Padmabhooshan Vasantraodada Patil Institute of Technology, Sangli (Budhgaon)

AUDIT REPORT 2022-23

ENVIRONMENTAL & CIVIL ENGINEERING SOLUTIONS
ISO 9001: 2015, IEC 17025: 2017

Editorial

In the Era of global warming and climate change every citizen has to reduce their own carbon foot prints to tackle with the adverse impacts of climate change. A green audit of any academic institution revels ways in which we can reduce energy consumption, water use and reduction in emission of carbon dioxide in the environment. It is a process to look into and ask ourselves whether we are also contributing to the degradation of the environment and if so, in what manner and how we can minimize this contribution and bring down to zero and preserve our environment for future generation.

Padmabhooshan Vasantraodada Patil Institute of Technology administration has already taken a step towards the green approach and conducted green audit of campus in the year 2022-2023. As an outcome of this institute has taken green steps to reduce its carbon foot prints by several means in campus viz. sustainable fittings, tree plantation and green computing in the administration and examination. The responsibility of carrying out the scientific green audit was given to Environmental and Civil Engineering Solutions. The organization has followed the rules and regulation of Ministry of Environment and Forest, Govt. of India and Central Pollution Control Board, New Delhi.

A questionnaire was prepared based on the guidelines and format of CPCB, New Delhi to conduct green audit. The information related to consumption of resources like water, electricity and handling of solid and hazardous waste was collected in the formats from main building support services and departments. The data collected was grouped and was tabulated in Excel sheets and analysed. The graphs of the analysed data were prepared for getting quick idea of the status. Interpretation of the overall outcomes was made which incorporates primary and secondary data, references and interrelations within. Final report preparation was carried out using this interpretation to prepare environment management plan of institute for next two years.

During the preparation of the Audit Report Audit Report Hon. Principal and Vice principal, Dean IQAC encouraged us with their full support. IQAC and other officers of the institute also gave support to carry out this work. We also thank all Heads of the departments and the Co-ordinators gave full co-operation.

Nikhil N. Kamble
(C.E.O and Head)

Environmental and Civil Engineering Solutions

Acknowledgement

We express our gratitude for calling upon us for this audit, mainly the Principal and all other staff members, who were ever helpful and supported us with all the inputs needed for this audit. We thank all the teaching, non-teaching and students for helping us in conducting this audit.

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1. Introduction:

The modernization and industrialization are the two important outputs of twentieth century which have made human life more luxurious and comfortable. Simultaneously, they are responsible for voracious use of natural resources, exploitation of forests and wildlife, producing massive solid waste, polluting the scarce and sacred water resources and finally making our mother Earth ugly and inhospitable. Today, people are getting more familiar to the global issues like global warming, greenhouse effect, ozone depletion and climate change etc. Now, it is considered as a final call by mother Earth to walk on the path of sustainable development. The time has come to wake up, unite and combat together for sustainable environment.

Considering the present environmental problems of pollution and excess use of natural resources, Hon. Prime Minister, Shri. Narendra Modiji has declared the Mission of Swachch Bharat Abhiyan. Also, University Grants Commission has mentioned “Green Campus, Clean Campus” mission mandatory for all higher educational institutes. As environmental sustainability is becoming an increasingly important issue for the nation, the role of higher educational institutions in relation to environmental sustainability is more prevalent.

Green Audit is the most efficient ecological tool to solve such environmental problems. It is a process of regular identification, quantification, documenting, reporting and monitoring of environmentally important components in a specified area. Through this process the regular environmental activities are monitored within and outside of the concerned sites which have direct and indirect impact on surroundings. Green audit can be one of the initiative for such institutes to account their energy, water resource use as well as wastewater, solid waste, E-waste, hazardous waste generation. Green Audit process can play an important role in promotion of environmental awareness and sensitization about resource use. It can create consciousness towards ecological values and ethics. Through green audit one can get direction about how to improve the condition of environment.

1.1 Need of audit:

Green auditing is the process of identifying and determining whether institutions practices are eco-friendly and sustainable. Traditionally, we are good and efficient users of natural resources. But over the period of time excess use of resources like energy, water, chemicals are become habitual for everyone especially, in common areas. Now, it is necessary to check

whether our processes are consuming more than required resources? Whether we are handling waste carefully? Green audit regulates all such practices and gives an efficient way of natural resource utilization. In the era of climate change and resource depletion it is necessary to verify the processes and convert it in to green and clean one. Green audit provides an approach for it. It also increases overall consciousness among the people working in institution towards an environment.

1.2 **Goals of audit:**

Institute has conducted a audit with specific goals as:

1. Identification and documentation of green practices followed by college.
2. Identify strength and weakness in green practices.
3. Conduct a survey to know the ground reality about green practices.
4. Analyse and suggest solution for problems identified from survey.
5. Assess facility of different types of waste management.
6. Increase environmental awareness throughout campus.
7. Identify and assess environmental risk.
8. Motivates staff for optimized sustainable use of available resources.
9. The long term goal of the environmental audit program is to collect baseline data of environmental parameters and resolve environmental issue before they become problem.

1.3 **Objectives of Audit:**

1. To examine the current practices which can impact on environment such as of resource utilization, waste management etc.
2. To identify and analyse significant environmental issues.
3. Setup goal, vision and mission for Green practices in campus.
4. Establish and implement Environmental Management in various departments.
5. Continuous assessment for betterment in performance in green practices and its evaluation.
6. To prepare an Environmental Statement Report on green practices followed by different departments, support services and administration building.

1.4 **NAAC criteria VII Environmental Consciousness:**

Institutes are playing a key role in development of human resources worldwide. Higher education institutes campus run various activities with aim to percolate the knowledge along with practical dimension among the society. Likewise different technological problems higher education institutes also try to give solution for issues related to environment. Different types of evolutionary methods are used to assess the problem concerning environment. It includes Environmental Impact Assessment (EIA), Social Impact Assessment (SIA), Carbon Footprint Mapping, Green audit etc

National Assessment and Accreditation Council (NAAC) which is a self-governing organization that declares the institutions as Grade according to the scores assigned at the time of accreditation of the institution. The intention of green audit is to upgrade the environmental condition inside and around the institution. It is performed by considering environmental parameters like water and wastewater accounting, energy conservation, waste management, air, noise monitoring etc. for making the institution more eco-friendly.

Students are the major strength of any academic institution. Practicing green actions in any educational institution will inculcate the good habit of caring natural resources in students. Many environmental activities like plantation and nurturing saplings and trees, Cleanliness drives, Bird watching camps, No vehicle day, Rain water harvesting, etc. will make the students good citizen of the country. Through Green Audit, higher educational institutions can ensure that they contribute towards the reduction of Global warming through Carbon Footprint reduction measures.

1.5 **Benefits of Green Audit to an Educational Institute:**

There are many advantages of green audit to an Educational Institute:

1. It would help to protect the environment in and around the campus.
2. Recognize the cost saving methods through waste minimization and energy conservation.
3. Find out the prevailing and forthcoming complications
4. Empower the organization to frame a better environmental performance.
5. It portrays good image of institution through its clean and green campus.

2. Overview of Institute:

Padmabhooshan Vasantraodada Patil Institute of Technology was established in the year of 1983. Institute has huge area of 36.00 acres and has been serving the mankind in the field of Engineering and technology.

The landscaped grounds of college are widely admired for their beauty. The most valuable investment any educational institution can make is “Nurturing Future Leaders”. With the continuous rise in expectation of essential leadership standards, the institute has torch bearers have taken a responsibility for this investment to nurture the NextGen leaders with a vision to bridge the existing skill gap. With a firm step forward to attain an academic excellence, several Centres of Excellence, computer labs, and industry-academia associations has been setup at the College in association with the top leaders. The College believes that its primary stakeholders are the students. All aspects of education focus on the core values of contributing to national development while fostering global competencies among students. The College admits students from all social milieus and empowers them through intensive mentoring and counselling to face the challenges of life and become responsible and sensitized citizens of the country.

Vision:

To become a leading Institute in providing high quality technical & engineering education to the aspirants and serve the industry and society through excellent educational programmes, creativity and research.

Mission:

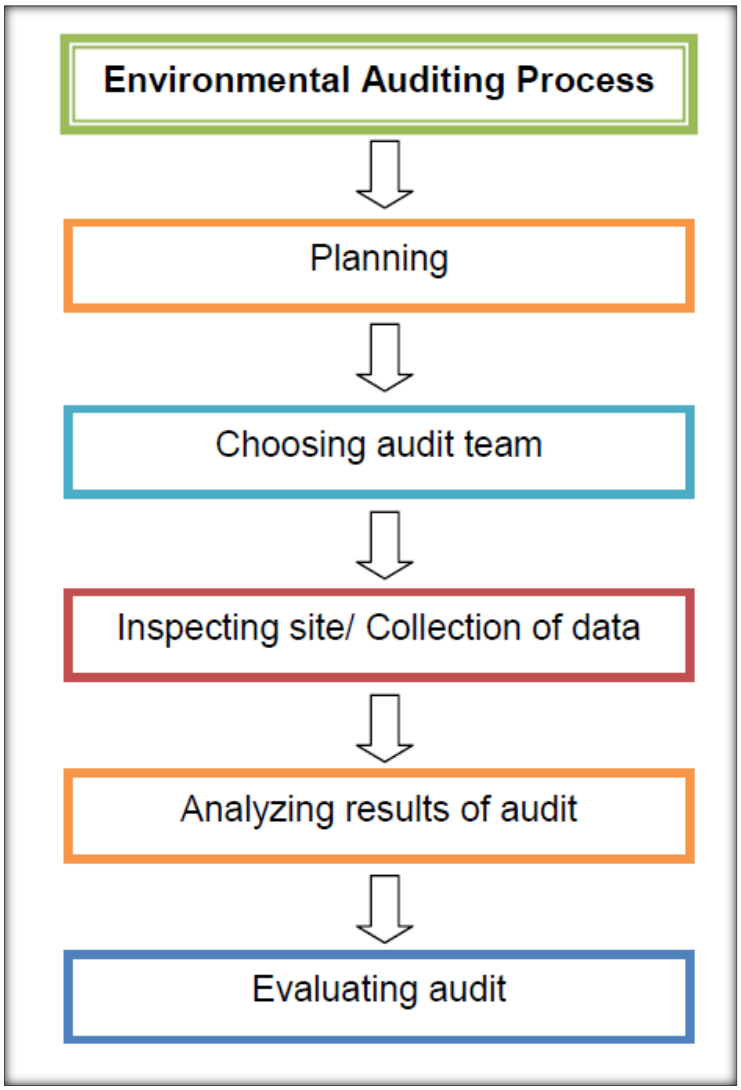
- To meet the short and long term engineering man power needs for Social, techno-economic development of region and nation, through teaching, research, consultancy and service.
- To contribute advancing of knowledge and wisdom in science and technology for the human welfare.
- To cultivate skills, lifestyle and habits of lifelong learning to adopt Knowledge based global civilization.
- To create highest standards of education with noble values of ethics, morality, integrity and humanity

Facilities at PVPIT:

- 36 acres of land with lush green landscape.
- Excellent Infrastructure facilities.
- Well-equipped laboratories.
- 140 core faculty with strong academic qualifications.
- Successful multidimensional development of students.
- Continuous Excellent academic performance.
- Well-furnished accommodation for boys and girls.
- Full Fledged modernized library of 57000 Books with Digital Library.
- BSNL 200 Mbps (1:1) 24 x 7 Leased line internet connection.
- 24 hour full power back up.
- Well-equipped Gymkhana and Outdoor as well as Indoor facilities.
- Scholarship Facility (SC,ST,OBC,SBC,VJNT,PTC,SST,NMS,etc.)
- Independent Training and Placement Cell.
- Personality Development Cell, Competitive exam guidance cell.
- Students Counselling Cell for overall Personality developments.
- Sound Industry – Institute Partnership.
- Special facilities for Co-curricular, Extracurricular activities.
- Free Medical facilities for Hostel students.
- Many students pursuing post-graduation in Abroad and India.
- Students ranked in Shivaji University Kolhapur.

- Open air Theatre of 2000 seating Capacity.
- Auditorium with 250 seating capacity.
- In House ATM Facility.

3. Methodology:



3.1 **Audits to be carried out:**

- Green and carbon footprint audit
- Energy audit
- Environmental audit
    - Water audit
    - Wastewater audit
    - Solid waste audit


GREEN AUDIT

4. Green and Carbon footprint audit:

Green Audit is the most efficient ecological tool to solve such environmental problems. It is a process of regular identification, quantification, documenting, reporting and monitoring of environmentally important components in a specified area. Through this process the regular environmental activities are monitored within and outside of the concerned sites which have direct and indirect impact on surroundings. Green audit can be one of the initiative for such institutes to account their energy, water resource use as well as wastewater, solid waste, E-waste, hazardous waste generation. Green Audit process can play an important role in promotion of environmental awareness and sensitization about resource use. It can create consciousness towards ecological values and ethics. Through green audit one can get direction about how to improve the condition of environment.

Carbon is the basis of life on mother Earth. It is incorporated into the plants through photosynthesis, consumed by animal species through the food, presents in the form of carbon dioxide (CO_2) the atmosphere, locked into the rocks as limestone and compressed into the different fossil fuels such as coal and oil. As CO_2 level in the atmosphere continue to increase, most climate designs or project that the oceans of the world and trees will keep soaking up more than half CO_2 . The plants on land and in the sea, taken up carbon by over many years increased the percentage discharged during decay, and this increased carbon became locked away as fossil fuels beneath the surface of the planet. The starting of the 21st century brought growing concern about global warming, climate change, food security, poverty and population growth. In the 21st century more carbon has been released into the atmosphere than that has been absorbed. CO_2 is a principle component causing global warming. Atmospheric carbon dioxide levels have increased to 40 % from preindustrial levels to more than 390 parts per million CO_2. On this background it is a need of time to cover the research areas interrelated with climate change.

4.1 **Green Cover:**

Padmabhooshan Vasantraodada Patil Institute of Technology has got a huge green cover and has almost 24 species of vegetation inside the campus. The institute has 6.0 acres of campus and most of this is covered by green area. They have huge plantations along with variation in species Greenery is maintained well by the institute. .

Figure 4-1 Padmabhooshan Vasantraodada Patil Institute of Technology Campus

Institute has taken huge efforts to develop its green cover. The institute has about 6.0 acres of green cover. In the vicinity of the institute there are about approximately 2180 fully grown trees and more than a 108 growing plants. The below table shows some of the common tree species found.

Species	Count	Species	Count
Pongame oil tree	58	Tamrind Tree	28
Mango tree	62	Blue berry(Jamun)	22
Coconut	12	Alma tree	3
Neem tree	77	Custered Apple	10
Banayan tree	22	Cherry	42
Bamboo tree	7	Ashok tree	28
Fig tree	15	Sandalwood Tree	13
Rubber tree	2	Rudrakshi Tree	3
Curry leaves tree	4	Champk Tree	14
Guava tree	34	Jack fruit Tree	6
Pongame oil tree	62	Tamrind Tree	27

Almond Tree	28	Cycas Tree	12
Glorious Tree	8	Teak tree	57

Mostly there are trees of Mango, cherry and neem etc. Due to this the institute has high carbon sequesterial values. Considering the vicinity some dry plants were observed to approximately about 3. Plants absorb sunlight, 50% is absorbed and 30% reflected so this helps to create a cooler and more pleasant climate through a 3°C temperature reduction in the vicinity. This has also leaded to increase in biodiversity as more than 16 species of birds were observed. Some off the common birds were viz. Sparrow, wild parrots, little stint, black kite etc.

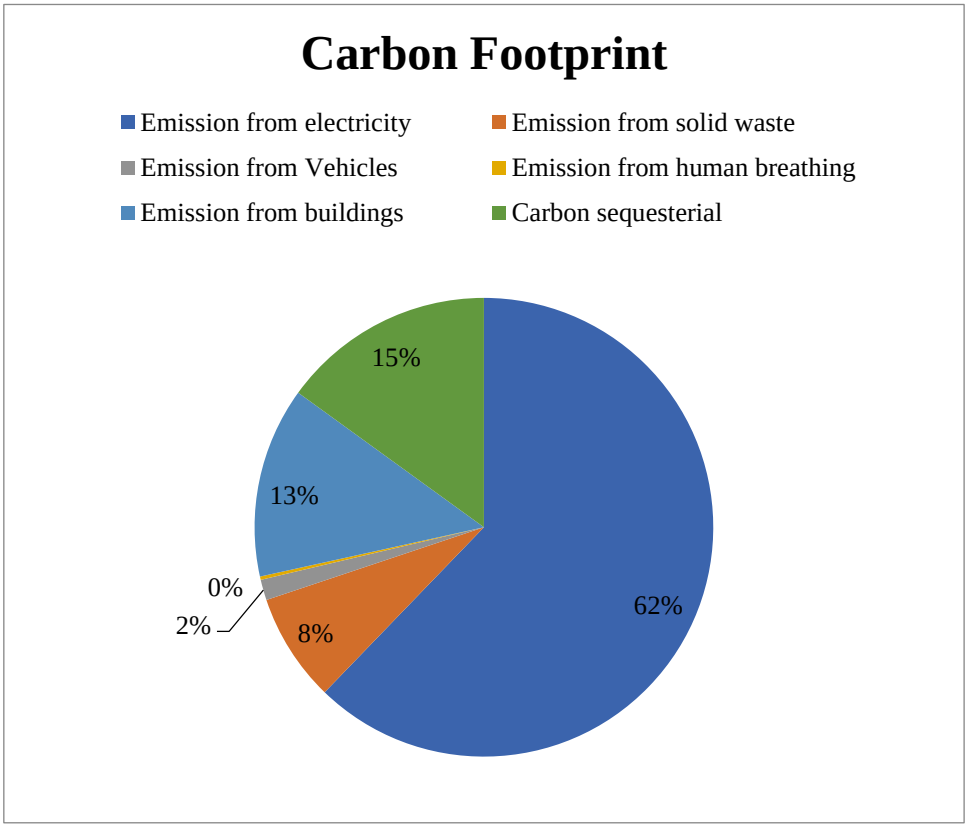
4.2 **Carbon Footprint Audit:**

Institute has estimated its carbon footprint by factor methodology. Various factors were used to estimate the carbon emissions from Consumption of electricity, generation of solid waste, use of vehicles in campus, carbon emissions due to human breathing and emissions from buildings. At last they have also calculated Carbon sequesterial value i.e. carbon that is absorbed by the plants.

Sr. No.	Section	Emission
1	Emission from electricity	6899.211 kg CO_2 eq.
2	Emission from solid waste	848.916 kg CO_2 eq.
3	Emission from Vehicles	161.982 Kg CO_2 eq.
4	Emission from human breathing	25.888 tons of CO_2 eq.
5	Emission from buildings	1489.400 kg CO_2 eq.
6	Carbon sequesterial	1666.000 kg CO_2 eq.

Hence as per the calculation the carbon emission for electricity is 6899.211 kg CO_2 eq. secondly considering emissions from human breathing; the institute has total 2430 students and staff. Considering all the staff viz. junior teachers, senior teachers, Non grant, grant CHB they are total of 130. The staff's works for about averagely 6 hours a day in the institute and the students are present for 5 hours averagely daily. Vehicles emit significant amount of gases in environment and the institute has various parking sections in the campus. It was found that averagely 545 vehicles entered the institute daily and travel about 200 m of distance from the gate. Cars also enter the institute and as per observation 42 cars are observed daily. Hence, Overall the institute emits 161.982 Kg CO_2 eq. Solid waste is very important as it emits significant amount of carbon through it. Institute has a good solid waste

management system. Hence the institute develops about 1488 kg of waste daily in both the form of wet and dry. Overall for a year the generation is about 848.916 kg CO_2 eq. Buildings play an important role in carbon contribution. During the construction operation and use phase they emit significant amount of carbon. Hence considering total built-up area the carbon emissions could be evaluated. After the estimation the total built-up area observed was approximately about 31916 sq. m. and the carbon emission were 1489.400 kg CO_2 eq. Carbon sequesterial in important as it is the carbon absorbed by the trees. The campus has 348 fully grown trees in the campus; hence the sequesterial value is about 1666 kg CO_2 eq.



4.3 **Conclusion:**

- Highest carbon emission was observed from human breathing i.e. 25.88 tons of CO_2 eq. There is no any significant mean to reduce this number as it is not controllable.
- The next is solid waste. The emission from solid waste comprises of 848.916 kg CO_2 eq. This can be significantly reduced by following simple means. Waste segregation is properly observed by the institute and they should follow the cut out plastic plans. There should be complete ban in using the plastic inside the campus. There should be minimization of food waste as it contributes highest in carbon emissions.

- Considering emission from electricity they can be significantly reduced by decrease in electricity use. This can be done by installing LED lights and using energy efficient equipment's such as machines with high star ratings which save more. Institute can recognize renewable energy sources and have a setup in the institute. This can lead in significant saving of electricity and reduction in carbon emissions.
- Vehicles have the least emissions in the institute and it is due to the easy approached parking so that vehicles do not roam in the vicinity. All the vehicles travel hardly 200 m in the campus and this has led to lower emissions. Still institute can follows "NO Vehicle Day" on every 2nd Saturday of each month.
- Institute reduces about 1666 kg of CO_2 per by the means of plants. This could be increased by increasing in plantations. Institute can plant more trees in open areas avaliable.
- The plants having highest Carbon sequestration values are suggested. Cinnamomum verum, Eugenia caryophyllid, Bumelia celestina, Acacia Berland Eri, Acacia Francescana, Chinaberry tree, Moringa oleífer, Carya illusoriness, Pinus Arizonian and Buddleia cordata are some of the suggested species for plantation.


ENVIRONMENT
AUDIT

5. Environmental Audit:

An environmental audit is a type of evaluation intended to identify environmental compliance and management system implementation gaps, along with related corrective actions. ISO 14001 is a voluntary international standard for environmental management systems ("EMS"). ISO 14001:2004 provides the requirements for an EMS and ISO 14004 gives general EMS guidelines. An EMS meeting the requirements of ISO 14001:2004 is a management tool enabling an organization of any size or type to:

- Identify and control the environmental impact of its activities, products or services;
- Improve its environmental performance continually, and
- Implement a systematic approach to setting environmental objectives and targets, to achieving these and to demonstrating that they have been achieved.

The audit examines the potential hazards or risks posed by the institutes. Areas examined may include environmental policies and procedures, energy use practices, recycling, waste, conservation, and pollution. Then, the institute can use the results to determine what changes need to be made for compliance. In a broad sense, environmental auditing aims to help protect the environment and minimize the risks of business activities to the environment and human safety and health.

5.1 **Water Audit and wastewater audit:**

Water auditing is a method of quantifying water flows and quality in systems, with a view to reducing water usage and often saving money on otherwise unnecessary water use. Water audit is an effective management tool for minimizing losses, optimizing various uses and thus enabling considerable conservation of water. Water audits trace water use from its point of entry into the facility/system to its discharge into the sewer/river/canal etc. Wastewater audit deals with effective management of wastewater in the system. It deals with proper generation, management, treatment, transfer and disposal of wastewater.

Padmabhooshan Vasantraodada Patil Institute of Technology has carried out its water and wastewater audit and has suggested many more ways for water conservation, reuse and recycle. The detail water and waste water report is mentioned below.

5.2 **Water Audit report:**

Water audit for the "Padmabhooshan Vasantraodada Patil Institute of Technology" was carried out. The purpose of the water audit is to provide a thorough understanding of the water uses by identifying and measuring all water using fixtures, appliances, and practices in order to recommend potential water saving efficiencies.

PRIMARY DATA

Sr. No.	Title	Information
1	**Name of Institute**	Padmabhooshan Vasantraodada Patil Institute of Technology
2	**Address**	Sangli
3	**Name of company under which water audit is carried out**	Environmental and Civil Engineering Solutions, Sangli
4	**Number of floors**	G + 3 (Variablle)
5	**Category of building**	Educational Institute
6	**Nearest ESR location**	Campus
7	**Water supply hours**	3 hrs. daily
8	**Water meter present**	No

POPULATION DETAILS

Title	Information
Fixed population (Working staff and Students)	Gents: 741
	Ladies: 1689
Variable population (Visiting persons)	Gents: 21
	Ladies: 20

SOURCE INFORMATION

Title	Information
Sources of water	Corporation water and bore-well
Connection details	1” PVC pipe inlet and 1” outlet distribution pipe

STORAGE DETAILS

Title	Information
Overhead tank type	PVC and RCC tank
Location	On terrace
Number of tanks	15 PVC Tanks 5000 Liters average
Motor connection details	10 Hp and 3 Hp X 4 for bore well
Pumping period	5 hours daily
Underground sump	Yes

WATER USAGE

Toilet	Number of users	Water consumption
Gents toilet	741 users	741 X 12 lit = 8892
Washbasin	2430 users	2430 X 0.75 lit = 1822
Ladies toilet	1689 users	1689 X 18 lit = 30402
Toilet cleaning	3500 liters	3500 liters
Floor cleaning	3000 liters	3000 liters
Gardening	1500 liters	1500 liters
Laboratories	5000 liters	5000 liters
Total		**54,116 lit**

5.3 **Waste water audit:**

Padmabhooshan Vasantraodada Patil Institute of Technology campus generates huge amount of wastewater. The source for wastewater in the campus is hostels, institute, mess and the washrooms and urinals inside the campus. To estimate the amount of wastewater generated all the water that is used in the washrooms, quarters and hostels is considered as wastewater.

Sr. No.	Section	Wastewater generated in litres
1	Water usage generated in campus	**54,116**
Waste water generated		**37881**

5.4 **RO plant at institute:**

Padmabhooshan Vasantraodada Patil Institute of Technology has dedicated RO water treatment plant installed in the campus. The details of the plant are:

- Daily input water = 6000 Litres/hrs
- Daily reject water = 2000 Litres/hrs

The table below shows the quality of RO water.

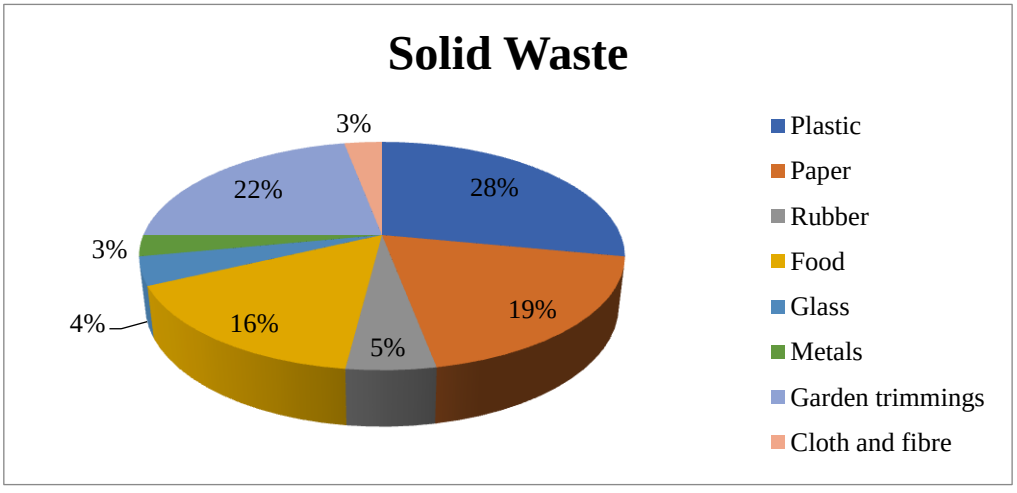
Sr. No.	Parameter	Reading
1	pH	7.21
2	TDS	89
3	Hardness	64
4	Chloride content	20
5	MPN	Absent

5.5 **Solid waste Audit:**

A waste audit is a physical analysis of waste composition to provide a detailed understanding of problems, identify potential opportunities, and give you a detailed analysis of your waste composition. A waste audit will help you clearly identify your waste generation to establish baseline or benchmark data, Characterize and quantify waste stream, Verify waste pathways, identify waste diversion opportunities and identify source reduction opportunities.

Solid waste is the unwanted or useless solid material generated from the human activities in residential, industrial or commercial area. Solid waste management reduce or eliminates the adverse impact on the environment and human health. Solid waste audit for Padmabhooshan Vasantraodada Patil Institute of Technology was carried out. The entire premise was analysed for solid waste generation and waste characterization. Overall waste was observed and characterization was done. The below table shows the components of solid waste at institute campus. Quartering method was used and 1 Kg of waste was selected.

Sr. No.	Type of waste	Composition %
1	Plastic	28
2	Paper	19
3	Rubber	5
4	Food	16
5	Glass	4
6	Metals	3
7	Garden trimmings	22
8	Cloth and fibre	3



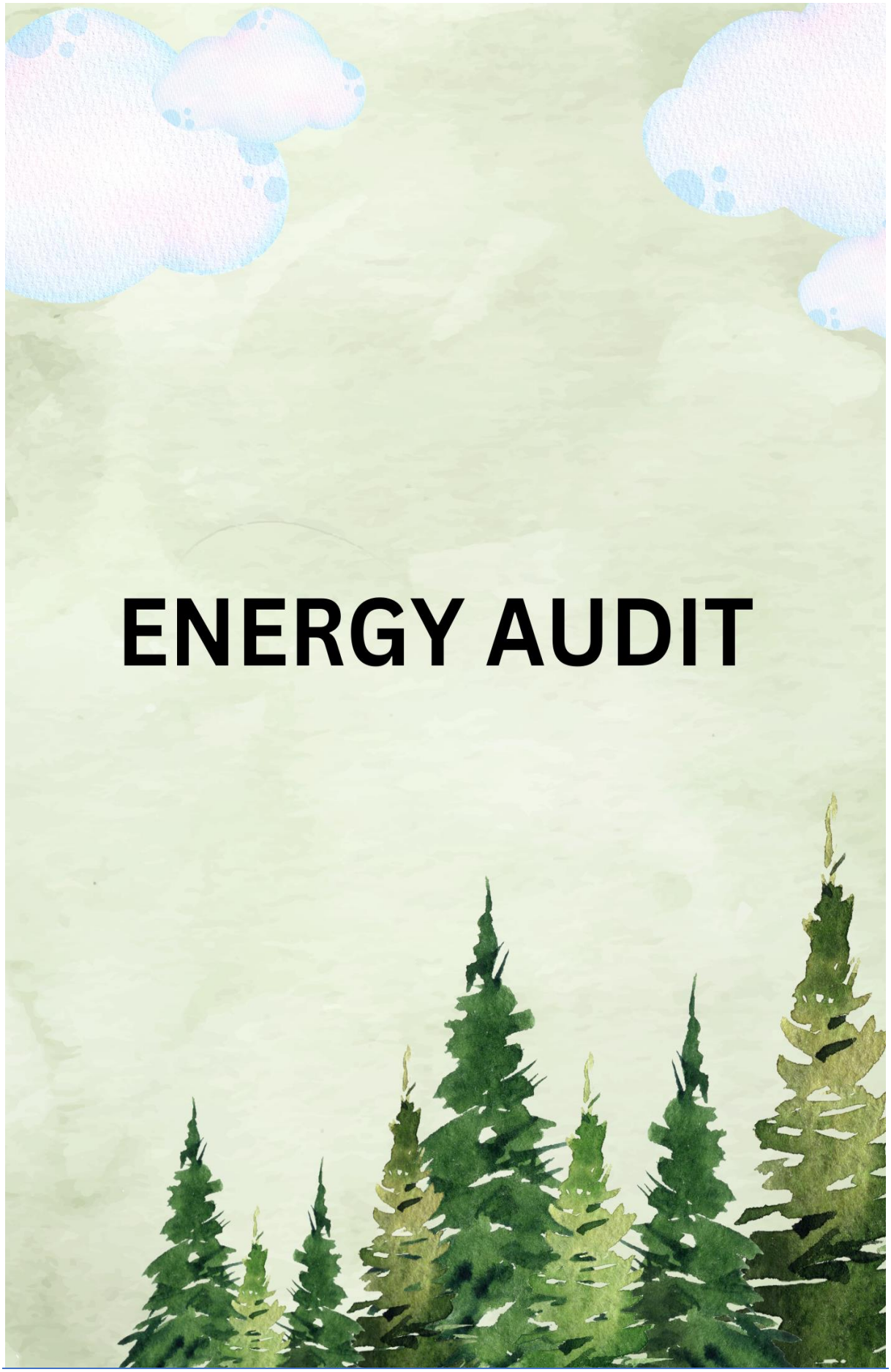
After analysing all the bins it was observed that plastic had highest contribution viz. 28% followed by the paper waste i.e. 19%. Mostly common observed plastic items were plastic wrappers of chips, soft drinks bottles and chocolate wrappers. The paper waste included paper wrappers, notebook pages, pamphlets and some pieces of cardboard. The third highest waste included garden trimmings. It included small grass, minute branches etc. The least contribution was of cloth, fibre, glass and metals.

5.6 **Observations and Conclusion:**

- There are separate bins for wet waste and dry waste. Hence, source segregation takes place.
- Institute has taken steps towards paper recycling. The paper waste collected from the bins is send to vendors.
- Plastic ban in campus is implemented but due to lack of seriousness in the students plastic is used in campus. Institute should conduct plastic awareness seminars for both the staff and students.

Assessment of soil was done to determine the quality of soil:

Sr. No.	Test	Results
1	pH	**6.1**
2	NPK	**2:3:1**
3	Acidity	**138 mg/lit**
4	Hardness	**159 mg/lit**


ENERGY AUDIT

6. Energy Audit:

An energy audit is an inspection survey and an analysis of energy flows for energy conservation in a building. It may include a process or system to reduce the amount of energy input into the system without negatively affecting the output. In commercial and industrial real estate, an energy audit is the first step in identifying opportunities to reduce energy expense and carbon footprint.

A nation is tiring to advance in quantity and quality to the spread of education among the common India and development of their intelligence. In India the entire field of education and other fields of intelligent activities had been monopolized by a handful of men before independence. But today we are marching towards the desirable status of a developed nation with fast strides. But the development should be a sustained one. For achieving such an interminable development energy management is essential. As far as concerning electricity crisis, we are facing lack of electricity during office work. So, institutional management is taking design regarding production of electricity and saving electricity for Eco social aspect. Energy requirement of India is growing and incomplete domestic fossil fuel treasury. The country has motivated strategy to enlarge its renewable energy resources and policy to establish the nuclear power plants. India increases the involvement of nuclear power to largely electrical energy development facility from 4.2% to 9%. India's industrial demand accounted for 35% of electrical power requirement, domestic household use accounted for 28%, agriculture 21%, commercial 9%, and public lighting and other miscellaneous applications accounted for the rest. Energy conservation means reduction in energy consumption without making any sacrifice of quantity or quality. A successful energy management program begins with energy conservation; it will lead to adequate rating of equipment's, using high efficiency equipment and change of habits which causes enormous wastages of energy. By observing all these study lack of electricity and huge electricity demands. It is necessary to plan to be self-sufficient in electricity requirement.

6.1 **Connection details:**

Institute receives electricity from State Electricity Distribution. Following are the details about connection.

- **Type of connection:** HT
- **Tariff:** HT (C) (II)

- **Contract demand:** 100 KVA
- **Feeder voltage:** 11 KV

Tariff Structure:

As per Distribution Company, HT and LT consumers have an option to take Time of Day (TOD) tariff instead of the normal tariff. Under TOD tariff electricity consumption and maximum demand in respect of HT consumers for different periods of the day i.e. normal period, peak load period and off-peak load period could be recorded by installing TOD meter. The maximum demand and consumption recorded in different periods could be billed on the following rates of the tariff applicable.

TOD Tariffs	Rate % (Rs./Unit)
0000 Hrs- 0600 Hrs & 2200 Hrs- 2400 Hrs	-1.500
0600 Hrs- 0900 Hrs & 1200 Hrs- 1800 Hrs	0.000
0900 Hrs- 1200 Hrs	0.800
1800 Hrs- 2200 Hrs	1.100

Power Factor:

Power Factor (PF) is an indicator of efficient utilization of power. In an AC (Alternating Current) electrical power system, PF is defined as the ratio of real power flowing to the load, to the apparent power in the circuit and is a dimensionless number.

6.2 **Bill analysis:**

Bill analysis for Padmabhooshan Vasantraodada Patil Institute of Technology had been done for academic year 2022-2023.

Sr. No.	Month	Power factor	Bill Amount
1	**June 22**	1.0	4,62,980
2	**July 22**	1.0	3,89,630
3	**August 22**	1.0	2,92,220
4	**September 22**	1.0	3,43,220
5	**October 22**	1.0	3,71,410
6	**November 22**	1.0	3,88,300
7	**December 22**	1.0	4,13,020
8	**January 23**	1.0	3,44,280
9	**February 23**	1.0	3,73,000
10	**March 23**	1.0	4,42,390
11	**April 23**	1.0	4,24,890
12	**May 23**	1.0	4,81,610

6.3 **ILER analysis:**

Lighting is provided in industries, commercial buildings, indoor and outdoor for providing comfortable working environment. The primary objective is to provide the required lighting effect for the lowest installed load i.e. highest lighting at lowest power consumption. The purpose of performance test is to calculate the installed efficacy in terms of lux/watt/m² (existing or design) for general lighting installation. The calculated value can be compared with the norms for specific types of interior installations for assessing improvement options.

Range	Condition
0.5 or less	Urgent activity required (UAR)
0.51 - 0.70	Review Suggested (RS)
0.70- above	Good

ILER analysis for various sections in the institute was carried out. Firstly using LUX meter illumination was measured and then numerical analysis was carried out. ILER gives idea about lighting conditions and measured regarding improving them.

Sr. No.	Section	LUX reading	ILER	Condition
1	Library	160	0.80	Good
2	Study room	128	0.77	Good
3	Classroom S1	130	0.76	Good
4	Classrooms S2	112	0.88	Good
5	Laboratories	148	0.85	Good
6	Office	146	0.79	Good

Reasons for Good ILER:

- Proper placement of windows and doors so that natural light is available well.
- Good ventilation system.

Fitting Details:

LED: 588

Fans: 1986

PC: 930

Printers: 368

Tube lights: 1982

AC: 06

Water cooler: 16

CCTV: 40

6.1 **Sustainable practices:**

Solar Energy

Rain water harvesting

Waste Disposal Pit

Solid waste Dump pit

PADMABHOOSHAN VASANTRAODADA PATIL INSTITUTE OF TECHNOLOGY, SANGLI (BUDHGAON)

AUDIT REPORT

2021-2022

ENVIRONMENTAL & CIVIL ENGINEERING SOLUTIONS
ISO 9001: 2015, IEC 17025: 2017

Editorial

In the Era of global warming and climate change every citizen has to reduce their own carbon foot prints to tackle with the adverse impacts of climate change. A green audit of any academic institution revels ways in which we can reduce energy consumption, water use and reduction in emission of carbon dioxide in the environment. It is a process to look into and ask ourselves whether we are also contributing to the degradation of the environment and if so, in what manner and how we can minimize this contribution and bring down to zero and preserve our environment for future generation.

Padmabhooshan Vasantraodada Patil Institute of Technology administration has already taken a step towards the green approach and conducted green audit of campus in the year 2021-2022. As an outcome of this institute has taken green steps to reduce its carbon foot prints by several means in campus viz. sustainable fittings, tree plantation and green computing in the administration and examination. The responsibility of carrying out the scientific green audit was given to Environmental and Civil Engineering Solutions. The organization has followed the rules and regulation of Ministry of Environment and Forest, Govt. of India and Central Pollution Control Board, New Delhi.

A questionnaire was prepared based on the guidelines and format of CPCB, New Delhi to conduct green audit. The information related to consumption of resources like water, electricity and handling of solid and hazardous waste was collected in the formats from main building support services and departments. The data collected was grouped and was tabulated in Excel sheets and analysed. The graphs of the analysed data were prepared for getting quick idea of the status. Interpretation of the overall outcomes was made which incorporates primary and secondary data, references and interrelations within. Final report preparation was carried out using this interpretation to prepare environment management plan of institute for next two years.

During the preparation of the Audit Report Audit Report Hon. Principal and Vice principal, Dean IQAC encouraged us with their full support. IQAC and other officers of the institute also gave support to carry out this work. We also thank all Heads of the departments and the Co-ordinators gave full co-operation.

Nikhil N. Kamble
(C.E.O and Head)

Environmental and Civil Engineering Solutions

Acknowledgement

We express our gratitude for calling upon us for this audit, mainly the Principal and all other staff members, who were ever helpful and supported us with all the inputs needed for this audit. We thank all the teaching, non-teaching and students for helping us in conducting this audit.

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(Committee Member)

1. Introduction:

The modernization and industrialization are the two important outputs of twentieth century which have made human life more luxurious and comfortable. Simultaneously, they are responsible for voracious use of natural resources, exploitation of forests and wildlife, producing massive solid waste, polluting the scarce and sacred water resources and finally making our mother Earth ugly and inhospitable. Today, people are getting more familiar to the global issues like global warming, greenhouse effect, ozone depletion and climate change etc. Now, it is considered as a final call by mother Earth to walk on the path of sustainable development. The time has come to wake up, unite and combat together for sustainable environment.

Considering the present environmental problems of pollution and excess use of natural resources, Hon. Prime Minister, Shri. Narendra Modiji has declared the Mission of Swachch Bharat Abhiyan. Also, University Grants Commission has mentioned “Green Campus, Clean Campus” mission mandatory for all higher educational institutes. As environmental sustainability is becoming an increasingly important issue for the nation, the role of higher educational institutions in relation to environmental sustainability is more prevalent.

Green Audit is the most efficient ecological tool to solve such environmental problems. It is a process of regular identification, quantification, documenting, reporting and monitoring of environmentally important components in a specified area. Through this process the regular environmental activities are monitored within and outside of the concerned sites which have direct and indirect impact on surroundings. Green audit can be one of the initiative for such institutes to account their energy, water resource use as well as wastewater, solid waste, E-waste, hazardous waste generation. Green Audit process can play an important role in promotion of environmental awareness and sensitization about resource use. It can create consciousness towards ecological values and ethics. Through green audit one can get direction about how to improve the condition of environment.

1.1 Need of audit:

Green auditing is the process of identifying and determining whether institutions practices are eco-friendly and sustainable. Traditionally, we are good and efficient users of natural resources. But over the period of time excess use of resources like energy, water, chemicals are become habitual for everyone especially, in common areas. Now, it is necessary to check

whether our processes are consuming more than required resources? Whether we are handling waste carefully? Green audit regulates all such practices and gives an efficient way of natural resource utilization. In the era of climate change and resource depletion it is necessary to verify the processes and convert it in to green and clean one. Green audit provides an approach for it. It also increases overall consciousness among the people working in institution towards an environment.

1.2 **Goals of audit:**

Institute has conducted a audit with specific goals as:

1. Identification and documentation of green practices followed by college.
2. Identify strength and weakness in green practices.
3. Conduct a survey to know the ground reality about green practices.
4. Analyse and suggest solution for problems identified from survey.
5. Assess facility of different types of waste management.
6. Increase environmental awareness throughout campus.
7. Identify and assess environmental risk.
8. Motivates staff for optimized sustainable use of available resources.
9. The long term goal of the environmental audit program is to collect baseline data of environmental parameters and resolve environmental issue before they become problem.

1.3 **Objectives of Audit:**

1. To examine the current practices which can impact on environment such as of resource utilization, waste management etc.
2. To identify and analyse significant environmental issues.
3. Setup goal, vision and mission for Green practices in campus.
4. Establish and implement Environmental Management in various departments.
5. Continuous assessment for betterment in performance in green practices and its evaluation.
6. To prepare an Environmental Statement Report on green practices followed by different departments, support services and administration building.

1.4 **NAAC criteria VII Environmental Consciousness:**

Institutes are playing a key role in development of human resources worldwide. Higher education institutes campus run various activities with aim to percolate the knowledge along with practical dimension among the society. Likewise different technological problems higher education institutes also try to give solution for issues related to environment. Different types of evolutionary methods are used to assess the problem concerning environment. It includes Environmental Impact Assessment (EIA), Social Impact Assessment (SIA), Carbon Footprint Mapping, Green audit etc

National Assessment and Accreditation Council (NAAC) which is a self-governing organization that declares the institutions as Grade according to the scores assigned at the time of accreditation of the institution. The intention of green audit is to upgrade the environmental condition inside and around the institution. It is performed by considering environmental parameters like water and wastewater accounting, energy conservation, waste management, air, noise monitoring etc. for making the institution more eco-friendly.

Students are the major strength of any academic institution. Practicing green actions in any educational institution will inculcate the good habit of caring natural resources in students. Many environmental activities like plantation and nurturing saplings and trees, Cleanliness drives, Bird watching camps, No vehicle day, Rain water harvesting, etc. will make the students good citizen of the country. Through Green Audit, higher educational institutions can ensure that they contribute towards the reduction of Global warming through Carbon Footprint reduction measures.

1.5 **Benefits of Green Audit to an Educational Institute:**

There are many advantages of green audit to an Educational Institute:

1. It would help to protect the environment in and around the campus.
2. Recognize the cost saving methods through waste minimization and energy conservation.
3. Find out the prevailing and forthcoming complications
4. Empower the organization to frame a better environmental performance.
5. It portrays good image of institution through its clean and green campus.

2. Overview of Institute:

Padmabhooshan Vasantraodada Patil Institute of Technology was established in the year of 1983. Institute has huge area of 36.00 acres and has been serving the mankind in the field of Engineering and technology.

The landscaped grounds of college are widely admired for their beauty. The most valuable investment any educational institution can make is “Nurturing Future Leaders”. With the continuous rise in expectation of essential leadership standards, the institute has torch bearers have taken a responsibility for this investment to nurture the NextGen leaders with a vision to bridge the existing skill gap. With a firm step forward to attain an academic excellence, several Centres of Excellence, computer labs, and industry-academia associations has been setup at the College in association with the top leaders. The College believes that its primary stakeholders are the students. All aspects of education focus on the core values of contributing to national development while fostering global competencies among students. The College admits students from all social milieus and empowers them through intensive mentoring and counselling to face the challenges of life and become responsible and sensitized citizens of the country.

Vision:

To become a leading Institute in providing high quality technical & engineering education to the aspirants and serve the industry and society through excellent educational programmes, creativity and research.

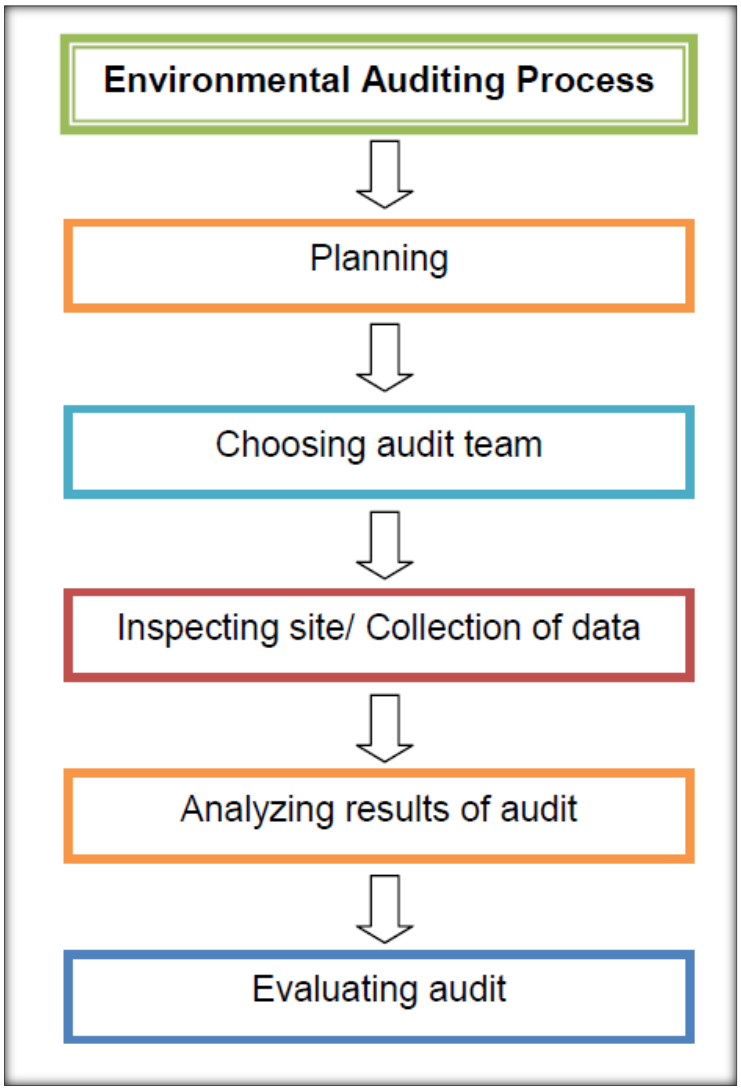
Mission:

- To meet the short and long term engineering man power needs for Social, techno-economic development of region and nation, through teaching, research, consultancy and service.
- To contribute advancing of knowledge and wisdom in science and technology for the human welfare.
- To cultivate skills, lifestyle and habits of lifelong learning to adopt Knowledge based global civilization.
- To create highest standards of education with noble values of ethics, morality, integrity and humanity

Facilities at PVPIT:

- 36 acres of land with lush green landscape.
- Excellent Infrastructure facilities.
- Well-equipped laboratories.
- 140 core faculty with strong academic qualifications.
- Successful multidimensional development of students.
- Continuous Excellent academic performance.
- Well-furnished accommodation for boys and girls.
- Full Fledged modernized library of 57000 Books with Digital Library.
- BSNL 200 Mbps (1:1) 24 x 7 Leased line internet connection.
- 24 hour full power back up.
- Well-equipped Gymkhana and Outdoor as well as Indoor facilities.
- Scholarship Facility (SC,ST,OBC,SBC,VJNT,PTC,SST,NMS,etc.)
- Independent Training and Placement Cell.
- Personality Development Cell, Competitive exam guidance cell.
- Students Counselling Cell for overall Personality developments.

3. Methodology:



3.1 **Audits to be carried out:**

- Green and carbon footprint audit
- Energy audit
- Environmental audit
    - Water audit
    - Wastewater audit
    - Solid waste audit


GREEN AUDIT

4. Green and Carbon footprint audit:

Green Audit is the most efficient ecological tool to solve such environmental problems. It is a process of regular identification, quantification, documenting, reporting and monitoring of environmentally important components in a specified area. Through this process the regular environmental activities are monitored within and outside of the concerned sites which have direct and indirect impact on surroundings. Green audit can be one of the initiative for such institutes to account their energy, water resource use as well as wastewater, solid waste, E-waste, hazardous waste generation. Green Audit process can play an important role in promotion of environmental awareness and sensitization about resource use. It can create consciousness towards ecological values and ethics. Through green audit one can get direction about how to improve the condition of environment.

Carbon is the basis of life on mother Earth. It is incorporated into the plants through photosynthesis, consumed by animal species through the food, presents in the form of carbon dioxide (CO_2) the atmosphere, locked into the rocks as limestone and compressed into the different fossil fuels such as coal and oil. As CO_2 level in the atmosphere continue to increase, most climate designs or project that the oceans of the world and trees will keep soaking up more than half CO_2 . The plants on land and in the sea, taken up carbon by over many years increased the percentage discharged during decay, and this increased carbon became locked away as fossil fuels beneath the surface of the planet. The starting of the 21st century brought growing concern about global warming, climate change, food security, poverty and population growth. In the 21st century more carbon has been released into the atmosphere than that has been absorbed. CO_2 is a principle component causing global warming. Atmospheric carbon dioxide levels have increased to 40 % from preindustrial levels to more than 390 parts per million CO_2. On this background it is a need of time to cover the research areas interrelated with climate change.

4.1 **Green Cover:**

Padmabhooshan Vasantraodada Patil Institute of Technology has got a huge green cover and has almost 22 species of vegetation inside the campus. The institute has 5.82 acres of campus and most of this is covered by green area. They have huge plantations along with variation in species Greenery is maintained well by the institute. .

Figure 4-1 Padmabhooshan Vasantraodada Patil Institute of Technology Campus

Institute has taken huge efforts to develop its green cover. The institute has about 6.0 acres of green cover. In the vicinity of the institute there are about approximately 2180 fully grown trees and more than a 108 growing plants. The below table shows some of the common tree species found.

Species	Count	Species	Count
Pongame oil tree	59	Tamrind Tree	21
Mango tree	71	Blue berry(Jamun)	20
Coconut	16	Alma tree	3
Neem tree	77	Custered Apple	8
Banayan tree	22	Cherry	28
Bamboo tree	8	Ashok tree	29
Fig tree	8	Sandalwood Tree	12
Rubber tree	2	Rudrakshi Tree	3
Curry leaves tree	4	Champk Tree	15
Guava tree	21	Jack fruit Tree	6
Pongame oil tree	60	Tamrind Tree	25

Mostly there are trees of Mango, cherry and neem etc. Due to this the institute has high carbon sequesterial values. Considering the vicinity some dry plants were observed to approximately about 17. Plants absorb sunlight, 50% is absorbed and 30% reflected so this helps to create a cooler and more pleasant climate through a 3°C temperature reduction in the vicinity. This has also leaded to increase in biodiversity as more than 14 species of birds were observed. Some off the common birds were viz. Sparrow, wild parrots, little stint, black kite etc.

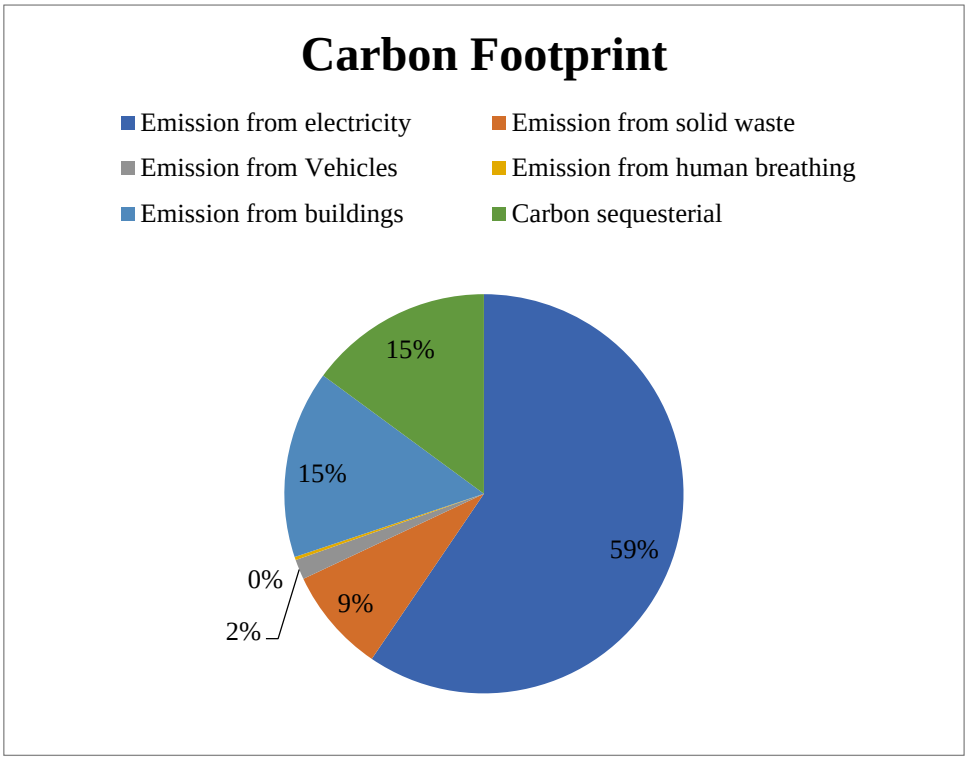
4.2 **Carbon Footprint Audit:**

Institute has estimated its carbon footprint by factor methodology. Various factors were used to estimate the carbon emissions from Consumption of electricity, generation of solid waste, use of vehicles in campus, carbon emissions due to human breathing and emissions from buildings. At last they have also calculated Carbon sequesterial value i.e. carbon that is absorbed by the plants.

Sr. No.	Section	Emission
1	Emission from electricity	5819.000 kg CO_2 eq.
2	Emission from solid waste	831.299 kg CO_2 eq.
3	Emission from Vehicles	158.296 Kg CO_2 eq.
4	Emission from human breathing	24.988 tons of CO_2 eq.
5	Emission from buildings	1489.400 kg CO_2 eq.
6	Carbon sequesterial	1458.000 kg CO_2 eq.

Hence as per the calculation the carbon emission for electricity is 5819.000 kg CO_2 eq. secondly considering emissions from human breathing; the institute has total 2422 students and staff. Considering all the staff viz. junior teachers, senior teachers, Non grant, grant CHB they are total of 128. The staff's works for about averagely 6 hours a day in the institute and the students are present for 5 hours averagely daily. Vehicles emit significant amount of gases in environment and the institute has various parking sections in the campus. It was found that averagely 520 vehicles entered the institute daily and travel about 200 m of distance from the gate. Cars also enter the institute and as per observation 38 cars are observed daily. Hence, Overall the institute emits 158.296 Kg CO_2 eq. Solid waste is very important as it emits significant amount of carbon through it. Institute has a good solid waste management system. Hence the institute develops about 1320 kg of waste daily in both the form of wet and dry. Overall for a year the generation is about 831.299 kg CO_2 eq. Buildings

play an important role in carbon contribution. During the construction operation and use phase they emit significant amount of carbon. Hence considering total built-up area the carbon emissions could be evaluated. After the estimation the total built-up area observed was approximately about 31916 sq. m. and the carbon emission were 1489.400 kg CO_2 eq. Carbon sequesterial in important as it is the carbon absorbed by the trees. The campus has 348 fully grown trees in the campus; hence the sequesterial value is about 1548 kg CO_2 eq.



4.3 **Conclusion:**

- Highest carbon emission was observed from human breathing i.e. 24.98 tons of CO_2 eq. There is no any significant mean to reduce this number as it is not controllable.
- The next is solid waste. The emission from solid waste comprises of 831.299 kg CO_2 eq. This can be significantly reduced by following simple means. Waste segregation is properly observed by the institute and they should follow the cut out plastic plans. There should be complete ban in using the plastic inside the campus. There should be minimization of food waste as it contributes highest in carbon emissions.
- Considering emission from electricity they can be significantly reduced by decrease in electricity use. This can be done by installing LED lights and using energy efficient equipment's such as machines with high star ratings which save more. Institute can

recognize renewable energy sources and have a setup in the institute. This can lead in significant saving of electricity and reduction in carbon emissions.

- Vehicles have the least emissions in the institute and it is due to the easy approached parking so that vehicles do not roam in the vicinity. All the vehicles travel hardly 200 m in the campus and this has led to lower emissions. Still institute can follows “NO Vehicle Day” on every 2nd Saturday of each month.
- Institute reduces about 1458 kg of CO_2 per by the means of plants. This could be increased by increasing in plantations. Institute can plant more trees in open areas avaliable.
- The plants having highest Carbon sequestration values are suggested. Cinnamomum verum, Eugenia caryophyllid, Bumelia celestina, Acacia Berland Eri, Acacia Francescana, Chinaberry tree and Buddleia cordata are some of the suggested species for plantation.


ENVIRONMENT
AUDIT

5. Environmental Audit:

An environmental audit is a type of evaluation intended to identify environmental compliance and management system implementation gaps, along with related corrective actions. ISO 14001 is a voluntary international standard for environmental management systems ("EMS"). ISO 14001:2004 provides the requirements for an EMS and ISO 14004 gives general EMS guidelines. An EMS meeting the requirements of ISO 14001:2004 is a management tool enabling an organization of any size or type to:

- Identify and control the environmental impact of its activities, products or services;
- Improve its environmental performance continually, and
- Implement a systematic approach to setting environmental objectives and targets, to achieving these and to demonstrating that they have been achieved.

The audit examines the potential hazards or risks posed by the institutes. Areas examined may include environmental policies and procedures, energy use practices, recycling, waste, conservation, and pollution. Then, the institute can use the results to determine what changes need to be made for compliance. In a broad sense, environmental auditing aims to help protect the environment and minimize the risks of business activities to the environment and human safety and health.

5.1 **Water Audit and wastewater audit:**

Water auditing is a method of quantifying water flows and quality in systems, with a view to reducing water usage and often saving money on otherwise unnecessary water use. Water audit is an effective management tool for minimizing losses, optimizing various uses and thus enabling considerable conservation of water. Water audits trace water use from its point of entry into the facility/system to its discharge into the sewer/river/canal etc. Wastewater audit deals with effective management of wastewater in the system. It deals with proper generation, management, treatment, transfer and disposal of wastewater.

Padmabhooshan Vasantraodada Patil Institute of Technology has carried out its water and wastewater audit and has suggested many more ways for water conservation, reuse and recycle. The detail water and waste water report is mentioned below.

5.2 **Water Audit report:**

Water audit for the "Padmabhooshan Vasantraodada Patil Institute of Technology" was carried out. The purpose of the water audit is to provide a thorough understanding of the water uses by identifying and measuring all water using fixtures, appliances, and practices in order to recommend potential water saving efficiencies.

PRIMARY DATA

Sr. No.	Title	Information
1	**Name of Institute**	Padmabhooshan Vasantraodada Patil Institute of Technology
2	**Address**	Sangli
3	**Name of company under which water audit is carried out**	Environmental and Civil Engineering Solutions, Sangli
4	**Number of floors**	G + 3 (Variablle)
5	**Category of building**	Educational Institute
6	**Nearest ESR location**	Campus
7	**Water supply hours**	3 hrs. daily
8	**Water meter present**	No

POPULATION DETAILS

Title	Information
Fixed population (Working staff and Students)	Gents: 737
	Ladies: 1688
Variable population (Visiting persons)	Gents: 18
	Ladies: 9

SOURCE INFORMATION

Title	Information
Sources of water	Corporation water and bore-well
Connection details	1” PVC pipe inlet and 1” outlet distribution pipe

STORAGE DETAILS

Title	Information
Overhead tank type	PVC and RCC tank
Location	On terrace
Number of tanks	15 PVC Tanks 5000 Liters average
Motor connection details	10 Hp and 3 Hp X 4 for bore well
Pumping period	5 hours daily
Underground sump	Yes

WATER USAGE

Toilet	Number of users	Water consumption
Gents toilet	737 users	737 X 12 lit = 8844
Washbasin	2425 users	2425 X 0.75 lit = 1818
Ladies toilet	1688 users	1688 X 18 lit = 30384
Toilet cleaning	3000 liters	3000 liters
Floor cleaning	2500 liters	2500 liters
Gardening	1500 liters	1500 liters
Laboratories	5000 liters	5000 liters
Total		**53,046 lit**

5.3 **Waste water audit:**

Padmabhooshan Vasantraodada Patil Institute of Technology campus generates huge amount of wastewater. The source for wastewater in the campus is hostels, institute, mess and the washrooms and urinals inside the campus. To estimate the amount of wastewater generated all the water that is used in the washrooms, quarters and hostels is considered as wastewater.

Sr. No.	Section	Wastewater generated in litres
1	Water usage generated in campus	**53,046**
Waste water generated		**37,132**

5.4 **RO plant at institute:**

Padmabhooshan Vasantraodada Patil Institute of Technology has dedicated RO water treatment plant installed in the campus. The details of the plant are:

- Daily input water = 6000 Litres/hrs
- Daily reject water = 2000 Litres/hrs

The table below shows the quality of RO water.

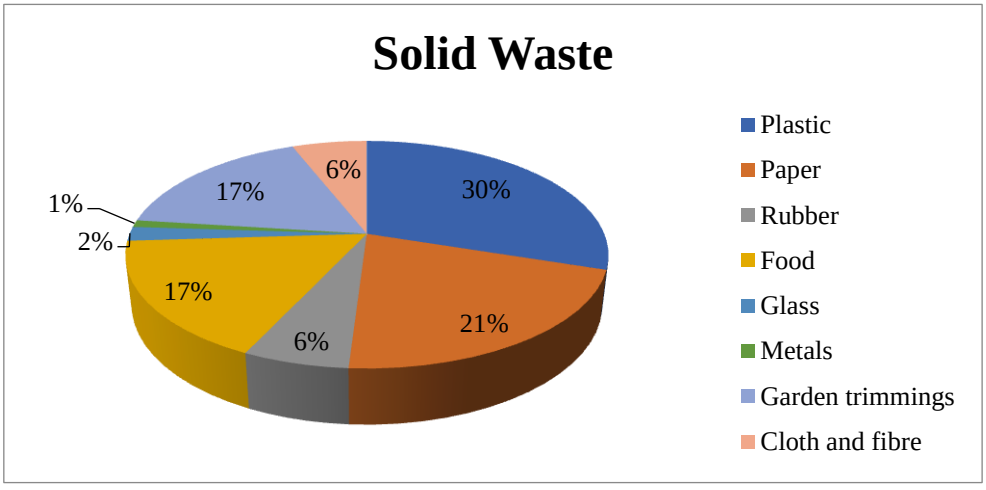
Sr. No.	Parameter	Reading
1	pH	6.88
2	TDS	101
3	Hardness	29
4	Chloride content	19
5	MPN	Absent

5.5 **Solid waste Audit:**

A waste audit is a physical analysis of waste composition to provide a detailed understanding of problems, identify potential opportunities, and give you a detailed analysis of your waste composition. A waste audit will help you clearly identify your waste generation to establish baseline or benchmark data, Characterize and quantify waste stream, Verify waste pathways, identify waste diversion opportunities and identify source reduction opportunities.

Solid waste is the unwanted or useless solid material generated from the human activities in residential, industrial or commercial area. Solid waste management reduce or eliminates the adverse impact on the environment and human health. Solid waste audit for Padmabhooshan Vasantraodada Patil Institute of Technology was carried out. The entire premise was analysed for solid waste generation and waste characterization. Overall waste was observed and characterization was done. The below table shows the components of solid waste at institute campus. Quartering method was used and 1 Kg of waste was selected.

Sr. No.	Type of waste	Composition %
1	Plastic	30
2	Paper	21
3	Rubber	6
4	Food	17
5	Glass	2
6	Metals	1
7	Garden trimmings	17
8	Cloth and fibre	6



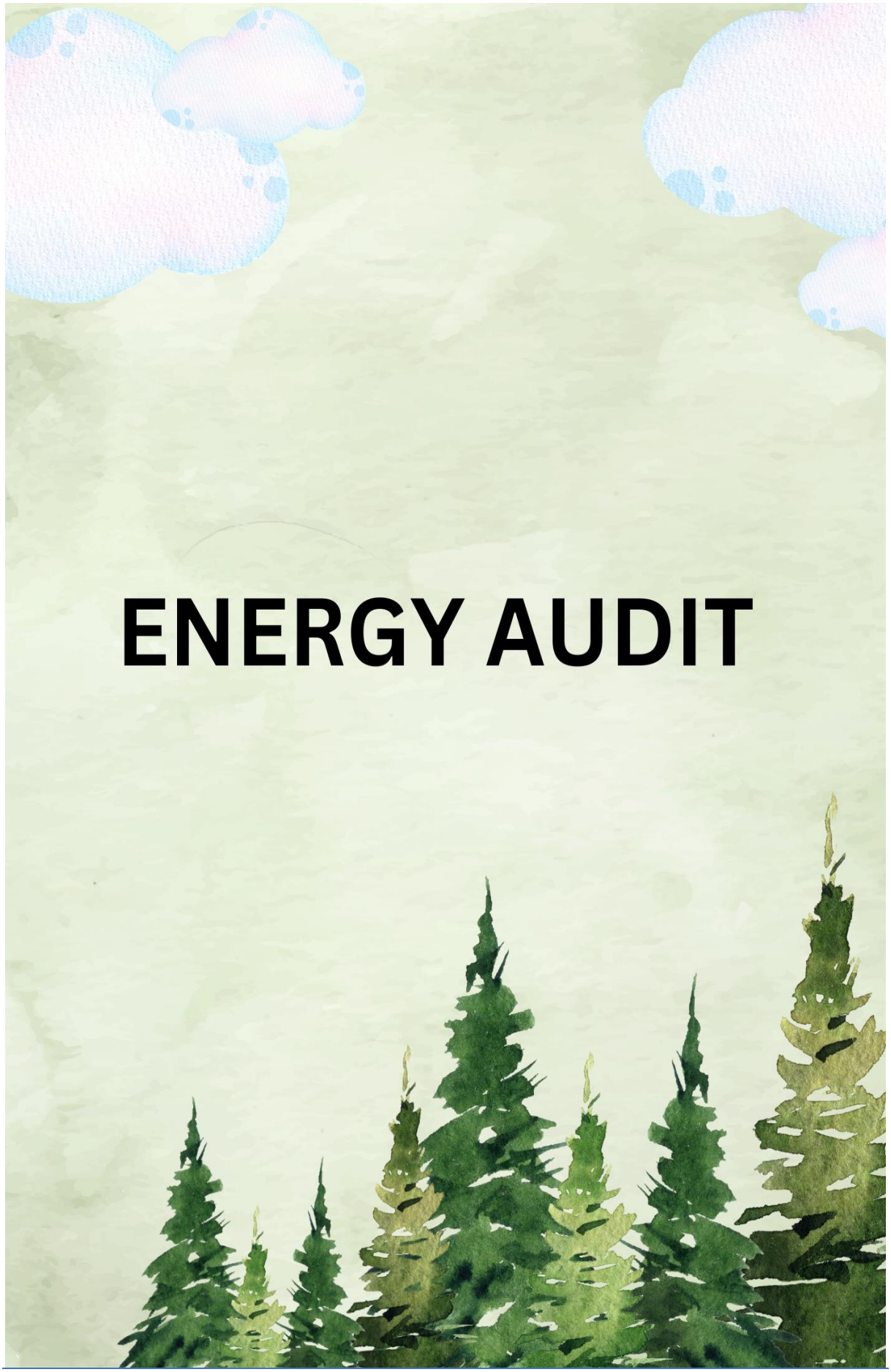
After analysing all the bins it was observed that plastic had highest contribution viz. 30% followed by the paper waste i.e. 21%. Mostly common observed plastic items were plastic wrappers of chips, soft drinks bottles and chocolate wrappers. The paper waste included paper wrappers, notebook pages, pamphlets and some pieces of cardboard. The third highest waste included garden trimmings. It included small grass, minute branches etc. The least contribution was of cloth, fibre, glass and metals.

5.6 **Observations and Conclusion:**

- There are separate bins for wet waste and dry waste. Hence, source segregation takes place.
- Institute has taken steps towards paper recycling. The paper waste collected from the bins is send to vendors.
- Plastic ban in campus is implemented but due to lack of seriousness in the students plastic is used in campus. Institute should conduct plastic awareness seminars for both the staff and students.

Assessment of soil was done to determine the quality of soil:

Sr. No.	Test	Results
1	pH	**6.1**
2	NPK	**2:3:1**
3	Acidity	**138 mg/lit**
4	Hardness	**159 mg/lit**


ENERGY AUDIT

6. Energy Audit:

An energy audit is an inspection survey and an analysis of energy flows for energy conservation in a building. It may include a process or system to reduce the amount of energy input into the system without negatively affecting the output. In commercial and industrial real estate, an energy audit is the first step in identifying opportunities to reduce energy expense and carbon footprint.

A nation is tiring to advance in quantity and quality to the spread of education among the common India and development of their intelligence. In India the entire field of education and other fields of intelligent activities had been monopolized by a handful of men before independence. But today we are marching towards the desirable status of a developed nation with fast strides. But the development should be a sustained one. For achieving such an interminable development energy management is essential. As far as concerning electricity crisis, we are facing lack of electricity during office work. So, institutional management is taking design regarding production of electricity and saving electricity for Eco social aspect. Energy requirement of India is growing and incomplete domestic fossil fuel treasury. The country has motivated strategy to enlarge its renewable energy resources and policy to establish the nuclear power plants. India increases the involvement of nuclear power to largely electrical energy development facility from 4.2% to 9%. India's industrial demand accounted for 35% of electrical power requirement, domestic household use accounted for 28%, agriculture 21%, commercial 9%, and public lighting and other miscellaneous applications accounted for the rest. Energy conservation means reduction in energy consumption without making any sacrifice of quantity or quality. A successful energy management program begins with energy conservation; it will lead to adequate rating of equipment's, using high efficiency equipment and change of habits which causes enormous wastages of energy. By observing all these study lack of electricity and huge electricity demands. It is necessary to plan to be self-sufficient in electricity requirement.

6.1 **Connection details:**

Institute receives electricity from State Electricity Distribution. Following are the details about connection.

- **Type of connection:** HT
- **Tariff:** HT (C) (II)

- **Contract demand:** 100 KVA
- **Feeder voltage:** 11 KV

Tariff Structure:

As per Distribution Company, HT and LT consumers have an option to take Time of Day (TOD) tariff instead of the normal tariff. Under TOD tariff electricity consumption and maximum demand in respect of HT consumers for different periods of the day i.e. normal period, peak load period and off-peak load period could be recorded by installing TOD meter. The maximum demand and consumption recorded in different periods could be billed on the following rates of the tariff applicable.

TOD Tariffs	Rate % (Rs./Unit)
0000 Hrs- 0600 Hrs & 2200 Hrs- 2400 Hrs	-1.500
0600 Hrs- 0900 Hrs & 1200 Hrs- 1800 Hrs	0.000
0900 Hrs- 1200 Hrs	0.800
1800 Hrs- 2200 Hrs	1.100

Power Factor:

Power Factor (PF) is an indicator of efficient utilization of power. In an AC (Alternating Current) electrical power system, PF is defined as the ratio of real power flowing to the load, to the apparent power in the circuit and is a dimensionless number.

6.2 **Bill analysis:**

Bill analysis for Padmabhooshan Vasantraodada Patil Institute of Technology had been done for academic year 2021-2022.

Sr. No.	Month	Power factor	Bill Amount
1	**June 21**	1.0	2,02,160/-
2	**July 21**	1.0	2,18,980/-
3	**August 21**	1.0	2,19,380/-
4	**September 21**	1.0	2,25,070/-
5	**October 21**	1.0	2,69,050/-
6	**November 21**	1.0	3,14,370/-
7	**December 21**	1.0	3,40,000/-
8	**January 22**	1.0	2,68,520/-
9	**February 22**	1.0	2,70,610/-
10	**March 22**	1.0	3,67,850/-
11	**April 22**	1.0	3,84,600/-
12	**May 22**	1.0	4,52,980/-

6.3 **ILER analysis:**

Lighting is provided in industries, commercial buildings, indoor and outdoor for providing comfortable working environment. The primary objective is to provide the required lighting effect for the lowest installed load i.e. highest lighting at lowest power consumption. The purpose of performance test is to calculate the installed efficacy in terms of lux/watt/m² (existing or design) for general lighting installation. The calculated value can be compared with the norms for specific types of interior installations for assessing improvement options.

Range	Condition
0.5 or less	Urgent activity required (UAR)
0.51 - 0.70	Review Suggested (RS)
0.70- above	Good

ILER analysis for various sections in the institute was carried out. Firstly using LUX meter illumination was measured and then numerical analysis was carried out. ILER gives idea about lighting conditions and measured regarding improving them.

Sr. No.	Section	LUX reading	ILER	Condition
1	Library	158	0.76	Good
2	Study room	131	0.78	Good
3	Classroom S1	136	0.75	Good
4	Classrooms S2	121	0.71	Good
5	Laboratories	144	0.79	Good
6	Office	139	0.72	Good

Reasons for Good ILER:

- Proper placement of windows and doors so that natural light is available well.
- Good ventilation system.

Fitting Details:

LED: 547

Fans: 1914

PC: 880

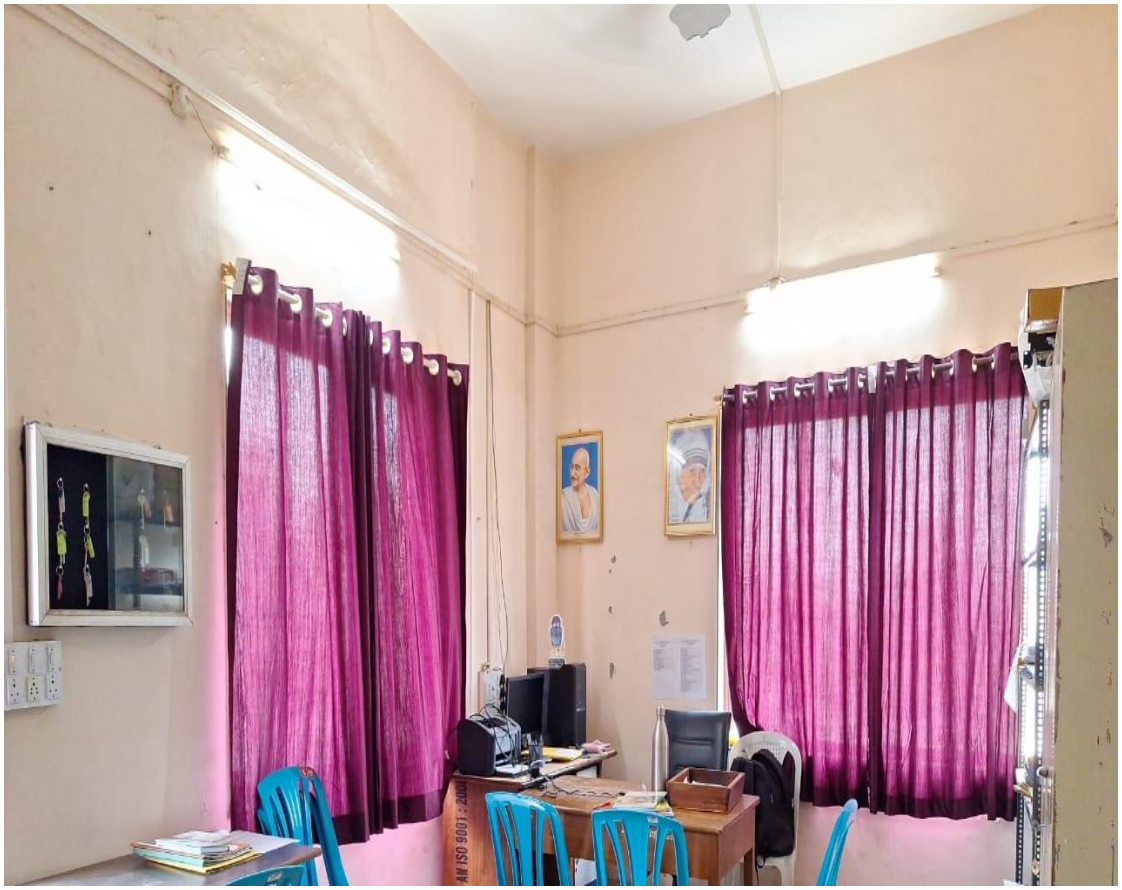
Printers: 341

Tube lights: 1758

AC: 06

Water cooler: 16

CCTV: 35



6.1 **Sustainable practices:**

Solar Energy

Rain water harvesting

Waste Disposal Pit

Solid waste Dump pit

PADMABHOOSHAN VASANTRAODADA PATIL INSTITUTE OF TECHNOLOGY, SANGLI (BUDHGAON)

2020-2021

AUDIT REPORT

ENVIRONMENTAL & CIVIL ENGINEERING SOLUTIONS
ISO 9001: 2015, IEC 17025: 2017

Editorial

In the Era of global warming and climate change every citizen has to reduce their own carbon foot prints to tackle with the adverse impacts of climate change. A green audit of any academic institution revels ways in which we can reduce energy consumption, water use and reduction in emission of carbon dioxide in the environment. It is a process to look into and ask ourselves whether we are also contributing to the degradation of the environment and if so, in what manner and how we can minimize this contribution and bring down to zero and preserve our environment for future generation.

Padmabhooshan Vasantraodada Patil Institute of Technology administration has already taken a step towards the green approach and conducted green audit of campus in the year 2020-2021. As an outcome of this institute has taken green steps to reduce its carbon foot prints by several means in campus viz. sustainable fittings, tree plantation and green computing in the administration and examination. The responsibility of carrying out the scientific green audit was given to Environmental and Civil Engineering Solutions. The organization has followed the rules and regulation of Ministry of Environment and Forest, Govt. of India and Central Pollution Control Board, New Delhi.

A questionnaire was prepared based on the guidelines and format of CPCB, New Delhi to conduct green audit. The information related to consumption of resources like water, electricity and handling of solid and hazardous waste was collected in the formats from main building support services and departments. The data collected was grouped and was tabulated in Excel sheets and analysed. The graphs of the analysed data were prepared for getting quick idea of the status. Interpretation of the overall outcomes was made which incorporates primary and secondary data, references and interrelations within. Final report preparation was carried out using this interpretation to prepare environment management plan of institute for next two years.

During the preparation of the Audit Report Audit Report Hon. Principal and Vice principal, Dean IQAC encouraged us with their full support. IQAC and other officers of the institute also gave support to carry out this work. We also thank all Heads of the departments and the Co-ordinators gave full co-operation.

Nikhil N. Kamble
(C.E.O and Head)

Environmental and Civil Engineering Solutions

Acknowledgement

We express our gratitude for calling upon us for this audit, mainly the Principal and all other staff members, who were ever helpful and supported us with all the inputs needed for this audit. We thank all the teaching, non-teaching and students for helping us in conducting this audit.

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1. Introduction:

The modernization and industrialization are the two important outputs of twentieth century which have made human life more luxurious and comfortable. Simultaneously, they are responsible for voracious use of natural resources, exploitation of forests and wildlife, producing massive solid waste, polluting the scarce and sacred water resources and finally making our mother Earth ugly and inhospitable. Today, people are getting more familiar to the global issues like global warming, greenhouse effect, ozone depletion and climate change etc. Now, it is considered as a final call by mother Earth to walk on the path of sustainable development. The time has come to wake up, unite and combat together for sustainable environment.

Considering the present environmental problems of pollution and excess use of natural resources, Hon. Prime Minister, Shri. Narendra Modiji has declared the Mission of Swachch Bharat Abhiyan. Also, University Grants Commission has mentioned "Green Campus, Clean Campus" mission mandatory for all higher educational institutes. As environmental sustainability is becoming an increasingly important issue for the nation, the role of higher educational institutions in relation to environmental sustainability is more prevalent.

Green Audit is the most efficient ecological tool to solve such environmental problems. It is a process of regular identification, quantification, documenting, reporting and monitoring of environmentally important components in a specified area. Through this process the regular environmental activities are monitored within and outside of the concerned sites which have direct and indirect impact on surroundings. Green audit can be one of the initiative for such institutes to account their energy, water resource use as well as wastewater, solid waste, E-waste, hazardous waste generation. Green Audit process can play an important role in promotion of environmental awareness and sensitization about resource use. It can create consciousness towards ecological values and ethics. Through green audit one can get direction about how to improve the condition of environment.

1.1 **Need of audit:**

Green auditing is the process of identifying and determining whether institutions practices are eco-friendly and sustainable. Traditionally, we are good and efficient users of natural resources. But over the period of time excess use of resources like energy, water, chemicals are become habitual for everyone especially, in common areas. Now, it is necessary to check whether our processes are consuming more than required resources? Whether we are

handling waste carefully? Green audit regulates all such practices and gives an efficient way of natural resource utilization. In the era of climate change and resource depletion it is necessary to verify the processes and convert it in to green and clean one. Green audit provides an approach for it. It also increases overall consciousness among the people working in institution towards an environment.

1.2 **Goals of audit:**

Institute has conducted a audit with specific goals as:

1. Identification and documentation of green practices followed by college.
2. Identify strength and weakness in green practices.
3. Conduct a survey to know the ground reality about green practices.
4. Analyse and suggest solution for problems identified from survey.
5. Assess facility of different types of waste management.
6. Increase environmental awareness throughout campus.
7. Identify and assess environmental risk.
8. Motivates staff for optimized sustainable use of available resources.
9. The long term goal of the environmental audit program is to collect baseline data of environmental parameters and resolve environmental issue before they become problem.

1.3 **Objectives of Audit:**

1. To examine the current practices which can impact on environment such as of resource utilization, waste management etc.
2. To identify and analyse significant environmental issues.
3. Setup goal, vision and mission for Green practices in campus.
4. Establish and implement Environmental Management in various departments.
5. Continuous assessment for betterment in performance in green practices and its evaluation.
6. To prepare an Environmental Statement Report on green practices followed by different departments, support services and administration building.

1.4 **NAAC criteria VII Environmental Consciousness:**

Institutes are playing a key role in development of human resources worldwide. Higher education institutes campus run various activities with aim to percolate the knowledge along

with practical dimension among the society. Likewise different technological problems higher education institutes also try to give solution for issues related to environment. Different types of evolutionary methods are used to assess the problem concerning environment. It includes Environmental Impact Assessment (EIA), Social Impact Assessment (SIA), Carbon Footprint Mapping, Green audit etc

National Assessment and Accreditation Council (NAAC) which is a self-governing organization that declares the institutions as Grade according to the scores assigned at the time of accreditation of the institution. The intention of green audit is to upgrade the environmental condition inside and around the institution. It is performed by considering environmental parameters like water and wastewater accounting, energy conservation, waste management, air, noise monitoring etc. for making the institution more eco-friendly.

Students are the major strength of any academic institution. Practicing green actions in any educational institution will inculcate the good habit of caring natural resources in students. Many environmental activities like plantation and nurturing saplings and trees, Cleanliness drives, Bird watching camps, No vehicle day, Rain water harvesting, etc. will make the students good citizen of the country. Through Green Audit, higher educational institutions can ensure that they contribute towards the reduction of Global warming through Carbon Footprint reduction measures.

1.5 **Benefits of Green Audit to an Educational Institute:**

There are many advantages of green audit to an Educational Institute:

1. It would help to protect the environment in and around the campus.
2. Recognize the cost saving methods through waste minimization and energy conservation.
3. Find out the prevailing and forthcoming complications
4. Empower the organization to frame a better environmental performance.
5. It portrays good image of institution through its clean and green campus.

2. Overview of Institute:

Padmabhooshan Vasantraodada Patil Institute of Technology was established in the year of 1983. Institute has huge area of 36.00 acres and has been serving the mankind in the field of Engineering and technology.

The landscaped grounds of college are widely admired for their beauty. The most valuable investment any educational institution can make is “Nurturing Future Leaders”. With the continuous rise in expectation of essential leadership standards, the institute has torch bearers have taken a responsibility for this investment to nurture the NextGen leaders with a vision to bridge the existing skill gap. With a firm step forward to attain an academic excellence, several Centres of Excellence, computer labs, and industry-academia associations has been setup at the College in association with the top leaders. The College believes that its primary stakeholders are the students. All aspects of education focus on the core values of contributing to national development while fostering global competencies among students. The College admits students from all social milieus and empowers them through intensive mentoring and counselling to face the challenges of life and become responsible and sensitized citizens of the country.

Vision:

To become a leading Institute in providing high quality technical & engineering education to the aspirants and serve the industry and society through excellent educational programmes, creativity and research.

Mission:

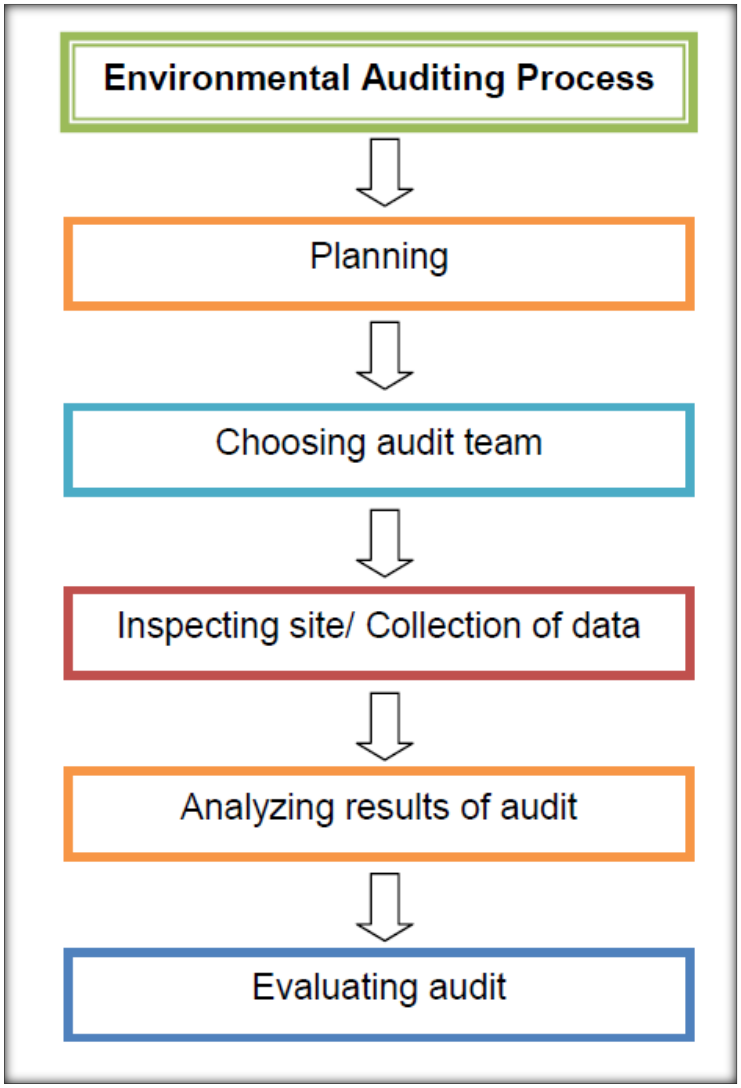
- To meet the short and long term engineering man power needs for Social, techno-economic development of region and nation, through teaching, research, consultancy and service.

- To contribute advancing of knowledge and wisdom in science and technology for the human welfare.
- To cultivate skills, lifestyle and habits of lifelong learning to adopt Knowledge based global civilization.
- To create highest standards of education with noble values of ethics, morality, integrity and humanity

Facilities at PVPIT:

- 36 acres of land with lush green landscape.
- Excellent Infrastructure facilities.
- Well-equipped laboratories.
- 140 core faculty with strong academic qualifications.
- Successful multidimensional development of students.
- Continuous Excellent academic performance.
- Well-furnished accommodation for boys and girls.
- Full Fledged modernized library of 57000 Books with Digital Library.
- BSNL 200 Mbps (1:1) 24 x 7 Leased line internet connection.
- 24 hour full power back up.
- Well-equipped Gymkhana and Outdoor as well as Indoor facilities.
- Scholarship Facility (SC,ST,OBC,SBC,VJNT,PTC,SST,NMS,etc.)
- Independent Training and Placement Cell.
- Personality Development Cell, Competitive exam guidance cell.
- Students Counselling Cell for overall Personality developments.

3. Methodology:



3.1 **Audits to be carried out:**

- Green and carbon footprint audit
- Energy audit
- Environmental audit
    - Water audit
    - Wastewater audit
    - Solid waste audit


GREEN AUDIT

4. Green and Carbon footprint audit:

Green Audit is the most efficient ecological tool to solve such environmental problems. It is a process of regular identification, quantification, documenting, reporting and monitoring of environmentally important components in a specified area. Through this process the regular environmental activities are monitored within and outside of the concerned sites which have direct and indirect impact on surroundings. Green audit can be one of the initiative for such institutes to account their energy, water resource use as well as wastewater, solid waste, E-waste, hazardous waste generation. Green Audit process can play an important role in promotion of environmental awareness and sensitization about resource use. It can create consciousness towards ecological values and ethics. Through green audit one can get direction about how to improve the condition of environment.

Carbon is the basis of life on mother Earth. It is incorporated into the plants through photosynthesis, consumed by animal species through the food, presents in the form of carbon dioxide (CO_2) the atmosphere, locked into the rocks as limestone and compressed into the different fossil fuels such as coal and oil. As CO_2 level in the atmosphere continue to increase, most climate designs or project that the oceans of the world and trees will keep soaking up more than half CO_2 . The plants on land and in the sea, taken up carbon by over many years increased the percentage discharged during decay, and this increased carbon became locked away as fossil fuels beneath the surface of the planet. The starting of the 21st century brought growing concern about global warming, climate change, food security, poverty and population growth. In the 21st century more carbon has been released into the atmosphere than that has been absorbed. CO_2 is a principle component causing global warming. Atmospheric carbon dioxide levels have increased to 40 % from preindustrial levels to more than 390 parts per million CO_2. On this background it is a need of time to cover the research areas interrelated with climate change.

4.1 **Green Cover:**

Padmabhooshan Vasantraodada Patil Institute of Technology has got a huge green cover and has almost 18 species of vegetation inside the campus. The institute has 5.91 acres of campus and most of this is covered by green area. They have huge plantations along with variation in species Greenery is maintained well by the institute. .

Figure 4-1 Padmabhooshan Vasantraodada Patil Institute of Technology Campus

Institute has taken huge efforts to develop its green cover. The institute has about 6.0 acres of green cover. In the vicinity of the institute there are about approximately 2191 fully grown trees and more than a 98 growing plants. The below table shows some of the common tree species found.

Species	Count	Species	Count
Pongame oil tree	55	Tamrind Tree	18
Mango tree	68	Blue berry(Jamun)	18
Coconut	14	Alma tree	3
Neem tree	65	Custered Apple	8
Banayan tree	20	Cherry	21
Bamboo tree	7	Ashok tree	28
Fig tree	7	Sandalwood Tree	10
Rubber tree	1	Rudrakshi Tree	1
Curry leaves tree	6	Champk Tree	17
Guava tree	20	Jack fruit Tree	6
Pongame oil tree	58	Tamrind Tree	20

Mostly there are trees of Mango, cherry and neem etc. Due to this the institute has high carbon sequesterial values. Considering the vicinity some dry plants were observed to approximately about 16. Plants absorb sunlight, 50% is absorbed and 30% reflected so this helps to create a cooler and more pleasant climate through a 3°C temperature reduction in the vicinity. This has also leaded to increase in biodiversity as more than 15 species of birds were observed. Some off the common birds were viz. Sparrow, wild parrots, little stint, black kite etc.

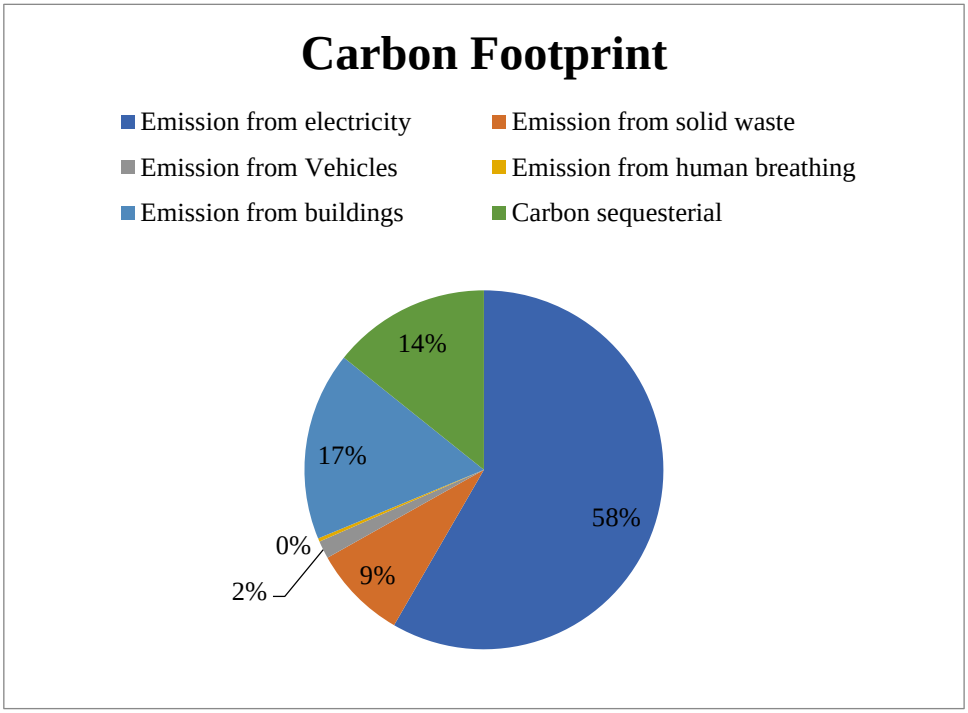
4.2 **Carbon Footprint Audit:**

Institute has estimated its carbon footprint by factor methodology. Various factors were used to estimate the carbon emissions from Consumption of electricity, generation of solid waste, use of vehicles in campus, carbon emissions due to human breathing and emissions from buildings. At last they have also calculated Carbon sequesterial value i.e. carbon that is absorbed by the plants.

Sr. No.	Section	Emission
1	Emission from electricity	5112.258 kg CO_2 eq.
2	Emission from solid waste	745.588 kg CO_2 eq.
3	Emission from Vehicles	140.128 Kg CO_2 eq.
4	Emission from human breathing	26.558 tons of CO_2 eq.
5	Emission from buildings	1489.000 kg CO_2 eq.
6	Carbon sequesterial	1248.739 kg CO_2 eq.

Hence as per the calculation the carbon emission for electricity is 5112.258 kg CO_2 eq. secondly considering emissions from human breathing; the institute has total 2841 students and staff. Considering all the staff viz. junior teachers, senior teachers, Non grant, grant CHB they are total of 112. The staff's works for about averagely 6 hours a day in the institute and the students are present for 5 hours averagely daily. Vehicles emit significant amount of gases in environment and the institute has various parking sections in the campus. It was found that averagely 480 vehicles entered the institute daily and travel about 200 m of distance from the gate. Cars also enter the institute and as per observation 35 cars are observed daily. Hence, Overall the institute emits 140.128 Kg CO_2 eq. Solid waste is very important as it emits significant amount of carbon through it. Institute has a good solid waste management system. Hence the institute develops about 1248 kg of waste daily in both the form of wet and dry. Overall for a year the generation is about 745.588 kg CO_2 eq. Buildings play an important role in carbon contribution. During the construction operation and use

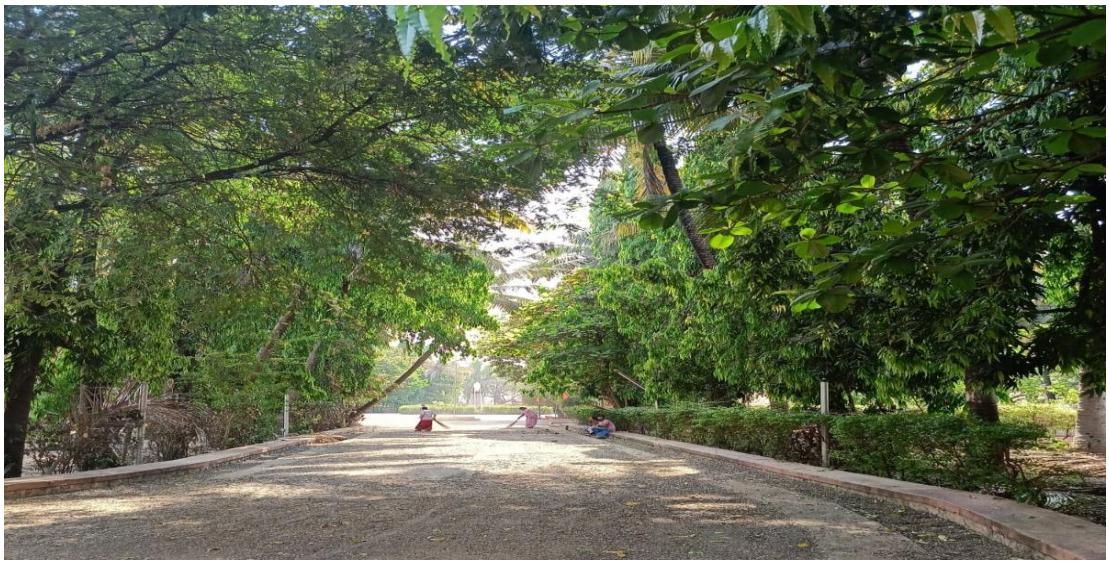
phase they emit significant amount of carbon. Hence considering total built-up area the carbon emissions could be evaluated. After the estimation the total built-up area observed was approximately about 31916 sq. m. and the carbon emission were 1489.400 kg CO_2 eq. Carbon sequesterial in important as it is the carbon absorbed by the trees. The campus has 348 fully grown trees in the campus; hence the sequesterial value is about 1248.739 kg CO_2 eq.



4.3 **Conclusion:**

- Highest carbon emission was observed from human breathing i.e. 26.55 tons of CO_2 eq. There is no any significant mean to reduce this number as it is not controllable.
- The next is solid waste. The emission from solid waste comprises of 745.588 kg CO_2 eq. This can be significantly reduced by following simple means. Waste segregation is properly observed by the institute and they should follow the cut out plastic plans. There should be complete ban in using the plastic inside the campus. There should be minimization of food waste as it contributes highest in carbon emissions.
- Considering emission from electricity they can be significantly reduced by decrease in electricity use. This can be done by installing LED lights and using energy efficient equipment's such as machines with high star ratings which save more. Institute can recognize renewable energy sources and have a setup in the institute. This can lead in significant saving of electricity and reduction in carbon emissions.

- Vehicles have the least emissions in the institute and it is due to the easy approached parking so that vehicles do not roam in the vicinity. All the vehicles travel hardly 200 m in the campus and this has led to lower emissions. Still institute can follows “NO Vehicle Day” on every 2nd Saturday of each month.
- Institute reduces about 1248.739 kg of CO_2 per by the means of plants. This could be increased by increasing in plantations. Institute can plant more trees in open areas avaliable.
- The plants having highest Carbon sequestration values are suggested. Cinnamomum verum, Eugenia caryophyllid, Bumelia celestina, Acacia Berland Eri, Acacia Francescana, Chinaberry tree and Buddleia cordata are some of the suggested species for plantation.




ENVIRONMENT
AUDIT

5. Environmental Audit:

An environmental audit is a type of evaluation intended to identify environmental compliance and management system implementation gaps, along with related corrective actions. ISO 14001 is a voluntary international standard for environmental management systems ("EMS"). ISO 14001:2004 provides the requirements for an EMS and ISO 14004 gives general EMS guidelines. An EMS meeting the requirements of ISO 14001:2004 is a management tool enabling an organization of any size or type to:

- Identify and control the environmental impact of its activities, products or services;
- Improve its environmental performance continually, and
- Implement a systematic approach to setting environmental objectives and targets, to achieving these and to demonstrating that they have been achieved.

The audit examines the potential hazards or risks posed by the institutes. Areas examined may include environmental policies and procedures, energy use practices, recycling, waste, conservation, and pollution. Then, the institute can use the results to determine what changes need to be made for compliance. In a broad sense, environmental auditing aims to help protect the environment and minimize the risks of business activities to the environment and human safety and health.

5.1 **Water Audit and wastewater audit:**

Water auditing is a method of quantifying water flows and quality in systems, with a view to reducing water usage and often saving money on otherwise unnecessary water use. Water audit is an effective management tool for minimizing losses, optimizing various uses and thus enabling considerable conservation of water. Water audits trace water use from its point of entry into the facility/system to its discharge into the sewer/river/canal etc. Wastewater audit deals with effective management of wastewater in the system. It deals with proper generation, management, treatment, transfer and disposal of wastewater.

Padmabhooshan Vasantraodada Patil Institute of Technology has carried out its water and wastewater audit and has suggested many more ways for water conservation, reuse and recycle. The detail water and waste water report is mentioned below.

5.2 **Water Audit report:**

Water audit for the "Padmabhooshan Vasantraodada Patil Institute of Technology" was carried out. The purpose of the water audit is to provide a thorough understanding of the water uses by identifying and measuring all water using fixtures, appliances, and practices in order to recommend potential water saving efficiencies.

PRIMARY DATA

Sr. No.	Title	Information
1	**Name of Institute**	Padmabhooshan Vasantraodada Patil Institute of Technology
2	**Address**	Sangli
3	**Name of company under which water audit is carried out**	Environmental and Civil Engineering Solutions, Sangli
4	**Number of floors**	G + 3 (Variablle)
5	**Category of building**	Educational Institute
6	**Nearest ESR location**	Campus
7	**Water supply hours**	3 hrs. daily
8	**Water meter present**	No

POPULATION DETAILS

Title	Information
Fixed population (Working staff and Students)	Gents: 811
	Ladies: 2030
Variable population (Visiting persons)	Gents: 21
	Ladies: 18

SOURCE INFORMATION

Title	Information
Sources of water	Corporation water and bore-well
Connection details	1" PVC pipe inlet and 1" outlet distribution pipe

STORAGE DETAILS

Title	Information
Overhead tank type	PVC and RCC tank
Location	On terrace
Number of tanks	15 PVC Tanks 5000 Liters average
Motor connection details	10 Hp and 3 Hp X 4 for bore well
Pumping period	4 hours daily
Underground sump	Yes

WATER USAGE

Toilet	Number of users	Water consumption
Gents toilet	811 users	811 X 12 lit = 9732
Washbasin	2841 users	2841 X 0.75 lit = 2130
Ladies toilet	2030 users	2030 X 18 lit = 36540
Toilet cleaning	3000 liters	3000 liters
Floor cleaning	2500 liters	2500 liters
Gardening	1500 liters	1500 liters
Laboratories	5000 liters	5000 liters
Total		**60,402 lit**

5.3 **Waste water audit:**

Padmabhooshan Vasantraodada Patil Institute of Technology campus generates huge amount of wastewater. The source for wastewater in the campus is hostels, institute, mess and the washrooms and urinals inside the campus. To estimate the amount of wastewater generated all the water that is used in the washrooms, quarters and hostels is considered as wastewater.

Sr. No.	Section	Wastewater generated in litres
1	Water usage generated in campus	**60,402**
Waste water generated		**42,281**

5.4 **RO plant at institute:**

Padmabhooshan Vasantraodada Patil Institute of Technology has dedicated RO water treatment plant installed in the campus. The details of the plant are:

- Daily input water = 6000 Litres/hrs
- Daily reject water = 2000 Litres/hrs

The table below shows the quality of RO water.

Sr. No.	Parameter	Reading
1	pH	7.62
2	TDS	199
3	Hardness	49
4	Chloride content	28
5	MPN	Absent

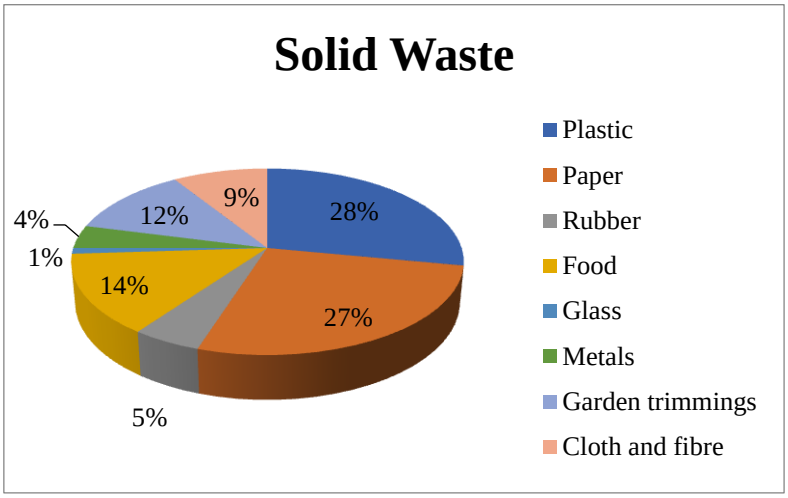

RAIN WATER HARVESTING
(RWH)
TUBE-WELL
WATER SOURCE

5.5 **Solid waste Audit:**

A waste audit is a physical analysis of waste composition to provide a detailed understanding of problems, identify potential opportunities, and give you a detailed analysis of your waste composition. A waste audit will help you clearly identify your waste generation to establish baseline or benchmark data, Characterize and quantify waste stream, Verify waste pathways, identify waste diversion opportunities and identify source reduction opportunities.

Solid waste is the unwanted or useless solid material generated from the human activities in residential, industrial or commercial area. Solid waste management reduce or eliminates the adverse impact on the environment and human health. Solid waste audit for Padmabhooshan Vasantraodada Patil Institute of Technology was carried out. The entire premise was analysed for solid waste generation and waste characterization. Overall waste was observed and characterization was done. The below table shows the components of solid waste at institute campus. Quartering method was used and 1 Kg of waste was selected.

Sr. No.	Type of waste	Composition %
1	Plastic	28
2	Paper	27
3	Rubber	5
4	Food	14
5	Glass	1
6	Metals	4
7	Garden trimmings	12
8	Cloth and fibre	9



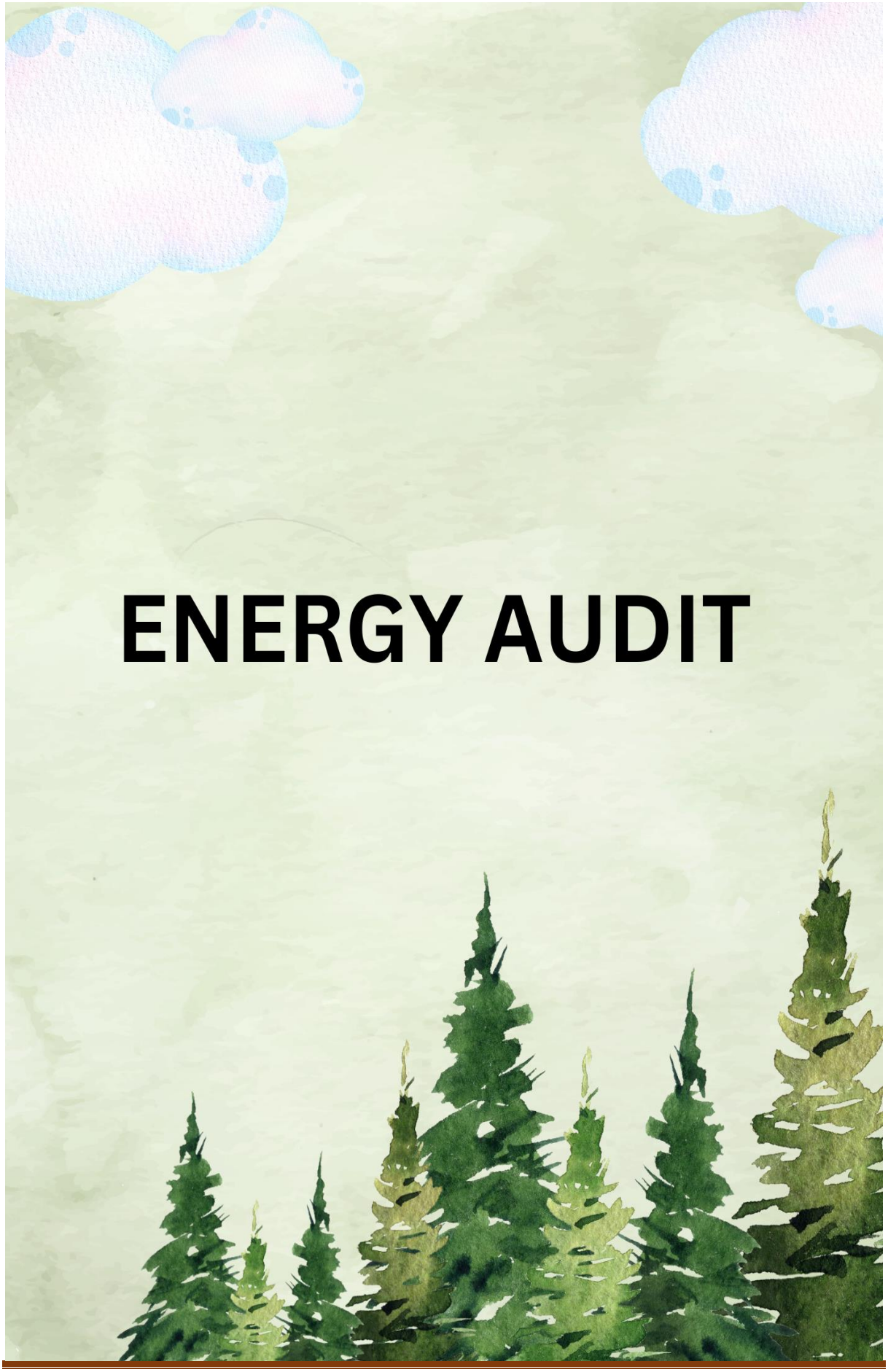
After analysing all the bins it was observed that plastic had highest contribution viz. 28% followed by the paper waste i.e. 27%. Mostly common observed plastic items were plastic wrappers of chips, soft drinks bottles and chocolate wrappers. The paper waste included paper wrappers, notebook pages, pamphlets and some pieces of cardboard. The third highest waste included garden trimmings. It included small grass, minute branches etc. The least contribution was of cloth, fibre, glass and metals.

5.6 **Observations and Conclusion:**

- There are separate bins for wet waste and dry waste. Hence, source segregation takes place.
- Institute has taken steps towards paper recycling. The paper waste collected from the bins is send to vendors.
- Plastic ban in campus is implemented but due to lack of seriousness in the students plastic is used in campus. Institute should conduct plastic awareness seminars for both the staff and students.

Assessment of soil was done to determine the quality of soil:

Sr. No.	Test	Results
1	pH	**6.1**
2	NPK	**2:3:1**
3	Acidity	**151 mg/lit**
4	Hardness	**168 mg/lit**


ENERGY AUDIT

6. Energy Audit:

An energy audit is an inspection survey and an analysis of energy flows for energy conservation in a building. It may include a process or system to reduce the amount of energy input into the system without negatively affecting the output. In commercial and industrial real estate, an energy audit is the first step in identifying opportunities to reduce energy expense and carbon footprint.

A nation is tiring to advance in quantity and quality to the spread of education among the common India and development of their intelligence. In India the entire field of education and other fields of intelligent activities had been monopolized by a handful of men before independence. But today we are marching towards the desirable status of a developed nation with fast strides. But the development should be a sustained one. For achieving such an interminable development energy management is essential. As far as concerning electricity crisis, we are facing lack of electricity during office work. So, institutional management is taking design regarding production of electricity and saving electricity for Eco social aspect. Energy requirement of India is growing and incomplete domestic fossil fuel treasury. The country has motivated strategy to enlarge its renewable energy resources and policy to establish the nuclear power plants. India increases the involvement of nuclear power to largely electrical energy development facility from 4.2% to 9%. India's industrial demand accounted for 35% of electrical power requirement, domestic household use accounted for 28%, agriculture 21%, commercial 9%, and public lighting and other miscellaneous applications accounted for the rest. Energy conservation means reduction in energy consumption without making any sacrifice of quantity or quality. A successful energy management program begins with energy conservation; it will lead to adequate rating of equipment's, using high efficiency equipment and change of habits which causes enormous wastages of energy. By observing all these study lack of electricity and huge electricity demands. It is necessary to plan to be self-sufficient in electricity requirement.

6.1 **Connection details:**

Institute receives electricity from State Electricity Distribution. Following are the details about connection.

- **Type of connection:** HT
- **Tariff:** HT (C) (II)
- **Contract demand:** 100 KVA

- **Feeder voltage:** 11 KV

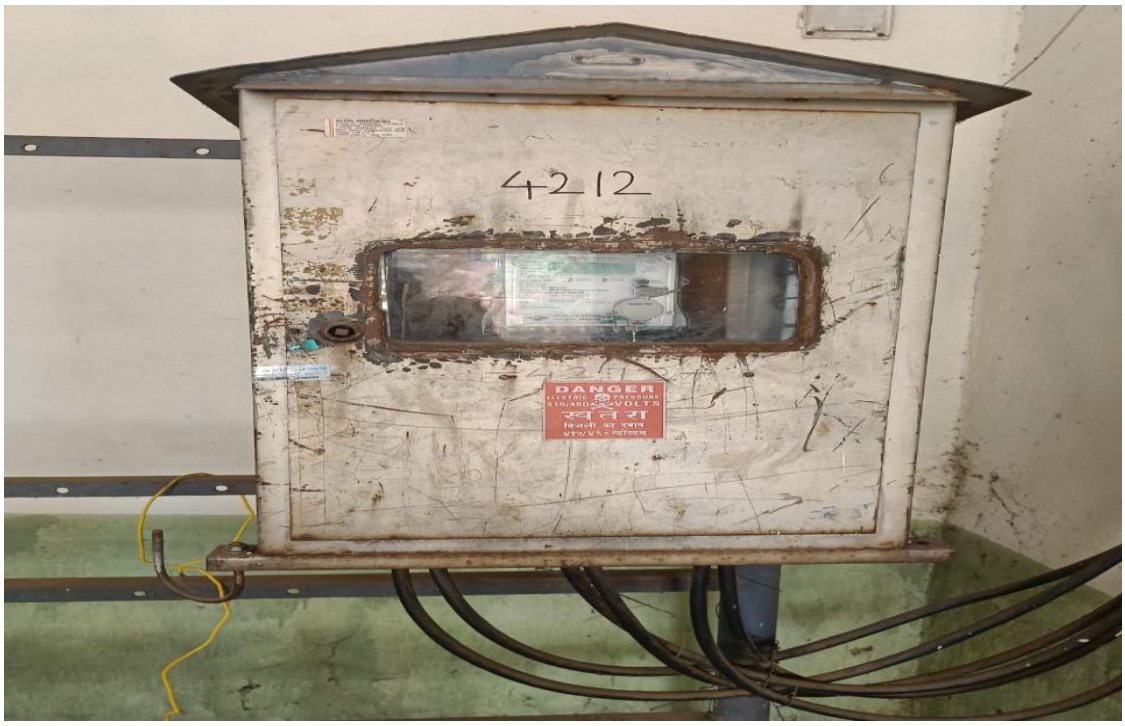
Tariff Structure:

As per Distribution Company, HT and LT consumers have an option to take Time of Day (TOD) tariff instead of the normal tariff. Under TOD tariff electricity consumption and maximum demand in respect of HT consumers for different periods of the day i.e. normal period, peak load period and off-peak load period could be recorded by installing TOD meter. The maximum demand and consumption recorded in different periods could be billed on the following rates of the tariff applicable.

TOD Tariffs	Rate % (Rs./Unit)
0000 Hrs- 0600 Hrs & 2200 Hrs- 2400 Hrs	-1.500
0600 Hrs- 0900 Hrs & 1200 Hrs- 1800 Hrs	0.000
0900 Hrs- 1200 Hrs	0.800
1800 Hrs- 2200 Hrs	1.100

Power Factor:

Power Factor (PF) is an indicator of efficient utilization of power. In an AC (Alternating Current) electrical power system, PF is defined as the ratio of real power flowing to the load, to the apparent power in the circuit and is a dimensionless number.



6.2 **Bill analysis:**

Bill analysis for Padmabhooshan Vasantraodada Patil Institute of Technology had been done for academic year 2020-2021.

Sr. No.	Month	Power factor	Bill Amount
1	**June 20**	1.0	3,73,630/-
2	**July 20**	1.0	4,03,460/-
3	**August 20**	1.0	2,24,710/-
4	**September 20**	1.0	2,37,710/-
5	**October 20**	1.0	2,55,410/-
6	**November 20**	1.0	2,23,920/-
7	**December 20**	1.0	2,48,480/-
8	**January 21**	1.0	2,98,520/-
9	**February 21**	1.0	3,18,150/-
10	**March 21**	1.0	3,61,140/-
11	**April 21**	1.0	3,35,740/-
12	**May 21**	1.0	2,25,620/-

6.3 **ILER analysis:**

Lighting is provided in industries, commercial buildings, indoor and outdoor for providing comfortable working environment. The primary objective is to provide the required lighting effect for the lowest installed load i.e. highest lighting at lowest power consumption. The purpose of performance test is to calculate the installed efficacy in terms of lux/watt/m² (existing or design) for general lighting installation. The calculated value can be compared with the norms for specific types of interior installations for assessing improvement options.

Range	Condition
0.5 or less	Urgent activity required (UAR)
0.51 - 0.70	Review Suggested (RS)
0.70- above	Good

ILER analysis for various sections in the institute was carried out. Firstly using LUX meter illumination was measured and then numerical analysis was carried out. ILER gives idea about lighting conditions and measured regarding improving them.

Sr. No.	Section	LUX reading	ILER	Condition
1	Library	141	0.77	Good
2	Study room	162	0.75	Good
3	Classroom S1	144	0.79	Good
4	Classrooms S2	128	0.72	Good
5	Laboratories	158	0.72	Good
6	Office	166	0.79	Good

Reasons for Good ILER:

- Proper placement of windows and doors so that natural light is available well.
- Good ventilation system.

Fitting Details:

LED: 547

Fans: 1914

PC: 880

Printers: 341

Tube lights: 1758

AC: 06

Water cooler: 16

CCTV: 35


DANGER
B बिल्डींग
C बिल्डींग
A बिल्डींग

6.1 **Sustainable practices:**

Solar Energy

Rain water harvesting

Waste Disposal Pit

Solid waste Dump pit

Padmabhooshan Vasantraodada Patil Institute of Technology, Sangli (Budhgaon)

AUDIT REPORT

- 2019 - 2020 -

ENVIRONMENTAL & CIVIL ENGINEERING SOLUTIONS

ISO 9001: 2015, IEC 17025: 2017

Editorial

In the Era of global warming and climate change every citizen has to reduce their own carbon foot prints to tackle with the adverse impacts of climate change. A green audit of any academic institution revels ways in which we can reduce energy consumption, water use and reduction in emission of carbon dioxide in the environment. It is a process to look into and ask ourselves whether we are also contributing to the degradation of the environment and if so, in what manner and how we can minimize this contribution and bring down to zero and preserve our environment for future generation.

Padmabhooshan Vasantraodada Patil Institute of Technology administration has already taken a step towards the green approach and conducted green audit of campus in the year 2019-2020. As an outcome of this institute has taken green steps to reduce its carbon foot prints by several means in campus viz. sustainable fittings, tree plantation and green computing in the administration and examination. The responsibility of carrying out the scientific green audit was given to Environmental and Civil Engineering Solutions. The organization has followed the rules and regulation of Ministry of Environment and Forest, Govt. of India and Central Pollution Control Board, New Delhi.

A questionnaire was prepared based on the guidelines and format of CPCB, New Delhi to conduct green audit. The information related to consumption of resources like water, electricity and handling of solid and hazardous waste was collected in the formats from main building support services and departments. The data collected was grouped and was tabulated in Excel sheets and analysed. The graphs of the analysed data were prepared for getting quick idea of the status. Interpretation of the overall outcomes was made which incorporates primary and secondary data, references and interrelations within. Final report preparation was carried out using this interpretation to prepare environment management plan of institute for next two years.

During the preparation of the Audit Report Audit Report Hon. Principal and Vice principal, Dean IQAC encouraged us with their full support. IQAC and other officers of the institute also gave support to carry out this work. We also thank all Heads of the departments and the Co-ordinators gave full co-operation.

Nikhil N. Kamble
(C.E.O and Head)

Environmental and Civil Engineering Solutions

Acknowledgement

We express our gratitude for calling upon us for this audit, mainly the Principal and all other staff members, who were ever helpful and supported us with all the inputs needed for this audit. We thank all the teaching, non-teaching and students for helping us in conducting this audit.

Green Audit Team

Mr. Nikhil N. Kamble
PhD (Sustainability), M. Tech. (Env. Eng.)

Miss. Maithilee N. Kamble
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Miss. Bhagyashri A Sathe
M. Tech. (Env. Eng.)

Mrs. Seema N. Kamble
Director, ECS, B. E. (Electrical)

1. Introduction:

The modernization and industrialization are the two important outputs of twentieth century which have made human life more luxurious and comfortable. Simultaneously, they are responsible for voracious use of natural resources, exploitation of forests and wildlife, producing massive solid waste, polluting the scarce and sacred water resources and finally making our mother Earth ugly and inhospitable. Today, people are getting more familiar to the global issues like global warming, greenhouse effect, ozone depletion and climate change etc. Now, it is considered as a final call by mother Earth to walk on the path of sustainable development. The time has come to wake up, unite and combat together for sustainable environment.

Green Audit is the most efficient ecological tool to solve such environmental problems. It is a process of regular identification, quantification, documenting, reporting and monitoring of environmentally important components in a specified area. Through this process the regular environmental activities are monitored within and outside of the concerned sites which have direct and indirect impact on surroundings. Green audit can be one of the initiative for such institutes to account their energy, water resource use as well as wastewater, solid waste, E-waste, hazardous waste generation. Green Audit process can play an important role in promotion of environmental awareness and sensitization about resource use. It can create consciousness towards ecological values and ethics. Through green audit one can get direction about how to improve the condition of environment.

1.1 **Need of audit:**

Green auditing is the process of identifying and determining whether institutions practices are eco-friendly and sustainable. Traditionally, we are good and efficient users of natural resources. But over the period of time excess use of resources like energy, water, chemicals are become habitual for everyone especially, in common areas. Now, it is necessary to check whether our processes are consuming more than required resources? Whether we are handling waste carefully? Green audit regulates all such practices and gives an efficient way of natural resource utilization. In the era of climate change and resource depletion it is necessary to verify the processes and convert it in to green and clean one. Green audit provides an approach for it. It also increases overall consciousness among the people working in institution towards an environment.

1.2 **Goals of audit:**

Institute has conducted a audit with specific goals as:

1. Identification and documentation of green practices followed by college.
2. Identify strength and weakness in green practices.
3. Conduct a survey to know the ground reality about green practices.
4. Analyse and suggest solution for problems identified from survey.
5. Assess facility of different types of waste management.
6. Increase environmental awareness throughout campus.
7. Identify and assess environmental risk.
8. Motivates staff for optimized sustainable use of available resources.
9. The long term goal of the environmental audit program is to collect baseline data of environmental parameters and resolve environmental issue before they become problem.

1.3 **Objectives of Audit:**

1. To examine the current practices which can impact on environment such as of resource utilization, waste management etc.
2. To identify and analyse significant environmental issues.
3. Setup goal, vision and mission for Green practices in campus.
4. Establish and implement Environmental Management in various departments.
5. Continuous assessment for betterment in performance in green practices and its evaluation.
6. To prepare an Environmental Statement Report on green practices followed by different departments, support services and administration building.

1.4 **NAAC criteria VII Environmental Consciousness:**

Institutes are playing a key role in development of human resources worldwide. Higher education institutes campus run various activities with aim to percolate the knowledge along with practical dimension among the society. Likewise different technological problems higher education institutes also try to give solution for issues related to environment. Different types of evolutionary methods are used to assess the problem concerning environment. It includes Environmental Impact Assessment (EIA), Social Impact Assessment (SIA), Carbon Footprint Mapping, Green audit etc

National Assessment and Accreditation Council (NAAC) which is a self-governing organization that declares the institutions as Grade according to the scores assigned at the time of accreditation of the institution. The intention of green audit is to upgrade the environmental condition inside and around the institution. It is performed by considering environmental parameters like water and wastewater accounting, energy conservation, waste management, air, noise monitoring etc. for making the institution more eco-friendly.

1.5 **Benefits of Green Audit to an Educational Institute:**

There are many advantages of green audit to an Educational Institute:

1. It would help to protect the environment in and around the campus.
2. Recognize the cost saving methods through waste minimization and energy conservation.
3. Find out the prevailing and forthcoming complications
4. Empower the organization to frame a better environmental performance.
5. It portrays good image of institution through its clean and green campus.

2. Overview of Institute:

Padmabhooshan Vasantraodada Patil Institute of Technology was established in the year of 1983. Institute has huge area of 36.00 acres and has been serving the mankind in the field of Engineering and technology.

The landscaped grounds of college are widely admired for their beauty. The most valuable investment any educational institution can make is “Nurturing Future Leaders”. With the continuous rise in expectation of essential leadership standards, the institute has torch bearers have taken a responsibility for this investment to nurture the NextGen leaders with a vision to bridge the existing skill gap. With a firm step forward to attain an academic excellence, several Centres of Excellence, computer labs, and industry-academia associations has been setup at the College in association with the top leaders. The College believes that its primary stakeholders are the students. All aspects of education focus on the core values of contributing to national development while fostering global competencies among students. The College admits students from all social milieus and empowers them through intensive mentoring and counselling to face the challenges of life and become responsible and sensitized citizens of the country.

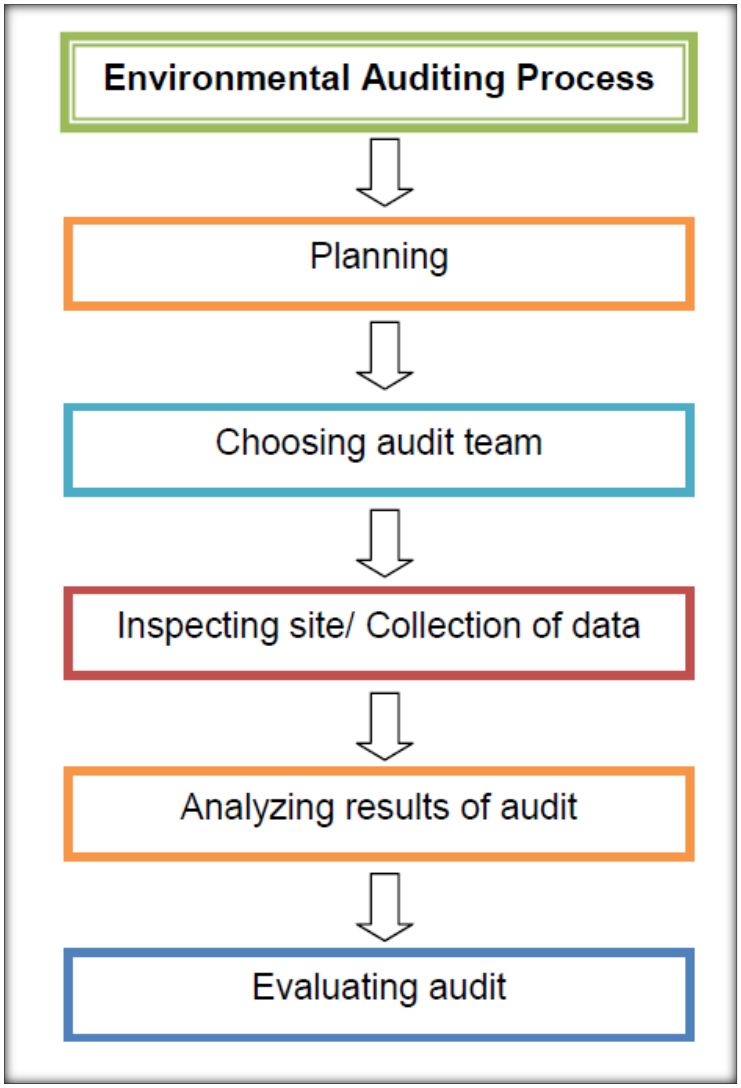
Vision:

To become a leading Institute in providing high quality technical & engineering education to the aspirants and serve the industry and society through excellent educational programmes, creativity and research.

Mission:

- To meet the short and long term engineering man power needs for Social, techno-economic development of region and nation, through teaching, research, consultancy and service.
- To contribute advancing of knowledge and wisdom in science and technology for the human welfare.
- To cultivate skills, lifestyle and habits of lifelong learning to adopt Knowledge based global civilization.
- To create highest standards of education with noble values of ethics, morality, integrity and humanity

3. Methodology:



3.1 **Audits to be carried out:**

- Green and carbon footprint audit
- Energy audit
- Environmental audit
    - Water audit
    - Wastewater audit
    - Solid waste audit


GREEN AUDIT

4. Green and Carbon footprint audit:

Green Audit is the most efficient ecological tool to solve such environmental problems. It is a process of regular identification, quantification, documenting, reporting and monitoring of environmentally important components in a specified area. Through this process the regular environmental activities are monitored within and outside of the concerned sites which have direct and indirect impact on surroundings. Green audit can be one of the initiative for such institutes to account their energy, water resource use as well as wastewater, solid waste, E-waste, hazardous waste generation. Green Audit process can play an important role in promotion of environmental awareness and sensitization about resource use. It can create consciousness towards ecological values and ethics. Through green audit one can get direction about how to improve the condition of environment.

Carbon is the basis of life on mother Earth. It is incorporated into the plants through photosynthesis, consumed by animal species through the food, presents in the form of carbon dioxide (CO_2) the atmosphere, locked into the rocks as limestone and compressed into the different fossil fuels such as coal and oil. As CO_2 level in the atmosphere continue to increase, most climate designs or project that the oceans of the world and trees will keep soaking up more than half CO_2 . The plants on land and in the sea, taken up carbon by over many years increased the percentage discharged during decay, and this increased carbon became locked away as fossil fuels beneath the surface of the planet. The starting of the 21st century brought growing concern about global warming, climate change, food security, poverty and population growth. In the 21st century more carbon has been released into the atmosphere than that has been absorbed. CO_2 is a principle component causing global warming. Atmospheric carbon dioxide levels have increased to 40 % from preindustrial levels to more than 390 parts per million CO_2. On this background it is a need of time to cover the research areas interrelated with climate change.

4.1 **Green Cover:**

Padmabhooshan Vasantraodada Patil Institute of Technology has got a huge green cover and has almost 26 species of vegetation inside the campus. The institute has 6.02 acres of campus and most of this is covered by green area. They have huge plantations along with variation in species Greenery is maintained well by the institute. .

Figure 4-1 Padmabhooshan Vasantraodada Patil Institute of Technology Campus

Institute has taken huge efforts to develop its green cover. The institute has about 6.02 acres of green cover. In the vicinity of the institute there are about approximately 1998 fully grown trees and more than a 98 growing plants. The below table shows some of the common tree species found.

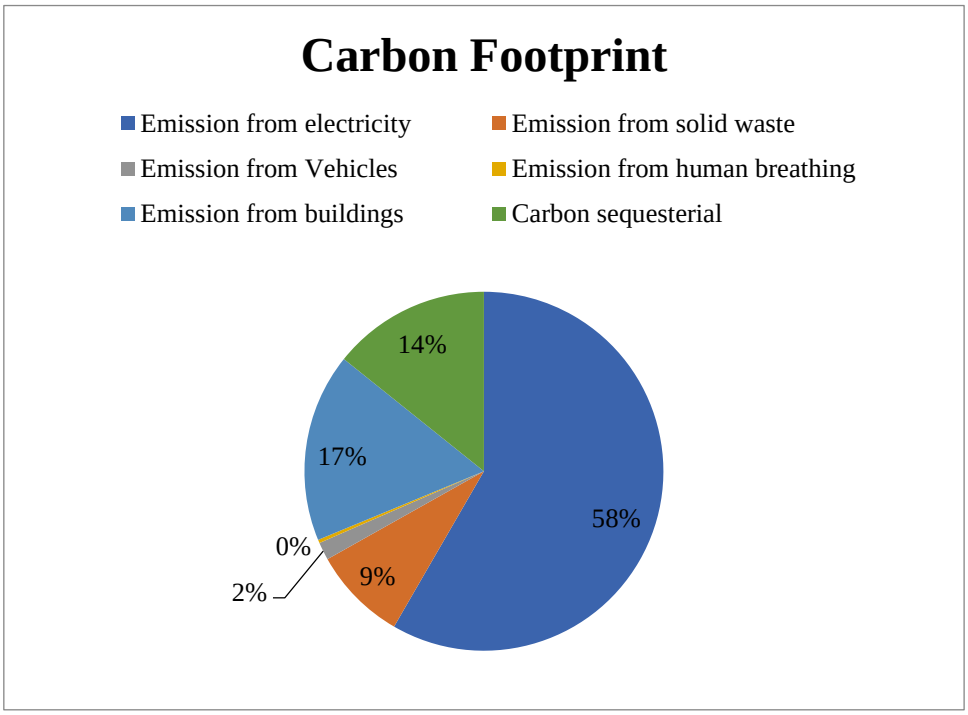
Species	Count	Species	Count
Pongame oil tree	55	Tamrind Tree	18
Mango tree	61	Blue berry(Jamun)	17
Coconut	15	Alma tree	3
Neem tree	66	Custered Apple	8
Banayan tree	21	Cherry	20
Bamboo tree	6	Ashok tree	26
Fig tree	5	Sandalwood Tree	10
Rubber tree	2	Rudrakshi Tree	1
Curry leaves tree	6	Champk Tree	17
Guava tree	28	Jack fruit Tree	6
Pongame oil tree	58	Tamrind Tree	18

Mostly there are trees of Mango, cherry and neem etc. Due to this the institute has high carbon sequesterial values. Considering the vicinity some dry plants were observed to approximately about 16. Plants absorb sunlight, 50% is absorbed and 30% reflected so this helps to create a cooler and more pleasant climate through a 3°C temperature reduction in the vicinity. This has also leaded to increase in biodiversity as more than 15 species of birds were observed. Some off the common birds were viz. Sparrow, wild parrots, little stint, black kite etc.

4.2 **Carbon Footprint Audit:**

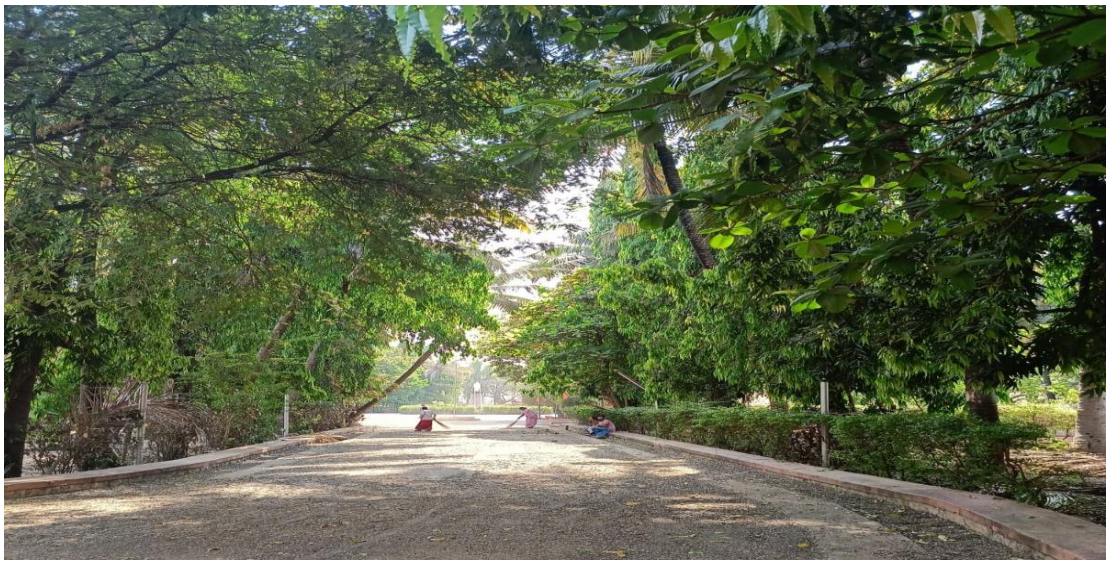
Institute has estimated its carbon footprint by factor methodology. Various factors were used to estimate the carbon emissions from Consumption of electricity, generation of solid waste, use of vehicles in campus, carbon emissions due to human breathing and emissions from buildings. At last they have also calculated Carbon sequesterial value i.e. carbon that is absorbed by the plants.

Sr. No.	Section	Emission
1	Emission from electricity	4899.277 kg CO_2 eq.
2	Emission from solid waste	766.500 kg CO_2 eq.
3	Emission from Vehicles	151.188 Kg CO_2 eq.
4	Emission from human breathing	28.011 tons of CO_2 eq.
5	Emission from buildings	1489.000 kg CO_2 eq.
6	Carbon sequesterial	1112.770 kg CO_2 eq.



4.3 **Conclusion:**

- Highest carbon emission was observed from human breathing i.e. 28.01 tons of CO_2 eq. There is no any significant mean to reduce this number as it is not controllable.
- The next is solid waste. The emission from solid waste comprises of 766.500 kg CO_2 eq. This can be significantly reduced by following simple means. Waste segregation is properly observed by the institute and they should follow the cut out plastic plans. There should be complete ban in using the plastic inside the campus. There should be minimization of food waste as it contributes highest in carbon emissions.
- Considering emission from electricity they can be significantly reduced by decrease in electricity use. This can be done by installing LED lights and using energy efficient equipment's such as machines with high star ratings which save more. Institute can recognize renewable energy sources and have a setup in the institute. This can lead in significant saving of electricity and reduction in carbon emissions.
- Vehicles have the least emissions in the institute and it is due to the easy approached parking so that vehicles do not roam in the vicinity. All the vehicles travel hardly 200 m in the campus and this has led to lower emissions. Still institute can follows "NO Vehicle Day" on every 2nd Saturday of each month.
- Institute reduces about 1112.770 kg of CO_2 per by the means of plants. This could be increased by increasing in plantations. Institute can plant more trees in open areas avaliable.
- The plants having highest Carbon sequestration values are suggested. Cinnamomum verum, Eugenia caryophyllid, Bumelia celestina, Acacia Berland Eri, Acacia Francescana, Chinaberry tree and Buddleia cordata are some of the suggested species for plantation.




ENVIRONMENT
AUDIT

5. Environmental Audit:

An environmental audit is a type of evaluation intended to identify environmental compliance and management system implementation gaps, along with related corrective actions. ISO 14001 is a voluntary international standard for environmental management systems ("EMS"). ISO 14001:2004 provides the requirements for an EMS and ISO 14004 gives general EMS guidelines. An EMS meeting the requirements of ISO 14001:2004 is a management tool enabling an organization of any size or type to:

- Identify and control the environmental impact of its activities, products or services;
- Improve its environmental performance continually, and
- Implement a systematic approach to setting environmental objectives and targets, to achieving these and to demonstrating that they have been achieved.

The audit examines the potential hazards or risks posed by the institutes. Areas examined may include environmental policies and procedures, energy use practices, recycling, waste, conservation, and pollution. Then, the institute can use the results to determine what changes need to be made for compliance. In a broad sense, environmental auditing aims to help protect the environment and minimize the risks of business activities to the environment and human safety and health.

5.1 **Water Audit and wastewater audit:**

Water auditing is a method of quantifying water flows and quality in systems, with a view to reducing water usage and often saving money on otherwise unnecessary water use. Water audit is an effective management tool for minimizing losses, optimizing various uses and thus enabling considerable conservation of water. Water audits trace water use from its point of entry into the facility/system to its discharge into the sewer/river/canal etc. Wastewater audit deals with effective management of wastewater in the system. It deals with proper generation, management, treatment, transfer and disposal of wastewater.

Padmabhooshan Vasantraodada Patil Institute of Technology has carried out its water and wastewater audit and has suggested many more ways for water conservation, reuse and recycle. The detail water and waste water report is mentioned below.

5.2 **Water Audit report:**

Water audit for the "Padmabhooshan Vasantraodada Patil Institute of Technology" was carried out. The purpose of the water audit is to provide a thorough understanding of the water uses by identifying and measuring all water using fixtures, appliances, and practices in order to recommend potential water saving efficiencies.

PRIMARY DATA

Sr. No.	Title	Information
1	**Name of Institute**	Padmabhooshan Vasantraodada Patil Institute of Technology
2	**Address**	Sangli
3	**Name of company under which water audit is carried out**	Environmental and Civil Engineering Solutions, Sangli
4	**Number of floors**	G + 3 (Variablle)
5	**Category of building**	Educational Institute
6	**Nearest ESR location**	Campus
7	**Water supply hours**	3 hrs. daily
8	**Water meter present**	No

POPULATION DETAILS

Title	Information
Fixed population (Working staff and Students)	Gents: 827
	Ladies: 1571
Variable population (Visiting persons)	Gents: 21
	Ladies: 18

SOURCE INFORMATION

Title	Information
Sources of water	Corporation water and bore-well
Connection details	1" PVC pipe inlet and 1" outlet distribution pipe

STORAGE DETAILS

Title	Information
Overhead tank type	PVC and RCC tank
Location	On terrace
Number of tanks	15 PVC Tanks 5000 Liters average
Motor connection details	10 Hp and 3 Hp X 4 for bore well
Pumping period	4 hours daily
Underground sump	Yes

WATER USAGE

Toilet	Number of users	Water consumption
Gents toilet	827 users	827 X 10 lit = 8270
Washbasin	2398 users	2398 X 0.75 lit = 1798
Ladies toilet	1571 users	1571 X 12 lit = 18852
Toilet cleaning	2500 liters	2500 liters
Floor cleaning	1500 liters	2500 liters
Gardening	1500 liters	1500 liters
Laboratories	5000 liters	5000 liters
Total		**40,402 lit**

5.3 **Waste water audit:**

Padmabhooshan Vasantraodada Patil Institute of Technology campus generates huge amount of wastewater. The source for wastewater in the campus is hostels, institute, mess and the washrooms and urinals inside the campus. To estimate the amount of wastewater generated all the water that is used in the washrooms, quarters and hostels is considered as wastewater.

Sr. No.	Section	Wastewater generated in litres
1	Water usage generated in campus	**40,402**
Waste water generated		**30,315**

5.4 **RO plant at institute:**

Padmabhooshan Vasantraodada Patil Institute of Technology has dedicated RO water treatment plant installed in the campus. The details of the plant are:

- Daily input water = 6000 Litres/hrs
- Daily reject water = 2000 Litres/hrs

The table below shows the quality of RO water.

Sr. No.	Parameter	Reading
1	pH	6.55
2	TDS	85
3	Hardness	12
4	Chloride content	18
5	MPN	Absent

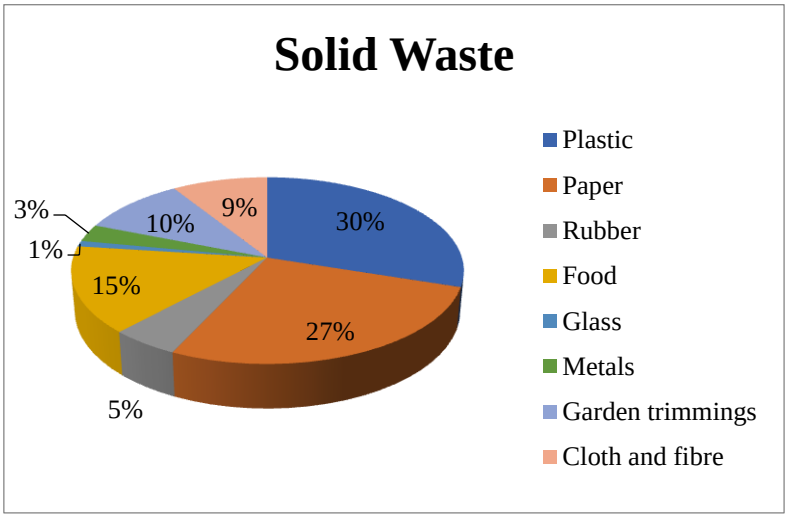

RAIN WATER HARVESTING
(RWH)

5.5 **Solid waste Audit:**

A waste audit is a physical analysis of waste composition to provide a detailed understanding of problems, identify potential opportunities, and give you a detailed analysis of your waste composition. A waste audit will help you clearly identify your waste generation to establish baseline or benchmark data, Characterize and quantify waste stream, Verify waste pathways, identify waste diversion opportunities and identify source reduction opportunities.

Solid waste is the unwanted or useless solid material generated from the human activities in residential, industrial or commercial area. Solid waste management reduce or eliminates the adverse impact on the environment and human health. Solid waste audit for Padmabhooshan Vasantraodada Patil Institute of Technology was carried out. The entire premise was analysed for solid waste generation and waste characterization. Overall waste was observed and characterization was done. The below table shows the components of solid waste at institute campus. Quartering method was used and 1 Kg of waste was selected.

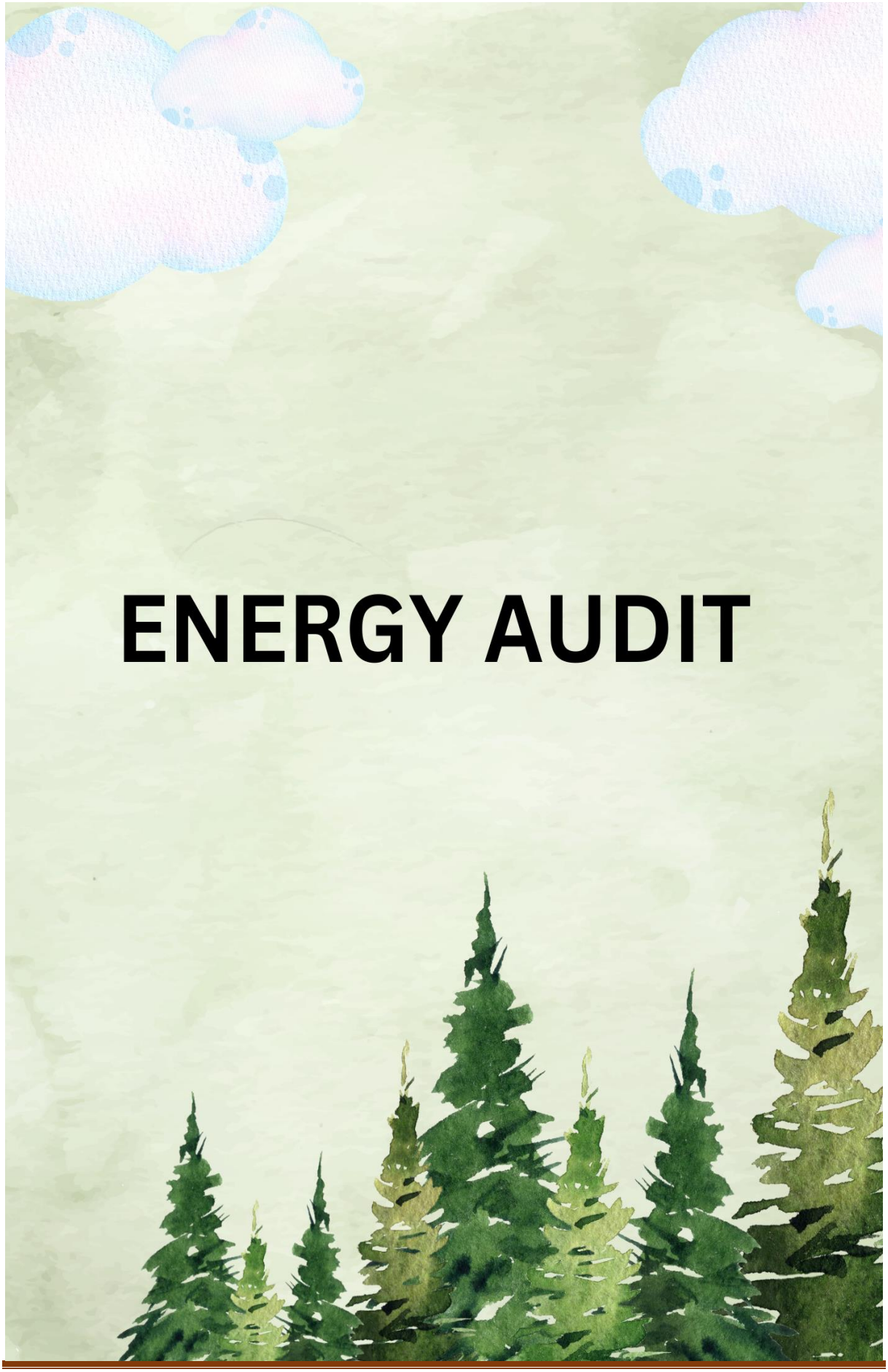
Sr. No.	Type of waste	Composition %
1	Plastic	30
2	Paper	27
3	Rubber	5
4	Food	15
5	Glass	1
6	Metals	3
7	Garden trimmings	10
8	Cloth and fibre	9



After analysing all the bins it was observed that plastic had highest contribution viz. 28% followed by the paper waste i.e. 27%. Mostly common observed plastic items were plastic wrappers of chips, soft drinks bottles and chocolate wrappers. The paper waste included paper wrappers, notebook pages, pamphlets and some pieces of cardboard. The third highest waste included garden trimmings. It included small grass, minute branches etc. The least contribution was of cloth, fibre, glass and metals.

Assessment of soil was done to determine the quality of soil:

Sr. No.	Test	Results
1	pH	**6.1**
2	NPK	**2:3:1**
3	Acidity	**151 mg/lit**
4	Hardness	**168 mg/lit**


ENERGY AUDIT

6. Energy Audit:

An energy audit is an inspection survey and an analysis of energy flows for energy conservation in a building. It may include a process or system to reduce the amount of energy input into the system without negatively affecting the output. In commercial and industrial real estate, an energy audit is the first step in identifying opportunities to reduce energy expense and carbon footprint.

A nation is tiring to advance in quantity and quality to the spread of education among the common India and development of their intelligence. In India the entire field of education and other fields of intelligent activities had been monopolized by a handful of men before independence. But today we are marching towards the desirable status of a developed nation with fast strides. But the development should be a sustained one. For achieving such an interminable development energy management is essential. As far as concerning electricity crisis, we are facing lack of electricity during office work. So, institutional management is taking design regarding production of electricity and saving electricity for Eco social aspect. Energy requirement of India is growing and incomplete domestic fossil fuel treasury. The country has motivated strategy to enlarge its renewable energy resources and policy to establish the nuclear power plants. India increases the involvement of nuclear power to largely electrical energy development facility from 4.2% to 9%. India's industrial demand accounted for 35% of electrical power requirement, domestic household use accounted for 28%, agriculture 21%, commercial 9%, and public lighting and other miscellaneous applications accounted for the rest. Energy conservation means reduction in energy consumption without making any sacrifice of quantity or quality

6.1 **Connection details:**

Institute receives electricity from State Electricity Distribution. Following are the details about connection.

- **Type of connection:** HT
- **Tariff:** HT (C) (II)
- **Contract demand:** 100 KVA
- **Feeder voltage:** 11 KV

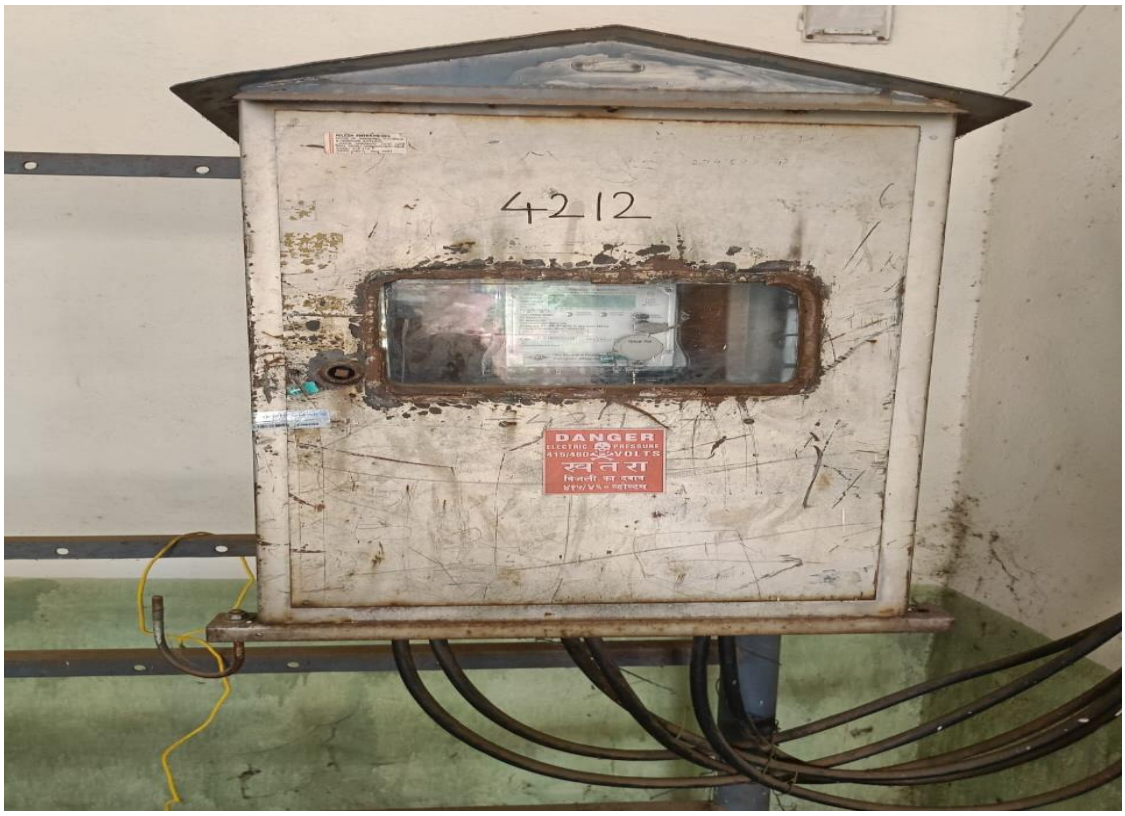
Tariff Structure:

As per Distribution Company, HT and LT consumers have an option to take Time of Day (TOD) tariff instead of the normal tariff. Under TOD tariff electricity consumption and maximum demand in respect of HT consumers for different periods of the day i.e. normal period, peak load period and off-peak load period could be recorded by installing TOD meter. The maximum demand and consumption recorded in different periods could be billed on the following rates of the tariff applicable.

TOD Tariffs	Rate % (Rs./Unit)
0000 Hrs- 0600 Hrs & 2200 Hrs- 2400 Hrs	-1.500
0600 Hrs- 0900 Hrs & 1200 Hrs- 1800 Hrs	0.000
0900 Hrs- 1200 Hrs	0.800
1800 Hrs- 2200 Hrs	1.100

Power Factor:

Power Factor (PF) is an indicator of efficient utilization of power. In an AC (Alternating Current) electrical power system, PF is defined as the ratio of real power flowing to the load, to the apparent power in the circuit and is a dimensionless number.



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3	Classroom S1	158	0.79	Good
4	Classrooms S2	136	0.75	Good
5	Laboratories	111	0.70	Good
6	Office	147	0.75	Good

Reasons for Good ILER:

- Proper placement of windows and doors so that natural light is available well.
- Good ventilation system.

Fitting Details:

LED: 547

Fans: 1914

PC: 880

Printers: 341

Tube lights: 1758

AC: 06

Water cooler: 16

CCTV: 35

6.1 **Sustainable practices:**

Solar Energy

Rain water harvesting

Waste Disposal Pit

Solid waste Dump pit

IMAGE GALLERY


कपॅसीटर बँक
DANGER
B बिल्डींग
C बिल्डींग
A बिल्डींग


Cummins
POWERICA
P.V.P/DG Set/Ele/P.No 1/6
• Generator •
125 KVA, 3Ø, 50 Hz, 415 V
Disel Engine 154 BHP Cummins Ltd.
FIRE

PADMABHOOSHAN VASANTRAODADA PATIL INSTITUTE OF TECHNOLOGY, SANGLI (BUDHGAON)

AUDIT REPORT

2018-2019

ENVIRONMENTAL & CIVIL ENGINEERING SOLUTIONS

ISO 9001: 2015, IEC 17025: 2017

Editorial

In the Era of global warming and climate change every citizen has to reduce their own carbon foot prints to tackle with the adverse impacts of climate change. A green audit of any academic institution revels ways in which we can reduce energy consumption, water use and reduction in emission of carbon dioxide in the environment. It is a process to look into and ask ourselves whether we are also contributing to the degradation of the environment and if so, in what manner and how we can minimize this contribution and bring down to zero and preserve our environment for future generation.

Padmabhooshan Vasantraodada Patil Institute of Technology administration has already taken a step towards the green approach and conducted green audit of campus in the year 2018-2019. As an outcome of this institute has taken green steps to reduce its carbon foot prints by several means in campus viz. sustainable fittings, tree plantation and green computing in the administration and examination. The responsibility of carrying out the scientific green audit was given to Environmental and Civil Engineering Solutions. The organization has followed the rules and regulation of Ministry of Environment and Forest, Govt. of India and Central Pollution Control Board, New Delhi.

During the preparation of the Audit Report Audit Report Hon. Principal and Vice principal, Dean IQAC encouraged us with their full support. IQAC and other officers of the institute also gave support to carry out this work. We also thank all Heads of the departments and the Co-ordinators gave full co-operation.

Nikhil N. Kamble
(C.E.O and Head)

Environmental and Civil Engineering Solutions

1. Introduction:

The modernization and industrialization are the two important outputs of twentieth century which have made human life more luxurious and comfortable. Simultaneously, they are responsible for voracious use of natural resources, exploitation of forests and wildlife, producing massive solid waste, polluting the scarce and sacred water resources and finally making our mother Earth ugly and inhospitable. Today, people are getting more familiar to the global issues like global warming, greenhouse effect, ozone depletion and climate change etc. Now, it is considered as a final call by mother Earth to walk on the path of sustainable development. The time has come to wake up, unite and combat together for sustainable environment.

Green Audit is the most efficient ecological tool to solve such environmental problems. It is a process of regular identification, quantification, documenting, reporting and monitoring of environmentally important components in a specified area. Through this process the regular environmental activities are monitored within and outside of the concerned sites which have direct and indirect impact on surroundings. Green audit can be one of the initiative for such institutes to account their energy, water resource use as well as wastewater, solid waste, E-waste, hazardous waste generation. Green Audit process can play an important role in promotion of environmental awareness and sensitization about resource use. It can create consciousness towards ecological values and ethics. Through green audit one can get direction about how to improve the condition of environment.

1.1 **Need of audit:**

Green auditing is the process of identifying and determining whether institutions practices are eco-friendly and sustainable. Traditionally, we are good and efficient users of natural resources. But over the period of time excess use of resources like energy, water, chemicals are become habitual for everyone especially, in common areas. Now, it is necessary to check whether our processes are consuming more than required resources? Whether we are handling waste carefully? Green audit regulates all such practices and gives an efficient way of natural resource utilization. In the era of climate change and resource depletion it is necessary to verify the processes and convert it in to green and clean one. Green audit provides an approach for it. It also increases overall consciousness among the people working in institution towards an environment.

1.2 **Goals of audit:**

Institute has conducted a audit with specific goals as:

1. Identification and documentation of green practices followed by college.
2. Identify strength and weakness in green practices.
3. Conduct a survey to know the ground reality about green practices.
4. Analyse and suggest solution for problems identified from survey.
5. Assess facility of different types of waste management.
6. Increase environmental awareness throughout campus.
7. Identify and assess environmental risk.
8. Motivates staff for optimized sustainable use of available resources.
9. The long term goal of the environmental audit program is to collect baseline data of environmental parameters and resolve environmental issue before they become problem.

1.3 **Objectives of Audit:**

1. To examine the current practices which can impact on environment such as of resource utilization, waste management etc.
2. To identify and analyse significant environmental issues.
3. Setup goal, vision and mission for Green practices in campus.
4. Establish and implement Environmental Management in various departments.
5. Continuous assessment for betterment in performance in green practices and its evaluation.
6. To prepare an Environmental Statement Report on green practices followed by different departments, support services and administration building.

1.4 **Benefits of Green Audit to an Educational Institute:**

There are many advantages of green audit to an Educational Institute:

1. It would help to protect the environment in and around the campus.
2. Recognize the cost saving methods through waste minimization and energy conservation.
3. Find out the prevailing and forthcoming complications
4. Empower the organization to frame a better environmental performance.
5. It portrays good image of institution through its clean and green campus.

2. Overview of Institute:

Padmabhooshan Vasantraodada Patil Institute of Technology was established in the year of 1983. Institute has huge area of 36.00 acres and has been serving the mankind in the field of Engineering and technology.

The landscaped grounds of college are widely admired for their beauty. The most valuable investment any educational institution can make is “Nurturing Future Leaders”. With the continuous rise in expectation of essential leadership standards, the institute has torch bearers have taken a responsibility for this investment to nurture the NextGen leaders with a vision to bridge the existing skill gap. With a firm step forward to attain an academic excellence, several Centres of Excellence, computer labs, and industry-academia associations has been setup at the College in association with the top leaders. The College believes that its primary stakeholders are the students. All aspects of education focus on the core values of contributing to national development while fostering global competencies among students. The College admits students from all social milieus and empowers them through intensive mentoring and counselling to face the challenges of life and become responsible and sensitized citizens of the country.

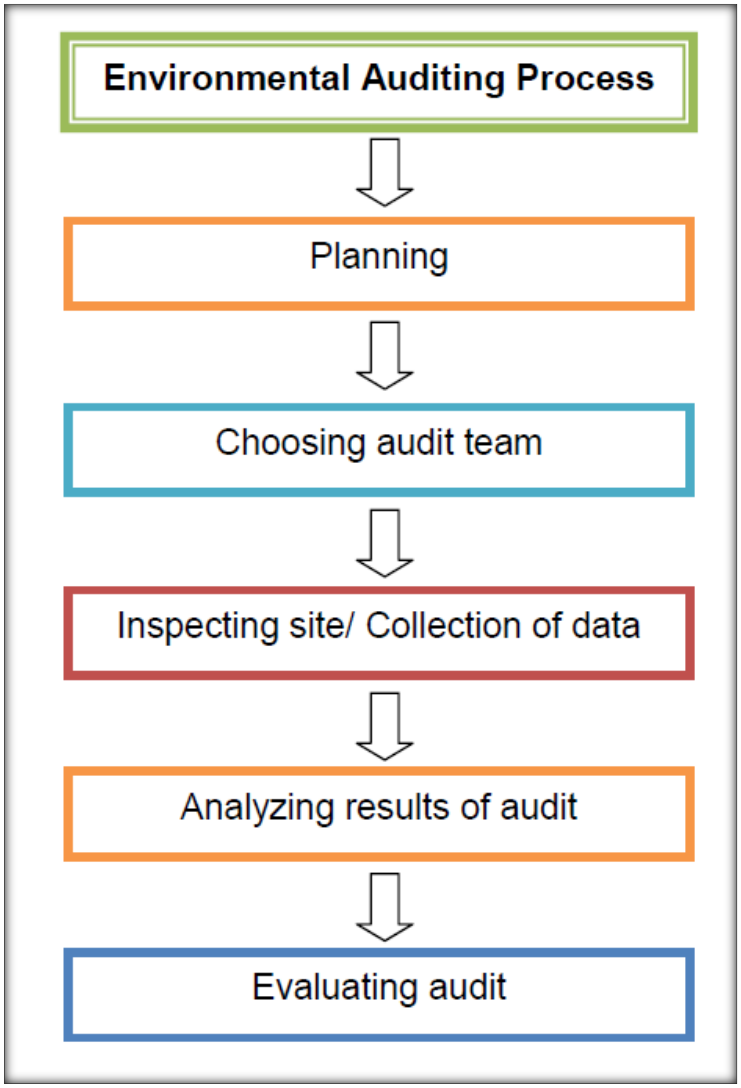
Vision:

To become a leading Institute in providing high quality technical & engineering education to the aspirants and serve the industry and society through excellent educational programmes, creativity and research.

Mission:

- To meet the short and long term engineering man power needs for Social, techno-economic development of region and nation, through teaching, research, consultancy and service.
- To contribute advancing of knowledge and wisdom in science and technology for the human welfare.
- To cultivate skills, lifestyle and habits of lifelong learning to adopt Knowledge based global civilization.
- To create highest standards of education with noble values of ethics, morality, integrity and humanity

3. Methodology:



3.1 **Audits to be carried out:**

- Green and carbon footprint audit
- Energy audit
- Environmental audit
    - Water audit
    - Wastewater audit
    - Solid waste audit


GREEN AUDIT

4. Green and Carbon footprint audit:

Green Audit is the most efficient ecological tool to solve such environmental problems. It is a process of regular identification, quantification, documenting, reporting and monitoring of environmentally important components in a specified area. Through this process the regular environmental activities are monitored within and outside of the concerned sites which have direct and indirect impact on surroundings. Green audit can be one of the initiative for such institutes to account their energy, water resource use as well as wastewater, solid waste, E-waste, hazardous waste generation. Green Audit process can play an important role in promotion of environmental awareness and sensitization about resource use. It can create consciousness towards ecological values and ethics. Through green audit one can get direction about how to improve the condition of environment.

Carbon is the basis of life on mother Earth. It is incorporated into the plants through photosynthesis, consumed by animal species through the food, presents in the form of carbon dioxide (CO_2) the atmosphere, locked into the rocks as limestone and compressed into the different fossil fuels such as coal and oil. As CO_2 level in the atmosphere continue to increase, most climate designs or project that the oceans of the world and trees will keep soaking up more than half CO_2 . The plants on land and in the sea, taken up carbon by over many years increased the percentage discharged during decay, and this increased carbon became locked away as fossil fuels beneath the surface of the planet. The starting of the 21st century brought growing concern about global warming, climate change, food security, poverty and population growth. In the 21st century more carbon has been released into the atmosphere than that has been absorbed. CO_2 is a principle component causing global warming. Atmospheric carbon dioxide levels have increased to 40 % from preindustrial levels to more than 390 parts per million CO_2. On this background it is a need of time to cover the research areas interrelated with climate change.

4.1 **Green Cover:**

Padmabhooshan Vasantraodada Patil Institute of Technology has got a huge green cover and has almost 26 species of vegetation inside the campus. The institute has 6.02 acres of campus and most of this is covered by green area. They have huge plantations along with variation in species Greenery is maintained well by the institute. .

Figure 4-1 Padmabhooshan Vasantraodada Patil Institute of Technology Campus

Institute has taken huge efforts to develop its green cover. The institute has about 6.02 acres of green cover. In the vicinity of the institute there are about approximately 1998 fully grown trees and more than a 98 growing plants. The below table shows some of the common tree species found.

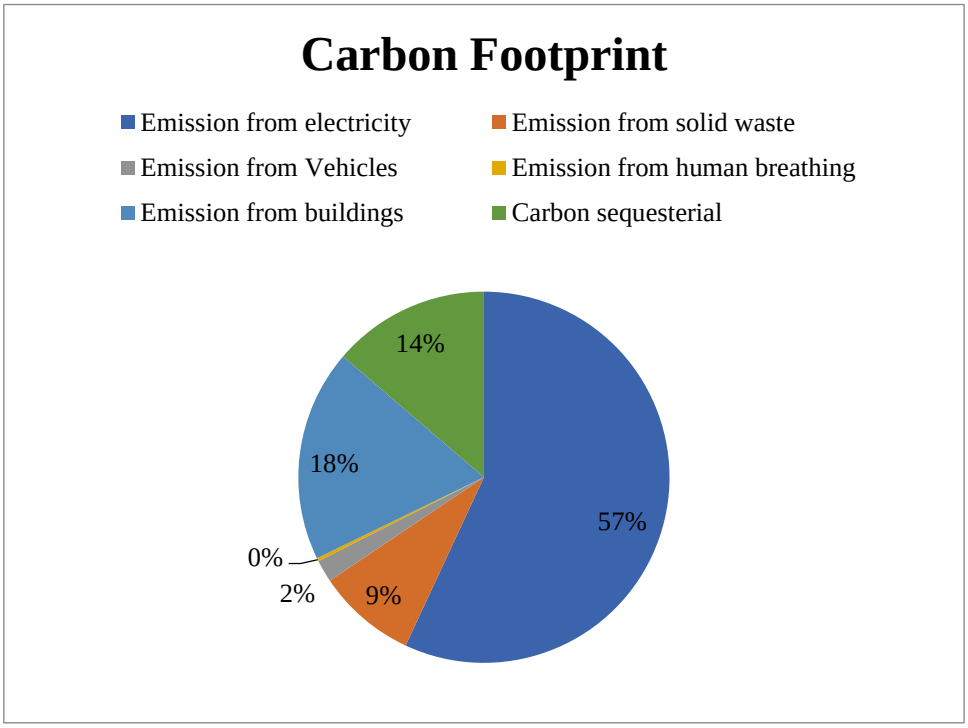
Species	Count	Species	Count
Pongame oil tree	49	Tamrind Tree	11
Mango tree	51	Blue berry(Jamun)	14
Coconut	18	Alma tree	1
Neem tree	75	Custered Apple	2
Banayan tree	19	Cherry	15
Bamboo tree	7	Ashok tree	18
Fig tree	5	Sandalwood Tree	9
Rubber tree	5	Rudrakshi Tree	2
Curry leaves tree	5	Champk Tree	6

Mostly there are trees of Mango, cherry and neem etc. Due to this the institute has high carbon sequesterial values. Considering the vicinity some dry plants were observed to approximately about 16. Plants absorb sunlight, 50% is absorbed and 30% reflected so this helps to create a cooler and more pleasant climate through a 3°C temperature reduction in the vicinity. This has also leaded to increase in biodiversity as more than 15 species of birds were observed. Some off the common birds were viz. Sparrow, wild parrots, little stint, black kite etc.

4.2 **Carbon Footprint Audit:**

Institute has estimated its carbon footprint by factor methodology. Various factors were used to estimate the carbon emissions from Consumption of electricity, generation of solid waste, use of vehicles in campus, carbon emissions due to human breathing and emissions from buildings. At last they have also calculated Carbon sequesterial value i.e. carbon that is absorbed by the plants.

Sr. No.	Section	Emission
1	Emission from electricity	4589.256 kg CO_2 eq.
2	Emission from solid waste	698.259 kg CO_2 eq.
3	Emission from Vehicles	155.702 Kg CO_2 eq.
4	Emission from human breathing	22.890 tons of CO_2 eq.
5	Emission from buildings	1489.000 kg CO_2 eq.
6	Carbon sequesterial	1105.901 kg CO_2 eq.



4.3 **Conclusion:**

- Highest carbon emission was observed from human breathing i.e. 22.89 tons of CO_2 eq. There is no any significant mean to reduce this number as it is not controllable.
- The next is solid waste. The emission from solid waste comprises of 689.259 kg CO_2 eq. This can be significantly reduced by following simple means. Waste segregation is properly observed by the institute and they should follow the cut out plastic plans. There should be complete ban in using the plastic inside the campus. There should be minimization of food waste as it contributes highest in carbon emissions.
- Considering emission from electricity they can be significantly reduced by decrease in electricity use. This can be done by installing LED lights and using energy efficient equipment's such as machines with high star ratings which save more. Institute can recognize renewable energy sources and have a setup in the institute. This can lead in significant saving of electricity and reduction in carbon emissions.
- Vehicles have the least emissions in the institute and it is due to the easy approached parking so that vehicles do not roam in the vicinity. All the vehicles travel hardly 200 m in the campus and this has led to lower emissions. Still institute can follows "NO Vehicle Day" on every 2nd Saturday of each month.
- Institute reduces about 1105.901 kg of CO_2 per by the means of plants. This could be increased by increasing in plantations. Institute can plant more trees in open areas avaliable.
- The plants having highest Carbon sequestration values are suggested. Cinnamomum verum, Eugenia caryophyllid, Bumelia celestina, Acacia Berland Eri, Acacia Francescana, Chinaberry tree and Buddleia cordata are some of the suggested species for plantation.


ENVIRONMENT
AUDIT

5. Environmental Audit:

An environmental audit is a type of evaluation intended to identify environmental compliance and management system implementation gaps, along with related corrective actions. ISO 14001 is a voluntary international standard for environmental management systems ("EMS"). ISO 14001:2004 provides the requirements for an EMS and ISO 14004 gives general EMS guidelines. An EMS meeting the requirements of ISO 14001:2004 is a management tool enabling an organization of any size or type to:

- Identify and control the environmental impact of its activities, products or services;
- Improve its environmental performance continually, and
- Implement a systematic approach to setting environmental objectives and targets, to achieving these and to demonstrating that they have been achieved.

The audit examines the potential hazards or risks posed by the institutes. Areas examined may include environmental policies and procedures, energy use practices, recycling, waste, conservation, and pollution. Then, the institute can use the results to determine what changes need to be made for compliance. In a broad sense, environmental auditing aims to help protect the environment and minimize the risks of business activities to the environment and human safety and health.

5.1 **Water Audit and wastewater audit:**

Water auditing is a method of quantifying water flows and quality in systems, with a view to reducing water usage and often saving money on otherwise unnecessary water use. Water audit is an effective management tool for minimizing losses, optimizing various uses and thus enabling considerable conservation of water. Water audits trace water use from its point of entry into the facility/system to its discharge into the sewer/river/canal etc. Wastewater audit deals with effective management of wastewater in the system. It deals with proper generation, management, treatment, transfer and disposal of wastewater.

Padmabhooshan Vasantraodada Patil Institute of Technology has carried out its water and wastewater audit and has suggested many more ways for water conservation, reuse and recycle. The detail water and waste water report is mentioned below.

5.2 **Water Audit report:**

Water audit for the "Padmabhooshan Vasantraodada Patil Institute of Technology" was carried out. The purpose of the water audit is to provide a thorough understanding of the water uses by identifying and measuring all water using fixtures, appliances, and practices in order to recommend potential water saving efficiencies.

PRIMARY DATA

Sr. No.	Title	Information
1	**Name of Institute**	Padmabhooshan Vasantraodada Patil Institute of Technology
2	**Address**	Sangli
3	**Name of company under which water audit is carried out**	Environmental and Civil Engineering Solutions, Sangli
4	**Number of floors**	G + 3 (Variablle)
5	**Category of building**	Educational Institute
6	**Nearest ESR location**	Campus
7	**Water supply hours**	3 hrs. daily
8	**Water meter present**	No

POPULATION DETAILS

Title	Information
Fixed population (Working staff and Students)	Gents: 916
	Ladies: 1925
Variable population (Visiting persons)	Gents: 26
	Ladies: 28

SOURCE INFORMATION

Title	Information
Sources of water	Corporation water and bore-well
Connection details	1" PVC pipe inlet and 1" outlet distribution pipe

STORAGE DETAILS

Title	Information
Overhead tank type	PVC and RCC tank
Location	On terrace
Number of tanks	15 PVC Tanks 5000 Liters average
Motor connection details	10 Hp and 3 Hp X 4 for bore well
Pumping period	4 hours daily
Underground sump	Yes

WATER USAGE

Toilet	Number of users	Water consumption
Gents toilet	916 users	916 X 10 lit = 9160
Washbasin	2841 users	2841 X 0.75 lit = 2130
Ladies toilet	1925 users	1925 X 12 lit = 23100
Toilet cleaning	2500 liters	2500 liters
Floor cleaning	1500 liters	2500 liters
Gardening	1500 liters	1500 liters
Laboratories	5000 liters	5000 liters
Total		**45,890 lit**

5.3 **Waste water audit:**

Padmabhooshan Vasantraodada Patil Institute of Technology campus generates huge amount of wastewater. The source for wastewater in the campus is hostels, institute, mess and the washrooms and urinals inside the campus. To estimate the amount of wastewater generated all the water that is used in the washrooms, quarters and hostels is considered as wastewater.

Sr. No.	Section	Wastewater generated in litres
1	Water usage generated in campus	**45,890**
Waste water generated		**34,418**

5.4 **RO plant at institute:**

Padmabhooshan Vasantraodada Patil Institute of Technology has dedicated RO water treatment plant installed in the campus. The details of the plant are:

- Daily input water = 6000 Litres/hrs
- Daily reject water = 2000 Litres/hrs

The table below shows the quality of RO water.

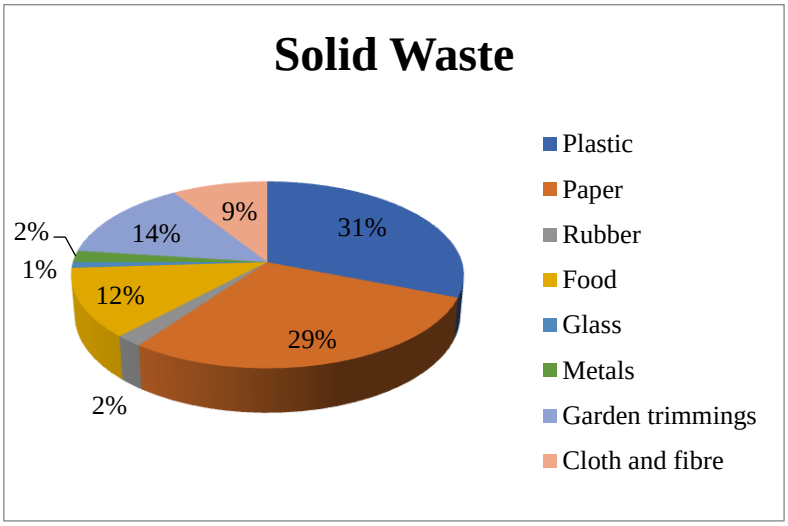
Sr. No.	Parameter	Reading
1	pH	6.75
2	TDS	91
3	Hardness	66
4	Chloride content	75
5	MPN	Absent

5.5 **Solid waste Audit:**

A waste audit is a physical analysis of waste composition to provide a detailed understanding of problems, identify potential opportunities, and give you a detailed analysis of your waste composition. A waste audit will help you clearly identify your waste generation to establish baseline or benchmark data, Characterize and quantify waste stream, Verify waste pathways, identify waste diversion opportunities and identify source reduction opportunities.

Solid waste is the unwanted or useless solid material generated from the human activities in residential, industrial or commercial area. Solid waste management reduce or eliminates the adverse impact on the environment and human health. Solid waste audit for Padmabhooshan Vasantraodada Patil Institute of Technology was carried out. The entire premise was analysed for solid waste generation and waste characterization. Overall waste was observed and characterization was done. The below table shows the components of solid waste at institute campus. Quartering method was used and 1 Kg of waste was selected.

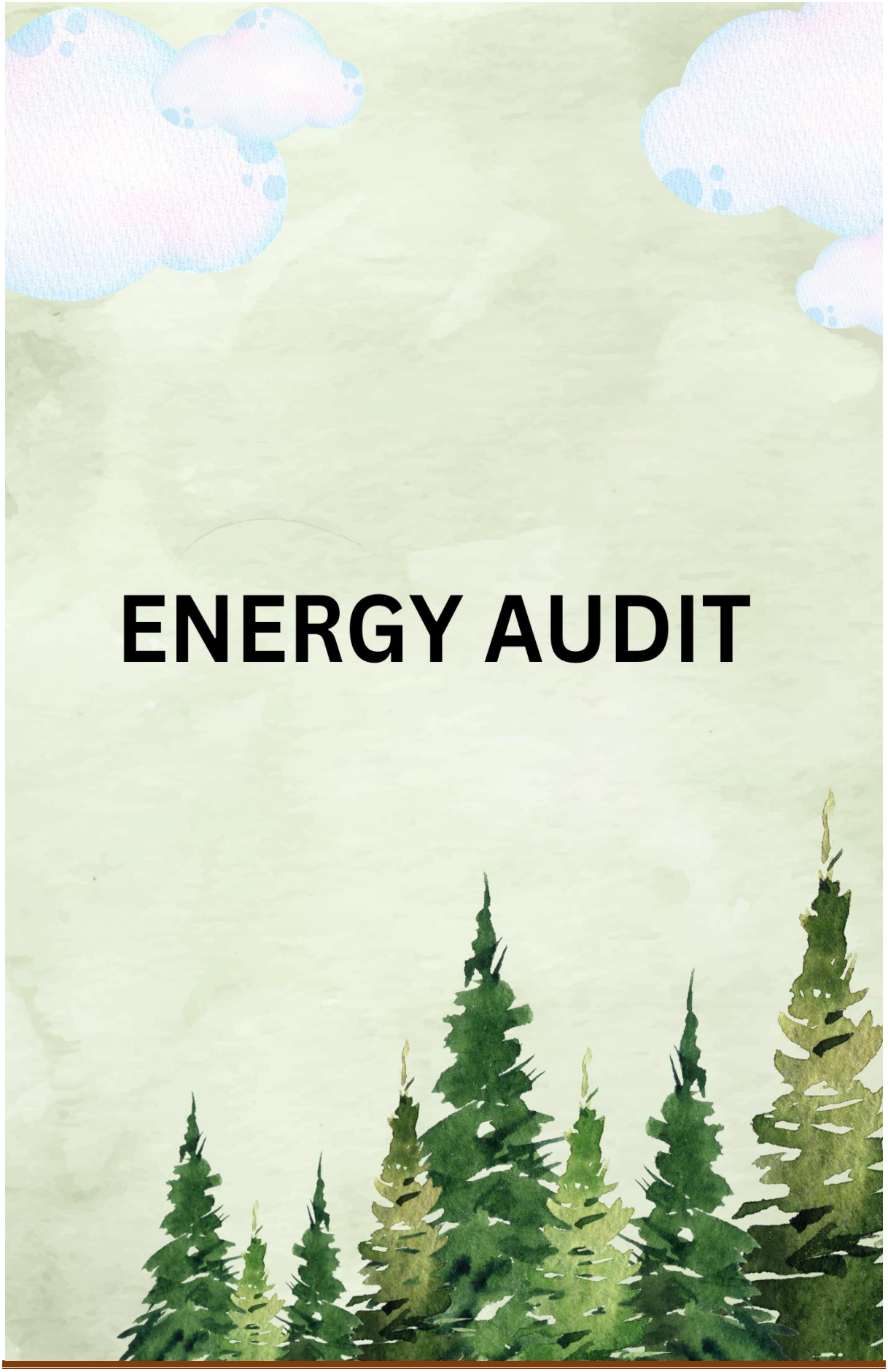
Sr. No.	Type of waste	Composition %
1	Plastic	31
2	Paper	29
3	Rubber	2
4	Food	12
5	Glass	1
6	Metals	2
7	Garden trimmings	14
8	Cloth and fibre	9



After analysing all the bins it was observed that plastic had highest contribution viz. 31% followed by the paper waste i.e. 29%. Mostly common observed plastic items were plastic wrappers of chips, soft drinks bottles and chocolate wrappers. The paper waste included paper wrappers, notebook pages, pamphlets and some pieces of cardboard. The third highest waste included garden trimmings. It included small grass, minute branches etc. The least contribution was of cloth, fibre, glass and metals.

Assessment of soil was done to determine the quality of soil:

Sr. No.	Test	Results
1	pH	**6.1**
2	NPK	**2:3:1**
3	Acidity	**144 mg/lit**
4	Hardness	**171 mg/lit**


ENERGY AUDIT

6. Energy Audit:

An energy audit is an inspection survey and an analysis of energy flows for energy conservation in a building. It may include a process or system to reduce the amount of energy input into the system without negatively affecting the output. In commercial and industrial real estate, an energy audit is the first step in identifying opportunities to reduce energy expense and carbon footprint.

A nation is tiring to advance in quantity and quality to the spread of education among the common India and development of their intelligence. In India the entire field of education and other fields of intelligent activities had been monopolized by a handful of men before independence. But today we are marching towards the desirable status of a developed nation with fast strides. But the development should be a sustained one. For achieving such an interminable development energy management is essential. As far as concerning electricity crisis, we are facing lack of electricity during office work. So, institutional management is taking design regarding production of electricity and saving electricity for Eco social aspect. Energy requirement of India is growing and incomplete domestic fossil fuel treasury. The country has motivated strategy to enlarge its renewable energy resources and policy to establish the nuclear power plants. India increases the involvement of nuclear power to largely electrical energy development facility from 4.2% to 9%. India's industrial demand accounted for 35% of electrical power requirement, domestic household use accounted for 28%, agriculture 21%, commercial 9%, and public lighting and other miscellaneous applications accounted for the rest. Energy conservation means reduction in energy consumption without making any sacrifice of quantity or quality

6.1 **Connection details:**

Institute receives electricity from State Electricity Distribution. Following are the details about connection.

- **Type of connection:** HT
- **Tariff:** HT (C) (II)
- **Contract demand:** 100 KVA
- **Feeder voltage:** 11 KV

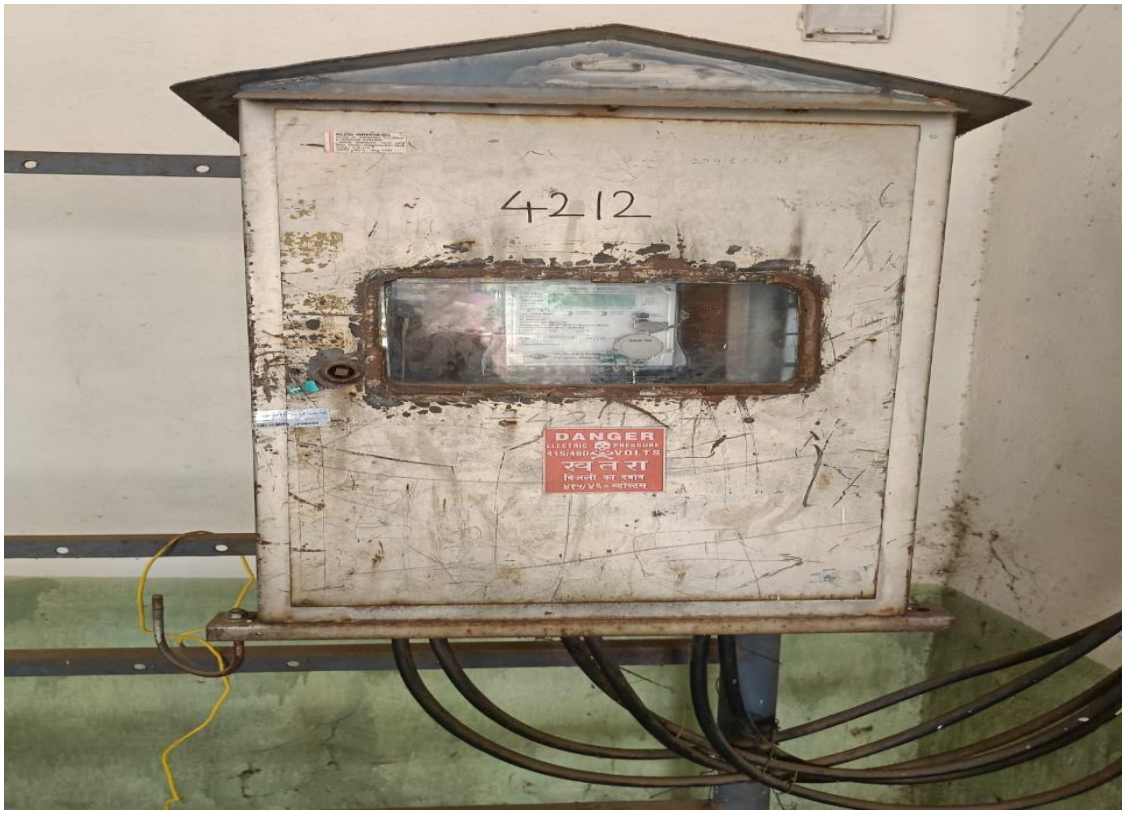
Tariff Structure:

As per Distribution Company, HT and LT consumers have an option to take Time of Day (TOD) tariff instead of the normal tariff. Under TOD tariff electricity consumption and maximum demand in respect of HT consumers for different periods of the day i.e. normal period, peak load period and off-peak load period could be recorded by installing TOD meter. The maximum demand and consumption recorded in different periods could be billed on the following rates of the tariff applicable.

TOD Tariffs	Rate % (Rs./Unit)
0000 Hrs- 0600 Hrs & 2200 Hrs- 2400 Hrs	-1.500
0600 Hrs- 0900 Hrs & 1200 Hrs- 1800 Hrs	0.000
0900 Hrs- 1200 Hrs	0.800
1800 Hrs- 2200 Hrs	1.100

Power Factor:

Power Factor (PF) is an indicator of efficient utilization of power. In an AC (Alternating Current) electrical power system, PF is defined as the ratio of real power flowing to the load, to the apparent power in the circuit and is a dimensionless number.



6.2 **Bill analysis:**

Bill analysis for Padmabhooshan Vasantraodada Patil Institute of Technology had been done for academic year 2018-2019.

Sr. No.	Month	Power factor	Bill Amount
1	**June 18**	1.0	3,68,230/-
2	**July 18**	1.0	2,98,690/-
3	**August 18**	1.0	3,39,840/-
4	**September 18**	1.0	7,78,900/-
5	**October 18**	1.0	9,60,430/-
6	**November 18**	1.0	7,51,559/-
7	**December 18**	1.0	7,03,810/-
8	**January 19**	1.0	7,80,200/-
9	**February 19**	1.0	7,66,300/-
10	**March 19**	1.0	6,15,510/-
11	**April 19**	1.0	4,96,920/-
12	**May 19**	1.0	4,82,710/-

6.3 **ILER analysis:**

Lighting is provided in industries, commercial buildings, indoor and outdoor for providing comfortable working environment. The primary objective is to provide the required lighting effect for the lowest installed load i.e. highest lighting at lowest power consumption. The purpose of performance test is to calculate the installed efficacy in terms of lux/watt/m² (existing or design) for general lighting installation. The calculated value can be compared with the norms for specific types of interior installations for assessing improvement options.

Range	Condition
0.5 or less	Urgent activity required (UAR)
0.51 - 0.70	Review Suggested (RS)
0.70- above	Good

ILER analysis for various sections in the institute was carried out. Firstly using LUX meter illumination was measured and then numerical analysis was carried out. ILER gives idea about lighting conditions and measured regarding improving them.

Sr. No.	Section	LUX reading	ILER	Condition
1	Library	141	0.77	Good
2	Study room	158	0.80	Good
3	Classroom S1	160	0.81	Good
4	Classrooms S2	148	0.72	Good
5	Laboratories	122	0.75	Good
6	Office	158	0.76	Good

Reasons for Good ILER:

- Proper placement of windows and doors so that natural light is available well.
- Good ventilation system.

Fitting Details:

LED: 560

Fans: 1584

PC: 899

Printers: 360

Tube lights: 1758

AC: 06

Water cooler: 16

CCTV: 35

6.1 **Sustainable practices:**

Solar Energy

Rain water harvesting

Waste Disposal Pit

Solid waste Dump pit

IMAGE GALLERY


4212
DANGER
ELECTRIC PRESSURE
415/480 VOLTS
खतरा


4212
"Property of MSEDCL"
Optical Port
DANGER