonnes in 2019-20 as against 1,34,608 tonnes in 2018-19. Export of copper (scrap) were at 7,738 tonnes in 2019-20 as against 5,077 tonnes in 2018-19 out of the total exports in 2019-20 copper & alloys comprised 81,509 tonnes and copper (scrap) 7,738 tonnes (Tables-16 to 31).

COPPER

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), copper powder & flakes, etc.

During the year 2019-20, imports of copper ores & concentrates decreased by very narrow margin to 8,21,555 tonnes as compared to 8,23,938 tonnes in 2018-19. Chile with a share of 63% was

the leading supplier followed by Peru (12%), Australia (9%) and Indonesia, Saudi Arabia & Panama (4% each). While imports of refined copper increased drastically by 65% to 1,51,964 tonnes in 2019-20 from 92,290 tonnes in 2018-19. Japan was the leading supplier of refined copper with share of 76% followed by UAE (14%) and Malaysia & Zambia (2% each) . Out of the total imports in 2019-20, copper & alloys comprised 6,16,485 tonnes and copper (scrap) 1,12,713 tonnes (Tables - 32 to 41).

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

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	181642	16627621	212659	20450948
China	156792	13968572	159572	13723814
Malaysia	-	-	28733	3792338
Taiwan	7191	1459397	21046	2713968
Korea, Rep. of	17659	1199609	3181	215992
Vietnam	-	-	109	3536
Thailand	-	-	18	1295
UK	-	-	++	2
USA	-	-	++	2
Australia	-	-	++	1
Yemen	++	43	-	-

Figures rounded off

COPPER

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

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	47917	21283026	36959	15257396
China	35908	16013180	35516	14629645
Bangladesh	1124	500821	1042	436308
France	265	142925	201	104079
UAE	1	485	104	44844
Iran	20	8740	44	19361
Hong Kong	-	-	24	9678
Nepal	11	4688	14	5378
Saudi Arabia	7	3257	10	5294
Nigeria	++	307	1	686
USA	++	20	++	398
Other countries	10580	4608604	3	1725

Figures rounded off

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

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	134608	70029622	141010	60527115
China	39021	17255592	52403	18935980
USA	15245	10720162	19368	11091379
UAE	4999	3555840	6332	3270707
UK	2779	2180981	4885	2040594
Saudi Arabia	2467	2050969	5142	1855274
Germany	3171	2187526	4194	1806980
Qatar	9578	4489268	3152	1386327
Nepal	4589	2091009	3098	1382262
Indonesia	1519	980526	1421	912373
Korea, Rep. of	9736	2071105	5201	886477
Other countries	41504	22446643	35814	16958760

Figures rounded off

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

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	5077	2003835	7738	2777610
China	1506	655392	2257	911846
Hong Kong	833	281426	2130	796198
Japan	535	220421	894	291003
Korea, Rep. of	655	261446	1048	281557
UAE	126	52766	521	220712
Germany	506	179088	403	125087
Taiwan	-	-	88	32275
Spain	488	188173	76	29876
Malaysia	216	91969	41	17819
UK	47	18085	38	14697
Other countries	166	55070	242	56542

Figures rounded off

COPPER

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

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	99279	46846435	81509	35989500
China	36443	16120139	40792	15168683
USA	8028	5476066	7929	5704047
UAE	2768	1536048	3768	1618762
Qatar	9376	4379924	2893	1275619
Nepal	4174	1888578	2671	1169870
Peru	850	438482	1848	884627
UK	1162	931374	1118	747377
Saudi Arabia	980	572119	1969	714286
Germany	1147	864866	1262	665541
Bangladesh	2298	1141177	1361	650752
Other countries	32055	13497661	15898	7389935

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

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	28654	20698053	50698	21447992
USA	7209	5241308	11420	5377054
China	1071	480061	9355	2855451
UAE	2048	1942905	2042	1431068
UK	1570	1231522	3717	1273733
Saudi Arabia	1487	1478850	3152	1132082
Germany	1362	1088650	2354	957535
Indonesia	1405	918429	1359	870289
Netherlands	898	566829	842	424746
Italy	539	417560	1198	388198
Thailand	629	357550	688	356826
Other countries	10436	6974390	14571	6381011

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

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	1598	481299	1065	312012
Malaysia	707	205799	440	121785
Korea, Rep. of	475	135193	348	97361
Germany	156	54923	175	58817
USA	++	137	17	8793
Italy	-	-	23	7967
Belgium	118	37168	21	4889
UK	-	-	12	4787
Mexico	++	4	23	4187
Qatar	6	1649	2	1002
Japan	1	54	2	682
Other countries	134	46374	3	1741

*Figures rounded off***Table – 23: Exports of Copper & Alloys:
Worked (Bar, Rod, Plates, etc)
(By Countries)**

Country	2018-19(R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	10389	6233885	8847	5462095
USA	1926	1431263	1596	1116201
UAE	1454	741233	1718	894988
Oman	330	189663	403	237263
Thailand	448	233932	483	231686
Canada	503	291678	246	204814
Italy	258	169595	277	184051
Nigeria	181	92643	295	169169
Germany	404	225558	244	162240
Nepal	352	162860	339	160676
Malaysia	176	94114	257	144596
Other countries	4357	2601345	2989	1956412

Figures rounded off

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**Table – 24: Exports of Copper Mattes
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	8472	658253	7728	670705
Korea, Rep. of	6290	623781	3569	361526
China	356	1551	4029	299829
Spain	197	21295	76	8701
Thailand	-	-	54	583
Bangladesh	++	79	++	30
Sri Lanka	++	94	++	28
Nepal	2	1309	++	5
Canada	-	-	++	3
Malaysia	1626	10018	-	-
Kuwait	++	75	-	-
Other countries	++	51	-	-

Figures rounded off

**Table – 25: Exports of Copper & Alloys:
Worked, Nes
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	14830	10268470	18242	10325528
USA	5605	3821083	6129	4452655
Peru	850	438439	1848	884606
UK	760	693539	801	553690
Saudi Arabia	688	420117	1715	548038
Germany	534	534038	917	454224
UAE	708	505441	1398	407411
Thailand	372	284129	338	234992
Nepal	467	191396	472	198326
France	181	149612	200	148969
Canada	203	168042	175	146706
Other countries	4462	3062634	4250	2295910

Figures rounded off

**Table – 26: Exports of Copper Powder & Flakes
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	455	267867	1157	197212
Brazil	387	224206	303	174468
China	++	22	834	10244
Korea, Rep. of	6	3936	7	3938
Thailand	8	4379	5	2877
Germany	1	299	2	1110
Turkey	18	10996	2	826
Japan	++	375	++	747
Bangladesh	3	837	2	742
Egypt	++	16	++	315
Malaysia	4	2552	++	271
Other countries	28	20248	2	1675

Figures rounded off

**Table – 27: Exports of Blister & Other
Unrefined Copper
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	-	-	++	5
Oman	-	-	++	4
UK	-	-	++	1

Figures rounded off

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**Table – 28 : Exports of Brass & Bronze :
Bronze Powder
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	97	30757	++	226
Indonesia	-	-	++	164
Singapore	-	-	++	62
USA	63	8840	-	-
Thailand	14	8733	-	-
Vietnam	5	3133	-	-
Kuwait	4	2496	-	-
Taiwan	4	2411	-	-
UAE	3	2045	-	-
Japan	2	1555	-	-
Australia	2	1210	-	-
Other countries	++	336	-	-

Figures rounded off

**Table – 29: Exports of Copper Alloys:
Unwrought Excl. Brass & Bronze
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	243	111364	388	154726
China	25	9991	139	51183
Sri Lanka	50	22130	107	46721
Belgium	-	-	38	11415
Malaysia	2	918	26	10454
Sweden	25	10794	24	9059
UAE	25	13467	21	8206
Taiwan	-	-	14	5863
Singapore	49	19040	11	4064
Germany	4	5045	2	1719
Thailand	2	843	2	1640
Other countries	61	29136	3	4402

Figures rounded off

**Table – 30 : Exports of Brass & Bronze Unwrought
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	1490	560237	9834	2958839
China	652	193998	9073	2628034
Thailand	296	126918	338	140234
USA	35	18078	103	43986
Taiwan	163	66383	117	43245
Mexico	-	-	41	18468
Malaysia	13	6527	33	13966
UAE	1	1372	26	12862
Sweden	1	902	25	9111
Australia	23	9285	20	8251
Bangladesh	15	5635	17	6261
Other countries	292	131138	41	34421

Figures rounded off

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

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	42	1916	1	367
Qatar	++	58	1	367
Korea, Rep. of	42	1856	-	-
Bhutan	++	2	-	-
France	++	++	-	-
Guinea	++	++	-	-

Figures rounded off

**Table – 32: Imports of Copper Ores & Concentrates
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	823938	121462018	821555	86675247
Chile	428118	54090680	520728	56127386
Peru	68374	10336736	97175	8748942
Australia	123724	20249519	71973	6170829
Indonesia	125780	27258731	30150	4932740
Saudi Arabia	41280	4207153	31389	3142310
Canada	-	-	20398	2590179
Panama	-	-	29119	2339999
Philippines	10731	1983762	10659	1513232
Thailand	9335	1038382	9929	1108424
Nigeria	-	-	10	720
Other countries	16596	2297054	25	487

Figures rounded off

**Table – 33: Imports of Refined Copper
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	92290	42562867	151964	67289146
Japan	59894	27799946	116158	51690905
UAE	3974	1870284	21868	9604118
Zambia	219	106038	3576	1573590
Malaysia	3801	1709266	3618	1531001
Thailand	1574	580850	1628	671491
Indonesia	452	202670	1266	545875
Germany	762	364635	722	330898
Tanzania	2988	1355733	695	301693
Luxemboug	100	43724	674	280966
Congo P Rep	5320	2420613	460	198276
Other countries	13208	6109110	1298	560332

Figures rounded off

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**Table – 34 : Imports of Copper & Alloys
(Including Brass & Bronze) : Total
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	839517	368963430	896887	361304795
Japan	70645	34705994	131396	59756788
Zambia	65858	29257249	116806	51124199
UAE	116685	51957538	111442	46828572
Malaysia	89870	42085297	86882	38375543
Vietnam	69374	34143628	67461	31632495
Thailand	45184	21937414	42412	19537105
USA	43480	15007118	58553	17873332
China	32593	16281595	28860	12599649
Germany	25969	11151377	32910	10027517
Saudi Arabia	25473	9324592	22771	7566885
Other countries	254386	103111628	197395	65982709

Figures rounded off

**Table – 35: Imports of Copper & Alloys
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	597928	287265270	616485	280500298
Japan	66891	32239460	127092	57661706
Zambia	65842	29251338	116785	51117159
UAE	97212	45407680	94409	41655990
Malaysia	80754	38667043	79347	35698691
Vietnam	69303	34104797	67399	31594111
Thailand	43225	21078266	40460	18691839
China	27965	13691350	25167	10609734
Indonesia	21528	10221680	11375	5158230
South Africa	7313	3317472	8570	3686974
Germany	7178	4904636	4510	3339767
Other countries	110718	54381547	41372	21286097

Figures rounded off

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**Table – 36 : Imports of Copper (Scrap)
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	79213	24547763	112713	29265173
USA	11258	2839238	17635	4588536
Saudi Arabia	13023	5465156	10929	4342309
UAE	9197	3294106	8490	2801587
UK	8847	1670837	15509	2386811
Kuwait	3698	1686422	5541	2325013
Germany	3112	519158	14222	2255962
Qatar	4785	2043596	5111	1751504
Australia	8136	1670774	8465	1651500
Canada	3012	889358	3401	1058148
Netherlands	655	158713	3382	815990
Other countries	13490	4310405	20028	5287813

*Figures rounded off***Table – 37 : Imports of Brass & Bronze
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	29961	16093222	23564	12369096
China	4537	2561598	3667	1980713
Malaysia	6641	2500466	4730	1726446
Japan	3692	2450499	2502	1644254
Korea, Rep. of	2922	1530883	3004	1402273
Germany	2396	1645173	1287	976410
Thailand	1848	835093	1799	792446
USA	457	747077	375	748806
Nepal	1390	578045	1172	470316
Sri Lanka	1434	512351	1327	445513
Taiwan	737	354727	673	302310
Other countries	3906	2377311	3027	1879609

Figures rounded off

COPPER

**Table – 38 : Imports of Brass & Bronze (Scrap)
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	132415	41057176	144125	3917022
USA	30260	9561336	39543	11080135
Germany	13282	4082411	12890	3455378
Saudi Arabia	12340	3821329	11752	3177036
UAE	10214	3227388	8479	2338901
UK	10960	3361955	6646	1724629
Poland	4476	1344695	5551	1483319
Sweden	5507	1482830	6115	1468727
Netherlands	6583	2059590	4446	1209506
Denmark	3106	963180	3395	905930
Switzerland	1918	593100	3194	873464
Other countries	33768	10559363	42113	11453203

Figures rounded off

**Table – 39 : Imports of Copper (Cement Copper Precipitated)
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	++	5	++	763
France	-	-	++	670
USA	++	5	++	80
UK	-	-	++	13

Figures rounded off

**Table – 40 : Imports of Copper & Alloys
(Excluding Brass & Bronze and Scrap)
(By Items)**

Item	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All items	597928	287265270	616485	280500298
Blister & Other Unrefined Copper	45875	20653167	103618	45396611
Copper & Alloys :Worked (Bars, Rods, Plates, etc.)	93758	48667650	100371	49227415
Copper & Alloys :Worked, Nes	9263	8059113	10212	7044876
Copper Alloys: Unwrought Excl. Brass & Bronze	951	557231	1277	662652
Copper Mattes	138	42820	++	9
Copper Powder & Flakes	835	634277	645	447431
Copper Refined Copper Worked	268514	127579456	217038	96866800
Electroplated Anode of Nickel	86233	38397691	31221	13449228
Master Alloys of Copper	72	110997	140	116130
Refined Copper	92290	42562867	151964	67289146

Figures rounded off

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**Table – 41 : Imports of Copper & Alloys : Worked (Bars, Rods, Plates, etc.)
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	93758	48667650	100371	49227415
Vietnam	30002	15433597	41305	20228334
Malaysia	14362	7753872	19351	9817650
China	22076	9561385	18242	7159227
Thailand	7210	3945653	7210	3584499
Germany	4260	2774687	2801	1987954
Korea, Rep. of	5295	2673494	2761	1246926
Taiwan	3543	1360568	2275	819271
USA	600	987097	402	789018
Hong Kong	1234	604855	1825	785657
Japan	833	742654	882	725463
Other countries	4344	2829790	3317	2083417

Figures rounded off

FUTURE OUTLOOK

HCL, Public Sector company, undertook expansion projects in its mines, namely, Malanjkhanda, Khetri, Kolihaan, etc. to increase production. HCL has chalked out an expansion plan to increase mine production from 3.95 to 20.2 million tonnes per annum in next six years with a capital layout of ₹ 5,500 crore. The company targets to complete the first phase of the plan, which will take its capacity to 12.2 mtpa by 2028-29. Copper demand in India is expected to grow at 6–7% due to increased thrust of Government of India towards "Make in India" and "Smart City" programmes and increased investments in railways, power, defence and infrastructure sectors would drive the demand for 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 manufacturing, India energy plan 2022–100 GW solar,

32 GW wind, 260 GW thermal & nuclear, 62 GW hydro etc. that are vigorously pursued by the Government. 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 0.5 kg to 1 kg by 2025. The per capita copper consumption of China is 6 kg and world average is 3.2 kg.

The market for Electric Vehicles (EVs) and renewable energier are 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 the demand for copper. The projected demand for copper due to electric vehicles is expected to increase by 1.7 million tonnes by 2027. A new generation of high performance copper alloy wire is attracting attention of the electronic industry.