



ITC Limited India Tobacco Division, Munger

Unit Profile

ITC Limited is one of India's foremost private sector companies with a market capitalization of over US \$ 5 billion and a turnover of US \$ 2.6 billion. Rated among the World's Leading Companies by Forbes magazine, ITC ranks fourth in net profit among India's private sector corporations. ITC has a diversified presence in Cigarettes, Hotels, Paperboards & Specialty Papers, Packaging, Agri-Business, Branded Apparel, Packaged Foods & Confectionery, Greeting Cards and other FMCG products. While ITC is an outstanding market leader in its traditional businesses of Cigarettes, Hotels, Paperboards, Packaging and Agri-Exports, it is rapidly gaining market share even in its nascent businesses of Branded Apparel, Greeting Cards and Packaged Foods & Confectionery.

The India Tobacco Division (ITD), the spearhead of ITC, has 4 manufacturing units in Munger, Bangalore, Saharanpur and Kidderpore.

Established in 1910 in Munger, 180 kms from Patna, Bihar, our unit is the oldest in ITD. Our facility manufactures Cigarettes and Smoking Mixtures. The plant spans over 20.04 acres, with a total production of is 8111 million cigarettes and 125 tons of Smoking Mixtures in 2003-04 . With a total employee strength of 1464, we deploy the largest workforce in ITD. The factory operates in 3 shifts, 7 days a week.

Energy Consumption raising benchmark

ITC Munger strives to conserve energy in its operations by reducing specific energy consumption. Considering the power supply scenario in the country, ITC Munger continues to ensure security of power availability. It also endeavours to progressively increase the use of waste for energy generation and to constantly augment its sourcing of renewable energy wherever feasible.

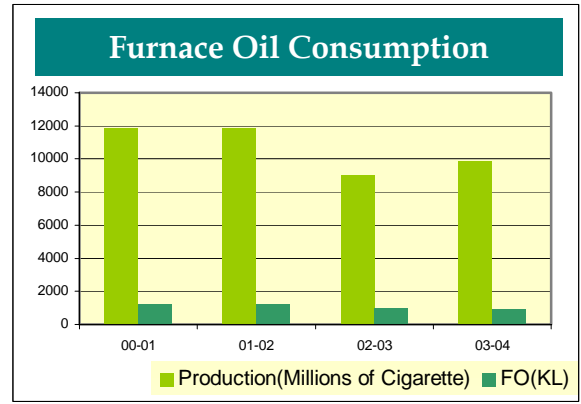
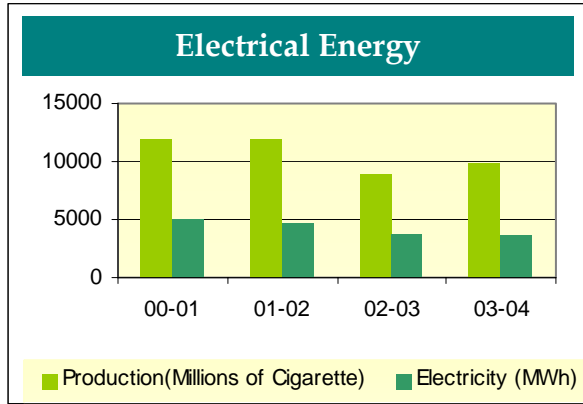
	Um	2000-2001	2001-2002	2002-2003	2003-2004	%age Reduction
Production	mnc	11859	11863	9023	9858	-9.26%
FO/T OF TOB	Ltrs.	53	54	43	42	0.77%
Electricity	KWh	4965395	4728234	3844434	3663041	4.72%
FO(PMD+AC)	Ltrs.	1232365	1246522	997676	943216	5.46%
FO(PMD)	Ltrs.	773128	774853	443861	476470	-7.35%
FO(AC)	Ltrs.	459237	471670	553814	466747	15.72%
Unit/MNC	KWh/mnc	418	405	426	372	12.79%

Total Energy in GJ

Electricity	GJ	17875	17022	13840	13187	4.72%
FO	Gcal	11831	11967	9578	9055	5.46%
FO	GJ	49500	50068	40073	37886	5.46%
Total Energy	GJ	67375	67090	53913	51073	5.27%
Specific Energy	GJ/mnc	5.68	5.66	5.97	5.18	13.29%



With a strong commitment & dedication towards Energy Conservation, ITC Ltd. Munger has been able to reduce its total energy consumption by 5.27% inspite of increase in production by 9.26% in the year 2003-04 against the year 2002-03. The specific energy consumption (GJ/million of Cigarettes) is reduced by 13.29%.

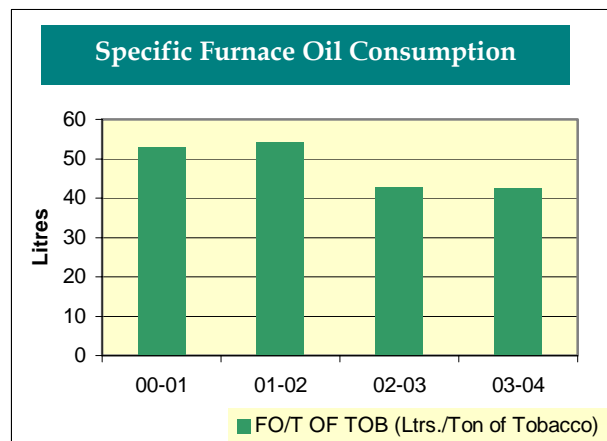
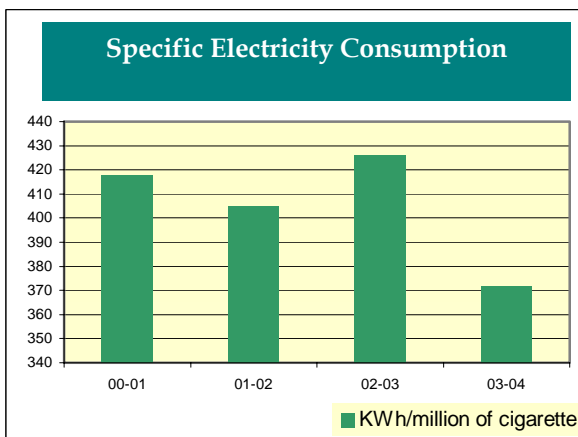


Although the demand from the market is less than the installed capacity of the plant, still ITC Munger continuously reducing the specific energy consumption by focusing the equipment throughput and efficiency.

In comparison with ITC's other Cigarette manufacturing Unit, ITC in FMCG (Cigarette) business, specific Energy Consumption Level is at 7 GJ per million cigarettes as reported in EHS Annual Report, 2004,



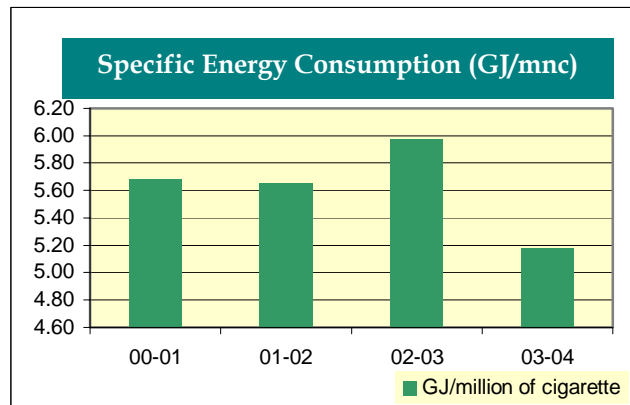
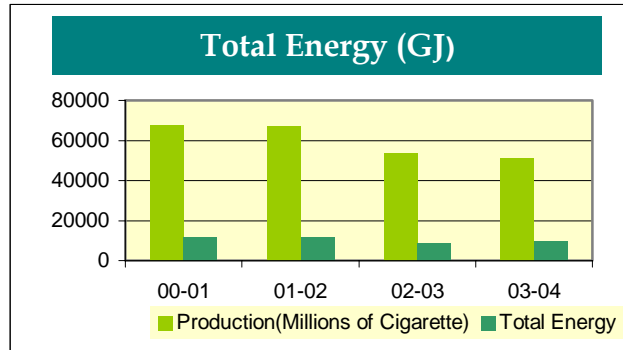
Primary Manufacturing Plant after Modernisation





Benchmark for FMCG (Cigarettes) Business

ITC Limited Munger's energy consumption of 5.18 GJ per million cigarettes is less than one third of the corresponding figure for British American Tobacco (BAT), at 15.76 per million cigarettes, as reported in BAT's Social Report for the year 2001.

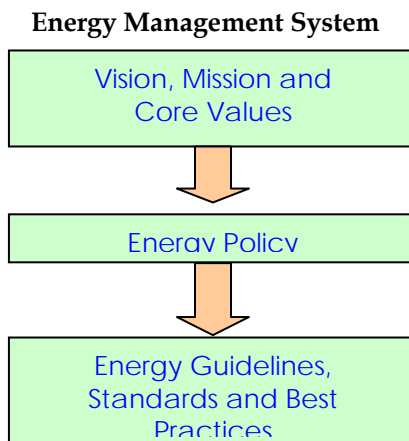


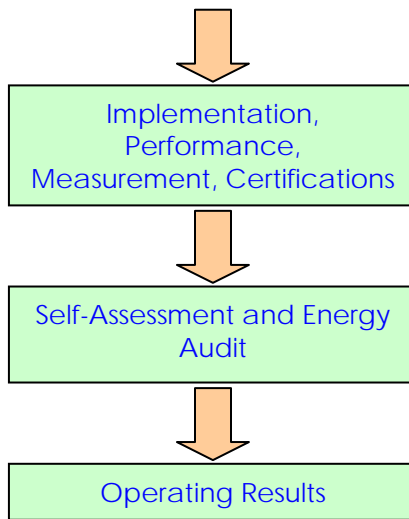
On line energy Monitoring system

Energy Conservation Commitment, Policy and Set up

Energy Management System :

ITC Munger's Top management has defined the policy on Energy Conservation. The responsibility for review and updation of Energy Conservation has been vested primarily in the Engineering Department. ITC Munger regularly reviews and updates all relevant Energy Consumption parameters and standards . The Unit is having a detailed organizational structure related to Energy Conservation. The Unit is also undergoing periodic Energy Audits by competent organizations e.g. TERI, Forbes Marshall, ION Exchange etc. The Energy Conservation also forms a part of Corporate EHS Policy.



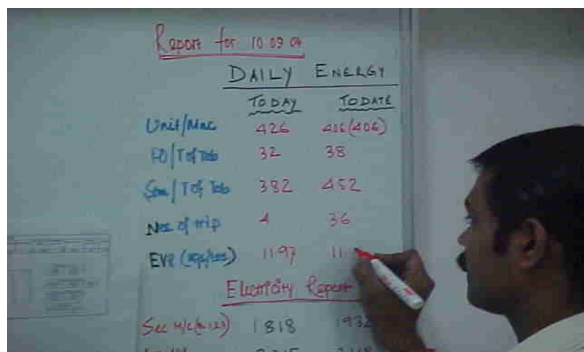


Unit takes active participation in the Divisional Meet on Energy every year to review the status of Projects and share the plan for coming year. The Senior Management Team chaired by the Unit Head in the “Branch Performance Review” held every month reviews the performance each of the performance indices in the area of Energy Conservation. The variance on any index against the target is discussed in daily review meetings where all managers of the factory are present. The review of EMPs (Energy Management Programme) are also being reviewed in the review meeting of ISO 14001 review meeting.



Review Meeting on Progress

Energy Conservation Projects and Targets are part of yearly objectives for performance assessment of the Engineers in the Plant. Half Yearly review is done by the Superiors to ensure progress and mid term correction. Along with inputs from the expert team at Divisional Head Office, potential areas for conservations are studied and various solutions are explored toward achieving the potential saving.



Macro level energy reading for morning meeting discussion

ITC Limited, Munger is equipped with powerful online energy monitoring system, which gives all the important macro and micro level energy information. Every day energy informations compiled with production information are reported in the daily morning meeting (operation review). This reports are discussed by the Unit Head along with functional departmental heads and all the managers in the factory. The action plans on the above discussions are also been finalized in the meeting.



At ITC, Energy is everybody’s business. ITC believes in innovations. A i2i (Innovation to implementation) competition is being arranged annually to promote the innovative ideas for Energy Conservation. Selected Team Members at Unit level qualifies for All India Competition (ITC) for sharing their innovations. Accordingly, the innovations made by other Units, copies each other and implement the same.



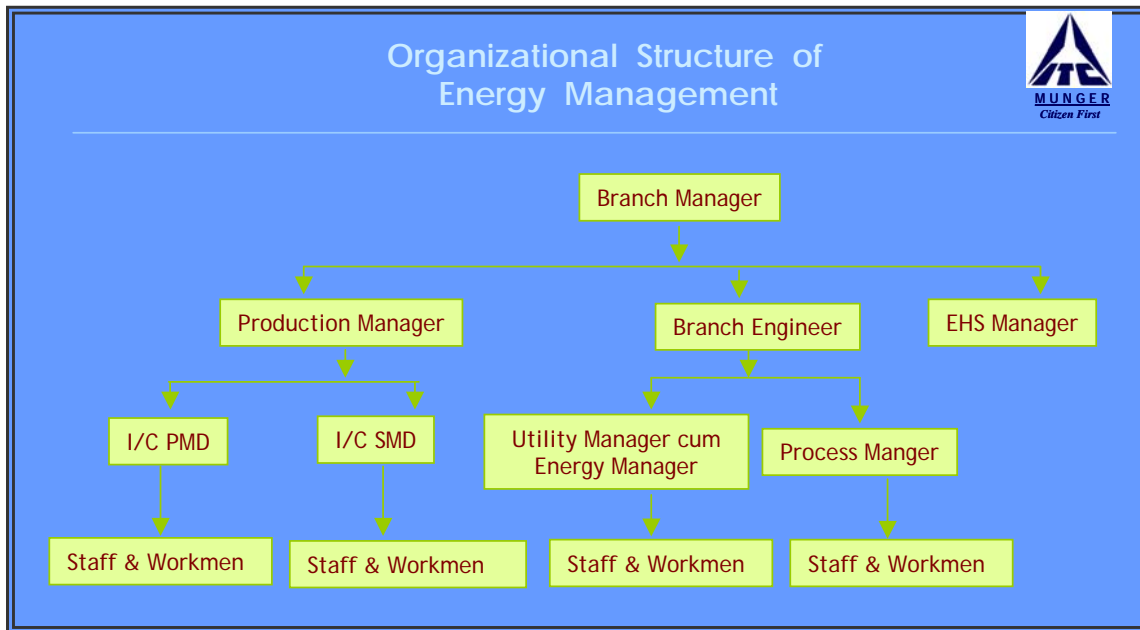
i2i Presentation in progress

Although ITC Munger is benchmarked in its Energy Consumption indices, the unit is still striving for breaking its own record. A stretched target is being put for all the Energy indices at the beginning of the year. The Unit has adopted some of the following measures towards Energy Conservation:

- ◆ Monitoring energy efficiency at points of generation, distribution and consumption
- ◆ Setting and reviewing targets periodically
- ◆ Auditing the system on regular basis
- ◆ Implementation of energy saving opportunities through technology up-gradation / renewable sources of energy
- ◆ Assessment of deliverables of energy saving projects

Energy Management Organisation Structure :

Energy group is headed by the Unit Head (Branch Manager). The primary responsibility of the Energy Management is lies with Engineering Department for managing and executing the Energy Conservation Projects. Production Manager and Departmental In-charges are responsible for Specific Energy Consumption parameters. Workmen are also part of Energy Management Structure.





Energy Policy :

ITC Limited, India Tobacco Division, Munger is committed to conserve Energy judiciously in all our activities, operations, products and services across the unit.

In particular, the unit will :

- Closely monitor and control the energy consumption by utilizing effective energy management systems
- Explore, Innovate & Implement ideas in the area of recovery of waste energy
- Instill a sense of duty in every employee towards energy conservation
- Select and adopt cleaner and energy efficient technologies for all its projects
- Carry out regular internal and external audits to identify areas for improvement
- Incorporate energy conservation target as a part of its annual business plan
- Enhance utilization of renewable energy resources, wherever feasible.
- Strive for improvement in specific energy consumption through superior quality and productivity
- Comply with all statutory requirements, regulations and Corporate EHS Policy

Energy Conservation Achievement

ITC Munger has made its contribution towards this initiative through a sustained focus on the energy consumption of the unit. Moreover, the Energy Conservation team, headed by the Branch Manager, has not confined its activities to the factory alone, but also extended it to the residential area.

Cumulatively, in the year 2003-04, 10 energy conservation initiatives have been concluded. At an overall cost of Rs. 41.59 Lakhs, savings of Rs. 33.99 Lakhs have been realized.

Major Energy Conservation Projects in the year 2003-04

1. EC Project # 1

Effimax System for Boiler

Without Effimax system, Stack O2 : 6-7%
 With Effimax System , Stack O2 : 3-3.5%
 Total Investment : Rs. 11.43 Lakhs
 Annual Savings : Rs. 7 Lakhs



2. EC Project # 2


Energy Efficient Pump

With Normal Pump : 7KW
 With Energy Efficient Pump : 4 KW
 Total Investment : Rs. 4.98 Lakhs
 Annual Savings : Rs. 1.47 Lakhs







3. EC Project # 3

<p><u>Lighting Voltage Controller</u></p> <p>Without Lighting Voltage Controller : Volatage : 240-248 V With Lighting Voltage Controller : Volatage : 220 V Total Investment : Rs. 9.28 Lakhs Annual Savings : Rs. 7.25 Lakhs</p>	
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4. EC Project # 4

<p><u>Speed Reduction of DRF Fan</u></p> <p>The Frequency of drive was reduced to 44 Hz from 50 Hz. After changing of bag design. Due to reduction in Speed, the total saving in energy was 870 units per day. Total Investment : Rs. 2 Lakhs Annual Savings : Rs. 1.98 Lakhs</p>	
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5. EC Project # 5

<p><u>Speed reduction of Vacuum Pump</u></p> <p>The speed of vacuum pump was reduced to 655 rpm from 970 rpm, resulting into savings of 275 units per day. Total Investment : Nil Annual Savings : Rs. 2.27 Lakhs</p>	
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Other major projects implemented during 2003-04 :

- Replacement of absorber & condenser tube of Vapour Absorption Chiller
- Photocell Control for lighting
- Replacement of old window conditioner
- Reduction of Maximum Demand from 1647 to 1452

Energy Conservation Plans & Target

Sl. No.	Proposal	Annual Savings	Approx. Investment	Target Date
		Rs. Lakhs	(Rs. Lakhs)	
<u>Short term EC Projects</u>				
1	Replacement of TC dryer cyclone fan with low pressure fan	0.90	0.60	Being evaluated
2	Replacement of Cooler Fan with high efficiency Fan	0.52	0.30	Completed
3	Usage of Extra Flash Steam of ITM Condensate in DCCC	0.40	0.50	Completed



4	Condensate recovery from PPD by installing PPPU	2.00	3.50	Nov-04
5	Replacement of V-belt of Boiler Fan with Flat Belt	1.20	0.30	Nov-04
6	Replacement of V-belt of AHU Fan with Flat Belt	1.50	0.40	Nov-04
7	Heat Recovery form CSVST Exhaust	6.32	7.00	Nov-04
8	Solar Preheater for Canteen	1.05	3.14	Nov-04
9	Solar Preheater for Guest House	0.90	2.14	Jan-05
10	Speed Control for Boiler Feed Water Pump	0.80	1.50	Jul-05
11	Single fan operation of DRF	3.01	0.00	Jul-05
12	Replacement of AHU Cooling Coil	1.40	3.12	Nov-04
Long term EC Projects				
13	Replacement of VAC with vapour Compression Chiller	67.80	70.00	July-06
14	Repalcement of existing 8 TPH boiler with a 5TPH Boiler	2.83	15.00	Being evaluated

Other initiatives like Kaizen, suggestion scheme, engineering initiatives, i2i competition will continue. Unit has put a target for the year 2004-05 as 366 unit per mnc and 39 ltrs of FO per Ton of Tobacco.

Environment & Safety

ITC Limited is known for its commitment to environment and safety. ITC's EHS (Environment Health and Safety) policy recognizes the twin needs of conservation and creation of productive resources .The unit has won many awards and accolades in the area of Environment , Health and Safety in the last few years such as **ISO 14001, OSHAS 18001, The Sword of Honour, Excellence in Environment Mgmt, RoSPA Gold Award, Greentech Gold Award.**

Unit has an organization structure across the hierarchy, unit head being the chairman of the Central Safety Committee. EHS coordinators for each section / department and active unionized employees are part of this committee, which conducts review meetings every two months. Each department conducts a monthly meeting to review the progress of the action plans and share knowledge on developments in the field. The unit goes through stringent divisional audit and Corporate audit every year. An established rating system covering the areas of Policy and organization , Occupation Health & Hygiene ,Equipment and Personal Safeguarding, Fire Prevention and Protection, Environment and Accident Recording And Investigation. The unit has progressively improved in the ratings over last 5 years. The unit EHS team also conducts monthly departmental audits and hygiene inspection audits.

Identified managers are sent for training programs conducted by Corporate branch of EHS. Every employee is covered once in three years on EHS awareness training program conducted in the unit. Weekly fire training program is conducted by fire coordinators for all employees on rotation. Unit has an emergency plan and mock drill are conducted once in 2 years. The unit has certified fire coordinators as part of the fire safety organization. Unit has adequate infrastructure in terms of fire safety and protection.

For more details, Please refer to " Annual Environment, Health & Safety Report 2003-04 (Annexure E)



A Report on implementation of Energy Conservation Projects 2003-04

Executive Summary

ITC Limited, in its role as a concerned corporate citizen, has committed itself towards responsibility towards the environment, and one of the key initiatives towards realizing this commitment has been a drive towards reducing energy costs.

Moreover, ITC cognizes that energy conservation efforts also deliver business value through their significant impact on the bottom-line. Through our energy conservation initiatives, the overall energy bill, 25-30% of the recurring revenue expenditure of the Tobacco Division, has had a marginal growth rate, though prices of fuel and electricity have recorded a CAGR of 17%. The focus on energy costs is reinforced by the fact that over a crore of capital expenditure is earmarked towards energy conservation initiatives in the current financial year (2004-05).

ITC Munger has made its contribution towards this initiative through a sustained focus on the energy consumption of the unit. Moreover, the Energy Conservation team, headed by the Branch Manager, has not confined its activities to the factory alone, but also extended it to the residential area.

Cumulatively, in the year 2003-04, 10 energy conservation initiatives have been concluded. At an overall cost of Rs. 41.59 Lakhs, savings of Rs. 33.99 Lakhs have been realized.

This report encapsulates the technical and commercial details of these projects. What it may fail to capture is the keen spirit towards energy management evinced by each member of the team Munger, a spirit that will continue to push us towards excellence in the field of energy conservation.



EC Project 01 : Effimax system for Boiler

1. Background of the Project :

The project was implemented with following objectives :

- To optimize the combustion efficiency of the boiler
- To monitor online different process parameter of the boiler
- To monitor online consumption of steam in different equipment
- To monitor online condensate recovery system

2. Observation :

The capacity of the earlier burner management system, AR63 modulation, the stack O₂ percentage is around 6-7% whereas the recommended stack O₂ percentage is 3% in high flame & 3.5% in low flame. Such high O₂ levels lead to dilution of the flue gas, with consequent reduction in heat recovery through the boiler economizer.

It was observed that failures of PPP Unit (Pressure Powered Pump Unit) leading to low condensate return required longer time to identify and rectify the shortcoming. The online health monitoring system of PPPU allows quicker response to failures while maintaining steam & water balance for the network automatically.

3. Technical & Financial Analysis :

The detailed tuning & control philosophy of the air-fuel tuning loop has been finalized consultation with of M/s Forbes Marshall, M/s Thermax & M/s Allen Bradley . The online networking of steam utility management system has been done using Wonderware MMI System.

The payback of the project analysed with our financial team and it work out to be of 2 years with a investment of Rs. 11.43 Lakhs.

4. Impact of Implementation :

Energy Centre staff has implemented this scheme with the help of expert from M/s Forbes Marshall oner planned shutdowns and commissioned the drives & control loop. Savings achieved were to the tune of 7.86 kgs of FO per day and 200 KWh electrical units per day, leading to a annual savings of approximately Rs. 7 Lakhs.



Effimax Main control Panel



Automatic Blowdown System



Online monitoring system



EC Project 02 : Energy Efficiency Pump

1. Background of the Project :

The project was implemented with following objectives :

- a. To reduce the utility electricity consumption
- b. To evaluate pumping technology for low power consumption
- c. To promote the use of energy efficiency pumping system in the unit

2. Observation :

It has been found that the water pumping cost is the one of the major contributor for utility energy. The Encon Cell evaluated different technology for pumping.

3. Technical & Financial Analysis :

The detailed analysis of pumping technology has been evaluated by the Encon team and finally found that to obtain higher efficiency, the pumping system should have

- a. Low weight of impeller
- b. Mechanical seal instead of gland
- c. Efficient motor

After evaluating different pump supplier, The Encon team finally selected M/s Grundfos, Denmark. The Grundfos pump is made of SS impeller which is lighter, having mechanical seal & with energy efficient (EE) motor. The rating of the new pump for same head & flow is lower by about 3 KW for the EE Pump.

The payback of the project was analysed with our financial team and the payback period worked out to be 3.36 years against a investment of Rs. 4.98 Lakhs.

4. Impact of Implementation :

Energy Centre staff has implemented this scheme with assistance from M/s Grundfos. Further, a control loop was introduced in the pumping system to switch off pumps when the main header pressure was more than the desired head. Savings of 90 KWh day, i.e. Rs. 1.47 Lakhs per annum have been achieved.



Energy Efficient Pump



Energy Efficient Pump



Control panel for interlocking Hi header pressure



EC Project 03 : Lighting Voltage Controller

1. Background of the Project :

The project was implemented with following objectives :

- a. To reduce the electricity consumption of the lighting circuit
- b. To promote the use of energy efficiency in lighting system

2. Observation :

The grid voltage for the plant varies from 415 to 430 VAC., which corresponds to lighting voage of 240 to 248 V. Recommended voltage level for normal lighting fittings is 220 +/- 10% V. Increased system voltage does not increase the lux level of the lighting but results in higher consumption of electricity. Hence, there is a potential saving of 20% in lighting energy.

3. Technical & Financial Analysis :

The detailed analysis of technical features of the lighting voltage controller was evaluated by the Encon team and consulted with TERI.

The Lighting voltage controller was procured from M/s Swastika Industries.

The payback of the project was analysed with our financial team and the payback period worked out to be of 1.35 years against a investment of Rs. 9.28 Lakhs.

4. Impact of Implementation :

Energy Centre staff has implemented this scheme with the help of an expert from M/s Duex, the principals of M/s Swastika Industries. Savings achieved was 424 KWh day, i.e. Rs. 7.25 Lakhs annually.



Main Lighting Energy Saver Panel



Lighting Energy Saver Panel for Slide Making Department



Lighting Energy Saver Panel for Canteen



EC Project 04 : Speed reduction of DRF Fans

1. Background of the Project :

The project was implemented with following objectives :

- a. To reduce the electricity consumption of the DRF system
- b. To promote the use of energy efficiency through innovative design

2. Observation :

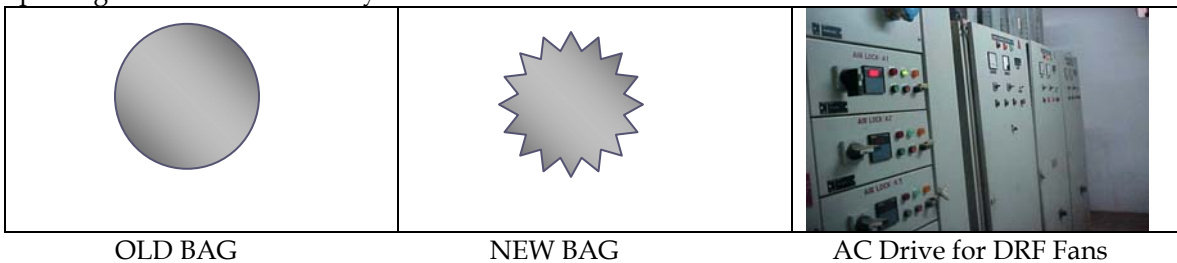
Actual Power Requirement in KW = (Volumetric flow of Air * Total Pressure drop) / (Fan Eff * 1000)



There are three DRF Fans available to extract tobacco dust from cigarette making machine. Out of these 3, any two are in use at any point of time. Pressure across filter is 80 to 100 mm Wg. The filter consists of 60 bags of cloth fabric.

3. Technical & Financial Analysis :

The existing bags were replaced by 36 pleated PTFE bags (manufactured by Nordic). Due to pleating, these bags offer higher surface area for the same size of bag, i.e. volume of air filtered per bag increases dramatically.



4. Impact of Implementation :

Secondary utility team has implemented this scheme with the help of expert from M/s Sindhu Engineering. Reduction in pressure drop would allow reduction in energy consumption. Pressure drop depends on :

1. Number of Bags
2. Dust Loading
3. Efficiency of Purging System

As result of this project, Fan frequency was reduced to 44 Hz from 50 Hz.

Avg. energy consumption with old bags = 1050 units / day

With new bags = 870 units / day

The savings of 180 units per day translate to Rs. 1.98 lakhs savings per annum.



EC Project 05 : Reduction of Speed of Vacuum Pump

1. Background of the Project :

The project was implemented with following objectives :

- a. To reduce the electricity consumption of the Vacuum Pump
- b. To promote the use of energy efficiency through innovative design

2. Observation :

The design data for existing system pump was as follows:

Vacuum pump volumetric flow rate = 635 cfm

Motor rating = 50 hp.

Requirement = 180 cfm (per Max machine)

Suction value required: 400 - 450 mm Hg.

There was a scope of reduction in fan speed and thereby reduction in energy consumption when vacuum pump is catering to lesser number of m/c. It has been found that approximately, 1 VP can cater to 3 MAX machines & there is a potential to reduce the speed to **655 rpm from 970 rpm**.

3. Technical & Financial Analysis :

For vacuum pump:

$$I = k * N^2$$

(Reduction in speed gives a reduction in power proportional to its square) provided suction value is still maintained.

Earlier : Speed of vacuum pump impeller: 970 rpm / 40 A current.

$$\begin{aligned} \text{Power} &= \text{Sqrt}(3) * V * I * \text{Cos}(f) * 22.5 / 1000 \\ &= 1.732 * 415 * 40 * 0.85 * 22.5 / 1000 \\ &= 550 \text{ units} \end{aligned}$$

Freq. of AC drive changed and rpm was reduced to 655 (from 970).

Current drawn reduced to 20 A.

$$\begin{aligned} \text{Power} &= 1.732 * 415 * 20 * 0.85 * 22.5 / 1000 \\ &= 275 \text{ units} \end{aligned}$$

4. Impact of Implementation :

Secondary electrical team along with manufacturing team reduced the speed of the drive from 655 rpm from 970 rpm.

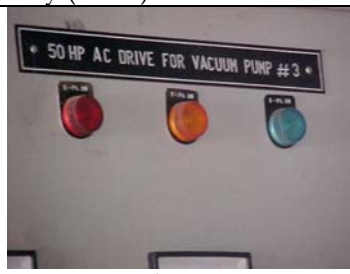
The saving achieved is as follows :

Savings per year (15 days of filter run) = 275 * 4.6 * 15 * 12 = Rs. 2.27 Lakhs

Actual data showed 319 units per day (mean).



AC Drives for Vacuum pumps



AC Drives for Vacuum pumps



Vacuum pumps



EC Project 06 : Replacement of absorber & condenser tube and optimization of running hours of Vapour Absorption chiller

1. Background of the Project :

The centralized AC conditioning system plays a major role in energy consumption of manufacturing process. It contributes around 30% in electrical energy & around 50% thermal energy. The project was implemented with following objectives :

- a. To optimise the electricity consumption of the HVAC System
- b. To reduce the steam consumption of VAM

2. Observation :

After carrying out the detailed performance audit of HAVC system, it has been found out that following are the major areas for improvement:

- a. The Specific steam consumption of VAM is found to be 6.7 Kg/TR against a design basis of 4.8 Kg/TR
- b. Capacity of the condenser water pump found to be less

3. Technical & Financial Analysis :

After detailed performance checkup with the help of M/s Voltas limited, it was decided that 120 absorber tubes and 190 condenser tubes need to be changed.

The tubes were imported from Hitachi and replaced by M/s Voltas limited. The total cost of replacement of tube is Rs. 13 Lakhs.

4. Impact of Implementation:

After replacement of the tube steam consumption reduced from 1200 Kgs per hr. to 900 Kgs/hr which in turn reduces specific steam consumption to 47 ltrs. of FO per million of cigarettes (Mnc) manufactured from 61 ltrs. of FO per MNC, which works out to a saving of around 13 lakhs per annum. Thus, the project cost will be recovered within the first year of implementation.





EC Project 07 : Photocell control for street lighting at Residential Colony

1. Background of the Project :

To reduce the Energy consumption of the outside lighting of residential colony.

2. Observation :

The Energy cell team has observed that street lighting of the residential colony have neither time based nor lux level based switching.

3. Technical & Financial Analysis :

The in-house electrical team decided to provide a photocell control for outside lighting to reduce the energy consumption during daytime. This photocell control automatically switches off the outside lights during day and switches on during night. Investment for installation of photocell control was Rs 10,000. With daily savings of 2 – 3 kw expected, payback is worked out to be less than six months.

4. Impact of Implementation :

This job was implemented by the maintenance staff. By implementation, electrical energy saving of 0.02 Lakh units per annum was achieved.



Photocell

Lighting control Panel

Lighting control Panel

EC Project 08 : Replacement of 20nos of window air conditioners by energy efficient air conditioners.

1. Background of the project:

To reduce Energy consumption in window type air-conditioners.

2. Observation :

Decade old window type air conditioners, operating in the plant were found to have higher energy consumption than new window type air conditioners having energy efficient compressors

3. Technical & Financial Analysis :



Enquiry bid document was raised for new window type air conditioners from various parties, on techno-commercial evaluation of bid received, one specific was chosen. The evaluation highlighted the immediate need for replacement of a majority of old type window air conditioners in service due to the substantial savings projected. Hence, 17 numbers of air conditioners were replaced with new energy efficient air conditioners, at an investment of Rs. 3.06 Lakhs.

4. Impact of Implementation :

The entire job was implemented by engaging factory electrical maintenance contractor. 9.56 kw of power saving was achieved.



Other Energy Conservation Projects :

<p><u>EC Project 09</u></p> <p>The Energy cell team has observed that lights of commercial department remained on even after their work hours, which were switched off by security personnel after a few hours subsequently. The Encon team decided to put timer based controls to switch off lights after office hour, with a facility to individually switch them on if required.</p>	 <p><i>Timer Based Lighting Controller</i></p>
<p><u>EC Project 10</u></p> <p>A study of power factor of each load center has been carried out and capacitor banks placed at the load center. As a result,</p> <ul style="list-style-type: none">• Improvement of PF from 0.89 to 0.97• Reduction of MD (Maximum Demand) from 1672 to 1452	 <p><i>Loadside online PF panel</i></p>

The regular Energy Conservation initiatives :

- Replacement of incandescent lamps/tube light with CFL
- Replacement of defective steam traps & valves
- Replacement of damaged/leaking steam/condensate line
- Replacement of damaged/leaking compressor line
- Replacement of damaged/leaking chilled water line
- Replacement of damaged insulation
- Replacement of inefficient motors
- Monitoring of all process parameter against standard