

LEAD & ZINC



Indian Minerals Yearbook 2012

(Part- II : Metals & Alloys)

51st Edition

LEAD & ZINC

(FINAL RELEASE)

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

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January, 2014

10 Lead & Zinc

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 such as silver & cadmium. Zinc is a silvery blue-grey metal with a relatively low melting and boiling point.

The largest single use of lead today is in the manufacture of lead acid storage batteries, while the single largest use for the zinc is in galvanizing industry.

With the expansion in capacities by HZL, the country enjoys self-sufficiency in respect of zinc. Production of zinc is more than its consumption. However, there is a shortage of lead in the country.

There is a thriving market of lead scrap recycling to meet the ever increasing demand from lead acid battery sector. Government of India has enacted Battery Management and Handling Rule (BMHR) 2002 which will further increase the availability of scrap from organised sector. It is estimated that worldwide more than 50% of refined lead produced is from recycled material. Producing lead through this route required 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. However, in this review emphasis is given on the primary lead and zinc scenario.

HZL is the only producer of primary lead in the country as well as the only integrated producer of primary zinc from its mines situated in Rajasthan. Other producer of zinc namely Binani Zinc Ltd (BZL) produces zinc from imported concentrates.

RESOURCES

The total resources of lead and zinc ores as on 1.4.2010 as per UNFC system, are estimated at 685.59 million tonnes. Of these, 108.98 million tonnes (16%) fall under 'reserves' category while balance 576.61 million tonnes (84%) are classified as 'remaining resources'.

The resources of ore containing + 10% Pb & Zn were estimated at 139.85 million tonnes, ore containing 5 to 10% Pb & Zn were 252.30 million tonnes and ore containing less than 5% Pb & Zn were 293.44 million tonnes.

The total metal content in resources is 11.55 million tonnes lead and 36.66 million tonnes zinc. Besides, 118.45 thousand tonnes lead and zinc metal resources are available. In terms of reserves, 2.24 million tonnes of lead metal and 12.45 million tonnes of zinc metal are estimated. Rajasthan is endowed with the largest resources of lead-zinc ore amounting to 607.53 million tonnes (88.61%), followed by Andhra Pradesh 22.69 million tonnes (3.31%), Madhya Pradesh 14.84 million tonnes (2.16%), Bihar 11.43 million tonnes (1.67%) and Maharashtra 9.27 million tonnes (1.35%). Resources are also established in Gujarat, Meghalaya, Odisha, Sikkim, Tamil Nadu, Uttarakhand and West Bengal (Table-1).

EXPLORATION & DEVELOPMENT

GSI carried out exploration for lead and zinc during 2011-12 in the districts of Bhilwara and Jaipur in Rajasthan, besides Baramulla and Reasi districts of Jammu & Kashmir, and Betul and Chhindwara districts in Madhya Pradesh. DMG, Rajasthan carried out exploration in the district of Dhoulpur. HZL carried out exploration in Rajsamand, Bhilwara and Udaipur districts in their lease hold areas and nine Reconnaissance Permit (RP) in Rajasthan. The details of exploratory activities are given in Table-2.

**Table – 1 : Reserves/Resources of Lead & Zinc Ore as on 1.4.2010
(By Grades/States)**

(In '000 tonnes)

Grade/State	Reserves				Remaining resources				Total resources (A+B)				
	Proved STD111	Probable		Total (A)	Feasibility STD211	Pre-feasibility		Measured STD331		Indicated STD332	Inferred STD333	Reconnaissance STD334	Total (B)
		STD121	STD122			STD221	STD222						
All India : Total Ore	20215	87569	1196	108980	129	1077	3983	21433	221601	325051	3340	576614	685594
By Grades													
Ore with (+)10% Pb & Zn	11055	64958	81	76094	-	-	-	-	24660	39095	-	63755	139849
Ore with 5-10 % Pb & Zn	9160	22611	1115	32886	-	961	3983	16827	59043	138602	-	219416	252302
Ore with (-)5% Pb & Zn	-	-	-	-	129	117	-	4606	137898	147354	3340	293444	293444
Metal													
Lead metal	398.42	1817.89	28.70	2245.01	-	34.32	50.95	472.37	2915.70	5831.04	-	9304.38	11549.39
Zinc metal	1938.37	10460.72	54.17	12453.26	5.20	4.71	86.91	11168.96	9607.12	13237.09	101.65	24211.64	36664.90
Lead & Zinc metals	-	-	-	-	-	-	-	-	-	118.45	-	118.45	118.45
By States													
Andhra Pradesh													
Ore	-	-	-	-	-	-	-	1000	4159	17530	-	22689	22689
Lead metal	-	-	-	-	-	-	-	28.70	119.53	688.65	-	836.88	836.88
Zinc metal	-	-	-	-	-	-	-	12.00	44.00	7.00	-	63.00	63.00
Bihar													
Ore	-	-	-	-	-	-	-	-	435	11000	-	11435	11435
Lead metal	-	-	-	-	-	-	-	-	-	24.00	-	24.00	24.00
Zinc metal	-	-	-	-	-	-	-	-	14.75	24.00	-	38.75	38.75
Gujarat													
Ore	-	4955	845	5800	-	-	-	129	-	200	-	329	6129
Lead metal	-	104.37	17.81	122.18	-	-	-	3.90	-	-	-	3.90	126.08
Zinc metal	-	224.04	39.37	263.41	-	-	-	1.10	-	-	-	1.10	264.51
Lead & Zinc metals	-	-	-	-	-	-	-	-	-	0.90	-	0.90	0.90
Madhya Pradesh													
Ore	-	-	-	-	129	117	-	1510	4006	5930	3150	14842	14842
Lead metal	-	-	-	-	-	-	-	26.12	5.13	5.04	-	36.29	36.29
Zinc metal	-	-	-	-	5.20	4.71	-	114.76	41.93	186.02	101.00	453.62	453.62
Maharashtra													
Ore	-	-	-	-	-	-	-	1967	6305	1000	-	9272	9272
Zinc metal	-	-	-	-	-	-	-	133.56	428.11	28.00	-	589.67	589.67

(Contd.)

LEAD & ZINC

Table - 1 (Concid.)

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						
Meghalaya													
Ore	-	-	-	-	-	-	-	-	880	-	-	880	
Lead metal	-	-	-	-	-	-	-	-	16.50	-	-	16.50	
Zinc metal	-	-	-	-	-	-	-	-	14.00	-	-	14.00	
Odisha													
Ore	-	-	-	-	-	961	119	-	-	670	-	1750	
Lead metal	-	-	-	-	-	34.32	4.25	-	-	38.39	-	76.96	
Rajasthan													
Ore	20215	82178	287	102680	-	-	3864	13157	200065	287576	190	504852	
Lead metal	398.42	1706.62	9.21	2114.25	-	-	46.70	272.54	2604.74	5055.46	-	7979.44	
Zinc metal	1938.37	10223.80	11.66	12173.83	-	-	86.91	741.17	8821.59	12950.20	0.53	22600.40	
Lead & Zinc metals	-	-	-	-	-	-	-	-	-	117.55	-	117.55	
Sikkim													
Ore	-	436	64	500	-	-	-	300	-	150	-	450	
Lead metal	-	6.90	1.68	8.58	-	-	-	-	-	-	-	-	
Zinc metal	-	12.88	3.14	16.02	-	-	-	3.00	-	1.05	-	4.05	
Tamil Nadu													
Ore	-	-	-	-	-	-	-	200	590	-	-	790	
Lead metal	-	-	-	-	-	-	-	2.26	5.48	-	-	7.74	
Zinc metal	-	-	-	-	-	-	-	11.76	24.76	-	-	36.52	
Uttarakhand													
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	
West Bengal													
Ore	-	-	-	-	-	-	-	3371	-	335	-	3706	
Lead metal	-	-	-	-	-	-	-	130.07	-	10.00	-	140.07	
Zinc metal	-	-	-	-	-	-	-	130.42	-	13.00	-	143.42	

Figures rounded off.

LEAD & ZINC

Table – 2 : Details of Exploration for Lead & Zinc, 2011-12

Agency/ State/District	Location	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Metres		
GSI							
Jammu & Kashmir							
Baramulla	Buniyar area	G-4 Stage (Reconnaissance Stage)	-	-	-	-	To reassess the nature and extent of Pb-Zn and other associated mineralisation. The work is yet to be taken up.
Reasi	Bakkal- Serasandhu Khairikot area	G-4 Stage (Reconnaissance Stage)	-	-	-	-	To reassess the potentiality of Pb-Zn mineralisation and other associated metals. Surface indications of sulphide mineralisation are seen in the form of gossan, slag pieces, malachite staining in quartzite and old workings. The work is in progress.
Madhya Pradesh							
Betul	Biskhan Khairi Block	-	-	-	-	-	The area was explored during Field season 2006-09. An indicated reserve (STD332) of 1.91 million tonnes of zinc ore with Zn-1.14% has been estimated.
Chhindwara	Jangaldehri Block	-	-	-	-	-	The area was explored during FS 2008-09 and indicated resources (STD 332) of 0.98 million tonnes of zinc ore with 1.10% Zn has been estimated.
Rajasthan							
Bhilwara	Rampuriya and Gadariya- Khera villages (Pur-Banera Belt)	G-4 Stage (Reconnaissance Stage)	-	-	-	489 soil samples	To identify the target areas for base-metal and gold mineralisation by ground evaluation of airborne geophysical anomalies. Results of 119 samples indicated Pb values from >10 ppm to 460 ppm and Zn from 20 ppm to 1100 ppm. The investigation work is in progress.
--do--	Salampur Block (Pur-Banera Belt)	G-3 Stage (Prospecting Stage)	-	-	-	-	Eight mineralised zones were intersected during drilling having about 5 to 6 % total sulphides (visual estimates). Zone II, IV, VI and VII are rich in Sphalerite and Galena with minor chalcopyrites. Analytical results of core samples are awaited.
Jaipur	Dholpura area (North Delhi Fold Belt)	(Reconnaissance Stage) 1:25000	-	-	-	-	To assess the extent and potential basemetal and associated gold mineralisation in the Rialo group of rocks. The channel/bedrock samples indicated Cu values ranging from < 5 ppm to 686 ppm (max.). 3 samples from old workings with malachite stains show 0.1% to 0.18% Cu. The Pb values range from < 25 ppm to 100 ppm (max) and Ag values are < 5 ppm.

(Contd.)

LEAD & ZINC

Table-2 (Concl.)

Agency/ State/District	Location	Mapping		Drilling		Sampling (No.)	Remarks Reserves/Resources estimated
		Scale	Area (sq km)	No. of boreholes	Metres		
DMG							
Rajasthan							
Dhoulpur	Jotripipal, Tehsil- Pahari. Piruka, Tehsil- Nagar.	1:10000	10	-	-	60	Lead mineralisation is exposed on the western slope of hill in the east of village Jotripipal. Lead is exposed in old pits in the form of galena specks. In the areas Khola-Piruka and Gol Pahari near Piruka village and Sad ki Baithak lead mineralisation is confined to intercalated quartzite and phyllite in old pits.
HZL							
Rajasthan	-	-	4500 (In 9 R.P.)	-	94,950 (core & non core)	-	HZL deployed advanced mineral exploration technologies, viz., Heliborne Magnetic and Electro Magnetic (VTEM) high resolution ground magnetic and gravity surveys, Deep Earth Imaging (Titan) GPS enabled field (XRF) Geochemical surveys in conjunction with other data acquisition and integration system. A hole of 1545 m was drilled at Rajpura Dariba mine, deepest in the history of base metals in India. Total reserves & resources estimated as on 31 st March, 2012 were 332.3 million tonnes containing 35 million tonnes of zinc lead metal and 912 million ounces of silver.

In addition, Pebble Creek Mining Ltd (PCML) of Canada is having a lease in Askot, Uttarakhand. PCML owns 100% of the Askot project through a subsidiary Adi Gold Mining Private Ltd. The Askot project is a polymetallic deposit containing gold, silver, copper, lead and zinc. SRK Consulting estimated a compatible resource of 2 million tonnes containing 2.6% Cu, 5.7% Zn, 3.7% Pb, 0.5 g/t Au and 37 g/t Ag.

PRODUCTION AND STOCKS

Lead & Zinc Ores and Concentrates

The production of lead and zinc ore at 8.04 million tonnes in 2011-12 increased by about 7% as compared to that in the previous year.

The metal content of lead and zinc in the ore produced in 2011-12 works out to 144,150 tonnes and 803,679 tonnes, respectively, as against the corresponding figures of 153,475 tonnes and 866,501 tonnes in the previous year. During the year under review, 7.95 million tonnes of lead & zinc ore was treated as against 7.43 million tonnes in 2010-11.

The production of lead concentrates in 2011-12 at 161,157 tonnes increased by about 9% as compared to the previous year. Entire production of lead concentrate was reported from Rajasthan.

The production of zinc concentrates decreased by 1% from 1,427,231 tonnes in 2010-11 to 1,412,291 tonnes in 2011-12. Entire production

LEAD & ZINC

of zinc concentrates was also reported from Rajasthan. The entire output of lead & zinc ore and concentrates in both the years was reported by mines owned by Hindustan Zinc Ltd, a private sector unit.

Grade Analysis

All India average metal content of ore treated during 2011-12 worked out to be 11.93 % (1.79% Pb and 10.14% Zn) as against 13.73 % (2.06% Pb and 11.67 % Zn) in 2010-11. Rajasthan continued to be the only producing state of lead concentrates accounting for the entire production. The production from Rampura Agucha mine in Bhilwara district of Rajasthan was the highest at 13.76% (1.77% Pb and 11.99% Zn). The lead concentrates produced in Rajasthan during 2011-12 was of grade 55.55% Pb as against 57.20 % Pb in 2010-11. Metal content of zinc concentrates produced in Rajasthan worked out to 51.39% Zn in 2011-12 as against 51.14% Zn in the previous year (Tables - 3 to 9).

Stocks

Mine-head stocks of lead concentrates at the end of the year were 721 tonnes as against 17,921 tonnes in the beginning of the year. The entire quantity of the stocks at the end of the year was held in Rajasthan (Table-10).

Mine-head stocks of zinc concentrates at the end of year were 6,384 tonnes as against 67,971 tonnes in the beginning of the year. The entire quantity of the stocks was held in Rajasthan (Table-11).

Employment

The average daily labour employed in lead and zinc mines during the year under review was 4,601 as against 3,408 in 2010-11.

Lead and Zinc Metals

The production of primary lead during 2011-12 increased to 92,100 tonnes from 57,294 tonnes in the previous year. The entire output of primary lead was contributed by Chanderiya smelter of Hindustan Zinc Ltd. No production of secondary lead was reported in both the years (Table-12).

The production of zinc ingot metal at 783,647 tonnes in 2011-12 increased by 6 % as compared to that in the previous year (Table-13). Hindustan Zinc Ltd contributed 97 % of the total output. The remaining production was from Binani Industries Ltd. The entire production was reported from private sector. (Tables -14 & 15).

Table – 3 : Producer of Lead & Zinc Ore, Concentrates and Metals, 2011-12

Name and address of the producer	Location	
	State	District
Hindustan Zinc Ltd, Yashad Bhavan, Udaipur-313 004, Rajasthan.	Rajasthan	Bhilwara, Udaipur
Binani Zinc Ltd,* (Binani Industries Ltd) Binanipuram-683 502, Kerala.	Kerala	Ernakulum

* Does not produce ore but produces zinc metal only from imported concentrate.

Table – 4 : Production of Lead and Zinc Ore, 2010-11 & 2011-12 (By State)

State	2010-11		2011-12(P)		(In tonnes)		
	Ore Produced	Metal content		Ore Produced		Metal content	
		Lead (Pb)	Zinc (Zn)			Lead (Pb)	Zinc (Zn)
India	7539999	153475	866501	8041881	144150	803679	
Rajasthan	7539999	153475	866501	8041881	144150	803679	

Table – 5 : Lead and Zinc Ore treated, 2010-11 and 2011-12 (By State)

State	2010-11		2011-12(P)		(In tonnes)		
	Ore Produced	Metal content		Ore Produced		Metal content	
		Lead (Pb)	Zinc (Zn)			Lead (Pb)	Zinc (Zn)
India	7428566	153561	866590	7953834	141984	806892	
Rajasthan	7428566	153561	866590	7953834	141984	806892	

LEAD & ZINC

**Table – 6 : Production of Lead Concentrates, 2009-10 to 2011-12
(By State)**

(Quantity in tonnes; value in ₹'000)

State	2009-10		2010-11		2011-12(P)	
	Quantity	Value	Quantity	Value	Quantity	Value
India	133921	1765874	147625	2000435	161157	2464159
Rajasthan	133921	1765874	147625	2000435	161157	2464159

**Table – 7 : Production of Lead Concentrates, 2010-11 & 2011-12
(By Sector/State/Districts)**

(Quantity in tonnes; value in ₹'000)

State/District	2010-11				2011-12(P)			
	No. of mines	Production			No. of mines	Production		
		Quantity	Pb%	Value		Quantity	Pb%	Value
India								
Private sector	6	147625	57.20	2000435	6	161157	55.55	2464159
Rajasthan	6	147625	57.20	2000435	6	161157	55.55	2464159
Bhilwara	1	117272	58.64	1368993	1	101674	59.03	1347297
Rajsamand	2	26896	51.86	487085	2	57418	49.52	1013923
Udaipur	3	3457	49.85	144357	3	2065	51.82	102939

**Table – 8 : Production of Zinc Concentrates, 2009-10 to 2011-12
(By State)**

(Quantity in tonnes; value in ₹'000)

State	2009-10		2010-11		2011-12 (P)	
	Quantity	Value	Quantity	Value	Quantity	Value
India	1279880	13058419	1427231	17930226	1412291	19893051
Rajasthan	1279880	13058419	1427231	17930226	1412291	19893051

**Table – 9 : Production of Zinc Concentrates, 2010-11 & 2011-12
(By Sector/State/Districts)**

(Quantity in tonnes; value in ₹'000)

State/District	2010-11				2011-12 (P)			
	No. of mines	Production			No. of mines	Production		
		Quantity	Zn%	Value		Quantity	Zn%	Value
India/Private sector	@	1427231	51.14	17930226	@	1412291	51.39	19893051
Rajasthan	@	1427231	51.14	17930226	@	1412291	51.39	19893051
Bhilwara	@	1319245	51.35	15400412	@	1261570	51.49	16724645
Rajsamand	@	93364	47.89	1966005	@	135339	50.41	2498523
Udaipur	@	14622	52.93	563809	@	15382	51.82	669883

@ Associated mines with lead concentrates.

LEAD & ZINC

Table – 10 : Mine-head Stocks of Lead Concentrates, 2011-12 (P)
(By State)

(In tonnes)

States	Stocks at the	
	Beginning of the year	End of the year
India	17921	721
Rajasthan	17921	721

Table – 12 : Production of Lead Metal, 2009-10 to 2011-12

(Quantity in tonnes; value in ₹'000)

Year	Lead Primary	
	Quantity	Value
2009-10	64319	7260867
2010-11	57294	6832535
2011-12 (P)	92100	11519013

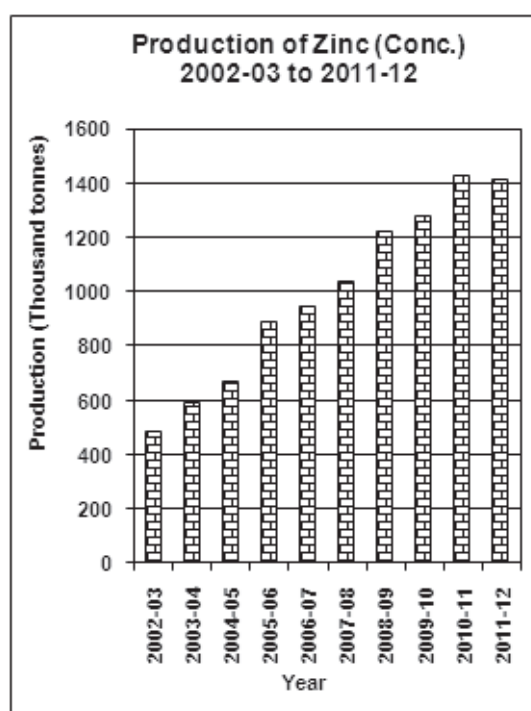
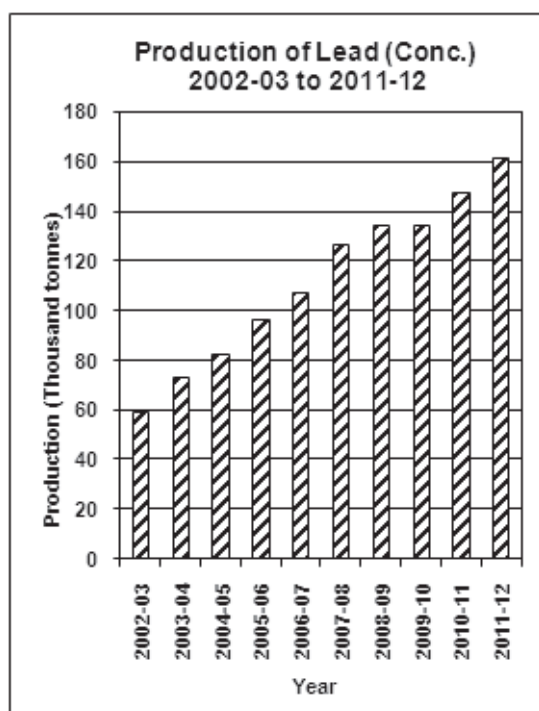


Table – 11 : Mine-head Stocks of Zinc Concentrates, 2011-12 (P)
(By State)

(In tonnes)

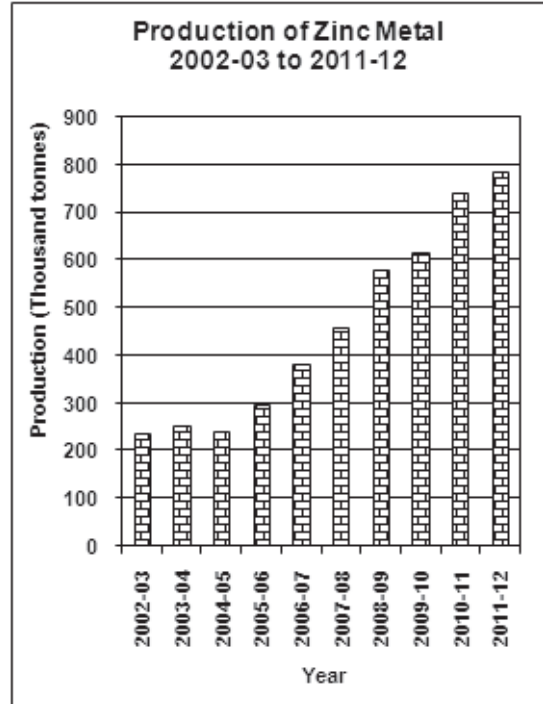
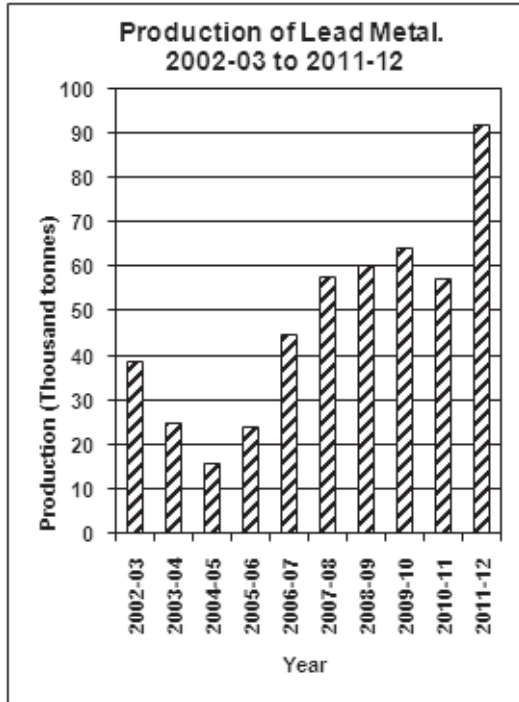
States	Stocks at the	
	Beginning of the year	End of the year
India	67971	6384
Rajasthan	67971	6384

Table – 13 : Production of Zinc Metal, 2009-10 to 2011-12

(Quantity in tonnes; value in ₹'000)

Year	Zinc Ingots	
	Quantity	Value
2009-10	613964	67484136
2010-11	740402	86758258
2011-12 (P)	783647	93434560

LEAD & ZINC



**Table – 14 : Production of Lead (Primary), 2010-11 and 2011-12
(By State/Plant)**

(Quantity in tonnes; value in ₹'000)

State	Plant	2010-11		2011-12 (P)	
		Quantity	Value	Quantity	Value
India		57294	6832535	92100	11519013
Rajasthan	HZL Chanderia	57294	6832535	92100	11519013

**Table – 15 : Production of Zinc (Ingots), 2010-11 and 2011-12
(By States/Plants)**

(Quantity in tonnes; value in ₹'000)

State	Plant	2010-11		2011-12 (P)	
		Quantity	Value	Quantity	Value
India		740402	86758258	783647	93434560
Rajasthan	HZL Chanderia/ Debari	712471	83427758	758717	90204160
Kerala	Binani Zinc	27931	3330500	24930	3230400

MINING & MILLING

HZL is the only integrated lead and zinc producer in the country. Its operation can be classified into mining and smelting. It has seven mining operations and three smelting operations. All, except one operation are located in Rajasthan. One new mining operation at Kayar in Ajmer district, Rajasthan is in development stage. One smelting plant is located in Visakhapatnam, Andhra Pradesh. The company's mining operations are located in Rampura-Agucha (Bhilwara district), Rajpura-Dariba, Sindesar-Khurd (both in Rajsamand district) and Zawar (Udaipur district), Rajasthan. Rampura-Agucha is the largest opencast mine of zinc and lead, with a capacity of 6.15 million tpy lead zinc ore after a recent expansion. The other three mines viz, Sindesar-Khurd, Rajpura-Dariba and Zawar are underground mines with an annual capacity of 2.0 million tonnes, 0.9 million tonnes and 1.2 million tonnes of lead & zinc ore, respectively. The average grade of Rampura-Agucha mine is 11.98% Zn and 1.77% Pb, Sindesar-Khurd (Zn 4.44%, Pb 2.21%), Rajpura-Dariba mine (Zn 5.43%, Pb 1.27%) and Zawar mines (Zn 3.78% and Pb 0.54%) during the year 2011-12. Sargipalli mine in Sundergarh district of Odisha, having a capacity of 500 tpd lead ore has not reported production for the last few years (Table-16).

Table – 16 : Ore Production Capacity of HZL Mines

Mine	Ore	Capacity (million tpy)
Total		10.25
Zawar Mines, Dist. Udaipur, Rajasthan.	Zinc-Lead	1.20
Rajpura-Dariba, Dist. Rajsamand, Rajasthan.	Zinc-Lead	0.90
Sindesar-Khurd Mine, Dist. Rajsamand, Rajasthan.	Zinc-Lead	2.00
Rampura-Agucha, Dist. Bhilwara, Rajasthan.	Zinc-Lead	6.15
Sargipalli, Dist. Sundergarh, Odisha.	Lead	Closed

Source : HZL Annual Report 2012.

All the mines of Zawar Group are mechanised. The Group has underground mining complex consisting of four underground mines namely, Mochia, Balaria, Zawarmala and Baroi and one concentrator for all mines. Mine development is done through Drill jumbo with Low Profile Dump Truck (LPDT) & Load Haul Dump (LHD) combination, and mining is done through open stoping method. The ore is crushed underground before being hoisted to the surface.

The Rajpura-Dariba mine of HZL is an underground mine with on-site concentrator and two vertical access shafts. Mining is done through Vertical Crater Retreat and Blast Hole Stopping method. Mined out stopes are backfilled with cemented tailing. Ore is crushed underground before hoisting and stock piling for secondary and tertiary crushing. A new surface ramp is being developed to maintain the production capacity of the mine.

Sindesar-Khurd mine, located near Rajpura-Dariba is an underground mine having access through a decline and service incline. Mining is done through Blast Hole Stopping method using 17 t Load Haul Dump (LHD) and 50 t Low Profile Dump Truck (LPDT). New surface ramp was developed to enhance production capacity upto 2 million tonnes.

Rampura-Agucha mine is the single largest open cast lead-zinc mine in the world with one of the lowest cost operated zinc mine with modern and efficient mining operations. Rampura-Agucha underground mine development and associated infrastructure work continued in conformity with the outcomes of the feasibility studies done by internationally reputed consultants. Underground mining is planned beyond the ultimate open pit depth of 372 metres from the surface. The process for carrying out detailed engineering work for shaft sinking (900 metres depth) has also begun. The Shotcreting machine (for the first time in the Indian mining industry), 17 tonnes loaders, 30 tonnes LPDT (Low Profile Dump Trucks), twin boom jumbo drill machines and other support equipment will be utilised for mining.

Kayar mine is a new greenfield project which is located near Ajmer commenced underground mine development work. Production is yet to be started.

INDUSTRY

Primary lead was produced entirely by HZL which operated smelter at Chanderiya and Dariba having capacity of 85,000 tpy and 1,00,000 tpy of lead metal (commissioned in 2012), respectively. Thus, the smelting capacity for lead (primary) in the country presently is 1,85,000 tpy. The Vizag lead smelter having 22,000 tpy metal capacity was closed down on 24.1.2001, while Tundoo lead smelter was closed from May 2003 for economic reasons. For producing secondary lead, Indian Lead Ltd (ILL), a private sector company has two units, one at Kolkata and other at Thane (Maharashtra), each having 12,000 tpy capacity. Both the units are based on imported concentrates/scrap. However, no production was reported by ILL. It is reported that Pondy Oxides & Chemicals also uses lead scrap along with concentrates as feedstock at its 17,000 tpy smelter and subsidiary company has capacity to refine metal to the tune of 12,000 tpy.

The smelting capacity of HZL for zinc is distributed between four smelters at Debari (88,000 tpy), Visakhapatnam (56,000 tpy), Chanderiya (525,000 tpy) and Dariba Smelting Complex (210,000 tpy). Binani Zinc Ltd's plant at Binanipuram (Alwaye), Kerala having a capacity of 38,000 tpy produces zinc from imported concentrates. Besides lead & zinc capacities, HZL has capacities to produce 518 tpy of silver, 740 tonnes of cadmium and 1.74 million tonnes of sulphuric acid. HZL has commissioned new silver refinery increasing the silver refining capacity to 518 tonnes per annum.

BZL does not have captive mines. The company produces zinc by procuring zinc concentrates from abroad/indigenously at its plant at Alwaye (Kerala). Companywise smelting capacity of lead and zinc smelters is furnished in Table - 17.

The Chanderia zinc smelter complex has three zinc smelters, namely, lead zinc smelter using Imperial Smelting Technology, UK, Hydrometallurgical zinc smelter, Hydro-I (100% EOU) and Hydro-II using Roast Leach Electrowinning Technology with conversion process and lead smelter using TSL Technology from Ausmelt, Australia and Cansol Technology for sulphur recovery. The total Pb-Zn metal production capacity is 6.1 lakh tpy and the silver production capacity is 168 tpy.

The Debari zinc smelter and Vizag zinc smelter are hydrometallurgical zinc smelters using Roast Leach Electrowinning Technology with conversion process.

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 25 kg.

Dariba commissioned new lead and zinc smelter with production capacity of 100 thousand tpy lead and 210 thousand tpy zinc. In the year 2011-12, Dariba smelter produced 1,98,204 tonnes of zinc and 30,415 tonnes of lead. The feed demand for Dariba lead zinc smelter is fulfilled from Rajpura Darbia mine and Sindesar Khurd mine.

Table – 17 : Companywise Capacity and Production of Primary Lead and Zinc

(In tonnes)

Company	Lead capacity tpy	Production		Zinc capacity tpy	Production	
		2010-11	2011-12		2010-11	2011-12
Hindustan Zinc Ltd	185000	57294	92100	879000	712471	758717
Binani Zinc Ltd	-	-	-	38000	27931	24930
Total	185000	57294	92100	917000	740402	783647

POLLUTION CONTROL & ENVIRONMENTAL MANAGEMENT EFFORTS

In order to regulate the reuse/reprocessing of recyclable waste in an environmentally sound manner, the Government had decided, with effect from 31 December 1999 to auction old/used lead-acid batteries and other non-ferrous metal waste to the actual users enlisted with Ministry of Environment & Forest (MoEF) and having facilities for environmentally sound management of waste processing.

Most of the mine overburden generated is utilised for secondary construction work including raising of tailing dam heights and mine backfilling. The slag generated from Pyro operations of Chanderiya is gainfully utilised for cement manufacturing. Likewise, fly ash is used in cement production, brick manufacturing and other secondary constructions.

The hazardous wastes generated are being disposed of in the secured landfills in environment-friendly manner, designed with state-of-the-art technologies and approved by statutory bodies. Extensive R&D has been undertaken for gainful utilisation of Jarosite (a waste from Hydro operations), in road construction and cement manufacturing. Premier research institutes and industries including National Council for Cement and Building Materials (NCCBM) and Cement industries and Tiles industries have been associated for the same. HZL has obtained positive results and is hopeful on alternative gainful utilisation of Jarosite.

All the units of HZL have achieved certification by International Occupational Health and Safety Management System OHSAS 18001, ISO 9001 and ISO 14001. Debari and Vizag smelters have obtained SA 8000 certificate for the social accountability. In view of severe scarcity of water in Rajasthan, zero discharge of desliming hydrocyclones was introduced in the tailing circuit to increase the recovery of water from the tailings. This has resulted in reducing the fresh water consumption. The sewage treatment plants at Debari and Chanderiya smelters were

operated continuously and the effluents were 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 foot-printing.

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.

RECYCLING OF LEAD & ZINC

Lead

Lead when used as metal in batteries, cable sheathing and sheathing for containing radiation is fully recyclable without losing its properties. Therefore, there is a thriving industry of lead recycling in the country. However, due to the health risk involved in lead recycling the Central Pollution Control Board issues licences to the lead-reprocessors with stringent environmental checks.

Government of India has enacted Battery Management and Handling Rules (BMHR), 2002 to organise the recycling of lead acid batteries and to make available raw material to the lead reproducers. As on 13.5.2010, there were 316 lead waste reproducers in the country with their combined battery intake capacity of 10,97,900 tpy. In the recently published Market Survey on Lead & Zinc by IBM, the secondary lead productions have been estimated at 72,000 tonnes in 2009-10.

Zinc

Largest consumer of zinc is galvanising industry. The zinc once used for galvanising as well for brass making is not recoverable. Hence, the quantum of zinc recycling is comparatively small as compared to lead recycling. There were 170 units of zinc recycling with combined capacity of 402,500 tpy and 132 units of zinc with other metal recycling having a combined capacity of 517,500 tpy in the country as on 13.5.2010.

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 74% of lead followed by pigments and compounds 9%, rolled and extruded products 8%, alloys 3%, cable sheathing 2% and the balance 4% is consumed by other industries. The apparent consumption of lead during the year 2010-11 and 2011-12 was calculated on the basis of production of lead (primary), imports and exports of refined lead (unwrought). The apparent consumption thus arrived at was 114,217 tonnes in 2010-11 and 125,606 tonnes in 2011-12 (Table-18). In addition to this, it is understood that large quantity of recycled lead is also consumed in various industries.

Table – 18 : Apparent Consumption of Lead (Based on Production of Lead (Primary), Imports and Exports of Refined Lead, Unwrought)

Item	(In tonnes)	
	2010-11	2011-12
Total Production Lead (Primary)	57294	92100
Total Imports	92372	76789
Total Exports	35449	43283
Apparent Consumption	114217	125606

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 2010-11 and 2011-12 was calculated on the basis of production of zinc, import and exports of zinc (not alloyed). The apparent consumption, thus arrived at was 542,591 tonnes in 2010-11 and 558,879 tonnes in 2011-12 (Table-19). The data on trade of zinc (not-alloyed) was taken from DGCI&S. In addition to this, some quantities of recycled zinc are also consumed in various industries.

Table – 19 : Apparent Consumption of Zinc (Based on Production of Zinc (Ingots), Imports and Exports of Zinc (not alloyed)

(In tonnes)

Item	2010-11	2011-12
Total Production Zinc	740402	783647
Total Imports*	61164	61426
Total Exports*	258975	286194
Apparent Consumption	542591	558879

* 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-knock 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 developing and will 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 and agriculture sectors has created shortage in 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

Global refined lead metal production in 2012 was expected to increase by 4% (10.9 million tonnes) owing to increase in production and new plants (4 primary and 8 secondary plants) in Belgium, Canada, China, India, Japan, Kazakhstan, the Republic of Korea, Sweden, UK and USA.

Global consumption of refined lead in 2012 was forecast to be 10.8 million tonnes, a 5% increase from that of 2011, according to International Lead & Zinc Study Group (ILZSG).

The global consumption of refined lead increased by 7% to 10.49 million tonnes in 2011 from 9.85 million tonnes in 2010. Chinese

consumption continued to drive global demand and growth increased by 10% in 2011 due to increased use in the automotive, e-bike, and stationary battery sectors. Consumption in India, Japan, Poland, the Republic of Korea, Russia, Thailand and Vietnam was expected to be greater in 2012 than in 2011.

Overall, ILZSG expected that production of refined lead would exceed consumption and the lead market would remain in surplus of about 114,000 tonnes by year end 2012.

ILZSG forecast zinc consumption in 2012 to increase by 4% from that in 2011 to 13.40 million tonnes. China's apparent consumption was expected to rise by 7% as the economy grows at the somewhat slower rate. Japanese consumption was forecast to increase by 7% owing to reconstruction following the tsunami.

World mine production was expected to increase by 4% in 2012 to 13.5 million tonnes owing to increased production in Australia, China, Finland, India, Kazakhstan, Portugal, Russia and Uzbekistan. Refined metal production was expected to increase by 4% to 13.7 million tonnes owing to increased production in Asia. Overall, the zinc metal market in 2012 forecast surpass 250,000 tonnes.

RESERVES

Lead

The world's reserves of lead were estimated at 89 million tonnes. Australia leads with 40% of world's reserves of lead, followed by China (16%), Russia (10%), Peru (9%), and USA & Mexico (about 6% each) (Table- 20).

Zinc

The world's reserves were estimated at 250 million tonnes. Australia accounts for 28% of world's zinc reserves, followed by China (17%), Peru (7%), Mexico (6%), India (5%) and USA and Kazakhstan (4% each) (Table-21).

PRODUCTION

Lead

The world mine production of lead increased to 4.7 million tonnes in 2011 as compared to 4.4 million tonnes in 2010. China was the leading producer accounting for about 50% of world production, followed by Australia (13%), USA (7%), and Peru & Mexico (5% each) (Table-22).

Zinc

The world mine production of zinc increased to 12.8 million tonnes in 2011 from 12.4 million tonnes in 2010. China (34%), Australia (12%), Peru (10%) were the leading producers followed by USA and India (6% each) and Canada & Mexico (5% each) (Table - 23).

WORLD PRICES

Prices of lead and zinc are furnished in the General Review on 'Prices'.

**Table – 20 : World Reserves of Lead
(By Principal Countries)**

(In '000 tonnes of lead content)

Country	Reserves
World: Total (rounded)	89000
Australia	36000
Bolivia	1600
Canada	450
China	14000
India	2600
Ireland	600
Mexico	5600
Peru	7900
Poland	1700
Russia	9200
South Africa	300
Sweden	1100
USA	5000
Other countries	3000

Source: Mineral Commodity Summaries, 2013.

**Table – 21 : World Reserves of Zinc
(By Principal Countries)**

(In '000 tonnes of zinc content)

Country	Reserves
World: Total (rounded)	250000
Australia	70000
Bolivia	6000
Canada	7800
China	43000
India	12000
Ireland	1300
Kazakhstan	10000
Mexico	16000
Peru	18000
USA	11000
Other countries	55000

Source: Mineral Commodity Summaries, 2013.

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

(In '000 tonnes of metal content)

Country	2009	2010	2011
World : Total	3900	4400	4700
Australia	566	712	621
Bolivia	84	73	100
Canada	69	65	55
China	1604	1981	2358
India*	83	84	91
Irish Republic	50	39	51
Kazakhstan	34	35	39
Mexico	144	192	224
Morocco	34	33	31
Macedonia	47	41	37
Poland	63	48	43
Peru	302	262	230
Russia	72	97	113
South Africa	49	51	54
Sweden	69	68	62
USA	406	369	342
Other countries	224	250	249

Source : World Mineral Production, 2007-2011.

* India's production of primary lead in 2009-10, 2010-11 and 2011-12 was 64.32 thousand tonnes, 57.29 thousand tonnes and 92.10 thousand tonnes, respectively.

**Table – 23 : World Mine Production of Zinc
(By Principal Countries)**

(In '000 tonnes of metal content)

Country	2009	2010	2011
World : Total	11600	12400	12800
Australia	1290	1480	1516
Bolivia	431	411	427
Canada	699	649	612
China	3324	3842	4308
India*	678	727	713
Irish Rep.	386	343	344
Kazakhstan	442	459	465
Mexico	490	570	632
Peru	1513	1471	1256
USA	736	748	769
Other countries	1611	1700	1758

Source: World Mineral Production, 2007-2011.

**India's production of primary zinc in 2009-10, 2010-11 and 2011-12 was 613.9 thousand tonnes, 740.4 thousand tonnes and 783.6 thousand tonnes, respectively.*

European Union

Recylex S.A. (Paris, France), a leading lead producer in Europe, reported in 2011 that its two facilities in France and subsidiary in Germany processed 149,000 tonnes of spent lead-acid batteries, unchanged from previous year 2010. The lead-bearing materials produced by these plants were sent to the company's two smelters in Belgium and Germany.

Australia

Xstrata plc (Zug, Switzerland) began construction to develop the high grade, zinc-lead-silver Lady Loretta deposit in north west Queensland. The company was going to develop the decline, surface infrastructure, and underground services at the \$239 million project. The company planned to start operation at Lady Loretta by the year end 2013.

Canada

Xstrata plc's (Zug, Switzerland) Brunswick underground zinc-lead mine near Bathurst, New Brunswick, was the leading producer of lead in concentrate in Canada. The mine had production capacity to process 3.10 million tonnes per year of ore containing copper, lead, silver, and zinc. Xstrata increased reserves at Brunswick Mine to extend the mine life to 2013. In 2011, Selwyn Resources Ltd, (Vancouver, British Columbia) and joint-venture partner, Yunnan Chihong Zinc and Germanium Co. Ltd, (Yunan Province, China) continued an exploration, permitting engineering and development programme

at the Selwyn project in the eastern Yukon Territory (also known as the Howard's Pass District). In 2010 and 2011, Selwyn Chihong completed an extensive diamond drilling programme in the XY Central and Don deposits to upgrade mineral resources to the measured and indicated category. It also undertook exploratory drilling in the XY West deposit to confirm the continuity and extent of the high-grade mineral resources. The Selwyn project was one of the largest undeveloped resources of lead and zinc in the world according to the company. The latest resource estimates for the project, as on August 2011, are 180.6 million tonnes of indicated mineral resources, grading 1.83% lead. Selwyn's revised development schedule provided for initial ore production to begin in 2015 at rates that would produce about 65,000 tpy of lead in concentrate.

Teck announced in 2011 that refined lead production at its metallurgical complex at Trail was 85,600 tonnes, a 20% increase from that of 2010 owing to the KIVCET furnace operating at great feed rates and no substantial shut downs during the year. Teck expected to produce 85,000 tonnes of refined lead at Trail in 2012.

China

China continued to be the leading global producer and consumer of lead in 2011. China was also the leading producer of lead-acid batteries in the world. Consumption of lead in China has increased by an average of 19% per year from 2000 to 2011 and was estimated to have increased by 10% to 4.63 million tonnes in 2011 from 4.21 million tonnes in 2010. Secondary lead production was accounted for 31% of total refined lead production in China. In 2011, the Chinese Government continued to eliminate smaller lead mines and smelters in an attempt to consolidate production and close lead acid battery manufacturers that violated environmental regulations. In August, the Ministry of Industry, Information and Technology (MIIT) released a draft proposal that would permanently close all secondary lead smelters with refined lead capacities less than 30,000 tonnes per year by 2013. New plants and expansions at existing plants would need to have the capacity to produce 50,000 tonnes per year of refined lead at recovery rate of 98% and 96% with existing plant. MIIT issued a circular to Provinces and Regions listing 3.6 million tonnes per year of outdated non-ferrous metal production capacity that was targeted to be closed or phased out during the XII Five Year Plan period (2011-2015).

Recycled production of lead was to account for 40% of annual refined lead production by 2015. In 2011, about 1600 lead acid battery manufacturing plants out of 1930 inspected were permanently or temporarily closed from April to July, as a result of National Environmental crack down.

Mexico

JCI planned to invest more than \$ 70 million in its secondary lead smelter in Nuevo Leon to replace existing rotary furnace with larger and more efficient rotary furnaces. The upgrade was part of JCI's strategy to increase lead recycling capacity in North America. Zinc mine production in Mexico also rose significantly owing to increased output at Goldcorp Inc's polymetallic Penaquito Mine in 2011 from that of 2010 as the mine continued to ramp up to full design capacity (approximately 204,000 tpy of zinc in concentrate).

Peru

Peru had the most significant contraction in Zinc production in 2011 from that of 2010 mostly owing to decrease in zinc concentrate production from the Antamin copper-zinc mine owing to lower zinc grades and reduced processing of copper-zinc ores.

FOREIGN TRADE

Lead

Exports

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

Exports of lead ores and concentrates decreased by 74% to 10,226 tonnes in 2011-12 as compared to 39,195 tonnes in the previous year. China was the single largest importer accounting for almost the entire quantity. Exports of lead and alloys & scrap also increased to 69,629 tonnes during 2011-12 as compared to 48,646 tonnes in the preceding year. Almost entire exports were of lead & alloys while those of scrap were nominal. Rep. of Korea is the largest importer accounting for 48% of exports followed by Saudi Arabia (15%) and Malaysia (12%) as the major destinations in 2011-12 (Tables - 24 to 31).

Imports

Imports of lead in India are in the form of lead ores and concentrates, lead and alloys including scrap, lead and alloys unwrought, pig lead, antimonial lead, worked lead and alloys (bars, rods, plates, etc.).

Imports of lead ores & concentrates increased to 30,282 tonnes in 2011-12 as compared to 9,722 tonnes in 2010-11. Imports were mainly from Ireland (36%), South Africa (22%) and Senegal and Morocco (5% each). Imports of lead and alloys & scrap during 2011-12 were 240,698 tonnes compared to 285,662 tonnes in 2010-11. Imports comprised mainly lead and alloys and the rest was scrap. The major suppliers during 2011-12 were UK (16%), UAE (14%), Australia (13%), Rep. of Korea (11%), China (5%) and USA (4%) (Tables - 32 to 39).

Zinc

Exports

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

Exports of zinc ores and concentrates decreased up to 5,591 tonnes in 2011-12 as compared to 67,501 tonnes in the previous year. China was the only importer in the year 2011-12.

Exports of zinc and alloys & scrap during 2011-12 were 2,95,071 tonnes as against 2,642,51 tonnes in the preceding year. Almost entire exports during 2011-12 were of zinc & alloys while those of scraps were nominal. Malaysia (21%), Rep. of Korea (14%), Chinese Taipei/Taiwan (11%), China (9%) and UAE (6%) were the main destinations (Tables-40 to 44).

Imports

Imports of zinc in the country are in the form of zinc ores and concentrates, zinc and alloys including scrap, zinc spelter, zinc and alloys in the forms of bars, rods, plates, mazak, etc. Imports of zinc ores and concentrates decreased to 63,194 tonnes in 2011-12 from 88,171 tonnes in the preceding year. Imports were mainly from Australia (59%), Benin(15%), Peru(13%), Ireland(12%). Imports of zinc and alloys & scrap during 2011-12 were 131,432 tonnes compared to 112,228 tonnes in 2010-11. The major suppliers were UAE (20%), Kazakhstan (12%), China (8%), Rep. of Korea (7%) and Australia (6%) (Tables - 45 to 52).

LEAD & ZINC

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

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	39195	3891804	10226	1390485
China	38915	3890115	10221	1390453
Djibouti	-	-	5	32
Malaysia	-	-	++	++
Thailand	-	-	++	++
Other countries	280	1689	-	-

**Table – 25 : Exports of Lead and Alloys
Including Scrap : Total
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	48646	5153688	69629	9074327
Rep. of Korea	23203	2447550	33136	3975253
Saudi Arabia	6176	693637	10277	1221514
Malaysia	1785	176197	8184	1020703
UAE	230	28311	2811	965335
Indonesia	10206	1022217	3310	412146
USA	134	28004	2002	238820
Chinese Taipei/Taiwan	219	23905	1403	183140
Egypt	111	12685	1108	128473
Sri Lanka	1640	169899	1036	120628
Tunisia	-	-	894	107211
Other countries	4942	551283	5468	701104

**Table – 26: Exports of Lead & Alloys
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	48536	5144743	69628	9074324
Rep. of Korea	23203	2447550	33135	3975250
Saudi Arabia	6176	693176	10277	1221514
Malaysia	1785	176197	8184	1020703
UAE	230	28311	2811	965335
Indonesia	10206	1022217	3310	412146
USA	134	28004	2002	238820
Chinese Taipei/ Taiwan	219	23905	1403	183140
Egypt	111	12685	1108	128473
Sri Lanka	1640	169899	1036	120628
Tunisia	-	-	894	107211
Other countries	4832	542799	5468	701104

**Table – 27 : Exports of Lead & Waste & Scrap
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	110	8945	1	3
Rep. of Korea	-	-	1	3
Other countries	110	8945	-	-

**Table – 28 : Exports of Refined Lead, Unwrought
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	35449	3641152	43283	5086411
Rep. of Korea	21020	2210087	23678	2774463
Saudi Arabia	4689	478443	8350	976753
Malaysia	1648	158527	3983	473405
Indonesia	5046	488107	1982	216042
Chinese Taipei/ Taiwan	219	23866	1351	175190
Tunisia	-	-	894	107211
Sri Lanka	1211	125537	741	83154
Egypt	80	8860	417	50444
Myanmar	60	5884	389	45415
Thailand	294	24541	296	43871
Other countries	1182	117300	1202	140463

**Table – 29 : Exports of Lead & Alloys
Unwrought, NES
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	4850	567464	13906	2494481
UAE	27	1489	2585	934369
Malaysia	52	7315	4170	542462
Rep. of Korea	1084	110073	1099	268578
USA	71	7504	1856	214030
Saudi Arabia	1133	134469	1699	206181
Egypt	30	3606	566	63439
Indonesia	386	41582	345	43012
Sri Lanka	403	41924	213	27600
Vietnam	-	-	229	26566
Benin	168	29070	108	20039
Other countries	1496	190432	1036	148205

LEAD & ZINC

**Table – 30 : Exports of Lead Unrefined, NES
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	21	2752	++	74
UAE	1	262	++	74
Other countries	20	2490	-	-

**Table - 31 : Exports of Lead & Alloys: Worked
(Bars, Rods, Plates etc.)
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	801	160238	981	174108
UK	83	12970	181	31636
USA	43	18010	146	24789
Saudi Arabia	154	58510	44	18894
UAE	102	13075	140	18799
Philippines	15	1808	66	9043
Jordan	5	1782	20	8069
Singapore	47	5425	60	7883
Tanzania Rep.	1	272	31	7675
Thailand	128	14897	57	7502
Oman	3	621	36	6647
Other countries	220	32868	200	33171

**Table – 32 : Imports of Lead Ores & Conc.
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	9722	342050	30282	1915093
South Africa	-	-	6713	719988
Ireland	-	-	10835	6922641
Morocco	1093	71100	1579	121322
Senegal	406	14669	1611	59736
UAE	504	11002	1177	41681
Ghana	794	27216	1113	40977
Mozambique	312	11407	940	32880
Belarus	379	6996	1108	31194
Ivory Coast/ Cote-d' ivoire	509	14825	803	28496
Iran	1119	27253	663	22997
Other countries	4606	157582	3740	123181

**Table – 33 : Imports of Lead and Alloys
Including Scrap : Total
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	285662	27568237	240698	27100104
UK	40198	3795711	38560	3936582
Australia	36809	3880606	30513	3852467
Rep. of Korea	20826	2462205	26003	3687115
UAE	41441	3936905	32961	3432781
China	5929	498166	11976	1406757
USA	4443	412021	10349	1050642
Belgium	16536	1587344	7762	906744
Germany	15421	1536517	6215	771598
Saudi Arabia	11468	1037619	6770	696918
Kazakhstan	1674	190799	4350	535634
Other countries	90917	8230344	65239	6822866

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

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	227387	22411491	174045	20575192
Australia	36140	3824638	30435	3847384
Rep. of Korea	20826	2462205	25899	3677131
UAE	37674	3593873	27929	3007196
China	5810	488533	10617	1276781
Belgium	14796	1442156	7385	869466
Germany	14311	1445105	4540	618937
Saudi Arabia	11414	1032522	5746	595438
Kazakhstan	1674	190799	4350	535634
Malaysia	4344	432969	4482	503801
Nigeria	5793	511122	4549	479314
Other countries	74605	6987569	48113	5164110

LEAD & ZINC

**Table – 35 : Imports of Lead (Scrap)
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	58275	5156746	66653	6524912
UK	33648	3041904	35649	3620727
USA	2652	229818	7672	734819
UAE	3767	343032	5032	425585
Germany	1110	91412	1675	152661
China	119	9634	1359	129976
Saudi Arabia	54	5096	1024	101480
Netherlands	1880	152913	1032	100845
Romania	905	72976	1052	96777
Kuwait	674	60247	732	72390
Georgia	735	59327	795	72053
Other countries	12731	1090387	10631	1017599

**Table – 36 : Imports of Lead: Pig Lead
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	3136	309565	6000	621704
UAE	726	69690	3616	361132
Saudi Arabia	367	35536	492	52090
Pakistan	289	28159	268	30661
South Africa	-	-	247	27675
Singapore	244	25065	174	18849
USA	97	9475	129	14971
China	67	6842	125	12916
Egypt	-	-	110	12655
Yemen, Rep.of	-	-	97	11049
Sri Lanka	100	10625	83	8539
Other countries	1246	124173	659	71167

**Table – 37 : Imports of Lead Unrefined NES
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	24260	2192762	17431	1834190
UAE	5753	537929	5259	536105
Saudi Arabia	2294	213672	2179	238728
Rep. of Yemen	2706	241505	1671	181769
China	237	20415	1036	121687
Russia	1075	100064	666	70286
Pakistan	1143	102511	609	63957
Malaysia	149	13754	595	60422
Ghana	491	41018	554	60035
Nigeria	1386	119149	531	55162
Venezuela	361	32532	530	55114
Other countries	8665	770213	3801	390925

**Table – 38 : Imports of Refined Lead
Unwrought
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	92372	9366335	76789	9751749
Australia	22158	2309025	19543	2488771
Rep. of Korea	8616	990815	15110	2211635
Belgium	13424	1317108	7360	866928
China	4101	329675	5332	643600
UAE	5824	580398	5155	597392
Kazakhstan	981	116828	4350	535634
Germany	13509	1340721	2717	405343
Malaysia	3637	368996	2781	323419
UK	4094	500644	1816	1941688
Italy	-	-	1289	164278
Other countries	16028	1512125	11336	1320581

**Table – 39 : Imports of Lead
(By Items)**

Item	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Items	285662	27568237	240698	27100104
Lead & alloys :				
unwrought	226303	22203677	173417	20412687
Pig lead	3136	309565	6000	621704
Unrefined lead, NES	24260	2192762	17431	1834190
Refined lead, unwrought	92372	9366335	76789	9751749
Antimonial lead	2052	202562	617	74201
Lead & alloys, unwrought				
NES	104483	10132453	72580	8130843
Lead & alloys: worked (bars, roda, lates, etc.)	1084	207814	628	162505
Lead scrap	58275	5156746	66653	6524912

LEAD & ZINC

**Table – 40 : Exports of Zinc Ores & Concentrates
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	67501	2846743	5591	14156
China	67500	2846725	5591	14156
Other countries	1	18	-	-

**Table – 41 : Exports of Zinc & Alloys Including
Scrap : Total
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	264251	32248477	295071	36266217
Malaysia	64738	7877943	63167	7631039
Rep. of Korea	55395	6685908	40465	4876719
Chinese Taipei/ Taiwan	25035	3190071	31528	3936243
China	26174	3375944	31201	3707896
UAE	14989	1748063	17558	2103236
Indonesia	9194	1161472	16506	1997932
South Africa	428	64510	13001	1576764
Nigeria	12387	1504516	11257	1326657
Nepal	8739	880413	4198	1099791
Rep. of Korea, Dem.1220	149719	6322	755774	
Other countries	45952	5609918	59871	7254166

**Table – 42 : Exports of Zinc & Alloys
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	264219	32244982	295033	36262165
Malaysia	64738	7877943	63167	7631039
Rep. of Korea	55395	6685908	40465	4876719
Chinese Taipei/ Taiwan	25035	3190071	31525	3936243
China	26174	3375944	31201	3707896
UAE	14989	1748063	17558	2103236
Indonesia	9194	1161472	16506	1997932
South Africa	428	64510	13001	1576764
Nigeria	12387	1504516	11257	1326657
Nepal	8739	880413	4198	1099788
Korea, Dem. Rep.of 1220	149719	6322	755774	
Other countries	45920	5606423	59833	7250117

**Table - 43 : Exports of Zinc & Alloys:Worked
(Bars, Rods, Plates etc.)
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	2387	306015	4463	554471
UAE	560	68859	1291	162678
Saudi Arabia	81	10345	643	77886
Nepal	50	6147	635	70971
Australia	513	61718	546	69021
South Africa	214	26842	345	44423
USA	213	37633	197	21565
Vietnam	87	11024	142	18115
Egypt	21	2827	125	16518
Peru	60	7859	100	13316
Indonesia	43	5429	93	13077
Other countries	545	67332	346	46901

**Table – 44 : Exports of Zinc (Scrap)
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	32	3495	38	4052
Singapore	-	-	36	3596
USA	8	474	1	297
Netherlands	1	495	++	99
Bahrain	4	900	1	36
UK	1	131	++	20
Nepal	-	-	++	4
Other countries	18	1495	-	-

LEAD & ZINC

**Table – 45 : Imports of Zinc Ores & Conc.
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	88171	3415929	63194	2396487
Australia	37120	1266903	37310	1344524
Benin	-	-	9244	368251
Peru	50317	2121274	8398	339988
Ireland	-	-	7367	312621
Morocco	46	1601	318	11011
Iran	48	1351	248	8908
UAE	51	3022	202	7092
Ethiopia	74	1263	83	3254
Syria	-	-	23	787
Thailand	-	-	++	32
Other countries	515	20515	1	19

**Table – 46 : Imports of Zinc and Alloys
Including Scrap : Total
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	112228	11302210	131432	13704756
UAE	10878	1046188	26562	2845860
Kazakhstan	20008	2049080	15796	1775625
China	4530	520588	10753	1279526
Rep. of Korea	9657	1029929	8870	986690
Australia	7789	842900	7299	762386
Germany	3658	394389	5604	595355
USA	2255	216878	6135	559251
Malaysia	3590	390711	4800	489726
Mexico	1603	178644	3790	379720
Saudi Arabia	3285	260474	4027	362193
Other countries	44975	4372429	37796	3668424

**Table – 47 : Imports of Zinc & Alloys :Worked
(Bars, Rods, Plates etc.)
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	12944	1118618	10764	1353919
UAE	1164	106076	4310	453437
Germany	1245	168257	1203	169725
Malaysia	1628	198028	1305	166594
Japan	26	3381	305	110809
China	455	55215	549	79264
Finland	314	40101	514	67580
Australia	431	59538	418	56891
Belgium	335	42414	342	55017
France	5	1211	129	34854
Saudi Arabia	533	30714	241	25652
Other countries	6808	413683	1448	134096

**Table – 48 : Imports of Zinc & Alloys
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	82411	8635693	82852	9595657
UAE	7463	770357	22168	2476235
Kazakhstan	20008	2049080	15796	1775625
China	4421	508665	9727	1191785
Rep. of Korea	9444	1007843	8372	944438
Australia	7244	800732	6363	702986
Germany	1504	218780	2428	323826
Malaysia	2573	288379	2201	2779725
Japan	1855	205514	1567	255484
Namibia	3690	382154	1855	202687
Bangladesh	1828	89501	2147	176980
Other countries	22381	2314688	10228	1267636

LEAD & ZINC

**Table – 49 : Imports of Zinc & Alloys, NES
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	3613	537591	6294	930414
China	721	115777	1856	330915
UAE	150	15573	1516	162115
Australia	957	103333	901	102392
Belgium	557	69079	573	67493
Rep. of Korea	124	14155	375	46629
Germany	136	40297	150	41389
Bangladesh	-	-	390	38482
Italy	80	20443	113	33156
Japan	95	27678	58	19231
Chinese Taipei/ Taiwan	78	39048	24	17827
Other countries	715	92208	338	70785

**Table – 50 : Imports of Zinc or Spelter
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	61164	6462902	61425	6816728
UAE	6149	648709	16342	1860684
Kazakhstan	18530	2032992	15796	1775625
China	3245	337672	6973	742087
Rep. of Korea	4744	492224	5183	578990
Australia	5608	611653	4839	519519
Namibia	3617	374100	1855	202687
Iran	9385	973729	1337	143638
Singapore	2165	198439	1056	122884
Bangladesh	60	2531	1366	121523
Germany	123	10227	1075	112711
Other countries	7538	780626	5603	636380

**Table – 51: Imports of Zinc (Scrap)
(By Countries)**

Country	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Countries	29817	2666517	48580	4109099
USA	2014	187253	5380	467847
UAE	3415	275831	4394	369624
Mexico	1597	178019	3422	338218
Germany	2154	175608	3176	271529
Saudi Arabia	2566	210702	3142	268399
Malaysia	1017	102333	2599	211751
UK	1525	124311	2446	207390
Belgium	1116	105377	2303	199295
Italy	1085	102139	2195	185591
Thailand	1132	89138	1883	158092
Other countries	12196	1115806	17640	1431363

LEAD & ZINC

**Table – 52 : Imports of Zinc
(By Items)**

Item	2010-11		2011-12	
	Qty (t)	Value (₹'000)	Qty (t)	Value (₹'000)
All Items	112228	11302210	131432	13704756
Zinc & alloys	82411	8635693	82852	9595657
Zinc or spelter	61164	6462902	61425	6816728
Mazak	4690	516582	4369	494596
Zinc & alloys, NES	3613	537591	6294	930414
Zinc & alloys: worked (bars, rods, plates, etc.)	12944	1118618	10764	1353919
Zinc scrap	29817	2666517	48580	4109099

FUTURE OUTLOOK

It is noteworthy that from being a net importer, 9 years ago, India has become a net exporter of zinc. The demand of zinc is riding on the steel industry growth, mainly driven by the production of galvanised products. Similarly, with the growth in the automotive, information & communication technology and infrastructure sectors, the demand for lead is poised to increase and sustain in future. It is expected that down-stream industry

development, improvement in standard of living and consumer awareness is set to further increase the demand of zinc and lead in the forthcoming years.

As per the Report of Sub- Group-II on Metals and Minerals for the XII Five Year Plan, the demand for zinc in India is expected to be 8,80,000 tonnes in 2016-17, HZL is the lone producer of lead in India. Its current primary lead capacity is 1,85,000 tonnes per annum. Lead demand is expected to be 5,68,000 tonnes by 2016-17.