

# **Green Audit Report**

## **Union Christian College, Aluva**



**Internal Quality Assurance Cell (IQAC)**

**Union Christian College, Aluva**

**Ernakulam, Kerala - 683102**

# Contents

## 1.0 Introduction

### 1.1 Background

### 1.2 Green Audit

### 1.3 Methodology

## 2.0 Water Audit

## 3.0 Energy Audit

## 4.0 Solid Waste Audit

## 5.0 Summary of Findings & Recommendations

## 1.0 INTRODUCTION

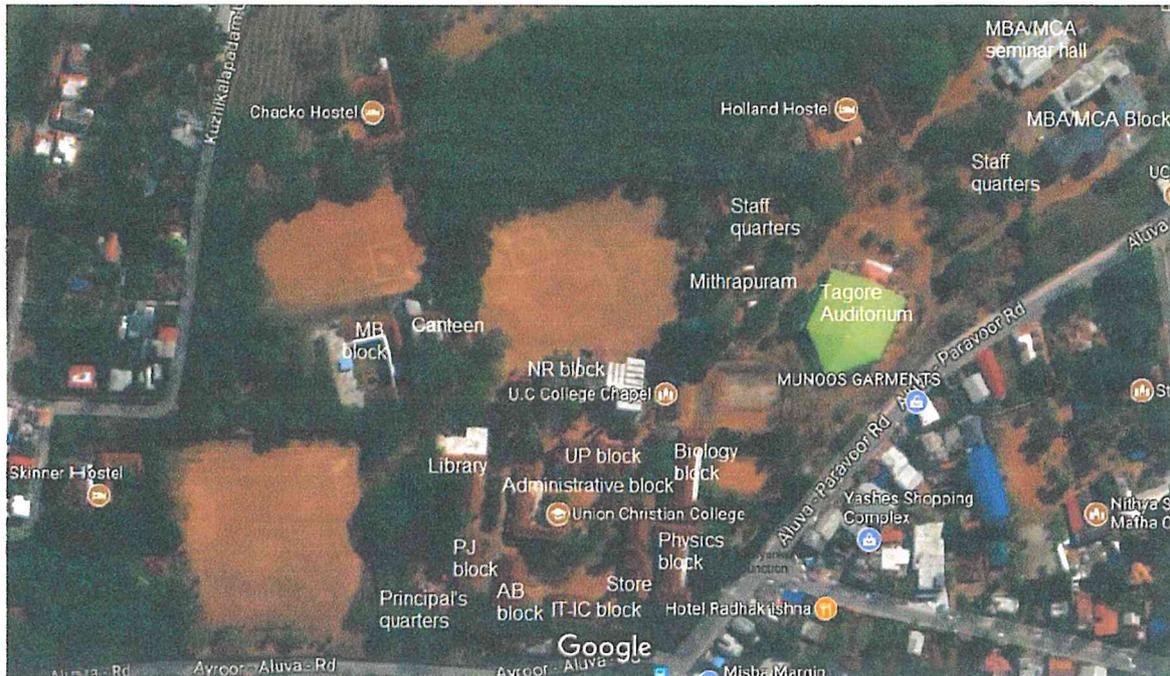
### 1.1 Background

Union Christian College (in short - UCC), Aluva is an educational institution located close to the banks of the river Periyar and it is affiliated to Mahatma Gandhi University, Kottayam. The college, established in 1921, with an area of 42 acres, campus presently offering fifteen UG and fourteen PG courses. The campus includes administrative block, nine academic blocks, library, canteen, MBA/MCA block, four auditoriums, three hostels, chapel and quarters for Principal and staff. The campus has strength of 144 staff, 55 non-teaching staff and 2576 students out of which 366 reside in the campus. The canteen is equipped to provide food for about 300 to 400 persons per day. The major water source is well. Electricity for the entire campus is provided by KSEB.

The college motto is 'The Truth shall make you free'. The lush green gardens and well designed infrastructure provide the perfect ambience for learning, sharing and development of the students. Union Christian College received A grade from the National Assessment and Accreditation Council. In India, UCC is the first college getting accredited in the third cycle (for the period of 2011-16).

**Table 1.1 Key facts about the site**

Name of the Project	Union Christian College
Address	UC College Rd, Aluva, Ernakulam
Average Annual Rainfall	3331mm
Water Source	Well
Waste Treatment System	Biogas Plant with capacity of 10 m <sup>3</sup>
Average daily water demand	~ 127.5 kilo litres
Average daily energy demand	~ 724.3 Units
Average daily waste produced	~ 63.23 kg



**Figure 1.1. Location of Union Christian College, Aluva**

## 1.2 Green Audit

Green audit is the process of assessing the environmental impact of an organization, process, project, product etc. green audit can be defined as a basic management tool comprising a systematic, documented, periodic and objective evaluation of how well environmental organisations, management systems and equipment are performing. The aim of the audit is to facilitate management control on environmental practices and to enable the organization to assess compliance with its policies including meeting regulatory requirement.

## 1.3 Methodology

Key components of green audit conducted at Union Christian College, Aluva campus included:

### i. Pre-audit planning

- a) Preliminary literature review of concepts and methodologies related to green audit.
- b) Discussion with the management staff on various systems installed in the campus.
- c) Awareness creation and interaction with the staff and student on the concept of green audit.
- d) Walk through the entire campus to understand the nature of water use, energy use and waste management systems in the campus.



**Figure 1.2. Inaugurating pre- auditing function at UCC, Aluva**

A green audit was started at UCC College, Aluva by SCMS Water Institute, SCMS School of Engineering and Technology, Karukutty. The pre- auditing function was inaugurated by Principal, Dr P Thomas Mathew on 27<sup>th</sup> April 2017.

## **ii. Data collection**

- a) Development of questionnaire format to identify all water/energy using fixtures/equipments and examine water or energy use patterns for individual buildings in the campus.
- b) Collection of secondary data from compilation of electricity bills, collecting records of pumps, generators, water quality analysis reports, civil and electrical drawings etc.
- c) Semi-structured interviews with maintenance manager, technicians, plumber and housekeeping staff on current situation and the past trends in water consumption, electricity consumption, waste management, waste generation etc.

## **iii. Data Processing and analysis**

The existing trends and patterns in water usage, energy usage and waste generation and management is analysed in this step from the data collected from the previous step.

#### **iv. Audit Recommendations and reporting:**

Based on the understanding from the green audit, recommendations are given to improve the existing environmental performance of the campus and are documented in a report format.

### **2.0 Water Audit**

A water audit is a systematic review of a site to identify opportunities to improve its water use efficiency. The site may be a public water utility, facility (institutional or commercial properties like malls, office, schools etc.) or a household. Audit recommendations are developed based on surveys and assessments of water-using hardware, fixtures, equipment, landscaping, and management practices at the site. Water audit involves tracking, assessing and validating all components of flow from the site of withdrawal or treatment through the water distribution system and into the consumer's properties. Water auditing examines the major areas of water use, including human consumption, personal hygiene & sanitation, washing, cleaning, laundry, gardening etc. Water auditing is an on-going process and rarely stays consistent in a site or system over time. Therefore, in order to gauge progress from adopted water conservation and cutbacks, water audit should be performed on a regular basis. In addition, it provides convincing overview of the water use trends, effectiveness of conservation measures and potential cost and water savings.

#### **2.1 Water supply**

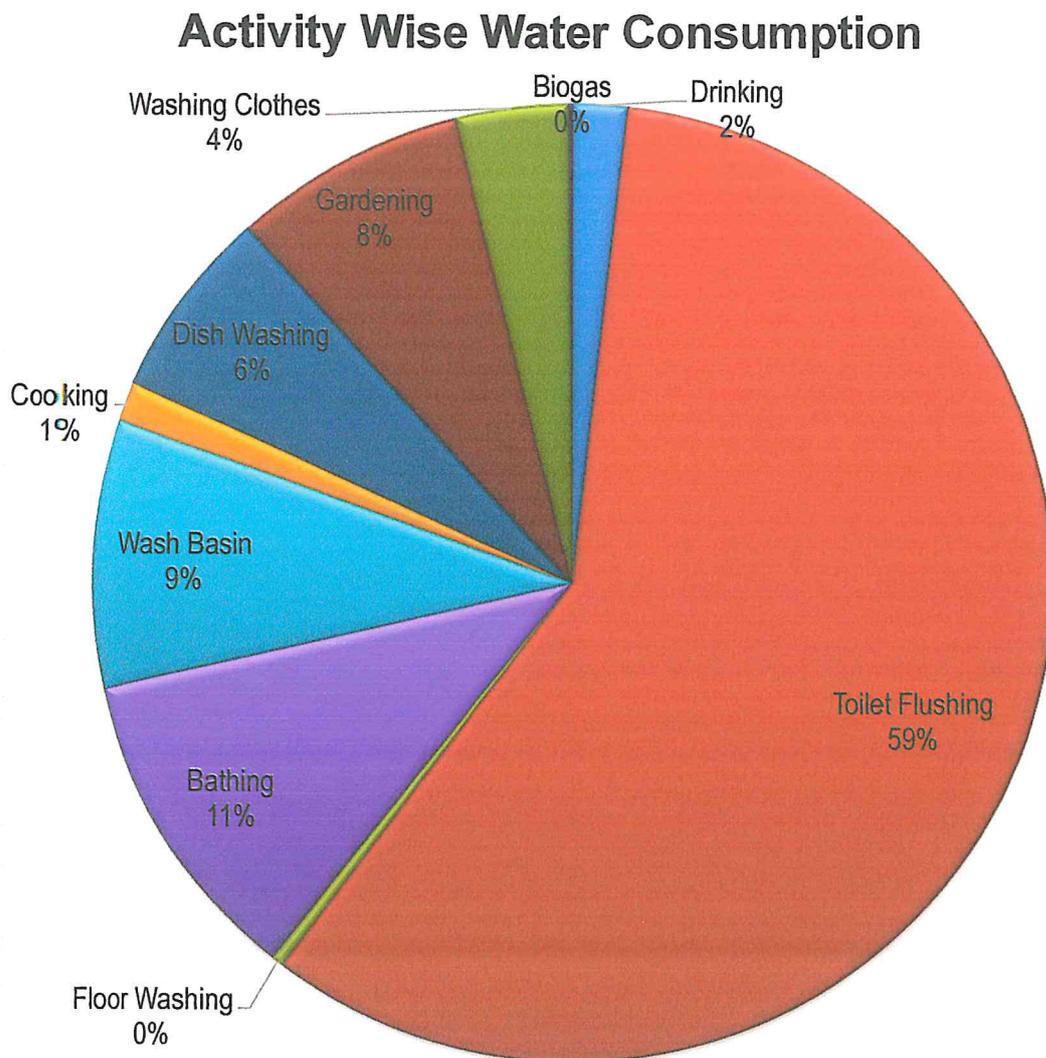
Around 127.5 kilo litres of water is used in the campus daily. Source of water for the entire campus is wells. There are three wells in the campus but only one well is used to meet the water demand of the entire campus.



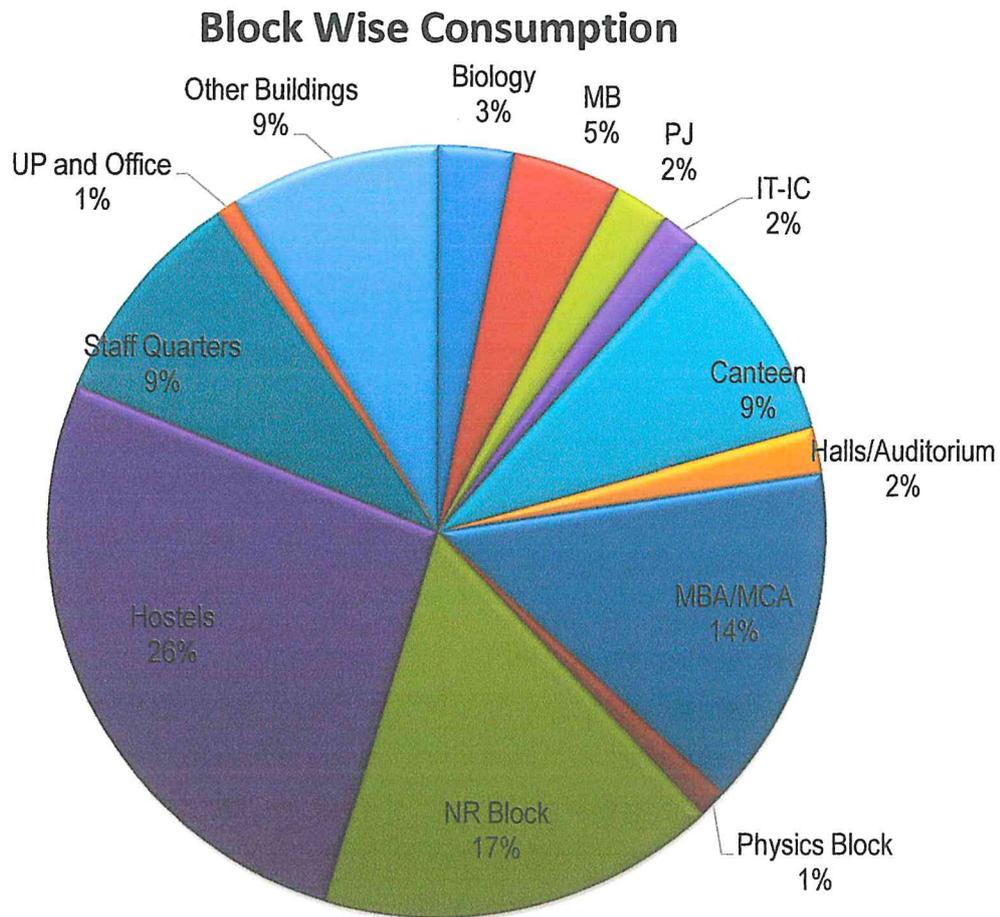
**Figure 2.1. Interviewing the pump operator**

## 2.2 Water use diagram

The various blocks of UCC campus such as administrative block, UP block, NR block, biology block, physics block, store, chapel, VMH hall, IT-IC block, AB block, PJ block, library, canteen, MB block, Skinners hostel, Chacko's hostel, Tagore auditorium, Mithrapuram, MBA\MCA block, MCA seminar hall, Sport's hostel, Principal's quarters and staff quarters were surveyed in this study with the questionnaire developed based on literature review and observations and discussions during the pre-audit phase. Figure 2.2 shows the water usage by various activities of UCC campus based on the survey. It can be seen that toilet flushing (59%), Bathing (11%) and Wash basin (9%) are the activities that dominates water usage. Figure 2.3 shows the water consumption by different blocks of UCC campus. There were no leakages that were observed or reported during the audit exercise at UCC.



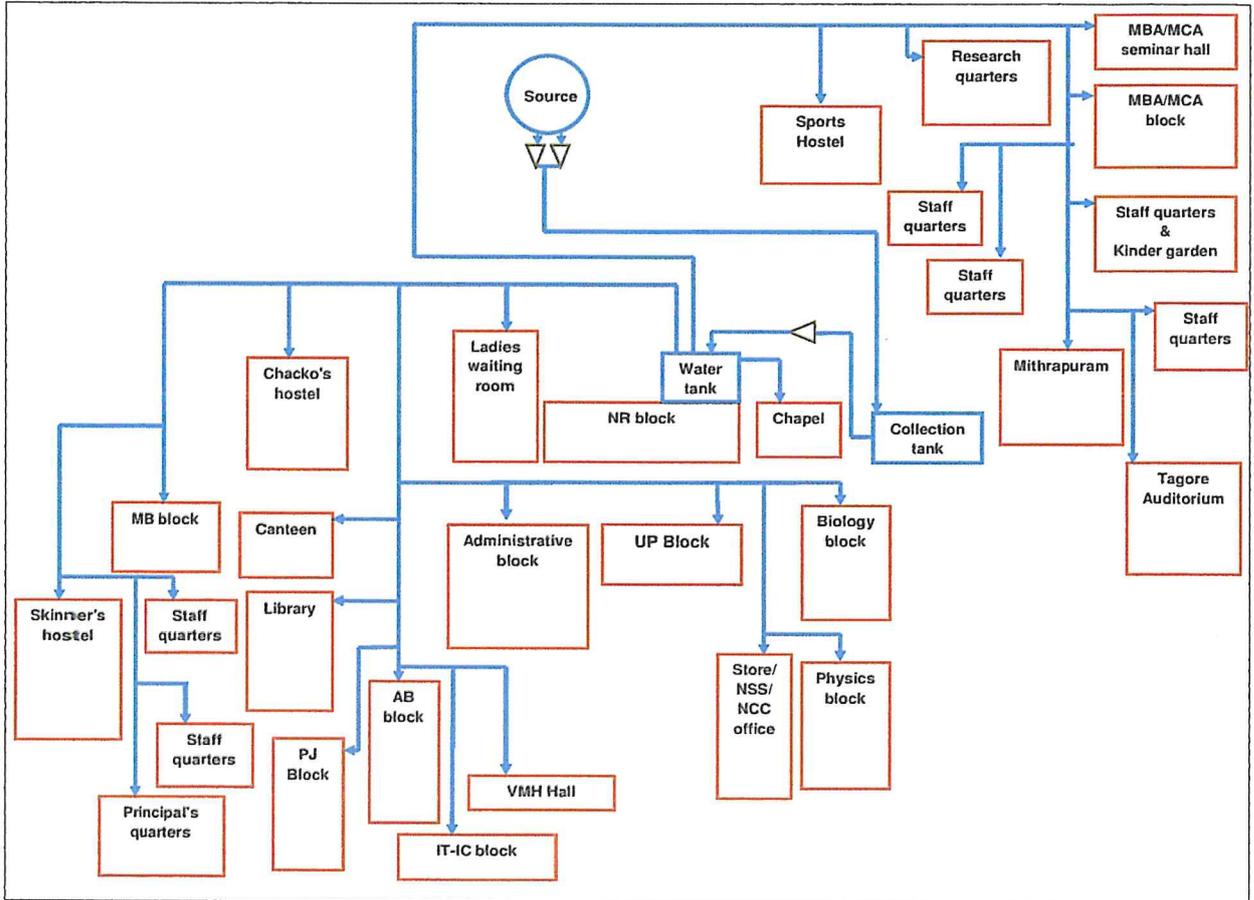
**Fig 2.2 Composition of total water use (127500 Litre/day) at UCC (in percentage)**



**Fig 2.3 Composition of total water use (127500 Litre/day) at UCC (in percentage)**

### 2.3 Water Circuit Diagram

Water circuit diagram shows how the water flows from the source to the consumers. Based on the walk through surveys, discussions with staff and managing committee, a water circuit diagram was prepared as shown in figure 2.4. Source of water is a single well. From there water is pumped into an underground tank using a pump of 12HP and 7.5HP, then it pumped to an overhead tank having a capacity of 85 cubic meter using a pump of 7.5 HP. From there water is distributed in the entire campus using natural flow.



**Fig 2.4 Water distribution network at UC campus**



**Fig 2.5 One lakh litre tank for rainwater harvesting**

### 3.0 ENERGY AUDIT

An energy audit is an inspection, survey and analysis of energy flow for energy conservation in a building, process or system to reduce the amount of energy input into the system without negatively affecting the output. Reducing energy consumption while maintaining or improving human comfort, health and safety are of primary concern. The primary objective of energy audit is to determine ways to reduce energy consumption per unit of product output or to lower operating cost. Energy audit provides a "benchmark" (reference point) for managing energy in the organization and also provides the basis for planning a more effective use of energy throughout the organization.

#### 3.1 General description about energy consuming appurtenances /activities in the campus

There is an administrative block, nine academic blocks, library, canteen, MBA/MCA block, four auditoriums, three hostels, chapel, Principal quarters and staff quarters are within the campus. The administrative block facilitates a Principal room, guest room, office room and manger room. Nine academic blocks provide space for fifteen UG and fourteen PG courses, faculty room, computer labs, seminar halls, individual labs for each department also there is research labs and computer labs which are air conditioned. There are four auditoriums in which one is air conditioned, and one is accessible for public for conducting various functions.

All the rooms are provided with ceiling fan and tubes. Projectors are mainly used by PG classes. Toilets are provided in different floors. A separate toilet near the canteen and NR block is also provided. They are lighted with tubes and fluorescent lamps. Since the building has good ventilation and natural lighting, no artificial lighting is required for corridor.

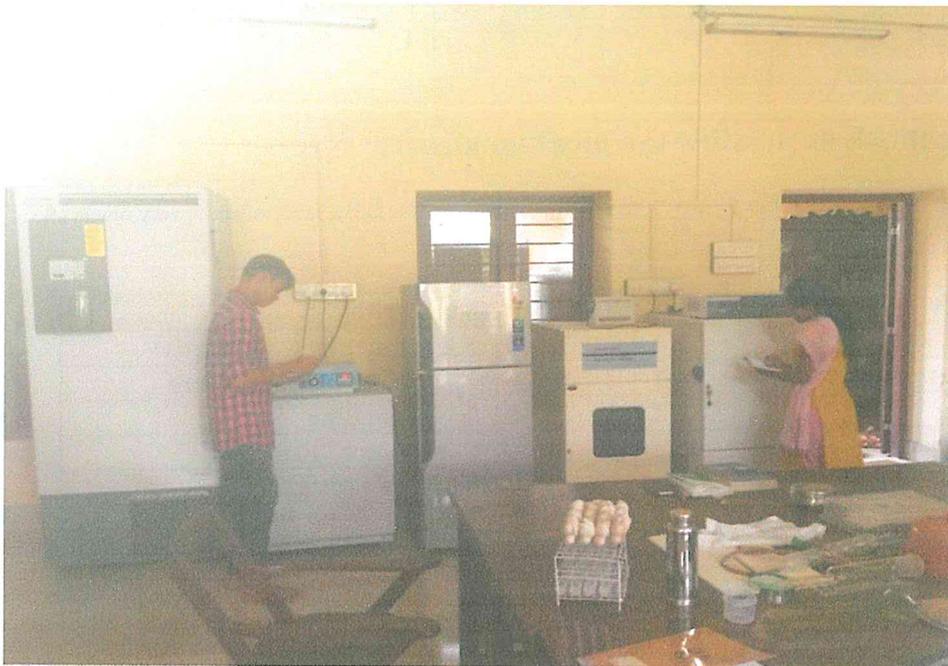
Ladies hostel, Gents hostel and a sports hostel along with staff quarters and principal quarters are provided in the campus. Presently there are 366 inmates; 60 girls in Skinner hostel, 216 girls in the hostels outside the campus and 48 boys in Chacko's hostel, 19 boys in sports hostel and 23 boys in the hostel outside the campus. There are 28 rooms in Skinner hostel which can accommodate two students in each and 50 rooms in Chacko's hostel, which can accommodate one student in each. There is one CFL lamps and one ceiling fan in each room. Apart from that, there is a warden's room, study room, cafeteria room. About twelve families are residing in

### 3.2 Methodology

- **Data collection**
  - Walk through audit- collection of type and number of energy consuming appurtenances
  - Informal interviews with staffs and students- usage pattern, lab and class timings, office working hours
- **Data analysis-** Identification of major energy consuming areas
- **Identification of energy conservation opportunities**

### 3.3 Energy consumption status of the campus

Energy consumption pattern of each building in the campus has been evaluated. Calculation criteria are described below.

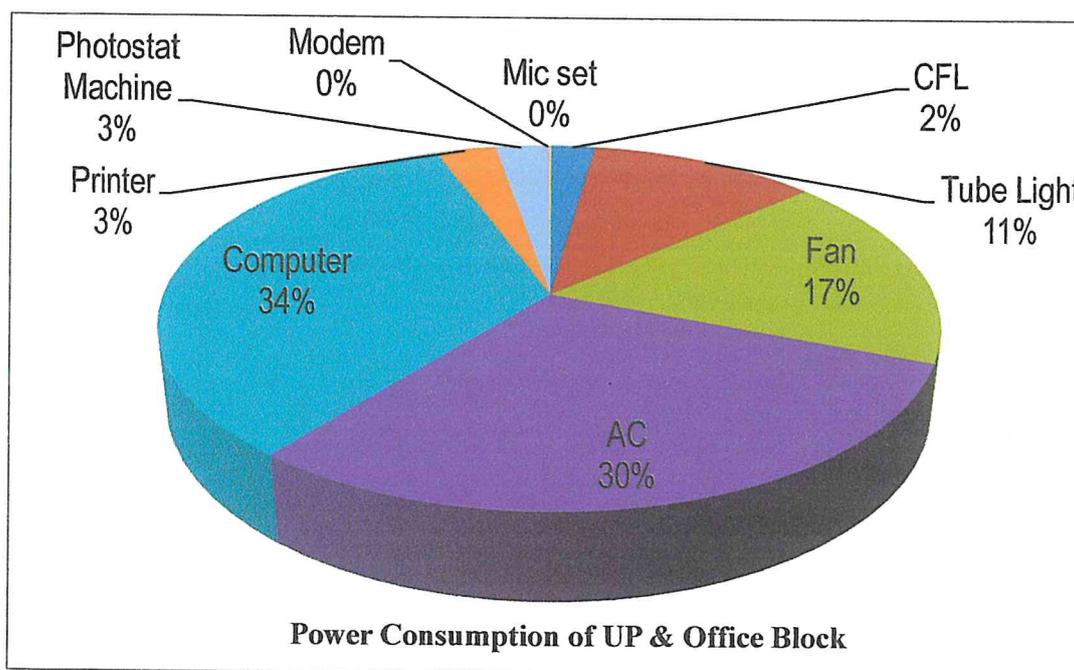


**Figure 3.1. Students collecting data on energy consumption at UCC College, Aluva**

#### 3.3.1 UP and Office Block

UP block consists of two floor and office block consists of ground floor alone. Detailed power consumption of both blocks are given in the below tables.

UP and Office Block		
Equipments	No:	Power Consumption/Month (kWh)
CFL	25	48.30
Tube Light	60	248.40
Fan	42	386.40
AC	1	662.40
Computer	31	750.72
Printer	8	64.40
Photostat Machine	2	57.50
Modem	1	1.10
Mic set	1	2.30
<b>Total</b>		<b>2221.52</b>



### 3.3.2 Biology Block

Biology block consists of two floors. Power consumption of biology block is shown below.

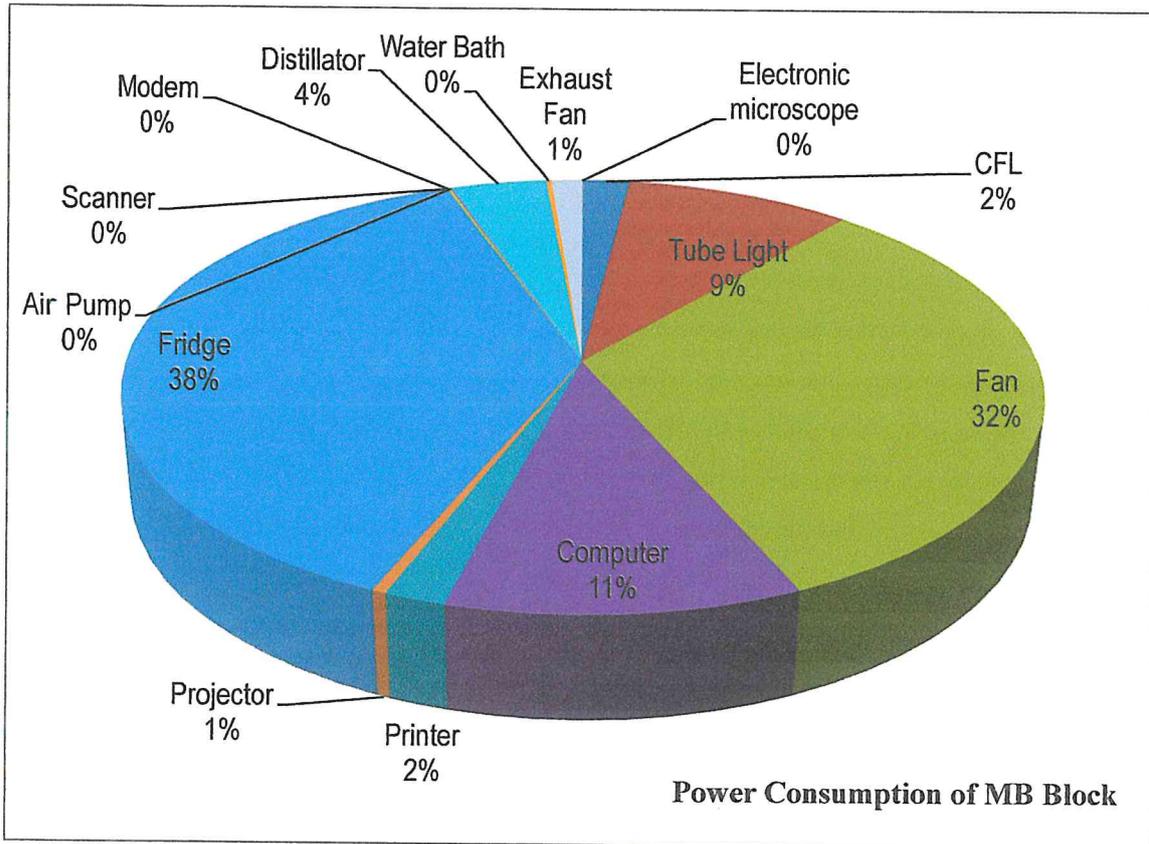
BIOLOGY BLOCK		
Equipments	No:	Power Consumption/Month (kWh)
CFL	27	74.52
Tube Light	95	78.66
Fan	27	248.40
Computer	21	115.92
Printer	1	8.05
A.C	7	434.70
Projector	2	9.20

Fridge	5	850.00
Centrifuge	5	0.33
Spectrometer	3	1.20
Autoclave	3	5.18
pH meter	2	0.40
Laminar Air Flow	2	7.50
Oven	2	6.40
PCR	3	1.58
Distillator	2	276.00
Water Bath	2	4.80
Exhaust Fan	2	18.40
Electronic microscope	2	0.13
Calorimeter	1	9.20
UV transiluminator	1	0.02
Microfuge	1	0.40
Incubator	1	1.60
<b>Total</b>		<b>2152.58</b>

### 3.3.3 MB Block

MB block consists of two floors. Power consumption of MB block is shown below.

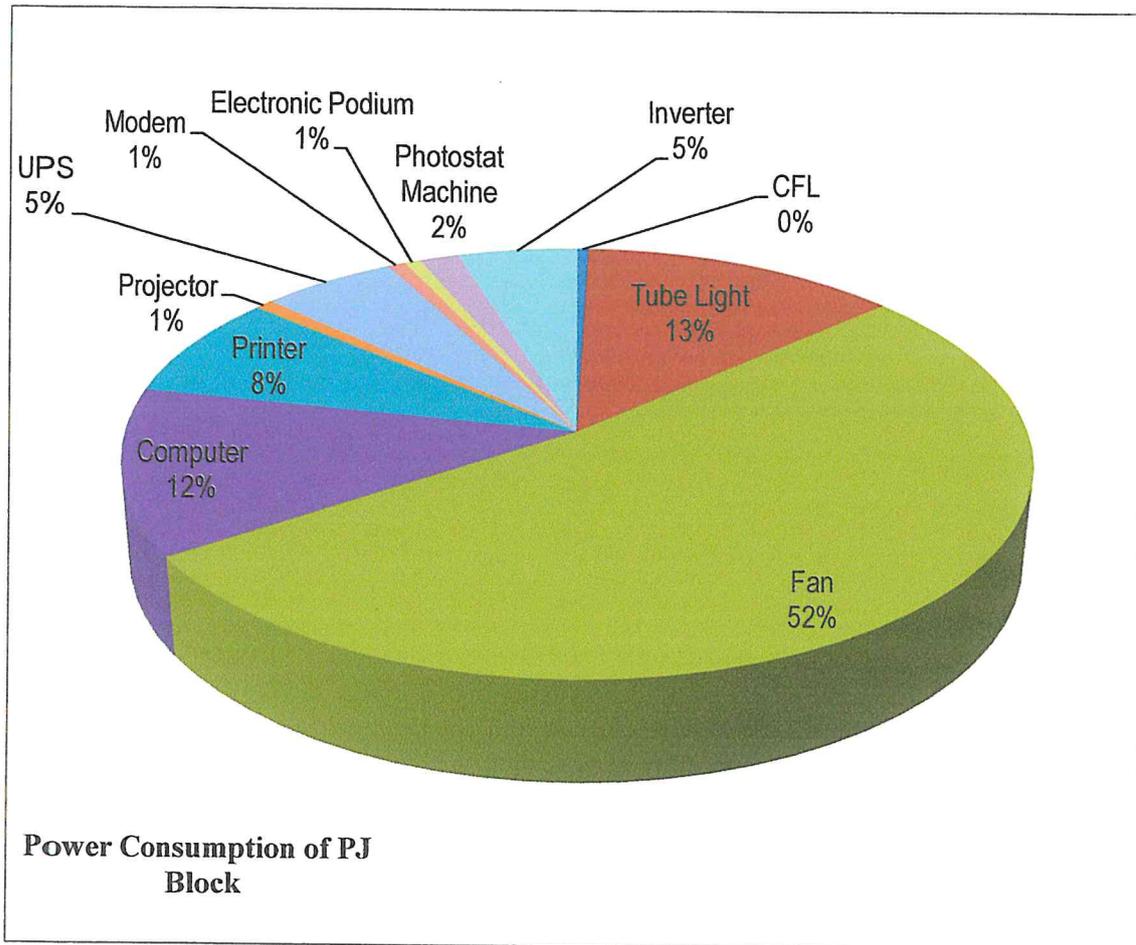
<b>MB Block</b>		
<b>Equipments</b>	<b>No:</b>	<b>Power Consumption/Month (kWh)</b>
CFL	24	41.40
Tube Light	120	200.12
Fan	76	699.20
Computer	42	231.84
Printer	5	40.25
Projector	2	9.20
Fridge	3	828.00
Scanner	1	0.30
Modem	2	2.21
Air Pump	1	2.16
Distillator	1	84.00
Water Bath	2	4.80
Exhaust Fan	3	27.60
Electronic microscope	2	0.13
<b>Total</b>		<b>2171.21</b>



### 3.3.4 PJ Block

PJ block consists of two floors. Power consumption of PJ block is shown below.

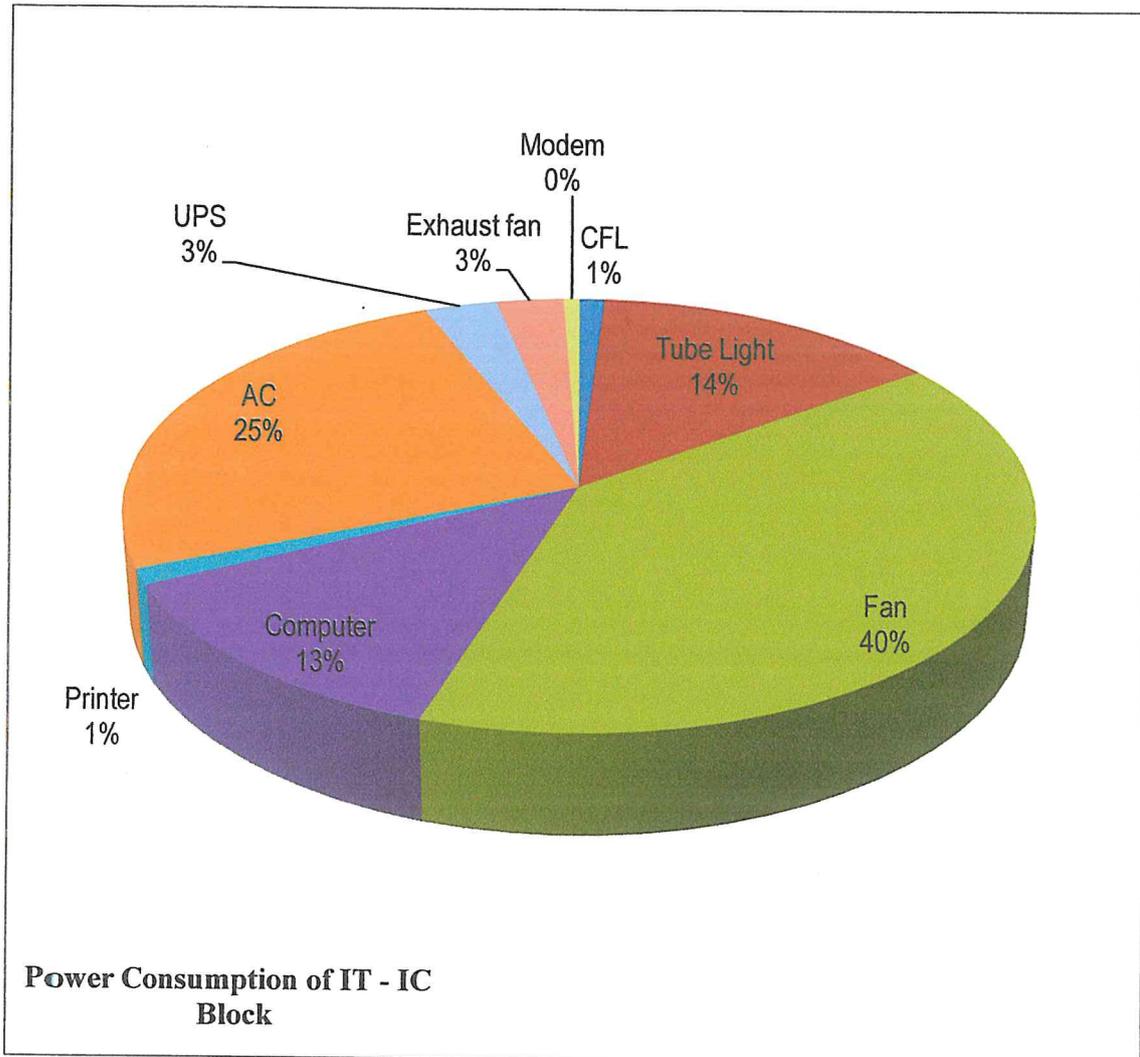
PJ BLOCK		
Equipments	No:	Power Consumption/Month (kWh)
CFL	4	1.38
Tube Light	17	39.77
Fan	28	161.00
Computer	7	38.64
Printer	6	24.15
Projector	1	2.30
UPS	3	17.25
Modem	2	2.21
Electronic Podium	2	1.92
Photostat Machine	2	5.00
Inverter	1	15.00
<b>Total</b>		<b>308.62</b>



### 3.3.5 IT - IC Block

IT - IC block consists of three floors. Power consumption of IT - IC block is shown below.

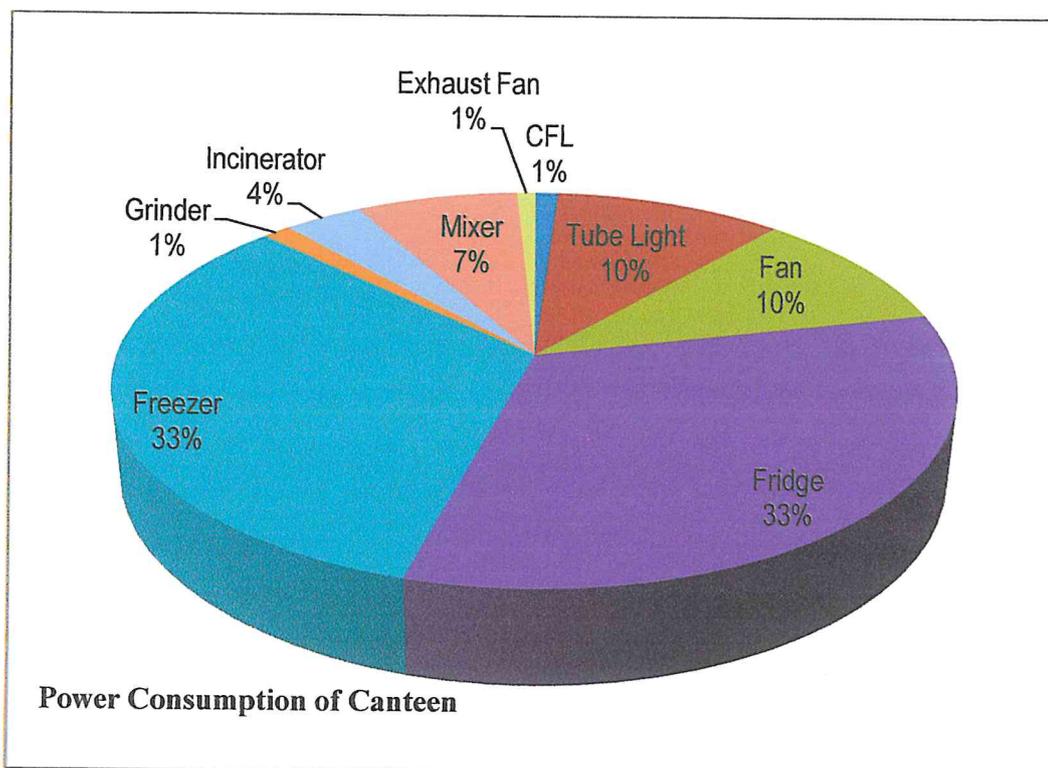
IT-IC BLOCK		
Equipments	No:	Power Consumption/Month (kWh)
CFL	5	3.45
Tube Light	24	48.02
Fan	15	138.00
Computer	2	44.16
Printer	1	4.03
AC	3	86.40
UPS	2	10.00
Exhaust fan	1	9.20
Modem	2	2.21
<b>Total</b>		<b>345.47</b>



### 3.3.6 Canteen

Power consumption of Canteen is shown below.

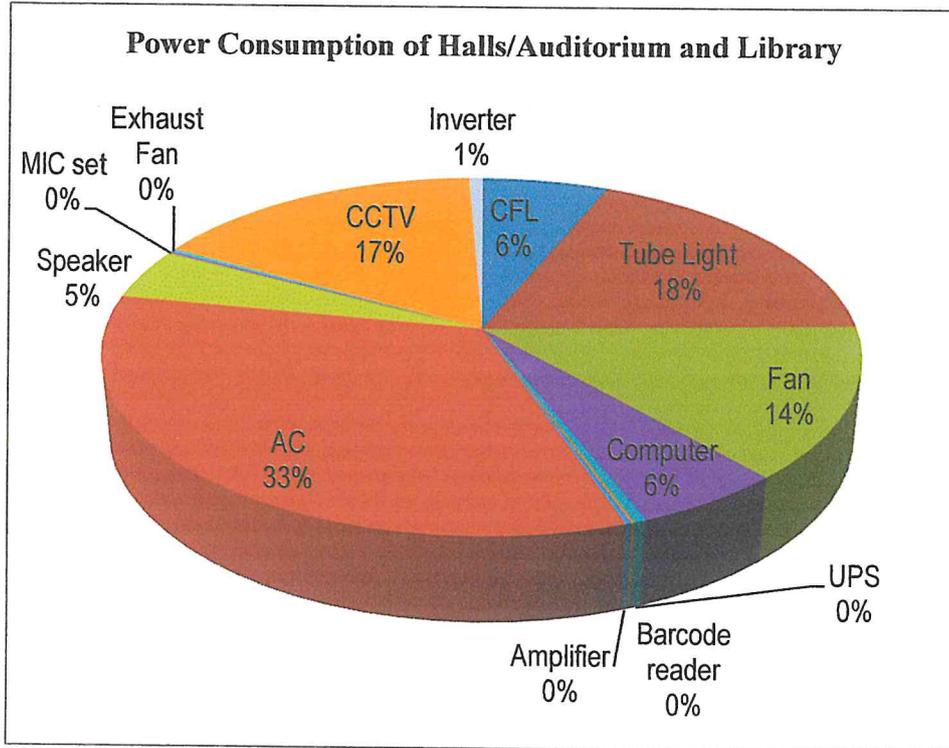
Canteen		
Equipments	No:	Power Consumption/Month (kWh)
CFL	4	11.04
Tube Light	17	112.61
Fan	12	110.40
Fridge	1	360.00
Freezer	1	360.00
Grinder	1	13.80
Incinerator	2	40.00
Mixer	1	80.50
Exhaust Fan	1	9.20
<b>Total</b>		<b>1097.548</b>



### 3.3.7 Halls/ Auditorium and Library

VMH, AB, Tagore and Mithrapuram are the four auditoriums in the campus. Power consumption of Halls/Auditoriums and Library are shown below.

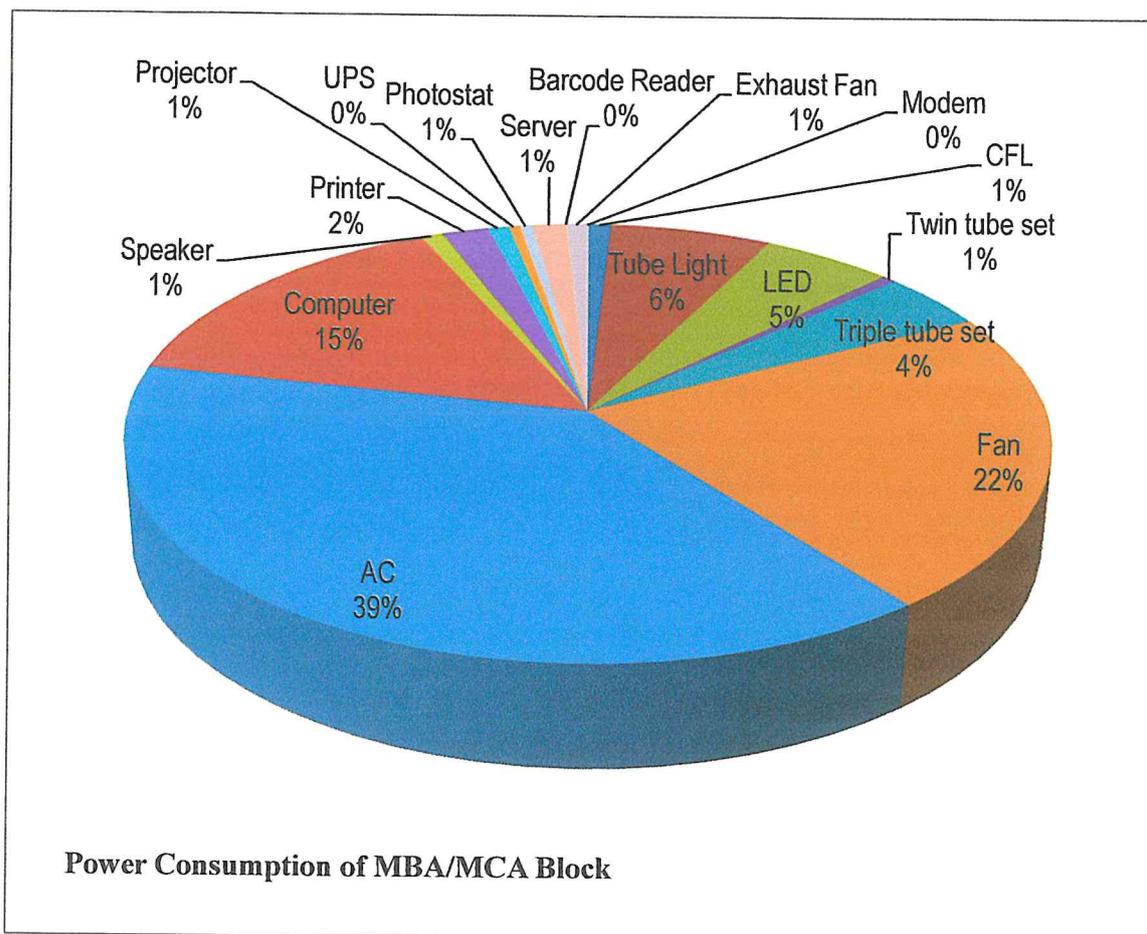
Halls/Auditorium and Library		
Equipments	No:	Power Consumption/Month (kWh)
CFL	13	13.46
Tube Light	175	40.00
Fan	98	30.00
Computer	17	12.24
UPS	1	1.00
Barcode reader	1	0.25
Amplifier	1	0.50
AC	4	72.00
Speaker	2	10.00
MIC set	1	0.50
Exhaust Fan	1	0.50
CCTV	1	36.00
Inverter	2	1.50
<b>Total</b>		<b>217.95</b>



### 3.3.8 MBA, MCA Block

MBA, MCA block has three floors. Power consumption of MBA, MCA block is shown below.

MBA/MCA Block		
Equipments	No:	Power Consumption/Month (kWh)
CFL	18	31.05
Tube Light	266	220.25
LED	43	178.02
Twin tube set	12	19.87
Triple tube set	58	144.07
Fan	164	754.40
AC	16	1324.80
Computer	188	518.88
Speaker	10	30.00
Printer	8	64.40
Projector	6	27.60
UPS	3	15.00
Photostat	1	17.25
Server	1	46.00
Barcode Reader	1	0.50
Exhaust Fan	3	27.60
Modem	2	2.40
<b>Total</b>		<b>3422.09</b>



### 3.3.9 Physics Block

Physics block has three floors. Power consumption of physics block is shown below.

Physics Block		
Equipments	No:	Power Consumption/Month (kWh)
CFL	52	53.82
Tube Light	110	91.08
Fan	58	400.20
AC	12	860.00
Computer	48	214.96
Printer	8	9.66
Projector	2	2.30
Fridge	3	276.00
Inverter	2	6.90
UPS	3	3.45
Modem	2	2.21
Speaker	4	4.60
Amplifier	2	2.30
Spectrophotometer	2	1.60

Source Meter	1	2.40
Spin Meter	2	4.00
Hair Dryer	1	1.00
Magnetic stirrer	4	8.00
Infra Cure	1	1.00
High precision Balance	1	3.00
Spray Pyrolysis Equipment	2	2.40
Hot air oven	2	60.00
Oven	1	3.20
Dip Coating unit	1	1.00
C-Mag HS	1	0.50
Digital Ultrasonic Cleaner	1	0.60
Centrifuge	1	0.14
Fume Hood	1	0.48
Thermal Evaporating Coating Unit	1	128.80
Chiller Unit	1	61.60
Muffle Furnace	2	138.00
Vacuum Coating Unit	3	192.00
Exhaust Fan	1	9.20
Interferometer	1	0.07
Multimeter	1	6.90
Microvolt Meter	1	3.90
CRO	10	6.40
Dual power supply	12	23.04
Single power supply	16	38.40
Function Generator	18	0.43
Heating Mantle	3	38.40
E/M bar magnet	2	0.02
Digital IC trainer Kit	15	1.08
Microprocessor trainer Kit	1	0.01
0.5HP Motor	2	50.20
1.5 HP Motor	1	70.00
<b>Total</b>		<b>2785.25</b>

### 3.3.10 NR Block

NR block has three floors. Power consumption of NR block is shown below.

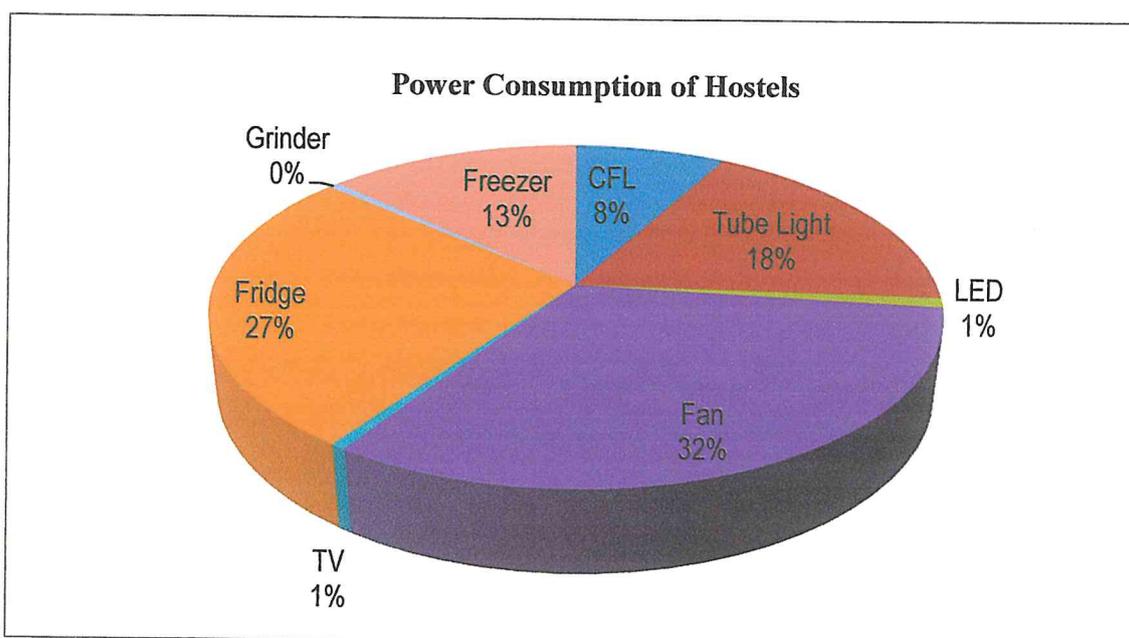
NR Block		
Equipments	No:	Power Consumption/Month (kWh)
CFL	31	10.70
Tube Light	90	74.52
Twin tube	4	6.62

Fan	96	220.80
AC	5	103.50
Computer	67	100.84
Printer	4	16.10
Scanner	2	0.06
Photostat Machine	2	5.75
Projector	3	3.45
Fridge	5	300.00
Exhaust Fan	16	110.40
UPS	13	14.95
Modem	3	3.31
Stabilizer	2	2.30
Battery	3	69.00
Router	1	3.68
Induction Cooker	1	11.50
Freezer	1	34.50
Muffle Furnace	1	69.00
Vacuum Oven	1	4.40
Oven	1	3.20
Magnetic Stirrer	1	8.00
Weighing Balance	1	0.09
Digital Balance	5	4.50
Vacuum pump	1	1.00
IR lamp	1	2.00
Electric Bunsen	16	8.00
Hot air oven	3	18.00
Melting Point Apparatus	2	0.40
Potentiometer	2	0.02
Conductivity Meter	5	0.05
Balancer	1	0.09
Distillation Apparatus	1	40.00
Autoclave	1	2.00
Water bath	1	2.40
Incubator	1	4.00
Airflow cabinet	1	3.40
Double distiller	1	10.00
Photoelectric colorimeter	2	4.00
<b>Total</b>		<b>1276.53</b>

### 3.3.1 1 Hostels

Skinner's and Chacko's hostels are the two hostels inside the campus. Power consumption of hostels are shown below.

Hostels		
Equipments	No:	Power Consumption/Month (kWh)
CFL	71	213.00
Tube Light	68	489.60
LED	2	24.00
Fan	58	870.00
TV	1	15.60
Fridge	2	720.00
Grinder	1	15.00
Freezer	1	360.00
<b>Total</b>		<b>2707.20</b>

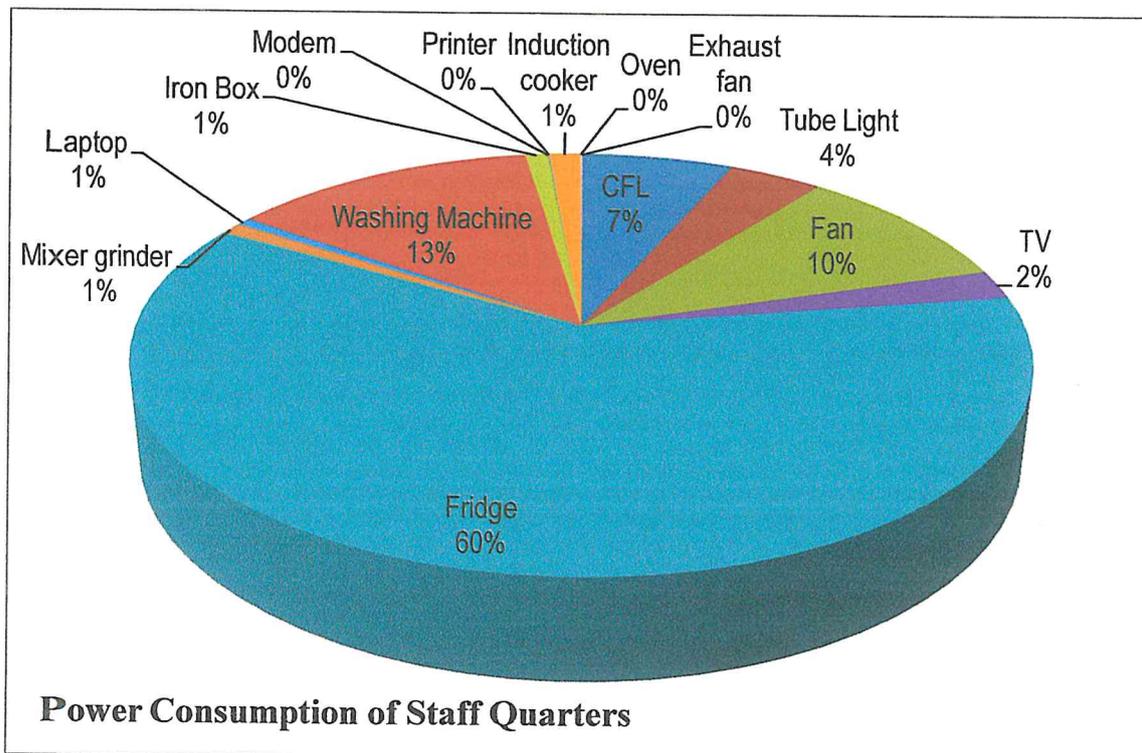


### 3.3.12 Staff Quarters

Principals quarters and staff quarters are provided inside the campus. Power consumption of staff quarters are shown below.

Staff Quarters		
Equipments	No:	Power Consumption/Month (kWh)
CFL	63	146.97
Tube Light	22	91.08
Fan	28	224.00
TV	4	52.00
Fridge	5	1380.00
Mixer grinder	5	20.13
Laptop	4	13.80
Washing Machine	5	300.00
Iron Box	4	22.00

Modem	1	0.48
Printer	1	0.88
Induction cooker	1	30.00
Oven	1	1.25
Exhaust fan	1	1.00
<b>Total</b>		<b>2283.58</b>

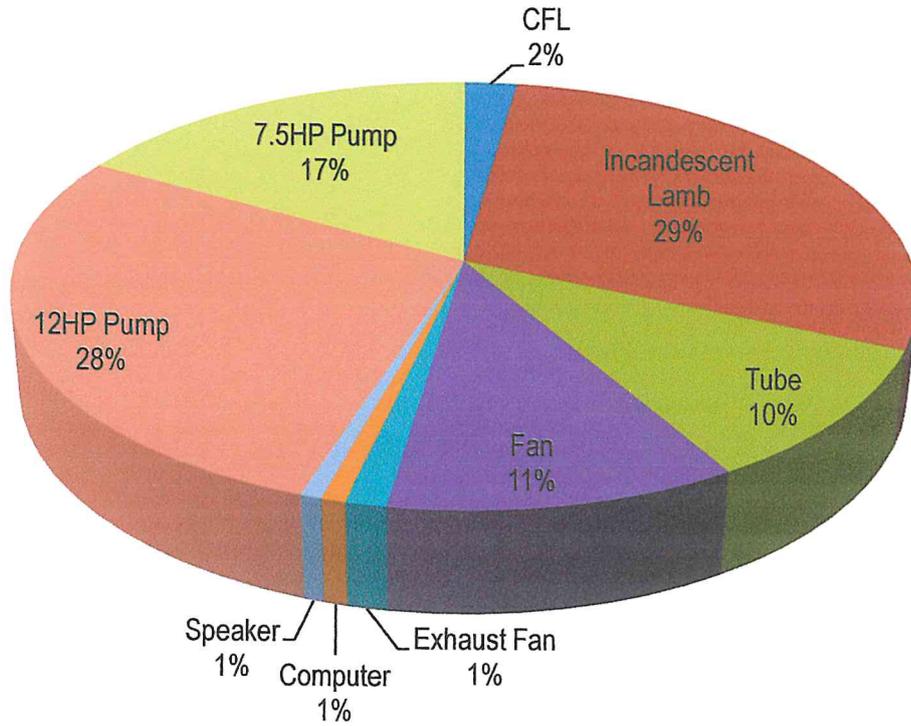


### 3.3.13 Other Buildings

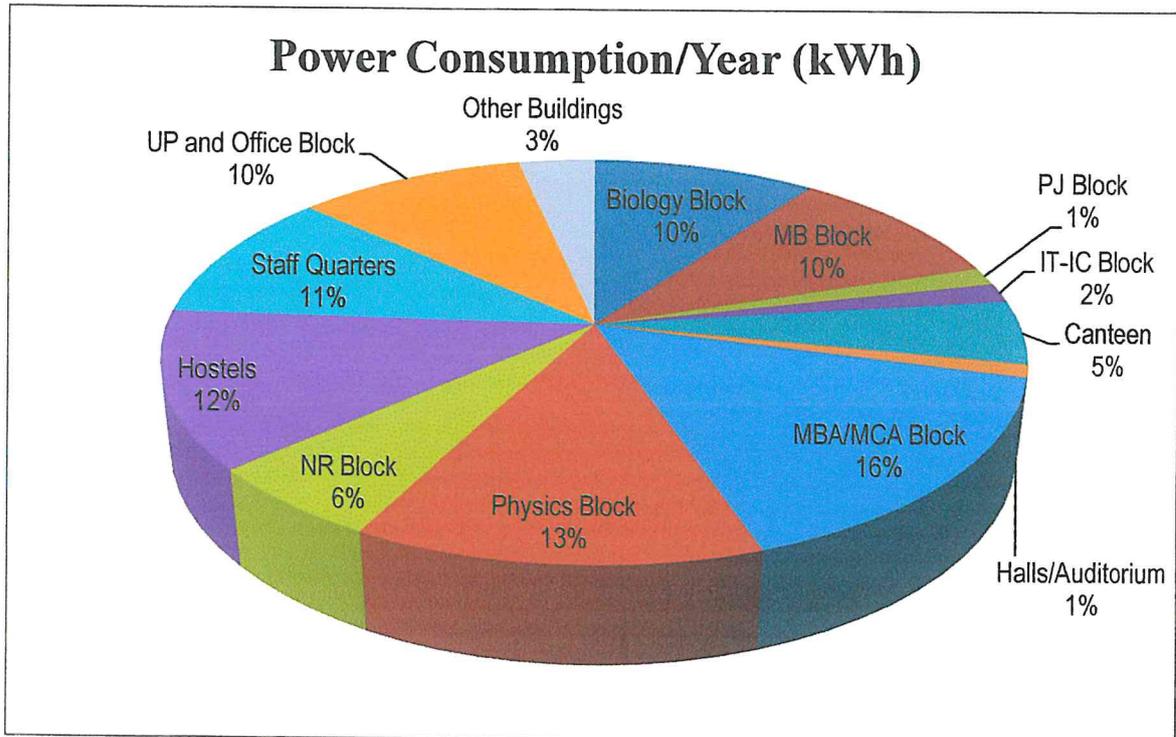
Other buildings includes the development block, Store, NSS, NCC camp rooms, pump houses etc. Power consumption of other buildings are shown below.

<b>Other Buildings</b>		
<b>Equipments</b>	<b>No:</b>	<b>Power Consumption/Month (kWh)</b>
CFL	27	15.89
Incandescent Lamb	9	216.00
Tube	47	75.13
Fan	23	79.35
Exhaust Fan	1	9.20
Computer	1	5.52
Speaker	3	5.00
12HP Pump	1	207.00
7.5HP Pump	2	126.50
<b>Total</b>		<b>739.59</b>

### Power Consumption of other buildings



Building	Power Consumption/Year (kWh)
Biology Block	25831
MB Block	26055
PJ Block	3703
IT-IC Block	4146
Canteen	13171
Halls/Auditorium & Library	2615
MBA/MCA Block	41065
Physics Block	33423
NR Block	15318
Hostels	32486
Staff Quarters	27403
UP and Office Block	26658
Other Buildings	8875
<b>TOTAL</b>	<b>260750</b>



## 4.0 SOLID WASTE AUDIT

### 4.1 Scope of Waste Audit

Waste audit encompasses the entire spectrum of waste collection, segregation, reuse, recycle, incineration and landfill. Appropriate suggestions and justifications would be put forth to improve the efficiency of the system as a whole.

### 4.2 Waste Generation in the Campus

Waste generated in the campus varies from paper, plastic, cloth, glass, food and sanitary items. Their sources include academic blocks, hostels, office, staff quarters, canteen and kitchen. The waste that is generated from all these sources if not handled properly may pose a serious health and environmental hazards. The wastes generated from various activities in the campus are mentioned below.

#### ➤ CANTEEN

Food waste of 10kg is generated daily from the canteen which were taken to a biogas plant. Other wastes including paper, plastic, ice cream cups etc. about 1kg is generated daily, which is burnt monthly.

### ➤ OFFICE BLOCK AND ACADEMIC BLOCKS

Rubbish of about 8 kg is collected daily and burnt in incinerator for two hours daily. Mixed paper wastes including answer sheets, question papers, office papers, used notebooks, packaging wastes etc. are generated and sold out. Newspapers, magazines, journals etc are stored in the library.

### ➤ HOSTELS AND STAFF QUARTERS

Wastes including paper, plastic, sanitary items, bags etc. weighing around 9kg are daily collected and burnt in the incinerator. Food waste from the hostel weighs around 1kg are given to biogas plant. The gas produced is used for cooking and the slurry is used as fertilizer. The food waste produced in the quarters of Principal and staff are put in pits, and other wastes like paper and plastic were collected and burnt in incinerator.

### ➤ E-WASTE

E-waste generated in the campus which is around 200kg per year has been stored in a room.

## 4.3 Methodology

UC campus includes an administrative block, nine academic blocks, library, MBA/MCA block, four auditoriums, three hostels, chapel, Principal quarters, staff quarters and a canteen which provides food for around 300-400 people at a time. To evaluate the trends of waste generation and waste management techniques adopted at campus, interviews were conducted with the cleaning staffs, administrative officers and students. The amount of waste generated, major sources of waste and frequency of waste collection were enquired from the cleaning staffs. The details about the sources of waste generation in the campus are shown in Table 4.1.

**Table 4.1 Sources of wastes**

SL. No.	Source	Types
1	Hostels and quarters	Food waste, paper, plastics, cloth, electronic items, leather, rubber, sanitary.
2	Academic Areas	Paper, plastic, electronic items, sanitary items, food
3	Canteen	Food, vegetable wastes, plastics, paper, gunny bags
5	Office	Paper, plastic
6	Labs	Glass beakers, electronic items, paper

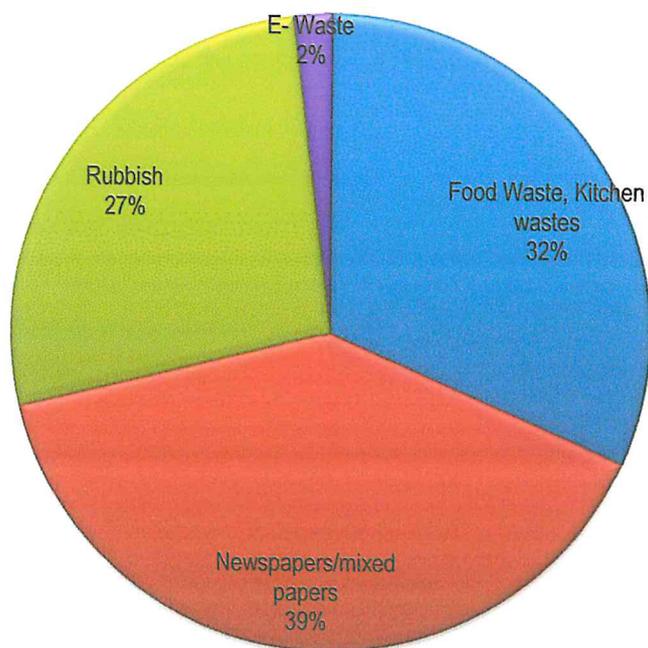
**Table 4.2 Frequency of Waste Collection from Various Sources**

SL. No.	Source	Frequency Of Collection
1	Administrative block and Academic Blocks	Once a day
2	Hostels and quarters	Once a day
3	Canteen	Once a day
4	Road Side Dustbins	Once a week

**Table 4.3. Daily Waste Generated**

SL. No.	Waste Type	Weight (Kg Per Day)	Percentage By Weight
1	Food Waste, Kitchen wastes	20	32%
2	Newspapers/mixed papers	25	39%
3	Rubbish (Paper waste, Plastic etc)	17	27%
4	E- Waste	1.23 (450 kg per annum)	2%
<b>TOTAL</b>		<b>63.23</b>	<b>100%</b>

**Percentage by weight**



The UCC, Aluva campus serves as a living laboratory of sustainable practices by integrating academia, student life and campus operations, researching new solutions through campus practices for sustainable waste management. Students have played a vital role in encouraging environmental consideration in every functional facet of the institution. An efficient management of waste starts with regular collection of waste generated. This task has been made easier by placement of dustbins at appropriate places. Dustbins are placed at canteens, each corridor of all the buildings, roadsides, etc. Covered dustbins are used in order to prevent breeding of infectious vectors. Campus wastes dominantly paper, plastic, thermocol, sanitary, ceramic, etc. which can neither be reused nor recycled and other combustible wastes from each buildings are collected by the cleaning staffs of the campus which is later on burnt in the incinerator for two hours each day.

The UC college, Aluva campus is now making a conscious effort to establish the campus as a ‘zero waste’ zone, through a slew of scientific and environment-friendly measures. A number of initiatives have been put in place to promote the concept of ‘reduce, reuse and recycle’ and contribute mite to protecting the environment.



**Figure 4.1 Roadside Bins at UCC Campus**

#### **A) Management of Paper Waste**

Papers are segregated based on the following basic paper grade categories:

- Magazines
- Mixed Paper
- Old Newspapers
- Carton

Mixed paper is a broad category that often includes items such as discarded mail, telephone books, paperboard and catalogues. High grade deinked paper is made of high grade paper such as letterhead, copier paper, envelopes, and printer and convertor scrap that has gone through the printing process.

#### **B) Management of Food Waste.**

Food wastes and all other organic wastes from canteen and the hostel is given to biogas plant. The amount of organic matter being retained at the campus is nil.



**Figure 4.2 Biogas Plant at UCC Campus**

#### **C) Management of Combustible Waste**

An incinerator is installed at the campus in which the combustible wastes like paper, plastic, wrappers, gunny bags, paper bags, clothes, sanitary waste etc are burnt daily. The ashes and residues from the incinerator are removed once in a month which is used for gardening. No fuel is used for burning the waste.



**Figure.4.3 Incinerator at UCC Campus**

#### **D) Management of Recyclable Waste**

Wastes including newspapers, magazines, cartons, mixed papers and plastic bottles are collected and are sold. E-wastes from the campus like monitors, keyboards, mouse, motherboard, hard discs, switch ports, UPS, CD s, LCD projectors, printers, battery etc are presently stored in a laboratories and then move to godown.



**Figure 4.4 E-waste storage in shelf and labs at UCC Campus**

## 5. Summary of Findings and Recommendations

### **Audit recommendations for potential water saving**

Based on the information collected and observations, the following can be recommended to reduce water use and increase its efficiency

- ❖ Replace old and damaged single flush cisterns in the toilets with dual flush cisterns, to regulate consumption of water.
- ❖ Establish a water budget for the building and, set and monitor performance criteria in due course of time
- ❖ Install sensors to avoid the overflow from overhead tanks.
- ❖ Awareness to the students and staff regarding the importance of conservation of water
- ❖ Incentives for those who consumes less water in hostels
- ❖ Install facility for waste water treatment and encourage reuse of water: at present the waste water from bathrooms and kitchen is flowing into septic tanks and there is no system of its reuse. As water is becoming a scarce commodity, it is advisable to treat the waste water and reuse it for gardening and flushing in toilets.
- ❖ A tank of one lakh liter capacity is constructed in the campus for rainwater harvesting, but it is not effectively using. Do the necessary arrangements to utilize the same.
- ❖ Open well and bore well recharging through rainwater harvesting from all rooftops should be done to increase the water storage and water quality of both wells.

### **Audit recommendations for potential Energy saving**

- All air conditioned rooms can be provided with doors having automatic closing mechanism and windows with tinted glass to reduce load on the air conditioning system.
- Good light ventilation and Air ventilation to classrooms without air conditioning system to avoid the use of tube lights and minimize the use of ceiling fans at high speed.
- It is recommended that fluorescent lamps in streets may be replaced with CFL or LED light at the end of utility period of currently installed fluorescent lamps as it consumes much less energy compared to fluorescent lamps.
- Use air conditioners only during summer.

- Replacement of CRT monitor with LCD monitor. LCD monitors typically require about 30% of the power required for a CRT monitor with the same screen area. In addition, the amount of heat generated by an LCD monitor is considerably less than a CRT monitor, resulting in a lower load on air conditioning. Building cooling needs may be decreased by up to 20%.
- Switch off the photocopier machine at the main outlet itself when not in use or in other words machine should not be kept in stand by and sleep mode which consumes power.
- Reduce wastage of water and thereby the power required to pump up the water can be cut down.
- Switch on heater only when required.
- Switch off the fridge at peak hours rather than working it for 24hrs daily.
- Use of conventional mode of cloth presser replacing iron boxes.
- Installation of solar panels can reduce the load of power consumption.

#### **Audit recommendations for waste reduction**

- Food wastes and all other organic wastes from canteen and all blocks should be taken to biogas plant, do not burn these waste.
- Gas produced from Biogas plant should be used effectively in canteen for reducing the usage of cooking gas.
- Provide more dustbins in gardens, corridors, roadsides, canteen and make students more aware of using it effectively.
- Place dustbins with different colour codes, so separate the waste into different types like (plastic, paper, food etc.) at source of waste itself.
- Sell waste paper, plastic waste and E-waste to recycling companies other than burning.
- A number of initiatives to be put forward, to promote the concept of '**reduce, reuse and recycle**' and to make the campus a '**zero waste**' zone.