

ENERGY AUDIT

2018-19; 2019-20 & 2020-21

AUDIT REPORT

Studied for

Karnataka Rashtriya Education Society's

**Karnatak Arts, Science
and Commerce College, Bidar**

Hyderabad Road, Bidar (Karnataka), India - 585 401

Analysed by



29 April 2022

Disclaimer

The Audit Team has prepared this report for the **Karnataka Rashtriya Education Society's Karnatak Arts, Science and Commerce College, Bidar** located at Hyderabad Road, Bidar (Karnataka), India - 585 401 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.

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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 has completed audits of multiple Institutes including Technical, State University, Private University and Single Faculty Colleges for a total of more than 60 lakhs+ sq. ft. of Built-up area audited till date Pan India as an Accredited and Certified Green Building Professional-Architect; ISO Certified Internal Auditor for Integrated Management System (IMS) which includes ISO 9001 Quality Management, ISO 14001 Environment Management and Occupational Health and Safety Management OHSAS 18001. 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

The Audit Assessment Team thanks the **Karnataka Rashtriya Education Society's Karnatak Arts, Science and Commerce College, Bidar, Karnataka** for assigning this important work of Energy Audit. We appreciate the cooperation extended to our team during the entire process.

Our special thanks are due to **Sri. Basavaraj Jabshetty**, President; **Sri. B.G. Shetkar**, Vice President; **Sri. Sidram Para**, Secretary; **Sri. Satish Patil**, Joint Secretary and everyone from the Management.

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

We are also thankful to **College's Task force the faculty members** who have collected data required **Dr. Mallikarjun Hangarge**, Vice Principal & IQAC Co-ordinator; **(Special mention for the excellent coordination)** and **Sri. A.V. Chikkamanoor**, Co-ordinator.

We highly appreciate the assistance of **Smt. Shivaleela**, Office and 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 Karnataka Rashtriya Education Society

It was established in 1942. It is the master mind of Shri R.V. Bidap who founded the Society under the name of "Karnatak Rashtirya Education Society Bidar", its aim is to:

- To establish, run, maintain and expand various types of educational institutions and ancillary establishments including hostels libraries.
- To organize mobile libraries, clubs or academic interest and take steps to spread adult education especially in backward classes.
- To organize and conduct cultural activities
- To create K.R.E. Society's trust vesting all immobile assets of the society in it.

1.2 Statements of the Institution

Vision - To achieve the higher level of Excellence.

Mission - To liberate the young minds from the shackles of ignorance and motivate them to face the complexities of life efficiently with a sense of Self respect and National Pride.

1.3 About the Institution

Karnatak Arts, Science and Commerce College, Bidar is one among the 26 educational institutions being run by Karnataka Rashtriya Education Society Bidar. Established in 1970, the college is one of the prime Institutions of Bidar district. It is the biggest learning hub of Bidar district located at the Northern tip of Karnataka State. Although a number of colleges have come up lately in different parts of the district, yet this institution has been drawing the students from every corner of the state due to its ability to offer a spectrum of courses that are not available in newly established colleges. It attracts the students irrespective of gender, geographical location, social and economic strata. The enrolment of students in various disciplines is exponential and exhibits a typical example of a multi-disciplinary co-educational institute. **It is the first and only College with CPE status among the affiliated colleges of Gulbarga University, Kalaburagi.**

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 also strives for excellence in academics and 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 their chosen careers. **The Institution is affiliated to the Gulbarga University and it offers the following courses.**

- **Graduation** – It offers the following courses
 - Bachelor of Arts (Economics, Statistics, Political Science, History, Kannada, English and Hindi)
 - Bachelor of Science (Mathematics, Computer Science, Electronics, Biotechnology, Zoology, Botany, Physics, Chemistry, Statistics)
 - Bachelor of Commerce
 - Bachelor of Vocational courses (Food processing technology, Renewable energy)
 - Bachelor of Computer Application – Professional course approved by UGC, University
- **Post-Graduation** – It offers the following courses
 - Master of Arts (Kannada, English)
 - Master of Science (Zoology, Computer Science, Biotechnology, Mathematics)
 - Masters of Commerce
- **UGC Web development technology course**
- **2 Research centres are recognized by the University the programs offered are Ph. D. in Kannada and in Computer Science.**
- **Recognised by IIT Mumbai as an Academic centre to run the spoken tutorial project courses since 2014 till date.**
- **IIT Madras local chapter for running SWAYAM/ NPTL Programmes since 2015.**

The College works towards training young men and women to be competent, committed and compassionate, and lead in all walks of life.

1.4 The surrounding premises around the Institution

The Premises is situated amidst the landscape serene of **Bidar district of Karnataka** with immense peace and calmness in the surroundings. The college is locate very close to the National highway and has a huge open spaces adjacent to its location. There is a frontal approach which provides quite a beautiful appreciation space while approaching the premises; this area is surrounded by huge trees which positively complement the background-foreground aspect in terms of Natural space and built-form Architecture. It also provides ample shade which enhances the micro climate of the region. 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 which are not too close but nearby.

1.5 Assessment of the College

1.5.1 Affiliations and approvals

The College has all its courses approved and affiliated to **Gulbarga University, a public university located in Kalaburagi, Karnataka, India**

1.5.2 Certification

- NIRF – The College is ranked participating in every year.
- AISHE – The code is C-9146
- ISO – The last certification was done in ISO 9001 for Quality Management System in 2015-16

1.5.3 Accreditation

NAAC - The following are details of the accreditation of the College.

Cycle	First	Second	Third
CGPA	-	3.05	3.24
Grade	B+	A	A
Year	2004	2012	2017

Table 1: NAAC Accreditation details of the Institute

The College is due to enter its Fourth cycle of NAAC soon.

1.5.4 Recognitions

The college has achieved the following recognition from **University Grant Commission (UGC) under section 2 (f) and 12 (b) of the UGC Act by University Grants Commission, New Delhi.**

1.6 Achievements of the College

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

- **College with Potential for excellence by UGC during 2006-2020 continuously awarded for 3 phases.**
- **Award for being the 'District Green Champion' by M.G.N.R.E Govt. of India 2020-21.**

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 were a total of **918 Boys and 1,068 Girls students**, thus there were **a total of 1,986 students** in the premises.

2.1.2 Staff data

Type	Male	Female	Total
Admin Staff	3	0	3
Teaching Staff	26	66	92
Non-Teaching Staff	15	26	41
Total Staff Members	44	92	136

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

The staff data shows the premises had a total of **136** 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 were a total of **933 Boys and 1,088 Girls students**, thus there were **a total of 2,021 students** in the premises.

2.2.2 Staff data

Type	Male	Female	Total
Admin Staff	3	0	3
Teaching Staff	26	66	92
Non-Teaching Staff	15	26	41
Total Staff Members	44	92	136

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

The staff data shows the premises had a total of **136** Staff Members.

2.3 Total College Area & College Building Spread Area

The **total site area is 5.1 Acres** and the **total Built-up area of College is 81,085 sq. ft.** for a **total of 2,157 footfalls.**

2.4 College Infrastructure

2.4.1 Establishment

The College was established in 1970. The college is located pretty close to nature and hence has very fresh environment which is absolutely pollution free and healthy. 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 Premises 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 premises, whereas there are amenities such as CCTV, Fire extinguishers, Library and first aid box.

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 Institution is open from Monday to Saturday. The detail wise timing for each is mentioned below.

S. No.	Section	Spaces	Time	Hours/ day	Days in a year
1	Main Institutional College	Student areas and Teaching faculty	Monday to Friday (07:30 a.m. to 05:30 p.m.) Saturday (07:30 a.m. to 01:30 p.m.)	Mon-Fri - 10 Sat - 6	280
2	General areas	Admin areas and library, Passage, staircase, toilet	Monday to Friday (07:00 a.m. to 05:30 p.m.) Saturday (07:00 a.m. to 01:30 p.m.)	Mon-Fri – 10.5 Sat – 6.5	300

Table 4: 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 premises 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 the premises.

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

- 10 March 2022 – Allotment and Initiation by the College
- 12 March 2022 – Induction Meeting
- 15 March 2022 – Survey of the Student and staff submitted
- 24 April 2022 – Data submitted by College
- 29 April 2022 – Submission of the 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 are the major consumers.
2. **Renewable Energy** – There are Solar panels installed in the premises at present.

4.1.2 Secondary sources

1. **Inverter/ Batteries/ UPS** – There are XXInverters installed and maintenance cost incurred for the same is of Rs. XXXXXX/-.
2. **Gas cylinders** – There are XXXX gas cylinders required per year and RsXXXXX/- is spent towards the same on a monthly basis.

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.
- There are **display boards encouraging staff and students to save energy are put up in the classrooms and laboratories**.
- There are **Ultra-violet lights used only in the scientific labs for experiment purpose, apart from these any other harmful lights used** in the premise.

4.3 Actual Electrical Consumption as per Bills

The admin department had shared the bills for Meter which is connected to all Buildings and is main source of energy supply. The supplier is Maharashtra State Electricity Distribution Company Limited. The analysis of actual electrical energy consumption is summarised below. The solar panels were installed in recently post which the cost of

electricity has been reduced. The details of unit consumption meter wise is as follows.

S. No	Academic Year	Amounts (Rs)
1	2017-18	2,32,840
2	2018-19	3,26,609
3	2019-20	1,39,624
4	2020-21	9,154 Solar Installed (So less bill)
5	2021-22	Solar Installed (So less bill)

Table 5: Study of the electricity consumption of the meters in premise

The summary of the above study shows the average consumption varies for each month. however, before the installation of solar panels the college was incurring an annual expenditure of around Rs. 6,00,000/- towards electricity bills. Whereas, after the installation in 2020-21 the bills have reduced and now there is zero expenditure incurred by the college. (Based on the discussion with Vice Principal Sir)

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

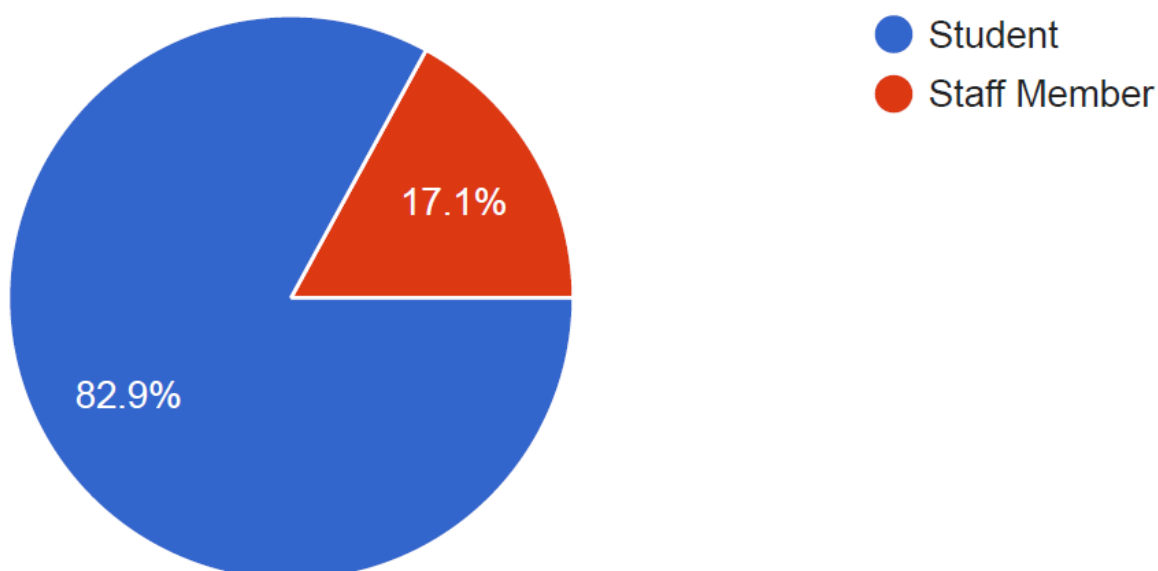


Figure 1: Participation analysis in the survey

A total of **129 responses** were received out of which 83% 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%)

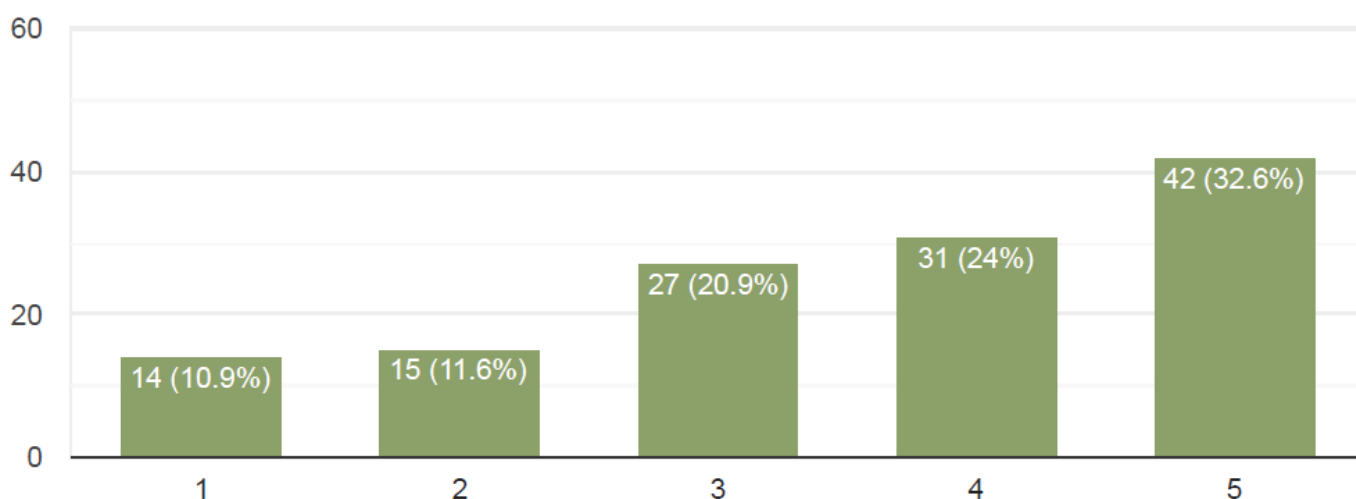


Figure 2: Energy management practices in college

The students, staff (**almost 33%**) of the responses found the practices to be **excellent** and **24%** of the responses found practices to be **good**.

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, 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.

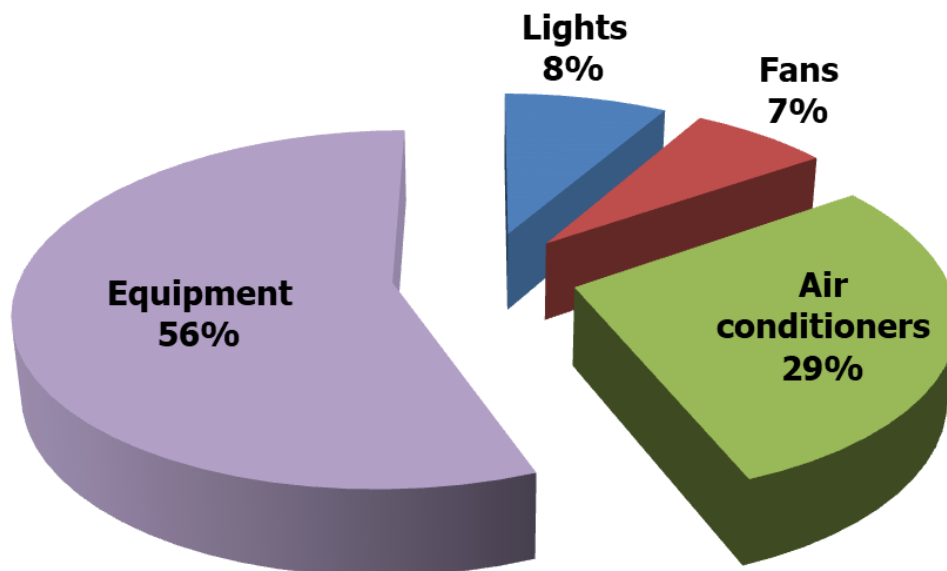


Figure 3: Summary of the calculated electrical consumption as per inventory

The above graph shows that Equipment consumes 60% followed by air conditioners at 31% the lights at 8% and the fans consume 7% of the total calculated electrical energy.

4.6 Lights

4.6.1 Types of lights based on the numbers

There are a total of **464 lights in the premises**; the following table shows the various types of lights in the premises.

S. No.	Type	Nos.
1	LED	333
2	Non-LED	131
Total		464

Table 6: Summary of the types of lights in premise

4.6.2 Types of lights based on the power consumption

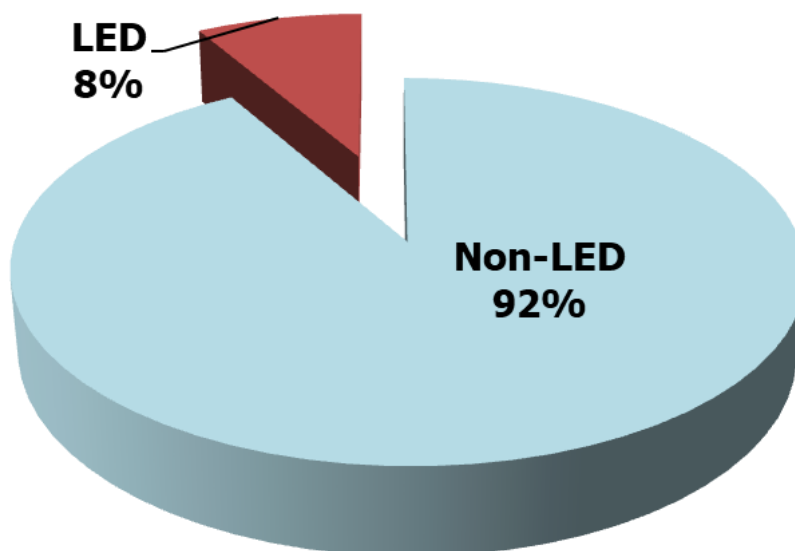


Figure 4: Energy consumed by types of lights in the premise based on the usage study

The analysis of the types of Lights in premises shows **Non-LED lights 92%** followed by **LED lights consuming 8%**

4.6.3 Floor-wise consumption analysis

The energy consumption of Lights is **29,465 kWh** of energy; the following graph shows the block wise consumption.

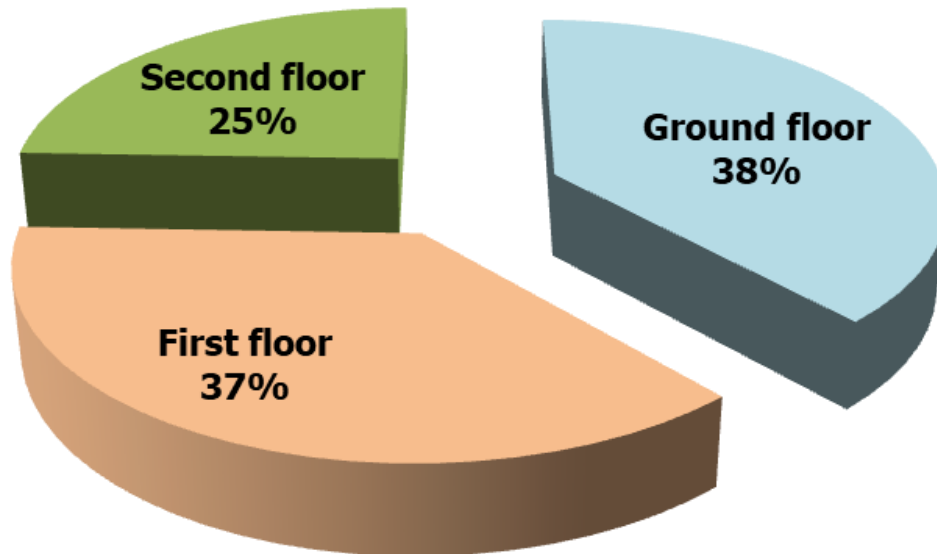


Figure 5: Energy consumed by lights floor wise

The above analysis shows the lights in the **Ground floor consume 38%**; the ones in **First floor consume 37%** and the ones in **Second floor consume 25%** of the total power consumed by lights.

4.6.4 Requirement of NAAC

4.6.4.1 Alternative Energy Initiative

Percentage of power requirement met by renewable energy sources – There are 20 grid of solar panels resulting in 45kW of energy. 100% energy is utilised in the premises and 100% of the power requirement is met by the solar energy.

4.6.4.2 Percentage of lighting power requirement met through LED bulbs

The premise has LED Lights contribute to 28% in terms of number and **8% of the power requirement** is met through the same. As per our study we could conclude that both of these are highest contributions among all the types of lights.

4.6.5 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 based on the numbers

There are a total of **185 fans** in the premises. The following table shows the various types of fans in the premises.

S. No.	Type	Nos.
1	Ceiling fan	129
2	Wall mounted fan	53
3	Small motor exhaust fan	3
Total		185

Table 7: Summary of the types of fans in premise

4.7.2 Types of fans based on the power consumption

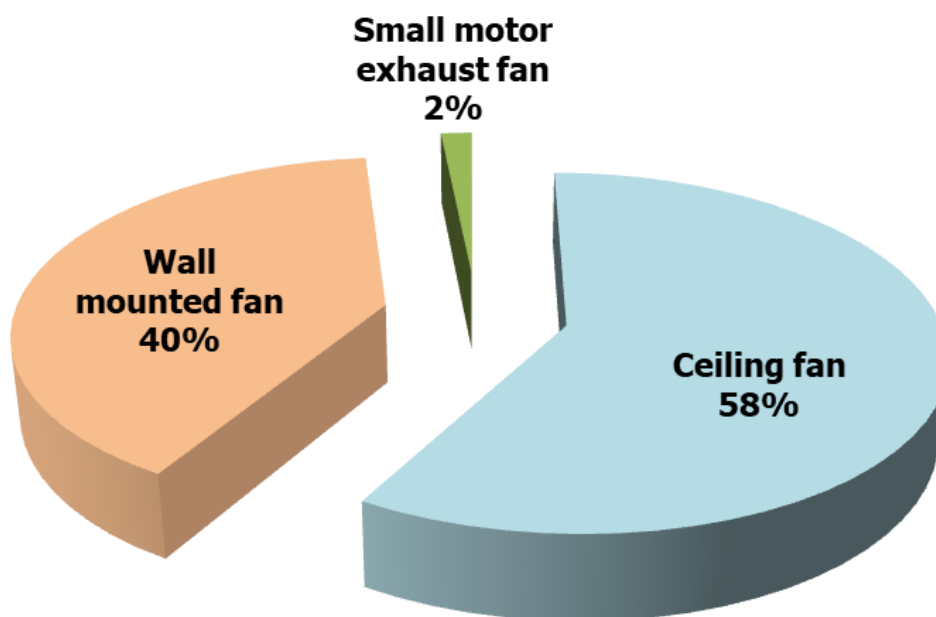


Figure 6: Energy consumed by types of fans in the premise based on the usage study

The analysis of the types of fans in premises shows **Ceiling fans consume 58%** the **Wall mounted fans consume 40%** and the **Small motor exhaust fans consume 2%**

4.7.3 Floor-wise consumption analysis

The energy consumption of fans is **24,910 kWh** of energy; the following graph shows the floor wise consumption.

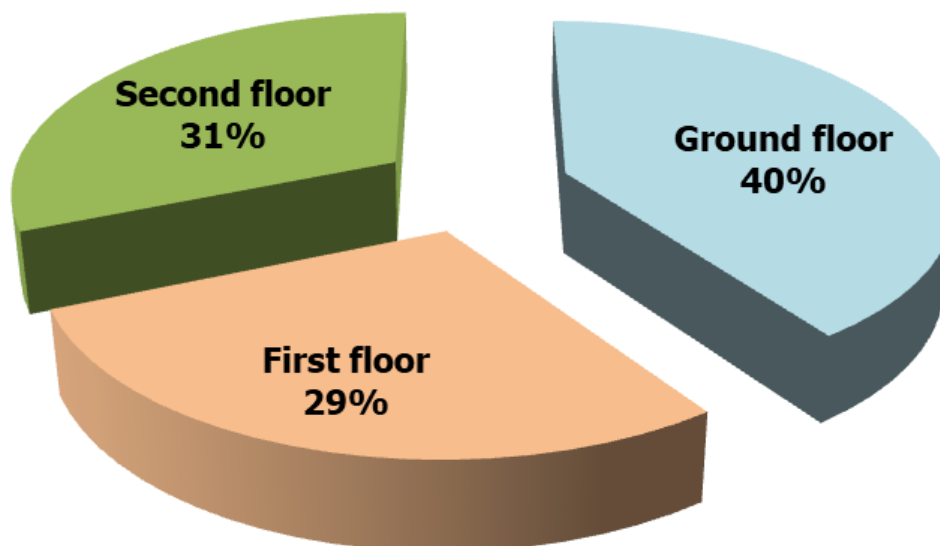


Figure 7: Energy consumed by fans floor wise

The above analysis shows the fans in the **Ground floor consume 40%**; the ones in **Second floor consume 31%** and the ones in **First floor consume 29%** of the total power consumed by fans.

4.7.4 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 Air conditioners

4.8.1 Types of air conditioners based on the numbers

There are **25 air conditioners** in the entire premises.

4.8.2 Floor-wise consumption analysis

The energy consumption of air conditioners is **1,01,050kWh** of energy; the following graph shows the floor wise consumption.

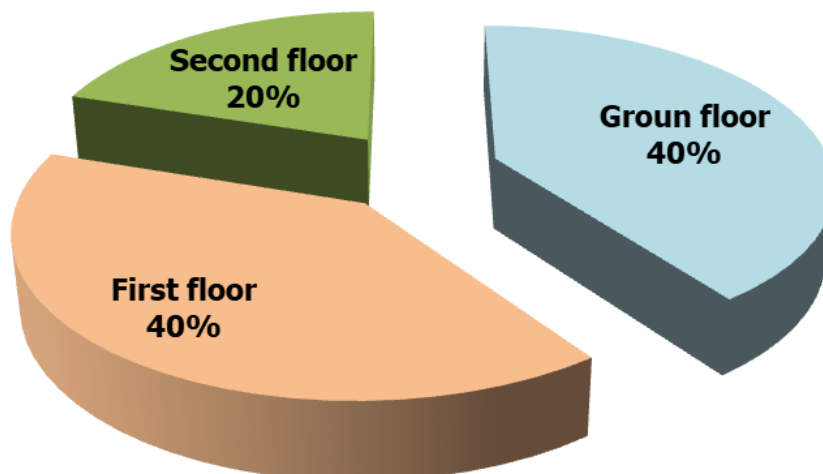


Figure 8: Energy consumed by air conditioners floor wise

The above analysis shows the air conditioners in the **Ground floor consume 40%**; the ones in **First floor consume 40%** and the ones in **Second floor consume 20%** of the total power consumed by air conditioners.

4.8.3 Site investigation observations

Some of the points noticed are as follows:

1. Daily monitoring and check is done by the maintenance staff and admin staff in an excellent manner.
2. The Outdoor Unit is properly cleaned and maintained well and do not have any dust collection problem.

4.8.4 About the replacement of Current AC

The current air conditioners are well maintained, through there is not an immediate requirement for replacement however, whenever the college undergoes redevelopment or a new floor is constructed 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 a total of **28 types of equipment totalling to 343 in number** in the premise. The various types are mentioned in the table below.

S. No.	Name	Nos.
1	Autoclave	1
2	Binocular	4
3	Binocular Magnus Olympus Dissecting Microscope	1
4	Biocraft Scientific System	1
5	Black Body Radiator	2
6	Digital Trainer Board	1
7	Dot Matrix Printer	1
8	Flame – Photometer	1
9	Dissecting Microscope (old model)	6
10	Electron Weighing Machine	1
11	Focus Pathological Electron Microscope	2
12	ID Printing Machine	1
13	Landline Phone	1
14	Magnetic Stirrer	2
15	Potentiometer	2
16	Incubator	1
17	Lactometer	1
18	PCR	1
19	Solar Cell	2
20	Spectrometer	7
21	Water Analyser	1
22	Wrist Action Shaking Machine	1
23	Refrigerator	1
24	Pump	1
25	Xerox Machine	2
26	Desktop Computer	253
27	Printer	22
28	Projector	23
Total		343

Table 8: Types of equipment in the premise as per the quantity

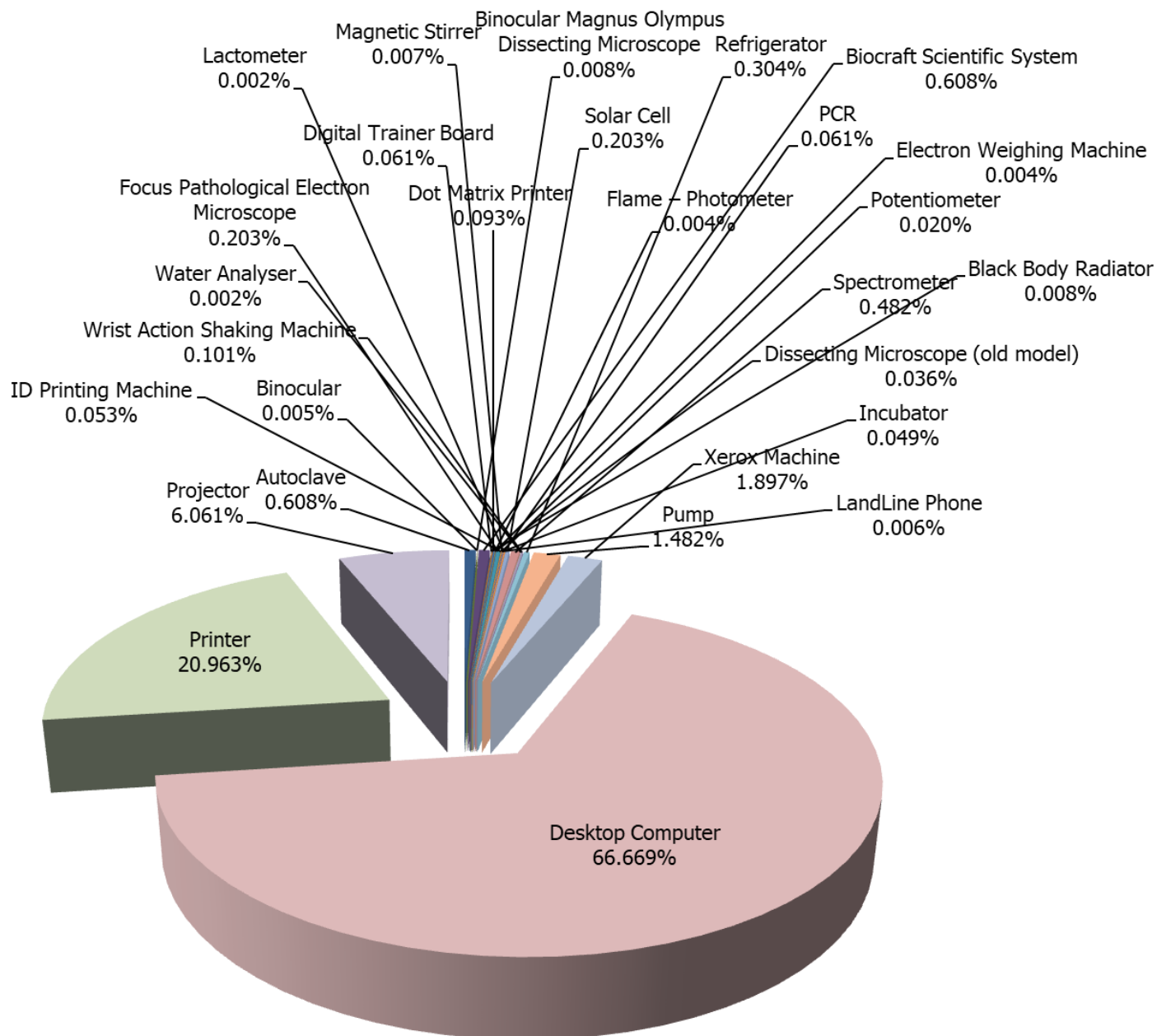


Figure 9: Summary of Energy consumed by equipment in the premises

The above summary shows that **Desktop computer consumes more energy at 66.669%** while **Printer consumes 20.963%** the **Projector consumes 6.061%** and the **Xerox machine consumes 1.897%** 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 **1,91,334 kWh** of energy; the following graph shows the floor wise consumption.

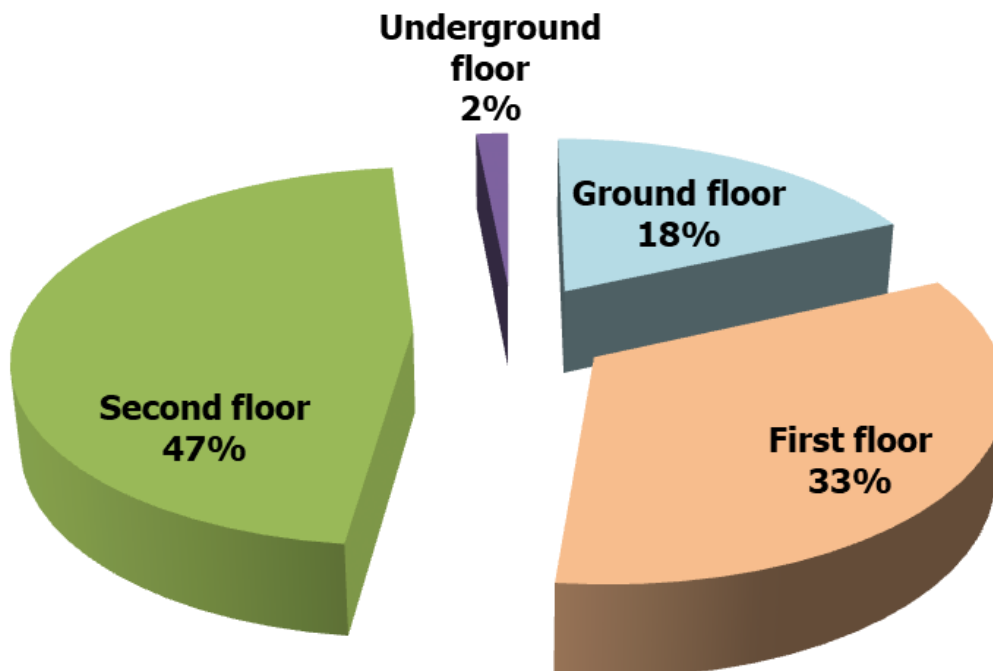


Figure 10: Energy consumed by equipment floor wise

The above analysis shows the equipment in the **Second floor consume 47%** while the ones in **First floor consume 33%** the ones in **Ground floor consume 18%** and the ones in **Underground floor (Referring to the pumps) consume 2%**

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 Electromechanical systems - Electrical and Lighting

Section 1 - Lights

Non-LED lights

The current light analysis shows that Non-LED tube lights consume anywhere between 24W, 36W and 40W when in use; similarly the CFL lights consume more than 25 to 28W when in use; these should be replaced with LED lights which consume on an average 16-20W when in use.

Our technical analysis shows that there would be a reduction of an average of **77% reduction** in energy consumption through lights specifically as a part of the electro-mechanical system if all **Non-LED CFL 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 60W when in use. These should be replaced with energy efficient fans consuming 32W 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 **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.

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 and Residential 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 University 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.

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) Terrace farming** - 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 as well as 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) Additional fire safety** - Measures such as Hose reel, signages, fire-fighting tank, fire alarm and sprinkler system should be adopted.
- d) Waste vio** – Stepping up a little further an initiative can be undertaken wherein 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. This has benefits such as awareness, eco-friendly habits in becoming a responsible citizen.
- e) Signages** – In addition to the signages being in regular language there can be additional signages in braille language for the specially abled students.

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 suggestions by the Students and staff are listed below:

- **Increase the trees**
- **Try to make herbal garden.**
- **Organising webinars and bring awareness among the students about green premises.**
- **Make a green garden at college for pure air and environment**
- **I think from all the departments of college should inform the students to plant one tree once in a month.**

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.

