

ENERGY AUDIT

2019-21

AUDIT REPORT

Studied for

**Ashti Taluka Shikshan Prasarak Mandal' s
Adv. B. D. Hambarde Mahavidyalaya**

MH SH 142, Ashti – 414203

Analysed by



23 November 2021

Disclaimer

Green Audit Team has prepared this report for **Ashti Taluka Shikshan Prasarak Mandal's Adv. B. D. Hambarde Mahavidyalaya, MH SH 142, Ashti – 414203** 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.

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The Report is prepared by the Team of Greenvio Solutions under their brand and department – Sustainable Academe as Consultancy firm along with Ar. Nahida Shaikh as an Accredited Green Building Professional.

Greenvio Solutions

Developing Healthy and Sustainable Environments

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Acknowledgement

Green Audit Assessment Team thanks the **Ashti Taluka Shikshan Prasarak Mandal' s Adv. B. D. Hambarde Mahavidyalaya Ashti** for assigning this important work of Green Audit. We appreciate the cooperation extended to our team during the entire process.

Our special thanks are due to **Er. Kishor B. Hambarde**, Chairperson; **Shri. Atul. M. Meher Sir**, Secretary and everyone from the Management.

Our heartfelt thanks to Chairperson of the entire process **Prin. Dr. Sopan Raosaheb Nimbore Sir**, Member Secretary and **Mr. Niwrutti Narayan Nanwate Sir**, Coordinator, IQAC for their valuable inputs.

We are also thankful to **College's Task force the faculty members** who have collected data required.

The kind gesture for the inventory and data collection of the Administrative Members is quite commendable.

We highly appreciate the assistance of Supervisor; Electrical Department and College Team 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 Ashti Taluka Shikshan Prasarak Mandal

The Society has implemented the goal of educating the students in the best way possible by uplifting the academic status of the students through quality education and adopting the local village for overall community development. Meticulous joint efforts of the students and staff have made the institution one of the most sustainable premises in the locality.

1.2 Vision and Mission Statement of College

Our Vision

- **A strong free minded and capable youth with social bonding**
- Excellence in higher education
- Empowerment through knowledge
- Inclusive growth for socio-economic change

Our Mission –

- A dynamic approach with firm belief in efficiency and hard work
- To empower students with relevant knowledge
- To achieve innovation in teaching, learning and research
- To facilitate optimum use of human and natural resources
- To create awareness on human rights, value system.

1.3 Institution and the surrounding premises

Ashti Taluka Shikshan Prasarak Mandal' s Adv. B. D. Hambarde Mahavidyalaya is located in rural area at Ashti, Tai. Ashti, Dist. Beed. It is one of the most socio-economically, educationally backward and drought affected regions in Beed district of Marathwada region. Agriculture is the prime occupation of people in the locality. The financial capacity and per capita income of the people is remarkably low. Irregular and less rainfall renders the masses to migrate to sugar factories for sugarcane cutting.

The Premises is situated amidst the landscape serene with immense peace and calmness in the surroundings. The college is surrounded by Residential areas on all sides. There is a frontal approach which provides quite a beautiful appreciation space while approaching the premise. The location of college is feasible to the nearby essential amenities such as Public Health Center, Fire Station, Civic body-Public administrative buildings, Recreational gardens and Police Station.

The aim of the college is to continuously enhance the teaching methods in order to provide students with an opportunity for their all-round development. **It strives for excellence in Holistic development for Students..** It makes an effort to induce passion for learning along with the inspiration for decisive thinking and assessment, thereby helping them to become the best professionals in life.

The institution offers the following courses affiliated to Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.

- **Graduation** - Bachelor of Arts (B.A.), Bachelor of Commerce (B. Com), Bachelor of Science (B. Sc), Bachelor of Computer Applications (B.C.A.)
- **Post-Graduation** – Masters of Arts (M.A. in Marathi, Hindi, History) and Masters of Science (M.Sc. in Organic Chemistry), M .Sc. in Mathematics and M.Sc. in Computer Science
- **Vocational** – B. Voc (Beauty and Wellness)
- **Preparatory – B. A. and M.A. (Marathi and English)**
- **Study Center** – Affiliated to Yashwanterao Chavan Maharashtra Open Universirt , Nashik B.A. and M.A (Marathi and English)
- **Diploma courses** – Under N.S.Q.F. related to Skill development
 - Automobile techonology
 - Accounting & Taxtion
 - Web page designing & development
 - ICT
 - Organic Farming
- **Cerificate courses** – There are following courses are offered
 - E-Commerce
 - Tourism

- Spoken English
- **Classes** – Civil Service Exam preparation
- **Interviews in the premise for jobs**

The College aspires at training young women and men to be competent, committed and compassionate and lead in all walks of life. It has the following objectives.

- To improve personality of the student.
- To inculcate civic responsibilities and social awareness among students.
- To identify and improve the potential inculture, sports and work to uplift them.
- To create national integration among the students.
- To create professional attitude.
- To create social awareness among the students.
- To inculcate discipline and moral values.
- To pursue the social and democratic values.
- To make them aware of national and socio.economic problems.
- To inculcate the values of patriotism, humanism, secuJarism and communal harmony for national integration.
- Communication of vision and mission of the Institution:
 - The vision, mission and objectives of the institution are communicated to the students,teachers and other stakeholders through the college prospectus, college magazine "Yuvaspandan".
 - The goals and objectives are made known to the stakeholders through the meetings with Students, Parents, Alumni, Extension Service, Placement Cell and the Media.
 - The display of Vision Statement and Mission Statement in prominent places on the campus helps the stakeholders identify the goals and objectives of the college.
 - Activities planned and conducted by the Students Union and various subject societies and clubs alsosetve to reiterate the mission and vision of the college.

1.4 Assessment of the College

The College is recognised as a Research Centre in Physical Education Institute, below mentioned are the administrative details of the Institute.

Affiliations - The institution is affiliated to Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.

Recognitions - University Grant Commission (UGC) by 2(f) 12(b)

Certification – The institute as received the following Certifications

- ISO 9001:2015
- NIRF
- AISHE

Accreditation

The following are details of the reaccreditation of the Institute.

Cycle	First	Second
CGPA		2.78
Grade	B	B++
Year	2001	2016

Table 1: NAAC Accreditation details of the Institute

The college is due to enter its Third cycle of NAAC soon.

2. Institution overview

2.1 Populace analysis for Academic year 2019-20

2.1.1 Students data

The student data (shared by the College) shows there are total of **1,659** students occupying the premises out of which Boys form the majority of **1,142** in numbers.

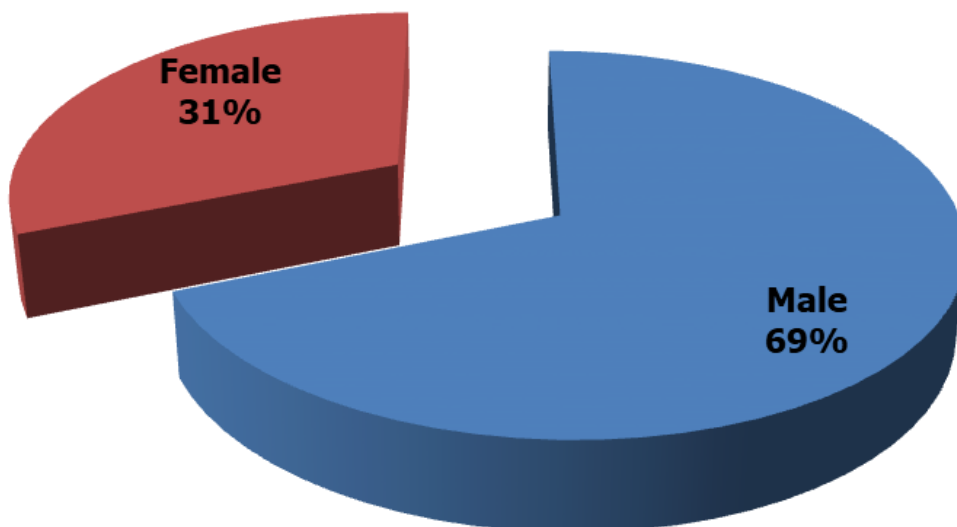


Figure 1: Summary of the students in Academic year 2019-20

The above graph shows **boys occupied 69%** as compared to **girls 31%**

2.1.2 Staff data

Type	Male	Female	Total
Teaching Staff	44	8	52
Admin Staff- office/library	9	3	12
Non-teaching & support staff/housekeeping	6	2	8
Total	59	13	72

Table 2: Staff data of the Institution for 2019-20

The staff data shows the premise has a total of **72** staff members.

2.2 Populace analysis for Academic year 2020-21

2.2.1 Students data

The student data (shared by the College) shows there are total of **1,903** students occupying the premises out of which Boys form the majority of **1,332** in numbers.

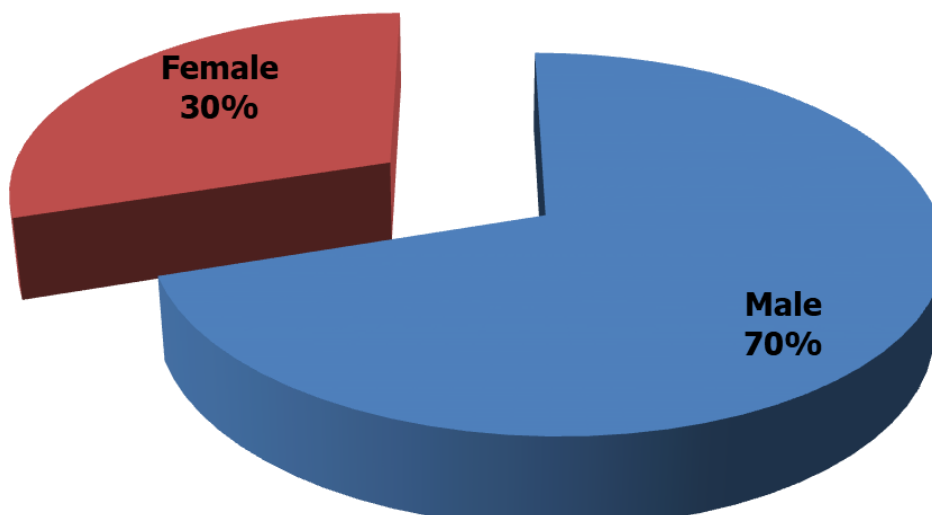


Figure 2: Summary of the students in Academic year 2020-21

The above graph shows **boys occupied 70%** as compared to **girls 30%**

2.2.2 Staff data

Type	Male	Female	Total
Teaching Staff	44	8	52
Admin Staff- office/library	9	3	12
Non-teaching & support staff/housekeeping	6	2	8
Total	59	13	72

Table 3: Staff data of the Institution for 2020-21

The staff data shows the premise has a total of **72** staff members.

2.3 Total Institute Area & College Building Spread Area

The total site area is 11.60 acres and total built-up area is 71,318 sq. ft. for approx. 1974+ footfalls.

2.4 Institute Infrastructure

2.4.1 Establishment

The College was formed in 1972. The Building is a Reinforced Cement Concrete (RCC) framework building. **Overall the Infrastructure of the Building is excellent in terms of the Architecture Design and Green Building Design. The Premise covers quite a few of the requirements for a Green Habitat.**

2.4.2 Spatial Organisation

The overall ambience of the College is warm and inviting. The classrooms and other spaces have ample natural ventilation in the form of clear glass windows with fresh air ventilation. The architecture of the building is quite well designed. The colour palette not just helps the building to stand out but also provides an Institutional arena. It balances with the local architecture with the natural landscapes of huge trees all around. The design emphasis on providing calmness to the built form and gradually merges with the serene landscape.

The floor to floor height is more than 10 feet. There is no provision for lifts in the premise, there are with CCTV, Fire extinguishers, first aid box and amenities such as courtyards, libraries, serene landscape, open areas, gardens.

2.4.2.1 Building wise details

The Building wise details on the Ashti Taluka Shikshan Prasarak Mandal' s Adv. B. D. Hambarde Mahavidyalaya, Ashti premise (Segregated into various blocks) are mentioned below:

Block Name	Building Name	Floor
A	Administrative Building	Ground Floor
	Principal Office	Ground Floor
	Administrative Office	Ground Floor
	Vice Principal Office	Ground Floor
B	Library Building	Ground Floor
	Library	Ground Floor
	Network Reasearch Centre	Ground Floor
C	Library Store Room	Ground Floor
	Life Long Learning & Extension	Ground Floor

D	Class Room	Ground Floor
	Class Room	Ground Floor
	Dept. of mathematics	Ground Floor
	Gents Toilet	Ground Floor
E	Dept. of Chemistry	Ground Floor
	Dept. of Biology	Ground Floor
	Class Rooms	Ground Floor
	F.F. Class Rooms	First Floor
F	Y.C.M.O.U.Study Centre	Ground Floor
	Ladies Common Room	
	Computer Lab	First Floor
	Class Room	
	Sanstha Office	
	Departments	Second Floor
	Departments	
	Examination Section	
G	Volley Ball Ground	Open Space
	Hand Ball Ground	
	Single Bar	
	Botanical Garden	
	Play Ground	
	Wrestling Ground	
	Kabaddi Ground	
	Volley Ball Ground	
	Kho - Kho Ground	
	Garden	
H	Flag Post	Open Space
I	Janseva College Canteen	Ground Floor
J	Womens Hostel	Ground Floor
K	Staff Room	Ground Floor
L	Proposed Administrative Building	Ground Floor
M	Water Tank	Entire Premise
N	Dept.Of Physical Education &	Ground Floor
	Gymnasium Hall	Ground Floor

O	Monument of Late Adv. B.D. Hambarde (Founder President)	Open Space
P	Parking	Open Space
	Gents Parking	Open Space
	Ladies Parking	Open Space
Q	Farm Pond	Open Space
R	Proposed Indoor Stadium	Ground Floor
S	Sport Stadium	Open Space
	400 M. Running Track	Open Space
	Jayelin Throw	Open Space
	Discthread	Open Space
	Foot Ball Ground	Open Space
T	Ladies Toilet	Ground Floor
	Gents Toilet	Ground Floor
	Ladies Toilet	Ground Floor

Table 4: Building wise detail in the premise

2.4.2.2 Room-wise details considered for Audit study

The room-wise details are mentioned below:

Sr. No.	Room No./ Room Name	Floor
1	Principal Cabin	Ground floor
2	Office	Ground floor
3	Vice Principal Office	Ground floor
4	Room No. 14	Ground floor
5	15 YCM	Ground floor
6	Staff Room 16	Ground floor
7	Math Dept. 19	Ground floor
8	Chem. Dept. 21 & 22	Ground floor
9	Zoology Dept. 23	Ground floor
10	Physics Dept. 25	Ground floor
11	Electric Dept. 25	Ground floor
12	Auto. Dept. 26	Ground floor
13	Auditorium 31	Ground floor

14	Library	Ground floor
15	Meter Hall 42	Ground floor
16	Ladies Room 44	Ground floor
17	Computer Lab 45	First floor
18	BCA Class Room 46	First floor
19	IQAC 47	First floor
20	Senior Dept. 48	Second floor
21	Senior Dept. 49	Second floor
22	BCA Class Room 50	Second floor

Table 5: Room-wise space details

2.4.2 Facilities available in the premise

The college has a good infrastructure, a grand administrative building, spacious class rooms, auditorium, Grand Library, spacious and well equipped science laboratories, Late B.D. Hambarde Stadium with 400 mtrs. running track and various play grounds, Gymkhana with indoor and outdoor sports facilities Ladies common room with toilet facility, Computer lab with 50 computers in LAN, Language Laboratory, Network resource center, virtual classroom, smart board and well-furnished departments and Wi Fi access to the staff and students.

2.4.4 Operation and Maintenance of the premises

The interview session with the staff regarding the operation and working hours is summarized in the table. The Institutions are open Monday to Saturday for full day. Sunday is an off for all. Below mentioned in the table are the average working hours. The detail wise timing for each is mentioned below the table.

S. No.	Section	Spaces	Time	Hours / day	Days in a year
1	Main Institutional College	Student areas and Teaching faculty	7:00 a.m. to 2:30 p.m. & 1 p.m. to 6 p.m.	6.5	200
2	General areas	Admin areas and library, Passage, staircase, toilet	10:00 a.m. to 5:00 p.m.	7	240

Table 6: Schedule of the timings of the premises

3. Green Building Study Audit

3.1 About the Green Building Study Audit

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

3.2 Analysis for 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 campus

Green Audit

- Green initiatives
- Hygiene audit
- Water Audit - Analysis of the current water consumption of campus; Scope to include Rain water harvesting and Waste water treatment in campus
- 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 campus
- Analysis of the flora and fauna of campus
- Strategies adopted at present to enhance vegetation
- Measures that can be adopted for ecological improvement of campus

3.3 Strategy adopted for Green Building Study Audit

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

3.4 Timeline of the activities for Green Building Study Audit

- 22 July 2021 – Discussion with the College
- 29 August 2021 – Physical site visit of College
- 9 September 2021 – Survey of the Student and staff submitted
- 15 September 2021 – Data submitted by College
- 10 October 2021 – Submission of draft Report
- 23 November 2021 – Submission of Main Report

4. Energy Audit

4.1 Sources of Energy consumption

The premise uses following sources of energy consumption.

4.1.1 Primary sources

1. **Electrical (Metered)** – Light, Fans, AC, Equipments, Pumps consume on an average 200 units monthly and Rs. 1,560/- is spent monthly.

4.1.2 Secondary sources

1. **Gas cylinder** – Only 6 numbers of gas cylinders of 19 Kg capacity is consumed in since 1 April 2019 to 31 March 2021 around Rs. 200/- is spent on an a monthly average.
2. **Diesel Generator** – There is 1 DG Set in the premise. On an average 3.3 litres is used per month and Rs. 260/- is spent monthly.
3. **Invertor** – There is 3 Invertors of 3.5, 2.2 and 1.6 kVa in the premise used mainly for admin purpose.
4. **UPS** – There is 1 UPS of 1.5 kVa
5. **Batteries** – There are 11 batteries with 850 kVa in the premise.

On an average Rs. 200/- is spent on a monthly basis for the Invertors, UPS and Batteries.

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 **inbuilt power saving mode** in every Computer is functioning.
- There are **no Ultra-violet lights and any other harmful lights used** in the premise.
- All class rooms and office are **ventilated using natural light.**

4.3 Actual Electrical Consumption as per Bills

The admin department had shared some of the bills for Meters as this is the main source of energy supply. The supplier is Maharashtra State Electricity Distribution Limited. The type of supply is **LT – Low Tension (90/LT I Res 1-Phase) Group K2**. The details of unit consumption meter wise are as follows:

Month-year	Units consumed
Apr-19	200
May-19	200
Jun-19	200
Jul-19	200
Aug-19	200
Sep-19	200
Oct-19	200
Nov-19	200
Dec-19	200
Jan-20	200
Feb-20	200
Mar-20	200
Apr-20	200
May-20	200
Jun-20	200
Jul-20	200
Aug-20	200
Sep-20	200
Oct-20	200
Nov-20	200
Dec-20	200
Jan-21	200
Feb-21	200
Mar-21	200
Total	4,800

Table 7: Study of the electricity consumption of the meters in premise

The summary of the above study shows the average consumption is stable each month.

4.4 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, ac, equipment. The inventory and data collection for sources of energy consumed in the premise is 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.

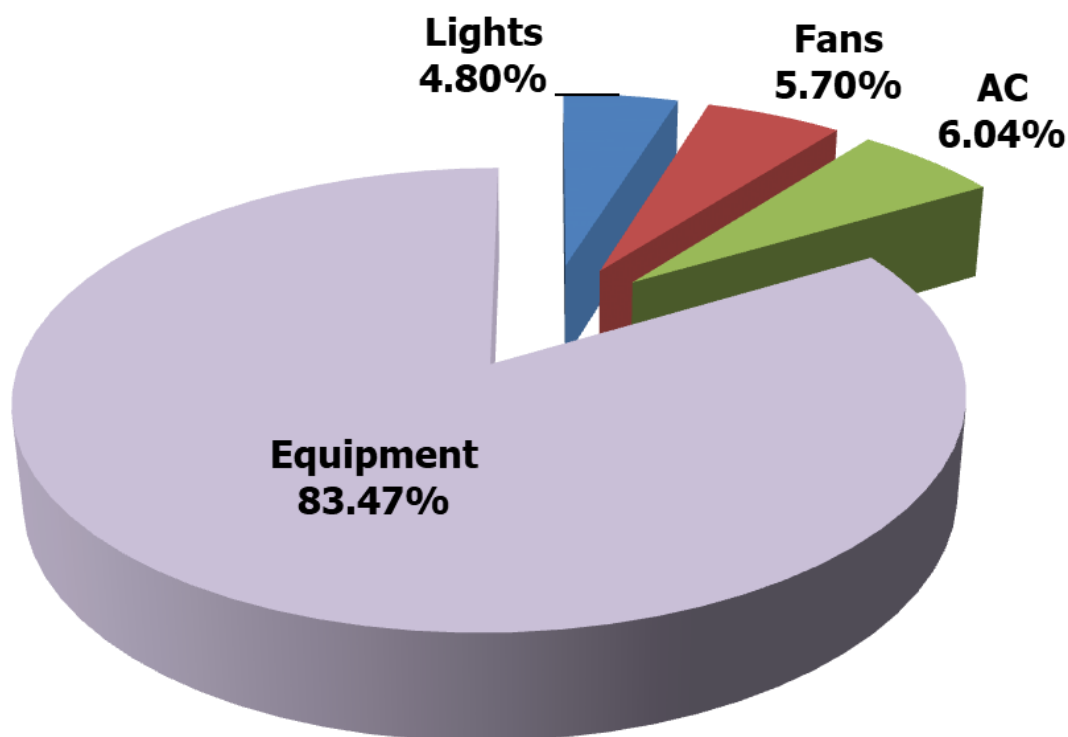


Figure 3: Summary of the Calculated Electrical Consumption as per inventory

The above graph shows that Equipment consumes 83.47% followed by AC at 6.04%, Fans at 5.70% and Lights at 4.80% of the total calculated electrical energy.

4.5 Survey Results

An online survey was conducted to analyse the student and staff views about the premise, following are some of the reviews.

4.5.1 Participation

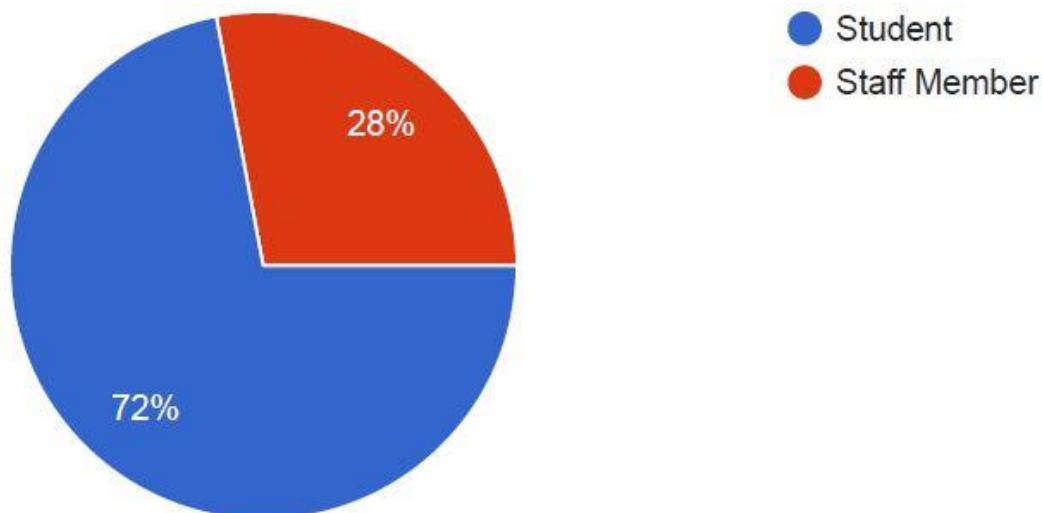


Figure 4: Participation analysis in the survey

A total of **143 responses** were received out of which 72% were students.

4.5.2 Energy management practices adopted in College

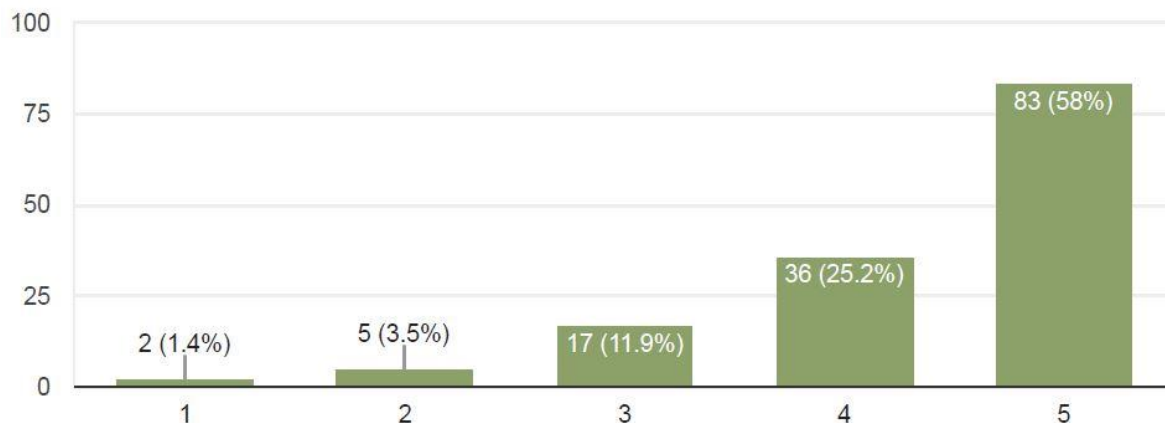


Figure 5: Energy Management practices in College

There were mixed responses received the equal also the highest was for **rating 4 (Excellent) at 58%** and **rating 4 (Very Good) at 25%** followed by **12% (11.9%) for rating 3 (Good)**.

4.6 Lights

4.6.1 Types of lights

There are a total of **157 lights in the premises**; the following table shows the various types of lights in the premises.

S. No.	Type	Nos.
1	CFL	3
2	LED	148
3	Non-LED Tubelight	6
Total		157

Table 8: Summary of the types of Lights in premise

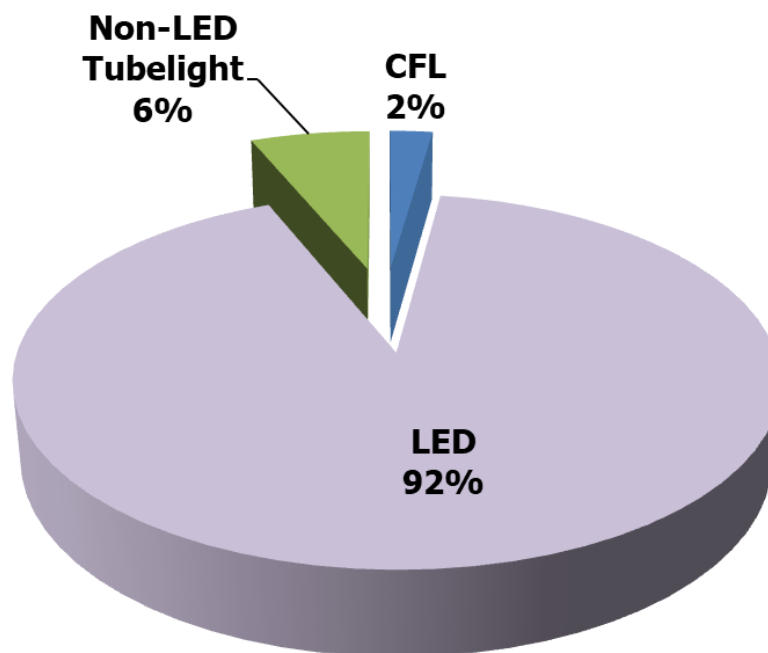


Figure 6: Types of Lights in the premise

The analysis of the types of lights in premises shows **LED Tubelights consume 3,533 kWh at 92%** followed by **Non-LED Tubelights consuming 260 kWh at 6%** and the **CFL consumes 86 kWh at 2%**

4.6.2 Floor-wise consumption analysis

The energy consumption of Lights is **3,859 kWh** of energy; the following graph shows the floor wise consumption. This section analysis constitutes all buildings as a single entity.

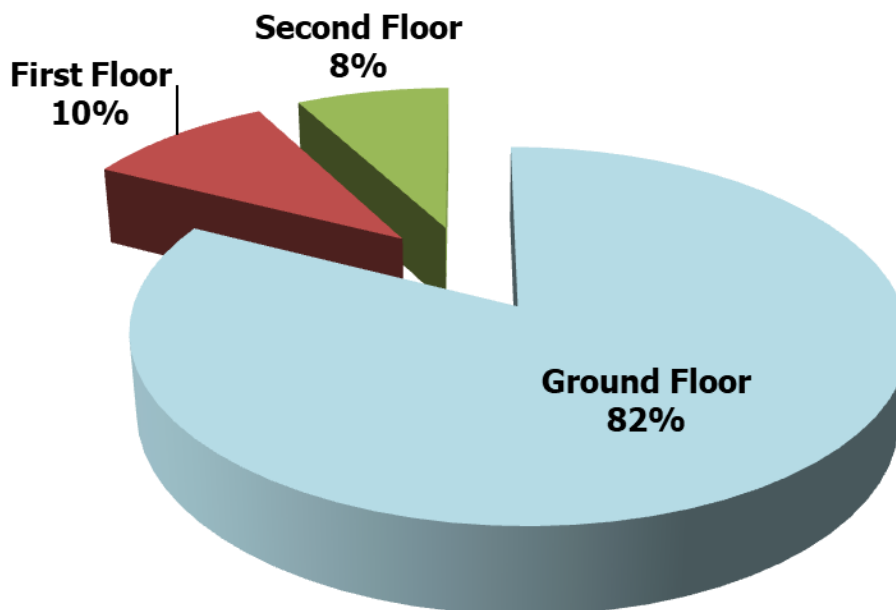


Figure 7: Energy consumed by Lights floor wise

The above analysis shows the equipment in the **Ground floor consumes the highest amount of energy of 3,183 kWh at 82%** while the **First floor consumes 374 kWh at 10%** and the **Second floor consumes 302 kWh at 8%**

4.6.3 Requirement of NAAC

4.6.3.1 Alternative Energy Initiative

Percentage of power requirement met by renewable energy sources – There are no solar panels available in premise at present. However there are plans to install these at the earliest.

4.6.3.2 Percentage of lighting power requirement met through LED bulbs

The premise does has LED Lights which consume 92% of the entire lighting power.

4.6.4 Site investigation observations

Some of the points noticed are as follows:

1. All lights are in working conditions
2. Daily monitoring and check is done by the maintenance staff.
3. There was no fuse defect observed.

4.7 Fans

4.7.1 Types of fans

There are a total of **74 fans** in the premise. The following table shows the various types of fans in the premises.

S. No.	Type	Nos.
1	Pedestal	1
2	Exhaust	1
3	Ceiling	72
Total		74

Table 9: Summary of the types of fans in premise

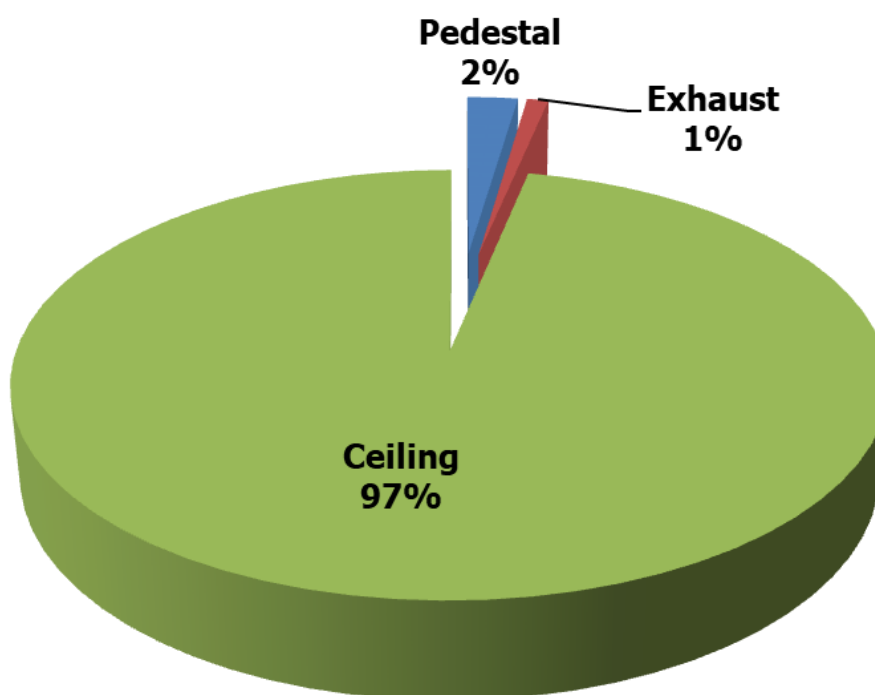


Figure 8: Types of Fans in the premise

The analysis of the types of fans in premises shows **Ceiling fans consume 4,435 kWh at 97%** the **Pedestal exhaust fans consume 106 kWh at 2%** while **Exhaust fans consume 45 kWh at 1%**

4.7.2 Floor-wise consumption analysis

The energy consumption of Fans is **more than 4,586 kWh** of energy; the following graph shows the floor wise consumption. This section analysis constitutes all buildings as a single entity.

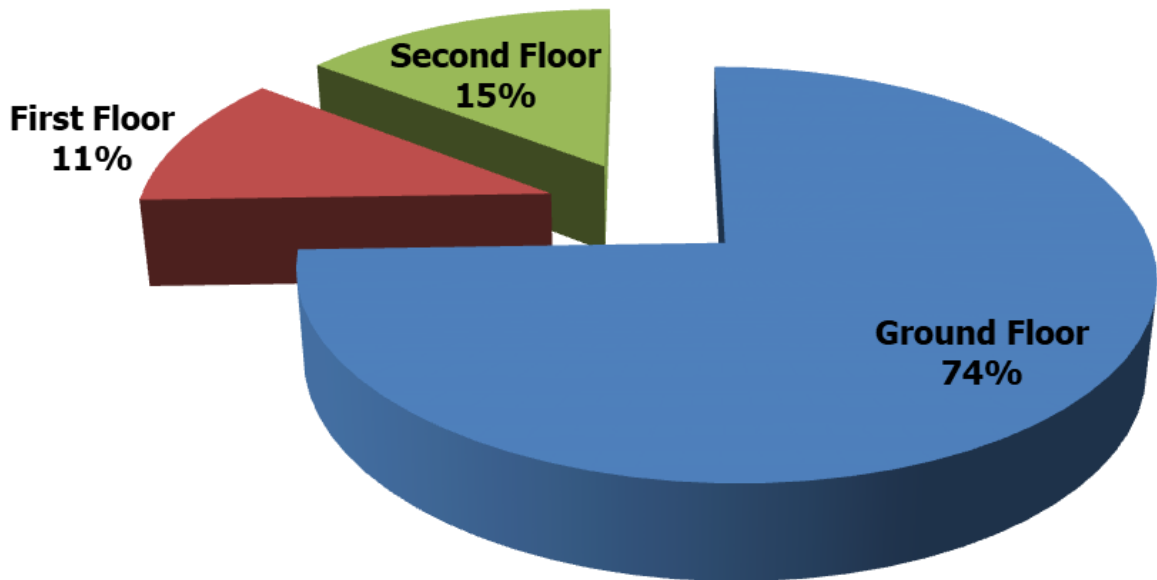


Figure 9: Energy consumed by Fans floor wise

The above analysis shows the equipment in the **Ground floor consumes the highest amount of energy of 3,416 kWh at 74%** while the **Second floor consumes 666 kWh at 15%** and the **First floor consumes 504 kWh at 11%**

4.7.3 Site investigation observations

Some of the points noticed are as follows:

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 AC

4.8.1 Types of AC

There is **1 Air conditioner in Principal Cabin. However, given the ambience and freshness experienced in the space because of the well maintained open spaces the AC is hardly used and it consumes on an average 4,864 kWh.**

4.8.2 Site investigation observations

Some of the points noticed are as follows:

1. The AC need not be replaced.
2. Daily monitoring and check is done by the maintenance staff and admin staff in an excellent manner.
3. The Outdoor Unit is properly cleaned and maintained well.
4. The Outdoor Unit does not have any dust collection problem.

4.9 Equipment

4.9.1 Types of Equipment

There are a total of **26 types of equipment totalling to 122 in number** in the premise. The various types are mentioned in the table below.

S. No.	Name	Nos.
1	Air Compressor	1
2	Air Cooler	2
3	Blower Type Room Heater	1
4	Battery Charger	1
5	Refrigerator	2
6	Stabilizer	10
7	Printer	8
8	Computer	71
9	Xerox Machine	2
10	Projector	3
11	Duplicator	1
12	Coffee Maker	1
13	RO Water Purifier	1
14	Water filter	1
15	Washing Machine	1
16	Electric Iron	2
17	Toaster	1
18	Geyser	1
19	Welding Machine	1
20	Volcanizing Machine	1
21	Spark Plug Testing M/C	1
22	Drill Machine	1

23	Sanitary Napkin Machine	1
24	Electric Oven	1
25	Borewell Motor	4
26	Grinder	2
Total		122

Table 10: Types of equipment in the premise

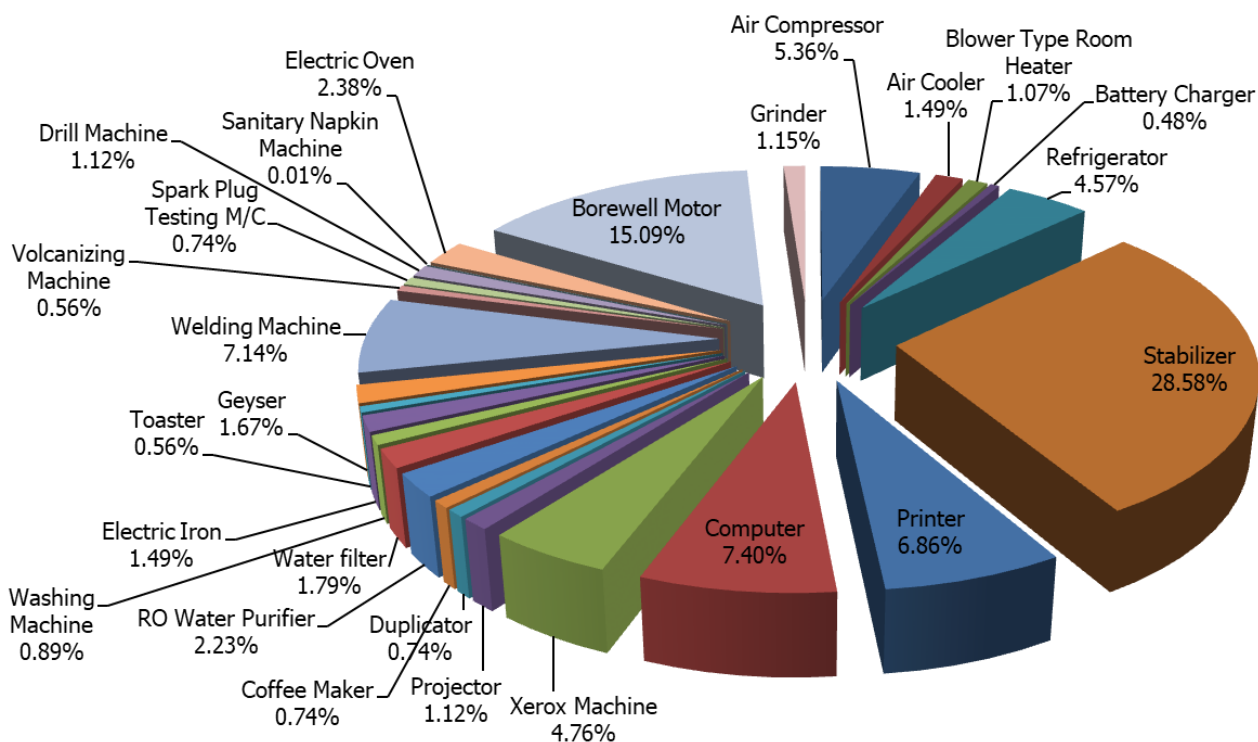


Figure 10: Summary of Energy consumed by Equipment

The above summary shows that **Stabilizer computer consumes more energy at 28.58%** while **Borewell Motor at 15.09%** the **Computers consumes 7.40%** and the **Printer consumes 6.86%** these are maximum consumers as compared to other equipment. UPS and Inverter (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.

4.9.2 Floor-wise consumption analysis

The energy consumption of Equipment is **67,190 kWh** of energy; the following graph shows the floor wise consumption. This section analysis constitutes all buildings as a single entity.

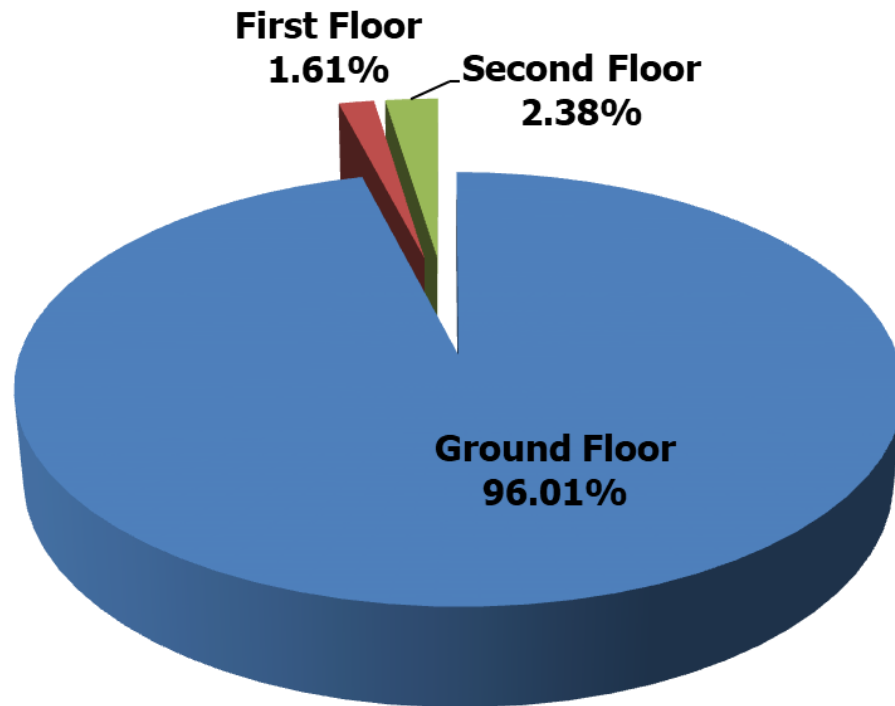


Figure 11: Energy consumed by Equipment floor wise

The above analysis shows the equipment in the **Ground floor consumes the highest amount of energy of 64,510 kWh at 96.01%** while the **Second floor consumes 1,600 kWh at 2.38%** and the **First floor consumes 1,080 kWh at 1.61%**

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.

4.10.1 Non-LED Tubelights

The current light analysis shows that Non-LED Tubelights lights consume anywhere between 24W, 36W and 40W when in use and these should be replaced with LED lights which consume on an average 16-20W when in use.

The following graph shows a comparison of the current consumption and consumption of all **6 Non-LED Tubelights on Ground floor** if replaced with LED lights.

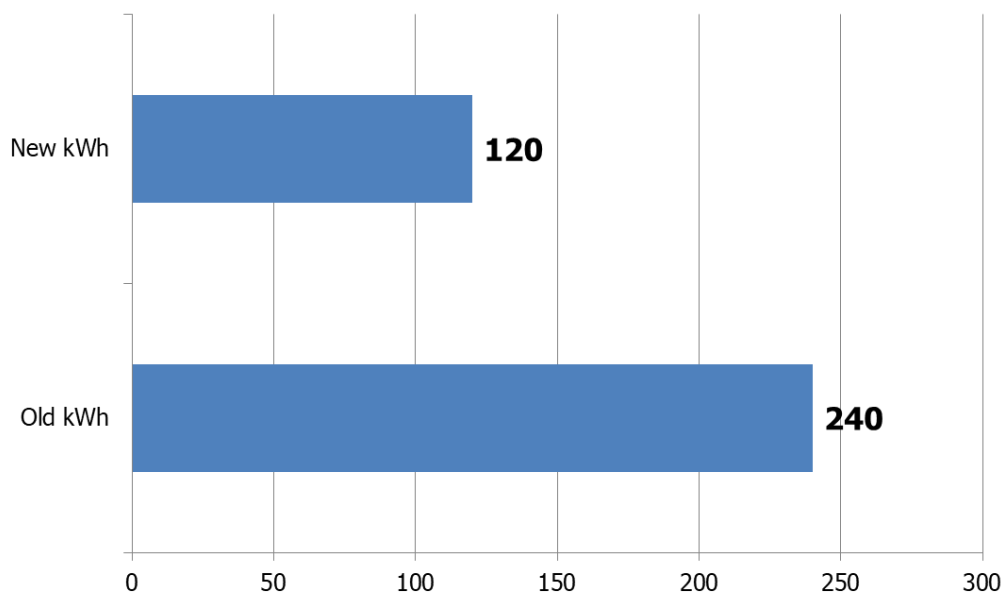


Figure 12: Analysis of current and new fans

The above analysis shows reduction of average of **50% reduction** in energy consumption if replaced with energy efficient appliance.

There are very less number of CFL these can be replaced with LED.

4.10.2 Fans

The current Fans are in proper working conditions and maintained well. The ceiling fans are in more quantity and consume at least 60W when in use. These should be replaced with energy efficient fans consuming 32W when in use.

The following graph shows a comparison of the current consumption and consumption of all **72 ceiling fans on all floors** if replaced with star rated appliance.

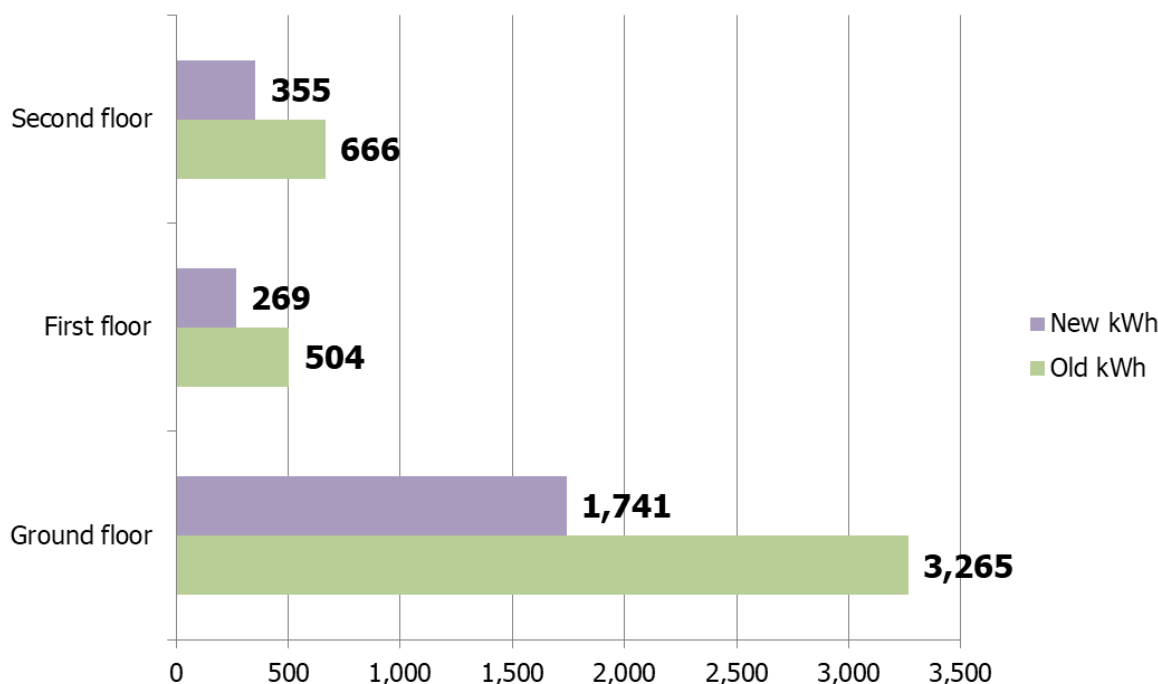


Figure 13: Analysis of current and new fans

The above analysis shows reduction of average of **47% 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.

4.10.3 AC

The current Air conditioners have become old. Most of these are not star rated and are consuming more energy. These should be replaced with energy efficient and star rated air conditioners wherein 1.5 ton consumes only 1,495W.

The following graph shows a comparison of the current consumption and consumption of all the **1 air conditioner on ground floor** if replaced with star rated appliance.

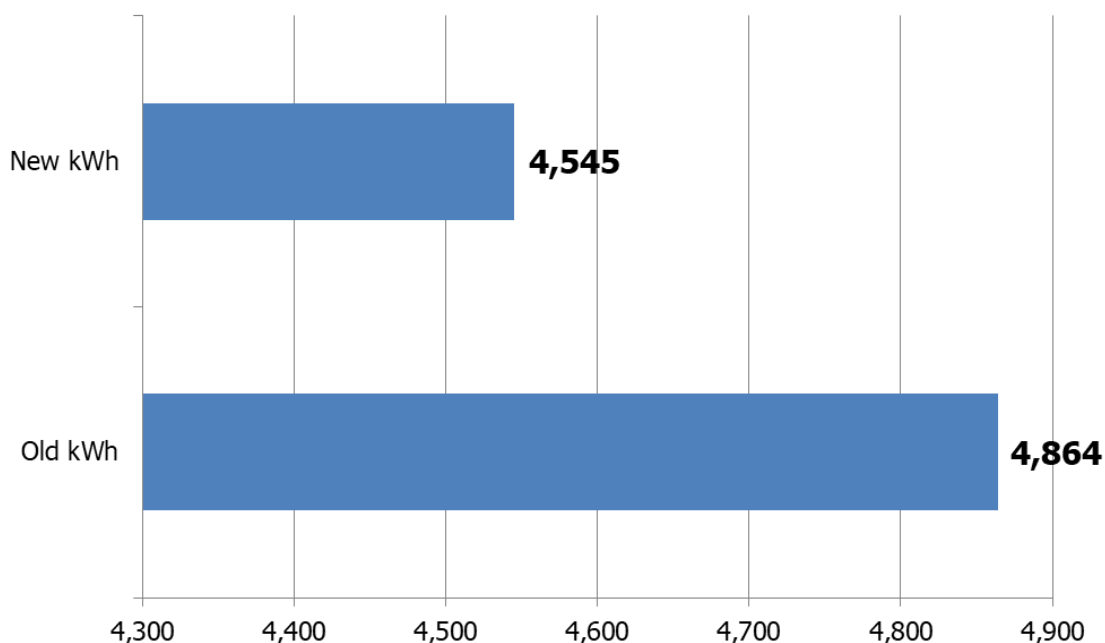


Figure 14: Analysis of current and new air conditioners

The above analysis shows reduction of average of **7% reduction** in energy consumption if replaced with energy efficient appliance on Ground floor, as the Air conditioner on First floor is hardly used there is no change in kWh consumption but it is better to be replaced.

It will be suggested to either replace these now if College can have certain plans else the replacement can be done when AC gets damaged or is not in working condition.

4.10.4 Equipment

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.

The following table shows a comparison of the current consumption and consumption of the **71 desktop computers** if replaced with laptops.

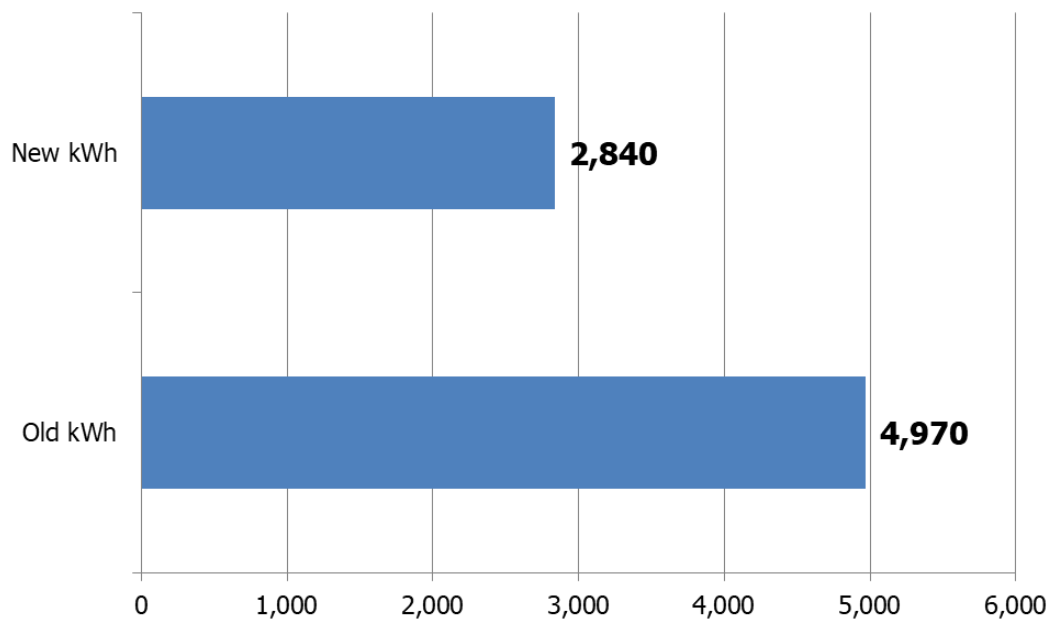


Figure 15: Analysis of current computers and new laptops

The above analysis shows reduction of average of **43% 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 the devices get damaged or are not in working condition.



5. Towards a Healthy & Sustainable Institution

5.1 Inputs by Greenvio Solutions

Based on the analysis of the study of premises in addition to the recommendations provided in each section of Ecological, Water, Waste and Energy Audit the College can adopt the following strategies towards a Healthy and Sustainable Institution practices.

- a) Kitchen garden** - There can be provision of kitchen garden practices in a designated area of the open space this would enhance the biodiversity and be useful in training students and staff about the healthy practices and vegetables grown which would be used in Canteen. It helps in capacity building. The smaller steps taken have huge impacts when each student would adopt these practices in their homes or societies and grow kitchen garden, terrace garden there will be a long term benefit for the environment as a whole..
- b) Cutlery in the Canteen** – The regular plastic and steel plates, spoons used in Canteen can be replaced with eco-friendly and organic leaves, paper straw, disposable plates, edible spoons and tables made out of sugarcane waste or bamboo. This will be first of its kind initiative to be adopted and practiced thus also inculcating the healthy practices in students.
- c) Waste vio** – College can tie up with an organisation and students can be encouraged to collect dry waste and electronic waste such as newspapers, old computers and others and hand over to organisation on a weekly or monthly basis thereby making a waste reduction approach in the community.
- d) Signages** – In addition to the signages being in regular language there can be additional signages in braille language for the specially abled students.
- e) Additional fire safety** - The premises at present has only Fire extinguisher as the safety practice but additional fire safety measures should be adopted such as Hose reel, signages, fire-fighting tank, fire alarm and sprinkler system. There should be fire extinguisher minimum two per floor.

5.2 Survey Results

An online survey was conducted to analyse the student and staff views about what changes according to you can be undertaken for Green audit improvement in College premise and activity, some of the key responses are listed below. Whereas many responses **stated there were no changes requires because the present practices are excellent.**

Some of the positive responses are listed as follows:

- No changes given because college already give very good maintenance programs
- No changes all is well
- Plants management are very good in college
- Already great changes have been implemented towards the same.

Some of the suggestions by the Students and staff are listed below:

- Organize guest lecture of doctorate in that field or give activity on that basis
- Write slogans on walls for green college
- It can also be used to determine the type and volume of waste, which can be used for a recycling project or to improve waste minimization plan. It can also be used to determine the type and volume of waste, which can be used for a recycling project or to improve waste minimization plan.
- Identify tree and shrub name plates.
- To cultivate more fruit trees in the premises for Institutions growth.
- Planting medicinal plants and Installing solar plates to generate electricity.
- Tree plantation record and maintenance of Greenery. Planting of various types of flowers
- Solar system, waste recycling and more trees

However, it should be noted that the College has taken up multiple initiatives and because of Pandemic the students have not practically visited the campus so many of these points are not mandatory at the moment.

6. 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.

