

**Unit Profile:**

Our story begins in 1897 from Cotton Textile Mill. It belonged to a company called the Century Spinning and Manufacturing Co. Ltd. and it carried in itself the seeds of what would some day become the dynamic, far-ranging Century Group.

The Rayon division at Shahad commenced its operation in 1956 with an initial capacity of 5 tons of viscose filament yarn per day. Today, after successive capacity expansions, Century Rayon is not only the largest VFY producer in the country commanding 26% of the Indian VFY market, the quality of its yarn is acknowledged in many overseas markets as well. The company's diversified product mix today includes the following yarns and chemicals:

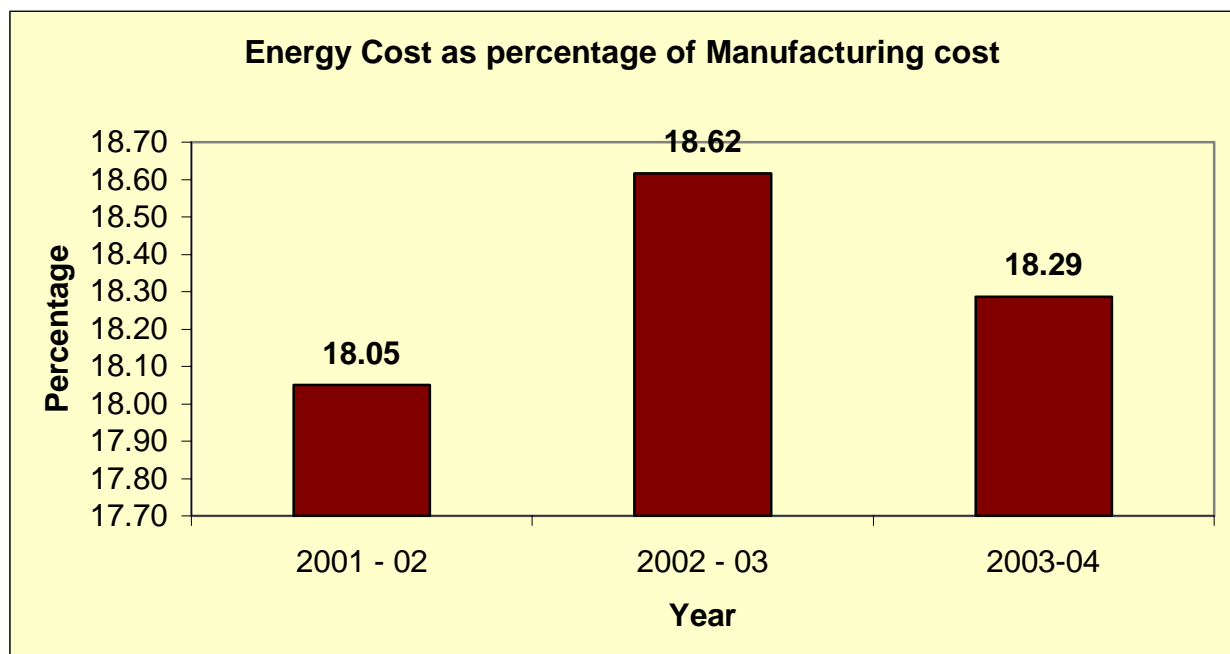
Products	Annual Capacity		Annual Production	
	Licensed MT	Installed MT	Actual (2003-04) MT	
Pot Spun Rayon Yarn			15765	
Continuous Spun Rayon Yarn	25000	24400	1366	23316
Tyre Yarn			6185	
Caustic Soda	28426	20000	16621	
Chlorine	16000	17000	12548	
Hydrochloric Acid	47241	19241	6763	
Carbon-di-sulphide	16000	14600	12530	
Sulphuric Acid	71000	62000	52592	
Hydrogen Gas (Compressed) M <sup>3</sup>	5800000	5000000	3879937	

## ii). Energy Consumption

With the implementation of various energy conservation measures as ongoing practice, there is a steady decline in specific energy consumption.

### Energy Cost as percentage of manufacturing cost

Year	Cost, Rs. Lakhs		Percentage
	Manufacturing	Energy	
2001 – 2002	28319.078	5111.7	18.05%
2002 – 2003	29590.231	5508.57	18.62%
2003 - 2004	31368.298	5736.15	18.29%



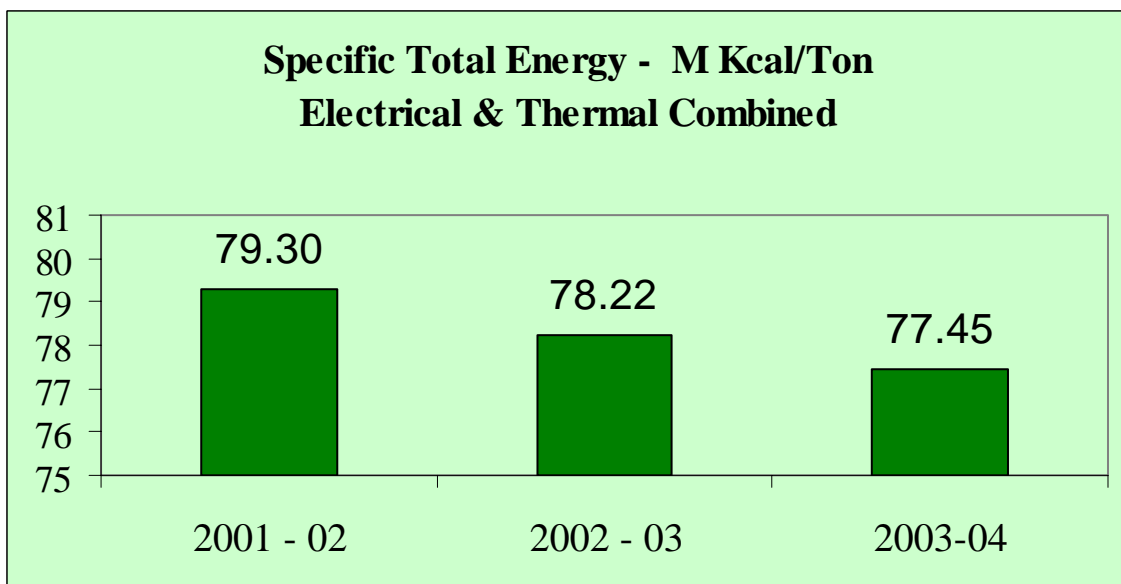
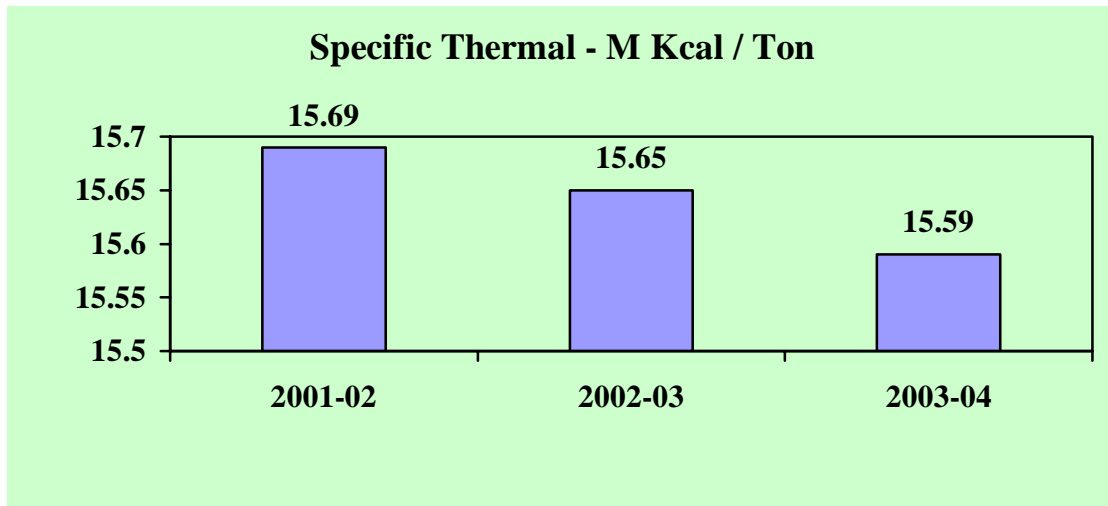
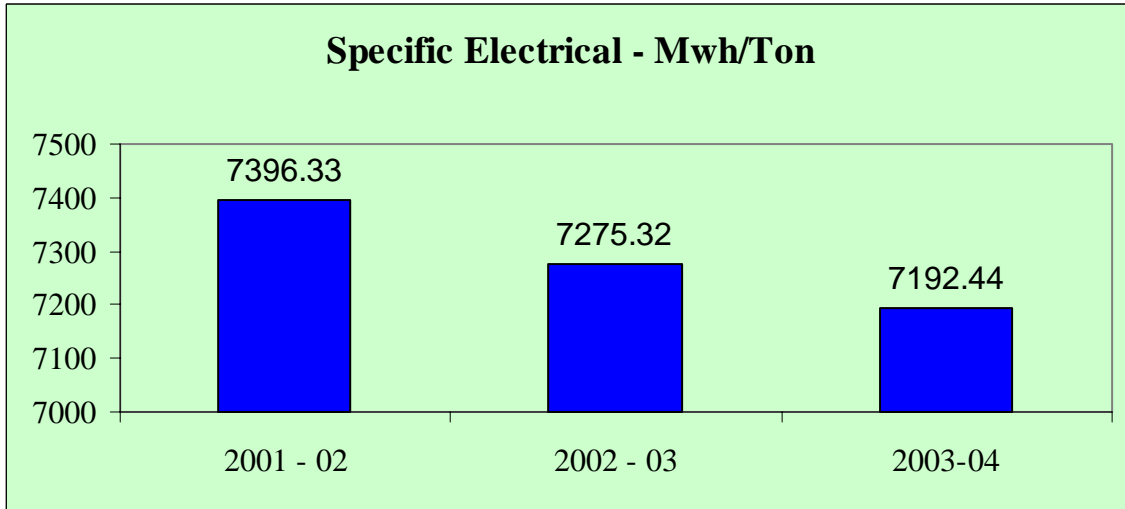
**The percentage increase in energy cost is due to increase in total energy cost because of 25.4% rise in oil cost during 2002-03 with reference to 2001-02.**

TOTAL ENERGY CONSUMPTION DETAILS							
Year	Electricity (Lakhs)		Coal (Lakhs)		Oil (Lakhs)		Total Cost (Rs./Lakhs)
	Kwh	Rs	Tons	Rs	KL	Rs	
2001-02	219.76	1068.09	0.80	1805.543	24041.44	2238.07	5111.7
2002-03	295.43	1241.28	0.84	1815.165	20994.96	2452.12	5508.57
2003-04	394.79	1429.13	0.83	1878.423	20191.28	2428.60	5736.15

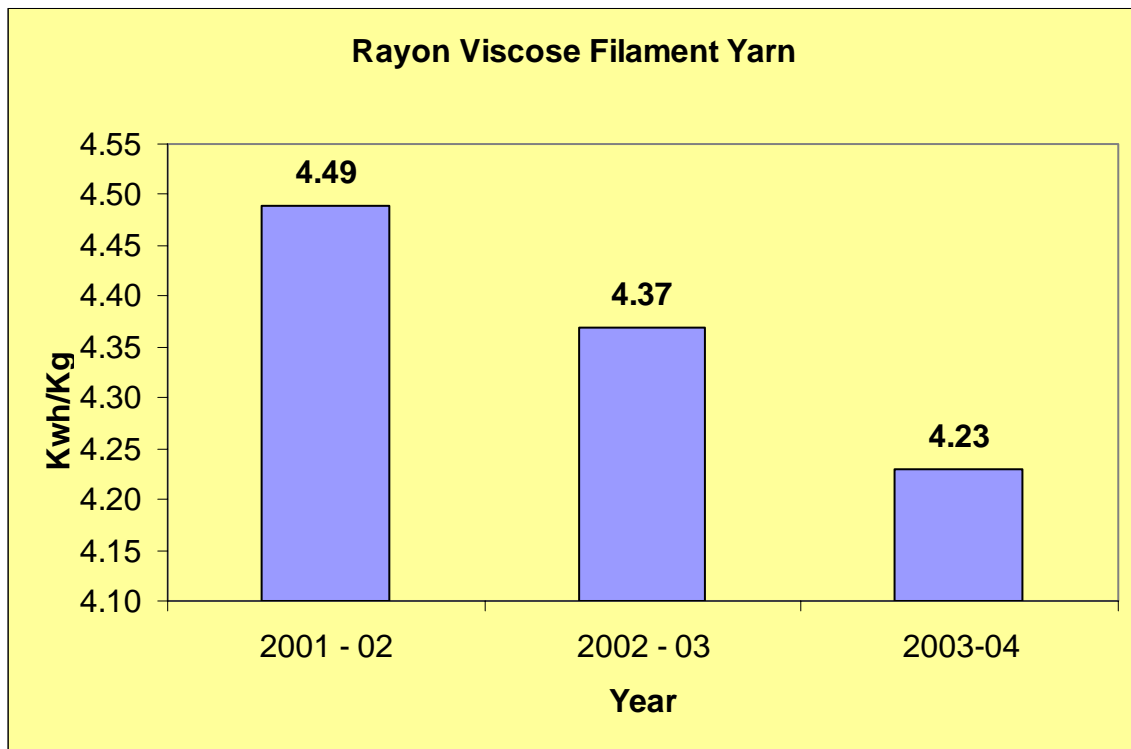
*The increase in percentage of total energy cost during the period 2002-2003 with reference to 2001-2002 is due to steep rise in oil cost even though oil consumption and specific thermal consumption has decreased.*

SPECIFIC ELECTRICAL + THERMAL ENERGY CONSUMPTION								
Year	Prod	Electrical Cons.	Equivalent Thermal	Thermal Cons.	Total Energy	Specific Electrical	Specific Thermal	Specific Total
Units	MT	Lakhs Kwh	M. Kcal	M. Kcal	M. Kcal	Mwh / Ton	M Kcal /Ton	M Kcal /Ton
2001-02	22595	1671.20	1437232	354465.28	1791697	7396.33	15.69	79.30
2002-03	22944	1669.25	1435555	359164.37	1794719	7275.32	15.65	78.22
2003-04	23316	1676.99	1442211	363507.59	1805719	7192.44	15.59	77.45

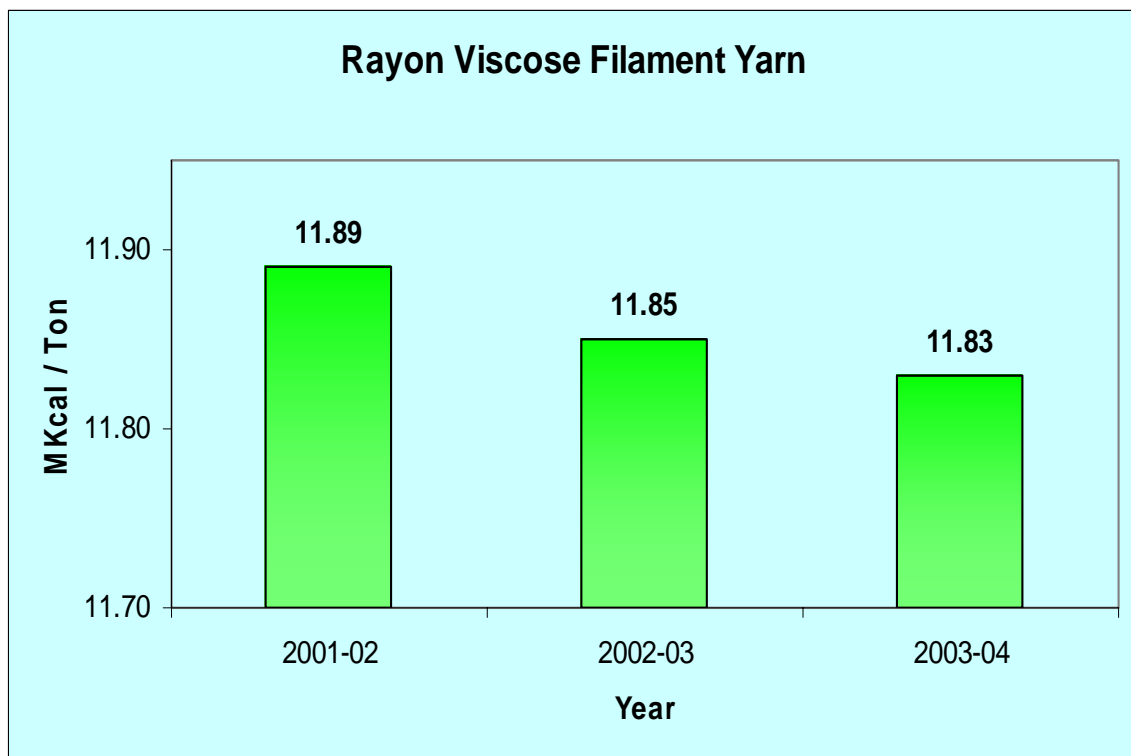
## Trend of Specific Energy Consumption per Kg of Yarn Production Period: 2001 – 2004



**Trend of Specific *Electrical* Energy Consumption per Kg of Yarn  
Production - Period: 2001 - 2004**



**Trend of Specific *Thermal* Energy Consumption per Kg of Yarn  
Production - Period: 2001 - 2004**





## Energy Conservation Commitment, Policy & Set Up

### COMMITMENT

Century Rayon is committed to total energy management & prevention of energy wastage. Energy conservation means use of lesser energy for same level of industrial activity. Conservation of energy is the choice option – as the results are immediate and non-expensive. It is vitally important for the company that measures of energy efficiency by its up-gradation and conservation are undertaken on a faster rate than what has been done before to avoid wastage of energy. Energy saved is energy produced. This dictum is effectively applied for realization of the objective of energy management in our organization.

Century Rayon accords high priority to energy conservation and the same has reflected in steady decline in terms of specific energy consumption for our main products as mentioned in the forthcoming pages. This decreasing trend is the outcome of our concerted and well-planned efforts at energy conservation and energy efficiency upgradation.

### ENERGY POLICY

*“Energy saved is energy produced. So, no effort will be spared to achieve highest levels of efficiency in managing and conserving the energy resources. Both financial and human resources coupled with technological up-gradation will be provided for the purpose.”*

### SET UP

Energy Conservation Cell is headed by Vice President (Dev. & Engg). He is supported by a designated Energy Manager under whom Task Force Units are created one each for: Rayon Plant, Tyrecord & Cont. Spun Yarn Plant, Chemicals, Auxiliaries, Boiler House & Power House

This internally created Energy Conservation Cell is responsible for

- (a). Identification of energy conservation areas on a continuous basis around the year
- (b). Implementation of approved energy conservation schemes
- (c). Time to time auditing from external agencies.
- (d). Monitoring of schemes under progress.
- (e). Interaction with equipment suppliers.
- (f). Getting abreast with technological developments in the field of energy conservation.

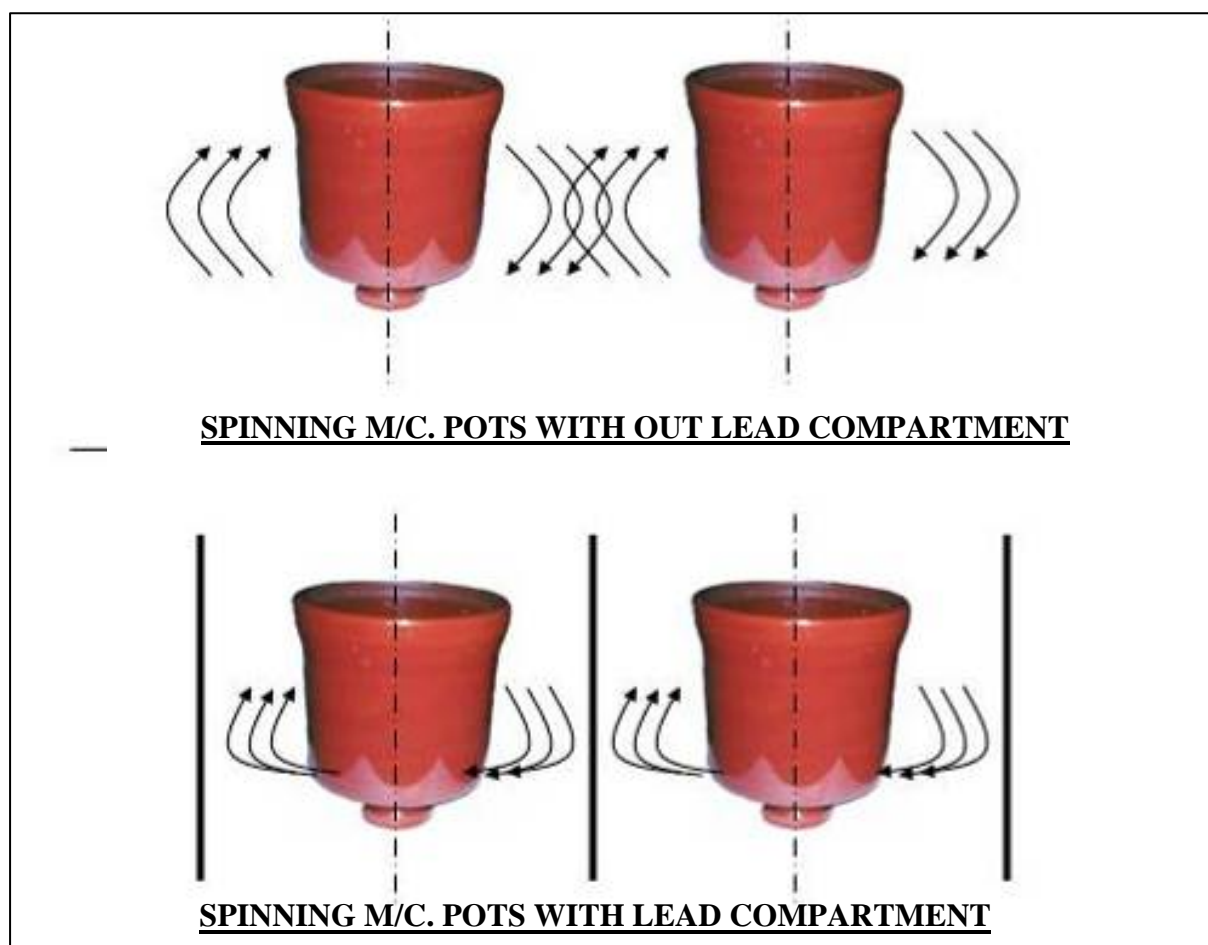
The overall set up for Energy Management & Conservation is illustrated in next sheet:

Energy Conservation and Achievement.

Some important energy conservation schemes implemented during year 2003-04 at Century Rayon are:

**Electrical Energy saving by providing lead compartment plates between pots of 63 Spinning Machines.**

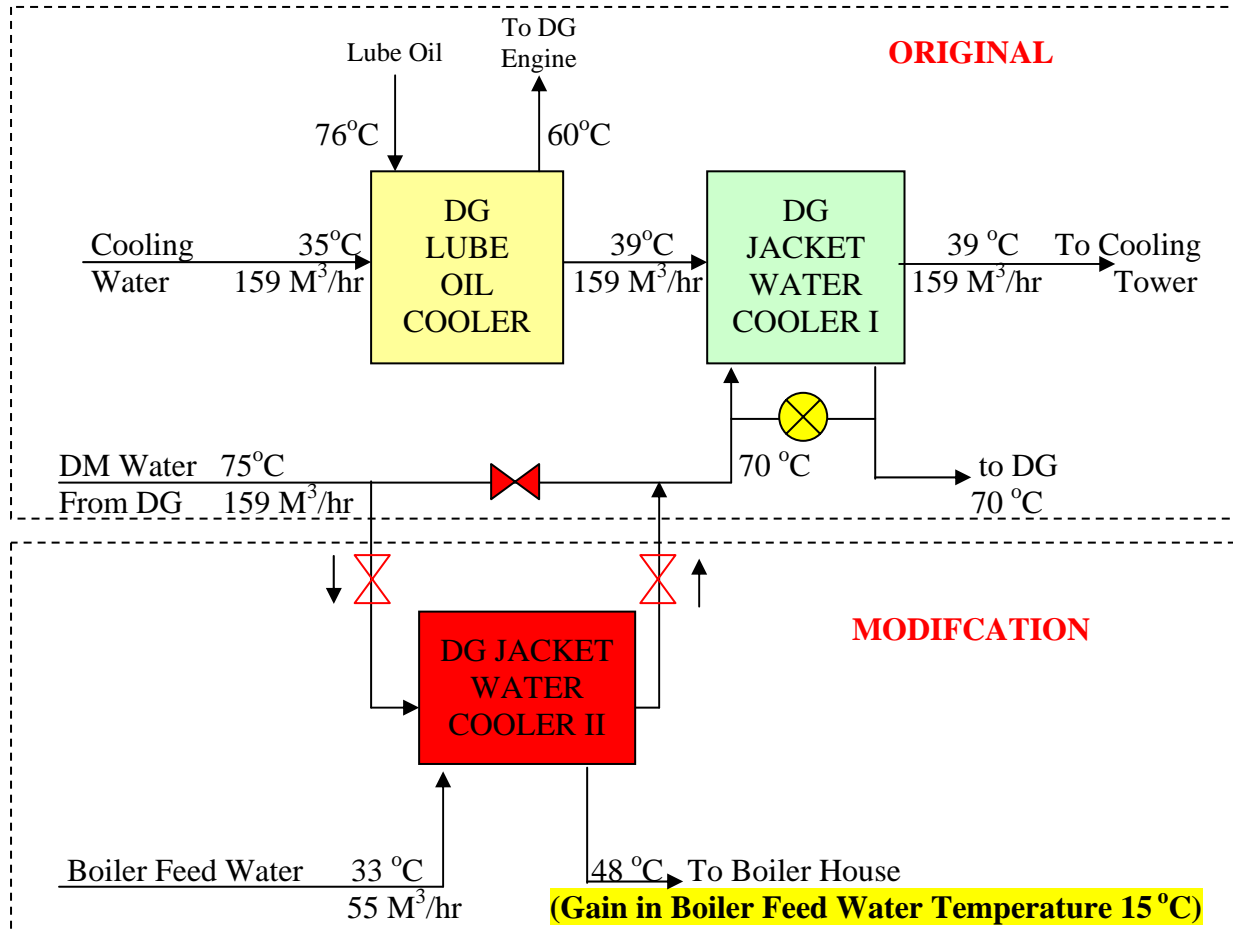
In spinning machines, Spinning pots are rotating at 7800 RPM. This is producing cross current of air between the adjacent pots. This cross current of air increases the electrical load of machines. Lead compartment plates are installed between the each spinning pots to overcome the cross current of air between the pots. This has resulted in net saving of Rs. 14.56 Lakhs (4.41 Lakhs Unit).



**Heat recovery from Diesel Engine jacket water**

400 M3/hr water is circulated through DG Engine Jacket and lube oil cooler for removing the heat generated in the engine. This heat is dissipated in the cooling tower for maintaining the DG operating temperature.

An additional plate type heat exchanger was installed in series with jacket water circulation line to pre heat boiler feed water by recovering heat from jacket water of engine. This has resulted in saving of 24.98 Rs. Lakhs per annum



- **Replacement of Low pressure ejector with energy efficient high pressure steam ejectors in Rayon and Tyre Cord Plant.**

LP steam ejectors are being used in TC & Rayon plants for developing vacuum. Approximately 140 TPD of steam is consumed in ejectors. Currently steam produced from DG boiler is used after reducing its pressure from 10 kg/cm<sup>2</sup> to 3 kg/cm<sup>2</sup> which is direct loss of energy. So LP ejector was replaced by H.P. steam ejector to utilize steam from DG boiler at 8 to 9 kg/cm<sup>2</sup> pressure, reducing steam consumption from 77 tons/hr to 44 tons/hr.

This has resulted in saving of 47.70 Rs. Lakhs

- **Replacement of Low Pressure Vapour Absorption Refrigeration machine by energy efficient high pressure Vapour Absorption Refrigeration machine.**

There is 480 TR VAR machine running on low pressure steam consuming 77 Tons of steam per day. Steam produced from DG boiler is used after reducing its pressure from 10 kg/cm<sup>2</sup> to 3 kg/cm<sup>2</sup> which is direct loss of energy. So low pressure VAR machine was replaced with High pressure VAR machine.

This has resulted in to saving of 34.53 Rs. Lakhs.



**DOUBLE EFFECT VAPOUR ABSORPTION & REFRIGERATION MACHINE**



**SINGLE EFFECT VAPOUR ABSORPTION & REFRIGERATION MACHINE**

**v) Energy Conservation Plans & Target**

With quest for excellence, the company is marching ahead to achieve the lower energy consumption in the plant. Some major future plans for this are:

1. Replace spinning (SPG) exhaust Fan No.2, 3 & 12 in Rayon Plant with energy efficient fan, expected saving Rs. 12.17 Lakhs per year
2. Installation of VFD in various plants, expected saving Rs. 49.86 Lakhs per year.



e identified spinning air washer fans with new efficient fan, expect  
.....4 Lakhs per year.



B K BIRLA GROUP OF COMPANIES

## Environment and Safety

### ENVIRONMENT & SAFETY POLICY

*This policy is an indispensable and integral part of our organization's core policy of Quality, Productivity, and Customer Satisfaction.*

*“We are committed to provide safe and healthy working conditions on the work premises as also to assure a safe and eco-friendly neighborhood. To achieve this objective:-*

- All statutory norms related to safety, health and environment shall be adhered to in letter and spirit.*
- Required resources – man, material and money – shall be made available to ensure a state of full preparedness at all times.*
- Extensive training and awareness programs shall be conducted regularly.*

*Everyone, therefore, would carry out his assigned responsibility and contribute in effective implementation of this policy.”*



### **Plantation**

Century Rayon lays high emphasis on Environmental improvement program like trees planting in its premises and surrounding areas. A record number of 25080 saplings have been planted during last 10 years. The company spends an approximate sum of Rs. 2 Lakhs every year on plantation. Century Rayon has developed dense and beautiful gardens at the famous Ganpati temple at Titwala. A children's park namely Shivaji Udyan opposite to famous Vithoba Temple with hundreds of trees and lot of greenery is a testimony to the company's commitment in this regard.

### **Pollutants Management**

Air pollutants – SO<sub>2</sub>, CS<sub>2</sub>, H<sub>2</sub>S, SPM, Cl<sub>2</sub>, HCl are main air pollutants from our plant. To take care of these, we have installed SO<sub>2</sub> scrubbers, chimneys, ESP and sensors for detection, since beginning of the plant.

Water effluent – Total suspended solids, COD, BOD, Zinc, Oil, Grease are main pollutants. A 15000 M<sup>3</sup>/day full-fledged effluent treatment plant neutralizes these pollutants. In the year 1999, we have achieved zero-effluent status of our Chemicals plant after stopping mercury cells for caustic.

### **Safety**

Safe working has become part of our culture. The vast safety implementation program includes trainings, inspection rounds, safety committee, suggestion schemes, safety a tion & exhibition, safety audits, workshops, 5S implementation,



## ***SCHEME: I – Heat Recovery from DG cooling water in power plant.***

### **Preamble**

400 M<sup>3</sup>/hr filter water is circulated through DG Engine Jacket and lube oil cooler for removing the heat generated in the engine. This heat is dissipated in the cooling tower for maintaining the DG operating temperature.

### **Action**

Additional plate type heat exchanger was installed in series with jacket water circulation line to pre heat boiler feed water by recovering heat from jacket water of engine.

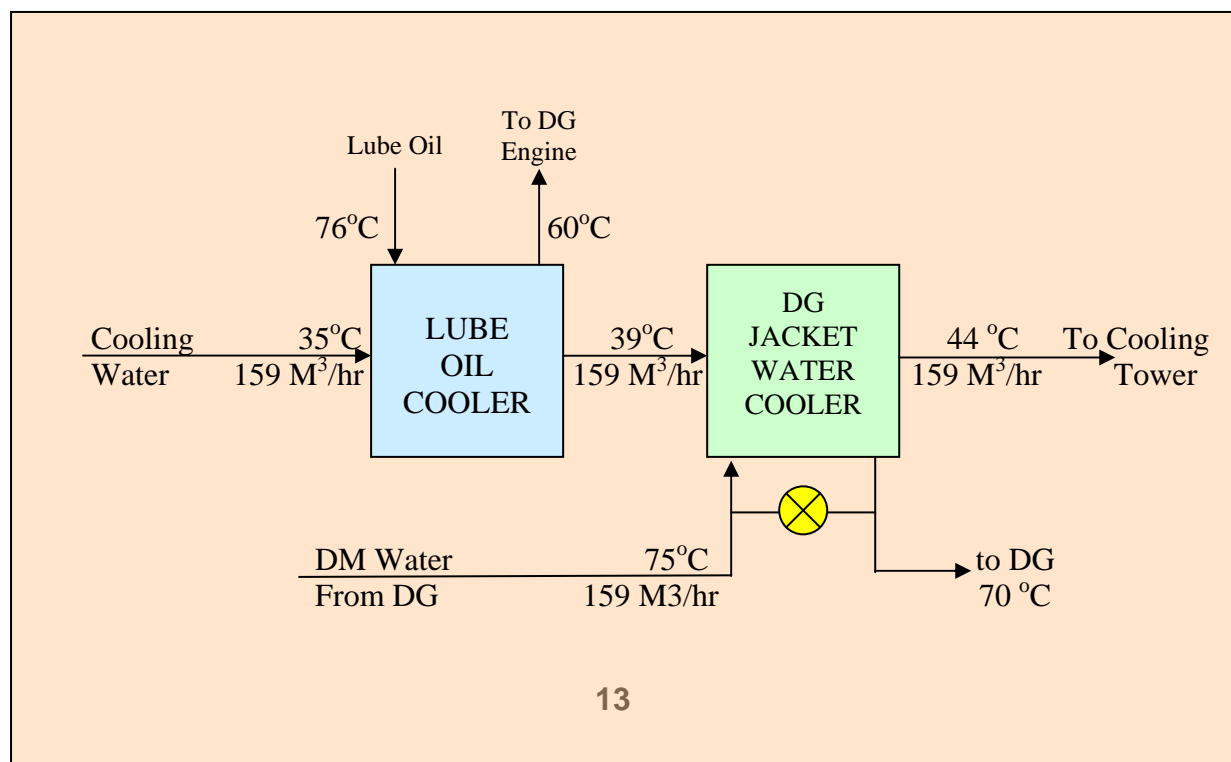
### Benefit

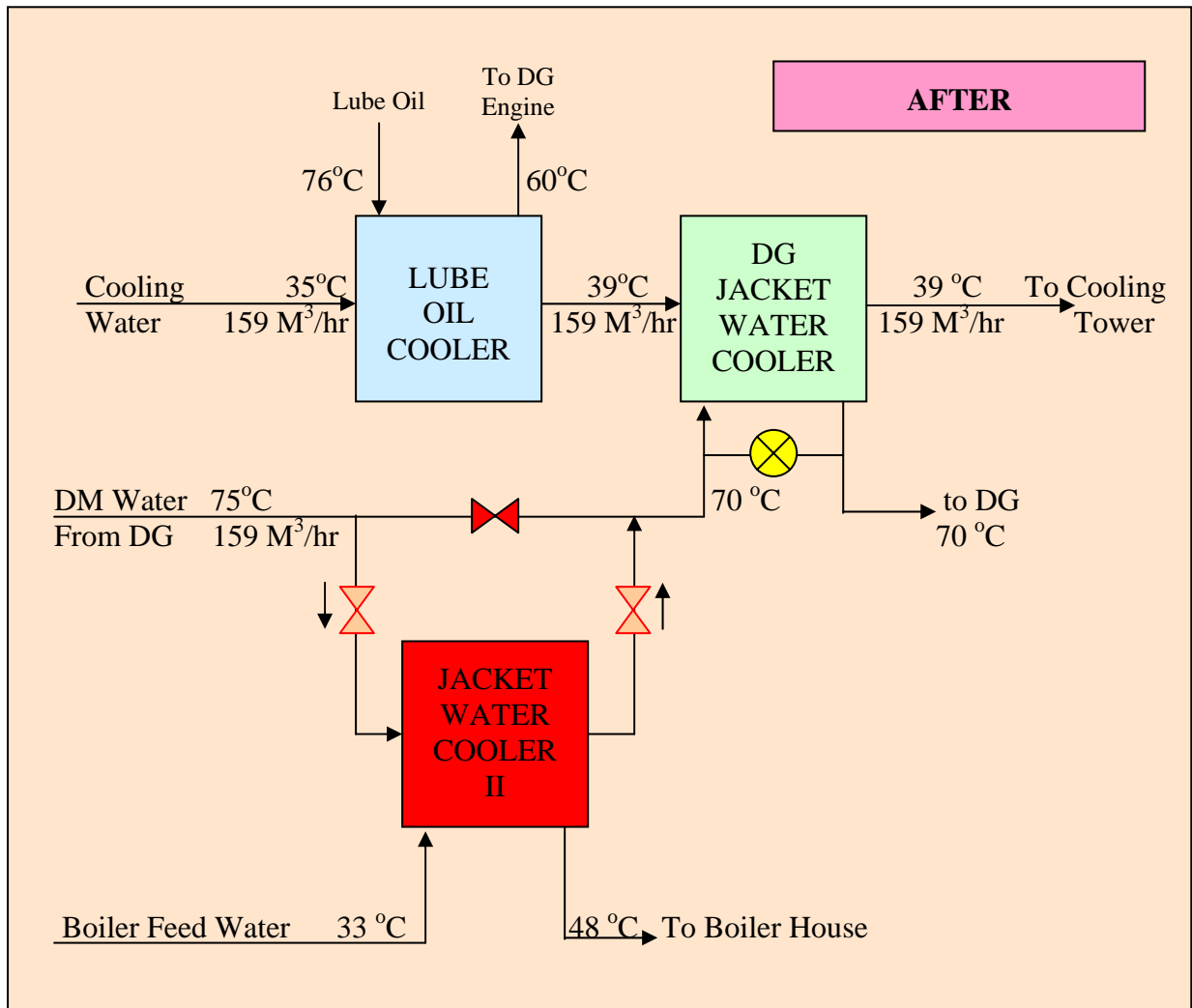
This has resulted in a saving of 58 Tons of LP steam in boiler feed water heating.

### Economics

Investment	:	Rs. 12.83 Lakhs
Calculation:		
Cost of HP Steam Saving/Year	:	Rs. 95.02 Lakhs
Power generation Loss due to steam reduction	: (-)	Rs. 70.04 Lakhs
Net Saving	:	Rs. 24.98 Lakhs

Period: : 6 Months







**SCHEME: II** – *Provided variable frequency drive for chilled water pump in Rayon Plant.*

### **Preamble**

Refrigeration load of Rayon plant is maximum 900 TR in summer and 600 TR in winter. Accordingly the chilled water requirement is 690 m<sup>3</sup>/hr in summer and 525 m<sup>3</sup>/hr in winter. 4 Nos of chilled water pumps of capacity 463 m<sup>3</sup>/hr are installed, out of which, 2 pumps are operating at total capacity of 926 m<sup>3</sup>/hr. thus pumps are operating at higher capacity and head required. Since the individual equipment in the chilled water system has got separate automatic temperature control, the excess capacity of pumps is lost as pressure drop across control valves.

1 No VFD has already been installed to regulate the speed of one pump according to the requirement and the results achieved are encouraging.

### **Action**

Another VFD installed on second pump. This has resulted into running of two pumps at lower speed, whenever chilled water requirement is reduced. The setting of VFD is based on the discharge pressure of the pumps.

### **Benefit**

The power consumption reduced by 10.6 units during summer (220 days) and 8.4 units during winter (110 days). Resulted in total power saving of 78000 units per year.

### **Economics**

Investment : Rs. 5.00 Lakhs

Saving (78000 Kwh x Rs. 3.30/Kwh): : Rs. 2.57 Lakhs

Payback Period: : 23 Months



**SCHEME: III:** *Replaced Star Delta Starter with Star Starter for Exhaust fans (No. 4, 5 & 6) in Rayon Plant*

**Preamble**

It is observed that exhaust fan no. 4, 5 & 6 of rayon plant are running on less than 50 % load with start delta starter and consuming normal power.

**Action**

Existing start delta starter is made star to reduce the power consumption

**Benefit**

This has resulted total saving of 46.2 Kw per hour.

**Economics**

Investment : Rs. 0.00 Lakhs

Saving (46.2 Kw x 24 Hrs x 300 days x Rs. 3.30/Kwh): : Rs. 10.98 Lakhs

Payback Period: : Immediate

**SCHEME: IV:** *Replacement of two Hot well pumps with energy efficient pumps in Rayon plant.*

### **Preamble**

Presently there are two calcination Hot Well pumps (1 Running + 1 Standby). These pumps are very old and inefficient.

### **Action**

These two pumps are replaced with energy efficient pumps

### **Benefit**

Reduction in power consumption from 19.5 Kw to 13.2 Kw, resulted in net saving of 6.3 Kw per hour.

### **Economics**

*Investment* : Rs. 1.70 Lakhs

Saving (6.3 Kwh x 24 Hrs x 365 days x Rs. 3.30): : Rs. 1.82 Lakhs

Payback Period : : 11 Months

## **SCHEME V: Stopping of two air compressor**

### **Preamble**

There are six air compressor in engine room and three air compressor in after treatment plant, which cater for compress air requirement of the whole plant. Out of these compressors three are running in engine room and two are running in after treatment plant to meet the requirement.

### **Action**

It was observed that total air requirement of 450 cfm can be meet by running only three compressors in engine room. So two no of air compressor in after treatment plant.

### **Benefit**

The Total electrical saving of 324 units per day.

### **Economics**

<i>Investment</i>	: Rs. Nil
Saving (324 Kwh x 330 days x Rs. 3.3):	: Rs. 3.54 Lakhs
<u>Payback Period:</u>	: Immediate

**SCHEME: VI:** *Providing lead compartment plates between pots in 63 spinning machines*

### **Preamble**

In spinning machines, Spinning pots are rotating at 7800 RPM. This is producing cross current of air between the adjacent pots. This cross current of air increases the electrical load of machines.

### **Action**

Lead compartment plates are installed between the each spinning pots to overcome the cross current of air between the pots.

### **Benefit**

Power saving of 20 Kwh / day / machine

### **Economics**

Investment (This is done during overhauling of these m/cs) : Rs. 00.00 Lakhs

Saving (20 Kwh x 350 days x Rs. 3.30 x 63 M/c): : Rs.14.56 Lakhs

Payback Period: : Immediate

**SCHEME: VII** – *The Light weight Reinforced Carbon backelite pots for spinning machines.*

**Preamble**

There are 118 spinning machines, each spinning machines has 132 spinning pots. These pots rotate at about 7000 rpm. Material of construction of spinning pot is steel reinforced backelite. The weight of the pot is 2.8 Kg and the power consumption with these spinning pots is 581 Kwh per machines per day.

**Action**

Lightweight Carbon Fiber Reinforced backelite spinning pot are being used in place of Steel Reinforced backelite spinning pots.

**Benefit**

The power consumption in spinning machines with lightweight carbon fiber reinforced spinning pot are reduced by 32 Kwh/Day/machine.

**Economics**

*Investment* : *Rs. 0.00 Lakhs*

Saving: (32 Kwh x 24 m/c x 365 days x Rs.3.3/Kwh) : Rs. 9.25 Lakhs

Payback Period: : Immediate

## Scheme-VII

### Light Weight Spinning Pot made from Reinforced Carbon Fiber

Sr. No.	Details	Spinning Pots		
		Steel Reinforced	Carbon Fiber Reinforced	Difference
1	Type of Spinning Pot	Steel Reinforced	Carbon Fiber Reinforced	Difference
2	Weight of Spinning Pot, Kgs	2.80	2.20	0.60
3	Power consumption/Spinning M/c. Kwh	581	549	32
4	Total Number of Spinning Machines	118		-
5	No. of Machines running with carbon reinforced spinning pot	24		-
6	Saving achieved in 15 machines (32 × 365 × 24 = 280320 Kwh /annum) Kwh/annum Rs./annum	2.80 Lakhs 9.25 Lakhs		- -
7	Total No. of machines to be replaced with carbon reinforced spinning pot	79		-
8	Saving Potential Kwh/annum Rs./annum	9.22 Lakhs 30.45 Lakhs		-



CARBON REINFORCED SPINNING POT

**SCHEME: VIII:** *Provided variable frequency drive for Raw Acid Pump in Tyre cord Plant.*

**Preamble**

3 pumps of 65 Kw and one of 45 Kw of Acid pumps are connected in parallel. 3 pumps are continuously running, with throttling of control valve as required.

**Action**

Three nos. of VFD are installed on Raw acid pumps of 65 KW each and run these pumps at equal discharge.

**Benefit**

Power consumption is reduced by 24.5 Kw per hour.

**Economics**

*Investment* : Rs. 15.00 Lakhs

Saving (24.5 Kw 24 Hrs x 365days x Rs. 3.30/Kwh): : Rs. 7.08 Lakhs

Payback Period: : 25 Months.

**SCHEME: IX:** *Provided variable frequency drive for cooling water pumps in Tyre cord plant.*

### **Preamble**

There are 4 nos of cooling water pumps in Tyre cord spin bath. They are continuously running in parallel, out of these 4 pumps one pump is running in throttle condition to maintain the required water quantity for cooling.

### **Action**

One VFD is installed on one cooling tower pump and vary the speed to maintain the discharge.

### **Benefit**

This has result into net saving of 28 Kw per hour.

### **Economics**

*Investment* : *Rs.15.00 Lakhs*

Saving (28 Kw x 24 Hrs 365 days x Rs.3.30/Kwh): : Rs. 8.07 Lakhs

Payback Period: : 22 Months

**SCHEME: X: *Trimming of Impeller of Engine Room Condenser Pump No. 5 of Tyrecord Plant.***

**Preamble**

Condenser water pump is used to re-circulate condenser water from chiller to cooling tower and back to chiller. This pump is running continuously for 24 Hrs.

**Action**

It was observed that pump is having 27 Mtrs head, whereas actual head required is only 18 Mtrs. So the pump impeller is done and diameter is reduced from 312 mm to 290 mm.

**Benefit**

The power consumption has reduced from 51.75 KW to 45.93 Kw.

**Economics**

*Investment* : Rs. 0.00 Lakhs

Saving(5.82 Kw x 24 Hrs 365 days x Rs.3.30/Kwh) : Rs. 1.67 Lakhs

Payback Period: : Immediate

**SCHEME: XI:** *Stopping Cooling Tower by utilizing Hot Filter water of turbine oil Cooler in Power Plant.*

### **Preamble**

20 Hp cooling tower pump is running for filter water circulation through turbine oil cooler for cooling lubrication oil to maintain bearing temperature. It is observed that differential temperature of cooling tower water is very low. i.e. 3°C in place of 8°C

### **Action**

Turbine cooling system is connected with DM plant suction for once through system with a booster pump of 5 HP.

### **Benefit**

This has resulted reduction in power consumption from 17 Kw to 3.72 Kw resulting in total electrical saving of 1.16 Lakhs Kwh per year

### **Economics**

*Investment* : Rs. 1.20 Lakhs

Saving (13.28Kw x 24 Hrs 365 days x Rs.3.30/Kwh) : Rs. 3.84 Lakhs

Payback Period: : 4 Months

**SCHEME: XII:** *Running Low pressure turbo oil pump in place of electricity driven oil pump in Boiler House.*

### **Preamble**

10 HP LSHS oil pump was continuously running for oil circulation for emergency oil firing in boiler, but the oil burners are rarely used and the pump is running unnecessarily and consuming power.

### **Action**

Turbo oil pump is run instead of electrical driven pump.

### **Benefit**

Reduction in power consumption 146 Kwh per day against the steam consumption of 0.35 Tons per day

### **Economics**

*Investment* : Rs. 0.27 Lakhs

Calculations:

Electrical: (6.1 Kw x 24 Hrs 365 days x Rs.3.30/Kwh) : Rs. 1.76 Lakhs

Less: Steam Consumption (0.35 MT x 365 x Rs.150) : Rs. 0.19 Lakhs

Total Saving : Rs. 1.57 Lakhs

Payback Period: : 2 Months



**SCHEME: XIV:** *Replacement of Low Vapour Absorption Refrigeration machine by energy efficient high pressure Vapour Absorption Refrigeration machine.*

### **Preamble**

There is 480 TR VAR machine running on low pressure steam consuming 77 Tons of steam per day. Currently steam produced from DG boiler is used after reducing its pressure from 10 kg/cm<sup>2</sup> to 3 kg/cm<sup>2</sup> which is direct loss of energy

### **Action**

Low pressure VAR machine is replaced with High pressure VAR machine.

### **Benefit**

Steam consumption of HP VAR machines is 44 tons per day instead of 77 tons per day in LP VAR machines. Therefore the total saving of steam 26 TPD (80% of 33 TPD), which is equivalent to 5.65 TPD of coal.

### **Economics**

*Investment* : Rs. 60.0 Lakhs

Saving (5.65 TPD x 270 days x Rs. 2263 / Ton): : Rs. 34.53 Lakhs

Payback Period: : 21 Months



# ORGANIZATIONAL STRUCTURE WITH RESPECT TO ENERGY CONSERVATION

