

Indo Rama Synthetics (I) Ltd Nagpur

i) Unit Profile:

Indo Rama Synthetics (I) Ltd., Butibori – Nagpur is an integrated composite Polyester complex producing Polyester Staple Fibre (PSF), Polyester Filament Yarn (PFY-POY/FDY), Draw Texturised Yarn (DTY) & Chips. It is second largest after Reliance. But, it will be first largest in size at single location after expansion facilities of doubling capacity are commissioned in 2006.

This plant belongs to well known Indo Rama group having substantial presence in South East Asia with manufacturing facilities located in Indonesia, Thailand, Nepal & Sri Lanka besides India.

The Butibori complex with technical know how from Dupont, USA & Toyobo, Japan was commissioned in three phases (CPI, CPII, CPIII) in the period of 1994-96. For current year of 2005-06, Indo Rama aims market share of 27% in PSF & 11% in PFY.

Indo Rama has in place ISO-9001 (2000) for highest standard of Quality Management System (QMS), ISO-14001 (2004) for Environment Management System (EMS) and OEKO Tex certificate to meet Human Ecological requirements. Implementation of OSHAS-18001 (Occupational Safety & Health) is taken up in current year of 2005-06.

Major Awards won in 2004-05 :

- National Water Management Award 2004 from CII, GBC Hyderabad
- Leadership & Excellence Award in Safety, Health & Environment from CII Western Region in 2005
- State level Energy Conservation Award from MEDA in 2005

ii) Energy Consumption:

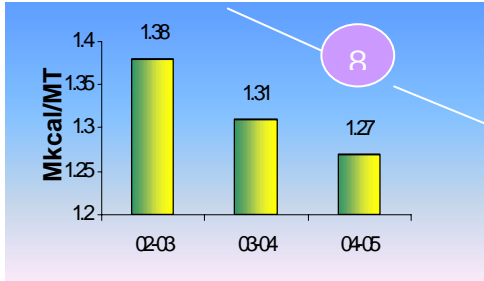
		UOM	2002-03	2003-04	2004-05
1.0	Annual Production	MT	330611	310280	303383
2.0	Total electricity consumption	lacs kWh	1944.6	1923.4	1950.43
3.0	Specific Electrical energy consumption for major products				
3.1	PSF Product	kWh/MT	183.71	161.61	161.06
3.2	PFY Product	kWh/MT	313.16	310.96	307.96
4.0	Thermal energy for process heating				
4.1	Coal	MT	31813	28746	27376
4.2	F.O	KL	32506	28571	27394
4.3	Total thermal energy consumption	MMcal	457.589	406.277	386.433
4.4	Specific process heat consumption	Mkcal/MT	1.38	1.31	1.27
5.0	Annual sales	Rs Million	20143.32	19879.35	21987.08
6.0	Total Energy cost	Rs Million	820.29	759.44	786.38
7.0	Energy cost as % of manufacturing cost	%	4.07	3.82	3.57
8.0	Raw material cost	Rs Million	10711.15	11073.1	13474.89
9.0	Energy cost as % of raw material cost	%	7.658	6.858	5.835

Energy conservation Plans & Targets

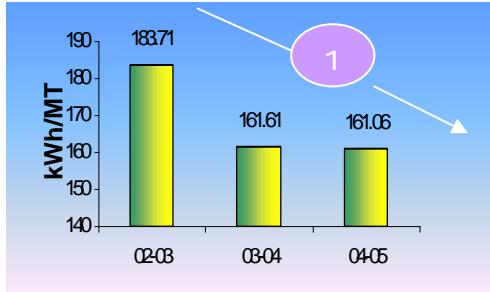
Planned Energy saving measures	Expected saving (Rs.Lacs)	Approx. Investment (Rs. Lacs)	Year of execution
Reduction in specific energy consumption by adoption of clean Technology (Doubling of polyester Production)	214.03	85000	2004-06
Cogen Captive Power Plant	2351	9000	2005-06
Harmonic filters to reduce Harmonics	11.43	32	2005-07
VFD for cooling tower fans	5.08	6.0	2005-06
Solar water heater for canteen (Renewal source of energy)	1.29	1.9	2005-06
Energy conservation system for 8 Bar Plant & Instt. Air	17.33	13.1	2005-07
Replacement of various pumps by energy efficient pumps along with VFD (Raw/Drinking/Soft/Degasser/Air washer etc)	32.23	30.00	2005-07
Replacement of Recip by Centac compressor	59.8	116.2	2006-07
Synchronisation of Vaasa 32 & 46 DG sets	117.42	20	2005-06
Sub Total	2809.61	94219.2	

Graphical Presentation of Specific Energy Consumption

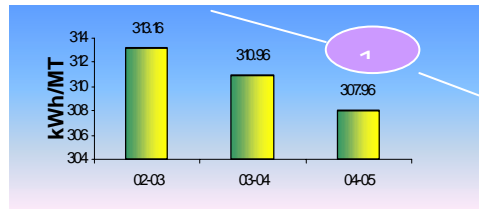
Specific Process Heat consumption



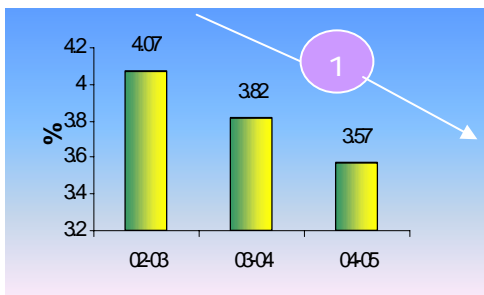
Specific Elect Energy Cons for PSF Product



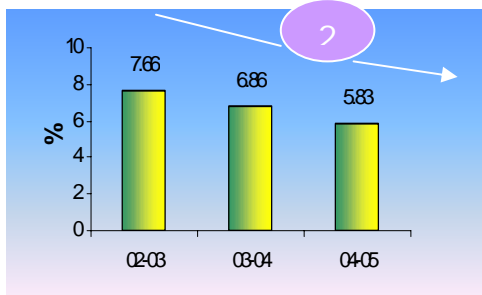
Specific Elect Energy Cons for PFY Product



Total Energy cost as % of manufacturing cost



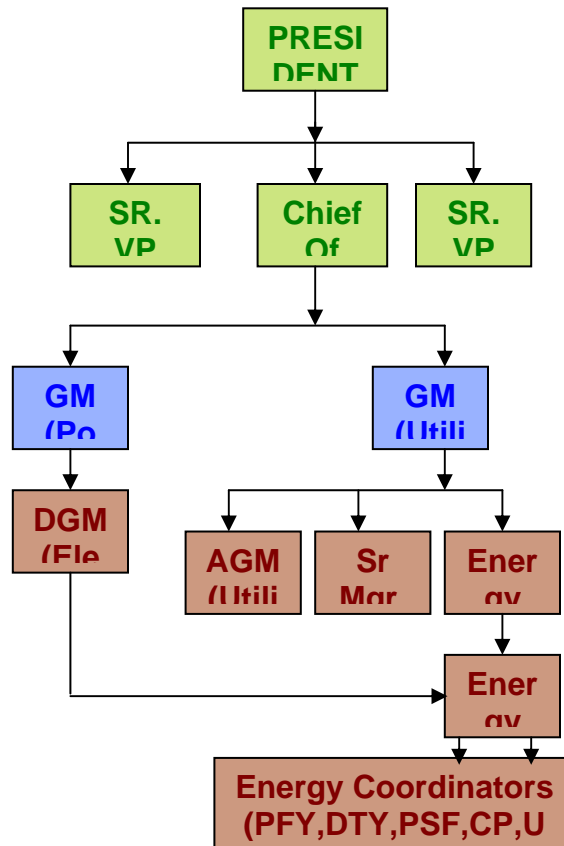
Total Energy cost as % of Raw Material cost



Profile - Energy Management Cell

Salient Features of Energy Conservation Cell

The energy cell is headed by GM (U) who is assisted by two Energy Managers from Utility & Electrical dept. They in turn are supported by at least one engineer from each production / services dept. The team finds Energy saving potential in the respective area's, bring it to energy cell for brain storming discussion for finalisation / approval. The organisation is committed to conserve the energy, promote renewable sources etc as per the declared Energy Policy.



MAJOR ENERGY CONSERVATION PROJECTS IMPLEMENTED DURING THE YEAR 2004-2005

(1) Title : Installation of low capacity pump at CP II VAC condensate tank.



- Condensate from 8 nos. VAC m/cs is collected and pumped to deaerator of Boilers.
- Earlier pump was to be run with throttled valve condition. Due to reduced steam consumption condensate generation from chillers is also reduced. Low capacity pumps with improved efficiency were installed to save electrical energy.

Basis of Saving :

- Old pump power consumption = 18 kwh
- Avg. yearly operating hours = 230 hrs. (Band of m/c operation)
- New pump power consumption = 11 kwh (With same band of operation)
- Saving in power = 18 - 11 = 7 Kwh
- Therefore yearly saving = 7 x 230 x 24 x 2.11 = Rs.81530.4/- ~ **Rs.0.82 Lacs.**
- **Investment : Rs.0.65 Lacs**

(2) Title : Installation of low head pump at CP II

Boiler feed water tank.



- Originally pumps were installed of high head. We were losing energy on pumping power as pump was running with throttled valve (recycling back to tank). Pumping power is reduced by installing low head pump with improved efficiency

Basis of Saving :

- Old pump power consumption = 30 kwh
- Power consup. after installation of new pump = 13 kwh
- Saving in power = 30 - 13 = 17 Kwh
- Therefore yearly saving = 17 x 365 x 24 x 2.11 = Rs.314221.2/- ~ Rs.3.14 Lacs.
- **Investment** : Rs.0.65 Lacs

(3) Title : Installation high efficiency DM water pump.



- Low efficiency pump is replaced by using high efficiency pump of Grundfos make.

Basis of Saving :

- Power consumption with low efficiency pump = $1.732 \times 420 \times 25 \times 0.85 = 15.5$ kwh
- Power consumption with new high efficiency pump = $1.732 \times 420 \times 11.5 \times 0.85 = 7.1$ kwh
- Saving = $(15.5 - 7.1) \times 2.5 \times 24 \times 350 = \text{Rs.}1.76$ lacs/annum.
- **Investment** : Rs.1.8 Lacs

(4) Title : Installation of Variable Speed Drive for 12 bar recip air compressor.



- Variable requirement of 12 Bar air is met by use of VFD. Earlier, reciprocating compressors used to run on no load based on timer. Wastage of power in idle run is avoided by VFD.

Basis of Saving :

- Installed motor rating is 180 KWH. Full load/unloading power consumption = 160 kwh / 52 kw
- (This is observed while loading/unloading pattern in ratio of 70% / 30% of time)
- Full load power consup. = $160 \times 7200 \text{ hrs.} \times 0.7 \times 2.11 = \text{Rs.}17.01 \text{ lacs.}$
- Unloading power consup. = $52 \times 7200 \text{ hrs.} \times 0.3 \times 2.11 = \text{Rs.}2.37 \text{ lacs.}$
- Therefore total power consumption = $17.01 + 2.37 = \text{Rs.} 19.38 \text{ lacs.}$
- Constant pressure VFD operation results in saving of about 8.8 kw or Rs.1.34 lacs.($8.8 \times 24 \times 300 \times 2.11$)
- By maintaining constant pressure to PSF production deptt. We save 700 kgs waste per wrap. Considering 4 wraps per month in all 5 PSFs, total saving of production loss = 2800 kgs/month.
- Contribution loss = Rs.32/- per kg
- Therefore total avoidable loss in Rs. = $2800 \times 12 \times 32 = \text{Rs.}10.75 \text{ lacs.}$
- Total annual potential saving with VFD = $\text{Rs.}1.34 \text{ lacs} + 10.75 \text{ lacs.} = \text{Rs.}12.09 \text{ Lacs.}$
- (Actual saving achieved is less as commissioning is done in later part of year)
- Investment : Rs.10.5 lacs (One Time)
- Payback : 11 Months.

(5) Title : Reduction of pressure drop in cooling water circuit in VAC m/c to save energy of pumping.



- By providing extra pipe connection between condenser & absorber, circuit pressure drop in cooling water has been reduced.
- Improvement was done by changing impellers, corrocoat coating inside all pumps casing.
- Overall, we could achieve 88% efficiency of pumps against ongoing pump efficiency of less than 70%. Additional power saving was achieved by reduced header pressure (stoppage of one pump on continuous basis)
- **Saving** : Rs.36.97 Lacs/year
- **Investment** : Rs.20 Lacs

(6) Title : Poor efficiency VAC m/cs replaced by new high efficiency version of VAC.



- Poor efficiency VAC machines were replaced by new high efficient version VAC. Steam consumption is improved from 4.9 to 3.9 Kg/TR/hour

Basis of Saving :

- Hourly saving = $(2046.7 - 1464.48) \times 2$ nos. = Rs.582.22 x 2 nos.
- Running hours = 3600 for each (commissioned in middle of year)
- **Total saving** = $582.22 \times 2 \times 3600$ = Rs.41.93 lacs/annum.
- **Investment** : Rs.238 Lacs.(One Time for 2 nos. m/cs)
- Nature of Saving : Recurring.
- Note : Indo Rama was first company in India to buy such large size (1125 TR each) VAC machine way back in 1995-96. Again, Indo Rama is first in India to buy largest size VAC mc each of 1240 TR with huge energy saving potential in terms of reduced steam energy as well as reduced cooling water consumption.

(7) Title : Bio gas plant for disposal of kitchen waste.



- Kitchen waste collected from employees/labour canteen is utilised to generate biogas which is fed back to canteen. It results in reduced consumption of fresh LPG cylinders for day to day cooking purpose.

Basis of Saving :

- Quantity of solid waste/day : 700 kg.approx.
- Bio-gas yield per day : 70 m³.
- Equivalent LPG replacement per day : 35 kg.
- Rate of Industrial LPG cylinder(19 kg) : Rs.758/-
- Saving in LPG cost per annum : $(758/19) \times 35 \times 365 = \text{Rs.}5.1 \text{ Lacs.}$
- Interest on investment @15% = Rs.0.82 Lac.
- Projected saving amount = Rs.5.1 - 0.82 = Rs.4.28 Lacs/year.
- **Actual saving** - 0.52 Lac (Due to commissioning in later part of the year & reduced plant load)
- **Investment** : Rs.5.28 lacs.(One Time)

(8) Title : Variable speed drive (Inverter) for Take-up fans of POY.



- Earlier, takeup AHU fan was being run at fixed speed. A variable speed drive is provided to have variable speed operation to maintain just required hall positive pressure.
- **Power saving** : Rs.11.88 Lacs.
- **Investment** : Rs.6.0 Lacs

(9) Title : Reduction in chilled water use (Thermal Energy) in Air Conditioning Plants for DTY machines



Earlier System

For air conditioning of the hall where 34 no textile spinning machines of DTY are installed, 9 no Air Handling Units (AHU) are provided to maintain about 32 deg.C temperature for optimum machine productivity. This involves use of Chilled water throughout the year.

Modified System :

Based on proven technology of evaporative cooling, Cellulose Paper Pads (imported) have been provided to ensure 100% saturation of air-matching of dry & wet bulb temperature. This cooled air without any chilled water use through cooling coils is used in all seasons except rainy season when inlet air RH itself is almost 95-100 %.

Thus, we are able to save about 300 TR for almost 9 months.

This idea is innovative - using conventional technology of evaporative cooling with latest available paper pads.

(Fusion of old & new technology)

Total Investment : Rs 10 lacs

Total Annual Savings (Thermal Energy) : Rs.94 lakhs

Payback = 1.3 months