



STERLITE INDUSTRIES (INDIA) LTD, TUTICORIN

Sterlite Industries (India) Ltd, is a leading producer of copper In India.SIIL pioneered the manufacturing of Continuous Cast Copper Rods in india and established india's largest Copper Smelting and Refining Plant for production of World Class refined Copper. Sterlite is a part of Vedanta resources , a London listed \$6 bn. metals and mining major with Aluminum,Copper and Zinc operations in India, Zambia and Australia.

Sterlite's tuticorin complex has a Copper smelter (4,00,000 tpa copper), Sulphuric acid plant (9,00,000 tpa),Copper Refinery (1,65,550 tpa copper),Rod mill (1,00,000 tpa copper) and Phosphoric acid plant (1,83,000 tpa).A captive power plant (LSHS based) with 46.5 MW capacity (4x6 MW,3x7.5 MW) and a 11.2 MW Steam Turnine Generator (STG) generating power through waste heat from the smelting furnace meet the power requirement of the complex. In Silvasa Sterlite has a Copper refinery (1,80,000 tpa copper) and a rod mill (1,50,000 tpa copper).

Energy Consumption

By implementing various energy saving projects there has been a consistent reduction in specific energy consumption.

Description	Unit	(2004-05)	(2005-06)	(2006-2007)
Copper anode	MT	174974	273049	313117
Sulphuric Acid	MT	546647	844376	946539
Phosphoric Acid	MT	104902	171893	172123
Copper Cathode	MT	NA	93778	150565
Copper Rods	MT	NA	30351	53715
Total Electricity Consumption	Lac KWh	2034.61	3504.82	4060.911

Total Thermal Energy Consumption	MKcal	201364	335804	360802
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Product (MT)	Year	Electrical Energy		Thermal Energy	
		Kwh/ton	% redn over (2004-05)	Mkcal/Ton	% redn over (2004-05)
Copper	2004-05	735	-	0.909	-
Sulphuric acid	2004-05	102	-	0.006	-
Phosphoric acid	2004-05	161	-	0.372	-
Copper	2005-06	770	-4.76	0.924	-1.65
Sulphuric acid	2005-06	88	13.73	0.012	80
Phosphoric acid	2005-06	144	10.56	0.272	26.88
Cathode	2005-06	403	NA	0.124	NA
Copper Rods	2005-06	68	NA	0.496	NA
Copper	2006-07	693	5.71	0.853	3.19
Sulphuric acid	2006-07	97	4.90	0.027	50
Phosphoric acid	2006-07	140	13.04	0.241	34.94
Cathode	2006-07	400	NA	0.028	NA
Copper Rods	2006-07	67	NA	0.422	NA

Monitoring And Reporting Systems

For monitoring of electrical energy and Thermal energy the plant is divided into many areas and each area is allotted a daily, monthly and yearly budget. A centralised energy management system enables monitoring of energy throughout the plant. The details regarding the electrical energy consumption is maintained by the electrical dept. and that regarding the thermal energy is maintained by the production planning Dept.



The energy manager of the plant functionally reports to Head-HSE and responsible for identifying, initiating and following up all encon projects. He co-ordinates with service depts. During the implementation Every month a copper business energy report covering Tuticorin and silvasa units is made and circulated to all in both units. TQM (Total Quality Management) is the driving force behind our operations. Every year the the TQM teams (cross fuctional teams consisting of employees from all levels including technicians) work on priority areas and energy is given top priority. Around 100 TQM projects have been carried out in the last 10 years. "Enabling initiatives" are formulated through brainstorming sessions among employees and selected ones are reviewed monthly to ensure faster implementation. Encon gets the top most focus in this. More over many of the managers are given KRA on Encon.

Two internal websites namely idea@vedanta.com and safety@vedanta.com are existing to get employees' ideas .Quite a few encon projects implemented in recent years are from the idea website. One of the major energy saving project of last year **"Reduction of Lance FO consumption" which resulted in FO savings of 0.742 KL per day was from the idea website. It also won the merit award in the All India suggestors summit (2006)-at New delhi conducted by INSANN.(Indian National Suggestion Scheme's Association)**

Energy Conservation achievements

In (2006-2007) we carried out 05 projects and saved Rs. 150.10 lakhs. For the record we have been winning the CII national energy award for the last 8 years. ("Excellent energy efficient unit" in 2000,2001,2003,2004,2005,2006 &2007, "Energy efficient Unit award" in 2002.)

SAFETY & ENVIRONMENT

HSE Steward System at Tuticorin:

The innovative HSE Steward System at Tuticorin has been accepted widely by all employees with due importance & is taken forward with lot of initiatives & improvements in the areas of health, hygiene, housekeeping, safety and environment. The total smelter complex has been divided into 28 areas and each area is owned by one designated HSE steward who implements the HSE system in its totality in his/her own area. In addition, Six HSE representatives from the unit's HSE department work with these stewards to ensure the system is implemented effectively. So far, 16 rounds of audit have been carried out and the compliance level has been over 90%. Though the HSE Steward system was introduced as a Penalty based system, lot of fine-tuning has been carried out in terms of granting authority & empowerment so as to motivate the stewards which has made the system quite balanced. We hold Improvement and Sustainability as the two key focus areas in the whole HSE Steward System.

The HSE steward system at Silvassa monitors and takes the necessary corrective and preventive action in the area of safety, health, hygiene, housekeeping and environment in coordination with production and engineering departments. The team also encourages the participation of every individual in the unit. The team consists of 19 member of the HSE stewards. The plant is divided into six zones with fixed responsibility to the HSE steward.

Safety initiatives :

Our motto being " Prevention of Accidents", we have been continuously striving towards implementing various preventive/ proactive measures to ensure safe working place. This includes HAZOP study for new installations like Waste Heat Recovery Boiler and Steam Turbine Generator,

Safety Audit & Fire Audit carried out by reputed agencies so as to identify the hazards & eliminate the same proactively. Also, Risk Assessment has been conducted for the whole operations and based on the findings, the Emergency Preparedness & Response Plan has been reviewed.

To inculcate safety awareness & culture in all individuals including the contractors, there has been rigorous training programs organized and the training man hours for year 2005-06 is 9423 man hours which is 50 % more than the previous year 2004-05 training man-hours. Also, as part of Awareness campaign, we have been releasing Quarterly Magazine on HSE , "THE QUEST". Periodical releases on selected safety topics are issued as Pamphlets to all employees. Periodical PEP TALKS and TOOLBOX MEETINGS are being conducted and any new / critical installations are carried out only after PEP TALK & TOOLBOX MEETINGS. We had also launched House Keeping Campaign across the unit to improve the housekeeping standards of the plant. The Safety Day & Fire Services Day were celebrated in befitting manner with lot of competitions held for all employees including contractors and also for employee's spouse & children. To cater to emergencies, we have taken steps to procure Advanced Fire Fighting Technique (AFT), whose capacity is equivalent to a Fire Tender but portable, easy to carry & handle. And to have equal focus on Contractor employees, we have started evaluating Contractor Safety Performance regularly. With the stringent built in safety standards, procedures followed and safety monitoring carried out, we are on the path to " ZERO ACCIDENTS".

OH Initiatives:

- Regular occupational health surveillance for all employees and contractors are conducted. This includes specific examinations such as tests for blood lead, audiometry, chest x-rays and pulmonary function tests.
- Towards the well being of our employees, company has initiated to cover all employees and their family to Company Medclaim Policy. This has been extended further to their parents by reduced Insurance Premium borne by employee, if the policy routed through company.
- Also, for people working in hazardous locations half-yearly check-ups have been introduced both for our employees as well as contractors.



- Use of asbestos hand gloves is totally banned, as asbestos produces carcinogenic risk, this has been replaced with better quality of leather hand gloves and Kaveler hand gloves.
- Work place monitoring being done regularly and proper PPE's are provided.

Environment

Sterlite Copper Smelter is focusing on environmental initiatives for effective water management, waste minimisation and recycling, reducing air emissions, energy conservation, which it believes are the main challenges for sustainability.

Environmental Improvements

- Achieved Emission level of less than 1 kg/ton of sulphuric acid produced in Sulphuric acid plants;
- Adoption of 'Zero discharge' status from the inception of plant;
- Commissioned first Secured Landfill in industry, in South India to store Hazardous waste;
- Surge pond constructed to store treated water for recycling;
- Commissioned Dry Gypsum handling process to minimize effluent generation and Gypsum pipe conveyer to eliminate dust problem in gypsum handling;
- Commissioned double hood system to improve working environment;
- Rainwater harvesting pond with a capacity of 27000 m³ constructed to collect water from various areas of the plant;
- Specific Water consumption is one of the lowest in the world, by progressive reduction in the last ten years from 19.3 m³ / ton to 5.9 m³ / ton
- Specific Energy consumption has been continuously reduced thru various energy conservation measures in the last ten years from 2.3 Gcal/ ton to 1.4 Gcal /ton
- Multistage scrubbing system commissioned to treat the secondary gases which controls fugitive emission from smelter;
- New Hygiene ventilation system to improve the efficiency of pollution control equipments;
- Revamping of ESPs in SAP and smelter in order to reduce the emission;
- Gas cleaning plant in SAP to reduce moisture carryover through stack.
- Mobile Hoppers have been installed to unload & load our copper concentrate to mechanize handling

Air:

- Sterlite Tuticorin Copper Smelter has completed the project of 3+1 Catalytic Converter Modification and Tail Gas Scrubber in Sulphuric Acid Plant at a cost of Rs.232 million

to reduce Sulphur dioxide Emission level to less than 1 Kg/T of Sulphuric Acid produced.

- Sterlite Tuticorin Copper Smelter has installed 7 Continuous Ambient Air Quality monitoring stations around its complex to monitor the ambient air quality, round the clock with Online Environmental Parameters Display arrangement at factory Main Gate. We have also installed online continuous analyser for CO monitoring in Captive Power Plant Stacks.

Water:

- Sterlite Tuticorin Copper Smelter has constructed additional rainwater catchment pond with necessary infrastructure facilities and storm water collection system at a cost of Rs 80 million for the collection of rainwater in the total complex during monsoon season. The collected water can be re-used back in the process, thus saving raw water, a precious commodity in this part of the country.
- Sterlite Tuticorin Copper Smelter has planned to conduct phase –II ground water modeling study through a reputed institute for studying the aquifer characteristics in this locality.
- Recharging bore well with excess rainwater, which is collected through harvesting system is implemented at Silvassa.
- Completely zero discharge is maintained at Silvassa and Tuticorin

Solid Waste:

- Sterlite Tuticorin Copper Smelter has completed the construction of Secured Land Fill, following a double liner system at a cost of Rs.44 million to store the Hazardous waste generated in the complex.
- Sterlite Tuticorin Copper Smelter has started the Green Cover of Gypsum Pond at a cost of Rs. 2.5 million
- Several Studies are in progress by various Indian Scientific and Industrial Research institutes for utilizing solid wastes in end-use applications such as Cement and Road Construction, thus converting waste to wealth.
- The group is focused on proper identification, characterization, quantification, segregation storage and disposal of all solid waste, especially the hazardous. All hazardous waste are being sold to the CPCB approved recycled vendors.

SIIL-Initiatives, Recognitions and Awards

➤ **Quality**

- ISO 9001, 2000 : Quality Management System
- Achieved IQRS level-5 in July 2002
- IMC Ramakrishna Bajaj National Quality (RBNQ) Commendation Certificate 2006 in Manufacturing Category
- First Prize of Indian Institute of Metals - Non Ferrous Best Performance Award 2006
- Laboratory Management Systems certified to ISO 17025 Certification

➤ **Environment**

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- ISO 14001: Environment Management System
- Greentech Gold Award for Environmental Management in 2006, 2007
- CII-National Energy Management Awards - 2000, 2001, 2002, 2003 & 2004, 2005, 2006 (Excellent Energy Efficient Unit)

➤ **Safety**

- British Safety Council - International Safety Award for the years 1999, 2000, 2001 & 2005
- British Safety Council – Five Star Award in the year 2002 (The First and the only achieved Copper smelter in the world)
- OHSAS 18001: Occupational Health And Safety Assessment System
- Green Tech Foundation Gold Award for Safety Excellence for the year 2006 in Metal & Mining Sector

Tamil Nadu State Level Safety Awards-1999

- First prize for highest reduction in accident rate
- 3rd prize in lowest weighted frequency rate

Tamil Nadu State Level Safety Awards-2002

- First prize for highest reduction in accident rate
- 1st prize in lowest weighted frequency rate
- 2nd prize for longest accident free period in man-hours

➤ **CSR Initiatives**

Education:

- Study Centers covering 1500 students
- Scholastic Excellence Awards for schools & colleges
- Assistance to over 1500 under privileged income group families to promote education

Health:

- Buildings for Primary Health Centers provided
- Rural Health camps & survey
- Medical Equipment Assistance
- Blood Donation camps
- Integrated child care programme launched to neighbouring villages

Women Empowerment:

- Creation of and assistance to SHG covering over 4000 rural women for self reliance, economical betterment and financial independence
- Rural Health camps & survey

Infrastructure:

- Integrated clean drinking water to cover over 20,000 neighbouring village population
- Potable water supply provided to near-by village
- Anganwadi's upgradation - Initiatives are underway to develop the Madathur Anganwadi as a model day care centre in the District