ENERGY AUDIT

STUDY PERIOD (FIVE YEARS) 2016-21

Sustainability study

AUDIT REPORT

Studied for

Viswambhara Educational Society's

Vaagdevi Pharmacy College

Bollikunta (Village), Khila Warangal (Mandal),
Warangal (Dist.) - 506 005, Telangana, 506005

Studied by

Greenvio Solutions

Issued on 31 May 2022

Background reference image Janko Ferlic on pexels

Disclaimer

The Audit Team has prepared this report for the **Viswambhara Educational Society's Vaagdevi Pharmacy College** located at *Bollikunta (Village), Khila Warangal (Mandal), Warangal (Dist.) - 506 005, Telangana* based on input data submitted by the College and analyzed 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 a 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 is an Accredited and Certified Green Building Professional-Architect; I.A.(IMS) 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 incapacity of an Accredited & Certified Green Building Professional with extensive experience.

Greenvio Solutions

Developing Healthy and Sustainable Environments

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Acknowledgment

The Audit Assessment Team thanks the **Viswambhara Educational Society's Vaagdevi Pharmacy College** 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. C. Janga Reddy,** Chairman; **Sri. Ch. Narsimha Reddy,** Vice President; **Dr. Ch. Devender Reddy,** Secretary & Correspondent; **Sri Ch. Sudharshan Reddy,** Joint Secretary; **Dr. Ch. Rathnakar Reddy,** Treasurer; **Mr. C. Satyapal,** Member, and everyone from the Management.

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Sustainable Academe
Brand of Greenvio Solutions, Palghar District, Maharashtra- 401208

Contents

1. Introduction

1.1 About Viswambhara Educational Society

It was established in the year 1993 to provide technical and higher education. This society was formed by dynamic and well-educated persons ***to impart standard higher education in the North region of Telangana state.*** The society is directed by highly experienced senior citizens, excellent academicians, and dynamic youngsters on the board of directors.

1.2 The surrounding premises around the Institution

The Premises is situated amidst the landscape serene of the **Warangal district of Telangana State** with immense peace and calmness in the surroundings. The College is surrounded by Educational Buildings on the macro front from all sides.

The college is situated in academia with several institutions under the same society. There are multiple shared facilities the colleges possess.

The college is located in serene atmosphere and green surroundings away from the buzz of the city and is feasible of the nearby essential amenities such as Public Health Center, Fire Station, Civic body-Public administrative buildings, Recreational gardens, and Police Station.

1.3 About the Institution

Vaagdevi Pharmacy College is the first Pharmacy College to be started in the Warangal region under JNTU, Hyderabad.

It is one of the pioneered institutions in the region of Telangana to provide a good pharmacy education and to meet the needs of the present-day healthcare system where a pharmacist has to play important role in society. To impart the professional course effectively, the institution is located in a peaceful locality away from a busy, noisy, and pollution-free atmosphere.

The premises are well equipped with a wide range of facilities that make life in academia comfortable and fulfilling. The academic life is vibrant and engaging.

It is affiliated with the Jawaharlal Nehru Technological University Hyderabad and provides the following programs:

- **Graduation** – It offers the Bachelor of Pharmacy (B. Pharm) course.
- **Post Graduation – It offers the following courses as Masters of Pharmacy**
  - M.Pharm - Pharmaceutics
  - M.Pharm - Pharmaceutical Analysis
  - M.Pharm - Pharmaceutical Regulatory Affairs
- **Doctor** – It offers the Doctor of Pharmacy (Pharm.D.) course.

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

1.4 Statements of the Institution

1.4.1 Vision

"The institute envisions ***"To create an educational environment in which students are geared up to meet the challenges of the modern Industry and Society."***

1.4.2 Mission

The College seeks to realize its Vision with a Mission to ***"To leverage the society reputation by an image composing of unique destination for standing out learning processes, success in profession and endow with a foundation towards research and development activities."***

1.5 Assessment of the College

1.5.1 Affiliations and approvals

The College has all its courses approved and is affiliated with the **Jawaharlal Nehru Technological University Hyderabad,** *a public university, located in Hyderabad, Telangana. Founded in 1965 as the Nagarjuna Sagar Engineering College, it was established as a university in 1972 by The Jawaharlal Nehru Technological University Act, 1972.*

1.5.2 Certification

AISHE – The College received the AISHE certification from the Department of Higher Education Statistics Division, New Delhi in 2022 and the code is *C-19653-2019.*

1.5.3 Approvals

The courses provided by the college are approved by the following bodies:

- **Pharmacy Council of India (PCI), New Delhi**
- **All India Council for Technical Education (AICTE), New Delhi**

2. Institution overview

2.1 Populace analysis for the Academic year 2020-21

2.1.1 Students data

The student data (shared by the College) shows there were a total of **138 Boys and 306 students,** thus there were **a total of 444 students** on the premises.

2.1.2 Staff data

Type	Male	Female	Total
Admin Staff	2	1	**3**
Teaching Staff	22	24	**46**
Non-Teaching Staff	11	12	**23**
Total Staff Members	**35**	**37**	**72**

Table 1: Staff data of the Institution for 2020-21

The staff data shows the premises had a total of **72** Staff Members.

2.2 Populace analysis for the Academic year 2019-20

2.2.1 Students data

The student data (shared by the College) shows there were a total of **107 Boys and 289 Girls students,** thus there were **a total of 396 students** on the premises.

2.2.2 Staff data

Type	Male	Female	Total
Admin Staff	2	1	**3**
Teaching Staff	21	19	**40**
Non-Teaching Staff	10	11	**21**
Total Staff Members	**33**	**31**	**64**

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

The staff data shows the premises had a total of **64** Staff Members.

2.3 Populace analysis for the Academic year 2018-19

2.3.1 Students data

The student data (shared by the College) shows there were a total of **79 Boys and 235 Girls students,** thus there were **a total of 314 students** on the premises.

2.3.2 Staff data

Type	Male	Female	Total
Admin Staff	2	1	**3**
Teaching Staff	23	22	**45**
Non-Teaching Staff	11	11	**22**
Total Staff Members	**36**	**34**	**70**

Table 3: Staff data of the Institution for 2018-19

The staff data shows the premises had a total of **70** Staff Members.

2.4 Populace analysis for the Academic year 2017-18

2.4.1 Students data

The student data (shared by the College) shows there were a total of **94 Boys and 193 Girls students,** thus there were **a total of 287 students** on the premises.

2.4.2 Staff data

Type	Male	Female	Total
Admin Staff	2	1	**3**
Teaching Staff	22	20	**42**
Non-Teaching Staff	10	11	**21**
Total Staff Members	**34**	**32**	**66**

Table 4: Staff data of the Institution for 2017-18

The staff data shows the premises had a total of **66** Staff Members.

2.5 Populace analysis for the Academic year 2016-17

2.5.1 Students data

The student data (shared by the College) shows there were a total of **90 Boys and 165 Girls students,** thus there were **a total of 255 students** on the premises.

2.5.2 Staff data

Type	Male	Female	Total
Admin Staff	2	1	**3**
Teaching Staff	22	20	**42**
Non-Teaching Staff	10	10	**20**
Total Staff Members	**34**	**31**	**65**

Table 5: Staff data of the Institution for 2016-17

The staff data shows the premises had a total of **65** Staff Members.

2.6 Total College Area & College Building Spread Area

The **total site area is 2 acres** and the **total Built-up area of the College is 79,068.5 sq. ft.** for **a total of 516 footfalls.**

2.7 College Infrastructure

2.7.1 Establishment

The College was established in 2007. The college is located pretty close to nature and hence has a very fresh environment which is absolutely pollution free and healthy. The Building is a Reinforced Cement Concrete (RCC) framework building.

2.7.2 Spatial Organisation

The overall ambiance 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 color palette not just helps the building to stand out but also provides an Institutional arena. There are

provisions for lifts and a staircase for accessibility on the premises, whereas there are amenities such as CCTV, Fire extinguishers, smoke detectors, a first aid box, etc.

2.7.3 Operation and Maintenance of the premises

The interview session was held with the staff regarding the operation and working hours. The Institution is open from Monday to Saturday. The first and third Saturdays are off. The schedule is mentioned below.

S. No.	Section	Spaces	Time	Hours/ day	Days in a year
1	Main Institutional College	Student areas and Teaching faculty	09:30 a.m. to 04:30 p.m.	7	280
2	General areas	Admin areas and library, Passage, staircase, toilet	09:00 a.m. to 04:30 p.m.	7.5	300

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 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 campus

Green Audit

- Green initiatives
- Hygiene audit
- Water Audit - Analysis of the current water consumption of campus; Scope to include 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 Timeline of the activities for the Green Building Study Audit

- 05 February 2022 – Discussion with the College
- 12 February 2022 – Allotment and Initiation by the College
- 18 February 2022 – Induction Meeting
- 03 March 2022 – Survey of students and staff completed
- 05 March 2022 – Site visit
- 22 March 2022 – Data submitted by College
- 31 May 2022 – Submission of the Report

On-site investigation and physical verification

Site visit and interaction session

4. Energy Audit

4.1 Sources of Energy consumption

The sources of energy consumption in a building comprise Lighting, Refrigeration, Ventilation, Cooling, Computers, Office equipment, cooking, space-eating, water heating, and others.

For study purposes, the sources are divided into primary and secondary sources, where the primary is considered for the generation and consumption purposes and secondary sources are additional sources used as an alternative backup.

The study emphasizes the consumption patterns, strategies adopted at present, and recommendations that can be implemented to improve the power consumption and utilization pattern.

4.1.1 Primary sources

These are the sources that are consumption and production

- **Electrical (Metered)** – This source studies the elements which are connected through a metered system of electrical consumption. Light, fans, air conditioners, equipment, and pumps are the consumers that comprise this category.
- **Renewable (Solar or other)** – There are solar panels, and solar water heaters available at present.

4.1.2 Secondary sources

The college is located in an urban area and has minimal to zero power cuts, thus there are no secondary sources of energy supply at present.

1. **Inverter, UPS, Battery –** These are utilized in the administrative areas; and are available as two each in nos., a certain amount is spent monthly towards annual maintenance charges.
2. **Gas cylinders –** There are 4 cylinders used in the laboratory.
3. **Diesel Generator –** There are no diesel generators available at present.

4.2 Site investigation analysis

The data investigated and collected through interviews are summarised below:

- The **switch-off drills are practiced at present,** and the maintenance staff and Lab Attendants put off switches of all equipment regularly.
- All the **computers are shut off after use** and also put on power-saving mode.
- There are **Ultra-violet lights used only in the scientific labs for experiment purposes, apart from these any other harmful lights used** in the premise.

4.3 Utility bill audit

Actual Billed Electrical Consumption

The admin department had shared the bills for the Meters connected to Buildings which is the main source of energy supply. The supplier is the Northern Power Distribution Company of Telangana Limited (TSNPDCL). The college has shared premises with other institutions. The Common electricity bills are available for the Colleges.

4.4 Survey Results

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

4.4.1 Participation

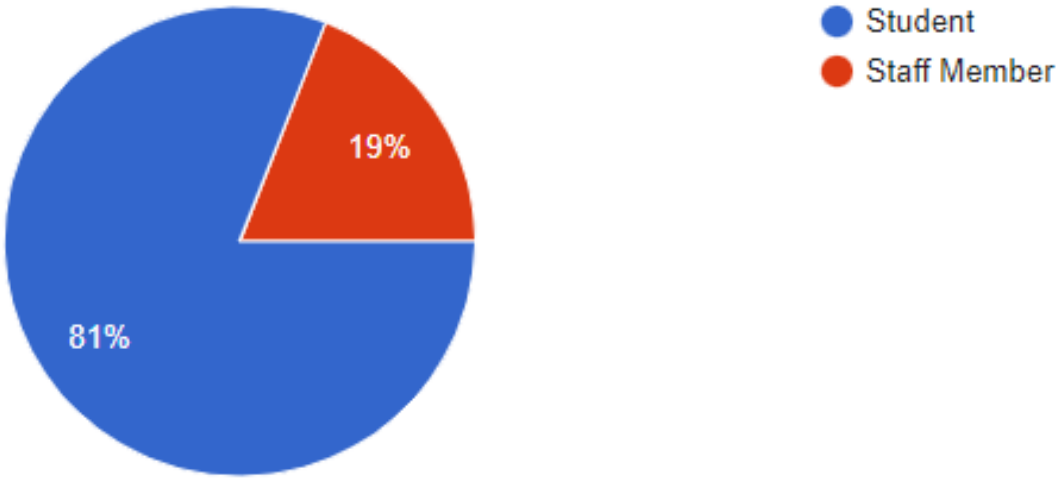


Figure 1: Participation analysis in the survey

A total of **21 responses** were received out of which 81% were students.

Note regarding the survey review

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 the graph depict the Number of participant's responses in numerical (Percentage of the participant response) – For example 101 responses (44.5%)

4.4.2 Review of the Energy management practices on the premises

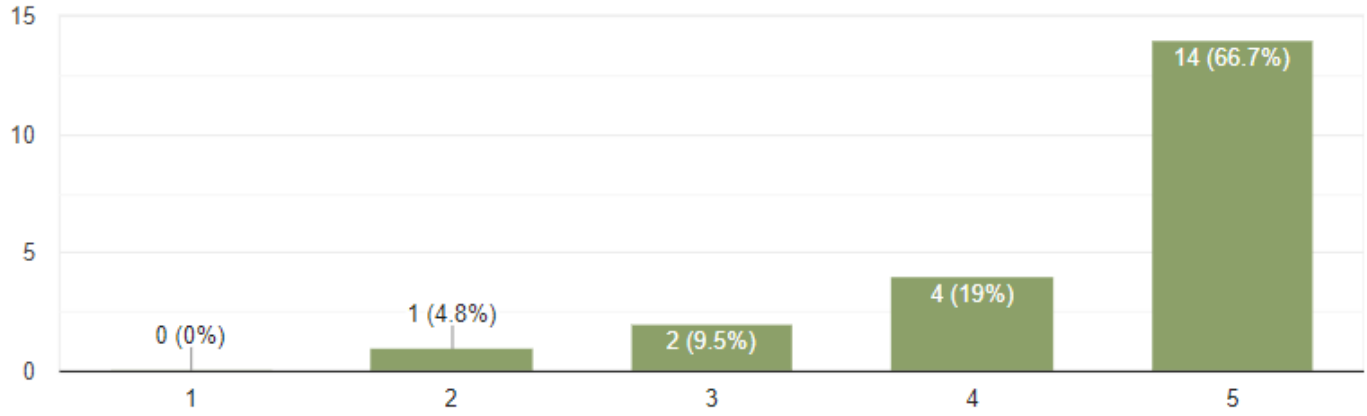


Figure 2: Energy management practices in college

The students and staff **(almost 67%) of the respondents found the practices to be excellent** and **19% found the practices to be very 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 collection 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 conditioners, and equipment. The inventory and data collection for sources of energy consumed in the premise are summarised in the following sections.

Note: The following analysis is combined for the entire premise taking into consideration the duration before the pandemic to understand the consumption pattern on a regular day.

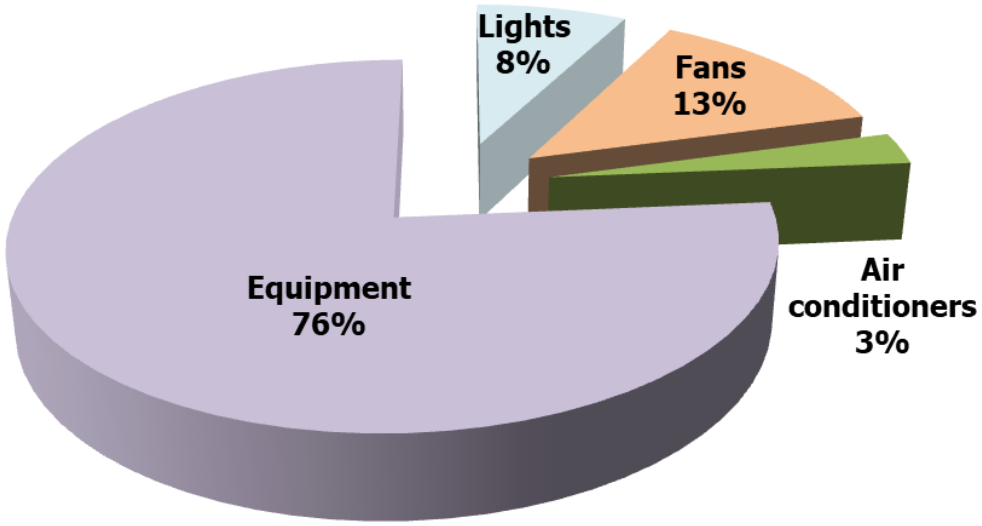


Figure 3: Summary of the calculated electrical consumption as per inventory

The above graph shows that equipment consumes 76% followed by fans at 13% the lights at 8% and the air conditioners consume 3% of the total calculated electrical energy.

4.6 Lights

4.6.1 Types of lights based on the numbers

There are a total of **250 lights on the premises;** the following table shows the various types of lights on the premises.

S. No.	Type	Nos.
1	Non-LED	139
2	LED	111

Table 7: Summary of the types of lights on-premise

4.6.2 Types of lights based on the power consumption

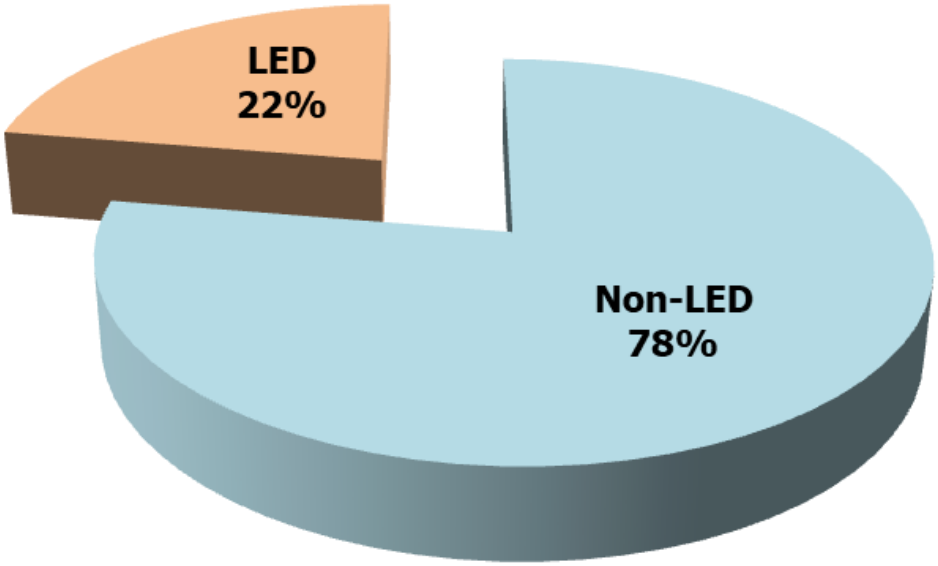


Figure 4: Energy consumed by types of lights in the premise based on the usage study

The analysis of the types of Lights on-premises shows **Non-LED lights 78%** followed by **LED lights consuming 22%**

4.6.3 Floor-wise analysis of the buildings

The specific energy consumption of the **250 lights in the buildings is 3,648 kWh**; the following graph shows the floor-wise consumption.

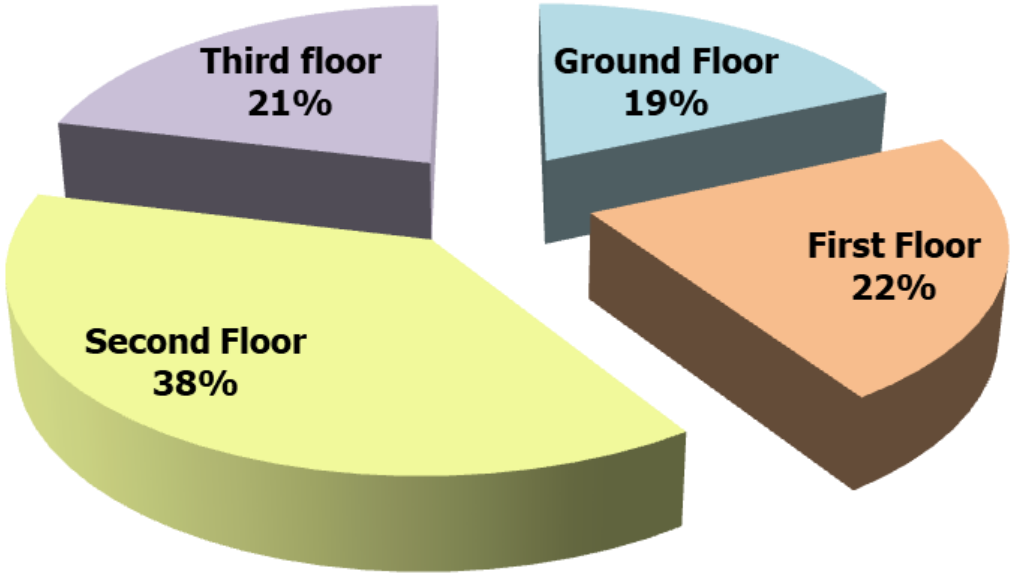


Figure 5: Energy consumed by lights (Floor-wise) in the building

The above analysis shows the lights on the **Second floor consume 38%** and the ones on the **First floor consume 22%** while the **Third floor consumes 21%** the **Ground floor consumes 19%** of the total power consumed by lights in the buildings.

4.6.4 Requirement of NAAC

4.6.4.1 Alternative energy initiative

Percentage of power requirement met by renewable energy sources – There are solar panels and solar hot water heaters are the sources of renewable energy available at present. The details of the 200Kwp Solar Power generating Systems is as follows:

1. 200Kva equal multiple 3ph Grid tie inverter with net metering facility.(50Kva x 4 Nos)
2. Grid inter facing panel with SPDs and energy meters on ac side- 1No
3. 200Kwp Solar photo voltaic panels(using 320Wp Modules- 624Nos as per IEC standard
4. Module Mounting structure (200Kwp)
5. Ac distribution box 2in 1 out- 2Nos
6. Array & main junction boxes- 4Nos

7. Cable Flexible Copper cable up to inverter
8. Lightning protection for 50Mtrs radius with Copper electrode- 1No
9. Earthing Protection with Copper Pole and with Copper strip- 4Nos

As per the data of 2020-2021, the total power requirement was 6,49,880 kW of energy; the total Solar Energy supplied to the Grid was 1,90,543 kW of energy. At present, thus zero percent of the power requirement of the College is met by solar energy because 100% of the energy produced is given back to the grid.

4.6.4.2 Percentage of lighting power requirement met through LED lights

The premise has LED Lights to contribute to 44% in terms of number and **22% of the power requirement** is met through the same. As per our study, we could conclude that this practice could be improved.

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 are 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 **320 ceiling fans** on the premises. For the study purpose, only the information on ceiling fans was shared which has been considered for the research.

4.7.2 Types of fans based on the power consumption

The analysis of the types of fans on-premises shows **ceiling fans consume 100% of the power with a consumption amounting to 22,848 kWh.**

4.7.3 Floor-wise analysis of the buildings

The following graph shows the floor-wise consumption.

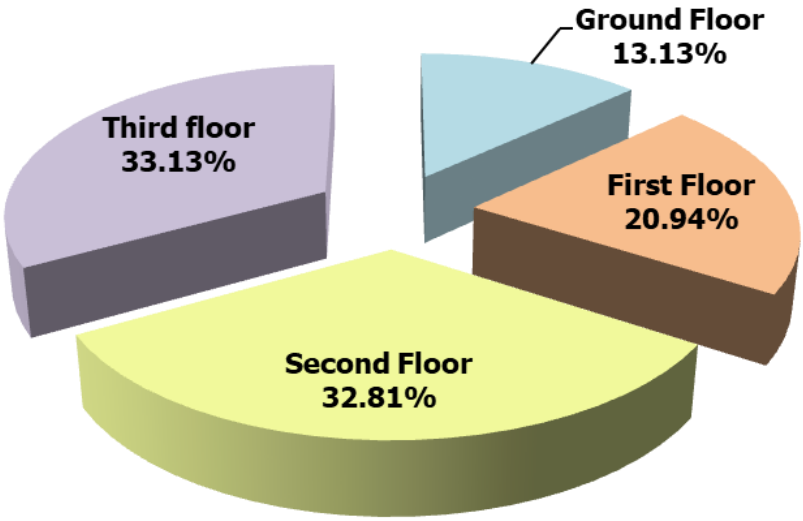


Figure 6: Energy consumed by fans in the buildings (Floor-wise)

The above analysis shows the fans on the **Third floor consume 33.13%** and the ones on the **Second floor consume 32.81%** while the **First floor consumes 20.94%** the **Ground floor consumes 13.13%** of the total power consumed by fans in the buildings.

4.7.7 Site investigation observations

Some of the points noticed are as follows:

1. All fans are in working conditions
2. Daily monitoring and check are done by the maintenance staff and admin staff excellently.

4.8 Air conditioners

4.8.1 Types of air conditioners based on the numbers

There are **3 air conditioners** on the entire premises**.**

4.8.2 Types of air conditioners based on the power consumption

The energy consumption of air conditioners is **5,092 kWh** of energy.

4.8.3 Floor-wise consumption analysis

The following graph shows the floor-wise consumption.

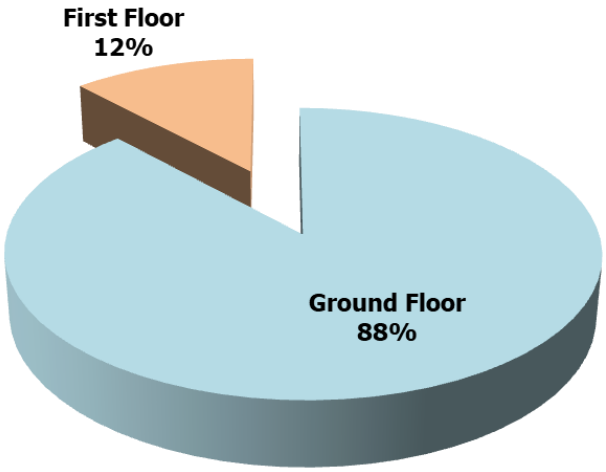


Figure 7: Energy consumed by air conditioners floor-wise

The above analysis shows the air conditioners on the **Ground floor consume 88%** and the ones on the **First floor consume 12%** of the total power consumed by air conditioners in the buildings.

4.8.4 Site investigation observations

Some of the points noticed are as follows:

1. Daily monitoring & check are done by maintenance staff, and admin staff skillfully.
2. The Outdoor units are properly cleaned and maintained with no dust 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 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 based on the numbers

There are a total of **35 types of equipment totaling 269 numbers** on the premise. The various types are mentioned in the table below.

S. No.	Name of the equipment	kwh
1	Wifi router	5
2	CCTV	90
3	Printer	5
4	Scanner	4
5	Water cooler	2
6	Xerox machine	2
7	Projector	5
8	Refrigerator	4
9	Lift Motor	1
10	Freezer	1
11	TV	1
12	Microwave oven	1
13	Sanitary vending machine	1
14	Sanitary incinerator	1
15	HUB	4
16	Bio Metric	2
17	Desktop computers	90
18	Smart board	4
19	Speakers	2
20	UV-Visible Spectrometer	2
21	BOD Incubator	1
22	Tablet dissolution apparatus	2
23	Tablet disintegration apparatus	2
24	Bulk density apparatus	3

25	Friability test apparatus	2
26	Hot air oven	2
27	Laminar air flow	1
28	Ball mill	2
29	Sonicator	2
30	Digital Balance	6
31	Autoclave	2
32	Hot plate	5
33	Magnetic stirrer	5
34	Homogenizer	5
35	Water motor starter	2

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

4.9.2 Types of equipment based on the power consumption

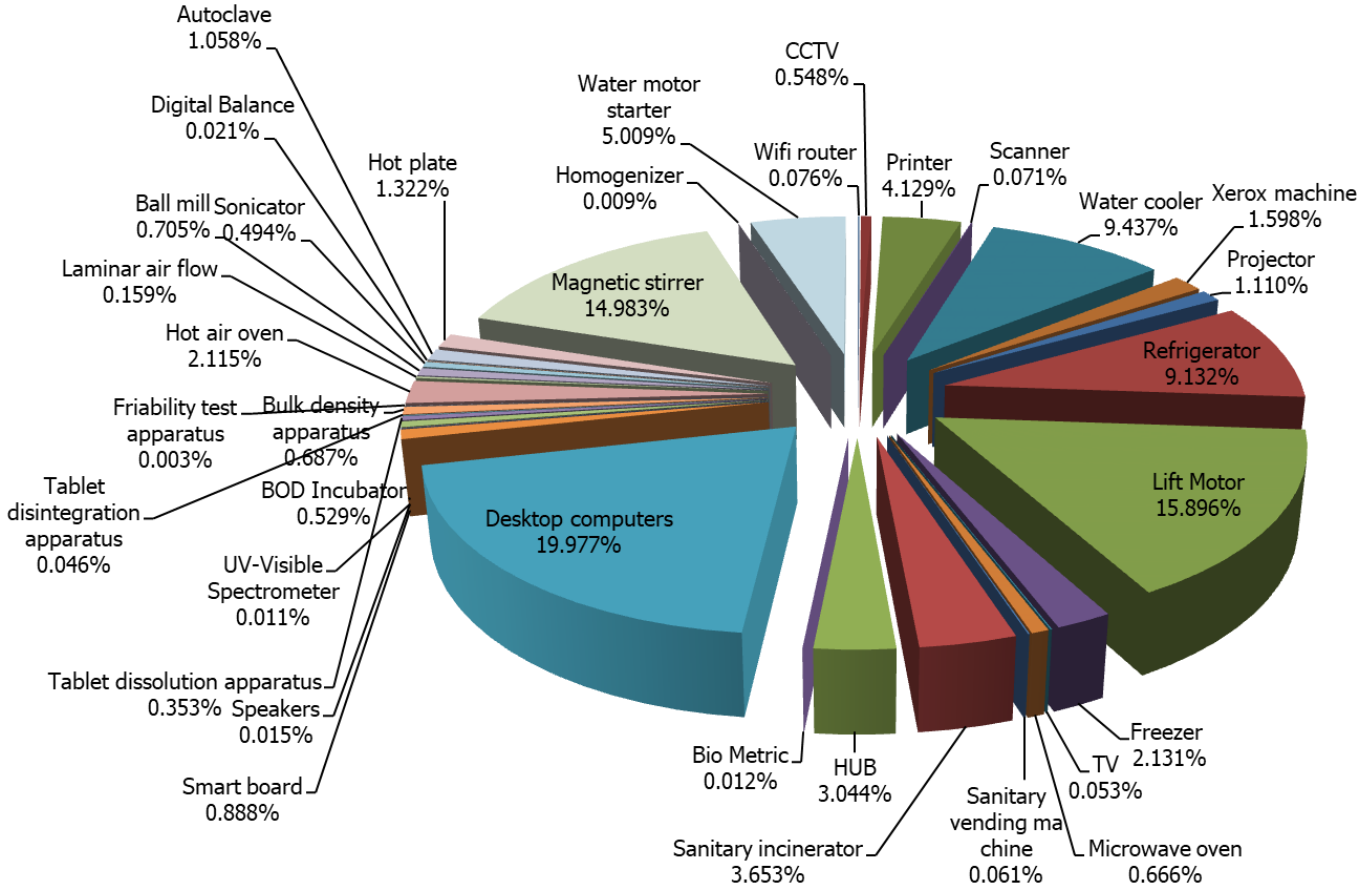


Figure 8: Summary of energy consumed by equipment on the premises

The above summary shows that the **desktop computer consumes more energy at 19.977%** while the **magnetic stirrer consumes 14.983%** the **lift motor consumes 15.896%** and the **water cooler consumes 9.437%** these are the maximum consumers as compared to other equipment.

4.9.3 Site investigation observations

Some of the points noticed are as follows:

1. All types of equipment are in working conditions and daily monitoring and check are done by the maintenance staff and admin staff skillfully.
2. No defect was found in any equipment of electrical consumption.

4.10 Recommendations for a Sustainable Habitat

Over time energy-efficient appliances have been a boon not only to the energy-saving parameters they adhere to but also to the eco-friendly habits it helps to inculcate. An institution such as Schools and Colleges is 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 some of the suggestions which can be implemented for an energy-efficient Institution. This would help in the 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 and the mercury lights consume 100W 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 **63% reduction** in energy consumption through lights specifically as a part of the electro-mechanical system if all **Non-LED lights** are replaced on all floors and buildings with an energy-efficient appliance whenever the college undergoes renovation. Since the UV lights are used in the laboratories, they are excluded.

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 all the **ceiling fans on all floors** if replaced with star-rated appliance results in a reduction of an average of **47% reduction** in energy consumption if replaced with an energy-efficient appliance. It will be suggested to either replace these now if the college can have certain plans else the replacement can be done when fans get damaged or are not in working condition.

While considering the replacement, based on the study we could state that the priority should be given to replacing the fans on the third floor and then all other floors.

Section 3 – Equipment

Desktop computers to laptops

Among all equipment, it suggested replacing the desktop computers with laptops as this would be energy efficient. A normal desktop computer consumes an average of 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 that lasts up to 4 hours.

There is **an average 84% reduction** in energy consumption if replaced with an energy-efficient appliance which is a laptop in all the areas of Educational and Residential areas.

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

- Some of the senior staff members may be more convenient with computers, replacement with a laptop might result in a change of the working patterns and hours which may affect the productivity.
- Laptops – in the case are not handled with care such as if dropped unintentionally might result in data imbalance.
- Students who are not day scholars can use a laptop at their convenience, whereas in common areas there can monitoring of the usage hours hence computers may be a preferable option then laptops 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 analyze the above points and then devise a strategy for 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 to e-waste management as well.

4.10.2 Building management systems

The college has extreme potential to become 100% energy-efficient premises. In addition to provisions in the electromechanical system, some facilities can be introduced towards building management systems as well. These can be undertaken equally for educational and residential sections.

- Set the BMS time of day schedules to suit the minimum occupancy periods of the areas served and implement optimum start-stop incorporating a night purge cycle, session, and holiday schedule.
- Space temperature Setback - A temperature setback is a simple strategy to help save utility costs by reducing how often your heating or cooling system operates. *(morrisseyengineering)*
- Timer control of air conditioners.
- Timer control of personal heaters - Install push button timer control of personal heaters in Residential areas.

4.10.3 Facility management systems and controls

(Includes electromechanical systems – Electrical, Water)

a) Common facilities for Residential and Educational areas

- Install PIR control of the lighting in the toilet areas.
- Install low flow taps with automatic shut-off in the toilets.
- Install push button timer control in all rooms lighting and ceiling fans.

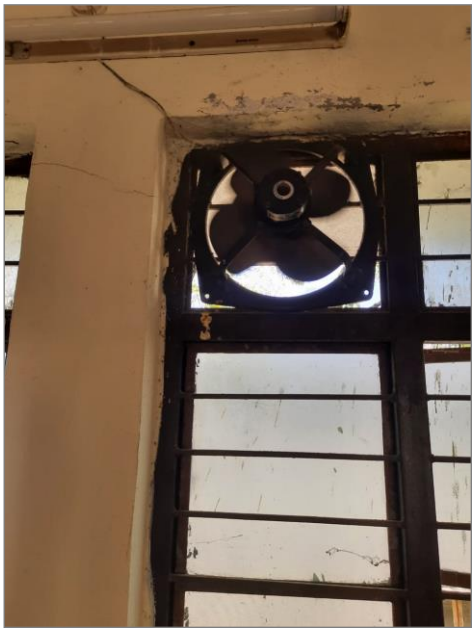
b) Specific facilities for Residential areas

- Additional security lighting in residential areas.
- Install PIR control of the lighting in the shower area.
- Install time of day control on the domestic hot water circulating pump

c) Specific facilities for Educational areas

- Install audible alarms on the laboratory doors to ensure doors remain closed at all times.
- Install Power Electronics control of the Foyer notice board lighting.
- Install reduced voltage control of the high bay lights.
- Install access lighting laboratories and Engineering Blocks and operate the high bay lighting only when required.


V-GUARD



5. Towards a Healthy & Sustainable Institution

5.1 Recommendations based on the study

In addition to the recommendations provided in each section; the College can adopt the following strategies for Healthy and Sustainable Institution practices.

a) **Terrace farming -** There can be the provision of terrace farming 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 food grown which would be used in Canteen. It helps in capacity building as well as the smaller steps are taken have huge impacts when each student would adopt these practices in their homes or societies and grow kitchen garden, and 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, and spoons used in the Canteen can be replaced with eco-friendly/ organic leaves, paper straws, disposable plates, and edible spoons made out of sugarcane waste or bamboo.

c) **Signages –** In addition to the signages being in regular language there can be additional signages in braille language for the specially-abled students.

d) **Amphitheatre cum open learning space -** The College can create an open space amphitheater in the open area and include open space learning and activities there providing a holistic approach to education and being one of its kind Institute to adopt this practice.

e) **Waste vio –** College can tie up with our organization and students can be encouraged to collect dry waste and electronic waste such as newspapers, old laptops, and others and hand them over on a weekly or monthly basis thereby making a waste reduction approach in the community. This has benefits such as awareness, and eco-friendly habits in becoming a responsible citizen.

f) **Eco clubs –** In addition to the NSS, there can be an eco-club with school and college students operating together which will help the collaboration to yield results right from the micro-level.

g) **Additional fire safety –** The measures such as a Hose reel, signages, fire-fighting

tank, fire alarm, and sprinkler system should be adopted. There should be a fire extinguisher minimum of two per floor on every staircase, immediately outside the lifts, and in every lab with appropriate signages and layouts for exit plans in case of an emergency.

5.2 Survey Results

An online survey was conducted to analyze the student and staff views about changes for Green audit improvement. **Some of the suggestions are listed below:**

- Planting more plants at different places on the premises is required.
- Improvement in plantation and take care of plants every day by watering plants.

However, it should be noted that because of the pandemic the students have not visited the premises physically so some of these points are not mandatory.

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 center for Accessible Environments) – an initiative supported by Shakti Sustainable Energy Foundation.
6. U.S. Energy Information Administration


VAAGDEVI PHARMACY COLLEGE