

Kesoram Rayon, Nayasarai, Dist. Hooghly, West Bengal

(i) Unit Profile

Kesoram Rayon, a division of Kesoram Industries Ltd., is an integrated process plant, in Eastern India with captive as well as co-generation power.

Diversified product mix includes annual installed capacity of 6500 MT of Rayon Yarn, 3600 MT of Cellophane Paper, 3600 MT of Carbon-di-Sulphide, 36500 MT of Sulphuric Acid and 5500 MT of Sodium Sulphate.



It has one of the lowest specific energy consumption in India and the fact that the present level is 35% lower than what it was, when serious effort towards Energy Conservation was taken, proves the commitment, perseverance as well as involvement of all employees. We are dedicated to minimize the specific energy consumption for our products further. Continuous reduction in electricity consumption despite increase in production has made the unit almost self-sufficient, grid power supply being maintained, only as back-up power.

(ii) Energy Consumption

Electricity, Coal and Diesel Oil are the main sources of energy. Low pressure steam is the process requirement, hence there is continuous effort to increase cogeneration power. Energy consumption trend is as follows:

	2002-2003	2003-2004	2004-2005
Purchased Electricity (Lakh KWH)	61.64	61.64	37.03
Cost of Electricity (Rs.Lakhs)	252.85	281.47	210.41
Coal (MT)	76045	76745	69107
Cost of Coal (Rs. Lakhs)	1520	1547	1480
Diesel (KL)	229.50	234.28	116.86
Cost Diesel Oil (Rs. Lakhs)	39.86	48.14	28.49

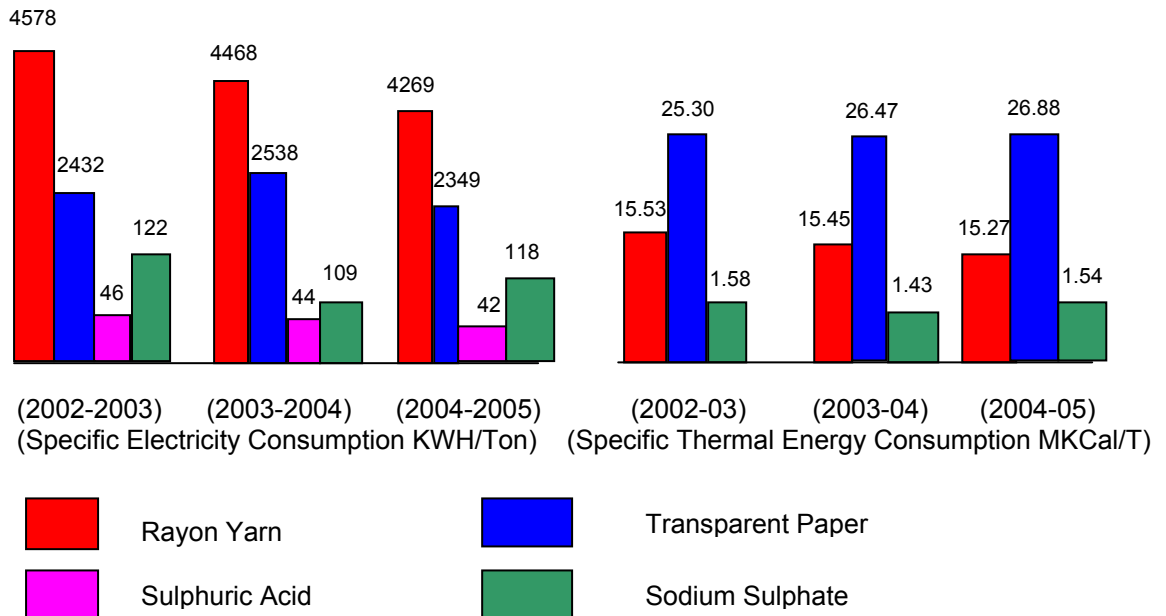
Specific energy consumption of various products for last 3 years are tabulated below:

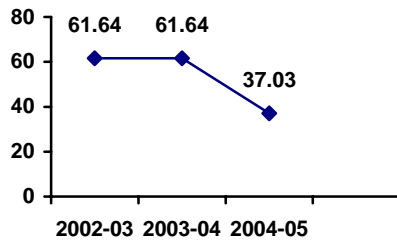
Specific Electricity Consumption(KWH/Ton)	2002-2003	2003-2004	2004-2005
Rayon Yarn	4578	4468	4269
Transparent Paper	2432	2538	2349
Sulphuric Acid	46	44	42
Sodium Sulphate	122	109	118

Specific Thermal Energy Consumption(MKCal/T)	2002-2003	2003-2004	2004-2005
Rayon Yarn	15.53	15.45	15.27
Transparent Paper	25.30	26.47	26.88
Sulphuric Acid	-	-	-
Sodium Sulphate	1.58	1.43	1.54

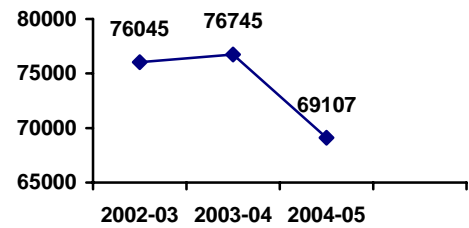
Despite increase in the cost of power as well as coal, total energy cost has been contained, to a great extent, as can be seen below:

	2002-03	2003-04	2004-05
Energy Cost (Rs.Lakhs)	1770.36	1879.19	1764.69
Manufacturing Cost (Rs.Lakhs)	12260.09	12909.04	13689.88
Percentage of Energy Cost to Manufacturing Cost	14.44	14.55	12.89

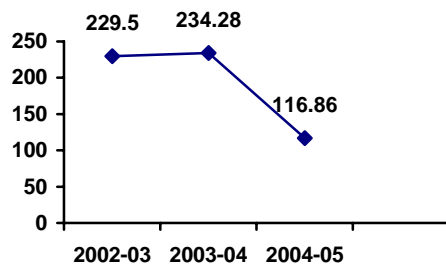




**Electricity Consumption Lakh KWH
Consumption in M.T**



Coal



Diesel Oil Consumption in KL

(iii) Energy Conservation Commitment, Policy and Set up

Our energy conservation policy stipulated minimization of specific energy consumption of the products through

- Effective Capacity Utilisation.
- Suitably tuning operations & maintenance continuously to achieve the desired goal.
- Upgradation of Technology with energy efficient process & equipments.
- Motivating, training & encouraging the employees to achieve target of reducing specific energy consumption by minimizing at least 1% of energy cost every year.

To augment this effort, yearly Energy Audit by an external agency is a regular feature with Kesoram Rayon.

The Company has an Energy Management Department, headed by Energy Manager – assisted by experienced Chemical, Power House & Electrical Engineers.

To monitor section-wise power consumption and have greater involvement 12 Small Groups have been formed.

Minimum energy requirement overrides cost, while selecting new equipment.

Energy Conservation Department arranges,

- Inter-unit visits & attending energy conferences to share experiences.
- Experts as well as external agencies to carry out technical study and energy audits.

(iv) Energy Conservation Achievements

Kesoram Rayon has received awards for Energy Conservation from Ministry of Power for last 9 consecutive years. The culture of energy conservation enabled the company to achieve lowest specific electricity consumption, lowest specific thermal energy consumption during the last three years. A reduction of specific electricity consumption of our main product 'Rayon Yarn' from 4578 in the year 2002-2003 to 4269 in the year 2004-2005 i.e. 6.74% reflects the quantum of energy conservation achieved in Kesoram Rayon. Similarly conservation achieved for other products viz.

for Transparent Paper	-	3.4%
for Sulphuric Acid	-	6.5%
for Sodium Sulphate	-	3.2%

In the preceding three years, many proposals, big as well as small have been implemented – been initiated through participation of workmen in small group activities. During these three years, total of Rs.2367.415 Lakhs were spent in various proposals with a return of Rs.849.27 Lakhs, which will have a great impact on energy cost.



Some of the major proposals implemented during 2004-2005

- Under loaded motors have been replaced with Energy Efficient Motors of approximate size, yielding a saving of 393 Kwh per day amounting to Rs.6.46 Lakhs per annum.
- Replacement of Gear Drives of Dissolvers 1 & 5 of Viscose Department, by Belt Drives, resulting in a substantial saving of 105 Kwh per day, amounting to Rs.1.72 Lakhs per annum.
- Replacement of spinbath double effect evaporator (old) intermediate pump and motor by suitably selected exact pump and motor of lower capacity – yielded an energy saving of 50 Kwh per day, annual saving of Rs73,000/- obtained.

- d) Restricted operation of AC fan and of fresh air fan of TP i.e. by running as and when necessary – yielded an energy saving of 49 Kwh per day, annual saving of Rs.69660/- could be obtained.
- e) Replacement of Son Lamps by Metal halide lamps at Colony and Club area, resulted in a saving of 51.84 Kwh per day, annual saving of Rs.75,686/- could be obtained.
- f) Replacement of flame proof 100 Watt Lamps by 36 Watt Flame proof tube lights at CS₂ storage tank area – resulted in a saving of 9.5 Kwh per day, annual saving of Rs.15,600/- could be obtained.
- g) Substantial saving in steam consumption could be achieved in Aftertreatment section dryer (both old & new), by way of modification of the steam traps – obsolete steam traps replaced with new ones – Steam 3.5 Tons/day could be saved, amounting to a saving of Rs.4.17 Lakhs per annum.

(v) Energy Conservation Plans & Targets

Sl. No.	Energy Conservation Measures Planned	Anticipated Savings/Year		Approximate Investment Rs.Lakhs	Project Commencement & Completion Year
		In Energy Value Lakh Kwh	Rs.in Lakh		
1	Replacement of Steep lye Pumps of Station Nos. 4, 6 & 13A	1.095	3.33	8.50	2005-06
2	Utilisation of Calcination Plant waste water in Boiler House	0.11	0.54	1.80	2005-06
3	Installation of Harmonic Filters	15.76	35.35	80.00	2005-06
4	Energy Efficient Motors	1.138	3.19	12.75	2005-06
5	Auto On-Off Controller of Cooling Tower	0.018	0.03	0.12	2005-06
6	Use of Load Limiter in Colony	0.08	3.78	5.00	2005-06
7	Replacement of Canteen corridor tubelights by CFL.	0.001	0.07	0.06	2005-06
8	Replacement of 40W Bulbs at Gate by CFL.	0.002	0.08	0.07	2005-06
9	TP Condensate Pump to run in Star Mode	0.003	0.40	-	2005-06
10	Replacement of Pump & Motor at AFT.	0.01	0.63	0.70	2005-06
	Total:	18.214	47.40	109.00	

Project for 2004-2005

1. Energy Efficient Motors in place of under loaded motors

Existing System

A few motor found to be lightly loaded, power consumption was high in comparison with power demand.

Proposed System

Motor rating precisely selected to meet demand properly, replaced by energy efficient motors.

Advantage

Due to reduction in motor rating, power loss reduced, saving of 393 Kwh per day achieved.

Investment on the Project is Rs.16.77 Lacs with annual savings of Rs.6.46 Lacs.

2. Replacement of Gear Drive by Belt Drive at Dissolver Nos. 1 & 5 of Viscose

Existing System

Dissolvers 1 & 5 of Viscose Plant were running with gear boxes.

Proposed System

Gear Drives replaced by Belt Drives.

Advantage

In case of measurement of power, it was observed that with the same load, belt drives draw 5 KW less power than that of gear drives.

Savings: Average running hours of Dissolver No.1 is 15 hrs. per day & Dissolver No.6 is 6 hrs. Per day.

Savings per day = $(15+6) \times 5 = 105$ Kwh

Investment on the Project is Rs.4.00 Lacs with annual savings of Rs.1.72 Lacs.

3. Replacement of Spinbath Double Effect Evaporator (Old) Intermediate pump

Existing System

Old Double Effect Evaporator intermediate pump used to run 24 hours continuously. Motor rating was 7.5 HP, Pump rating – 15 m³/hr, 25 M head.

Proposed System

It was proposed to reduce both pump and motor capacity. Trial run was taken on Pump of 5 Litre/Sec, 10M along with 5 HP Motor. It ran successfully.

Advantage

Due to reduced capacity of pump and motor, saving observed to be of 50 Kwh/day, considering 6 months running of the pump.

Savings per day : 50 Kwh

Investment on the Project is Rs.1.00 Lac with annual savings of Rs.0.73 Lac.

4. Restricted operation of AC Fan at TP Confectionary

Existing System

TP Cutting AC Fan used to run 24 hours continuously (except 2 months in winter). Motor rating – 30 KW, Power drawn – 18.5 KW

Proposed System

It was observed that 81°F was comfortable and acceptable temperature of that zone. Due to continuous operation, temperature often falls far below 81°F. It is proposed to fix one thermal controller with electrical accessories to make the fan, ON/OFF automatically to keep temperature in between 79 & 81°F

Advantage

In course of manual trial run, it was observed that cumulative stoppage per day obtained as 2 hours.

Savings per day: $2 \times 18.5 = 37$ Kwh.

Investment on the Project is Rs.0.40 Lac with annual savings of Rs.0.50 Lac.

5. Restricted operation of TP fresh air fan

Existing System

TP fresh air fan used to run continuously.
Motor rating = 10 KW, Power drawn = 4 KW

Proposed System

Fresh air is required at the time of paper breakage only. If remote operation is at the operator's desk, fan can be stopped intermittently.

Advantage

Motor can be stopped at least 3 hours per day.

Savings per day: $4 \times 3 = 12$ KWH

Investment on the Project is Rs.0.105 Lac with annual savings of Rs.0.20 Lac.

6. Replacement of SON Lamps by Metal Halide Lamps at Colony & Club Area

Existing System

About 54 Nos. of 150W SON Lamps are glowing in Club & Colony area.

Proposed System

To replace 54 Nos. of 150W SON Lamps by 54 Nos. of 70W Metal Halide Lamps with reduction of mounting height.

Advantage

54 Nos. SON Lamps consume 97.2 Kwh/day (12 hours running)

54 Nos. 70W Metal Halide Lamps will consume 45.36 Kwh/day, also with reduced mounting height, illumination will be better than the existing one.

Savings per day: $97.2 - 45.36 = 51.84$ Kwh

Investment on the Project is Rs.1.35 Lacs with annual savings of Rs.0.75 Lac.

7. Replacement of Flame Proof 100W Lamps by 36W Flame Proof Tubelights at CS₂ Storage tank area

Existing System

At present 12 Nos. of 100W are glowing, 10 hours per day.

Proposed System

To replace 12 Nos. of 100 Watt Flame Proof Bulbs by 6 Nos. of 36 Watt Flame Proof Tubelights.

Advantage

Better illumination

Present Power Consumption : 12 Kwh/day

Proposed Power Consumption: 2.5 Kwh/day

Savings per day: 9.5 Kwh

Investment on the Project is Rs.0.37 Lac with annual savings of Rs.0.16 Lac.

8. Steam Trap modification at Aftertreatment Section

Existing System

Obsolete steam traps, not functioning properly. Old dryer & new dryer steam consumption on an average was 42.58 tons/day.

Proposed System

To replace old and almost defunct steam traps by the modified ones, resulting in steam consumption of 39.2 tons/day.

Advantage

At a pressure of about 2.2 Kg/Cm², Savings per day = 42.58 – 39.20 = 3.38 Ton.

Savings could be increased upto around 3.5 Tons/day by increasing temperature by about 2°C.

$$\begin{aligned}\text{Savings} &= 3.5 \text{ Tons} \times 647.3 \times 3500 \times 365 \text{ Kcal/annum} \\ &= 827 \text{ MKCal/annum}\end{aligned}$$

Investment on the Project is Rs.5.0 Lacs with annual savings of Rs.4.17 Lacs.