

COMPANY PROFILE :-

Manganese Ore (India) Ltd. (MOIL) is a Govt. of India Undertaking, under Ministry of Steel is promoted jointly by Govt. of India (with 81.57% share holding), Govt. of Maharashtra (9.68%) and govt. of Madhya Pradesh (8.75%).



The company is primarily engaged in the mining of Manganese Ore and operating 5 Mines in the State of Maharashtra and 4 Mines in the state of Madhya Pradesh.

The company is operating its Mines way back from the year 1892 and continuously in the business of Manganese Ore in India. Company has set up the Ferro Manganese Plant for production of High Manganese Ferro Manganese with 10,000 MT per annum at Balaghat in the year 1998 and also set up EMD Plant at Dongri Buzurg Mine in the year 1991.

The company has increased production of Manganese from the level of 5.7 Lakhs Tons in the year 2000 to more than 10.50 Lakhs for the year 2007. Similarly, capacity of the EMD Plant has been increased from 800 MT to 1300 MT. The company is continuously growing from the level of Rs.130 crores turn over in 2000 to Rs.376 crores during the financial year 2006-07 and is expecting to cross Rs.600 crores in 2007-08. At MOIL we believe in **“Exceeding of rated capacity is a reality and records are created only to be broken again.”**

The entire workforce of the company works as a **well-knit** team for the progress of Company due to cordial industrial relations.

HIGHLIGHTS

- Largest producer of Manganese Ore in the country.
- Company produces 60% Ferro grade ore requirement of Ferro Alloys Industries in India.
- Developed In-house Technology for production of Electrolytic Manganese Di-oxide.
- Only Company in the country producing Electrolytic Manganese Di-oxide for use in Dry Battery.
- Only company producing High Manganese Ferro Manganese in India.
- First PSU in India to commission 5MW Wind Farm in Nagda Hills near Dewas in Madhya-Pradesh.

MAJOR AWARDS

- ❖ National Energy Conservation Awards for EMD Plant 1st prize in Chemical Sector for last two consecutive years.
- ❖ “National Energy Conservation award” for Balaghat Mine 1st prize in Mining Sector for last year.
- ❖ Rajya Bhasha Awards.
- ❖ MOU Excellent Rating.
- ❖ Safety Awards.
- ❖ Quality Circle Awards.
- ❖ National Award for Rescue Team.
- ❖ Receiving Prime Ministers Merit Certificate for Excellent Performance under MOU continuously for the last several years.



UNIT PROFILE:-

The Electrolytic Manganese Di-Oxide Plant is the only Plant in India producing Electrolytic Manganese Di-oxide (EMD) to meet the needs of Dry Cell battery producers. Even though no reference is available regarding process parameters, with dedicated and continuous efforts the Plant operation was established to meet the competition from imports especially from China and is being operated at 130% capacity utilization. Flow chart of the process is enclosed.

ENERGY CONSUMPTION:-

Manufacture of EMD is the most energy intensive process and contributes about 37% of the total cost. The main raw materials include Manganese Ore, Coal, Power and Sulphuric Acid.

ENERGY CONSUMPTION

BY IMPLEMENTING VARIOUS ENERGY CONSRVATION MEASURES THERE HAS BEEN CONSISTENT DESCREEASE IN SPECIFIC ELECTRICAL AND THERMAL ENERGY CONSUMPTION:

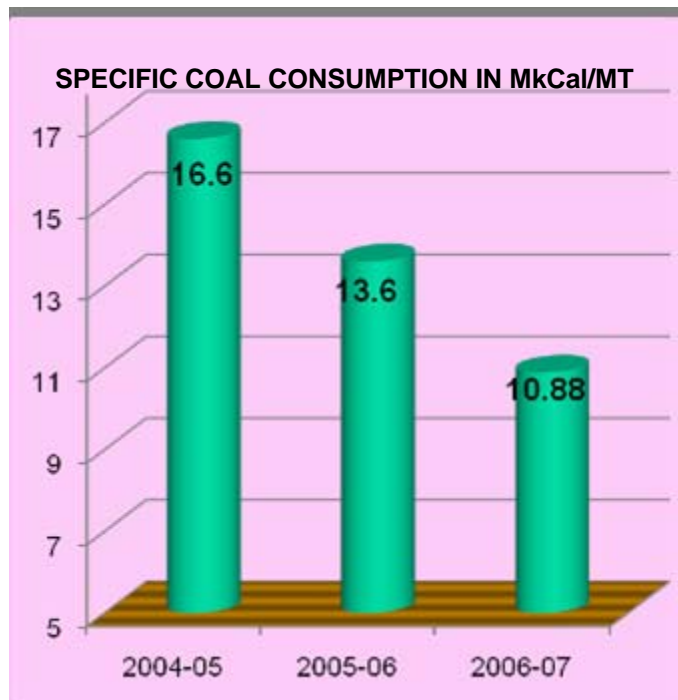
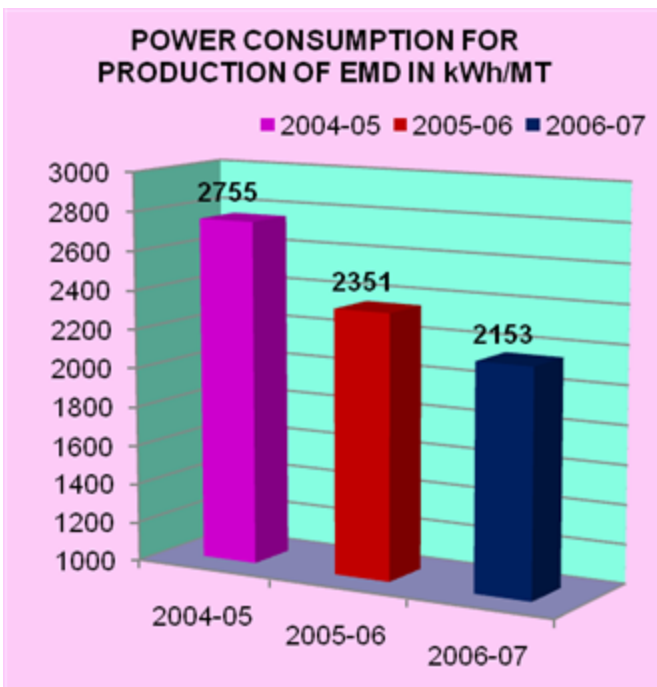
TABLE - I

S N	SPECIFIC POWER CONSUMPTION DETAILS	UNIT	2004-05	2005-06	2006-07
1.	ANNUAL PRODUCTION	MT	1123	1301	1312
2.	TOTAL ELECTRICAL ENERGY CONSUMPTION	Lakh kWh	30.94	30.58	28.24
3.	SPECIFIC ELECTRICAL ENERGY CONSUMPTION	kWh	2755	2351	2153
4.	TOTAL THERMAL ENERGY CONSUMPTION	MkCal	18642.8	17836	14280
5.	SPECIFIC THERMAL ENERGY CONSUMPTION	MkCal	16.60	13.60	10.88
6.	TOTAL ENERGY COST	Rs. Lakh	159.32	165.71	168.83
7.	TOTAL MANUFACTURING COST	Rs.Lakh	435.78	459.10	450.26
8.	ENERGY COST % OF MANUFACTURING COST	%	36.55	36.09	37.50

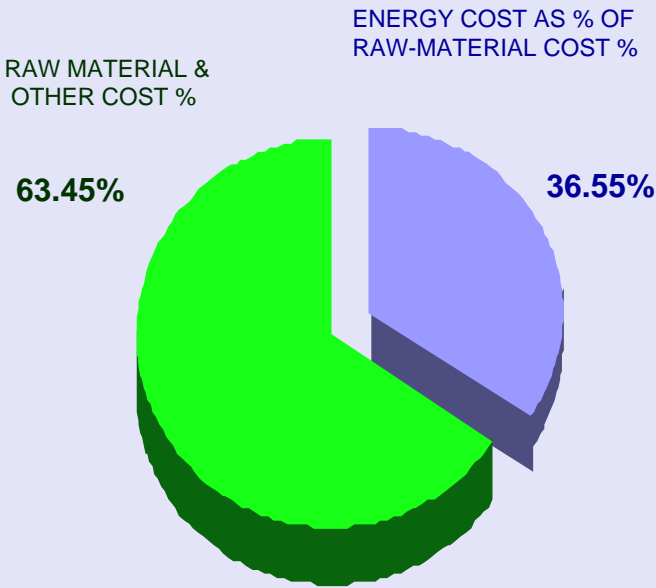
Note: Even though power tariff increased from Rs.3.38 to Rs.4.12 per kWh i.e. by 22%, cost of Coal increased from Rs.1555/- per MT to Rs.1833/- per MT i.e. by 18%. The Production increased by 17%,The Energy Cost increased by 6% only over 2004-05

TABLE - II

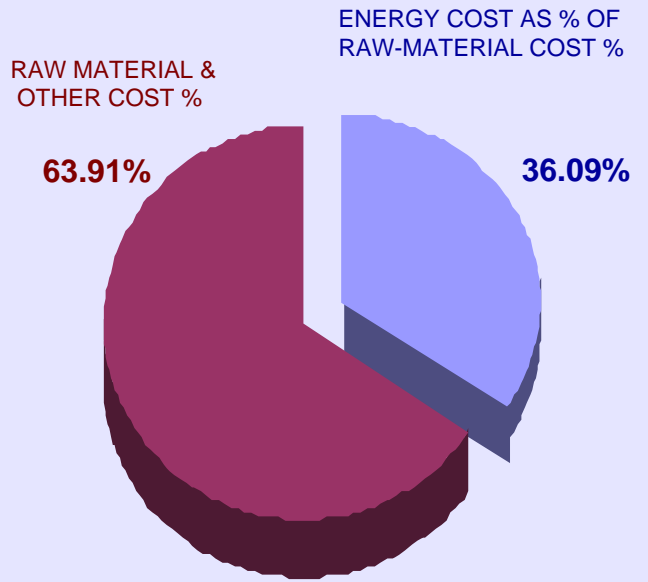
YEAR	ELECTRICITY		THERMAL	
	CONSUMPTION kWh/T of EMD	% REDUCTION OVER 2004-05	CONSUMPTION MkCal/T of EMD	% REDUCTION OVER 2004-05
2004-05	2755	-	16.60	-
2005-06	2351	14.66	13.60	18.07
2006-07	2153	21.85	10.88	34.45



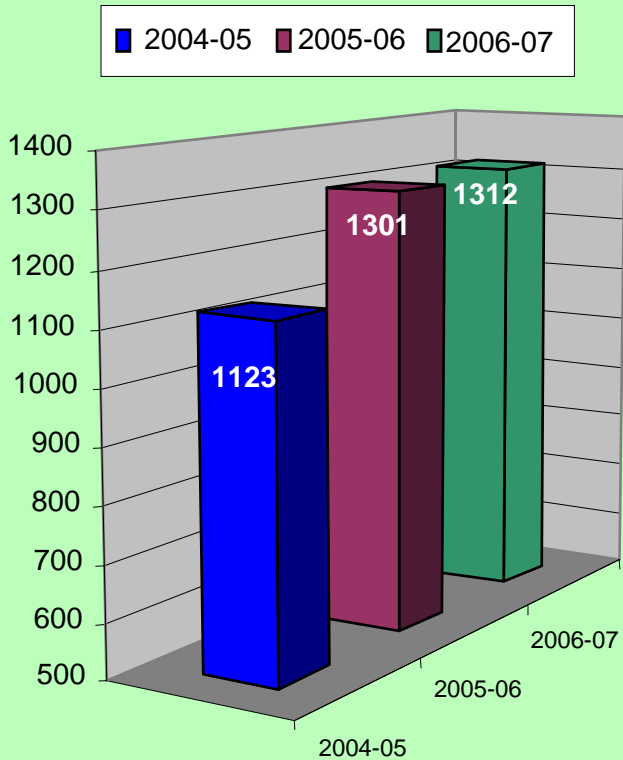
RAW MATERIAL & OTHER COST Vs ENERGY COST FOR THE YEAR OF 2004-05



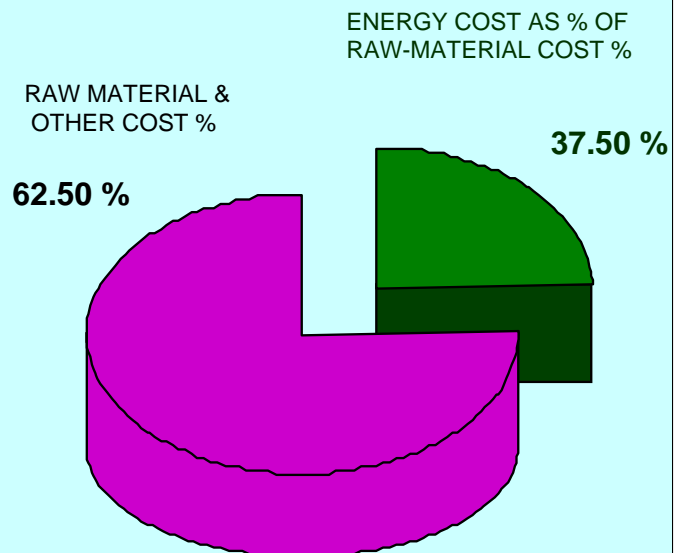
RAW MATERIAL & OTHER COST Vs ENERGY COST FOR THE YEAR OF 2005-06



ANNUAL PRODUCTION IN MT



RAW MATERIAL & OTHER COST Vs ENERGY COST FOR THE YEAR OF 2006-07



National Bureau of Energy Efficiency, Government of India has given the National recognition, by selecting our Electrolytic Manganese Dioxide (EMD) Plant for the **First Prize** in Chemical Sector in two consecutive years 2004-05 and 2005-06 for Energy Conservation. Various R&D efforts are continuing for energy efficiency in MOIL with lot of dedication and teamwork. With consistent R&D efforts, the specific power consumption of EMD plant has been reduced from 3546 Kwh per Tone to 2755 Kwh per Tone during the year 2004-05 and 2755 to 2351 Kwh per tone with further continuous R&D efforts in the year 2005-06. The specific power is further reduced from 2351 Kwh per Tone to 2153 Kwh per Tone. **Thus, achieving a total reduction of 1393 Kwh per Tone in last three years accounting for a total of 42.4% reduction, i.e. 19% reduction during 2004-05 and 15% reduction during 2005-06 and 8.4% in 2006-07.**

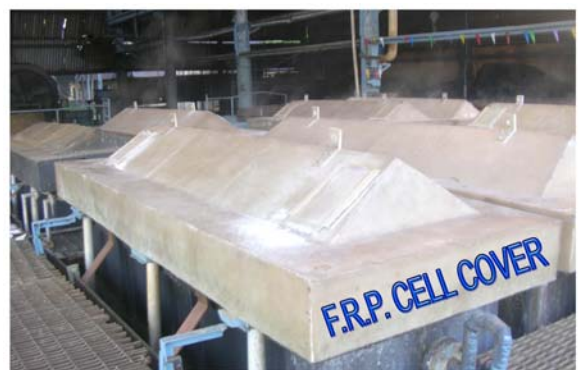
Thereby a Net Electrical Energy Saving is 42,70,000 kWh units and Monetary Saving is Rs.157.50 lakhs.

The company has not only emphasized on the reduction of power consumption but also other precious fuel which is coal. **The specific consumption of coal has been reduced from 4.3 MT in 2003-04 to 3.3 MT in 2004-05 and further to 2.72 MT in 2005-06 and further reduced to 2.18 MT in 2006-07 reflecting an overall reduction of 49.3% in three years. Thereby Net Saving of Coal is 5960 MT i.e. 29800 MkCal of Thermal Energy and Monetary Saving is Rs.104.80 lakhs.**

The reductions achieved by the Company was possible by taking various measures such as providing FRP Hoods to cells, increasing the deposition cycle time and reduced the Cell Voltage by changing feed composition of electrolyte and other parameters. By providing FRP Hood, we have not only saved the energy but also we made the operation of the plant more environmental friendly.



Before

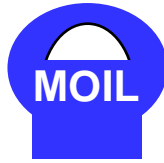


After

ENERGY CONSERVATION COMMITMENT

The Company is committed to –

- Increased use of Energy Efficient designs and equipments in all projects, use of CFL Energy Efficient lamps than conventional lamps.
- Everywhere at H.O., Mines, Plants & other establishments use of 4 Star BEE marked air conditioners & CFL Lamps are being used for effective Energy conservation.
- Provided Solar street light at workers colony.
- Increase use of non conventional sources of energy & fuel sources.
- MOIL commissioned 4.8 MW Wind Farm at Nagda Hills (M.P.) and so far generated 13.5 Million kWh in last 14 months.
- Another 15 MW Wind Energy Project is due to commission by January 2008, near Nagda Hills, (M.P.).
- Conduct regular energy audit.
- Training program in all Mines and Plants..
- To encourage generation of bio-diesel, MOIL planted 25,000 Nos. jatropha saplings.
- “QUEST AWARDS” for Energy efficient profit centers within MOIL introduced.
- suitable rewards towards energy conservation suggestions.
- celebration of Energy Conservation week at all Plant & Mines.
- for making all units **Zero Discharge** units.



MANGANESE ORE (INDIA) LIMITED

(A GOVERNMENT UNDERTAKING)

3, MOUNT ROAD EXTENSION,
NAGPUR – 440 001

ENERGY POLICY

We in MOIL, the largest producer of manganese ore in the country and also the market leader, commit to adopt a comprehensive approach towards conservation of energy in all its operations. To accomplish this, we will:

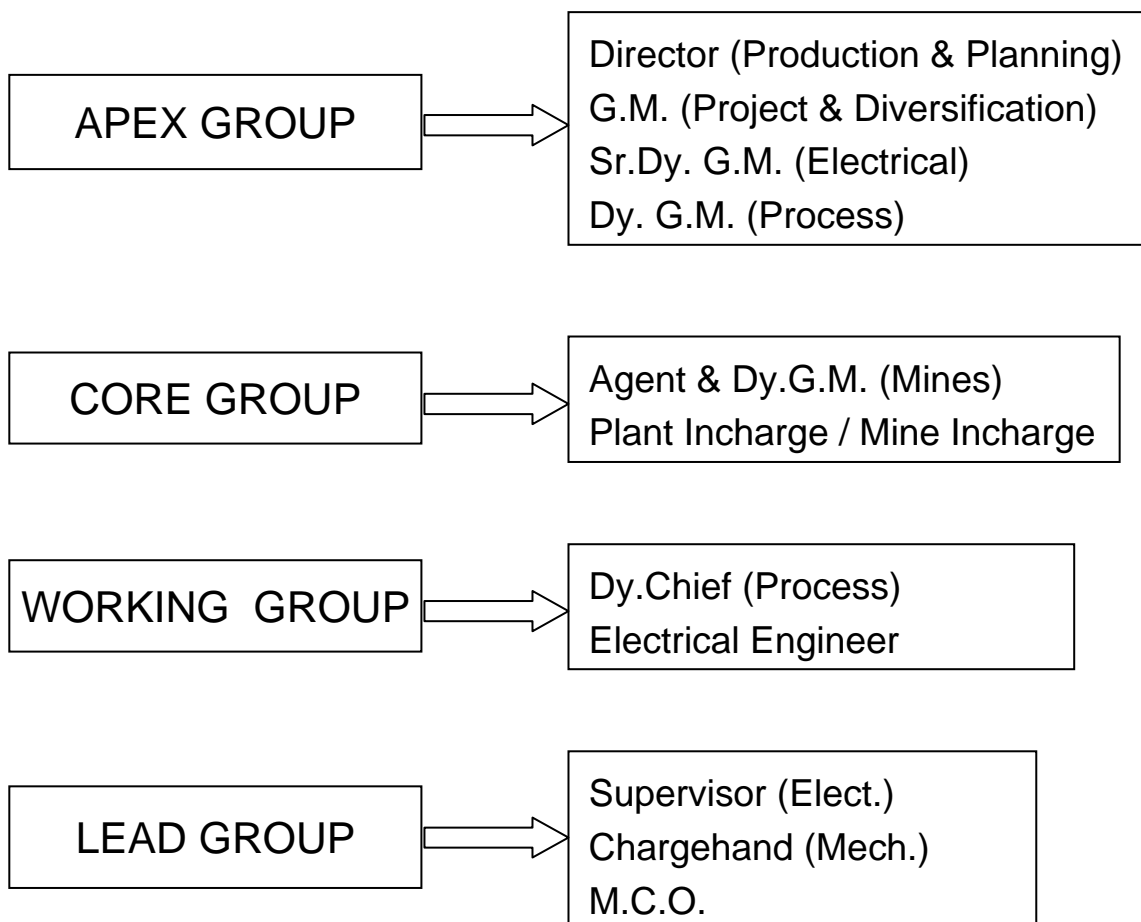
- Optimally utilize various forms of energy in a cost effective manner to effect conservation of energy resources.
- Maximize the use of renewable energy resources and non-conventional sources of energy.
- Train our employees to make energy conservation as a way of life and recognizing their initiatives in this regard.
- Carry out regular internal and external audit to identify the areas for improvement.
- Reduce specific energy conservation by 1% every year till 2010.
- Improve capacity utilization.

KISHAN LAL MEHROTRAA
Chairman-cum-Managing Director

SALIENT FEATURES OF ENERGY CELL

This team finds various means to bring the energy saving in the working areas in which various techniques such as brain storming, bench marking, parato diagram analysis, 5'S techniques are used. The outcomes of the team findings are implemented very sincerely and have been followed with continuous monitoring. It has already achieved the goal and the team is committed for technical up gradation to avoid any energy losses by continuous maintenance and replacement of equipment where necessary. The team has been entrusted with the work of reducing electric power and reducing the coal consumptions.

ENERGY CONSERVATION CELL STRUCTURE:



MAJOR ENERGY CONSERVATION PROJECTS IMPLEMENTED DURING THE YEAR 2006-07

1. Increased Concentration of Electrodes:- The concentration of Mn in the electrolyte solution increased by 10% and also replaced the pressure plates, has reduced the voltage for 2.90 volts to 2.80 volts in each cell.

The electrical power saving achieved is as below.

Reduction in Cell Voltage $2.90 - 2.8 = 0.10$ volt

Nos. of Cells 41 Nos.

Current in each cell 2750 Amp.

Net saving in a Year:

$= 0.10 \times 41 \times 2750 \times 23\text{Hrs.} \times 30 \text{ Days} \times 10 \text{ Months}$

$= 77,797$ kwh/year

Monetary Savings in a year

$= 77,797 \times \text{Rs.}4.12$ per kwh (Average Energy Cost)

$= \text{Rs.}3,20,524/-$ per year.

Net Saving per MT = 59.30 kWh



2. Increase in Deposition Time :-

EMD gets deposited on Titanium Anodes and these Anodes are stripped after cycle period of 100 hours to recover the EMD flakes. Now by changing the composition the cycle period has been increased from 100 hours to 130 hours. This has resulted in improved quality, increased production and reduction in accumulation of Bottom EMD in the cell.

During stripping, some flakes were falling and accumulate as Bottom EMD which is not saleable quality. For smooth operation of cells the Bottom EMD has to be removed for proper placement of electrodes. Earlier the cell Bottom was cleaned once in 15 days now with the increase in time of cycle the Bottom EMD accumulation reduced and now the cell bottom cleaning is being carried out once in a month only. Due to this the availability of cell increased resulted in increased in production.



Earlier Nos. of times the cleaning of cell carried out = 24 in a year.

Presently the Nos. of times the cleaning of cells carried out = 12 in a year.

Time required for cleaning of cell = 24 hours per cell.

Time saved per cell for maintenance = 12 days in a year

The increase in production for 12 days per cell = $12 \times 100\text{kgs} = 1.2 \text{ MT}$

Total increase in production for 41 cells = $1.2 \times 41 = 49.2 \text{ MT}$

During maintenance of one cell even though the cell was by passed the steam supply was maintained at the same pressure, in order to maintain the required steam pressure in other cells.

Due to increased availability of cell for production, the steam has been effectively used, otherwise waste which in turn reduced Coal Consumption by about 100 MT

Total saving in Thermal Energy = 535 MkCal.

Total saving in Thermal Energy per MT = 0.41 MkCal.

Monetary Saving in Thermal Energy per MT = 1.96

3. Increase Recovery of EMD:

The time period for operation cycle for deposition of EMD was increased in from 100 hours to 130 hours. This has resulted increase in utilization of Electrolytic Cells and reduced the down time for bottom cleaning of EMD. Major advantage of this operation is reduction time in bottom cleaning. During the stripping operation there was loss of EMD as bottom EMD. With the increase in time in cycle, the bottom cleaning of EMD has been reduced. About 100 Kgs of bottom EMD was collected in single bottom cleaning operation. With the reduced number of operation of stripping, the wastage generated was reduced by about 50%.

Earlier bottom EMD (reject) collected in two cleanings per month = 200Kgs.

Presently bottom EMD collected in one cleaning per month = 100 Kgs.

The increase in yield per cell per month = 100 Kgs.

For 41 Cells = 4100 Kgs.

Increase in production per annum = 49200 Kgs.

This production otherwise waste was effectively recovered

on account of increase in time period for cycle.

Net Saving in Electrical Energy per Annum = 105928 kWh

Net Saving in Thermal Energy = 535 MkCal

Net Saving in Electrical Energy per MT = 81 KWh

Net Saving in Thermal Energy per MT = 0.41 MkCal.

Monetary Saving in Electrical Energy = Rs.4.36 lacs.

Monetary Saving in Thermal Energy = Rs.1.96 lacs



4. Timer and Level Switches for Pumps and Tray Drier :-

a. Timer for condensate Pump:

A Timer Switch is provided on 2.2 kW Condensate Pump, by which the idle running hours of Pump is avoided.

Net Investment Rs.3,500/-

Nos. of idle running hrs = 6 hrs. per day

Net Saving in a year:

= $2.2 \times 6 \times 30 \text{ Days} \times 10 \text{ moths}$

= 3960 kwh/year

= $3960 \text{ kwh} \times \text{Rs.}4.12 \text{ per kWh}$

(Average Energy Cost)

= Rs.16,315 per year.



b. Level Switch for Spent Transfer Pump & Water Pump:

The Level Switches are provided for 5.5 kW Spent Transfer Pumps and 5.5 kW Water Pumps. The idle running hours is avoided by 6 hours in a day for Spent Transfer Pump and 4.5 hours in a day for Water Pumps.

Net Investment Rs.7,000/-

Net Saving in a year:

For Spent Transfer Pump:

(Average load on pump 95%)

= $5.22 \times 6 \times 30 \text{ Days} \times 10 \text{ moths}$

= 9396 kwh/year

= $9396 \text{ kwh} \times \text{Rs.}4.12 \text{ per kWh}$

(Average Energy Cost)

= Rs.38,711 per year.

For Water Pump: :

(Average load on pump 95%)

= $5.22 \times 4.5 \times 30 \text{ Days} \times 10 \text{ moths}$

= 7047 kwh/year

= $7047 \text{ kwh} \times \text{Rs.}4.12 \text{ per kWh}$

(Average Energy Cost)

= Rs.29,033 per year.

Total Saving:

= $38,711 + 29,033$

= Rs.67,744/- per year.



c. Pre-Drying of EMD:-

The operation time of Tray drier was reduced from 6 hours to 5 hours per day. As EMD flakes after Neutralization subjected to atmospheric drying in sunlight before drying in Tray Drier.

Net Saving:

Capacity of Tray Drier = 90 kw

Average Load on Drier 70% = 63 kw.

Saving by reducing operation of

Tray Drier in a day = 63 kW

Net Saving in a year

= 63 x 30 x 11 = 20790 kWh

= 20790 x Rs.4.12 per kWh

(Average Energy Cost)

Rs. 85,654 per year.



5. Optimum setting of ID & FD Fan:- We are operating 3 MT Coal Fired FBC Boiler. Crushed coal is fed into the furnace with air pressure. Air pressure of FD & ID Fan is so adjusted to maintain required pressure and temperature in the furnace. Modified the Mechanical Dust Collection system to make it full proof and also other leakages stopped. This has increased the efficiency of Boiler. Now by reducing the FD Fan opening, controlled the feed rate from 800 rpm to 700 rpm and saved nearby 200 MT of steam coal. Net Saving Rs.3,66,600/-



F.D. FAN



I.D. FAN

6. Increased the Height of the HDPE Overflow Bends:-

The height of the Overflow Bend has been increased by 2" (50 mm) in all Electrolytic Cells there by the volume of cell has increased. Thereby the deposition area on anodes has increased.

With the increased in deposition are the current from Rectifier has been increased keeping the rate of flow and current density same. Because of this there is saving in coal consumption. This also unable to operate the plant of higher capacity.

Saving in Coal consumption is about 130 MT per annum.

Net Saving Rs.2.38 lacs.



Before



After

Other Energy Conservation Projects Implemented During the Year 2006-07:

1. Individual Voltmeter provided for each cell resulted in close monitoring of cell voltage.
2. By optimization of size of grinding media, the out put of grinding unit increased by 125%.
3. Replaced the pressure plates of bus bar joints to reduce the losses..
4. Condensate pipe line insulation replaced.
5. Changed high HP to lower HP motors wherever possible.
6. Replaced all fluorescent lamps in laboratory, office & other buildings with CFL Lamps.
7. For getting instant results for the process parameters Atomic Absorption Spectrophotometer (G.B.C.) replaced with highly efficient one which resulted in reduction of time in monitoring the parameters of Electrolyte which has reduced the heat losses due to holding time.

Above resulted in savings of about 0.37 lakh kWh in electrical and 160 MT of coal. Monetary Saving Rs.4.45 lakhs.

Total Investment = Rs.6.00 lakhs

Solar Light at Dongri Buzurg



Energy Conservation Plans & Targets:-

S N	Project Name	Background	Savings (in lacs/Annum)	Investment (in lacs)
1	Installation of ECT Turbine to harness let down energy of steam	Steam generated at 10Kg/sq.cm & let down to 3Kg/sq.cm for process use	1.00	5.00
2	Ebonite/FRP Header bars for electrodes	Wooden header bars due to acidic & moist atmosphere required frequent replacement	2.00	20.00
3	Separate steam trap for each cell	Complete utilization of latent heat of steam	0.4	2.00
4	Introduction of Solar Water Heating System	For preheating of Boiler feed water	3.00	30.00
5	Facilities for recovery of Bottom EMD by beneficiation	Non saleable generation of Bottom EMD	5.00	20.00
6	Introduction of variable frequency drive for Grinding M/c & Leaching Vessels.	Drawing more current during starting of M/c	0.5	5.00

Company has adopted the Energy Conservation Policy with utmost commitment, from the year 2003-04 onwards to meet the Competition from Overseas Market (specially China), resulted in Electrical Energy Saving of 42.70 lakhs kWh and Thermal Energy Saving of 5960 MT of Coal for last three years (2004-04,2005-06 & 2006-07). The Net Monetary Saving from three years on account of Energy Conservation is Rs.157.5 lakhs in Electricity and Thermal Rs.104.80 lakhs. The Total Monetary Saving is Rs.262.30 lakhs.

ENVIRONMENT & SAFETY

Safety:- The company is making continuous efforts to reduce the accident by improving the standards of safety gears, mechanization and introduction of latest techniques, training and re-training of workers, accident analysis by safety committee meeting at Mines.

The company was the recipient of “National Safety Awards” for the Mines.

Environment:- Plantation is being done continuously in Plant & Mine area. The company has planted petro- plants like Jetropetra in waste dump.

At MOIL the culture of work is **GOOD PLACE TO WORK (GPTW)** and the quality objective is “To strive for **CLEAN & GREEN MOIL.**”