

KESORAM RAYON

Nayasarai, Dist. Hooghly, West Bengal

(i) Unit Profile

Kesoram Rayon, a division of multi-location, multi-product Kesoram Industries Ltd., is an integrated process plant, in the suburb of Kolkata. The Company has 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. Kesoram Rayon has cogeneration power plant and is almost self-sufficient in power.

Wood pulp, caustic soda and sulphuric acid are the major raw materials. Its dyed yarn is perceived as the most preferred in market. It also exports its products, all over the world.

Kesoram Rayon has undergone a complete metamorphosis, over the years since inception in terms of innovations & equipment updation. The Company is certified for ISO 9001:2000, ISO 14001 and OHSAS 18001.

It has the best specific energy consumption in India, achieved through involvement of people at all levels.



(ii) Energy Consumption

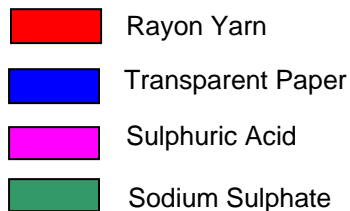
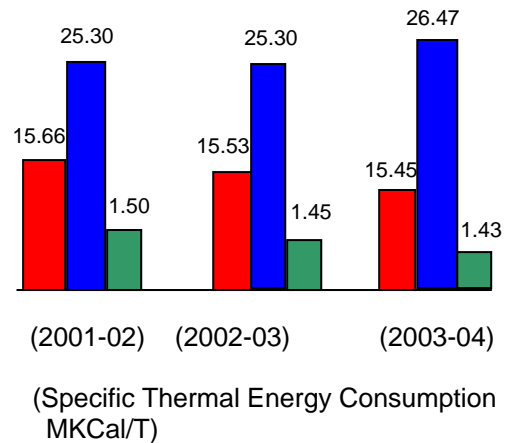
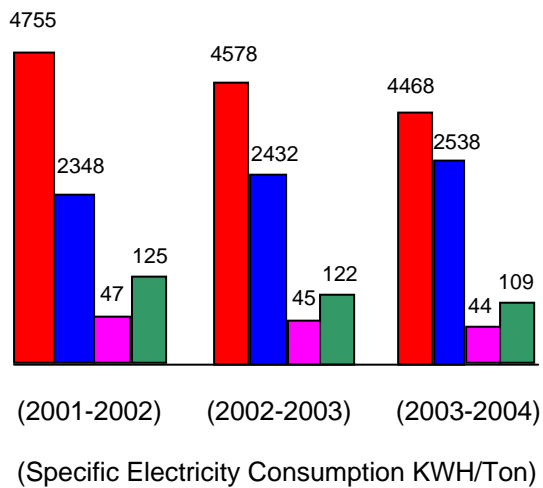
The energy consumption pattern as tabulated below highlights the Company's efforts for energy conservation:

	2001-2002	2002-2003	2003-2004
Purchased Electricity (Lakh KWH)	70.52	61.64	61.64
Coal (MT)	57893	76045	76745
Diesel (KL)	464.47	229.50	227.68
Total power & fuel cost (Rs.Lakhs)	1527.50	1770.40	1879.20
Energy cost as percentage of manufacturing cost	14.42	14.44	14.55

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

Specific Electricity Consumption(KWH/Ton)	2001-2002	2002-2003	2003-2004
Rayon Yarn	4755	4578	4468
Transparent Paper	2348	2432	2538
Sulphuric Acid	47	45	44
Sodium Sulphate	125	122	109

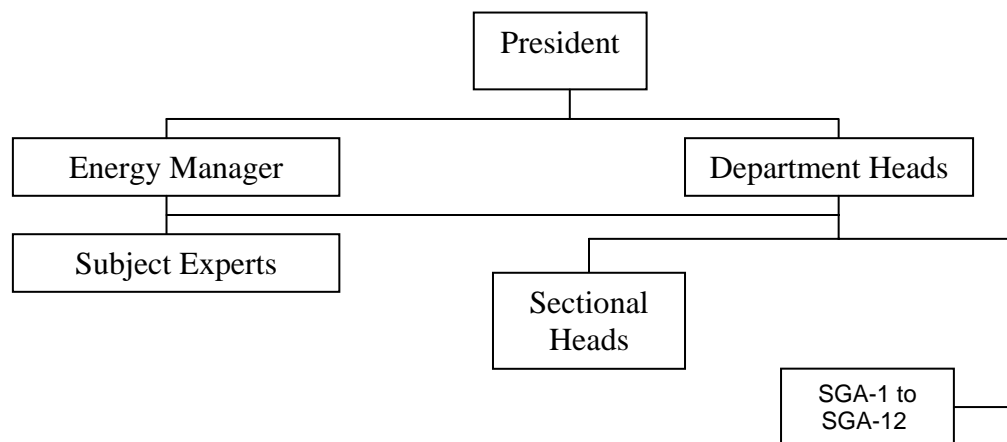
Specific Thermal Energy Consumption(MKCal/T)	2001-2002	2002-2003	2003-2004
Rayon Yarn	15.66	15.53	15.45
Transparent Paper	25.30	25.30	26.47
Sulphuric Acid	-	-	-
Sodium Sulphate	1.50	1.45	1.43



(iii) Energy Conservation Commitment, Policy and Set up

Kesoram Rayon views Energy Conservation as an activity as pivotal as production or maintenance. The commitment is unquestionable, apparent in creation of Energy Management Department way back in 1990 and declaration of Energy Policy, where reduction of at least 1% of energy cost every year 'as a mission' has been accepted. Yearly energy audit by an external agency, is a regular feature with Kesoram Rayon. Photocopy of energy policy is attached as per App.VI

The Company has an Energy Management Department headed by Manager – Energy, assisted by experienced chemical, powerhouse and electrical engineers.



The department monitors daily consumption of electricity, steam & water and initiates controlling action. For wider involvement 9 Nos. of Energy Productivity Improvement teams have been formed, each consisting of 7-9 persons, who carry out brain storming and regularly generate ideas.

Evaluation of energy requirement for each capital project and cost benefit analysis of each energy project is also the function of Energy Management Department.

The department also arranges:

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

(iv) Energy Conservation Achievements

A reduction in specific energy consumption of our main product 'Rayon Yarn' from 4755 in the year 2001-2002 to 4468 in the year 2003-2004 i.e. 6.4% reflects the quantum of energy conservation achieved in Kesoram Rayon. During 2003-04, many proposals have been implemented, which were initiated through participation of workmen in small group activities. A total of Rs.2100.00 lacs were spent in various proposals with an annual return of Rs.756.00 lacs, which will have a great impact on energy cost.

Major projects implemented are listed below:

1. Increase in Cogeneration Power

The plants requirement of process steam as well as power was met by a battery of 5 boilers(Capacity 10 - 25 TPH) at a pressure of 17.5 Kg/Cm2 and 3 turbines, two of which were back pressure type and one condensing (Capacity of 0.65, 1.5 & 4.00 MW). Since steam raised was at low pressure, coal consumption was high.

All the boilers & turbines were replaced by a 40 TPH, 64 Kg/Cm2 boiler & 6.0 MW turbine with bleed, extraction & condensing facilities. Because of this, process steam itself produces substantial power giving rise to reduction in coal consumption as well.



The following is the achievement due to this:

	<u>Previous</u>	<u>Present</u>	<u>R e m a r k s</u>
a) Cogeneration power from process steam (KWH)	42.05	281.88	Power requirement being same, from this reduced the steam required for balance condensing power
b) Coal consumption (MT) (B-Grade)	70445	58400	

Investment on the project is Rs.2100 lacs with annual savings of Rs.713 lacs.

2. Replacement of Spinning exhaust fan

6 Nos. of Buffalo make fans of 135000 CFM of old design and low efficiency were running for exhausting the spinning hall gases. These were replaced by new fans of high efficiency type at an investment of Rs.33.00 lacs and saving of Rs.10.85 lacs/annum.

The following is the achievement due to this:

	<u>Previous</u>	<u>Present</u>
a) Average Power Consumption Per Day (Kwh)	6200	5278

3. Replacement of Aftertreatment Supply Fan

3 Nos. of Aftertreatment supply fans were running with heavy metallic impellers, which were replaced by light weight FRP type impellers.

	<u>Previous</u>	<u>Present</u>
Avg. Power Consumption Per Day (Kwh)	576	528

Investment on the project is Rs.1.30 lacs with annual savings of Rs.0.79 lacs.

4. Replacement of Engine Room Cooling water pump

Requirement of water of our refrigeration plant is 324 m³/hr. Capacity of the pump used for this purpose was 410m³/hr. Correct size high efficiency pumps were installed to reduce power consumption.

	<u>Previous</u>	<u>Present</u>
Avg. power consumption per day (Kwh)	2664	2582

Investment on this project is Rs.3.0 lacs with annual savings of Rs.1.34 lacs.

5. Counter flow cooling tower for Engine room

Existing cooling towers were cross flow type with flow of 1050 m³/hr (total of 7 cells) and outlet of 32°C, inlet of 35°C. Counter flow cooling towers, 2 cells of 575 m³/hr were installed, with box design & PVC films. These cooling towers were designed for an approach temperature of 1°C.

Due to low temperature of outlet water, total water quantity reduced. Pumping & fan power was only 744 units, compared to earlier consumption of 1680 units per day.



Investment on the project is Rs.24.0 lacs with annual savings of Rs.15.38 lacs.

6. High efficiency fans for TP Dryer

Existing fans were running with efficiency of 37 to 44%. High efficiency fans were installed.

	<u>Previous</u>	<u>Present</u>	<u>Remarks</u>
Avg. power consumption per day (Kwh)	1920	1580	Avg. savings per day is 340 Kwh.

Investment on this project is Rs.10.00 lacs with annual savings of Rs.5.60 lacs.

7. Use of Energy Efficient Light

Sodium vapor lamps, tubelights and incandescent lamps of Colony were replaced with energy efficient CF lamps. Also Asean tubelights were installed in place of 36 Watt slim tubelights.

Total investment in this project was Rs.28.90 lacs and per day energy saving is about 500 units. Annual saving due to this, is Rs.8.20 lacs.

Other projects implemented were: -

- Lube oil additive in air compressors, for reducing power consumption
- Star-delta-star starters for high torque, low running load motors
- Replacement of pumps, by rationalisation.

(v) Energy Conservation Plans and Targets

Major projects planned are:

<u>Sl.No.</u>	<u>Planned Project</u>	<u>Targeted Savings</u>
1.	Energy efficient motor to replace under loaded motor	393 Kwh/Day
2.	To replace SON Lamp by energy efficient lamp	51.84 Kwh/Day
3.	To introduce Load Limiter in Colony	240 Kwh/Day
4.	To replace Aftertreatment pump	38 Kwh/Day
5.	To replace tubelight at Canteen corridor	4 Kwh/Day
6.	To use LP Steam in place of HP Steam in Viscose	898 MKCal/Day

vi) Environment & Safety

Efforts are made to safeguard the environment in the surroundings by way of protection, preservation and improvement. Updated technology and energy conservation methods are being imported from Indian industrial scenario and abroad on regular basis.

Our constant endeavour is evident from the following:

- ❖ New oil scrubbing system, installed CS₂ plant to recover more CS₂ from tail gas which otherwise definitely would cause pollution.
- ❖ Installation of three incinerators in hazardous waste treatment plant to burn solid waste in totality and store in a leach proof reservoir.
- ❖ The effluent treatment plant of the factory is in operation continuously for last decade with most up-to-date technology.



- ❖ Replacement of Ammonia compressor by Vapour absorption heat pump is another step to eliminate possibility of ammonia leakage.
- ❖ Continuous monitoring SO₂ and H₂S provides, better way to control the emissions.
- ❖ Programmable microprocessor based wind monitor provide accurate data of wind spread direction and temperature.
- ❖ Modification of Spinning machine is aiming towards arresting acid vapours.

Safety is a whole time, whole team job in Kesoram Rayon. The following approach illustrates our safety endeavour:

- ❖ Factory Directorate / Regional Labour Institute conduct safety audit, every year.
- ❖ Safety training programme held every month.
- ❖ Central Safety Committee, Departmental Safety Committee, moves around the plant and locates potential unsafe conditions. Action taken with no investment barred.
- ❖ National safety day is observed every year with participation of workmen.
- ❖ Safety suggestion scheme, poster competition and inter departmental competitions are regular features.
- ❖ In-house dispensary & hospital with all emergency treatment facility.
- ❖ Qualified doctors and nurses available round the clock.

A two Paragraph write-up for each project for 2003-2004

1. Increase in Cogeneration Power through rationalisation of boiler & turbine

The plants requirement of process steam as well as power was met by a battery of 5 boilers (Capacity 10 – 25 TPH) at a pressure of 17.5 Kg/Cm² and 3 turbines, two of which were back pressure type and one condensing (Capacity of 0.65,1.5& 4.0 MW). Since steam raised was at low pressure, coal consumption was high.

All the boilers & turbines were replaced by a 40 TPH, 64 Kg/Cm² boiler & 6.0 MW turbine with bleed, extraction & condensing facilities. Because of this, process steam itself produced substantial power giving rise to reduction in coal consumption as well.

The following is the achievement due to this:

	<u>Previous</u>	<u>Present</u>	<u>R e m a r k s</u>
a) Cogeneration power from process steam Lakh (KWH)	42.05	281.88	Power requirement being same, this reduced the steam required for balance condensing power

b) Coal consumption (MT) (B-Grade)

Investment on the project is Rs.2100 lacs with annual savings of Rs.713 lacs.

2. Replacement of Spinning main exhaust fan

6 Nos. of Buffalo make fans of 135000 CFM of old design and low efficiency were running for exhausting the spinning hall gases. These were replaced by new fans of high efficiency type.

The following is the achievement due to this:

	<u>Previous</u>	<u>Present</u>
a) Average Power Consumption Per Day (Kwh)	6200	5278

Investment of the project is Rs.33 lacs with annual savings of Rs.10.85 lacs.

3. Replacement of Aftertreatment Supply Fan

3 Nos. of Aftertreatment supply fans were running with heavy metallic impellers, which were replaced by light weight FRP type impellers.

	<u>Previous</u>	<u>Present</u>	<u>R e m a r k s</u>
Avg. Power Consumption Per Day (Kwh)	576	528	Avg.savings per day is 48 Kwh.

Investment on the project is Rs.1.30 lacs with annual savings of Rs.0.79 lac.

4. Lube oil addition to compressor

No additive was used in our compressors. Now we have started using Fin-25 additive.

The following is the achievement due to this.

	<u>Previous</u>	<u>Present</u>	<u>R e m a r k s</u>
Avg. Power Consumption Per Day (Kwh)	1300	1241	Avg.savings per day is 59 Kwh.

Investment on the project is Rs.0.30 lac with annual savings of Rs.0.97 lac.

5. Replacement of Engine room Cooling water pump

Requirement of water of our refrigeration plant is 324 m³/hr. Capacity of the pump used for this purpose was 410m³/hr. Correct size high efficiency pumps were installed to reduce power consumption.

	<u>Previous</u>	<u>Present</u>
Avg. power consumption per day (Kwh)	2664	2582

Investment on this project is Rs.3.0 lacs with annual savings of Rs.1.34 lacs.

6. Supermisers for TP Dryer fan

8 Nos. of Dryer fans were running with a loading of 50%. For low load running Supermisers were used.

	<u>Previous</u>	<u>Present</u>	<u>R e m a r k s</u>
Avg. Power Consumption Per Day (Kwh)	1920	1613	Avg.savings per day is 48 Kwh.

Investment on the project is Rs.13.5 0 lacs with annual savings of Rs.5.05 lacs.

7. Auto Star-Delta-Star-Starters for different motors

8 Nos. of motors of Viscose plant were running with an average load of 26%. The start stop operation is frequent and motors required to deliver high torque. Star-Delta-Star-Starters were installed to run them in star mode at light load condition.

	<u>Previous</u>	<u>Present</u>
Avg. Power Consumption Per Day (Kwh)	1920	1829

Investment on the project is Rs.1.50 lacs with annual savings of Rs.1.50 lacs.

8. Counter flow cooling tower for Engine room

Existing cooling towers were cross flow type with flow of 1050 m³/hr (total of 7 cells) and outlet of 32°C, inlet of 35°C. Counter flow cooling towers, 2 cells of 575 m³/hr were installed, with box design & PVC films. These cooling towers were designed for an approach temperature of 1°C.

Due to low temperature of outlet water, total water quantity reduced. Pumping & fan power was only 744 units, compared to earlier consumption of 1680 units per day.

Investment on the project is Rs.24.0 lacs with annual savings of Rs.15.38 lacs.

9. High efficiency fans for TP Dryer

Existing fans were running with efficiency of 37 to 44%. High efficiency fans were installed.

	<u>Previous</u>	<u>Present</u>	<u>Remarks</u>
Avg. power consumption per day (Kwh)	1920	1580	Avg. savings per day is 340 Kwh.

Investment on this project is Rs.10.00 lacs with annual savings of Rs.5.60 lacs.

10. Replacement of water treatment filter water pump

Existing pump is having capacity of 230 m³/hr. It is replaced by high efficiency 210 m³/hr pump.

Following is the achievement:

	<u>Previous</u>	<u>Present</u>	<u>R e m a r k s</u>
Avg. Power Consumption Per Day (Kwh)	768	712	Avg.savings per day is 56 Kwh.

Investment on the project is Rs.0.70 lac with annual savings of Rs.0.92 lac.

11. Use of Energy Efficient Light

Sodium vapor lamps, tubelights and incandesant lamps of Colony were replaced with energy efficient CF lamps. Also Asean tubelights were installed in place of 36 Watt slim tubelights.

Total investment in this project was Rs.28.90 lacs and per day energy saving is about 500 units. Annual saving due to this, is Rs.8.20 lacs.