

# ENERGY AUDIT

STUDY PERIOD (TWO YEARS) 2020 - 2021 AND 2021-2022

## Sustainability study **AUDIT REPORT**

**Studied for**  
Anekant Education Society's  
**Anekant Institute of Management Studies**

Anekant Education Society Campus, T. C. College Road,  
Baramati – 413 102, District Pune, Maharashtra, India

**Studied in the capacity of**  
**An accredited & Certified Green Building Professional**



**Studied by**

**Valid till December 2023**

## Disclaimer

The Audit Team has prepared this report for the **Anekant Education Society's Anekant Institute of Management Studies** located at Anekant Education Society Campus, T. C. College Road, Baramati – 413 102, District Pune, Maharashtra, India based on input data submitted by the College analysed by the team to the best of their abilities.

The details have been consolidated and thoroughly studied as per the various guidelines for Green Buildings available in National and International Standards; the report has been generated based on comparative analysis of the existing facilities and the prerequisites formulated by various standards. The inputs derived are a result of the inspection and research. These will further enhance and develop a Healthy and Sustainable Institution.

These can be implemented phase wise or as a whole depending on the decision taken by the Hon'ble Management and College. The warranty or undertaking, expressed or implied is made and no responsibility is accepted by Audit Team in this report or for any direct or consequential loss arising from any use of the information, statements or forecasts in the report.

The audit is a thorough study based on the inspection and investigation of data collected over a period of time and should not be used for any legal action. This is the property of Greenvio Solutions and should not be copied or regenerated in any form.

The Report is prepared by the Team of Greenvio Solutions under their brand and department – Sustainable Academe as Consultancy firm with the Project Head - Ar. Nahida Shaikh who is as an Accredited and Certified Green Building Professional-Architect. Green Building consultancy is her forte and she is one of the most sought after names when it comes to providing excellent quality services within the stipulated time frame.

The Study is conducted in capacity of Accredited & Certified Green Building Professional with extensive experience.

### Greenvio Solutions

*Developing Healthy and Sustainable Environments*

We are an Environmental and Architectural Design Consultancy firm

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## Acknowledgement

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Our special thanks are due to **Shri. Jawahar Motilal Shah (Wagholikar)**, Chairman; **Shri. Vikas Shashikant Shah (Lengarekar)**, Secretary and everyone from the Management.

Our heartfelt thanks to Chairperson of the entire process **Dr. M.A. Lahori**, Principal for the valuable inputs.

We are also thankful to **College's Task force the faculty members** who have collected data required **Dr. T. V. Chavan**, IQAC Coordinator; **Dr. Abhishek. Y. Dikshit**, Associate Professor.

We highly appreciate the assistance of the **entire Teaching, Non-teaching and Admin staff** for their support while collecting the data.

### **Sustainable Academe**

Brand of Greenvio Solutions, Palghar District, Maharashtra- 401208

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# 1. Introduction

## 1.1 About the Institution

AIMS, Baramati envisages to be a global epicentre and socially accountable Institution of Excellence which conserves, create, and imparts pertinent knowledge and values. Our stakeholders are empowered to progressively conquer all the socio-economic, technological challenges and to uphold echelon of citizenry.

AIMS, Baramati has a unique blend of rich culture of proactive, committed environment and latest technology. Its objective is to provide our students valued riven quality management knowledge, through new methodologies and resources by experienced, dedicated faculty members.

## 1.2 Statements of the Institution

### 1.2.1 Vision

The College proposes "To develop multidimensional business leaders through the blend of value based, techno-powered and skill intensive management education."

### 1.2.2 Mission

The College adheres and focuses "To inculcate life skills in students through proactive involvement of all stakeholders to lead in the dynamic business environment."

### 1.2.3 Motto

The College channelizes its efforts towards the motto of "Aiming Beyond Excellence."

### 1.2.4 Objective

It is the objective of the College is

- To provide world class technological and academic infrastructure to facilitate intellectual transactions and enhanced technology know how.
- To establish the collaborations with national and international Corporates, NGO's, Academic Institutions and Government establishments for student grooming.



- To develop business research acumen in students to cater real-time solutions.
- To instil contemporary skills in students to lead the businesses with sustainability approach
- To inculcate universal values in students for social wellbeing.

## 1.3 Assessment of the Institute

### 1.3.1 Affiliations

The Institute is affiliated to **Savitribai Phule Pune University**, formerly the University of Poona, is a collegiate public state university located in the city of Pune, India.

### 1.3.2 Accreditation

The College has received '**B++**' Grade with a **CGPA of 2.93 in its First cycle** of Accreditation in 2019 awarded by the National Assessment & Accreditation Council (NAAC). The College is due to enter its second cycle of NAAC.

### 1.3.3 Certification

The College has received the following Certifications

- ISO 9001:2015 – Quality Management Systems
- ISO Green Audit
- NIRF – Participated in the National Institutional Ranking Framework and has secured position in 2019-2020 and 2020-2021.
- AISHE – The All India Survey of Higher Education code is C-41812.

## 1.4 Achievements of the Institute

The Institute has a tremendous track record of excellence in Built form and educational services provided, below are some of the achievements of the prestigious Institute.

- '**Letter of Recognition**' through the office of Govt. of Maharashtra, District Skill Development, Employment and Entrepreneurship Guidance Centre, Pune, August 2018.
- '**Letter of Recognition for commendable contribution to skill development**' through the office of Maharashtra Centre for Entrepreneurship Development, June 2018.

## 2. Institution overview

### 2.1 Populace analysis for Academic year 2021 - 2022

#### 2.1.1 Students data

The student data (shared by the College) shows there were a total of **132 Boys and 107 Girl students**, thus there were **a total of 239 students** on the premises.

#### 2.1.2 Staff data

Type	Male	Female	Total
Admin staff	02	03	<b>05</b>
Teaching staff	08	02	<b>10</b>
Non-Teaching staff	03	03	<b>06</b>
<b>Total Staff Members</b>	<b>13</b>	<b>08</b>	<b>21</b>

*Table 1: Staff data of the Institution for 2021 - 2022*

The staff data shows the premises had a total of **21** Staff Members.

### 2.2 Populace analysis for Academic year 2020 - 2021

#### 2.2.1 Students data

The student data (shared by the College) shows there were a total of **130 Boys and 90 Girl students**, thus there were **a total of 220 students** on the premises.

#### 2.2.2 Staff data

Type	Male	Female	Total
Admin staff	1	3	<b>4</b>
Teaching staff	10	2	<b>12</b>
Non-Teaching staff	3	2	<b>5</b>
<b>Total Staff Members</b>	<b>14</b>	<b>7</b>	<b>21</b>

*Table 2: Staff data of the Institution for 2020 - 2021*

The staff data shows the premises had a total of **21** Staff Members.

## 2.3 Total College Area & College Building Spread Area

The **total site area is 3.39 Acres & total Built-up area of College is 40,565 sq. ft for around 260 populace footfalls.**

## 2.4 College Infrastructure

### 2.4.1 Establishment

**The College was established in 2011.**

### 2.4.2 Spatial Organisation

The college has ample and wide open classes with facilities appropriate for an educational space. There are open spaces with a beautiful entrance approach. The balance of hardscape and softscape provides a landscape serene ambience. **Overall the Infrastructure of the Building is excellent in terms of the Architecture Design.**

### 2.4.3 Operation and maintenance of the premises

The data collection session was held with the staff regarding the operation and working hours. The schedule is mentions that the College is working Monday to Friday with timings being 08:30 hours to 17:30 hours.



## 3. Green Building Study as a Research based technical audit

### 3.1 About the Green Building Study Audit

It is a systematic study of the aspects which make the Institution sustainable and healthy premises for its inhabitants.

### 3.2 Analysis of the Green Building Study Audit

The procedure included detailed verification for the following:

#### Energy Audit

- Analysis of the Lights, Fans, AC, Equipment
- Renewable energy
- Scope for reducing the current energy bills if any
- Improvement in the thermal comfort of the premises

#### Green Audit

- Green initiatives
- Hygiene audit
- Water Audit - Analysis of the current water consumption of campus; Rainwater harvesting and Wastewater treatment on the premises.
- Waste Audit - Current waste produced, its segregation, and usage; Strategies to be adopted for waste management and awareness

#### Environmental Audit

- Analysis of the current landscape + hardscape of the premises
- Analysis of the flora and fauna of the premises
- Strategies adopted at present to enhance vegetation
- Measures that can be adopted for ecological improvement of the premises.

### 3.3 Strategy adopted for Green Building Study Audit

The strategies included data collection from the admin department, actual inventory, investigation to check the operation and maintenance, analysis of the data collection, and preparation of the Report.

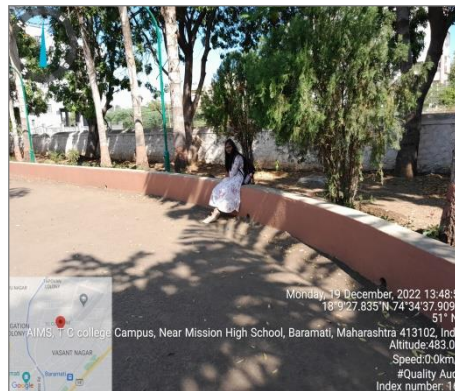
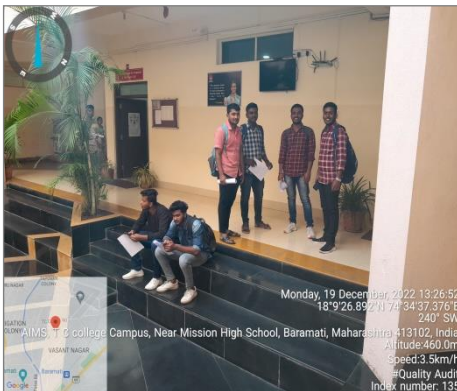
### 3.4 Activities undertaken for the Green Building Study Audit

- Allotment and Initiation by the Institute
- Survey of students and staff completed
- Site visit at the Institute
- Submission of the Certificate

## On-site investigation and physical verification Audit Team during the visit on 19 December 2022



Discussion with the Core Team



On-site review with the team for site management, green wall and other features



Group photo with the Team

## 4. Energy Audit

### 4.1 Sources of Energy consumption

The premise uses following sources of energy consumption.

#### 4.1.1 Primary sources

- **Electrical (Metered)** – Light, Fans, Equipments, Pumps comprise these sources.
- **Renewable energy** – There are solar panels in the premises.

#### 4.1.2 Secondary sources

These are available in the form of 6 Gas cylinders, 2 UPS, 2 Inverters and 8 Batteries for general purposes and the UPS, batteries as a backup.

### 4.2 Site investigation analysis

The Site investigation observations and interviews with the Maintenance staff, Electrical department in charge are summarised below:

- The **switch-off drills are practised at present**, the maintenance staff and Lab Attendants put off switches of all equipments regularly.
- All the **computers are shut-off after use** and also put on power saving mode.

### 4.3 Actual Electrical Consumption as per Bills

#### 4.3.1 Consumption study

The admin department had shared the bills for Meter which is connected to the Building and is the main source of energy supply. The details are documented below.

S. No.	Month	Year	Units consumed	Amount in Rupees
<b>Academic Year 2021-2022</b>				
<b>1</b>	April	2021	1009	29,830
<b>2</b>	May	2021	1064	44,950
<b>3</b>	June	2021	1569	73,230
<b>4</b>	July	2021	1080	38,400
<b>5</b>	August	2021	824	29,410



<b>6</b>	September	2021	976	30,510
<b>7</b>	October	2021	891	27,870
<b>8</b>	November	2021	636	22,560
<b>9</b>	December	2021	760	25,660
<b>10</b>	January	2022	1822	59,510
<b>11</b>	February	2022	1545	47,300
<b>12</b>	March	2022	1289	58,350
<b>Academic Year 2020-2021</b>				
<b>1</b>	April	2020	606	16,730
<b>2</b>	May	2020	76	46,880
<b>3</b>	June	2020	76	0
<b>4</b>	July	2020	4404	0
<b>5</b>	August	2020	1326	53,470
<b>6</b>	September	2020	1246	41,790
<b>7</b>	October	2020	1128	78,920
<b>8</b>	November	2020	1386	32,530
<b>9</b>	December	2020	436	19,300
<b>10</b>	January	2021	651	26,130
<b>11</b>	February	2021	664	26,380
<b>12</b>	March	2021	566	23,060

*Table 3: Details of the electrical consumption*

The summary of the above study shows the average consumption varies for each month.

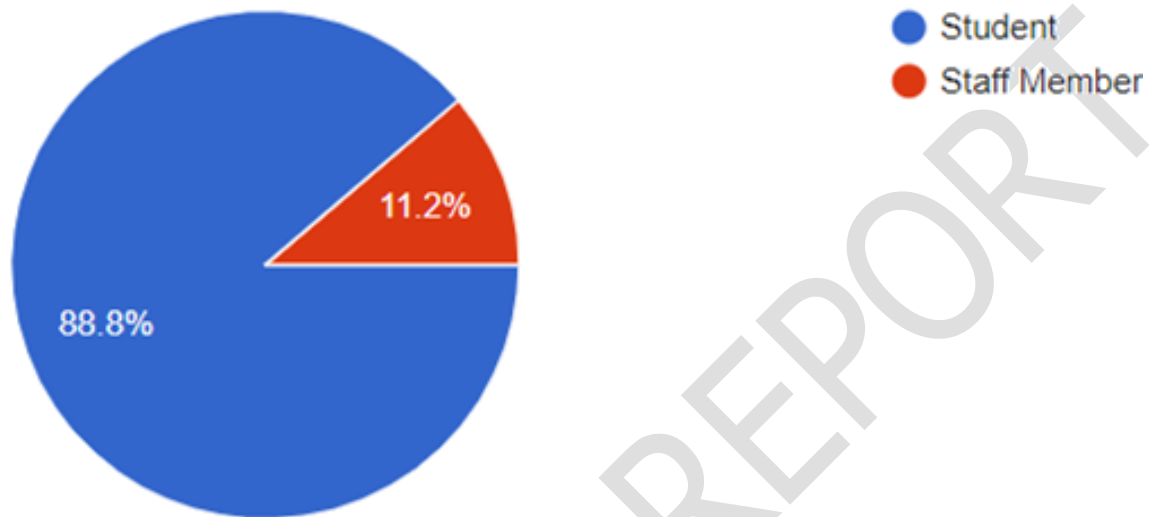
#### 4.3.2 Solar study

The summary of the study shows there has been a positive impact by the installation of solar panels. Ample efforts are under process to make the premises a 'Nearly Zero Energy Premises'

## 4.4 Survey Results

An online survey was conducted to analyse the student and staff views about the Energy management practices adopted in College, following is the result received.

### 4.4.1 Participation



*Figure 1: Participation analysis in the survey*

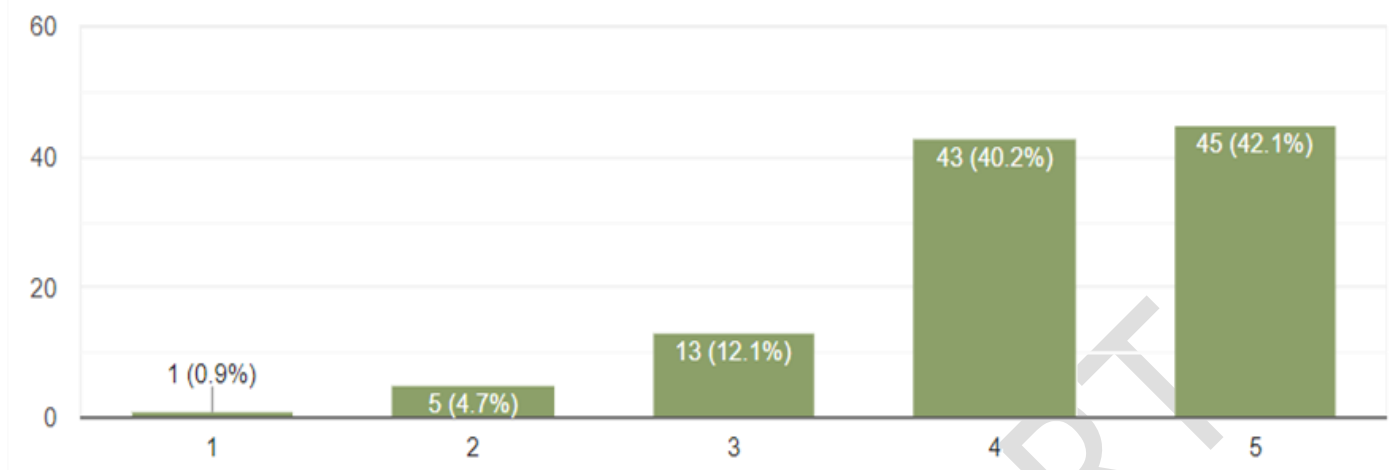
A total of **107 responses** were received out of which 89% were students.

### 4.4.2 Review of the Energy management practices in the premises

Note: The Participants were asked to review the practice on a scale of 1-5 with scale components as follows:

- ➡ Scale 1 – Poor
- ➡ Scale 2 – Satisfactory
- ➡ Scale 3 – Good
- ➡ Scale 4 – Very good
- ➡ Scale 5 – Excellent

The figures in each of the columns of graph depict the Number of participants responses in numerical (Percentage of the participant response) – For example 101 responses (44.5%)



*Figure 2: Energy management practices in college*

The students, staff **(almost 42%)** of the responses found the practices to be **excellent (rating 5)** and **40%** of the responses found practices to be very good (rating 4).

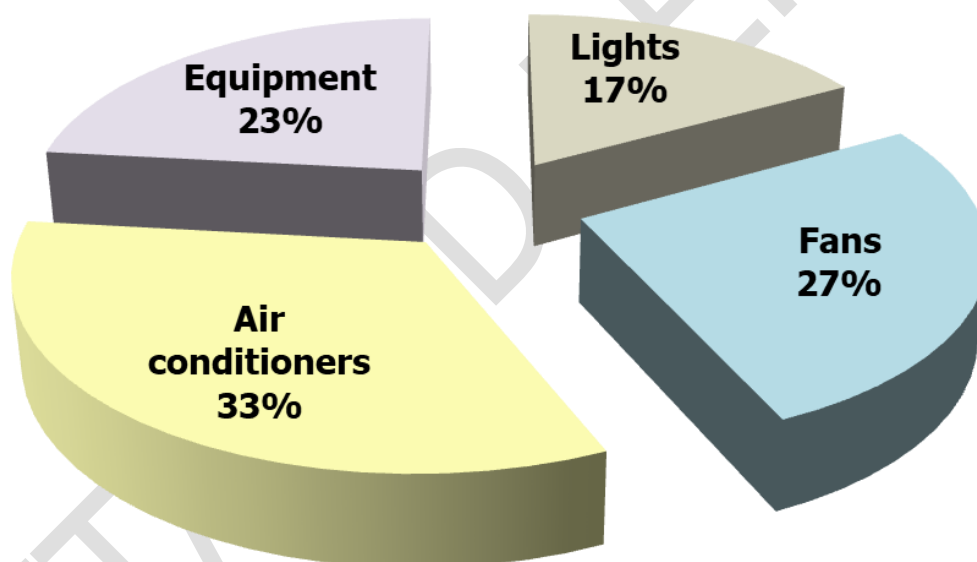


## 4.5 Calculated Electrical Consumption as per inventory

The electricity bills provide actual consumption data. The following is the calculated consumption. It is done to understand the percentage of energy usage in the premises by various applications. It is based on the inventory collected and interviews with the staff.

The additional data such as wattage is taken from market research. In terms of electrical consumption, the main sources are lights, fans, air conditioner, and equipment. The inventory and data collection for sources of energy consumed in the premise in summarised in the following sections.

Note: The following analysis is combined for entire premise taking into considerations the duration before pandemic to understand the consumption pattern as post pandemic the premise is used only for a few hours.



*Figure 3: Summary of the calculated electrical consumption as per inventory*

The above graph shows that air conditioners consumes 33% whereas the fans consume 27% while the equipment consume 23% and the lights consume 17% of the total calculated electrical energy.

## 4.6 Lights

### 4.6.1 Types of lights based on the numbers

There are a total of **455 LED lights on the premises**; the following table shows the various types of lights on the premises.

### 4.6.2 Types of lights based on the power consumption

The energy consumption of lights is **22,250 kWh** of energy and the **LED lights consume 100%** of the same.

### 4.6.3 Requirement of NAAC

#### 4.6.3.1 Alternative energy initiative

**Percentage of power requirement met by renewable energy sources** – The College does has solar panels as a source of renewable energy which is directly linked to power consumption reduction. Around 2-5% of the power requirement is met by these.

#### 4.6.3.2 Percentage of lighting power requirement met through LED lights

The premise has LED Lights to contribute to 100% in terms of number and **100% of the power requirement** is met through the same. As per our study, we could conclude that both of these are the highest contributions among all the types of lights.

### 4.6.4 Site investigation observations

- ➞ All lights are in working conditions.
- ➞ There was no fuse defect observed.

## 4.7 Fans

### 4.7.1 Types of fans based on the numbers

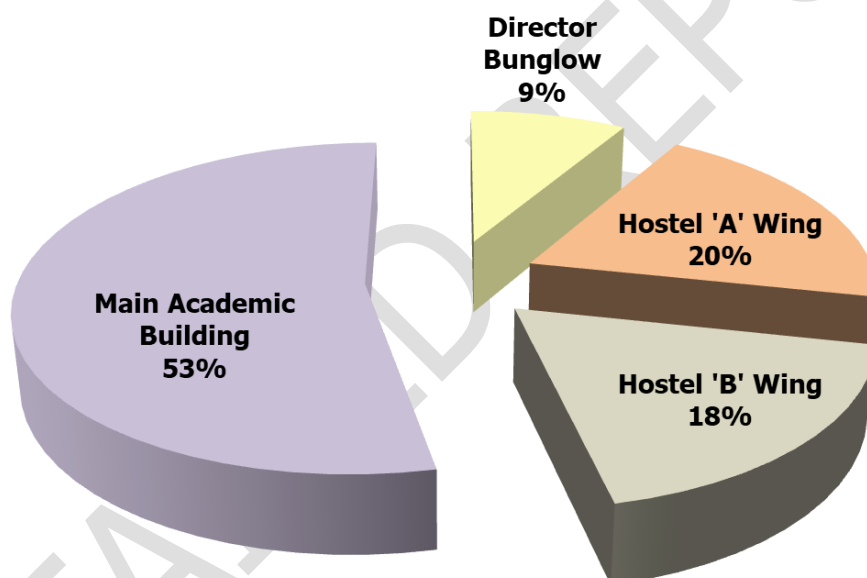
There are a total of **161 ceiling fans** in the premises.

### 4.7.2 Types of fans based on the power consumption

The energy consumption of fans is **34,776 kWh** of energy; the research is limited to ceiling fans thus they consume 100% of the energy.

### 4.7.3 Block -wise consumption analysis

The following graph shows the Floor-wise consumption of only Ceiling fans since they form a majority.



*Figure 4: Energy consumed by fans floor wise*

The above analysis shows the fans in the **Main academic building consume 53% whereas the ones in Hostel 'A' wing consume 20% while the ones in the Hostel 'B' wing consume 18% and the ones in the Director's bungalow consume 9%** of the total power consumed by fans. Whenever there is an opportunity for general replacement the first priority should be given to lights in the Main academic building.

### 4.7.4 Site investigation observations

1. All fans are in working conditions
2. Daily monitoring and check is done by the maintenance staff and admin staff in an excellent manner.

## 4.8 Air conditioners

### 4.8.1 Types of air conditioners based on the numbers

There are **13 air conditioners** on the entire premises.

### 4.8.2 Building-wise consumption analysis

The energy consumption of air conditioners is **43,709 kWh** of energy.

### 4.8.3 Floor -wise consumption analysis

Since all the air conditioners are located in the Main Academic Building only the building wise study is excluded for this section.

### 4.8.4 Site investigation observations

Some of the points noticed are as follows:

1. Daily monitoring and check are done by the maintenance staff skilfully.
2. The Outdoor units were not properly cleaned, maintained and had no dust collection problems.

### 4.8.5 About the replacement of current air conditioners

The current air conditioners are well maintained, though there is not an immediate requirement for replacement however, whenever the College undergoes redevelopment there can be provisions for replacement with energy-efficient appliances or new air conditioners that require less power consumption.

## 4.9 Equipment

### 4.9.1 Types of Equipment

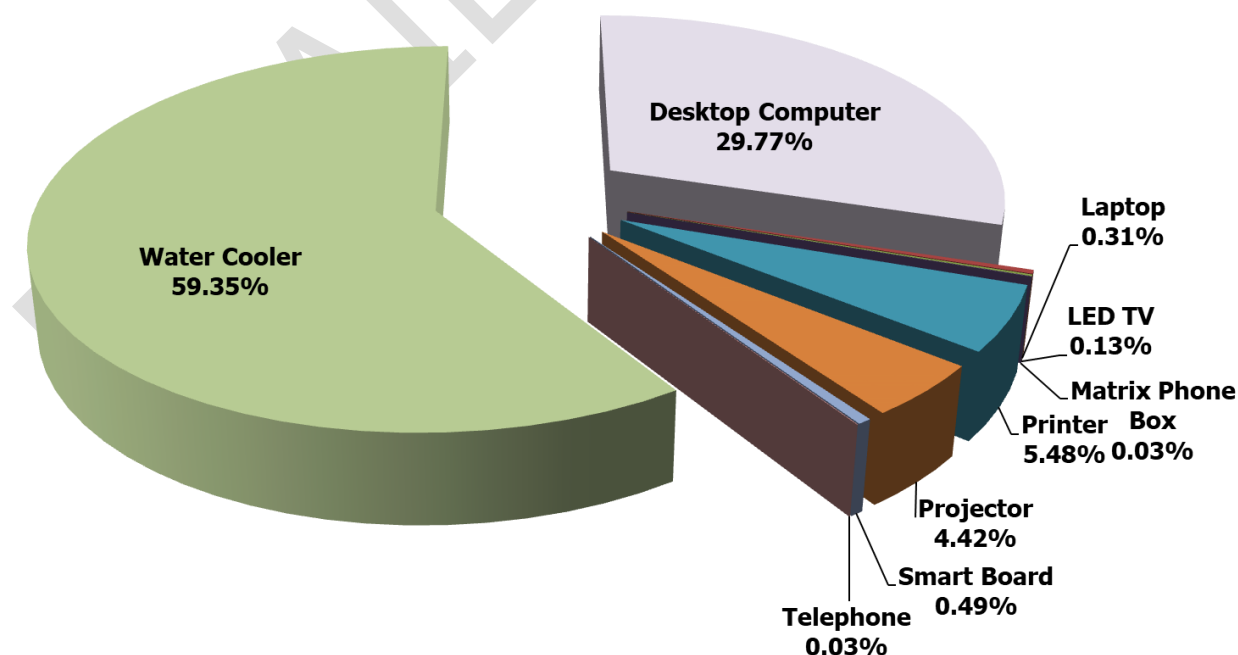
There are **9 types of equipment totalling to 118** in the premises as follows; (The College is a technical premise hence there are certain scientific equipment which are subjective for their usage, thus these have been excluded and the research is based only the genera usage pattern.)

S. No.	Name	Nos.
1	Desktop Computer	91
2	Laptop	6
3	LED TV	2
4	Matrix Phone Box	1
5	Printer	3
6	Projector	9
7	Smart Board	1
8	Telephone	1
9	Water Cooler	4

*Table 4: Types of equipment in the premise as per the quantity*

### 4.9.2 Types of equipment as per their energy contribution

The energy consumption of equipment is **30,571 kWh** of energy.



*Figure 5: Summary of Energy consumed by equipment in the premises*

The above summary shows that **water cooler consumes more energy at 59.35%** while **desktop computer consumes 29.77%** and the **printer consumes 5.48%** these are maximum consumers as compared to other equipment.

Batteries, Inverters and UPS (when used for electrical consumption else it is a battery backup and does not require electricity as an equipment) are also one of the equipment but are excluded in this calculation.

#### 4.9.3 Site investigation observations

Some of the points noticed are as follows:

1. All equipments are in working conditions and daily monitoring and check is done by the maintenance staff and admin staff in an excellent manner.
2. No defect was found in any equipment of electrical consumption.



## 4.10 Recommendations for a Sustainable Habitat

Over the time energy efficient appliances have been a boon not only to the energy saving parameters they adhere to but also the eco-friendly habits it helps to inculcate. The Institution such as Schools and Colleges are the best way to implement these initiatives. It creates awareness among the students at a young age. The Institutions also act as a symbol and representative of being an energy efficient premise. Following the analysis we found are some of the suggestions which can be implemented for an energy efficient Institution. This would help in reduction of the current electrical consumption by a major percentage.

### Electromechanical systems - Electrical and Lighting

#### Section 1 - Lights

##### Non-LED lights

The current light analysis shows that Non-LED lights consume anywhere between 50W to 54W and even more when in use; these should be replaced with LED lights which consume on an average 12-16W when in use.

Our technical analysis shows that there would be a reduction of an average of **67% reduction** in energy consumption through lights specifically as a part of the electro - mechanical system if all **Non-LED lights on all floors** are replaced with an energy efficient appliance whenever the College undergoes renovation.

#### Section 2 - Fans

##### Ceiling fans

The current Fans are in proper working conditions and maintained well. The ceiling fans are in more quantity and consume at least 45W when in use. These should be replaced with energy efficient fans consuming 14W when in use.

Our detailed study states that is all the **ceiling fans on all floors** if replaced with star rated appliance results in a reduction of average of **69% reduction** in energy consumption if replaced with energy efficient appliance. It will be suggested to either replace these now if college can have certain plans else the replacement can be done when fans get damaged or are not in working condition.

## Section 3 - Equipment

### Desktop computers to laptops

Among all equipment it suggested to replace the desktop computers with laptops as this would be energy efficient. A normal desktop computer consumes on an average 250W and it is to be connected all time when it has to be used. On the contrary a laptop consumes 40W and has a battery backup which lasts up to 4 hours. There is **an average 84% reduction** in energy consumption if replaced with energy efficient appliance which is a laptop in all the areas of Educational areas.

This replacement is however is dependent on a variety of factors as follows.

- ➔ Some of the senior staff members may be more convenient with computers, replacement with laptop might result in a change of the working patterns and hours which may affect the productivity.
- ➔ Laptops – in case are not handled with care such as if dropped unintentionally might result in data imbalance.
- ➔ Students who are not day scholars can use laptop as per their own convenience, whereas in common areas there can a monitoring about the usage hours hence computers may be a preferable option then laptop in certain spaces.
- ➔ Similarly depending on the pandemic situation in case it might be possible due to irregular usage the device might have issues while functioning.

Thus the College should analyse the above points and then devise a strategy about the replacement, essentially when the devices get damaged or are not in working condition they can surely be replaced.

As well as once they are not in working condition the proposed strategy should be linked towards e-waste management as well.

**1. Solar Panels at Girls and Boys Hotel at AIMS**



**LED's in the Campus**



## 5. References

1. Uniform Plumbing Code – India, 2008
2. IGBC Green Existing Buildings – Operation & Maintenance (O&M) Rating system, Pilot version, Abridged Reference Guide, April 2013
3. IGBC Green Landscape Rating system, March 2013
4. BOMA Canada Waste Auditing Guide, Best Environmental Standards, BOMA BEST – Canada
5. Used only for understanding Universal design - Universal accessibility Guidelines for Pedestrian, Non-motorized vehicle and Public Transport Infrastructure – Report guidelines by Samarthyam (National centre for Accessible Environments) – an initiative supported by Shakti Sustainable Energy Foundation.

