

LEAD & ZINC



# Indian Minerals Yearbook 2020

(Part- II :Metals and Alloys)

**59<sup>th</sup> Edition**

**LEAD & ZINC**

**(ADVANCE RELEASE)**

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

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# 10 Lead & Zinc

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Lead is a soft, heavy, toxic and highly malleable metal. It is bluish white when freshly cut, but tarnishes to dull grey when exposed. Both lead & zinc are found to occur together in ore along with other metals like silver and cadmium. Zinc is a silvery blue-grey metal with a relatively low melting and boiling point.

The largest single use of lead worldwide today is in the manufacture of lead-acid storage batteries which is about 74%, while the single largest use for zinc is in the Galvanising Industry which is about 50%.

Zinc is the fourth most widely used metal across the globe, trailing only steel, aluminium and copper. The country has the self-sufficiency in respect of zinc. In contrast, there is short supply of lead vis-a-vis the demand in the country.

The ever increasing demand for lead especially from Lead Acid Battery Sector is met by the thriving market of lead scrap recycling. The Government of India has enacted Battery Management and Handling Rule (BMHR), 2002, in order to enable further increase in the availability of scrap from the Organised Sector. It is estimated that 56% of refined lead produced worldwide is from recycled material. Producing lead through this route requires around one-third of the energy needed to extract it from its ores. Recovery of secondary zinc and lead is economically more attractive because of certain advantages. Besides, lower energy consumption, it also entails low capital cost, less environmental hazards and high metal contents.

HZL is the only producer of primary lead and primary zinc in 2019-20 due to shut down of the operation of Edayar Zinc Limited (EZL). EZL is in the process of arriving at a settlement with the banks. The banks have taken over physical possession of the secured assets of EZL on 23<sup>rd</sup> July 2019.

The consortium of banks led by Punjab National Bank has taken physical possession of the mortgaged assets and has conducted auctions for sale of the mortgaged properties.

## RESERVES/RESOURCES

The total reserves/resources of lead and zinc ore as on 1.4.2015 as per NMI database based on UNFC system have been estimated at 749.46 million tonnes. Of these, 106.12 million tonnes (14.16%) fall under 'Reserves' category while the balance 643.34 million tonnes (85.84%) are classified as 'Remaining Resources'.

The reserves/resources of ore containing + 10% Pb & Zn were estimated at 124.23 million tonnes (16.57%), ore containing 5 to 10% Pb & Zn were 329.88 million tonnes (44%) and ore containing less than 5% Pb & Zn were 295.35 million tonnes (39.41%).

The total metal content in reserves/resources of lead is 13 million tonnes and that of zinc is 36.36 million tonnes and for lead & zinc metal is 0.14 million tonnes. In terms of reserves, 2.48 million tonnes of lead metal and 9.99 million tonnes of zinc metal have been estimated. Rajasthan is endowed with the largest reserves/resources of lead – zinc ore amounting to 670.34 million tonnes (89.44%), followed by Andhra Pradesh 22.69 million tonnes (3.03%), Madhya Pradesh 14.84 million tonnes (1.98%), Bihar 11.43 million tonnes (1.52%) and Maharashtra 9.27 million tonnes (1.24%). Resources are also established in Gujarat, Meghalaya, Odisha, Sikkim, Tamil Nadu, Uttarakhand and West Bengal (Table-1).

## DEVELOPMENT

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

## LEAD &amp; ZINC

**Table – 1 : Reserves/Resources of Lead & Zinc Ore as on 1.4.2015  
(By Grades/States)**

(In '000 tonnes)

Grade/State	Reserves				Remaining Resources				Total Resources				
	Proved STD111	Probable		Feasibility STD211	Pre-feasibility		Measured STD331	Indicated STD332	Inferred STD333	Reconnaissance STD334	Total Resources (A+B)		
		STD121	STD122		STD221	STD222						Total (A)	Total (B)
<b>All India</b>													
<b>Ore</b>	<b>31662</b>	<b>68687</b>	<b>5767</b>	<b>106116</b>	<b>5564</b>	<b>17411</b>	<b>31297</b>	<b>37055</b>	<b>192083</b>	<b>355403</b>	<b>4530</b>	<b>643343</b>	<b>749459</b>
Lead metal	624.56	1666.02	191.76	2482.34	119.31	521.74	780.56	690.65	2171.43	6237.67	-	10521.36	13003.7
Zinc metal	2871.75	6728.14	399.63	9999.52	364.08	940.26	1362.05	1941.94	7931.06	13722.2	101.65	26363.24	36362.76
Lead & Zinc metal	-	-	-	-	-	-	-	-	-	120.76	22.37	143.13	143.13
<b>By Grades</b>													
Ore with (+)10%	17597	36790	-	54387	155	148	81	-	24850	44605	-	69839	124226
Pb & Zn													
Ore with 5-10 %	14065	31897	5767	51729	5280	17146	31216	32449	29335	162730	-	278156	329885
Pb & Zn													
Ore with (-)5%	-	-	-	-	129	117	-	4606	137898	148068	4530	295348	295348
Pb & Zn													
Lead metal	624.56	1666.02	191.76	2482.34	119.31	521.74	780.56	690.65	2171.43	6237.67	-	10521.36	13003.7
Zinc metal	2871.75	6728.14	399.63	9999.52	364.08	940.26	1362.05	1941.94	7931.06	13722.2	101.65	26363.24	36362.76
Lead & Zinc metal	-	-	-	-	-	-	-	-	-	120.76	22.37	143.13	143.13
<b>By States</b>													
<b>Andhra Pradesh</b>													
Ore	-	-	-	-	-	-	-	1000	4159	17530	-	22689	22689
Lead metal	-	-	-	-	-	-	-	28.70	119.53	688.65	-	836.88	836.88
Zinc metal	-	-	-	-	-	-	-	12.40	43.57	7.19	-	63.16	63.16
<b>Bihar</b>													
Ore	-	-	-	-	-	-	-	-	435	11000	-	11435	11435
Lead metal	-	-	-	-	-	-	-	-	-	24	-	24	24
Zinc metal	-	-	-	-	-	-	-	-	14.75	24.00	-	38.75	38.75
<b>Gujarat</b>													
Ore	-	-	-	-	2470	3010	1380	129	-	200	-	7189	7189
Lead metal	-	-	-	-	74.1	90.3	41.4	3.9	-	-	-	209.70	209.70
Zinc metal	-	-	-	-	123.5	150.5	69	1.1	-	-	-	344.10	344.10
Lead & Zinc metal	-	-	-	-	-	-	-	-	-	0.9	-	0.90	0.90
<b>Madhya Pradesh</b>													
Ore	-	-	-	-	129	117	-	1510	4006	5930	3150	14841	14841
Lead metal	-	-	-	-	-	-	-	26.12	5.13	5.04	-	36.29	36.29
Zinc metal	-	-	-	-	5.2	4.71	-	114.76	41.93	186.02	101.12	453.74	453.74
<b>Maharashtra</b>													
Ore	-	-	-	-	-	-	-	1967	6305	1000	-	9272	9272
Zinc metal	-	-	-	-	-	-	-	133.56	428.11	28	-	589.67	589.67

(Contd)

LEAD & ZINC

Table - 1 (Concid) (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						
<b>Meghalaya</b>													
Ore	-	-	-	-	-	-	-	-	880	-	-	880	
Lead metal	-	-	-	-	-	-	-	-	16.50	-	-	16.50	
Zinc metal	-	-	-	-	-	-	-	-	14.00	-	-	14.00	
<b>Odisha</b>													
Ore	-	-	-	-	961	119	670	-	-	670	-	1750	
Lead metal	-	-	-	-	34.32	4.25	38.39	-	-	38.39	-	76.96	
<b>Rajasthan</b>													
Ore	31662	68687	5767	106116	2965	12888	29734	28779	170547	317929	1380	564221	
Lead metal	624.56	1666.02	191.76	2482.34	45.21	390.22	733.23	490.82	1860.47	5462.09	-	8982.04	
Zinc metal	2871.75	6728.14	399.63	9999.52	235.38	772.17	1289.91	1514.15	7145.53	13435.31	0.53	24392.98	
Lead & Zinc metal	-	-	-	-	-	-	-	-	-	119.86	22.37	142.23	
<b>Sikkim</b>													
Ore	-	-	-	-	-	436	64	300	-	150	-	950	
Lead metal	-	-	-	-	-	6.9	1.68	-	-	-	-	8.58	
Zinc metal	-	-	-	-	-	12.88	3.14	3	-	1.05	-	20.07	
<b>Tamil Nadu</b>													
Ore	-	-	-	-	-	-	-	200	590	-	-	790	
Lead metal	-	-	-	-	-	-	-	2.26	5.48	-	-	7.74	
Zinc metal	-	-	-	-	-	-	-	11.76	24.76	-	-	36.52	
<b>Uttarakhand</b>													
Ore	-	-	-	-	-	-	-	3170	1790	660	-	5620	
Lead metal	-	-	-	-	-	-	-	138.85	34.25	9.50	-	182.60	
Zinc metal	-	-	-	-	-	-	-	151.21	87.99	27.63	-	266.83	
<b>West Bengal</b>													
Ore	-	-	-	-	-	-	-	-	3371	335	-	3706	
Lead metal	-	-	-	-	-	-	-	-	130.07	10.00	-	140.07	
Zinc metal	-	-	-	-	-	-	-	-	130.42	13.00	-	143.42	

Figures rounded off

## PRODUCTION & STOCKS

### Lead & Zinc Ores and Concentrates

The entire output of lead & zinc ore and concentrates in 2018-19 and 2019-20 was reported by mines owned by Hindustan Zinc Ltd, a Private Sector company.

The production of lead and zinc ore at 14.48 million tonnes in 2019-20 increased by 5% as compared to previous year. The metal content of lead and zinc in the ore produced in 2019-20 works out to 2,56,921 tonnes and 8,30,501 tonnes respectively as against the corresponding figures 2,65,605 and 8,10,765 tonnes in the preceding year (Tables-2 & 3).

During the year 2019-20, 14.40 million tonnes of lead & zinc ore was treated as against 14.19 million tonnes in 2018-19 (Table-4).

The production of lead concentrates in 2019-20 at 3,51,271 tonnes decreased by 2% as compared to the previous year. Entire production of lead concentrates was reported from Rajasthan (Tables-5 & 6).

The production of zinc concentrates decreased to 14,46,823 tonnes in 2019-20 from 14,56,804 tonnes in 2018-19. The entire production of zinc concentrates was reported from Rajasthan (Tables - 7 & 8).

### Grade Analysis

All India average metal content of ore treated during 2019-20 worked out to be 7.42% (1.77% Pb and 5.65% Zn) as against 7.74% (1.89% Pb and 5.85% Zn) in 2018-19. The metal content of ore treated at Rampura Agucha mine in Bhilwara district of Rajasthan was the highest at 11.65% (1.46% Pb & 10.19% Zn). The lead concentrates produced during 2019-20 was of grade 55.32% Pb as against 57.46% Pb in 2018-19. Metal

content of zinc concentrates produced in Rajasthan worked out to 49.63% Zn in 2019-20 as against 50% Zn in the previous year.

### Stock

Mine-head closing stocks of lead concentrates in 2019-20 were 17,735 tonnes as against 6,684 tonnes in 2018-19. The entire quantity of the stocks at the end of the year was held in Rajasthan (Table-9).

Mine-head closing stocks of zinc concentrates in 2019-20 were 25,929 tonnes as against 23,272 tonnes in 2018-19. The entire quantity of the stocks was held in Rajasthan (Table-10).

### Employment

The average daily labour employed in lead and zinc mines during the year 2019-20 was 11,417 as against 8,223 in 2018-19.

### Lead and Zinc Metals

The production of primary lead during 2019-20 decreased by 33% to 1,32,316 tonnes from 1,97,839 tonnes during 2018-19. The entire output of primary lead was from Chanderiya and Dariba smelters of Hindustan Zinc Ltd.

The production of zinc ingot metal at 5,16,316 tonnes in 2019-20 decreased by 26% from 6,96,283 tonnes in the previous year. Hindustan Zinc Ltd, contributed 100% of the total output. (Tables - 11 to 14).

**Table - 2 : Producers of Lead & Zinc Ore, Concentrates & Metals, 2019-20**

Name and address of the producer	Location	
	State	District
Hindustan Zinc Ltd, Yashad Bhavan, Udaipur - 313 004, Rajasthan.	Rajasthan	Ajmer Bhilwara Rajsamand Udaipur

**Table – 3 : Production of Lead and Zinc Ore, 2018-19 and 2019-20 (By State)**

State	2018-19			2019-20 (P)		
	Ore Produced	Metal content		Ore Produced	Metal content	
		Lead (Pb)	Zinc (Zn)		Lead (Pb)	Zinc (Zn)
<b>India</b>	<b>13752295</b>	<b>265605</b>	<b>810765</b>	<b>14479032</b>	<b>256921</b>	<b>830501</b>
Rajasthan	13752295	265605	810765	14479032	256921	830501

(In tonnes)

## LEAD &amp; ZINC

**Table – 4 : Lead and Zinc Ore Treated, 2018-19 and 2019-20  
(By State)**

(In tonnes)

State	2018-19			2019-20 (P)		
	Ore Treated	Metal content		Ore Treated	Metal content	
		Lead (Pb)	Zinc (Zn)		Lead (Pb)	Zinc (Zn)
<b>India</b>	<b>14194947</b>	<b>268638</b>	<b>830212</b>	<b>14400411</b>	<b>254949</b>	<b>813101</b>
Rajasthan	14194947	268638	830212	14400411	254949	813101

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

(Quantity in tonnes; Value in ₹'000)

State	2017-18		2018-19		2019-20 (P)	
	Quantity	Value	Quantity	Value	Quantity	Value
<b>India</b>	<b>306398</b>	<b>11429413</b>	<b>358369</b>	<b>16316914</b>	<b>351271</b>	<b>18072776</b>
Rajasthan	306398	11429413	358369	16316914	351271	18072776

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

(Quantity in tonnes; Value in ₹'000)

State/District	2018-19				2019-20 (P)			
	No. of mines	Production			No. of mines	Production		
		Quantity	Pb%	Value		Quantity	Pb%	Value
<b>India</b>	<b>8</b>	<b>358369</b>	<b>57.46</b>	<b>16316914</b>	<b>8</b>	<b>351271</b>	<b>55.32</b>	<b>18072776</b>
Private Sector	8	358369	57.46	16316914	8	351271	55.32	18072776
<b>Rajasthan</b>	<b>8</b>	<b>358369</b>	<b>57.46</b>	<b>16316914</b>	<b>8</b>	<b>351271</b>	<b>55.32</b>	<b>18072776</b>
Ajmer*	1	-	-	-	1	-	-	-
Bhilwara	1	77613	57.92	2963123	1	73839	54.83	2929685
Rajsamand	2	210299	55.83	8542830	2	185895	55.26	8319263
Udaipur	4	70457	61.82	4810961	4	91537	55.85	6823828

\*Reported production of lead and zinc ore only and processing is done along with ore produced from Rampura Agucha mine at Bhilwara

**Table – 7 : Production of Zinc Concentrates, 2017-18 to 2019-20  
(By State)**

(Quantity in tonnes; Value in ₹'000)

State	2017-18		2018-19		2019-20 (P)	
	Quantity	Value	Quantity	Value	Quantity	Value
<b>India</b>	<b>1539657</b>	<b>49799273</b>	<b>1456804</b>	<b>56083827</b>	<b>1446823</b>	<b>60231216</b>
Rajasthan	1539657	49799273	1456804	56083827	1446823	60231216

## LEAD &amp; ZINC

**Table – 8 : Production of Zinc Concentrates, 2018-19 & 2019-20  
(By Sector/State/Districts)**

(Quantity in tonnes; Value in ₹'000)

State/District	No. of mines	2018-19			No. of mines	2019-20 (P)		
		Production				Production		
		Quantity	Zn%	Value		Quantity	Zn%	Value
<b>India</b>	@	<b>1456804</b>	<b>50.00</b>	<b>56083827</b>	@	<b>1446823</b>	<b>49.63</b>	<b>60231216</b>
Private Sector	@	1456804	50.00	56083827	@	1446823	49.63	60231216
<b>Rajasthan</b>	@	<b>1456804</b>	<b>50.00</b>	<b>56083827</b>	@	<b>1446823</b>	<b>49.63</b>	<b>60231216</b>
Bhilwara	@	910223	50.04	32528451	@	904022	49.93	33291114
Rajsamand	@	442085	49.37	16908683	@	403559	48.91	16992620
Udaipur	@	104496	52.31	6646693	@	139242	49.72	9947482

**Table – 9 : Mine-head Closing Stocks  
of Lead Concentrates,  
2018-19 & 2019-20  
(By State)**

(In tonnes)

State	2018-19	2019-20 (P)
<b>India</b>	<b>6684</b>	<b>17735</b>
Rajasthan	6684	17735

**Table – 11 : Production of Lead Metal,  
2018-19 & 2019-20**

(Quantity in tonnes; Value in ₹'000)

Year	Lead Primary	
	Quantity	Value
2017-18	168245	28487471
2018-19	197839	33814419
2019-20 (P)	132316	21429039

**Table – 10 : Mine-head Closing Stocks  
of Zinc Concentrates,  
2018-19 & 2019-20  
(By State)**

(In tonnes)

State	2018-19	2019-20 (P)
<b>India</b>	<b>23272</b>	<b>25929</b>
Rajasthan	23272	25929

**Table – 12 : Production of Zinc Metal,  
2017-18 to 2019-20**

(Quantity in tonnes; Value in ₹'000)

Year	Zinc Ingots	
	Quantity	Value
2017-18	791461	169157981
2018-19	696283	153894301
2019-20 (P)	516316	105428610

**Table – 13 : Production of Lead (Primary), 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
<b>India</b>		<b>197839</b>	<b>33814419</b>	<b>132316</b>	<b>21429039</b>
Rajasthan	HZL Chanderiya/ Dariba	197839	33814419	132316	21429039

**Table – 14 : Production of Zinc (Ingots), 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
<b>India</b>		<b>696283</b>	<b>153894301</b>	<b>516316</b>	<b>105428610</b>
Rajasthan	HZL Chanderiya/ Debari/Dariba	696283	153894301	516316	105428610

**MINING & MILLING**

HZL is the only integrated lead and zinc metal producer in the country. Its operations can be classified into mining and smelting. At present, HZL's eight mines and all mining operations are located in Rajasthan. The eight mines are Rampura–Agucha mine (Bhilwara district), Kayad mine (Ajmer district), Rajpura–Dariba mine, Sindesar–Khurd mine (both in Rajsamand district) and Zawar group of mines (4 mines in Udaipur district i.e. Mochia, Balaria, Zawarmala and Baroi), Rajasthan. All the mines of HZL undertake underground mining operations. Rampura–Agucha mine was completely turned to underground mine with an annual production capacity of 5 million tonnes of lead & zinc ore. Sindesar–Khurd mine is highly mechanised and the largest ore producing underground mine with annual production capacity of 6 million tonnes. The other six mines viz, Rajpura-Dariba, Zawar group of mines (Mochia, Balaria, Zawarmala and Baroi) and Kayad mine are underground mines with an annual production capacity of 1.08 million tonnes, 4.0 million tonnes and 1.2 million tonnes of lead & zinc ore respectively (Table-15).

Zawar group of mines is a cluster of four underground mines viz. Mochia, Balaria, Zawarmala and Baroi mines and one beneficiation plant for all mines commissioned in the year 1966. Zawar group of mines, one of the oldest mines is located about 40 km south of Udaipur. Lead & Zinc ore of the mines is divided into stope blocks which are drilled and blasted using sub-level open stoping mining method. Loading and transportation are done using combination of LHDs, LPDTs, LOCO and shaft hoisting to surface. The ore is further crushed and passed through a flotation process to produce concentrate. In 2019-20, the Zawar group of mines produced 3.27 million tonnes ore at 2.52% Zn and

**Table – 15 : Ore Production Capacity of  
HZL Mines**

Mine	Ore	Capacity (million tpy)
<b>Total</b>		<b>17.28</b>
Zawar Mines, Distt Udaipur, Rajasthan.	Zinc-lead	4.00
Rajpura-Dariba, Distt Rajsamand, Rajasthan.	Zinc-lead	1.08
Sindesar-Khurd Mine, Distt Rajsamand, Rajasthan.	Zinc-lead	6.00
Rampura-Agucha, Distt Bhilwara, Rajasthan.	Zinc-lead	5.00
Kayad Distt Ajmer Rajasthan.	Zinc-lead	1.20

*Source : HZL Annual Report 2019-20*

1.94% Pb feed grade. During the year 2019-20, at Zawar mines (Mochia and Baroi mines), a control room was set up to improve underground communication between machine operators and workforce. Sub-level open-stoping method is used for extraction of ore at the mines.

The Rajpura–Dariba mine is an underground lead & zinc mine where mining operations began in 1983. It is located at 75 kilometers north-east of Udaipur, Rajasthan. Mining is carried out by using Blasthole stoping method with hydraulic filling. Mined out stopes are backfilled with cement tailings. During the year 2019-20, Rajpura–Dariba Mine produced 1.038 million tonnes ore at 4.85% Zn and



1.18% Pb feed-grade. Presently, the mine is accessed via decline and two shafts. As RDM ore body also allows for multiple production centres, the mine is poised to produce at the capacity of 2 million tonnes per annum of ore in future with new level of mechanisation & automation. Mine has achieved highest truck filling hours and exploration drilling resulting in its readiness for expansion.

Rampura–Agucha mine is located at 230 km north of Udaipur in Bhilwara district, Rajasthan and it was commissioned in 1991. It has high zinc-lead reserve grades averaging 15.4%. In 2019-20, the production of ore was carried out by underground mining at 3.94 million tonnes at 11.13% Zn and 1.62% Pb feed grade. Until 2017-18 the production of ore from the mine was by surface mining and the mine has been fully transformed into an underground mine. Two ventilation shafts (North and South) each with diameter of 7.5 m and 450 m depth are in operation. The main hoisting shaft of 7.5 m diameter has been sunk and furnished to its final depth of 950 m and winders, skip loading & surface conveyors have been installed, while off-shaft development activities to commission underground crushing and conveying system are under progress. Paste-Fill plant has been established in the mine area. Underhand stoping method has been adopted which will use mine tailings to fill stopes after ore extraction.

Sindesar–Khurd mine is located at 6 km NNE of Rajpura-Dariba mine and 82 km north-east of Udaipur. It is an underground mine, commissioned in 2006. The average reserve grade of Sindesar- Khurd mine is 7% with its silver-rich lead-zinc deposit. The mine lies on the same geological belt as the Rajpura–Dariba mine. During the year 2019-20, Sindesar–Khurd mine produced 5.078 million tonnes ore at 3.37% Zn and 2.05% Pb grade. It produces high silver content ore at 128 g/tonne. During the year 2019-20, production shaft has been operationalised along with associated conveyor. Second paste-fill plant was also commissioned and ramped it up to its designed throughput. The mine consists of multiple standalone deposits or auxiliary lenses, which gives three standalone production centres at present. The production is carried out from the main lens which has an annual capacity of 3.5 million tonnes & two auxiliary lens SKA2 and SKA6,

are functioning at 2.5 million tonnes capacity per annum. Two existing beneficiation plants at the mine are operating at 4.7 million tonnes per annum, while in the year 2019-20, three beneficiation plant is in operation and third beneficiation plant of 1.5 million tonnes per annum was operationalised. The total beneficiation capacity of Sindesar-Khurd mine is 6.2 million tonnes per annum.

Kayad mine is a newly developed underground mine near Ajmer, Rajasthan. It was commissioned in 2014 having small but high-grade ore at 6.3% Pb & Zn ore deposit. In Kayad mine, 21 tonnes capacity of LHD and 65 tonnes capacity of LPDT are used to produce 1.2 million tonnes of ore per annum. The mine has access through a single decline from surface portal to the top of the orebody and split in two declines 75 meters below surface.

Longitudinal Long-Hole Open Stopping method is used for the steeper and thinner portion of ore body and Transverse Long-Hole Open Stopping method for flatty dipping and thick portion of the ore body. In the year 2019-20, the Kayad mine produced 1.139 million tonnes ore at feed grade of 6.86 % Zn and 0.92% Pb. The ore from Kayad mine is treated at Rampura-Agucha's beneficiation plant.

## SMELTING

Primary lead was produced entirely by HZL which operated smelter at Chanderiya and Dariba having capacity of 90,000 tonnes and 1,20,000 tonnes per annum of lead metal, respectively. Thus, the smelting capacity for lead (primary) in the country presently is 2,10,000 tonnes per annum. Company-wise smelting capacity of lead and zinc smelters is furnished in Table-16.

The smelting capacity of HZL for zinc is distributed between three smelters at Debari (88,000 tonnes), Chanderiya (5,85,000 tonnes) and Dariba (2,40,000 tonnes). Edayar Zinc Ltd's plant at Binanipuram (Aluva), Kerala, has capacity of 38,000 tonnes per annum. Thus, the smelting capacity for zinc in the country is 9,51,000 tonnes per annum. EZL produced zinc from imported concentrates but since the Company has been declared as sick unit, it did not operate its plant. Besides lead & zinc capacities, HZL has capacities to produce 800 tonnes per annum of silver. HZL is India's largest

## LEAD &amp; ZINC

**Table – 16 : Company-wise Capacity and Production of Primary Lead and Zinc**

(In tonnes)

Company	Lead capacity tpy	Production		Zinc capacity tpy	Production	
		2018-19	2019-20 (P)		2018-19	2019-20 (P)
Hindustan Zinc Ltd	210000	197839	132316	913000	696283	516316
Edayar Zinc Ltd	-	-	-	38000	-	-
<b>Total</b>	<b>210000</b>	<b>197839</b>	<b>132316</b>	<b>951000</b>	<b>696283</b>	<b>516316</b>

manufacturer of sulphuric acid which is by-product of its smelting operations. In 2019-20, HZL produced 1.24 million tonnes of sulphuric acid, as compared to 1.28 million tonnes in the previous year.

Edayar Zinc Ltd (EZL) has been incurring huge fixed costs due to shutdown of the plant from April, 2014 onwards, except for a brief period of 59 days when the plant operated. The company entered in to a One Time Settlement (OTS) with the Lenders and payments are being made under the sanctioned OTS. Due to Covid-19 and consequent lockdown, Company sought extension of time for payment under the settlement. Settlement with the statutory authorities and Government agencies is underway. The Company is hopeful that Lenders, Creditors and Authorities will take a measured stand to safeguard interest of all stakeholders.

Chanderiya lead-zinc smelting complex is located at 110 km North of Udaipur in Chittorgarh district, Rajasthan. It was commissioned in 1991 with an initial production capacity of 70,000 tonnes per annum. Chanderiya lead-zinc smelting complex comprises one zinc Pyro-metallurgical smelter having production capacity of 1,05,000 tonnes zinc, one lead Pyrometallurgical smelter having production capacity of 90,000 tonnes lead and one Hydro-metallurgical zinc smelter having production capacity of 4,80,000 tonnes zinc. It employs Roast-Leach Electro-winning technology in its Hydro-metallurgical smelters, Imperial Smelting process in lead-zinc smelter and Top Submerged Lance Technology (Designed by M/s Ausmelt Ltd, Australia) coupled with Cansolv Technology for its lead smelter. In the year 2019-20, Chanderiya lead-zinc smelter produced 4,25,780 tonnes of zinc and 94,916 tonnes of lead as compared to 4,24,803 tonnes of zinc and 85,916 tonnes of lead in the previous year.

Zinc fuming is a process that recovers valuable metals from zinc residue and will help in higher recovery of zinc, lead and silver. At the Hydro plant, Hydro-2 cell house was upgraded from 192 kA to 200 kA for enhancing zinc output.

Zinc Smelter Debari was commissioned in the year 1968 with an initial production capacity of 18,000 tonnes per annum of zinc. The present capacity has now reached 88,000 tonnes per annum of zinc. It is located at about 13 km north of Udaipur, Rajasthan. Zinc smelter Debari employs Roast-leach Electro-winning Technology at its Hydro-metallurgical zinc smelter. The plant has three roasting facilities, leaching & purification section, electrolysis, melting and casting sections. It produced surplus calcine, an intermediate product, which is supplied to the rest of the Hydro-metallurgical zinc smelter. In the year 2019-20, Zinc Smelter Debari produced 61,817 tonnes of zinc as compared to 67,968 tonnes of zinc in the previous year.

Dariba smelting complex is located at 75 km north-east of Udaipur near to Rajpura–Dariba mine and 7 km from Sindesar-Khurd mine in Rajsamand district, Rajasthan. The zinc smelter at Dariba was commissioned in March 2010 and has a capacity of 2,40,000 tonnes per annum while lead smelter was commissioned in July, 2011 and has a capacity of 1,20,000 tonnes per annum. Dariba smelting complex employs Roast-Leach Electro-winning technology at its Hydro-metallurgical zinc smelter. The plant has two roasting facilities, a leaching & purification section and a cell house. The lead smelter employs SKS bottom blowing technology. The plant consists of SKS furnace–bottom blowing, blast furnace, electric arc furnace & fuming furnace and electro-refining. Fuming furnace is also installed to produce zinc oxide from blast furnace slag. In the

year 2019-20, the smelter produced 2,00,689 tonnes of zinc and 86,454 tonnes of lead metal as compared to 2,03,512 tonnes of zinc and 1,11,922 tonnes of lead metal in the previous year. Dariba Smelting Complex lead plant steam was utilised in Dariba Smelting Complex Captive Power Plant (CPP) for reducing the auxiliary steam consumption. In 2019-20, Dariba Smelting Complex produced 4,26,623 tonnes of sulphuric acid as compared to that of 4,77,217 tonnes in the previous year.

The product range of HZL constitutes two grades, namely, Special High Grade (SHG) zinc containing 99.995% Zn (min.) and Prime Western (PW) containing 98.65% Zn (min.). Both these products are available in the form of slabs weighing 25 kg, SHG Jumbo weighing 1,000 kg and PW Jumbo weighing 600 kg. Lead is available as HZL Grade containing 99.99% Pb (min.) in the form of slab weighing 24 kg. In October, 2016, a new zinc alloy value-added product, HZDA or Hindustan Zinc Die-cast Alloy was added to the Company's portfolio from Chanderiya Lead-Zinc Smelter.

## **POLLUTION CONTROL & ENVIRONMENTAL MANAGEMENT EFFORTS**

The standard for Emission or Discharge of Environment Pollutant from lead & zinc smelting is prescribed in Schedule-I of the Environment (Protection) Rules, 1986. The standards for Particulate Matter Emission in concentrator for lead & zinc smelter is 150 mg per normal cubic metre and the standard for emission of oxides of sulphur in smelter & convertor is that off-gases must be utilised for sulphuric acid manufacture. The limit of sulphur dioxide emission from stock shall not exceed 4 kg per tonne of concentrate (one hundred per cent acid produced).

At underground mines, the tailings generated after beneficiation is utilised to backfill the underground mined stopes and the remaining tailings is stored in tailing dam at various mines location. During the process of recovery of metal at smelters, waste is generated. The waste contains toxic element, i.e., waste water effluent sludge, smelter slag leach residues, Suspended Particulate Matter (SPM), SO<sub>2</sub>, NO<sub>x</sub> and toxic metal fumes which are harmful at low

exposure generated during the production of lead & zinc metal.

Smelting and mining operations of HZL are working on zero discharge principle and the Company is committed for efficient utilisation of waste generated at its mines and smelter. The Company has adopted Fumer technology to reduce jarosite generation, which is known to be successful in a few Chinese and Korean Zinc Plants.

Hindustan Zinc Limited runs a 25 MLD STP in Udaipur for treating municipal sewage. The enhancement of capacity of STP to 45 MLD and establishment of another STP of 15 MLD capacity is in progress. This STP is a unique PPP initiative of the Company and is counted among the best functioning STPs in the country.

HZL is using internal waste for paste filling of stopes in mines. Remote operations and autonomous fleet in mines keep people away from risk. Some other initiatives in pipeline include ventilation on demand in mines to reduce energy consumption and use of advance flotation & ore retreatment technology to increase ore-to-metal ratio which is aimed at reducing waste and increasing output.

The sewage treatment plants at Debari and Chanderiya smelters were operated continuously and the recovered water was reutilised in the smelter and for plantation in the colony. Over the years, the Company has been voluntarily filing Carbon Disclosure Project (CDP) responses as a proactive step towards reporting carbon footprint emissions.

HZL has entered into a charter on Corporate Responsibility for Environmental Protection (CREP) with MoEF, Central Pollution Control Board (CPCB) and State Pollution Control Boards (SPCBs) for achieving a quantum jump in its environmental performance in the coming years.

Many of the secondary lead producing units have operated in the Unorganised Sector and they create major pollution by emission of lead vapour and SO<sub>x</sub>. The small-scale units generally do not control process parameters, such as, smelting temperature, charge to fuel ratio, leakages in the body, etc. As per the National Ambient Air Quality

standards, the permissible concentration of lead in ambient air is  $0.50 \mu\text{g}/\text{m}^3$  while the permissible limit for  $\text{SO}_x$  is  $50 \mu\text{g}/\text{m}^3$ .

## RECYCLING OF LEAD & ZINC

### Lead

The storage battery scrap is the main source of secondary lead production. Lead is one of the highest recycled metals. It can be re-melted any number of times, and provided enough processes to remove impurities are performed, the final product (termed secondary lead) is indistinguishable from primary lead produced from ore. The amount of lead recycled is about 75% of the total lead production in India. More than 80% of lead consumed in the country goes for manufacturing of lead batteries.

The Government of India enacted Battery Waste Management Rules, 2020 and issued Gazette Notification No. S.O. 770(E) dated 20<sup>th</sup> Feb. 2020 to organise the recycling of lead acid batteries and to make available raw material to the lead reproducers. The said Rules are in supersession of the Batteries (Management and Handling) Rules, 2001, published vide number S.O.1035(E) dated 16<sup>th</sup> May 2001. At present, 672 units are registered as lead recycling units with CPCB for processing used lead batteries with the production capacity of 3.53 million tonnes per annum in India. CPCB has also developed online web-based application “Batteries (Importer) Registration Management” for registration /renewal of registration for import of new lead acid batteries.

Lead when used as metal in batteries, cable sheathing and sheathing for containing radiation is fully recyclable and it does not lose its properties. There is indeed a thriving industry that recycles lead in the country. However, due to the health risk involved in lead recycling the Central Pollution Control Board issues licences to the lead-reprocessors to ensure adherence to environmental norms.

### Zinc

The largest consumer of zinc is the Galvanising Industry. The zinc once used for galvanising as well as for brass making is not recoverable. Hence, the quantum of zinc recycling is comparatively small as compared to lead recycling. The secondary zinc was recovered from pure zinc scrap in the form of sheet

cutting, zinc roofings, old zinc anodes and alloys containing zinc as a major constituent.

## CONSUMPTION

Consumption of lead and zinc in various industries is not available readily. However, it is known that lead and zinc are consumed in the form of metals as well as in the form of compounds and oxides.

### Lead

The Battery Industry consumes about 80% of lead and remaining 20% is consumed in pigments & compounds, rolled & extruded products, alloys, cable sheathing and other industries.

The apparent consumption of lead during the year 2018-19 and 2019-20 was calculated on the basis of production of lead (primary) and imports & exports of refined lead (unwrought). The apparent consumption thus arrived at was 1,13,225 tonnes in 2019-20 and 1,78,297 tonnes in 2018-19 (Table-17). In addition to this, it is understood that large quantities of recycled lead were also consumed in certain other industries.

**Table – 17 : Apparent Consumption of Lead (Based on Production of Lead (Primary), and Imports & Exports of Refined Lead, Unwrought)**

Item	(In tonnes)	
	2018-19	2019-20
Total Production Lead (Primary)	197839	132316
Total Imports*	118072	103604
Total Exports*	137614	122695
Apparent Consumption (Primary)	178297	113225

\* DGCI & S, Kolkata

### Zinc

Owing to its corrosion resistance in varied types of environment, zinc is used for protecting steel by way of galvanising. The Galvanising Industry alone consumes about 57% of zinc, followed by coatings (16%), die-casting alloys (14%), oxides & chemicals (7%) and extruded products (6%). The apparent consumption of zinc during the year 2018-19 and 2019-20 was calculated on the basis of production of zinc, import & export of zinc (not alloyed). The apparent consumption, thus arrived at was 6,22,188 tonnes in 2018-19 and 4,24,605 tonnes in 2019-20 (Table-18). The data on trade of zinc (not-alloyed) was taken from DGCI&S (HS Code 79011100). In addition to this, some quantities of recycled zinc are also consumed in certain other industries.

**Table – 18 : Apparent Consumption of Zinc (Based on Production of Zinc (Ingots) and Imports & Exports of Zinc (not alloyed)**

Item	(In tonnes)	
	2018-19	2019-20
Total Production Zinc	696283	516316
Total Imports*	111013	107453
Total Exports*	185108	199164
Apparent Consumption	622188	424605

\*DGCI&S, Kolkata

## SUBSTITUTES & TECHNICAL POSSIBILITIES

### Lead

Battery replacements include batteries of nickel-zinc, zinc lithium chloride, sulphide or nickel lithium hydride. The large-scale commercial use of any of these four possible substitutes was so far precluded by cost and operating problems. Polyethylene and other materials work as substitute in some cable applications.

In construction applications, in place of galvanised sheets, copper and aluminium are alternatives. In corrosive chemical environment, stainless steel, titanium, plastics and cements are substitutes. Tin, glass, plastics and aluminium are alternatives in tubes and containers; iron & steel or bismuth in shots for ammunition; and tin in solder. In Electronic Industry, there has been a move towards lead-free solders with varying compositions of tin, bismuth, silver and copper.

Environmental concerns for lead are limiting the uses, particularly in gasoline, where its use as an anti-knocking agent was phased out by the introduction of catalytic converters. Storage batteries for industrial load levelling, mains power management and electric vehicles have growing markets. The continued search for weight reduction is reducing the amount of lead per battery, and battery lives are being extended. Possible new

developments include the use of lead as an anti-oxidant in asphalt, as a shielding material in nuclear waste, in protection of buildings against radon gases and as a sound buffer. Environmental legislation will inhibit the growth of new uses and possibly eliminate lead from many existing uses. The Organisation for Economic Cooperation & Development (OECD) is actively examining possible restrictions on uses of lead. New techniques to recover lead from concentrates and from scrap are being developed and are bound to become more important in future. Recycling of lead and zinc through environmentally safe processes needs to be encouraged as the growing use of lead and zinc in railway electrification as well as in road transport vehicles have created shortage of these metals in the country.

### Zinc

Aluminium, magnesium and plastic compete in some die-casting applications. Ceramic and plastic coatings, electroplated cadmium & aluminium and special steel compete in some galvanising applications. Aluminium, magnesium and titanium can replace zinc in chemicals and pigments. Zirconium is an alternative in ceramic and enamel applications. New alloys, e.g. superplastic alloys of zinc and aluminium could be developed. Many elements are substitutes for zinc in chemical, electronic and pigment uses.

## WORLD REVIEW

### Lead

The world's reserves of lead were estimated at 88 million tonnes in terms of lead content. Australia possesses 41% of the world's reserves followed by China (20%), Peru (7%), Mexico & USA (6% each) and Russia (5%). (Table- 19).

### Zinc

The world's reserves of zinc were estimated at 250 million tonnes of zinc content. Australia accounts for 27% of world's zinc reserves, followed by China (18%), Russia & Mexico (9% each), Peru (8%), Kazakhstan (5%), USA (4%), etc. (Table-20).

**Table – 19 : World Reserves of Lead  
(By Principal Countries)**

(In '000 tonnes of lead content)

Country	Reserves
<b>World: Total (rounded off)</b>	<b>88000</b>
Australia <sup>(a)</sup>	36000
Bolivia	1600
China	18000
India*	2500
Kazakhstan	2000
Mexico	5600
Peru	6000
Russia	4000
Sweden	1100
Tajikistan	NA
Turkey	860
USA	5000
Other countries	5000

**Source:** USGS, Mineral Commodity Summaries, 2021.*(a) For Australia, Joint Ore Reserve Committee-compliant reserves were about 12 million tonnes**\* India's total reserve/ resources of lead & zinc as per National Mineral Inventory based on UNFC as on 01.04.2015 are 749.46 million tonnes.***Table – 20 : World Reserves of Zinc  
(By Principal Countries)**

(In '000 tonnes of zinc content)

Country	Reserves
<b>World: Total (rounded off)</b>	<b>250000</b>
Australia <sup>(a)</sup>	68000
Bolivia	4800
Canada	2300
China	44000
India*	10000
Kazakhstan	12000
Mexico	22000
Peru	20000
Russia	22000
Sweden	3600
USA	11000
Other countries	34000

**Source:** USGS, Mineral Commodity Summaries, 2021.*(a) For Australia, Joint Ore Reserve Committee-compliant reserves were about 25 million tonnes**\* India's total reserves/ resources of lead & zinc as per National Mineral Inventory based on UNFC as on 01.04.2015 are 749.46 million tonnes***PRODUCTION****Lead**

World mine production of lead in terms of metal content was about 4.7 million tonnes in the year 2019 which is 4.4% more as compared to 4.5 million tonnes in the previous year. China is foremost amongst producing countries with about 1.93 million tonnes (41%) followed by Australia (11%), Peru (7%), USA & Mexico (6% each), Russia (5%), India (4%), Bolivia and Turkey (2% each)(Table-21).

**Zinc**

World mine production of zinc ore was at 12.30 million tonnes in terms of zinc content in the year 2019 which was slightly decreased by 1% from 12.20 million tonnes in the year 2018. China is at top position with 3.7 million tonnes (30%) followed by Peru & Australia (11% each), USA, India & Mexico (6% each), Bolivia (4%), etc. (Table-22).

**Table – 21 : World Mine Production of Lead  
(By Principal Countries)**

(In '000 tonnes of metal content)

Country	2017	2018	2019
<b>World: Total (rounded off)</b>	<b>4500</b>	<b>4500</b>	<b>4700</b>
China	1852	1892	1930
Australia	395	447	509
Peru	307	289	308
USA	310	271	266
Mexico	243	231	259
Russia	210	220	220
India <sup>*(c)</sup>	174	207	207
Bolivia	113	112	88
Turkey	75	76	71
Other countries	823	767	756

**Source:** BGS, World Mineral Production, 2015-19*\* India's production of primary lead in 2017-18, 2018-19 and 2019-20 was 168 thousand tonnes, 198 thousand tonnes and 132 thousand tonnes respectively**(c) Year ended 31<sup>st</sup> March following that stated**(d) Metal content of ore**(e):Estimated*

**Table – 22 : World Mine Production of Zinc  
(By Principal Countries)**

	(In '000 tonnes of metal content)		
Country	2017	2018	2019
<b>World: Total (rounded off)</b>	<b>11900</b>	<b>12200</b>	<b>12300</b>
China	3869	3721	3700 <sup>(e)</sup>
Peru	1473	1474	1404
Australia	852	1147	1337
USA	774	824	753 <sup>(e)</sup>
India <sup>*(b)</sup>	773	729	727
Mexico	671	662	677
Bolivia	527	520	528
Canada	347	305	323
Russia	275	296	305
Other countries	2340	2557	2580

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

\* India's production of primary zinc in 2017-18, 2018-19 and 2019-20 was 791 thousand tonnes, 696 thousand tonnes and 516 thousand tonnes respectively.

(b) Year ended 31<sup>st</sup> March following that stated

(e): Estimated

## Lead

As per USGS Minerals Yearbook, world refined lead production (including secondary production) was 11.40 million tonnes in which secondary lead production was 6.6 million tonnes in the year 2018. Secondary lead production represented about 58% of total refined lead production worldwide in 2018 which was 55% in 2017. The global production of refined lead in the year 2018 is the same as that of the previous year. China is the largest producer of refined lead with 4.91 million tonnes in the year 2018 and contributed 43 % of world refined lead production followed by USA (10%), Republic of Korea (7%), India (5%), Mexico (4%), etc.

World consumption of refined lead was 11.87 million tonnes in the year 2018 (including secondary lead) which is 1.2% more than that of the previous year. China is the largest refined lead consuming country with 4.9 million tonnes consumption during the year 2018 which was 42% of world refined lead consumption followed by European countries (17%), USA (14%), Republic of Korea & India (5% each), etc. After falling by 3.9% in 2020, International Lead & Zinc Study Group (ILZSG) forecasted the global demand for refined lead metal to rise by 5.5% to 12.39 million tonnes in

this year and by 1.7% to 12.61 million tonnes in 2022.

A generalised view of the development in various countries in respect of along with the country-wise description sourced from latest available publication of Minerals Yearbook of 'USGS', 2016 & 2017 is furnished as below.

## Australia

In 2016, lead mine production in Australia decreased by 31% as a result of the closure of Glencore plc's (Switzerland) Black Star Mine, which had a lead production capacity of 75,000 t/yr and was a part of the Mount Isa mining complex. Black Star was placed on care-and-maintenance status in November 2016 owing to reserve depletion.

## China

In 2016, China continued to be the leading global producer and consumer of lead and the leading producer of lead-acid batteries. China produced 4.67 Mt of refined lead, essentially unchanged from that in 2015 and accounting for about 42% of global refined lead. China's secondary lead production was about 28% of total secondary world refined lead production in 2016, slightly less than that in 2015. China's refined lead production consisted of 64% primary and 36% secondary lead production. In 2016, two lead refineries opened a 40,000 t/yr secondary smelter owned by Yunnan Xiangyun Feilong Nonferrous Metal Co. Ltd in China and Aqua Metal's 30,000 t/yr secondary plant in the United States (International Lead and Zinc Study Group, 2017). Lead in concentrate production in 2016 was estimated to be about 2.34 Mt, unchanged from that in 2015. According to the ILZSG, consumption of lead in China decreased slightly to 4.64 Mt in 2016 from 4.71 Mt in 2015.

## USA

In 2017, domestic mine production of recoverable lead was 3,02,000 tonnes, 10% less than that in 2016. There were 9 lead producing mines operating in the United States in 2017. Alaska and Missouri accounted for most of the US mine output of lead. Lead was also mined in Idaho and Washington. Domestic mine production data were collected by the U.S. Geological Survey (USGS) from a voluntary survey of lode mines. Eight lead-producing mines responded to the survey in 2017, accounting for about 90% of US production.

According to the ILZSG, global consumption of refined lead in 2017 was 11.7 Mt, 5% more than that in 2016. The leading refined-lead-consuming countries in 2017 were China (42%), USA (15%), India (5%), Republic of Korea (5%) and Germany (3%).

## Zinc

As per USGS Minerals Yearbook, world refined zinc production was 13.7 million tonnes in the year 2019 which increased by 3% from that of the previous year.

China was the largest producer of refined zinc with 6.16 million tonnes in the year 2019 which contributed 45% of world refined zinc production followed by Republic of Korea (7%), Canada & India (5% each), Japan (4%), Australia (3%), etc.

The world consumption of refined zinc was 13.69 million tonnes in the year 2018 which is 2% less than the previous year. China was the largest refined zinc consuming country with 6.52 million tonnes in 2018 which accounted for 48% of world consumption followed by European countries (18%), USA (6%), India (5%) and Republic of Korea (4%), etc.

ILZSG forecasts that world demand for refined zinc metal will rise by 6.2% to 14.09 million tonnes in 2021 and will further increase by 2.3% to 14.41 million tonnes in 2022.

A summary of generalised view of the development in various countries in respect of zinc, which include country-wise description sourced from latest available publication of Minerals Yearbook of 'USGS', 2017 is furnished as below.

### Australia

Zinc mine production in Australia decreased by 5% in 2017 as compared with that of 2016 mainly as result of several mine closures. Three mines opened in Australia in 2017 and therefore it is expected that production would increase in 2018. During the second quarter of 2017, Auctus Minerals Pty. Ltd, restarted the 20,000 tonnes per annum Mungana zinc mine in Northern Queensland. In September, 2017, Red River Resources Ltd restarted production at 21,000 tonnes per year from Thalang zinc-copper-lead mine in Queensland. The mine was placed on care-and-maintenance status in 2012 and reopened after the processing plant was refurbished. Minerals

and Metals Group opened Dugald River zinc mine in North western Queensland and commercial production was expected to commence in 2018 at 1,70,000 tonnes per year.

### Canada

Zinc mine production in Canada was 3,44,000 tonnes in 2017, 7% more than that in 2016. Production increased in 2017 owing mostly to an increase in zinc production at Trevali Mining Corp.'s Caribou Mine. In October 2017, Coeur Mining Inc. acquired the Silvertip silver-zinc-lead mine in British Columbia and production was expected to commence in the first quarter of 2018. Zinc smelter production in Canada was at 6,08,000 tonnes in 2017, 12% less than that in 2016. Smelter production decreased mainly as a result of the nine month strike at Noranda Income Fund's zinc refinery in Salaberry-de-Valleyfield, Quebec. During the strike, the facility operated at a partial production level, although the reduced rate was not disclosed.

### China

Zinc mine production in China decreased by 8% in 2017 from that of 2016 to 4.4 million tonnes. According to Beijing Antaike Information Development Co. Ltd, decreased production was attributed to the closure of mines owing to increased environmental protection measures, lower than expected production from new mines and a decrease in ore grades. As a result of the decrease in mine production, China's net imports of zinc in concentrate increased by 22% in 2017 to about 2.4 million tonnes. About 60% of China's zinc concentrate imports (gross weight) were sourced from Australia, Peru and Russia.

Zinc metal production in China decreased slightly in 2017 from that of 2016 to 6.14 million tonnes. Despite the slight production decrease, two smelters of 1,00,000 tonnes per year capacity opened in China, i.e., Hualian Zinc and Indium Co.'s Hualian zinc smelter in Yunnan Province and Huili Lead and Zinc Co.'s Huili zinc smelter in Sichuan Province. Antaike attributed the decrease in zinc smelter production to refinery maintenance, a shortage of zinc concentrates and stricter environmental regulations.

China's net imports of refined zinc increased by 67% in 2017 to about 0.66 million tonnes. Increased imports were attributed to the tight domestic supply.



About 66% of China's refined zinc imports were sourced from Australia, Kazakhstan and Spain.

China's zinc consumption increased in 2017 from that of 2016. ILZSG reported a 4% increase in zinc consumption in 2017 as against 9% increase in 2016.

#### **Cuba**

In 2017, construction was completed on the Castellanos lead and zinc mine near Santa Lucia, Pinar del Rio. This was the first new mining project in Cuba in more than 20 years. The mine, operated by Empresa Minera del Caribe, was expected to commence commercial production during the first half of 2018. Trafigura reported that the mine was expected to ramp up through out the year and produce 1,00,000 tonnes of zinc concentrate when it reached full capacity.

#### **Peru**

Zinc mine production in Peru increased by 10% in 2017 from that of 2016 as a result of increased production at the Antamina copper-zinc mine and the opening of two mines. Zinc production nearly doubled at Antamina in 2017 to 3,72,100 tonnes, primarily as a result of increased processing of copper-zinc ores and significantly higher zinc grades and recoveries. Copper and zinc production at Antamina can vary significantly from year to year, owing to the geology of the deposit and the proportion of copper to copper-zinc ore produced.

In 2017, a new mine and a capacity expansion opened in Peru. In January, Compania de Minas Buenaventura S.A.A. commissioned the 10,000 tonnes per year Tambomayo Mine near Chilcaymarca, Arequipa. In May 2017, Shougang Group Co. Ltd added 30,000 tonnes per year of capacity by reprocessing the tailings at the Marcona Mine near San Juan de Marcona. The Company also planned to produce copper and iron.

#### **Thailand**

Zinc mine production ceased in Thailand in 2017 after closure of Padaeng Industry Public Co. Ltd's Mae Sod Mine in 2016. The mine closed owing to the depletion of reserves and ceased operations by the end of 2017. In 2017, zinc metal production decreased by 73% from that of 2016. Padaeng Industry's smelter in Tak Province processed the remaining zinc concentrate from Mae Sod in 2017

and operations at the plant ceased in the second quarter of 2017. The refinery had a production capacity of 1,05,000 tonnes per year.

## **FOREIGN TRADE**

### **Lead**

#### **Exports**

Exports of lead from the country are in the form of ore & concentrates, lead & alloys including scrap, lead waste & scrap, lead unrefined, refined lead unwrought, pig lead, lead & alloys worked and others.

Exports of lead ores and concentrates which were 3 tonnes in 2019-20 decreased drastically by 92% as compared to 37 tonnes in 2018-19. Bangladesh is the sole country which imports lead ores & concentrates from India.

Exports of lead & alloys including scrap decreased slightly by 1% to 1,74,948 tonnes during 2019-20 as compared to 1,76,846 tonnes in the preceding year. Similarly, export of lead and alloys also decreased by 1% to 1,74,945 tonnes in 2019-20 as compared to 1,76,783 tonnes in the previous year. Exports of refined lead unwrought also decreased by 11% to 1,22,695 tonnes in 2019-20 as compared to 1,37,614 tonnes in the previous year. Republic of Korea with 31% followed by Vietnam (19%) and Thailand (16%) were the major export destinations for refined lead, unwrought (Tables-23 to 29).

#### **Imports**

Imports of lead in India are in the form of lead ores & concentrates, lead & alloys including scrap, refined lead/ unwrought, pig lead, refined lead & alloys (bars, rods, plates, etc.), lead unrefined etc.

Imports of lead ores & concentrates more than doubled to 3,283 tonnes in 2019-20 as compared to 1,499 tonnes in 2018-19. Imports were mainly from UAE (36%), Mozambique (21%), Morocco (12%) and Nigeria (7%). The total imports of lead & alloys including scrap decreased marginally by 3% in 2019-20 with 3,48,743 tonnes as compared to 3,60,247 tonnes during 2018-19, of the total imports of lead and alloys industry scrap imports of lead and alloys during 2019-20 were 2,56,132 tonnes as compared to 2,52,583 tonnes in 2018-19.

## LEAD & ZINC

Imports comprised mainly of lead and alloys and the rest was scrap (27%). The major suppliers during 2019-20 were Republic of Korea (20%), Malaysia, UK & USA (9% each), UAE (8%) and Vietnam (7%) (Tables- 30 to 36).

### Zinc

#### Exports

Exports of zinc are in the form of ores & concentrates, zinc & alloys including scrap and zinc & alloys in the form of bars, rods & plates.

Exports of zinc ores & concentrates decreased drastically by 85% to 317 tonnes in 2019-20 as against 2,079 tonnes in the previous year. China is the main export destination of zinc ores & concentrates and accounted for 63% of all the exports of zinc ores & concentrates followed by Cuba (32%).

Exports of zinc & alloys and scrap during 2019-20 were 2,12,715 tonnes as against 1,95,900 tonnes in the preceding year. Almost entire exports during 2019-20 were of zinc & alloys while those of scraps were nominal. Republic of Korea (17%), Taiwan (16%), China (15%) Singapore (13%) Nepal

(8%) and Thailand (6%) were the main export destinations for zinc alloys & scrap. Exports of zinc (scrap) were at 110 tonnes in 2019-20 as compared to 119 tonnes in the preceding year (Tables- 37 to 40).

#### Imports

Imports of zinc in the country are in the form of zinc ores & concentrates, zinc & alloys including scrap, zinc or spelter and zinc & alloys in the forms of bars, rods, plates, mazak, etc.

Imports of zinc ores & concentrates during 2019-20 were at 101 tonnes as against 1,422 tonnes import during the previous year. Imports were mainly from Ethiopia (59%), UAE (21%) and UK (20%). Imports of zinc & alloys during 2019-20 were at 1,73,999 tonnes as compared to 1,84,255 tonnes in 2018-19. Imports of zinc (scrap) were 75,507 tonnes during 2019-20 as compared to 93,834 tonnes in 2018-19. Imports of zinc or spelter were at 1,45,135 tonnes in 2019-20 as compared to 1,44,269 tonnes during the previous year. The major suppliers of zinc & alloys including scrap during 2019-20 were Republic of Korea (45%), Japan (10%), USA (8%) and UAE (6%) (Tables- 41 to 45).

**Table – 23 : Exports of Lead and Alloys  
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>176783</b>	<b>28192397</b>	<b>174945</b>	<b>26421816</b>
Korea, Rep. of	70009	11080144	53405	7940558
Vietnam	21289	3425059	28491	4310717
Thailand	18197	2848504	25498	3821467
UAE	9559	1526982	11891	1798359
Bangladesh	7290	1216479	11744	1737393
Taiwan	9042	1437967	10465	1608589
Turkey	11246	1760729	6375	939053
Oman	3076	516786	5841	917069
USA	6168	970025	5336	805448
China	6540	985820	2584	390522
Other countries	14366	2423901	13314	2152642

*Figures rounded off*

## LEAD &amp; ZINC

**Table – 24 : Exports of Lead Ores & Concentrates  
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>37</b>	<b>2007</b>	<b>3</b>	<b>202</b>
Bangladesh	2	150	3	178
Nepal	-	-	++	24
Belgium	35	1686	-	-
Sri Lanka	++	134	-	-
South Africa	++	37	-	-

*Figures rounded off***Table – 25 : Exports of Lead & Alloys Including scrap  
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>176846</b>	<b>28199782</b>	<b>174948</b>	<b>26422504</b>
Korea, Rep. of	70009	11080144	53405	7940558
Vietnam	21289	3425059	28491	4310717
Thailand	18197	2848504	25498	3821467
UAE	9596	1530361	11891	1798366
Bangladesh	7290	1216479	11744	1737393
Taiwan	9042	1437967	10465	1608589
Turkey	11246	1760729	6375	939053
Oman	3076	516786	5841	917069
USA	6186	972996	5336	805448
China	6540	985820	2584	390522
Other countries	14374	2424937	13317	2153323

*Figures rounded off***Table – 26 : Exports of Lead and Waste & Scrap  
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>62</b>	<b>7385</b>	<b>3</b>	<b>688</b>
Nepal	4	589	3	680
UAE	36	3378	++	7
Mozambique	++	++	++	++
USA	18	2971	-	-
Ghana	4	413	-	-
Ethiopia	++	33	-	-

*Figures rounded off*

## LEAD &amp; ZINC

**Table – 27 : Exports of Refined Lead Unwrought  
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>137614</b>	<b>21562902</b>	<b>122695</b>	<b>18128634</b>
Korea, Rep. of	55136	8618237	37909	5561918
Vietnam	18532	2958785	22932	3438337
Thailand	14638	2239118	19434	2824753
Taiwan	9039	1437342	10457	1599104
Bangladesh	6537	1084326	7416	1085177
Turkey	11244	1760225	5847	849106
USA	5895	914993	4912	729775
UAE	4084	631298	4073	593575
China	6537	984877	2559	386105
Sri Lanka	226	37352	1779	261716
Other countries	5745	896348	5376	799068

*Figures rounded off***Table – 28 : Exports of Lead & Alloys Unwrought, NES  
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>26394</b>	<b>4478738</b>	<b>34930</b>	<b>5603890</b>
Korea, Rep. of	12397	2054497	13057	2026226
Thailand	3330	566407	5783	947651
UAE	2552	417156	4402	667661
Oman	2021	359083	3673	599639
Vietnam	1231	210911	2988	476240
Indonesia	2364	383458	1413	225603
Bangladesh	203	37055	1249	191107
Turkey	-	-	525	88717
Japan	453	82111	371	66442
Belgium	5	7177	183	47054
Other countries	1838	360884	1285	267550

*Figures rounded off***Table – 29 : Exports of Lead (Pig Lead)  
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>-</b>	<b>-</b>	<b>1</b>	<b>88</b>
Nepal	-	-	1	80
Bhutan	-	-	++	8

*Figures rounded off*

## LEAD &amp; ZINC

**Table – 30 : Imports of Lead Ores & Conc.  
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>1499</b>	<b>85467</b>	<b>3283</b>	<b>166726</b>
UAE	669	41127	1192	56676
Mozambique	-	-	686	41725
Morocco	72	6928	380	23721
South Africa	-	-	201	10327
Nigeria	95	7442	217	8196
China	-	-	207	7269
Sudan	-	-	98	4330
Jordan	-	-	64	3111
Cote d'Ivoire	-	-	40	2363
Zambia	-	-	26	2052
Other countries	663	29970	172	6956

*Figures rounded off***Table – 31 : Imports of Lead and Alloys Including Scrap : Total  
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>360247</b>	<b>54754913</b>	<b>348743</b>	<b>49923442</b>
Korea, Rep. of	76209	12881476	68876	10913957
Malaysia	14477	2232251	32955	4673445
USA	28054	4219985	31191	4246560
UK	29996	4279513	31520	4232373
UAE	31044	4632718	27656	3884471
Vietnam	20546	3254845	23196	3299440
Australia	47627	7764397	15330	2215733
Singapore	7858	1206618	8587	1271828
Philippines	1685	189468	7567	1082965
Sri Lanka	6396	1004351	7455	1077869
Other countries	96354	13089291	94409	13024801

*Figures rounded off*

## LEAD &amp; ZINC

**Table – 32 : Imports of Lead & Alloys  
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>252583</b>	<b>40998157</b>	<b>256132</b>	<b>37990315</b>
Korea, Rep. of	75996	12857476	68780	10902383
Malaysia	13594	2111911	30824	4413631
UAE	25415	4012331	23787	3405219
Vietnam	20546	3254845	23196	3299440
Australia	43819	7218879	11259	1667801
UK	3581	613637	8756	1330137
Singapore	6850	1069828	8049	1199770
Sri Lanka	6396	1004351	7455	1077869
Philippines	659	104450	7467	1069360
Tanzania	7156	1109489	6893	973831
Other countries	48570	7640960	59667	8650873

*Figures rounded off***Table – 33 : Imports of Lead and Waste & Scrap  
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>107664</b>	<b>13756756</b>	<b>92611</b>	<b>11933126</b>
USA	25153	3789067	29817	4050544
UK	26415	3665876	22765	2902236
Australia	3808	545518	4072	547932
UAE	5629	620387	3869	479252
Kuwait	3474	378083	2798	379677
Germany	1730	237034	2908	369144
Netherlands	1643	229032	2708	341658
Malaysia	883	120340	2130	259813
Spain	971	134301	1688	224209
Canada	2207	300983	1693	223558
Other countries	35752	3736135	18164	2155103

*Figures rounded off*

## LEAD &amp; ZINC

**Table – 34 : Imports of Lead (Pig Lead)  
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>5496</b>	<b>862572</b>	<b>3048</b>	<b>435541</b>
UAE	4223	656881	2224	318017
South Africa	129	20592	450	63870
Nepal	-	-	157	22218
Taiwan	-	-	99	13755
Myanmar	-	-	50	7824
Singapore	-	-	49	7006
USA	-	-	20	2851
Nigeria	303	49946	-	-
Georgia	214	33636	-	-
Jordan	200	32339	-	-
Other countries	427	69178	-	-

*Figures rounded off***Table – 36 : Imports of Refined Lead Unwrought  
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>118072</b>	<b>19209829</b>	<b>103604</b>	<b>15394885</b>
Korea, Rep. of	56174	9204775	45756	6956160
Malaysia	3219	499729	12827	1825824
UAE	5277	824013	7397	1047041
Australia	33780	5543498	6707	975249
UK	3026	520354	6348	952326
Myanmar	-	-	3500	520040
Sri Lanka	2800	453507	3400	489024
Japan	249	41899	2418	384525
Indonesia	-	-	2457	362998
China	99	15237	2021	329348
Other countries	13449	2106817	10773	1552349

*Figures rounded off***Table – 35 : Imports of Lead Unrefined, NES  
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>43512</b>	<b>6730099</b>	<b>52367</b>	<b>7459333</b>
Vietnam	6341	965397	16992	2428886
UAE	6526	1025018	6818	977842
Singapore	3008	469131	5002	738455
Sri Lanka	1550	237732	2263	329255
Malaysia	6305	977548	2282	325287
Philippines	447	69662	2286	324116
Zambia	1171	177385	1953	274670
Saudi Arabia	607	93459	1058	147573
Senegal	-	-	1052	146258
Jordan	997	151759	955	135331
Other countries	16560	2563009	11708	1631660

*Figures rounded off***Table – 37 : Exports of Zinc Ores & Concentrates  
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>2079</b>	<b>71170</b>	<b>317</b>	<b>15827</b>
Cuba	240	23318	100	10896
China	1838	47816	199	4078
UAE	-	-	4	636
South Africa	-	-	13	196
Japan	++	2	1	14
Finland	-	-	++	6
Nepal	-	-	++	2
Canada	1	18	-	-
Ghana	++	10	-	-
Australia	++	5	-	-

*Figures rounded off*

## LEAD &amp; ZINC

**Table–38 : Exports of Zinc & Alloys Including Scrap : Total  
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>195900</b>	<b>41899908</b>	<b>212715</b>	<b>40372947</b>
Korea, Rep. of	43349	9116309	35929	6670089
Taiwan	25716	5430998	33646	6381708
China	17635	3819016	32318	5869959
Singapore	822	180925	26607	4807449
Nepal	17134	3505608	17063	3184486
Thailand	13518	2867271	12331	2393847
UAE	16586	3645841	10706	2234539
Malaysia	6204	1356527	10189	1893547
Indonesia	9509	1993054	7478	1441090
Kenya	5686	1194518	4587	882778
Other countries	39740	8789840	21861	4613455

*Figures rounded off***Table – 39 : Exports of Zinc & Alloys  
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>195780</b>	<b>41882289</b>	<b>212605</b>	<b>40361625</b>
Korea, Rep. of	43339	9115170	35929	6670089
Taiwan	25716	5430998	33646	6381708
China	17635	3819016	32318	5869959
Singapore	813	180031	26607	4807449
Nepal	17134	3505532	17063	3184430
Thailand	13518	2867271	12331	2393847
UAE	16532	3638989	10706	2234539
Malaysia	6204	1356527	10189	1893547
Indonesia	9463	1984899	7478	1441090
Kenya	5686	1194518	4587	882778
Other countries	39739	8789337	21751	4602189

*Figures rounded off*



**Table – 40 : Exports of Zinc (Scrap)  
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>119</b>	<b>17620</b>	<b>110</b>	<b>11322</b>
USA	++	++	40	3948
Italy	-	-	25	3769
Belgium	-	-	27	2675
Bangladesh	-	-	10	621
Bhutan	-	-	8	173
Saudi Arabia	++	34	++	74
Nepal	++	76	++	57
Canada	-	-	++	4
South Africa	-	-	++	2
Lithuania	-	-	++	++
Other countries	119	17510	-	-

*Figures rounded off***Table – 41 : Imports of Zinc Ores & Conc.  
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>1422</b>	<b>38776</b>	<b>101</b>	<b>2667</b>
Ethiopia	1078	28534	60	1630
UAE	344	10204	21	610
UK	-	-	20	424
China	-	-	++	3
USA	-	-	++	++
Nigeria	++	38	-	-

*Figures rounded off***Table – 42 : Imports of Zinc and Alloys Including Scrap: Total  
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>278089</b>	<b>56463016</b>	<b>249506</b>	<b>46153995</b>
Korea, Rep. of	115817	25365240	111255	21809466
Japan	11179	2402311	25287	4907879
USA	17879	3200610	18918	3040877
UAE	26544	5098972	15288	2546126
Italy	6344	1197473	6869	1168593
Australia	12937	2715280	5642	1087264
Myanmar	4155	854274	4306	832663
Malaysia	7581	1427510	4511	778874
Belgium	5244	1074884	3811	767882
UK	2966	516380	3710	703806
Other countries	67443	12610082	49908	8510566

*Figures rounded off*

## LEAD &amp; ZINC

**Table – 43 : Imports of Zinc & Alloys  
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>184255</b>	<b>40200060</b>	<b>173999</b>	<b>34384919</b>
Korea, Rep. of	115481	25307467	111119	21787035
Japan	11073	2384854	25164	4889763
UAE	13233	2732555	6828	1244854
Australia	11549	2466323	5190	1013881
Myanmar	4115	847719	4306	832663
Belgium	3527	771192	2764	597159
China	4067	1127705	1403	576742
Uzbekistan	201	42985	3053	519974
Malaysia	4337	890611	2035	410069
USA	1292	305201	1527	300450
Other countries	15379	3323450	10610	2212329

*Figures rounded off***Table – 44 : Imports of Zinc or Spelter  
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>144269</b>	<b>30929338</b>	<b>145135</b>	<b>27974590</b>
Korea, Rep. of	87004	19125107	93379	18155566
Japan	10627	2250496	24881	4809588
UAE	12270	2552616	6077	1134815
Australia	8642	1808233	4721	921056
Myanmar	4115	847719	4306	832663
Uzbekistan	201	42985	3053	519974
Singapore	1891	380128	1101	218187
USA	712	143351	1150	192728
Spain	1221	258009	748	151235
Russia	2432	495383	688	141126
Other countries	15152	3025312	5032	897651

*Figures rounded off*

**Table – 45 : Imports of Zinc (Scrap)  
(By Countries)**

Country	2018-19 (R)		2019-20 (P)	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
<b>All Countries</b>	<b>93834</b>	<b>16262956</b>	<b>75507</b>	<b>11769076</b>
USA	16587	2895409	17392	2740426
UAE	13311	2366418	8460	1301272
Italy	6196	1082882	6751	1081899
Saudi Arabia	5599	954020	3941	593340
UK	2900	482780	3615	559797
Mexico	2677	482388	2460	389926
Bangladesh	2249	407562	2205	376421
Malaysia	3244	536899	2476	368805
Indonesia	2425	415584	2113	318293
Germany	1720	293388	1955	309729
Other countries	36927	6345628	24140	3729168

Figures rounded off

## FUTURE OUTLOOK

International Lead & Zinc Study Group (ILZSG) forecasted the global demand for refined lead metal to rise by 1.7% to 12.61 million tonnes in 2022. ILZSG also forecasted that world demand for refined zinc metal would rise by 6.2% to 14.09 million tonnes in 2021 and would further increase by 2.3% to 14.41 million tonnes in 2022. This cause of this would be due to a number of new projects and expansions in existing capacity in India, Kazakhstan, Mexico and Portugal.

HZL has ambitious plans to expand in mining extraction & production of zinc, depending on the country's need while in lead, the recycling sector is likely to emerge as the major sector in future.

As per Ministry of Mines report on "National Non-Ferrous Metal Scrap Recycling Framework, 2020", Lead finds its use in storage batteries, also dubbed lead acid batteries. India is likely to witness a substantial growth in the demand for lead batteries given that several sectors, including automotive, telecommunication, railways and defence, are set to expand in the years ahead. As

a battery ingredient, lead is increasingly used in inverters, UPS and similar energy storage devices. The Indian market for lead acid batteries is currently estimated at US\$7 billion, driven by the Automotive Sector, which consumes ~60% of lead acid batteries. The demand of Lead has been increasing with a CAGR of 3.8%, while there has been a consistent level of imports over last 5 years.

In case of zinc, the demand has increased at CAGR 1.89% in last five years. The production, however has declined and has a negative, -1.3% CAGR. Dependence on imports has grown over the years at the rate of CAGR 2.10%. To meet the demand domestically in view of low production trend and higher imports, recycling can be a good alternative.

As every major national plan sees continuous rise in the power generation capacity of the country, the demand for galvanised transmission tower is also expected to increase by about 4 to 5% along with increasing necessity of erection of mobile towers for which higher investment in infrastructure would have to met. Railways will also lead in the use of galvanised steel.