Zinc Smelter Visakhapatnam - Hindustan Zinc Limited
Zinc Smelter, Visakhapatnam (Andhra Pradesh)

Unit Profile

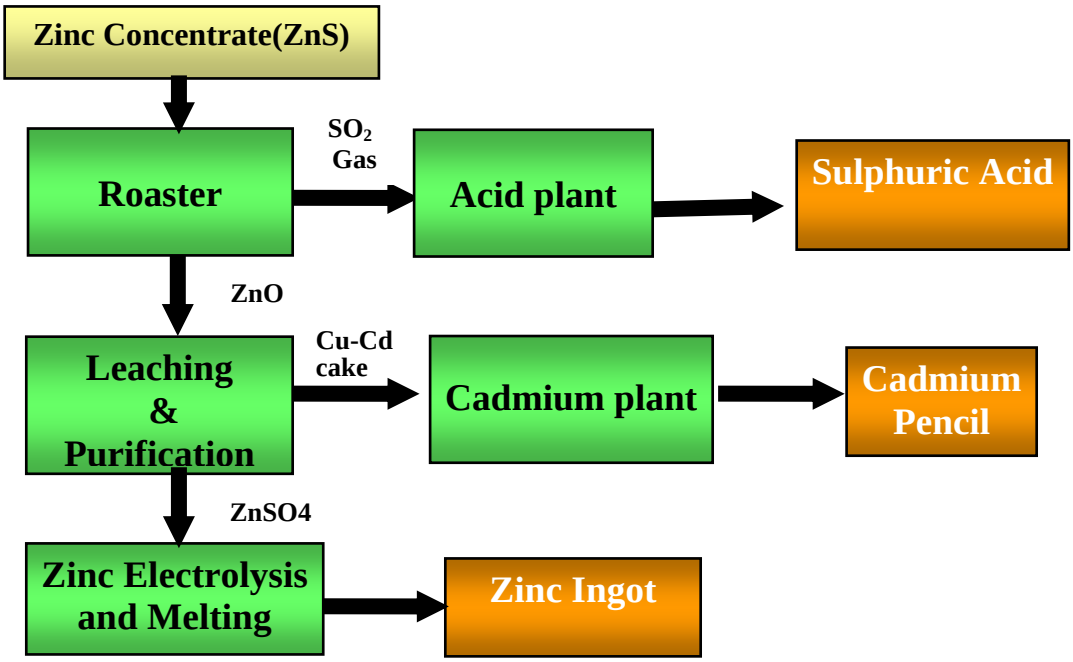
Zinc Smelter Visakhapatnam, a unit of Hindustan Zinc Limited, is engaged in manufacturing of Zinc, Cadmium and Sulphuric Acid. In order to bridge the gap between country's demand and production, unit was commissioned in 1977 with installed capacities of 30,000 MTPA Zinc, 115 MTPA Cadmium and 60,000 MTPA. Performance improvement projects and debottlenecking exercises were undertaken in phases to enhance the production capacity. The present capacities of the unit are 56,000 MTPA Zinc, 138 MTPA Cadmium and 91000 MTPA Sulphuric Acid.

Zinc metal is extracted through hydro-metallurgical route using Roast-Leach-Electro-winning process. Sulphuric Acid and Cadmium metals are produced as by-products. Raw materials required for the plant is sourced from the captive mines located at Rajasthan.

Due to hydro-metallurgical route, manufacturing of zinc is power intensive. Keeping this in view, Unit has adopted state-of-the-art technology to conserve the power.

The plant operates round the clock in three shifts of 8 hours duration each. Unit is managed by a team of dedicated professionals, committed to the management of Safety, Health, Environment, and Quality (SHEQ). Unit has implemented Best[4] Management Systems (ISO-9001, ISO-14001, OHSAS-18001 and SA-8000) and certified to Best[4] Management System certification. Unit is the recipient of **Best Management Award 2005** from State Government for maintenance of excellent Production, Productivity & Industrial Relation.

Process Flow Chart



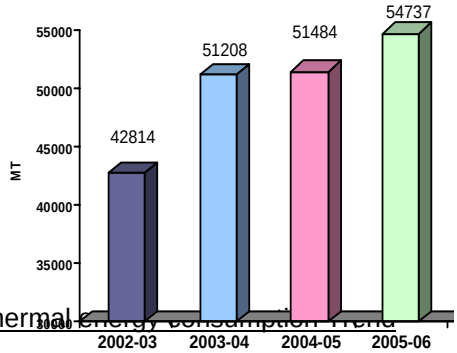
Energy Consumption

By implementing various energy saving projects there has been consistent decrease in the specific Electrical and Thermal Energy Consumption.

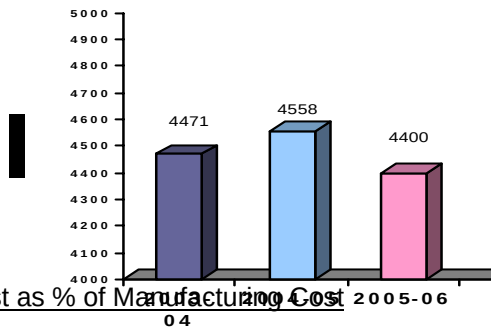
Description	Unit	2003-04	2004-05	2005-06
Zinc Metal Production	MT	51208	51484	54737

Total electrical energy consumption	Lakhs KWH	2289.33	2346.59	2408.29
Specific energy consumption - Electrical	KWH/MT	4471	4558	4400
Total Thermal (Fuel) Consumption	MKCals	19699.99	20874.12	12088.40
Specific energy consumption – Thermal (Fuel)	MKCals/MT	0.3847	0.4054	0.2208
Energy cost as % of manufacturing cost	%	47 %	52 %	44 %

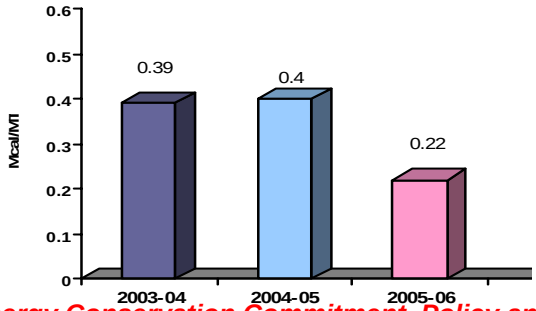
Zinc Ingot Production Trend



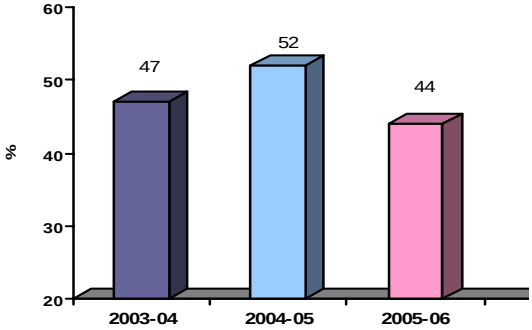
Power Consumption Trend



Thermal Energy consumption Trend



Energy cost as % of Manufacturing Cost



Energy Conservation Commitment, Policy and Set Up

Zinc Smelter Visakhapatnam (ZSV) considers Energy Saving as a **key value driver** and hence emphasis is given at all levels to conserve the energy for enhancing the productivity. Energy conservation week is celebrated every year in order to renew our commitments towards conservation of energy for sustainable development. To give further fillip to our energy saving efforts, company has launched the Six **Sigma approach** and good number of projects have been undertaken through this approach in order to save the specific energy consumption. Company has also formulated Energy Management Policy and same has been displayed at all locations.

Energy Conservation Cell has been constituted and AGM(Electrical) has been made Energy Manager to make a focused approach towards energy conservation.

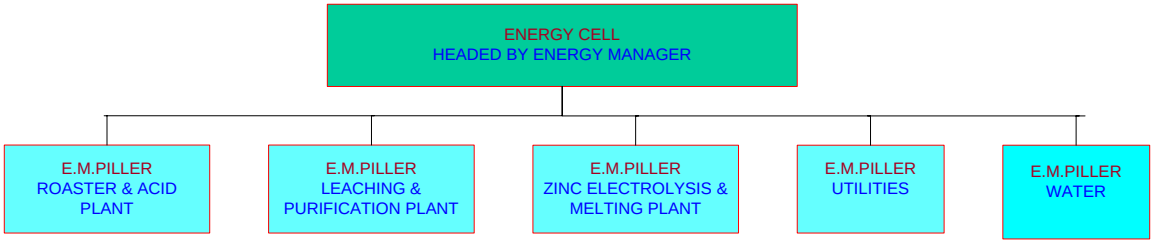
ENERGY MANAGEMENT POLICY

We, at Zinc Smelter Visakhapatnam, are committed to optimally utilize the various forms of energy in all our activities and products so as to become the lowest specific energy consumer in the industry segment and to make it environmentally sustainable for future generations.

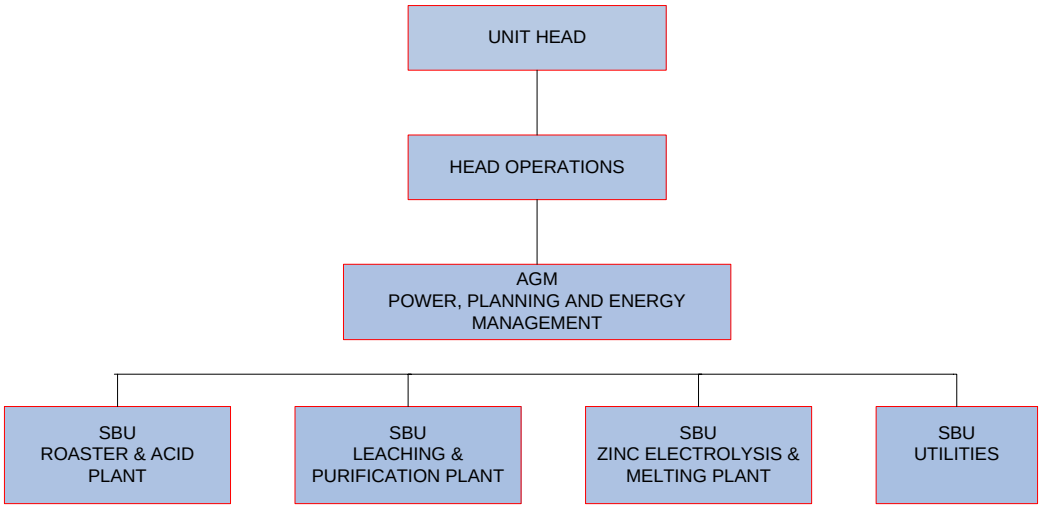
To accomplish this, we will :

- Comply with energy conservation Act-2001 and other statutory requirements.
- Involve & train all the employees to make energy conservation a way of life in and outside the plant.
- Conduct regular internal and external audits to identify areas for improvements.
- Replace energy inefficient equipment with energy efficient equipment .
- Adopt energy efficient operations and energy efficient technologies/equipment.
- Recognize energy conservation initiatives by our employees
- Reduce the cost continuously by adopting energy management system & six sigma approach.

ENERGY MANAGEMENT CELL



ENERGY CONSERVATION CELL STRUCTURE



Energy Conservation Achievements

During the period 2003-2006, ZSV has implemented number of initiatives through internal & external audits, adopting six sigma tools, brainstorming sessions involving all employees, regular monitoring. This has resulted in savings of Rs. 474 Lacs during last 3 years with most of the projects having recurring benefits.

Energy Conservation Measures Undertaken During 2005-06

1. Reduction in Compressed Air Power Consumption :

Compressed air is required for the purpose of measurement, process reactions and pneumatic operations of automatic casting machine in Zinc Manufacturing Process. The following initiatives were taken to reduce Power Consumption of Compressed Air system.

i) In–house audit of the Plant Air lines.

ii) Replaced 1" airline of 6 kg/cm^2 pressure mechanized Agitator of 3HP which runs for 3 hrs in a shift.

iii) Number of air leakages in the distribution network were identified and plugged.

iv) An air receiver was relocated in one of the plants to avoid the pressure drop in the system. We used to run an additional 250 HP compressor to meet the drop. Now the running of the additional compressor of 150 HP was avoided.

v) Instrument and process airlines were separated.

The Plant requirement used to be met with 2 nos. 250 HP and 1 no. 100hp.capacity reciprocating compressors. The Screw Compressor of 120 HP, 16.6 M^3/min capacity was installed in place of 250 HP Reciprocating Compressor to meet the Instrument & Process requirements.

- **Total Investment : Rs. 12.0 Lacs**
- **Annual Savings in Units : 3.19 Lac Units**
- **Annual Savings : Rs. 9.58 Lacs**

2. ***Replacement of Acid Circulation Pumps with Energy Efficient Pumps*** :

In Acid Plant, there were two Acid Circulation Pumps of 100hp capacity. These two were replaced with high efficient Circulation Pumps of 75hp each to reduce power Consumption and to increase equipment reliability. This resulted in 35KW of power savings. The project also increased the reliability of the equipment.

- **Total Investment : Rs. 26.00 Lacs**
- **Annual Savings in Units : 3.06 Lac Units**
- **Annual Savings : Rs. 9.32 Lacs** (on account of power)

3. ***Improvement in Cell House Rating*** :

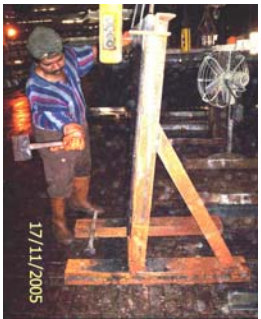
In the Zinc Manufacturing Process, Zinc is extracted under in Cell House under Zinc Electro winning process, which is a power intensive Plant. Efficiency of Cell House is measured in terms of metal produced per MW of power. The improvement in the power rating was obtained by adopting Six Sigma tools and continuous monitoring as given below:

i) The impurities in Zinc electrolyte solution are the main reasons for more the power consumption. The problem was addressed by following methods:

a) The spent line discharge tapping end points were shifted to top portion of the Reaction Tanks in Leaching plant.

b) The setting time for the neutral solution was increased to facilitate the solids to settle down before the solution is taken into Cell House.

c) Filter press launders were modified as shown in picture so that solid cake did not escape into the neutral solution while cleaning the Filter Press.

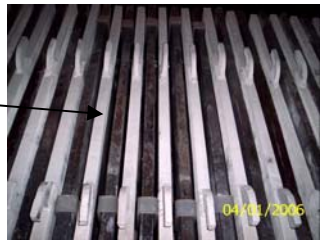


ii) Straightening of cell anodes:

i) Anode straightening machine was developed to avoid short circuit in cell.

ii) Permanent anode header spacers were provided to short circuit between cathode and anode.

Anode Header Spacers



iii) Regular measurement of cell house bus bars joints milli volts drop to control the power leakages.

iv) Regular tightening of all bus bars joints.

a. Improved environment of Cell House plant by providing natural air ventilation.
b. Regular training and development of strippers in view of manual stripping of the metal.

The rating of the Cell House got increased from 6.85 MT/MW of 2004-05 to 7.05 MT/MW. This resulted in savings as given below:

- **Total Investment : Marginal**
- **Annual Savings in Units : 56.838 Lac Units**
- **Annual Savings : Rs. 173.00 Lacs**

4. Replacement of oversize motors with right size motors :

On carrying in-house auditing, it was found that Final Discharge Pump in ETP and one agitator in Tail Gas Treatment Plant were running with higher size motors of 40 HP and 10 HP respectively. These motors were replaced by 25 HP and 3 HP motors.

- **Total Investment : NIL**
- **Annual Savings in Units : 8760 Units**
- **Annual Savings : Rs.26,630**

5. Replacement of old motors with Energy Efficient Motors :

Two number old motors of 60 HP and 15 HP capacity were replaced with Energy Efficient Motors.

- **Total Investment : Rs. 84,000**
- **Annual Savings in Units : 17280 Units**
- **Annual Savings : Rs.53,000**

6. Installation of Energy Savers in Lighting Circuit :

There are different Lighting Circuits in the plant to cater the needs of the plant lighting. Energy savers are installed in two circuits. The Savers also helped in maintaining equal distribution of load, reduction in maintenance cost and increased life of Fittings. The details are given below:

- **Total Investment : Rs. 75,000**
- **Annual Savings in Units : 4380 Units**
- **Annual Savings : Rs.13,000**

7. <u>Reduction in Consumption of Furnace Oil in Auxiliary Boiler</u> :

Furnace Oil is used in the Boiler to produce steam. The steam is used in different process reactions in Leaching Plant. The areas steam consumption were studied to reduce steam consumption:

a) The surface of the Reactors was reinsulated.
b) All hot slurry carrying launders were covered with non conducting material like FRP to avoid heat loss.
c) Usage of cold water in chemical preparation is reduced and in some places it was replaced by condensate water.
d) Some Steam traps were replaced.

The above initiatives resulted in the following savings.

- **Total Investment : Nominal**
- **Annual Savings in kL : 963.53 kL**
- **Annual Savings : Rs. 281 Lacs.**

Energy Conservation Plans & Targets

A number of energy conservation measures planned during 2006-2008. These are :

i. Reduction of Power Consumption in Water Pumping
ii. Reduction of Power Consumption in Leaching & Purification Plant
iii. Reduction of Pumping Power Consumption in Zinc Electrolysis and Melting Plant
iv. Reduction of Power Consumption of Pneumatic Conveying System
v. Improvement in the Cell House Power Rating

By adopting the above energy conservation measures, ZSV will be able to achieve the set target of 4307 KWH/MT of Zinc metal produced by the end of 2008. Financial savings projected is Rs. 173 lacs.

In addition, reduction energy consumption through Kaizens, Suggestion Scheme and Quality Circles are planned during 2006-2008.

Environment & Safety

Safety

ZSV has a commitment to provide a safe and healthy workplace for its employees and contractors. We believe that we can minimize risks and train our employees and contractors to recognise this and act accordingly. Our safety and health initiatives focus on the following elements:

- Leadership – ensuring that senior management and operational heads provide leadership in, and are committed to, health and safety;
- Management systems – we have adopted OHSAS18001 certified management systems. Safety committees operate at various levels to ensure that employees are involved in decisions affecting their health and safety;
- Training – safety flows from safe behaviours and attitudes. Regular training is provided to all employees and contractors to increase their awareness and to improve their behaviours and attitudes towards safe working practices; and
- Risk management – risk assessments are carried out, particularly for hazardous operations, and significant risks are minimised by the application of engineering measures and the adoption of new technology and safe working practices.

- Hazard reporting system – we have implemented hazard reporting system by all employees through hazard reporting boxes located at various places in the plant. Immediate actions are taken to eliminate the hazards.
- Safety steward system - we have implemented Safety steward system on an experimental basis to improve standards. This has yielded excellent results and, importantly, is motivating individuals and teams to integrate HSE actions into their routine activities and thinking.
- Audits - Many internal and external audits were undertaken through specialists, as well as relevant agencies, to look at the operations and identify risks and hazards, whilst also recommending preventive measures. These audits provide valuable input and feedback to the operating teams in reducing safety risks.
- Safety promotion – every year we celebrate safety week and various competitions are conducted such as Safety Slogan/ Poster/ Suggestion/ Playlet/Essay. In addition, we recognize best safety conscious employees and best housekeeping plants.
- Occupational Health –We have got full-fledged Occupational Health Centre which conducts regular occupational health surveillance of all employees and contractors. This includes specific examinations such as audiometry, lung-function test, blood cadmium, vision tests, chest x-rays and pulmonary function tests.

Our commitments and initiatives have enabled us to bag the prestigious **Greentech Safety Platinum Award 2006** instituted by Greentech Foundation, New Delhi.

Environment

ZSV is fully conscious of its responsibility towards environment protection and sustainable development. Top Management has demonstrated its commitments through formulation & implementation of **Environment Policy** with the objective to achieve sustainable development through compliance of legal & other requirements, continual improvement in environmental performance through reduction in pollution, recycling/re-use of wastes, conservation of resources and adoption of eco-friendly technology.

Company has implemented ISO 14001 Environmental Management system & improved the environmental performance by identification of significant aspects and taking measures (environment management programmes / standard operating procedures) to prevent/ reduce the effects of significant aspects.

All pollution control measures were incorporated in the design stages itself with respect to all environmental attributes. However, additional facilities have been created in the vital areas to prevent pollution. These include onsite **Secure Land Fill** for effective management of solid wastes, **Tail Gas Treatment Plant** for reduction in SO2 emission from 500 ppm to less than 250 ppm, **Effluent Treatment Plant** for proper treatment of effluents, **Residue Treatment Plant** for recovery of metals from the residues, **Mercury removal plant** to recover mercury from the gases, etc.

Besides the facilities available for environmental protection, we have been following environment friendly practices such as regular monitoring of air quality (ambient & workzone), water (effluent, groundwater), soil, solid wastes by engaging internal & external agencies, developing greenbelt through plantation of 5000 saplings every year, improving the housekeeping, organizing a number of training & awareness programme on environment among the surrounding villagers, children, employees and their family members, customers and suppliers.

Various requirements relating to EHS legislations were duly complied by the company. In addition, company also complied voluntary requirements relating to Corporate Responsibility for Environment Protection applicable for zinc industries.

Company has been rewarded by various bodies for the environmental improvement initiatives. These include :

i) Best Solid Waste Management Award from State Pollution Control Board.
ii) Greentech Environment Excellcelnce Gold Award in Metal Sector for 2006 from Greentech Foundation, New Delhi.
iii) Golden Peacock Environment Management Award from the World Environment Foundation, UK.