

**ITC LIMITED**  
**Paperboards & Specialty Papers Division**  
**Bhadrachalam Unit, Sarapaka (Andhra Pradesh)**

***Unit Profile***

Promoted by ITC limited, Bhadrachalam Paper Division was incorporated on 17th July 1975, manufacturing high quality paper and paperboards for printing and packaging. During the year 2003-2004, the company produced 2,36,911 tons of paper and paperboards against the installed capacity of 1,82,500 tons with a Capacity utilization of 129.8%. In the Indian market ITC-PSPD commands a market share of 18% by volume. Since inception ITC PSPD has won 67 awards in various areas out of these, 36 are in Energy and Environment front. Exports are to the tune of 15 % of total production. Premium products manufactured on one of state of art board machine are import substitution for major FMCG packing industry.

The company installed state-of-the-art Elemental Chlorine Free pulp mill in the year 2002 having a production of 330 tons bleach pulp with an investment of Rs. 200 crores which has resulted in huge reduction in energy, chemicals, water, etc., etc. In the year 2004-2005 ITC-PSPD unit Bhadrachalam has installed Turbo-Generator set of 18.5 MW and paper machine-5 (PM-5) having capacity of 100000 TPA.

ITC-PSPD, unit Bhadrachalam has exclusively setup an energy cell in 1986 and appointed a dedicated Energy Manager on a full time job with one engineer in each discipline to Audit Energy on all ENCON activities.

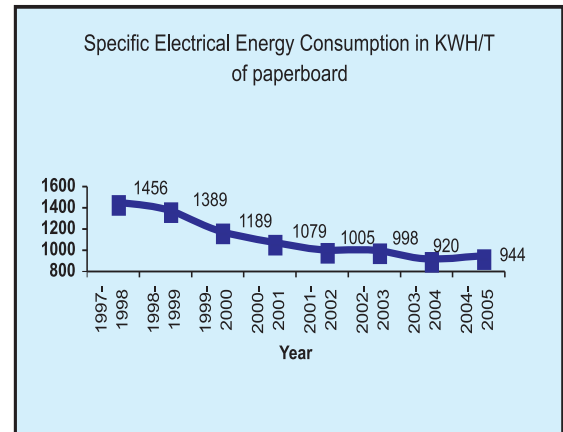
The unit has its own plantation makes available high-yielding disease resistant clonal planting stock developed through biotechnology, with the use of these clonal plantations farmers have brought 16000 hectares under these plantations. The clones are procured by forest department of Andhra Pradesh, Karnataka, Tamil Nadu, Maharashtra and West Bengal in all 8000 hectares have been planted.

ITC-PSPD Bhadrachalam Unit has planted high yield eucalyptus 300587 in just 20 minutes in Khammam district thereby entering Guinness book of world records

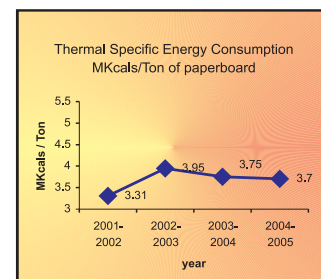
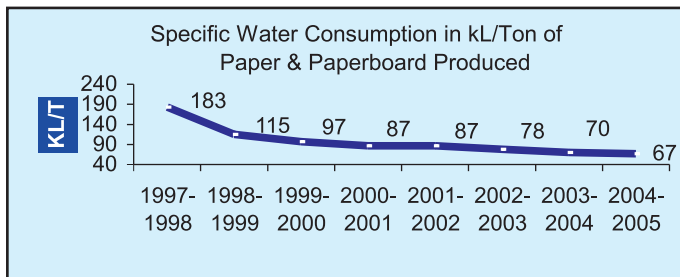
The Unit has put enormous efforts to reduce energy, chemicals, water consumption by updating the technology and constantly strives to bring the consumption of all inputs at par with international practices.

## Energy Consumption

DESCRIPTION	UNIT	2002-03	2003-04	2004-05
Annual Production	tonnes	238264	236911	256061
Total Electrical Energy consumption	Lakhs kWh	2378	2180	2417
Specific Energy Consumption-Electrical	kWh/T	998	920	944
Total Thermal Energy consumption	Million Kcal	941143	888416	947426
Specific Energy Consumption-Thermal	Million kKcal/t	3.95	3.75	3.7
Total Manufacturing Cost	Lakhs Rs.	55178	58700	64007
Total Energy Cost	Lakhs Rs.	5103	6234	7092
Energy cost as %age of Total Manufacturing cost	%	7.38	10.83	11.08



ITC-PSPD, unit Bhadrachalam like any other pulp and paper company is highly energy intensive. The senior management who are policy makers, have given a very high priority for Energy Conservation activities is because of technology which the energy, chemical and water reduction on decline tendency year after year.



## Energy Conservation Commitment, Policy and Set up

### Commitment

At ITC-PSPD, Bhadrachalam unit, the company's main objective is to operate a modern, cost-effective, energy efficient and environment friendly production plant. The management commitment towards Energy Conservation is as under :

- Use Energy but very efficiently.
- Target better than design
- Bench mark with International best
- Energy auditing and monitoring for all sections to micro level and eliminate waste.
- Replace the inefficient systems with efficient ones at the first available opportunity.
- Use of SCADA systems for Energy monitoring.
- Keep track of latest technological developments in pulp & paper and upgrade the plants as soon as the schemes becomes viable.

- h) Engaging experts / external consultancy for study of various equipment efficiency and ways and means to improve the operating efficiency of the various equipments.
- i) Organise visit to various pulp & paper mills to study and understand the operation and gather data for study and actions to be initiated in particular to the equipments which are operating at lower efficiencies.
- j) Minimum procurement of purchased power.
- k) In-house co-generation should be maximum possible.

At ITC Bhadrachalam, the vision of Energy Conservation of the founders was turned into a mission by the successors. The concept was converted into culture. Commitment of the Top Management trickled down to all levels. Electrical Department acting the role of a facilitator, the Process adopted energy conservation as a regular function.

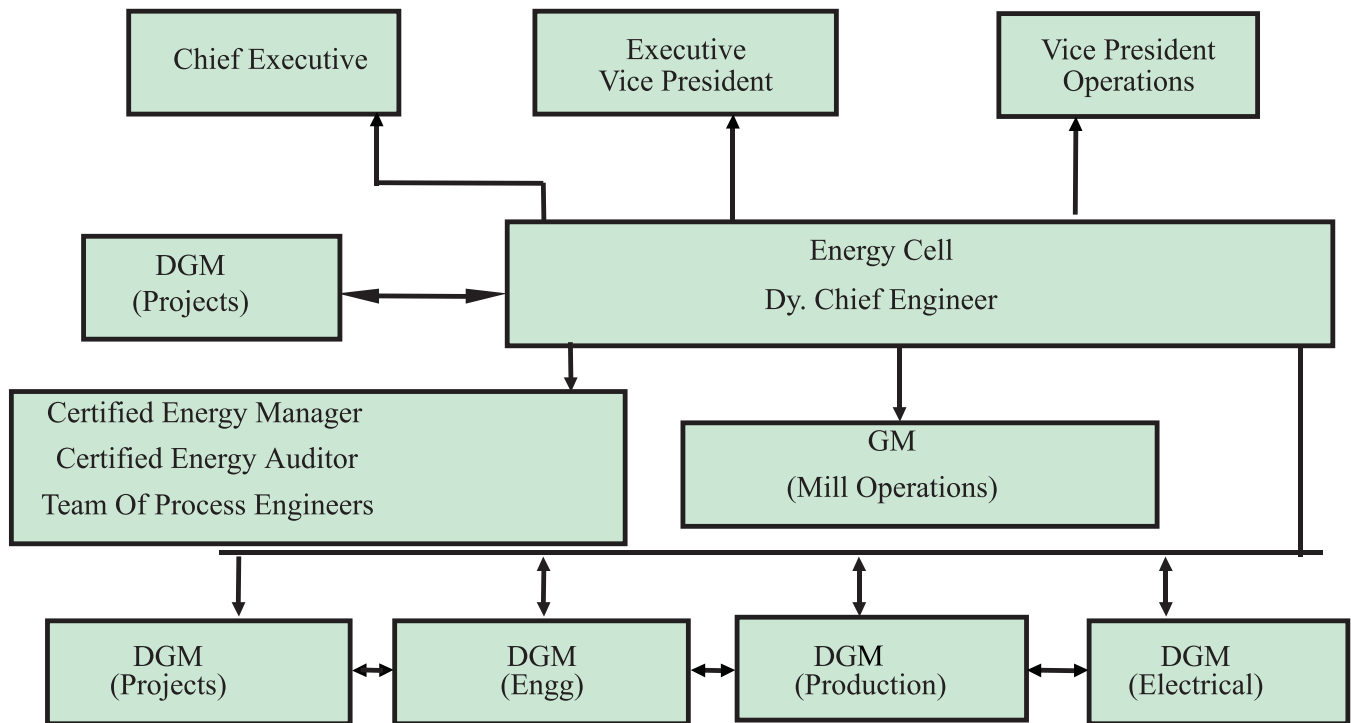
Regular monitoring of the energy usage pattern is day-to-day activity in the company and is done by top most levels. Energy Consumption is monitored at macro and as well as micro level.

The culture of the company is to constantly modernize the mill with the equipment of latest technology, which are environmentally friendly, and energy efficient. Since inception of the company it has been practice to work always on system efficiency and this guiding factor has been followed in day-to-day activities and as well as in the project stage. The commitment to greening the environment is visible in the mill and the town of Bhadrachalam through the gardens and plantations being maintained by ITC Bhadrachalam.

In the year 2002-2003, ITC-PSPD Bhadrachalam Unit has installed India's most Modern plant with Elemental Chlorine Free Pulp-Mill 300TPD (and old Pulp-Mill 200TPD has been stopped). Soda Recovery Boiler having 650TPD black liquor solids firing and Lime re-burning Plant augments the Pulp Mill. The payback is of 3 year 10 Months with an investment of 200 crores. All the additions in equipments have very marginally increased the Specific Energy in view of Energy efficient equipment selected

In 1980 ITC-PSPD felt the implementation of EnCon and identified a separate section and certified energy managers to head all EnCon activities to give maximum thrust. Chief Executive and Executive Vice-president personally involve and see the achievements.

## Energy Conservation Set Up:



## Energy Conservation Achievements

During the period 2004-2005, ITC-PSPD Bhadrachalam unit has implemented 80 ENCON projects from in-house expertise and as well as from external consultants. The effort has resulted in savings of Rs 988 lakhs was achieved with an investment of Rs 2851 lakhs.

Three major Projects implemented during the year 2004-2005 are given below

1. Replacement of 2 x 27TPH at 42ata 405C stoker fired boiler and 1 x 20TPH 11ata by 1 x 90TPH at 62ata 480C AFBC boiler to increase boiler efficiency and reduce heat rate of co-generation system.

### Impact of implementation:

Efficiency (Direct) of old boilers	: 55%
Efficiency (Direct) of new boilers	: 78%
Increase in efficiency of steam generation	: 23%
Coal consumption for 35TPH of steam (Old)	: 7TPH
Coal consumption for new boilers	: 6.25TPH
Saving in coal consumption	: 0.75TPH
Annual operating hours	: 7500h
Coal savings	: 5625 ton
Annual savings @ Rs.1600/ton	: Rs.90 Lakhs



**2. Replacement of extraction cum back pressure type 1 x 5MW with 42ata 405C steam by 1 x 18.5MW with 62ata 480C steam of same type to improve energy efficiency of co-generation system.**

**Impact of implementation:**

Output rate of 5MW turbine	: 88kwh/ton
Output rate of new turbine	: 110kwh/ton
Increase in output rate of turbine	: 22kwh/ton
Avg. steam flow through 5MW unit	: 45TPH
Additional power generation per hour	: 990kwh
Equivalent steam savings	: 11.25TPH
Equivalent coal saving@5.6 steam coal ratio	: 2.00TPH
Annual operating hours	: 8000h
Additional annual generation	: 16000 ton
Annual savings @ Rs.1600/ton	: Rs.256Lakhs



**Old 5 MW TG**



**New 18.5 MW TG**

**3. Installation of improved system with new plate type heat exchanger to recover heat from blow heat released from digester blows.**

**Impact of implementation:**

Reduction in steam consumption	: 80 ton/day
Steam coal ratio	: 5.6
Reduction in coal consumption	: 14.2 ton/day
Annual operating days	: 330days
Annual coal savings	: 4686 ton
Annual savings @ Rs.1600/ton	: Rs.74.97 Lakhs



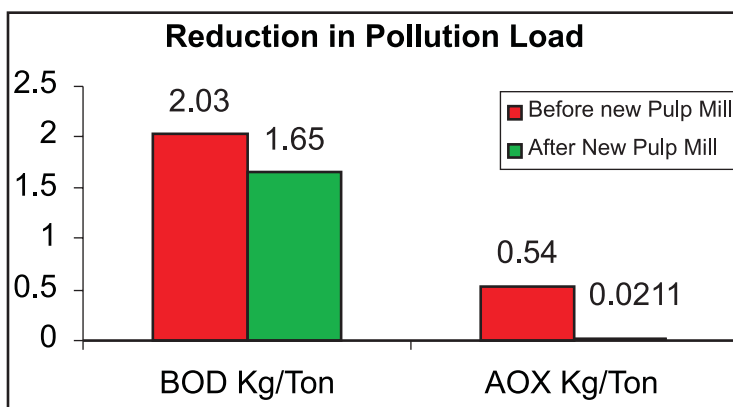
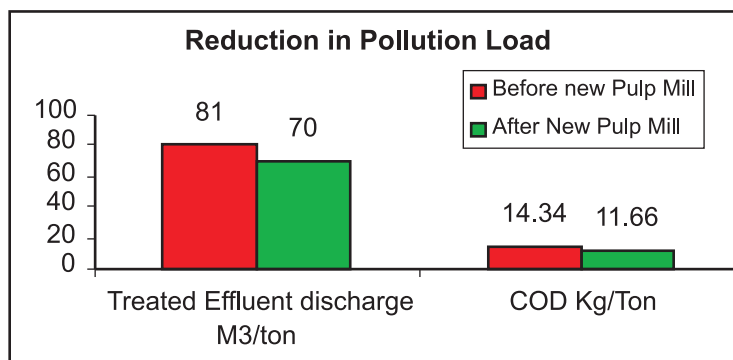
## Energy Conservation Plans and Targets

For the period 2005-2006, ITC-PSPD Bhadrachalam unit has Targeted for 56 ENCON projects with in-house expertise and as well as with external consultants. The efforts will result in an annual savings of Rs 1189.67 lakhs with an investment of Rs 844.35 Lakhs (payback of 9 months).

## Environment & Safety

### Environment

ITC-PSPD (Bhadrachalam unit) as per the environmental policy committed for continual up gradation of technology, which generates less pollution, use of less water consumption, use of effluent water to paddy fields and high yield Eucalyptus plantations are taken as prime importance at ITC-PSPD (Bhadrachalam unit). It's worth to note Chlorine dioxide plant has been designed and commissioned for zero effluent discharge



### Safety

The plant has been rated very high in terms of safety. ITC-PSPD (Bhadrachalam unit) always imparts training on Environment & Safety to all the employees to get the maximum benefit.

**BALLARPUR INDUSTRIES LIMITED**  
**Bhigwan, Pune (Maharashtra)**

**Unit Profile**

Ballarpur Industries Limited, unit Bhigwan (formerly known as Bilt Graphic Papers Ltd.) is an ISO 9001, 2000 & ISO 14001,1996 company. It is one of the largest state-of-the-art Paper Mill, with a capacity to manufacture 1,15,000 tpa of coated wood free paper of various grades based on 100% imported pulp at village Bhadalwadi, Taluka Indapur, Dist. Pune, Maharashtra.



Stock Preparation



Paper Machine



Off Machine Coater



Re-Reeler



Super Calander



Sheet cutter



Despatch



Wrapmatic

## Manufacturing process

The process starts from stock preparation where slushing in pulpers, deflacking, refining, centri cleaning activities are carried out. Refiners, pulper are run by 500 KW, 350 KW HT motors respectively. In Paper Machine on line coating is done at BTG coater and base paper is produced. This base paper is processed in OFF MACHINE COATER to produce coated paper. The coater has 4 coating stations with Electrical Infra red dryers and 4 cylinder groups where steam is used for paper drying. The coating chemicals / colour is produced in colour kitchen. The coated paper is processed in the fully automated Finishing house equipped with Super calendars, Rewinders, Synchro fly sheet cutter, ream wrapping machines and bundling machines.

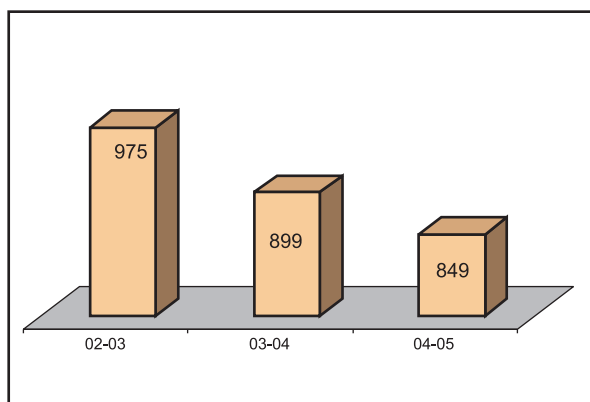
The 30 MW cogeneration thermal power plant is equipped with High pressure CFBC boiler and extraction cum condensing turbine. Steam requirement for the paper plant is supplied thru extraction and power is generated partly (20%) with extraction and mostly (80%) by condensing. The balance power after meeting the paper plant requirement is exported to MSEB grid. The process flow chart with equipment details is enclosed for reference.

### **Energy Consumption**

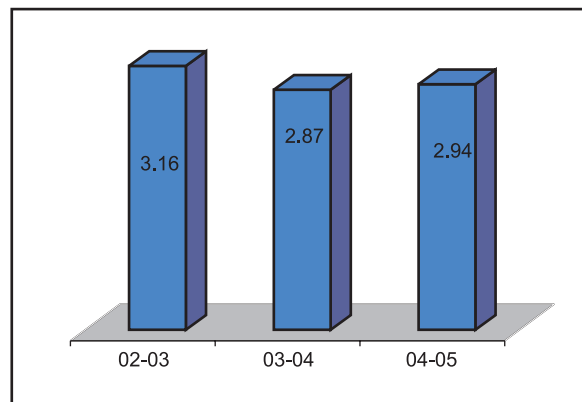
With consistent effort and sustained focus on Energy consumption, controlled use, its analysis and implementation of various energy consumption projects the specific energy consumption has reduced and the production quantity along with quality is improved.

Description	Unit	2002-03	2003-04	2004-05
Annual productionMT	102045	113102	116907	
Electrical Energy Consumption	Lakh KWH	994.47	1016.29	992.05
Specific electrical Energy Consumption	Kwh / Ton	975	899	849
Specific Thermal Energy Consumption (Steam)	Ton /Ton	2.78	2.49	2.58
Specific water Consumption	Cub. Mtr /Ton	26.68	24.39	22.45
Energy cost as % of manufacturing cost	%	11.30	10.24	11.25
Coal GCV	KCAL	4355	4603	4608
Coal cost	Rs / Cal	0.40	0.39	0.48

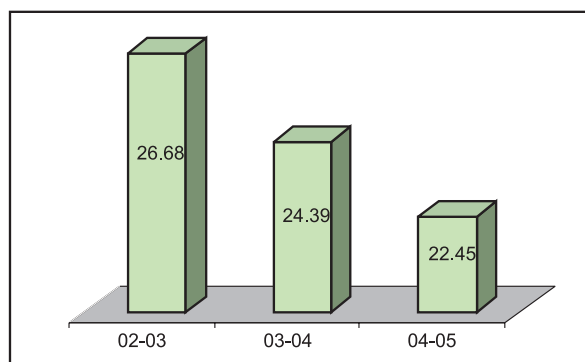
**Specific Electrical Energy Consumption (KWH/Ton)**



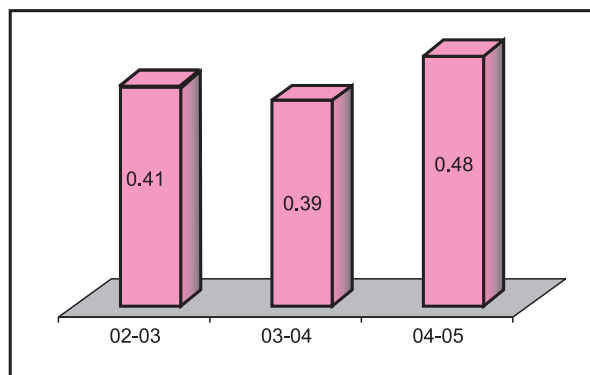
**Specific Thermal Energy Consumption (Steam ton / Ton)**



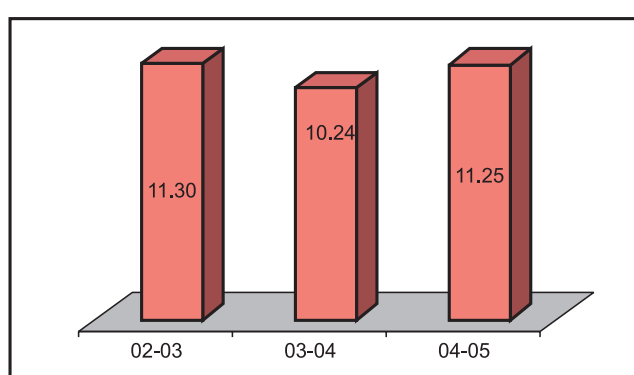
**Specific Water Consumption (Cub.Mtr / Ton)**



**Increase in coal price (Rs / Cal)**



**Energy cost as a % of Manufacturing cost**



## **Energy Conservation Achievements**

Plant is committed for effective energy utilization. In the year 2004 – 05 , eight major energy saving projects are implemented. The investment made is Rs 206.50 Lakhs resulting in total saving of around Rs 273.57 lakhs.

**The summary of projects is as below:**

### **1. Installation of Variable Frequency Drives**



Annual Savings : Rs 104 Lakhs

Investment made : Rs 60.0 Lakhs

### **2. Installation of HT Capacitors**

Annual Savings : Rs 5.46 Lakhs  
(Excluding PF rebate)

Investment made : Rs 10.0 Lakhs



### 3. Installation of Steam Soot Blower



Annual Savings : Rs 93.73 Lakhs

Investment made : Rs 100.0 Lakhs

### 4. Installation of 75 KW pump in WTP

Annual Savings : Rs 8.70 Lakhs

Investment made : Rs 6.0 Lakhs



## **Safety and Environment**

### **Safety**



BILT- Bhigwan's main objective is to attain zero accident. There is separate safety department , taking care for ensuring the safe operation of the plant. Safety ambassador from each dept. are the member of the safety team. Safety ambassador presents the progress to Unit Head in Safety meetings where various types of functional and Cross-functional aspects are addressed. Safety Slogan & Safety Poster Competitions are arranged every year and best ones are rewarded.

## Environment

BILT, Bhigwan is committed to protect environment through its sound environment policy and activities. Plant is ISO 14001 -1996, ISO 9001 - 2000 certified company.

A five-stage state of the art Effluent Treatment Plant, as well as waste management ensures enviro friendly disposal of waste. The mill uses more than 70% of the ETP treated water and is also developing a green belt in and around 700 acre site.



	MPCB Norms	BILT norms	Actual
B.O.D	< 30 ppm	< 10 ppm	2 to 6 ppm
C.O.	< 350 ppm	< 120 ppm	30 to 60 ppm
T.S.S	< 50 ppm	< 10 ppm	3 to 5 ppm
T.D.S	< 2100 ppm	< 700 mpm	500 to 600 ppm

### Verification of Environment efforts:

- ❖ To demonstrate the quality of treated water to nearby farmers, many crops like Pomegranates, Sugarcane, Maize, Wheat, Sunflower and different type of vegetables are grown. Varieties of fruits bearing treesplanted like Banana, Mango, Chiku, Grapes, , lemon, almond, guava, cherry, coconut etc. are planted.
- ❖ Fishes are kept in every stage after secondary clarification to demonstrate the quality of treated ETP water. It is a matter of pride that there is not only 100% Fish survival in ETP water and a sizable amount of multiplication.
- ❖ The water discharged from ETP is used for irrigation purposes by the surrounding farmers.



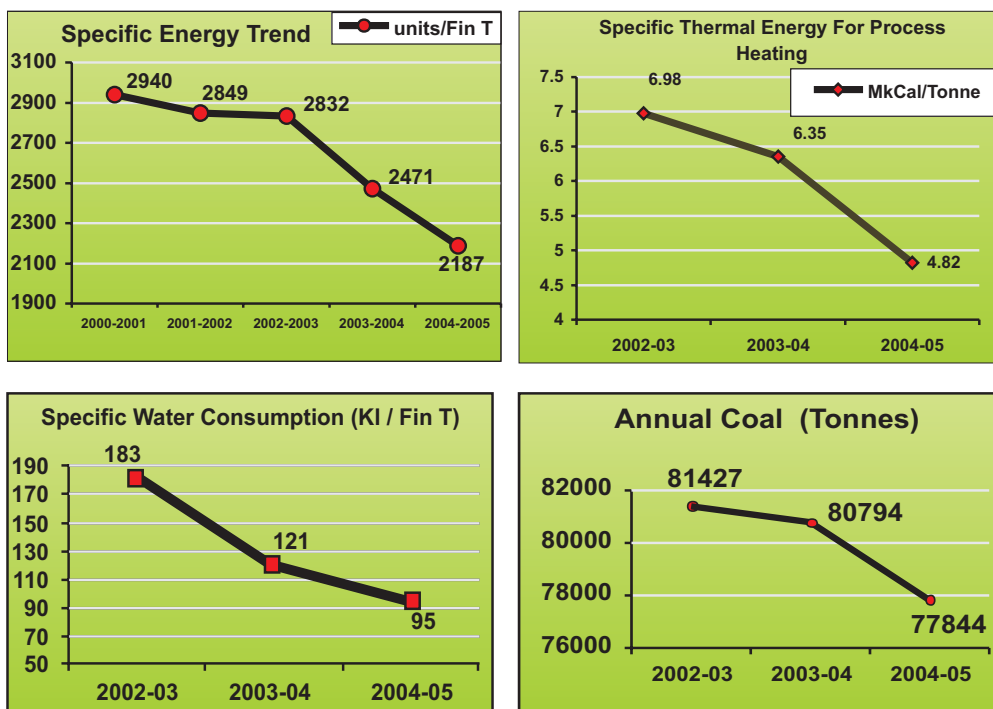
**ITC LIMITED**  
**Paperboards & Specialty Papers Division**  
**Unit : Tribeni, Hooghly (West Bengal)**

**Unit Profile**

ITC Limited, Paperboard and Specialty Papers Division, Unit-Tribeni is a pioneer in the manufacture of a wide range of specialty papers in India. British American Tobacco founded it in 1949 to manufacture papers for the cigarette industry as Tribeni Tissues.

And the mill's capacity was enhanced to 30000 tonnes per annum. At present it has three paper machines, 1,3 & 4 namely. It has developed significant capabilities in product development and other research covering specialty paper through one of the most comprehensive paper laboratories in the country. The major grades of specialty papers produce of Tribeni are cigarettes, décor, insulating, fine printing and other niche segments like matching tissue, faxing base etc.

Tribeni Unit is certified under the ISO 9001 program, since November'1999 and ISO 14001 programs, since Dec 2002 by the Lloyds Register of Quality Assurance, UK. It has achieved the highest level of certification for OHSAS 18001 with DNV. The business emerged runners-up in 2000 in the prestigious Golden Peacock Environment Management Award, instituted by the World Environment Foundation.



## Energy Consumption

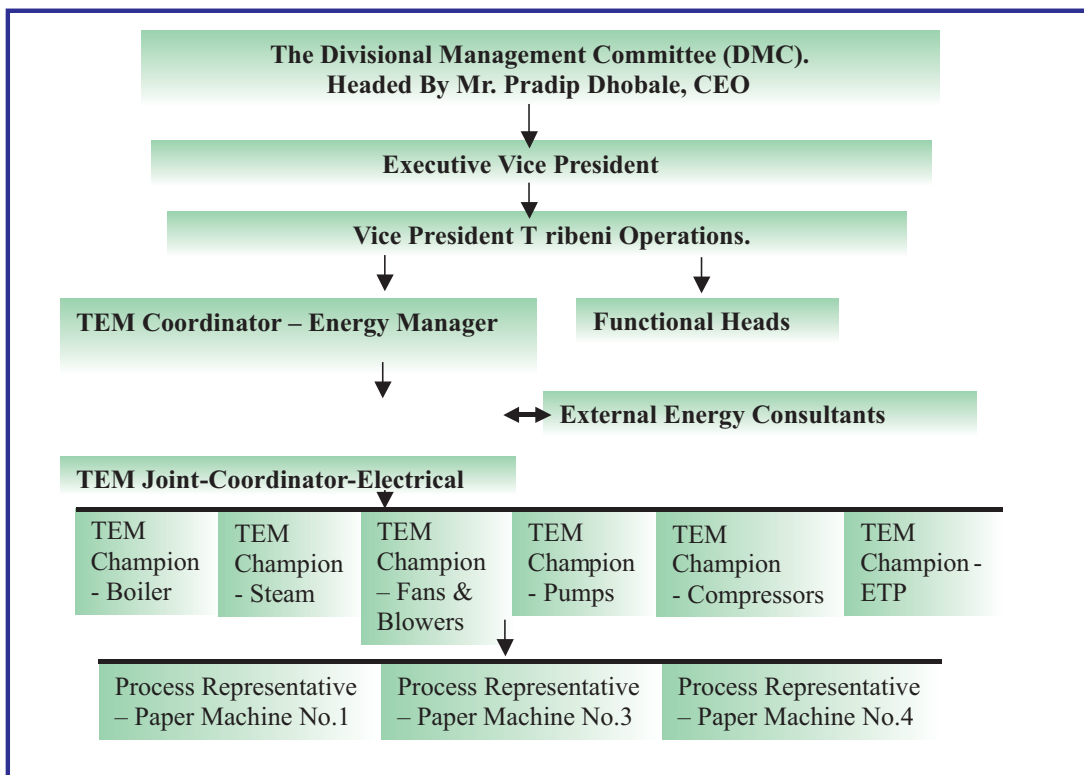
Description	Unit	2002-03	2003-04	2004-05
Annual Paper Production	tonnes	19786	21186	23667
Annual Electrical Energy Consumption	Lakhs kWh	560	524	517
Annual Thermal Energy Consumption	MkCal	138076	134594	114114
Total Energy Cost	Rs.Lakhs	1782	1735	1882
% of Energy Cost with Mfg cost		17	15	15
Specific Energy Consumption	KWh/ton	2832	2471	2187
Specific Thermal Energy Consumption	MkCal/ton	6.98	6.35	4.82

### Salient features of Energy Conservation Cell

As of now, EC Cell is constituted of Electrical, Energy and Process engineering functions which is called as Total Energy Management Committee (TEM) handled by the Group TEM Management Representative mentioned in above playing the role of a catalyst.

At ITC Tribeni, the vision of Energy Conservation were conceptualized in the late eighties. Successive Management thrusts on EC were translated into action plans and implemented with time-bound targets. Commitment of the Top Management trickled down to all levels. Project deptt had been acting as a Facilitator & Executor.

In the year, 2003, thrust to the Energy Conservation (EC) activity was given by the creation of an EC cell headed by a Sr. Manager exclusively qualified and certified for the job. The Process adopted energy conservation as a regular function. The commencement was moderate but within a short time the specific energy trend showed quantum improvement, with machine utilisation and productivity improvements following the fast track. There was an all round spurt in the systematic identification of EC potential in several areas of the Mill,



## Brief description of projects implemented during the year 2004-05.

### Installation of multi-step Capacity controller for compressor by replacing Unload/Full-load control.

Air fluctuation was in the range of 6.1 – 7 kg/cm<sup>2</sup>g i.e, over all pressure fluctuation was around 0.9 kg/cm<sup>2</sup>g which was high, leading to energy losses. Most of the instrument applications required only around 5.5 kg/cm<sup>2</sup>g pressure.

Operating pressure band reduced to 5.5 -5.8-kg/cm<sup>2</sup>g by installing multi-step controller in Two stage KGK make 500 CFM compressor. This consists of a Pressure transmitter with microprocessor and set of solenoid valves. The actual operating pressure can be set with minimum differential pressure. Reduced operating pressure band to 5.5 -5.8-kg/cm<sup>2</sup>g.



**Recurring Annual Savings :** 92000 kWh  
 ≈ Rs. 2.07 lakhs  
**Total Investment :** Rs. 40,000.

### Segregation of Operating pressure (HP & LP) in compressed air lines - replacing single-pressure operation.

Separate High pressure & low pressure air line Existing two mains for lub & non-lub air used with minor modifications. Reduced operating pressure for service air requirements to the lowest possible (<4.0 Kg/cm<sup>2</sup>).

Removed unwanted piping from the circuit. Removed single stage oil-free compressors Operating two-stage compressor for instrument air requirements.

**Recurring Annual Savings :** 510000 kWh  
 $\approx$  Rs. 11.5 lakhs  
**Total Investment :** Rs 3.50 lakhs



### Retrofit of Induced draught fan of IJT boiler with Efficient design Casing & Rotor.

The 96,000 m<sup>3</sup>/h @ 286 mm wc ID of IJT boiler was running with Variable frequency drive since 1995. The type of the impeller was Radial inclined. The ID fan is installed with IJT boiler. The outlet duct was designed in such a way that the resistance of the system was increased.

Retrofitted the existing fan with energy efficient Impeller & Scroll design. Modified the delivery duct of the fan to reduce the resistance of the system

**Recurring Annual Savings :** 191000 kWh  
 $\approx$  Rs. 4.30 lakhs  
**Total Investment :** Rs. 4.0 lakhs



### Process re-routing of PM3 Consistency dilution pump and obtaining water from separate clarified water header, decommissioning of the dilution pump

The consistency dilution pump was oversized & operating away from the BEP duty point. The nearby clarified water pump was supplying the back-water to a group of consumers e.g UTM pulper (approx 100 m<sup>3</sup>/h, few minutes in shift), silo make up (most of the time valve is closed) and couch pit shower (during occasional paper breaks). This pump is also identified as less-loaded & working inefficiently away from optimum efficiency point.

Unit has supplied the consistency water line from the clarified water pump of 108m<sup>3</sup>/hr and dismantled the consistency dilution water pump.



**Recurring Annual Savings** : 65000 kWh  
   ~ Rs. 1.5 lakhs  
**Total Investment** : Nil.

**Replacement of oversized Pump feeding PM3 Drum Thickener Shower with correct sized efficient pump.**

The drum thickener pump was used to supply the Recycled /fresh water continuously to shower, refiner gland sealing and to PM4 shower. The delivery of the pump is connected to common header and the pressure was maintained between 10-12 kg/cm<sup>2</sup>. From the main header, two lines are connected to the Refiner gland sealing with 50% throttling condition and third line is connected to shower of drum thickener and other line is connected with PM4 shower. The Pressure requirement in the refiner gland sealing and shower is 6 kg/cm<sup>2</sup>.



Reduced Operating pressure to 6 barg and installed correct size energy efficient pump. The power consumption across the throttling is totally eliminated. The inefficient way of utilization of the pump is avoided.

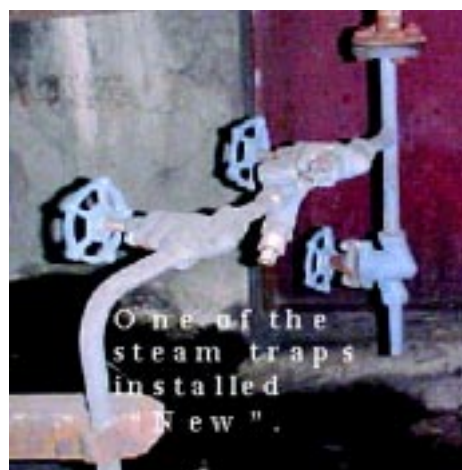
**Recurring Annual Savings** : 24000 kWh  
   ~ Rs. 54,000  
**Total Investment** : Rs. 1.30 lakhs

**Improvement through hardware replacements in Steam Line Insulation and steam traps.**

In this Phase of study on steam system: 12 Nos. steam traps identified with wrong orientation/layout. 10 New trap positions located. 19 stem traps were damaged. 1600 Sq.ft of steam & condensate lines had been identified for improved lagging.

Replaced 31 steam traps. Introduced 10 new traps at identified locations and steam line lagging done during 2004-05.

**Recurring Annual Savings** : 757 tonnes of coal equivalent.  
   ~ 3179.4 Mk.Cal  
   ~ Rs. 15.4 lacs  
**Total Investment** : Rs 16.2 lakhs



**Install De-super heater for Process Steam.**

A Desuperheater for Process steam has been installed in the Turbine Extraction Steam main which is

supplying Heating Steam for the Paper Machines and process. The Temperature of Extraction Steam coming out of the Co-generation plant varies depending of the Electrical Load on the Turbo-Alternator no 2. It is found that the Temperature more often ranges between 180 Deg C to 200 Deg C. The process steam requirement at the Paper Machine end is at 4.00 Kg/Cm2g at which the saturation steam temperature is 151 DegC. Keeping a margin to prevent generation of wetness in steam and possible line heat losses the desired Temperature at sending end ( at Boiler) was fixed at 165 Deg C

Desuperheater System was supplied by M/s. Forbes Marshall ,Pune. Spray water is drawn from the Deaerated Feed water line ( Delivery of Boiler Feed Pump ). The Energy Saving accrued from the Reduction in Overall Surface Temperature of Steam Piping from Boiler to Process as well as from better functioning of the Thermo-compressor Heating System of the Paper Machines ( by way of lower dumping of Steam to Condenser).



**Recurring Annual Savings** : 543 tonnes of coal equivalent.  
 ≈ 2280.60 Mk.Cal  
 ≈ Rs. 9.50 lakhs  
**Total Investment** : Rs 3.04 lakhs

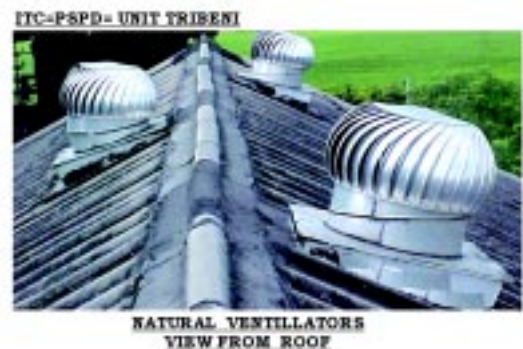
#### Natural (wind Driven) ventilators to replace Power driven Exhaust Fans.

As a means to Trap Renewable Wind Energy Natural Roof Ventilators have been installed to extract the Venting Vapour from Turbine Hall and paper Machine Operating Floors of PM3&4. This has replaced the Power driven exhaust Fans which were running since inception of the power plant.

The Natural Ventilators run with an air velocity which is rather low for wind turbine installation. The Speed and Exhaust air quantity varies on outside air velocity . The number of Ventilators is liberally kept on a higher side to cater for ambient variations.

**A total 12 nos installed in TG Hall and 52 Nos in PM3&4.**

**Recurring Annual Savings** : 86000 Kwh  
**Total Investment** : Rs 5.2 lakhs



#### Other Projects Implemented during 2004-05.

1. Incorporation of water separators in vacuum pumps.
2. Timer operated external lighting.
3. Replacement of belt transmission system with energy efficient system. (Special Wedge Belts instead of old jacketed belts along with dual duty pulleys)

### Energy Conservation plans to be completed during 2005-06.

Energy Conservation Measures (Planned)	Anticipated savings in		Approx. investment (Rs.lakhs)	Project Commencement & Completion year
	Energy Value kWH	Rs. Lakhs		
Replacement of Mechanical Aeration System in Effluent Plant with Diffused Aeration.	430000	10.32	148.4	commenced in April'2005 - to be completed in March'2006.
Replacement of Paper Machine 1 and 3 Dryer's Pocket Ventillation system fans with energy efficient fans.	120000	2.88		
Replacement - Paper machine 1 Pump from Sump to water recycling plant(Dynasand).	32000	0.768		
Replacement - Paper machine 3 Pump from Sump to water recycling plant(Dynasand).	30000	0.72		
Replacement of De-aerator feed pumps in two boilers ( IJT and IBIL) with energy efficient pumps.	55000	1.32		
Cooling water system modifications in Turbo-Generator no 2 with pump replacements.	450000	10.8		
Cooling water system modifications in Turbo-Generator no 3 with pump replacements.	450000	10.8		
Installation of Natural Ventilation devices in Paper Machine buildings and finishing house.	75000	1.8		
Load-based operation of Cooling Tower Fan in Power Plant with Variable speed drive.	60000	1.44		
Heat recovery from Paper Machine Dryer exhaust in Paper Machine 3.	540000	12.96		
Installation of combustion Air Preheater using exhaust flue gas heat.	410000	9.84		
Enhanced temperature/pressure operation of Boiler Deaerators with system modifications	240000	5.76		
Process re-designing at Paper Machine no 4 approach flow system with replacement/retrofit of Fan Pump and Centricleaners.	250000	6		
Recycling of used cooling water from compressor system .	40000	0.96		
Heat recovery from Turbine Gland Vent condenser in Turbo Generator no 3.	120000	2.88		
Replacement of inefficient screw compressors with two stage reciprocating compressor.	80000	1.92		
<b>TOTAL</b>	<b>3382000</b>	<b>81.168</b>		

## **Environment and Safety**

ITC Tribeni is governed by the Corporate EHS guidelines and is focused on sustainable improvements beyond the statutory regulations.

### **a. Best Practices prevailing in our Unit**

- Total Productive Maintenance (TPM),
- 5S,
- Juran Quality Initiative (JQI),
- OHSAS 18001,

### **b. Unit has a Cleaner Production Approach through :**

**Recycling** : Process back water recycling., Recycling of wooden pallets. Broke Paper : segregated & reused. Treated Effluent : partly used in cooling tower.

#### **Waste Minimisation:**

Reduction of shrinkage, Reduction of fibre & filler loss through adoption of latest technology of dual & triple polymer systems for retention programmes. JQI groups actively engaged in shrinkage and variance reductions.

#### **Water Conservation :**

Replacement of fresh water with water from Dynasand in Vacuum pump sealing, Fibre-Miser elutriation, Machine wire showers, Refiner & pump gland sealing and FloorCleaning, Replacement of fresh water for slushing of pulp by Krofta clarified water.

Last year we planned to bring down freshwater consumption level to 102 m<sup>3</sup> / T. Achieved 95 m<sup>3</sup> / T .

#### **Raw Material Management :**

Use of De-inked recycled pulp. Consumption of Eco-friendly products. Gunny packing. Corrugated fibre board container. Re-pulpable adhesive tape. Chemicals with FDA approval.

Pulp sourced from units having sustained forests & ECF bleaching (Bhadrachalam Unit) .

### **Social Responsibilities**

- Water for irrigation (500 acres), Tree plantation, Road islands, Educating society through film shows, Medical support to society, English medium ISC affiliated school, Aid to educational institutions in the vicinity.

### **Housekeeping**

- Adopted 5S principle, Periodic internal & external audit, Initiated TPM activities

### **Non-hazardous Solid Waste**

- Segregated at source, Disposed off as per Standard Operating , Procedure

**HINDUSTAN NEWSPRINT LIMITED**  
**News Print Nagar, Kottayam (Kerala)**

***Unit Profile***

Hindustan Newsprint Limited (HNL), a Subsidiary of Hindustan Paper Corporation Limited, a Govt. of India Undertaking operates one of the largest integrated newsprint mills in the country. The mill was commissioned in 1982 with an installed capacity of 80,000 MT/annum, which was raised to 1,00,000 MT/annum in 1993-94 with major modernization and technological up gradation. The company achieved capacity utilization of 112% consecutively in 2003-04 & 2004-05. HNL's major product is 48.8 GSM newsprint and during the last two financial years, 45 GSM newsprint was also made to cater to the market demand. Also, the company achieved a record sales turnover of Rs 273.9 crores during 2004-05.

HNL has undergone a number of major plant modernization and technological up gradations like commissioning of environment friendly and energy efficient 100 TPD De-inking plant in December 2002, commissioning of the state- of the art Quality Control System (QCS) for Paper machine in July 2002, commissioning of latest technology Distributed Control System (DCS) interfacing and integrating Paper machine, Chemical Pulp mill and Chemi-Mechanical pulp mill, in July 2002 etc.

HNL is always keen in energy conservation activities with a dynamic and professional energy management set up, supported by a well structured energy policy and latest technology energy management tools like Centralized Energy monitoring system of Enercon eLAN and ERP system of BaaN –IV giving reliable and accurate MIS reports, creating awareness among all levels of employees, which results in a high level of employee participation for energy conservation and by implementing a number of practical schemes proposed through Employee Suggestion Schemes. With the energy conservation measures taken up, HNL could reduce the Contract Demand with Kerala State Electricity Board from 30MVA to 26MVA with effect from 1st November, 2003.

During 2004-05, the company implemented a number of major energy conservation schemes like speed control of pumps and fans through variable frequency drives for 45 equipments, replacement of low efficiency pumps with new generation energy efficient pumps, commissioning of trim pulper with cyclone separator etc and also a number of no investment schemes proposed by our employees, all of which resulted in considerable saving in electrical and thermal energy fronts.

## Energy Consumption

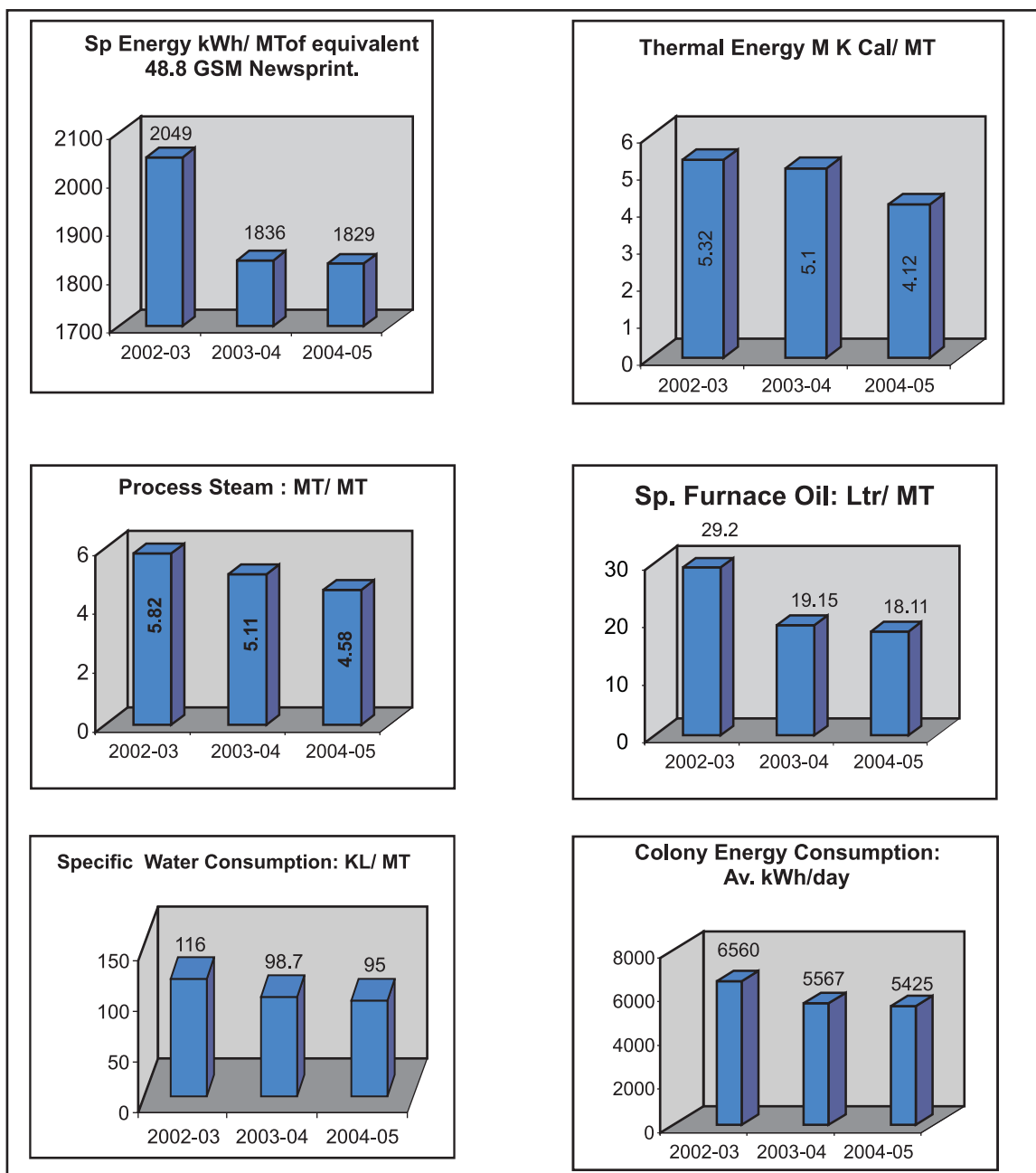
The energy scenario of HNL in the past three years is given below :-

SI.No	Description	Unit	2002-03	2003-04	2004-05
I	Production of Newsprint				
	a) 48.8 GSM	MT	1,00,495	1,09,263	98,749
	b) 45 GSM	MT	0	3,292	13,453
	c) Total Production of equivalent 48.8 GSM Newsprint.	MT	1,00,495	1,12,832	1,13,332
II	<b>Total Electrical energy Consumption:</b>				
	a) Electrical energy Purchased	Lakh kWh	1151	1095	1135
	b) Electrical energy generated thro' TG	Lakh kWh	932.29	997.75	956.57
	c) Electrical energy generated thro' DG	Lakh kWh	0.71	0.47	1.46
	d) Total electrical energy consumption	Lakh kWh	2084	2093.22	2093.03
III	a) Total Coal Consumption	MT	1,24,361	2892	1,44,308
	b) Total Furnace oil consumption	KL	2216	1,66,604	2058
IV	Energy Cost Details:				
	a) Energy cost as % of total cost of prodn.	%	32.80	29	30.82
	b) Cost of Electricity	Rs Lakhs	5682.51	6125.54	6140.97
	c) Cost of Coal	Rs Lakhs	1712.85	2021.13	2095.92
	d) Cost of Furnace oil	Rs Lakhs	387.09	300.07	302.01
V	<b>Specific Energy Consumption / MT of equivalent 48.8 GSM NP :</b>				
1)	Specific Electrical energy	KWh/MT	2073	1855	1847
2)	Specific Thermal energy	Million K Cal/MT	5.32	5.10	4.12
3)	Specific Process steam	MT/MT	5.82	5.12	4.58
4)	Specific Furnace oil	L/MT	29.2	19.15	18.11
5)	Specific Water	KL/MT	116	98.7	95

Continual improvement in specific energy consumption has been achieved for electrical energy, process steam, furnace oil, water & thermal energy during 2002 to 2005.

The trends of specific energy consumption figures are graphically represented below.

### Specific Energy Consumption Trends



## **Energy Conservation Commitment, Policy and Set Up**

### **Commitment**

The daily monitoring & review of all energy parameters of various plants at MD's chamber with core team of energy management cell including energy manger and the weekly review of all energy parameters and status of on going energy conservation schemes in the performance review meeting of MD with HODs and energy manger show the commitment of top management at HNL .

The monitoring & review of all energy parameters of various plants in the daily plant performance meeting of General Manager (Works) with sectional managers and sectional mangers with the plant team and the chairman of the Energy Management Cell with the members on monthly basis etc. show the commitment of the middle management and our employees towards energy conservation.

100% of technical staff of various plant sections were given energy awareness training, covering 495 employees in 14 batches, for enlightening them on Energy Conservation Act-2001, scarcity of natural resources, need for energy conservation and the details of the on going energy conservation schemes. Also brain storming session conducted to trigger the employees in identifying new avenues for energy conservation was very successful and as a result a number of creative, no investment and practical energy saving suggestions were proposed by the employees, especially from the operational side and all the practical schemes have been completed during 2004-05. One of these schemes, which was found innovative, brought a saving of 2500 units a day which brings an annualized saving of 8.5 Lakh units and annualized energy cost saving of Rs 29.75 Lakhs, without any investment.

### **Energy Policy**

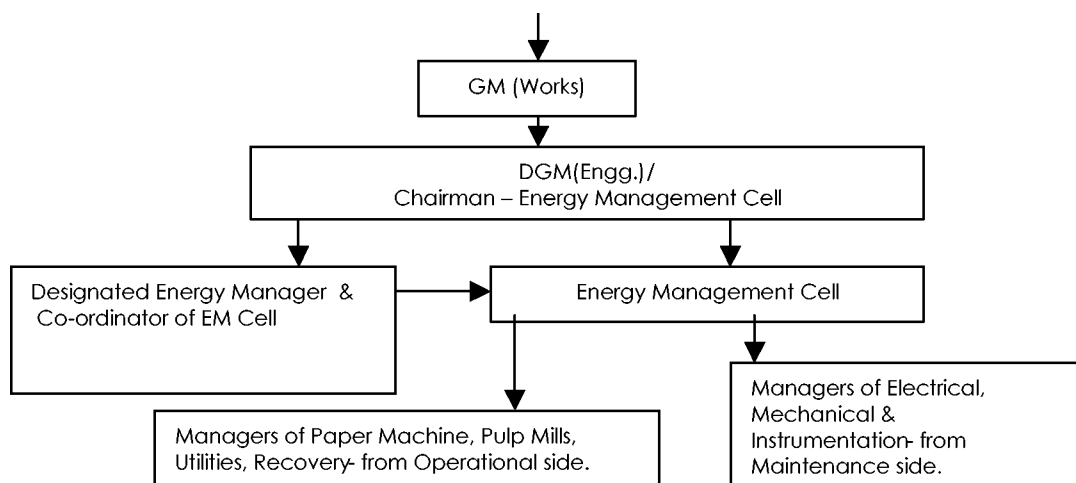
The company has formulated a well structured **Energy Policy in 2002** and this policy acts as the backbone of all the energy management activities at mill.

### **Organizational Set up for Energy Management**

The company appointed Energy Manager as per the guidelines of EC Act 2001, in August 2003, who was later on qualified by BEE through the 1<sup>st</sup> National examination for energy managers. The designated energy manager acts as the co-ordinator and facilitator for energy management activities.

Energy Management Cell is headed by Dy. General Manager (Engg) with cross-sectional representatives comprising of Managers of Production and Maintenance teams of different Plants, as members and Designated Energy Manager as the co-ordinator. The responsibility of the above cell is to explore the new avenues for energy conservation in all areas, to implement the schemes, look for continuous improvement, conduct brain storming discussions and make awareness and involve all employees for the energy saving activities. The EC cell members review all energy parameters in all area on daily basis and initiate actions to improve the performance.

## Energy Management Structure



### Energy Conservation Achievements

During 2004-05, company invested Rs 356 Lakhs on various energy conservation schemes, which resulted in annualized energy saving of 99 Lakh units of electrical energy, 3804 MT of coal, 129.8 KL of furnace oil and a total energy cost saving of Rs 442 Lakhs.

### MAJOR ENERGY CONSERVATION PROJECTS IMPLEMENTED DURING 2004-05:

#### (1) Installation of Variable Frequency Drives for 45 Pumps & Fans:-

After conducting a comprehensive study on energy saving potential in pumps and fans of various plants, installed variable frequency drives for 45 pumps / fans in two phases. Speeds of all these equipments were optimized through the drives ,by the process staff and maintenance engineers together as a team to get maximum energy saving without compromising on process quality parameters.

Investment	: Rs 247.10 Lakhs
Connected load of the equipments	: 3503 KW
Power Saving	: 880 KW
Annualised Energy Saving	: 66.99 Lakh kWh.
Annualised Energy Cost Saving	: Rs 234 Lakhs
Simple Payback	: 13 Months
Status	: Commssioned during July '04 to January '05



## (2) Replacement of low efficiency pumps with Energy Efficient Pumps with Energy Efficient Motors:

### (a) 400 KW Secondary Cleaners Feed Pump in Paper Machine Plant by 250 KW Sulzer Pump:

The secondary cleaners feed pump in Paper Machine of 400KW, running for 24 hours, was replaced with an energy efficient new generation Sulzer pump with energy efficient motor of 250KW to reduce the energy consumption of paper machine plant.

Pump Capacity: 32,400 LPM& 37m Head.

Power Saving	:	70KW
Investment	:	Rs 18.13 Lakhs
Annualised Energy Saving	:	5.54 Lakh units
Annualised Energy cost Saving	:	Rs 19.40 Lakhs
Simple Payback	:	1 Year
Status	:	Completed in January 2005



### (b) 110KW Liquor Circulation pump by 90KW Sulzer Pump.

The original pump was KMW Johnson make of 900cub.m/hr & head 23 m with 110 KW motor for black liquor circulation in Chemical Pulp mill. Due to inefficient operational performance, frequent gland leakage and maintenance problems, the pump was replaced with energy efficient new generation Sulzer pump with double mechanical seal and driving motor of energy efficient 90KW motor.

Investment	:	Rs 13.77 Lakhs
Annual Energy Saving	:	79,200 units
Annual Energy Cost Saving	:	Rs 2.77 Lakhs
Status	:	Completed in January '05



## (3) Trim Pulper with Cyclone Separator:

Installed a trim Pulper with cyclone separator in Paper Machine plant to handle the winder trims, thereby avoiding the continuous running of 200KW agitator of Dry end pulper. The new trim pulper helped in reducing the running time of the 132 KW Dry end pulper pump from 8 hours to 6 hours and that of 200KW Dry end pulper agitator from 24 hours to 4hours.

Investment	:	Rs 26 Lakhs
Energy Saving	:	1500 units/ day
Annualised Energy Saving	:	4.95 Lakh units
Annualised Energy Cost saving	:	Rs 17.32 Lakhs
Simple Pay back	:	18 Months
Status	:	Commissioned in October '04



#### (4) Stoppage of running hours of CP Refiners in Paper Machine Plant for 5 to 8 hours a day:

HNL implemented this 'No investment & Innovative' Energy conservation Scheme on 01/01/2005.

##### Background:

The employees of all plants were given awareness classes on energy conservation, in different batches, during April '04 to October 04, in which some brain storming activity was carried out towards identifying new energy saving potential by operators and maintenance technicians, through operational improvements in different plants.

The scheme was evolved as a suggestion from one of the Senior Operators of Paper Machine, Production during the Employee Suggestion competition held during the observance of Energy Conservation week in December 2004.

##### Scheme:

The operator identified that, instead of running the two CP Refiners (450 KW & 400KW) in Paper Machine plant on continuous basis, as was the practice for the last 23 years, Batch Refining by increasing the through put and by storing the refined CP pulp utilizing an idle chest also, would be more energy efficient as there is possibility of stoppage of both the refiners for a duration of 5 to 10 hours a day during batch refining.

##### Modification done:

A short pipe line (using used pipe) laid between the two nearby chests.

##### Energy Saving achieved :

Average Energy Saving	: 2500 units/day.
Annualised Energy Saving	: 8.5 lakh units.
Annualised Energy Cost saving	: Rs 29.75 Lakhs
Investment	: NIL.



#### (5) Thermal insulation of the Inner Walls of package air conditioners room for Paper Machine DCS control rooms:

The roof as well as the three walls of the package air conditioner rooms in Paper Machine DCS control rooms are exposed to sun and hence the roof as well as the three walls are getting heated heavily during summer. After insulating the inside of the roof and all the four walls, there is a considerable energy saving for air conditioners.

Investment	: Rs 12,200/-
Annualised Energy Saving	: 53, 000 kWh
Annualised Energy Cost Saving	: Rs 1.87 Lakhs.



### (6) Solar Lighting System at Factory main gate:

As a footstep towards renewable energy sources, a solar lighting system of 500W rating has been commissioned at factory main gate to cater to the lighting requirement of factory gate & security office.

Solar Modules	:	10 Nos.
Capacity	:	500W
Connected load	:	8 Nos. of 15W CFL & 1 no. T5 Fl. Lamp of 30W
Annual Energy Saving	:	730kWh
Investment	:	Rs 2 Lakhs.



### (7) Coal saving by using non- conventional fuels in FBC Boilers:

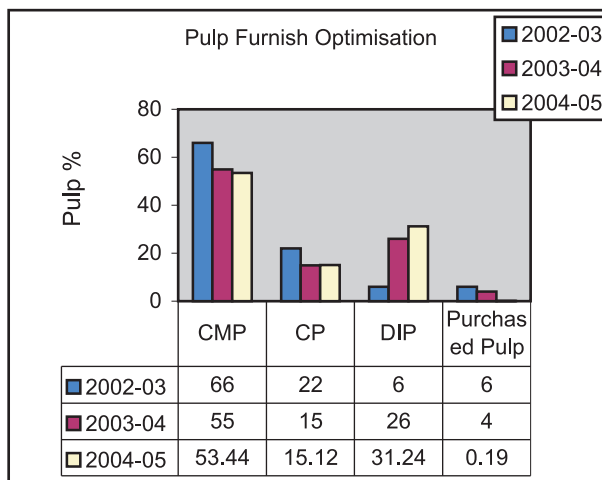
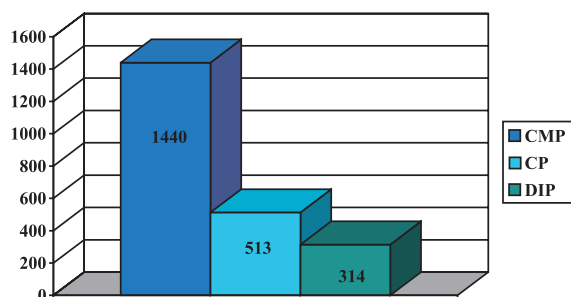
The internal waste generated as wood dust from pulp mill is being burnt in FBC boilers to save consumption of coal.

Wood Fines burnt in FBC boilers	:	4212 MT.
Coal Saving	:	3804 MT.
Energy Cost Saving	:	Rs 76 Lakhs



### (8) Optimisation Of Pulp Furnish:

The specific energy consumption of Chemi- mechanical pulp was 1440kWh/BDMT where as that of De-inked pulp was only 314KWh/BDMT during 2004-05. Reduced usage of energy intensive Chemi-mechanical pulp by increased usage of energy efficient de-inked pulp in the pulp furnish for making newsprint in paper machine resulted in an annualized saving of 9.65 Lakhs units of electrical energy and a cost saving of Rs 33.78 lakhs. Investment for raw material change: Rs 45 Lakhs.



### (9) Replacement of one 55 KW Aerator with new Energy Efficient Aerator of 18.5KW:

Replaced one of the 11 nos 55 KW aerators with energy efficient aerator of 18.5 KW in March 2004.

Power saving	:	27 KW.
Annual Energy Saving	:	2.36 Lakh units.
Annual Energy Cost Saving	:	Rs 8.28 Lakhs.
Investment	:	Rs 4.5 Lakhs.



### SUMMARY OF POWER SAVING (KW) DUE TO MAJOR ENERGY SAVING SCHEMES – 2004-05

Major schemes	KW Saving
VFDs	880
Energy Efficient Pumps	70
Trim Pulper	62
Employee Suggestion Schemes	125
<b>Total</b>	<b>1137 KW</b>

### Other EC Schemes implemented during 2004-05:

1. Maintaining system power factor at 0.97 by power factor correction using proper capacitor banks and field control of synchronous motors.
2. Replacement of conventional chokes of 400W Sodium Vapour Lamps of raw material yard with electronic chokes.
3. Stoppage of no load running of hydra pulper in De inking Plant during each batch stoppages.
4. Cyclic switching ON & OFF of plant air conditioners for control rooms.
5. Automatic control of running hours of many equipments through proper DCS logics.
6. Reduced the secondary voltage of lighting transformers in chipper house and De-inking plant.
7. Reduced the delivery air pressure setting of Centrifugal air compressor for 7.05 to 6.7 kg/sq.cm.
8. Maintaining steam coal ratio to a minimum of 5 by proper mix of imported and Indian coal.
9. Replaced the thermal insulation of 608m of steam pipes.
10. Arresting all steam and air leakages, when ever found on immediate basis.
11. Re-circulation of paper machine back water in pulping mills & De-inking plant.
12. Purchase of only energy efficient pumps and motors, whenever required.
13. Replaced 50 nos of fluorescent lamps with T5 Lamps.
14. Replaced 10 nos of 150W HPMV lamps with 75W metal halide lamps in CP plant
15. Replaced 10 nos 150W Sodium vapour lamps with 70 W for colony street lighting.
16. Heat recovery from condensate of impregnation liquor heater in CMP plant.

<b>Energy Saving Achieved in 2004-05 as a result of all Energy Conservation Schemes implemented between 1st April 04 &amp; 31st March 05</b>			
<u>Comparison Period</u> : Month of <b>March</b> , during stabilised plant operation & maximum production in both years			
Period		<b>March 1 to 31st</b>	
Year	<b>2003-04</b>	<b>2004-05</b>	Variation
Finished Production	10,593	10,453	140
<b>Purchased Pulp Consumption MT</b>	<b>388</b>	<b>0</b>	<b>388</b>
Total Electrical Energy Consumed kWh	19,158,120	18,315,897	842,223
<b>Energy Saving for 31 days</b>			<b>842,223</b>
<b>Energy Saving per day</b>			<b>27,168</b>
<b>Average KW Saving</b>			<b>1,132</b>
<b>Power Saving : 1.132 MW</b>			

### **Energy Conservation Plans and Targets**

#### **Target for 2005-06:**

Reduction of Specific electrical Energy from **1847 to 1825 units/ MT of newsprint.**

Reduction of Thermal Energy from **4.12 to 4 .0 MKCal/MT of newsprint.**

The major energy conservation projects planned for achieving the above targets are:

- (1) Installation of Variable Frequency drives for 46 pumps/ fans in Phase III.
- (2) Replacement of 5 nos .old pumps with energy efficient new generation pumps.
- (3) Retrofitment of one agitator with energy efficient impeller.
- (4) Replacement of 3 nos aerators of ETP with energy efficient aerators.
- (5) Replacement of the 17 dynodrives, in chipper house & Chemical pulp mill with energy efficient motors driven by variable frequency drives.
- (6) Revamping of the compressed air distribution system to minimize distribution losses.
- (7) Revamping of thermal insulation of steam distribution system.
- (8) Optimizing the capacity utilization of the power boilers and thereby to maximize the internal power generation.
- (9) Maximizing the use of non-conventional fuels in FBC boilers.
- (10) Installation of Energy efficient Automatic FCMA slip regulator system for 970KW Wood chipper motor , presently with rotor resistance starting unit.
- (11) Automatic voltage control for colony street lighting through Beblec Energy saver.
- (12) Lower capacity oven at motor maintenance shop for drying small motors after rewinding.

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## **Environment and Safety**

### **Environment**

The quality Management System of HNL is certified ISO 9000:2000 and the Environment Management System is certified ISO 14001:1996. Our residential colony also is certified with ISO 14001 : 1996 and HNL is keen in maintaining the “green” belt in and around the mill premises.

HNL has a structured solid waste management system in place. Process wastees like sludge from de-inking plant, wood dust etc are burnt in FBC boilers. Lime sludge is recalcined in lime reburning plant. Boiler as is supplied for cement manufacturing.

As per the directive of Pollution control board, construction of a Secured land fill was started in March 14, 2005 , which is nearing completion, for storage of effluent sludge.

During 2004-05, HNL distributed 50 lakhs seedlings for pulp wood plants to the farmer community in Kerala state, through farm forestry scheme, in addition to the on going captive plantation schemes. Waste water discharge per MT of newsprint has been reduced from 76.2 KL/MT in 2003-04 to 74.06 KL/MT in 2004-05.

### **Safety**

A well structured Safety Department headed by a manager ensures the effective implementation of Company’s health and safety policy, aided by the active involvement and participation of a safety committee comprising of employees from different levels.

HNL has a first aid center and a Health clinic with qualified doctors and paramedical staff working rounds the clock in the mill premises.