

ANEKANT EDUCATION SOCIETY'S  
**TULJARAM CHATURCHAND COLLEGE**  
of Arts, Science And Commerce, Baramati  
DIST. PUNE 413102

**ENERGY AUDIT  
REPORT  
2017-2018**





## **Executive Summary of Savings**

The preliminary energy analysis was entrusted at T.C. College campus for the year 2017-2018 following are the major energy saving potential, identified during the study.

### **1. Lighting and cooling fans system**

There are different types of departments and buildings where lighting points and fans are provided. Depending upon category of load, monthly billing is done by MSEDCL as per applicable tariff. The assessments of monthly bill is done in two part tariff in which fix charges depend on sanctioned load and variable charges as per consumption. For higher consumption, rates are more in various slabs. It is always advisable to limit the consumption at lower billing slab and utilize the optimum sanction load. For commercial category connection, unit rate is highest. We need to focus on such connections, viz, Admin building, Auditorium, Canteen, Society etc.

### **2. Water pumping System**

There are 4 No. of water pump connection at various locations. Existing water pumps are high speed mono block and their condition is normal. While the billing for water pump is done at Rs. 6 to 8 per kwh. There is no capacitor provided for 5HP water pump at boy's hostel and power factor is 0.58, which should be above 0.95. The capacitor bank of 2KVAR needs to be provided urgently.

### **3. Girls Hostels**

The billing is done at residential rate. All 40 watt florescent tubes (Total No. 410) were replaced by LED tube (20w) which reduces load from 16.4 kwh to 8.2 kwh.

### **4. College Library**

There are 26 no. of 23w and 218 no. of 15w with a load at 4.78kw which was reduced to 3.924 kw. 18w by replacing 66 no. of 22w.

## 5. Summary of Energy Saving

Sr. No.	Description	Monthly Saving Potential			Capital Investment Rupees	Investment Recovery Period
		Nos	Kuh Saved	Amt. Rs.		
1	Replacement of CFLs	530	6360	14840/-	159000/-	Ten Months
2	Reduction of Load in Connection for Adm. Bldg.	2	55 to 40 kw	6600	-	Immediate
3	Restricting use fans in boys and girls hostels during college working hours	200	2400	27700	-	Immediate

By optimizing the locating pattern and operational times of hostels substantial energy consumption can be reduced. Also by replacing the traditional lamps with low consumption LED lamps, effective energy saving and thereby reducing the energy bills strongly recommended.

## 6. Preamble

The Govt. of India is its organization have decided to bring down the energy consumption by 30% during 5 years by conducting comprehensive energy audit studies in their premises and by 20% in private premises followed by implementation of suggestion / Recommendation arising out of the study.

## 7. Introduction

Tuljaram Chaturchand college is the oldest college in the region and established in a big campus with different faculties, admin building, Auditorium, Library building, Boys and girls hostels, Mess arrangements, Water wells and Pumping systems, Canting, Banking, Student waiting house, Printing press, Gymkhana etc. The internal roads are provided with street lighting and area lighting arrangements. Adequate plantation and gardening at open loads is provided buildings are constructed in such a way that ample ventilation and sunlight is easily accessible hence the power requirement in classrooms and offices in day hours is reduced.



## **8. Energy Source and Distribution**

The energy demands for different faculty and activities are met through various single phase and three phase electrical connections. Monthly bills are charged by MSEDCL authorities and are regularly paid by concerned depts. The bills of constructions activities are paid by civil contractor and canteen meter bills by canteen manager. There are 37 no. of electrical connections in college campus. Separate distribution boards are provided for each connection.

## **9. Study Results**

The existing billing tariff reveals that, the power consumption of commercial units are charged at higher rate as compared with other categories of power consumption, however, for higher consumption in all categories, the rate per unit increases. Hence it is advisable to restrict the consumption at lower slab. In existing scenario, wherever the rate of unit is more than Ten Rupees, the immediate action is needed to reduce the consumption by way of replacing the high power lamps by LEDs and restrict the use of power by proper operational measures. Such locations are identified and mentioned in energy saving calculation sheet.

Adequate and proper lighting contributes both directly and indirectly towards productivity safety and towards providing and improved work atmosphere. In fact all these are enter related and complementary to each other. To study, analyze and identify energy conservation option in lighting, a study of lighting loads of all buildings and area was conducted. The purpose of study was to determine the lighting load and its distribution in various sections of buildings, determine the quality of illumination provided and recommend measures to improve illumination and reduce electricity consumption. To determine total lighting load, a physical count of the number of light fixtures provided in different floors of different buildings was carried out.

## **10. Options for Improvements in lighting systems:**

Based on the measurements and observations made during energy audit, the following option have been evolved for producing energy consumption as well as improvement in lux levels in lighting system

- a. The tube lights and CFLs energized at other windows may be put off when sufficient day light is available.

- b. Although less number of fluorescent tube lights are provided, while chock type CFLs are provided at some places. (e.s. Bathroom etc.) These tubes and CFLs can be replaced with high lumen LEDs to minimize the lighting consumption and to reduce the amount of monthly bills. The net affect it various locations is shown in energy saving calculation sheet with net saving in monthly bills.

### **11. Grid-tied solar- the best option for reducing the existing energy bills.**

The ministry for new and renewable energy (MNRE) of Govt. of India has launched the scheme as 'roof top solar grid connected system' for common man to generate own power for self use without storage and with thought wastage of energy. In this scheme any consumer of MSEDCL can apply for grid connected solar system as per the sanctioned load and monthly requirement units in prescribed format along with relevant document and can get installed the solar .that power plant on roof top of his building such that the AC output of solar plant can be connected to grid through net meter. The un-utilized or balance power of solar plant is exported to grid during day hours. The units exported to grid are recorded in net meter every day and during night hours the power is taken or imported from the grid. This imported power is also recorded in net meter. At the end of every month the energy bill is generated considering export/import power during the month. If export is more than import the excess units are carried forward for next month. If the import is more than export the difference unit will be charged as per appropriate tariff. The final account of export / import units is closed at the end of year. The benefits of this scheme are (i) We can utilize full capacity of solar plant (ii) There is no need to store the power in batteries. (iii) Cost of storage devices and routing maintenance is saved (iv) When there is no local load for consumption of power the total power is sent to grid and the units exported remain to the credit for future use. The main fetcher of the system is that the solar plant works only when grid power is available. In absence of grid power the solar plant immediately shuts down, so as to avoid back feed on grid and mishap power grid of 10kwh was installed.

### **12. Conclusion**

During Energy Audit Study of the college campus, following points are noted for immediate action in phases.

1. First action will be taken to reduce the excess section load of particular connection so as to save the excess payment against fix charges of excess demand.



2. Second action shall be taken to monitor the undue use of light and fans. Especially in boys and girls hostels, the power cut can be implemented in college working hours. The use of fans for soaking of clothes should be watched. Every person in the campus should take care to switch off the light, fans, computers, A/c etc wherever not needed.
3. Where the rate of unit in bill is high at such identified location the replacement should be done in first phase and likewise depending upon availability of funds.

Meterwise abstract of proposed load reduction by replacing fluo. Tubes and high wattage CFLs by LED Annexure-1

Sr. No.	Connection	Location	Equivalent LEDs		Billing Rate
			Nos	Wattage (Kw)	Per Unit Rs/Kwh
1	186840038421	Boys Hostel-1	33	0.4	6.00
2	186840038463	Physics Lab	4	0.05	12.00
3	186840010461	Chemistry Lab.	61	0.73	6.79
4	186840038447	Boys Hostel-2	19	0.23	11.50
5	186840038439	Boys Hostel-3	17	0.2	11.50
6	186840010666	Adm. Office Bld.	28	0.33	6.79
7	186840041987	College Library	218 18w 66 22 w 69 36w	3.924 1.452 2.284	6.79
8	186840042151	Ladies Hostel-1	129	1.55	9.20
9	186840011468	Ladies Hostel-2	7	0.08	9.20
10	186840011476	Ladies Hostel-3	4	0.05	9.20
11	186840046466	Office Store	14	0.16	9.20
12	186840048264	Principal Residence	6	0.07	11.50
13	186840048639	Student Rest Room	10	0.12	6.79
14	186840048647	Assembly Hall (Jivraj)	1	0.01	6.79
15	186840022524	Sci. Workshop	20	0.24	9.20
16	186840014874	Gymkhana Build.	4	0.05	6.79
17	186840015293	P.G. Build.	4	0.05	6.79
18	186840065215	Boys Hos. 2 <sup>nd</sup> Floor	45	0.54	11.50
19	186840066904	Ladies Rest Room	9	0.1	11.50
20	186841208125	Working Women Host.	81	0.97	11.50
21	186841210804	Microbiology	12	0.14	6.79

22	186840022915	Print. Press	4	0.05	9.20
23	186841218635	Comp.Sci.	45	0.54	6.79
24	186841396126	New Comp. Lab	32	0.38	11.60
25	186841396088	New Micro. Lab	14	0.17	11.60
26	186841396070	New Elect. Lab	23	0.27	9.20
27	186841396100	New Chem. Lab	13	0.15	9.20
28	186841396134	New Ladies Host.	24	0.29	11.50
		Total	1016		

**Suggestions:** Considering daily 12 Hours consumption and present billing rate following suggestion are made for savings in monthly energy bills

1. In order to improved the power factor the capacitors to be provided as mention above this will reduced the consumption.
2. In order to improved the power factor the capacitors to be provided as mention above this will reduced the consumption
3. The bills charged at commercial rates should be considered for reduction of load on priority.
4. The A.C. should be operated in temperature range 20 to 24 degree centigrade for low power consumption.



Mr. Bapu Shinde



Dr. Jagdish Deshpande



Dr. Ashok Kalange