

**HINDUSTAN ZINC LIMITED-RAMPURA
AGUCHA MINE
Stream-3, Distt. Bhilwara (Rajasthan)**

Unit Profile

Hindustan Zinc Limited today is part of one of the top global companies Vedanta Limited. Hindustan Zinc Limited (HZL) is the only integrated Lead & Zinc manufacturer in India which owns captive Lead and Zinc Mines that supply complete requirement of Lead and Zinc concentrate for its smelters. Rampura Agucha is presently having mining and beneficiation capacity of 6.15 and 6.50 million ton ore production and beneficiation. It is an ISO 9001, ISO 14001 & OHSAS 18001 and SA-8000 certified Mines.

Rampura-Agucha Open Cast and Underground Mines has present capacity of 6.15 Mtpa ore production and beneficiation plant to produce zinc and lead concentrates. Rampura-Agucha Open Cast and Underground Mines is one of the largest & richest Lead-Zinc deposits in the world. The Mines were commissioned in the year 1991 with capacity of 0.90 Mtpa. Further, the capacity of the Mines was increased from 0.90 Mtpa to 1.35 Mtpa. Furthermore the production was enhanced to 3.75 Mtpa in 2004-05. The production capacity was once again expanded to 5.00 Mtpa in 2007-08 and 6.15Mtpa Mines production and 6.50 Mtpa ore beneficiation plant in Dec.2009.

SUSTAINABLE MINING - RAMPURA-AGUCHA OPEN CAST AND UNDERGROUND MINES (ISO 9001:2000, ISO 14001, ISO 18001 and SA 8000: 2014 certified Mines)



Stream 3 Unit Profile:

Stream-3 plant is located in Mill department of Rampura Agucha Mines in District Bhilwara of Rajasthan. Commissioning of Stream-3 Plant was done in April'2008. Plant's nameplate capacity is 1.0 million tons of ore treatment per annum. Plant is designed with state of the art technology of Lead-Zinc beneficiation operation. The plant plays a role to increase metals concentration from excavated ore from mines to separate concentrates of Lead and Zinc by following sequential unit operations:-

1. Primary Crushing (Gyratory Crusher 54" * 74")
2. Grinding operation (SAG Mill & Ball mill circuit of 134tph installed capacity)
3. Different Flotation operation & Quality (Lead flotation circuit followed by Zinc flotation circuit with tank cells)
4. Thickening and De-watering operation for Lead, Zinc and tailing. Filtration operation for Lead and Zinc concentrate by Larox press filters.

During the course of these unit operations power is consumed. Total power consumed is measured in terms of specific power "Kwh/ Mt of ore treatment". Total consumed specific power consumption divided in following Sectorial for better visibility and control:-

1. Crushing Power (Gyratory Crusher)
2. Grinding Power (Sag Mill with VFD drive & Ball Mill)
3. Blower Power
4. LT Power: Comprises auxiliaries, flotation cells, pumps, conveying system, compressors, thickeners and press filters.

Environmental Performance of the Mines:

Unit has a strong environment monitoring mechanism and have deployed the best technologies for ecofriendly mining. Extensive activities have been done to achieve world class standards by proper air quality management, noise and vibration management, over burden management, plantation, water quality management, tailing management etc. Plantation of about 3.27 lakhs plants in Mines lease area, colony and road sides since 1991.

Electrical System Description

(A) 132 KV GRID SUBSTATION

The 132KV Grid Sub Station (GSS) acts as a power source for Rampura Agucha Mines. Power is received from 220KV substation of the State Electricity Board at Gulabpura through a single circuit 132KV O.H. line After this it forms a 132 KV bus and energies following five transformers of 132/ 11KV, 12.5/16MVA transformer

through various protective and metering equipment such as Isolator, CT, SF6 circuit breaker, surge arrestor.

11KV POWER SYSTEM -

11KV Bus 3A (having total 16 switchgears):- Feeding power to PMCC Stream-III, Capacitor Bank.

6.6KV POWER SYSTEM –

The 6.6KV Bus, being charged from above said transformers, cater the 6.6KV load of the Ball mills(2800KW), Zinc regrind Mills(450KW) & 3.3 KV Sag Mill motor is being fed by 11/3.3 KV transformer via 3.3 KV Medium voltage drive of Stream3.

440V POWER SYSTEM -

There are three transformers of 11/0.433 KV, 1250KVA and two transformers of 500 KVA for lighting purpose. Lighting load of all streams & services are centrally fed /controlled from here.

THE POWER & MOTOR CONTROL CENTER (440V TPN_PMCC & MCC)

All PMCCs have outgoing feeders for MCCs & power control (for VFD Drive) & starter feeder for drive above 75KW. All small feeders (below 75KW) are distributed through MCCs. Other auxiliary feeders have ACB installed.

All PMCCs having closed loop system with bus coupler connecting each bus.

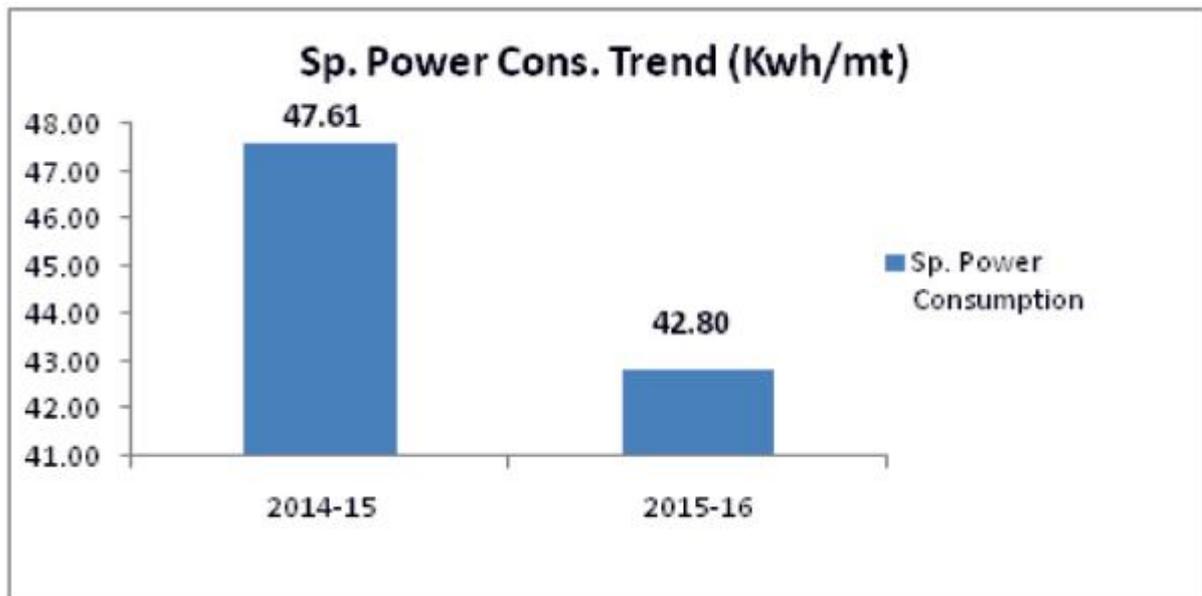
All MCCs are having alternate source/spare feeder available with it as stand by.

Power is received from 11KV switchgears located at GSS Stream-III Section and it is stepped down to 0.433 KV by following 5Nos 2000KVA transformers, which is charging the 0.415KV, 3ph, 50Hz bus bar

Energy consumption

There has been a steady decrease in the electrical energy consumption per MT of ore treatment due to the implementation of the various energy conservation measures.

Description	Unit	2014 - 15	2015 - 16
Ore Treatment	Metric ton (MT)	891173	1035672
Total energy consumption	Lakhs kWh	424.287	443.267
Specific energy consumption	kWh / MT	47.61	42.80



SINDESAR KHURD MINE
Hindustan Zinc Limited (Vedanta Ltd)
Distt. Rajsamand (Rajasthan)

Unit Profile

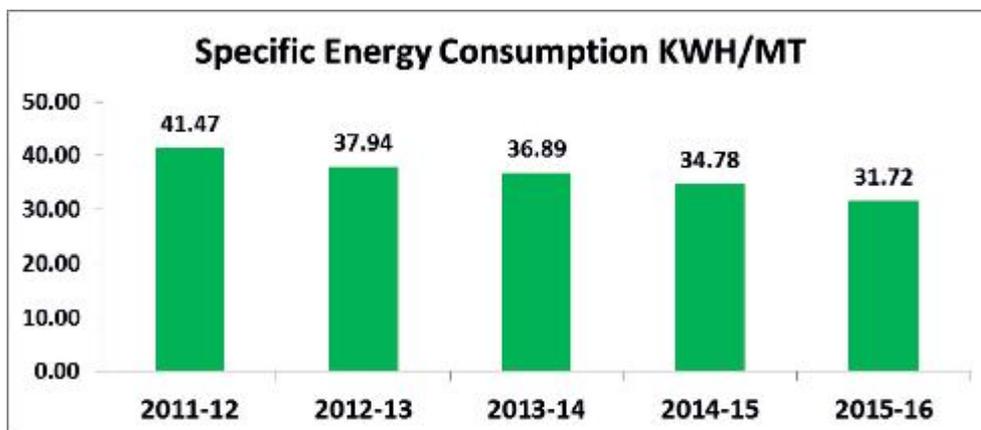
Introduction

Sindesar Khurd Mine of Hindustan Zinc Ltd is operating as an underground mine for production of lead and zinc ore. It was opened in year 1999 and started production in 2006. The current annual production is 3.75mtpa, which is planned to be increased to 4.5mtpa & treatment of 4.5mtpa in FY 2017-18 along with a Production Shaft.

Beneficiation plant



Energy Consumption



Description of the energy conservation measures

Various projects were undertaken to reduce specific Power Consumption in SK Mine. The major projects are listed below-

Project 1 –Increase the throughput of grinding feeding circuit from 150 TPH to 180 TPH

Grinding circuit capacity increased by optimizing size of input material from 25mm to 20mm feed to grinding circuit. Also size of cyclone vortex finder optimize from 160mm to 150mm to get consistent mesh of grind at higher throughput.

Result- Reduction in Specific Energy Consumption by 2.6 kWh/MT of ore treatment

Project 2: Replacement of 70 Watt HPSV (High Pressure sodium Vapour) Lighting fixtures with 30 Watt LED lighting fixtures

Initially, In Plant area 70 Watt HPSV (High Pressure Sodium Vapour) lighting fixture installed in plant different area like., MPP Pump Floor area, Crusher section belt conveyor area, Tunnel area, staircase etc., Now HPSV lighting fixture replaced with new technology 30 Watt LED Lighting fixture. Also Provided Digital Lighting timer in different circuit to make automatic operation of lighting circuit as per time fixed. This will reduce the maintenance cost and time as well as for energy saving.

Result- Net Energy savings per annum is- 21900 KWH

Project 3: Replacement of IE2 motor with premium efficiency IE3 Motor

For Zinc and Lead Cleaner Cell operation installed the 22 KW rating IE2 Efficiency motor having the efficiency of 91.6 %. This motor is continuously run throughout the year with full load capacity. Now total 8 nos. cleaner cell motor is replace with IE3 premium efficiency motor having the efficiency of 93%.

Result- Net Energy savings per annum is- 24192 KWH

Project 4: Optimization of extra process water generation during paste fill plant operation

During normal mill operation, mill tailing is going to the tailing dam through 2 nos. 75 KW series pump motor. Each Battery consist of 2 nos motor (One VFD Operation & Other DOL operation). After commissioning of Paste Fill Plant, tailing solid percentage has increased and extra process water is recycled back to the tailing thickener from that it goes to the Process Water Tank. For that reason Process Water tank overflows. To control the process water, the arrangement can be made to send the water to tailing dam through tailing battery or it can be diverted to plant reservoir. For that purpose, 90 KW additional process water pump has been

taken into line and water is directly send to 10,000 m3 pond instead of tailing dam. So, during the paste fill plant operation tailing battery is completely stopped & only 90Kw process water pump is operated for process water optimization.

Result- Net Energy savings per annum is- 6.66 Lakhs KWH

Project 5: Installation of ASRi System in Tertiary Crusher

Gap Setting of Tertiary Crusher is done manually by operator which was replaced by installation of ASRi (Automatic Setting Regulation Intelligent) system in tertiary crusher and improves the productivity.

Result- Net Energy savings per annum is- 1.79 Lakhs KWH

Major Energy Conservation initiatives taken in FY 2015-16

Sr. No.	Project description	Achievement of Annual energy savings in 2015-16					Total savings (Rs. Lakhs)	Investment incurred on the project Rs. (Lakhs)
		Electricity	Fuels*					
			(Lakh kWh)	Coal (tonnes)	F.Oil (kL)	Gas (lakh Nm3)		
1	Increase the throughput of grinding feeding circuit	66.76	---	---	---	---	231	500
2	Replacement of 70 Watt HPSV (High Pressure sodium Vapour) Lighting fixtures with 30 Watt LED Lighting fixtures.	0.22	---	---	---	---	0.76	6
3	Replacement of IE2 motor with premium efficiency IE3 Motor	0.24	---	---	---	---	0.84	3.48
4	Optimization of extra process water generation during paste fill plant operation.	6.66	---	---	---	---	23.11	0.45
5	Increase in water transfer from 10000 m3 pond to 20000 m3 storage reservoir.	2.19	---	---	---	---	7.6	2.5
6	Elimination the extra cooling of Ball Mill & Rod Mill Gear Box	0.74	---	---	---	---	2.56	---
7	Installation of ASRi system in Tertiary Crusher	1.79	---	---	---	---	6.23	20
8	Underground waste dumping in mined out stopes in place of hauling to surface	---	---	204.5	---	---	80.75	30
9	Reduction in fuel consumption by introducing 60T LPDT, Higher Bucket Size in 17T LHD	---	---	148.13	---	---	58.49	40
10	Reduction in fuel consumption by following standard maintenance practices in 50/60 T LPDT and 17 T LHD	---	---	351.45	---	---	138.78	55

Energy Policy

	<p align="center">INTEGRATED MANAGEMENT SYSTEM (IMS) (ISO 9001, ISO 14001, ISO 50001, OHSAS 18001). HZL - SINDESAR KHURD MINE</p>		
Doc No: HZL/SKM/ IMS/Apex Manual	ISSUE NO. : 01 Date – 31.01.2015	REVISION NO : 01 15.03.2016	Page 1

15.0 HEALTH, SAFETY, ENVIRONMENT, ENERGY AND QUALITY (HSEEQ) POLICY

We at Sindesar Khurd Mine of Hindustan Zinc Limited commit ourselves as a team to achieve effective management of our Safety-Health, Environment, Energy and Quality responsibilities towards our employees, stakeholders and customers.

We commit ourselves to continually improve our Safety Health, Environment, Energy and Quality performance by:

- ◆ Complying in letter and spirit to fulfill the applicable national statutory / regulatory and other requirements of OH&S, environment, energy & product.
- ◆ Committing ourselves for prevention of pollution, injury or ill health by the use of safe and efficient processes, practices and products.
- ◆ Optimization and reducing the consumption of water, energy and other inputs by all efforts including procurement of quality, environment friendly and energy efficient product / services and design for their performance improvement.
- ◆ Ensuring timely supply of Lead & Zinc concentrate to the smelters and other customers as per their requirements.
- ◆ Achieve operational excellence by performance measurement, innovation, setting objectives, targets & bench marking ourselves against Best cost, Quality, Environment, Energy, Health and Safe practices. Assure the availability of informations and resources required to achieve these objectives and reviewed.
- ◆ Propagate Environment, Energy Health & Safety consciousness among community, employees, suppliers & other stakeholders.
- ◆ Ensuring adherence to environment friendly and safe practices at workplace.

We have accepted to demonstrate our leadership by reinforcing this policy throughout the unit by our trained and empowered employees by the application of best management practices and technologies in line with our corporate mission and practices.

March 15, 2016


Rajeev Bora
 Unit Head
 Sindesar Khurd Mine

MINE I NLC INDIA LIMITED **Neyveli (Tamil Nadu)**

Unit Profile

NLC India Ltd (Formerly Neyveli Lignite Corporation Limited), a “Navratna” Government of India Enterprise, under the administrative control of Ministry of Coal (MoC) is a leader in lignite mining and power generation since its inception in 1956. The Head Quarter of NLC is located at Chennai and the Industrial Units are located at Neyveli, Tuticorin in Tamil Nadu and Barsingsar in Rajasthan. NLC has formed two Joint Venture Companies for setting up coal based power projects.



NLC is operating lignite mines of 28.5 Million ton per annum at Neyveli and 2.1 MTPA at Barsingsar, Rajasthan. These mines are linked to Power generation capacity of 2990 MW at Neyveli and 250 MW at Barsingsar in Rajasthan. NLC has a turnover of Rs. 6669.05 Crores during 2015-16 and gross profit of Rs. 1204.15Crores.

Mine-I was established in 1957, the lignite seam was first exposed in August 1961 and regular mining of lignite commenced in May 1962. German excavation technology in opencast mining using Bucket Wheel Excavator, Conveyor and Spreader was adapted in the mine for the first time in the country.

Capacity: The present capacity of the mine is 10.5 MTPA and the lignite is supplied to Thermal Power Station-I [600 MW] and Thermal Power Station-I Expansion (420 MW).

Area: The demarcated Mine-I area is 36.354 square kms and the total lignite reserve is 466.32 Million Tonnes.

Mining Operation:

In Mine I, Overburden which is soft clayey sandstone with sandy clay beds, is removed in four bench levels deploying specialized mining equipments. Five conveyor systems are operated to exclusively for overburden removal. The excavated OB is conveyed through conveyors and backfilled in the mined out area.

Lignite is mined using specialized mining equipments and conveyed through one conveyor system. Lignite is stacked at ground level stock yard and supplied to the connected power stations through conveyors.

During 2015-16, Mine I was operated in 1: 7 stripping ratio. About 518.86 LM3 of overburden was displaced to mine 91.01 LT of lignite from a depth of 110m from surface level.

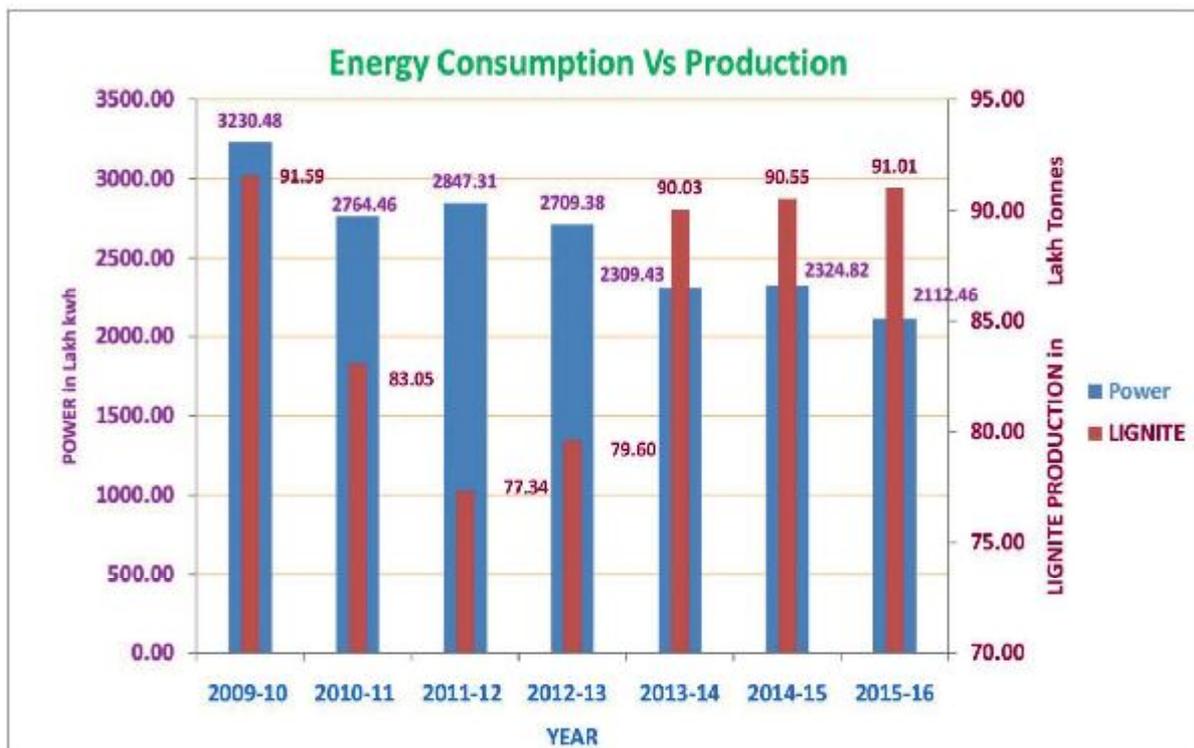
In Mine I, the following electrically operated Specialized Mining Equipments and conveyors are in operation.

1. 1400 Lit Bucket Wheel Excavators - 6 Nos.
2. 700 Lit Bucket Wheel Excavators - 6 Nos.
3. 2400mm Belt Conveyor System - 5 conveyors with total length of 6.8 Km
4. 2000mm Belt Conveyor System - 5 conveyors with total length of 24.48 Km

- 5. MTC Mobile transfer conveyors - 5 Nos.
- 6. Tripper car - 6 Nos.
- 7. 11000 TPH Spreader - 3 Nos.
- 8. 22000 TPH Spreader - 1 No.
- 9. Reclaimer & Stacker - Each 1 No.

Energy Consumption

DESCRIPTION	UNIT	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Energy consumption	Lakh kWh	3230.48	2764.46	2847.31	2709.38	2309.43	2324.82	2112.46
Annual production	Lakh Tons	91.59	83.05	77.34	79.60	90.03	90.55	91.01
Specific energy consumption	KWhr/T	35.27	33.29	36.81	34.04	25.65	25.68	23.21



Energy Conservation Activities in Mine-I, NLC Ltd

Apart from NLC India Corporate efforts, Mine I have taken special initiatives to conserve electrical energy and consumption of diesel which are the main sources of energy inputs.

1. Optimizing electrical energy consumption by Specialized Mining Equipments.
 - (i) By reducing number of conveyors and length of the system in synchronization with mine advance and dump rearrangement.
 - (ii) Effective utilization of SME machines by minimizing idle running and maintaining rated capacity loading.
 - (iii) According to the power requirement electrical drives were introduced / isolated in conveyors.
 - (iv) LED lightings are being fitted in SMEs and in conveyors
 - (v) Energy Efficient motors are being procured for replacement.
2. After implementing the above said energy efficient measures, Specific Energy Consumption for 2015-16 has come down to 23.21 KWhr/T which is 2.5 KWhr/T lower than the previous year SEC.
3. By effective utilization of HEMM and reducing Diesel consumption of light & heavy motor vehicles, the Diesel consumption has reduced by 31,256 Lit. in comparison to previous year's consumption.
4. It is proposed to install Solar Power Plant in Mine I Old dump yard.