



AGNIHOTRI COLLEGE OF PHARMACY. WARDHA



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 reveals 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.

Agnihotri College of Pharmacy, Wardha 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 Hon. Principal, Dean Academics and IQAC encouraged us with their full support and the audit team wants to mention a warm vote of thanks towards them.



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.)

Mr. Smithesh L. Bhatt

B. E. (Civil. Eng.)

Miss. Maithilee N. Kamble

M.B.A, B. Tech. (Mech. Eng.)

Mrs. Seema N. Kamble

Director, ECS, B. E. (Electrical)



Institutional Audit Committee

Dr. Dharmendra R. Mundhada

(Principal)

Dr. Prasad P. Jumade

(Officiating Principal)

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 Swachh 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.

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.

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.

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.

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. Green Audit has become mandatory procedure for educational institutes under Criterion of NAAC. 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.

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.

Overview of Institute:

Agnihotri College of Pharmacy, Wardha was established in the year of 2001. Institute has huge area, infrastructure and been serving the mankind in the field Science 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, 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.

Agnihotri college of Pharmacy is fully dedicated to profession of Pharmacy and to mankind. The college has adequate infrastructure as per A.I.C.T.E. and P. C. I. norms. The various laboratories in the college are well equipped with latest equipment’s required to provide the

best hands on training to each and every budding pharmacist. Besides, the college has additional facilities such as pilot, sophisticated instrument laboratories, computer laboratories with internet facilities where the students gain practical exposure and a realistic approach to become a full-fledged pharmacist and become acquainted with latest developments in pharmaceutical field. Also, the college owns a Medicinal Plants garden with a diverse variety of medicinal plants in it. The college has an inbuilt Animal House with standards as per guidelines of Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA) and which works in accordance with Institutional Animal Ethics Committee (IAEC). The college library has wide range of books, periodicals, national and international journals, reference books and educational software & newspapers to fulfil the academic needs of the students. For students, library also provides book bank facility. The Institute emphasizes on practical and industrial training and organizes academic tours for students of their respective disciplines in order to enhance their learning through practical experience. The campus is located just 1.5 km from Wardha main railway station as well as from bus stand and around 4 km from Sevagram railway station.

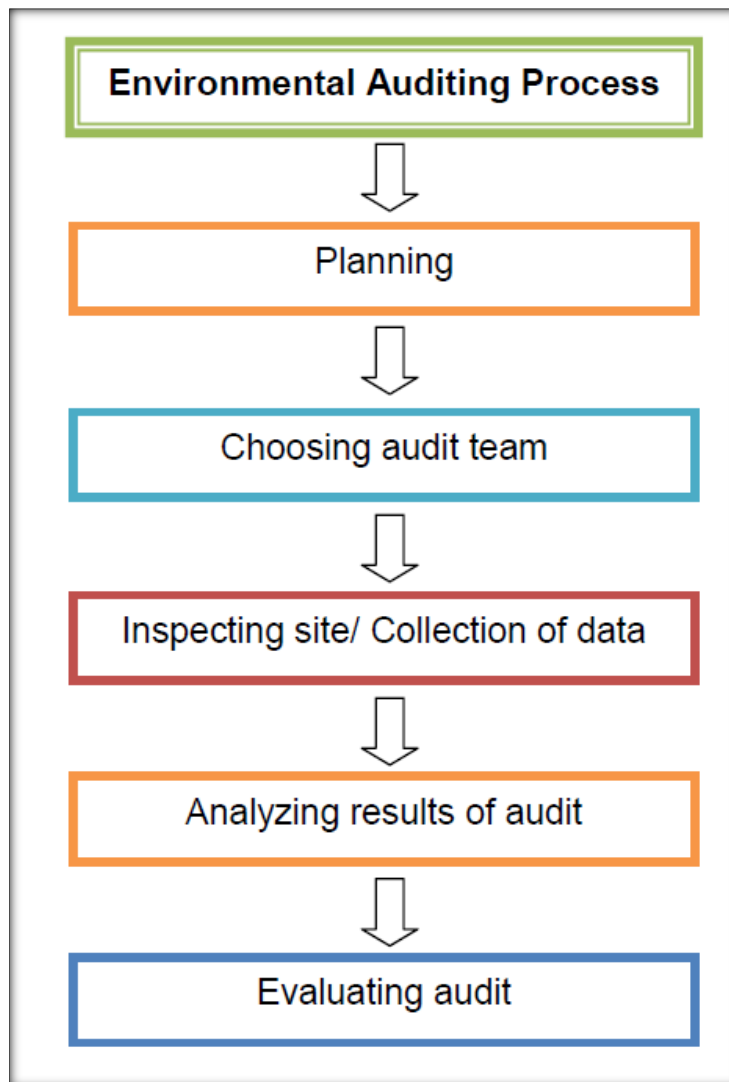
Vision of the institute:

To become a creative educational centre where innovations become a tool so as to build a budding Pharmacist

Mission of the institute:

To provide a comprehensive and progressive education that prepares pharmacists to assume an active role in providing skilled, ethical and compassionate patient care that improves the health and quality of life.

Methodology:



Audits to be carried out:

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



GREEN AUDIT

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 (CO₂) the atmosphere, locked into the rocks as limestone and compressed into the different fossil fuels such as coal and oil. As CO₂ 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 CO₂. 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. CO₂ 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 CO₂. On this background it is a need of time to cover the research areas interrelated with climate change.

Green Cover at ACOP:

ACOP has got a huge green cover and has almost 8 species of vegetation inside the campus. The institute has huge campus and most of this is covered by green area. Institute has huge plantations along with variation in species Greenery is maintained well by the institute. .



Figure 0-1 ACOP, Campus

ACOP has taken huge efforts to develop its green cover. In the vicinity of the institute there is huge vegetation along the road side and around the campus. The below table shows different species of trees available in the campus and vicinity.

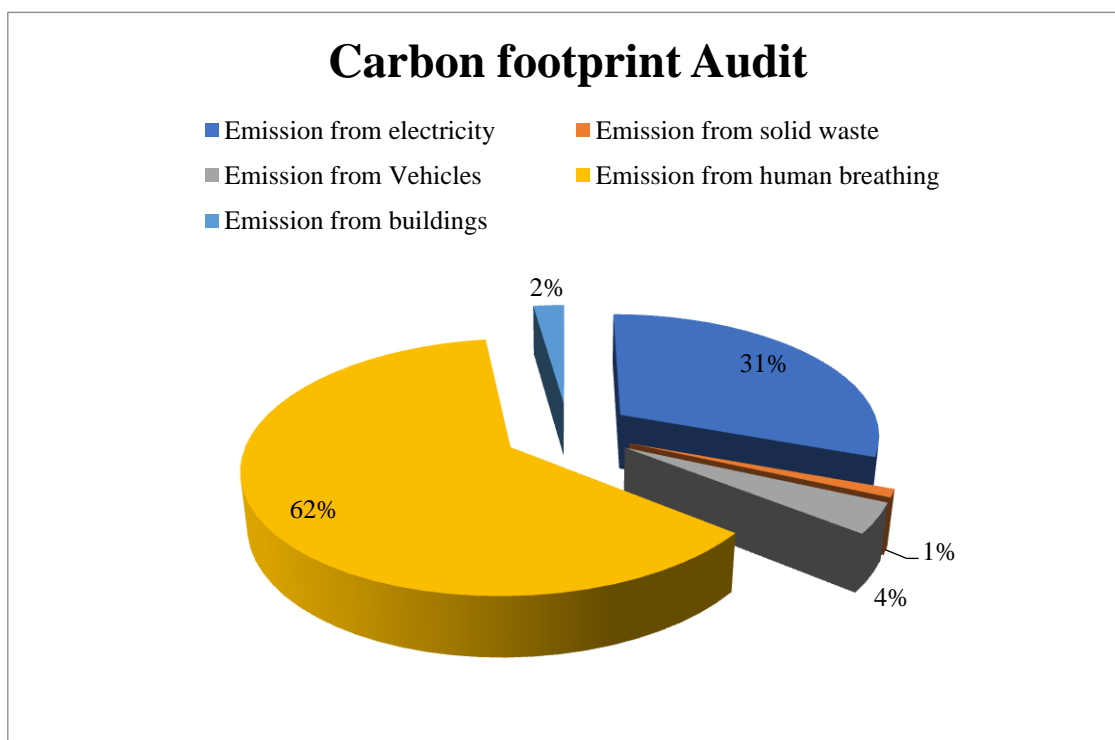
Species	Count
Neem	4
Pimpal	1

Mostly there are trees of Neem, and Pimpal. Due to this the institute has high carbon sequestration values. Considering the vicinity some dry plants were observed to approximately about 9. 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 led to an increase in biodiversity as more than 6 species of birds were observed. Some of the common birds were viz. Sparrow, wild parrots, little stint, black kite and crow etc.

Carbon Footprint Audit:

ACOP 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	3234.9 kg CO ₂ eq./year.
2	Emission from solid waste	4427.26 kg CO ₂ eq. per year.
3	Emission from Vehicles	18001 kg CO ₂ eq. per year.
4	Emission from human breathing	37.3 tons of CO ₂ eq. per year.
5	Emission from buildings	2019.99 kg CO ₂ eq. per year.
6	Carbon sequesterial	69 kg CO ₂ eq. per year.



Hence as per the calculation the carbon emission for electricity is 3234.9 kg CO₂ eq./year. Secondly considering emissions from human breathing, the institute has total 373 students and staff. 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 ACOP has various parking sections in the campus. It was found that averagely 630 vehicles entered the institute daily and travel about 550 m of distance from the

gate. Cars also enter the institute and as per observation 11 cars are observed daily. Hence the overall the institute emits 18001 Kg CO₂ eq. per year.

Solid waste is very important as it emits significant amount of carbon through it. ACOP has a good solid waste management system. Hence the institute develops about 5120 kg of waste daily in both the form of wet and dry. Hence the emission is about 4427.26kg CO₂ eq. per year. 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 10099.95 sq. ft and the carbon emission were 2019.99 kg CO₂ eq. per year. Carbon sequesterial in important as it is the carbon absorbed by the trees. ACOP campus has 8 fully grown trees in the campus; hence the sequesterial value is about 69 kg CO₂ eq. per year.

Conclusion:

- Highest carbon emission was observed from human breathing i.e. 37.30 tons of CO₂ eq. per. Year. 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 4427.27 kg CO₂ eq. per year. 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 ACOP and it is due to the easy approached parking so that vehicles do not roam in the vicinity. All the vehicles travel hardly 550 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 69 kg of CO₂ per year by the means of plants. This could be increased by increasing in plantations. ACOP can plant more trees next to various sections, surrounding to play ground.
- The plants having highest Carbon sequestration values are suggested. Cinnamomum verum, Eugenia caryophyllid, Bumelia celestina, Acacia Berland Eri, Acacia Francescana, Chinaberry tree, Moringa oleifer, Carya illusoriness, Pinus Arizonian and Buddleia cordata are some of the suggested species for plantation.



SUSTAINABLE PRACTICES

ACOP follows sustainable practices in the section of water, energy and waste management.

LED Tubes



Institute has almost 4 LED tubes present in various sections viz. classrooms, office and laboratories. The main advantages of having LED tubes are:

- **Long Lifespan:** Compared to the lifespan of your average incandescent bulb, the lifespan of a LED light is far superior. The average incandescent bulb lasts about a thousand hours. The lifespan of an average LED light is 50,000 hours. Depending on how you use it, its life may be as long as 100,000 hours. This means that an LED light can last anywhere from six to 12 years before you need to replace it. That is 40 times longer than an incandescent bulb. As such, savings extend not only to replacement costs but also to the maintenance costs of your company's lighting bill.
- **Energy Efficiency:** Another one of the leading LED lighting advantages is their energy-efficient operation. You can measure the energy efficiency of a lighting source

in useful lumens, which describes the amount of lighting that the device emits for each unit of power, or watt, that the bulb uses. If you replaced all the lighting in your office, school or other facility with LEDs, you could see as much as a 60% to 70% improvement in your overall energy savings. In some cases, the improvement could be as great as 90%, depending on what kind of lights you are replacing and what kind of LED lights you are using.

- **Improved Environmental Performance:** It is becoming increasingly important for companies to become eco-friendly. Customers increasingly want environmentally friendly options and using an environmentally friendly light source can help companies reduce their energy use, as well as attract a socially conscious consumer base. The environmental benefits of LED lighting also extend to their manufacturing process. Many traditional lighting sources, like fluorescent lighting and mercury vapour lights, use mercury internally as part of their construction. Because of this, when they reach the end of their lifespans, they require special handling. You do not have to worry about any of these issues with LED lights.
- **No Heat or UV Emissions:** LEDs emit almost no heat, and most of the light they emit is within the visible spectrum. This feature is one reason that medical experts are looking at LEDs as a possible solution for Seasonal Affective Disorder (SAD), which affects many people during the darker months of the year. It also makes LEDs ideal for illuminating works of art that will degrade or break down over time with exposure to UV rays.
- **Low Voltage Operation:** If your business is in a location where flooding may occur, you want to be able to light your facility with devices that require as little voltage as possible. LEDs are perfect for this because they operate on very low voltage. When you use a low-voltage system in areas that may be prone to flooding, you are protecting your staff and others from potentially harmful or fatal shocks. If, during a flood clean-up, someone mistakenly touches some electrical component, a low-voltage lighting system that generates 12 volts is much safer than a line voltage system that generates 120 volts.

Open well water system



Institute has Open well in its campus and it acts as the primary source of water. The main advantage of having the open well system is that the institute reduces the load on Municipal Corporation and the supply water is throughout the year from the well.

RO Water system



The problem with drinking tap water is that it contains harmful toxins and inorganic compounds such as lead, which in excess can cause high blood pressure and kidney problems. Because of the pollution in our environment and the deterioration of natural resources, we need a way to filter out these pollutants in our drinking water. The main reason for the RO water purification to be so much in demand is its ability to remove impurities from the water. It is able to clean around 97 percentages of bacteria, virus and other elements that can cause serious health problems. The likes of micro particles which are smaller than 10 microns can also be removed by an RO purifier.

Septic tanks



Septic tanks are secure systems for storing and subsequently disposing of faecal waste. A simple decantation and sedimentation process eliminates any solids in the wastewater, thus preventing them from contaminating the soil or freshwater sources. Institute has installed septic tanks and they offer effective pre-treatment before the water purification phase since they are inexpensive. They don't produce foul odour and prevents the appearance of pests, such as flies and mosquitoes.

Fire Extinguisher

ACOP have installed fire extinguishers at every necessary section in the premises. These help easily as they are portable fire extinguishers and can be quickly brought to the scene of a fire.



Rain Water harvesting system:





ENVIRONMENT AUDIT

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.

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.

ACOP 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.

Water Audit report:

Water audit for the “ACOP” 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	Agnihotri College of Pharmacy
2	Address	Wardha 442001
3	Name of company under which water audit is carried out	Environmental and Civil Engineering Solutions, Sangli
4	Number of floors	G + 3 (Variable)
5	Category of building	Educational Institute
6	Nearest ESR location	NA
7	Water supply hours	NA
8	Water meter present	No

POPULATION DETAILS

Title	Information
Fixed population (Working staff and Students)	Gents: 185
	Ladies: 188
Variable population (Visiting persons)	Gents: 24
	Ladies: 18

SOURCE INFORMATION

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

STORAGE DETAILS

Title	Information
Overhead tank type	PVC tank
Location	On terrace
Number of tanks	2 X 2,000 lit PVC 1 X 1,000 lit PVC
Motor connection details	5 Hp for Open well 3 Hp for Ground water tank
Pumping period	4 hours daily
Underground sump	Yes
Capacity of underground sump	15000 Lit RCC

WATER USAGE

Toilet	Number of users	Water consumption
Gents toilet	185 users	185 X 15 lit = 2775
Washbasin	373 users	373 X 0.75 lit = 279
Ladies toilet	188 users	188 X 18 lit = 2284
Toilet cleaning	600 liters	600 liters
Floor cleaning	1500 liters	1500 liters
Gardening	1500 liters	1500 liters
Laboratories	2500 liters	2500 liters
Total		12,538 lit

SCHEDULE OF TOILETS AND WASHROOMS:

Number of Students and staff toilets in each floor

Sr. No.	Toilet	Boys	Girls	Staff
1	Ground floor	0	0	0
2	First floor	1	1	0
3	Second floor	1	1	0
4	Third floor	0	0	0

WATER USED FOR DRINKING

There are coolers cum water purifiers present in the institute. Sample assessment for 3 months was done and average values are presented below for each section.

Potable water assessment:**Open well assessment**

Sr. No.	Test	Results	Limit
1	pH	7.7	6.5-8.5
2	TDS	1358	-
3	E.C	2875	-
4	Hardness	177	200
5	Chlorides	117	200
6	MPN	Ab	1.0
7	Odor and Color	Ab	-

Main RO plant

Sr. No.	Test	Results	Limit
1	pH	6.6-7.1	6.5-8.5
2	TDS	101	-
3	E.C	111	-
4	Hardness	118	200
5	Chlorides	106	200
6	MPN	Ab	1.0
7	Odor and Color	Ab	-

Testing specifications:

Test	ISO Code
pH	ISO 3025:11 (1993)
TDS	ISO 3025: 16 (1984)
E.C	ISO 3025: 14 (1984)
Total Hardness	ISO 1055: 12 (2012)
Chloride	ISO 3025: 40 (1991)
MPN	ISO 9308: 2 (2012)



Waste water audit:

ACOP 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 and hostels is considered as wastewater.

Sr. No.	Section	Wastewater generated in litres
1	Water usage generated in campus	12,538.75
Waste water generated		9404.06

Waste water treatment plant at ACOP:

Currently ACOP lets all its waste water into sewers. Currently there is no any waste treatment facility. Sampling of waste water was done for 3 months for the parameters of COD, BOD, TKN and pH. Following table shows the characterization of wastewater.

Sr. No.	Parameter	Reading
1	pH	7.12
2	COD	205
3	BOD	111
4	TKN	27

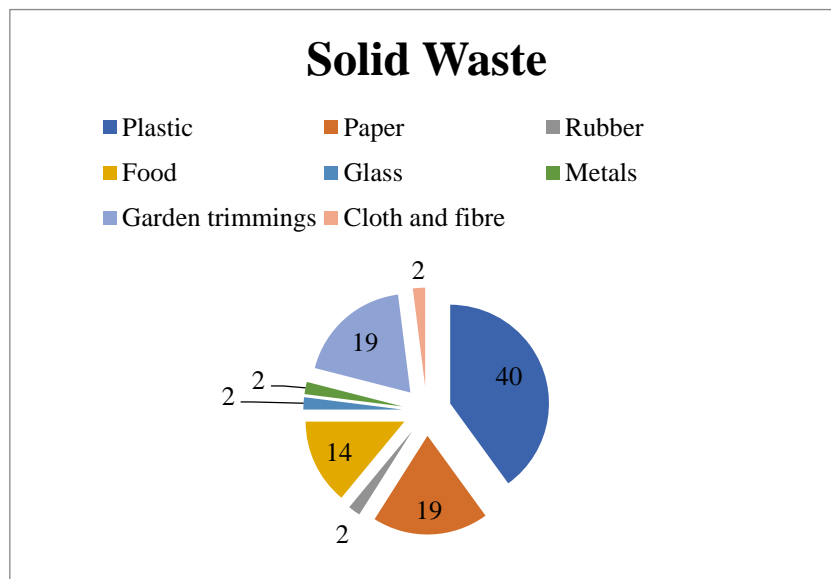


Solid waste Audit:

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 ACOP 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 ACOP campus. Quartering method was used and 1 Kg of waste was selected.

Sr. No.	Type of waste	Composition %
1	Plastic	38
2	Paper	20
3	Rubber	10
4	Food	9
5	Glass	5
6	Metals	7
7	Garden trimmings	8
8	Cloth and fibre	3



After analysing all the bins it was observed that plastic had highest contribution viz. 38% followed by the paper waste i.e. 20%. 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 rubber gloves etc.

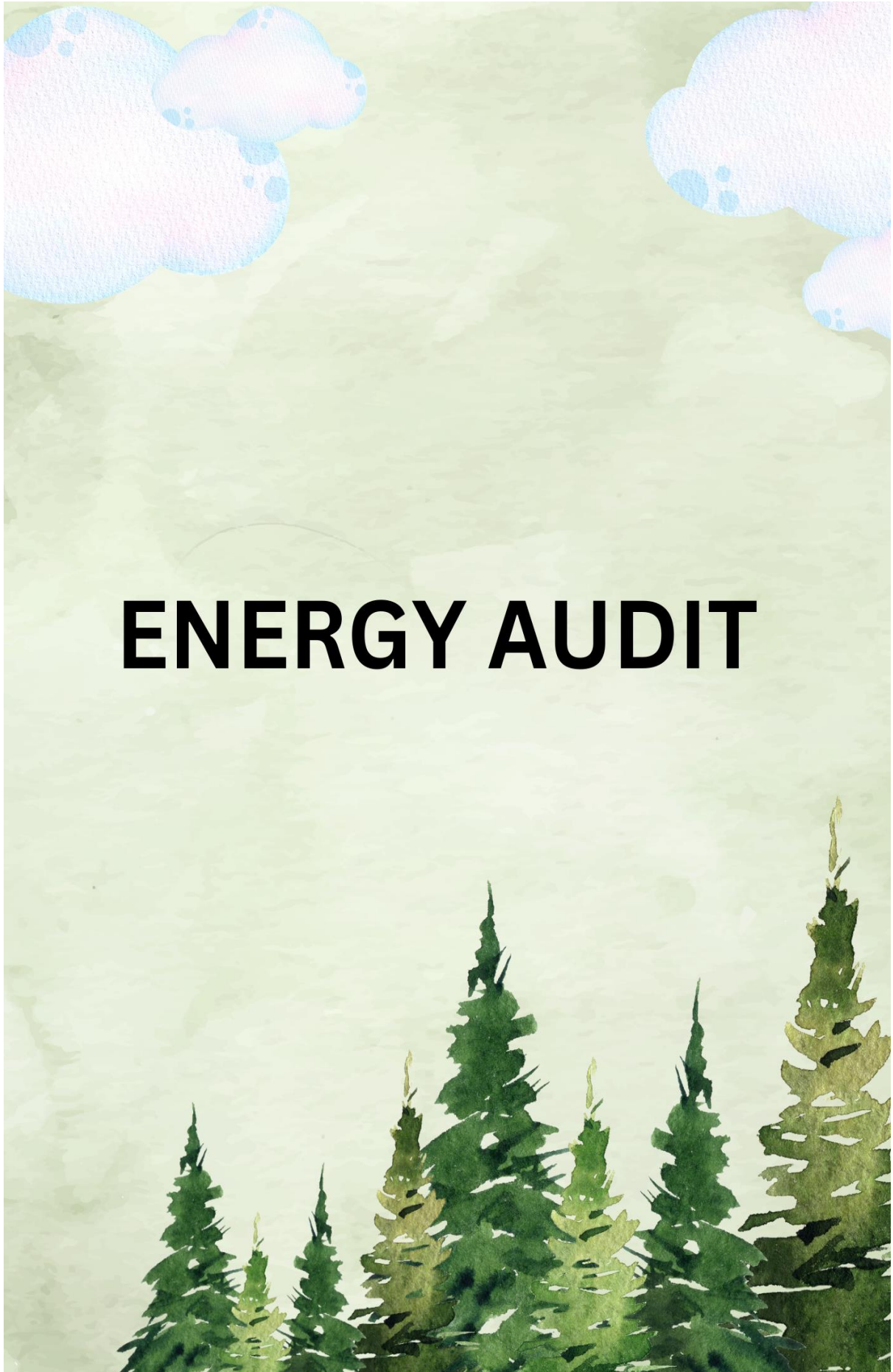
Observations and Conclusion:

- 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	137 mg/lit
4	Hardness	170 mg/lit





ENERGY AUDIT

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.

Connection details:

Institute receives electricity from MSEB i.e. Maharashtra State Electricity Distribution Co. Ltd. Following are the details about connection.

- **Type of connection:** HT (High tensioned)
- **Tariff:** 146 HT-VII B

- **Contract demand:** 200 KVA
- **Feeder voltage:** 11 KW

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.



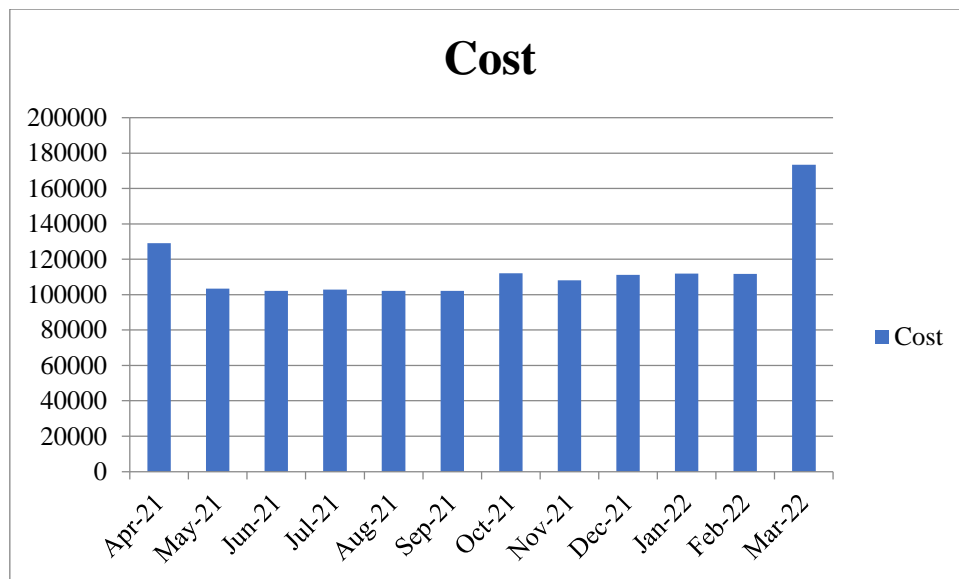
Bill analysis:

Bill analysis for ACOP had been done for academic year 2021-2022.

Sr. No.	Month	Consumption (Kw)	Bill Amount
1	Apr-21	5703	129145
2	May-21	3067	103371
3	Jun-21	2972	102118
4	Jul-21	3027	102837
5	Aug-21	2965	102058
6	Sep-21	2974	102168
7	Oct-21	3729	112165
8	Nov-21	3421	108095
9	Dec-21	3648	111190
10	Jan-22	3701	111837
11	Feb-22	3682	111659
12	Mar-22	8457	173390

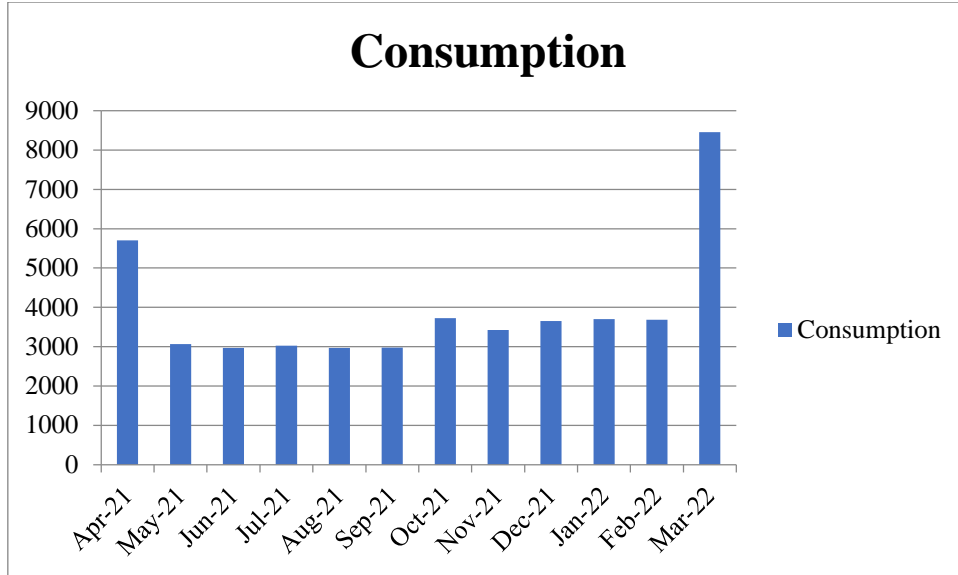
Cost Analysis:

After analysing the bill the average cost expenditure of the institute on energy is about 114169.41 Rs

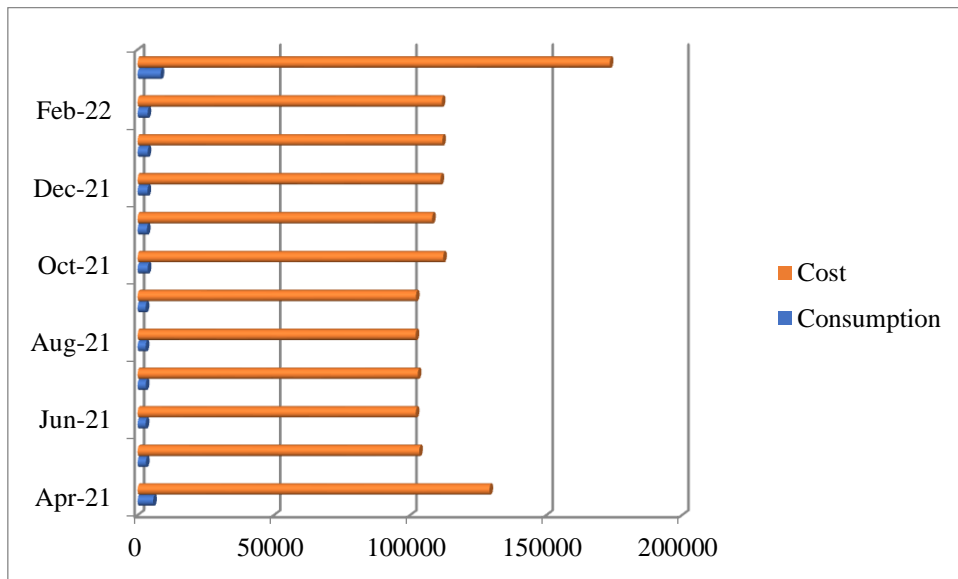


Consumption analysis:

After analysing the bill the average energy consumption of the institute is about 3945.50 Units



Cost VS Consumption:



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 ACOP were 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.

Main Building analysis

Sr. No.	Section	LUX reading	ILER	Condition
1	Library	160	0.78	Good
2	Study room	132	0.78	Good
3	Classroom	134	0.76	Good
4	Lab 1	177	0.78	Good
5	Lab 2	129	0.77	Good
6	Office	154	0.70	Good

Reasons for Good ILER:

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

Details of light fittings:

Below table shows the main fitting details in the institute building.

Energy	Count
LED	4
Fans	136
PC	111
Printer	7

Laboratory equipment's details:**Lab Number 1 : P'ceutics Lab**

	Equipment's	Count
1	Homogenizer	1
2	Digital balance (10 mg sensitivity)	5
3	Microscopes	5
4	Stage and eye piece micrometers	5
5	Brookfield's viscometer	1
6	Ball mill	1
7	Sieve shaker with sieve set	1
8	Double cone blender	1
9	Propeller type mechanical agitator	5
10	Autoclave	1
11	Steam distillation still	1
12	Vaccum Pump	1
13	Standard sieves, sieve no. 8, 10, 12, 22, 24, 44, 66, 80	1
14	Tablet panching machine	1
15	Capsule filing machine	2
16	Ampoule washing machine	1
17	Ampoule filling and sealing machine	1
18	Tablet disintegration test apparatus IP	2
19	Tablet dissolution test apparatus IP	4
20	Monsanto's hardness tester	3
21	Pfizer type hardness tester	3
22	Friability test apparatus	2
23	Clarity test apparatus	1
24	Ointment filling machine	2
25	Collapsible tube Crimping Machine	2
26	Tablet coating pan	1
27	Magnetic stirrer, 500ml and 1 litre capacity with variable speed control	5
28	Digital pH meter	2

29	Aseptic Cabinet	1
30	BOD Incubator	1
31	Incubator	1
32	Bottle washing machine	1
33	Bottle sealing machine	1
34	Bulk Density Apparatus	1
35	Conical Percolator (Stainless Steel)	15
36	Capsule Counter	2
37	Energy meter	2
38	Hot plate	1
39	Humidity Control Oven	1
40	Liquid Filling machine	1
41	Mechanical stirrer with speed regulator	2
42	Tray Drier	1
43	Refrigerator	1
44	Laminar air flow	1
45	Colony counter	1
46	Zone reader	1
47	Moisture Balance	1

Lab Number 2: Pharmacology Lab

	Equipment's	Count
1	Microscopes	15
2	Haemocytometer	20
3	Sahli's haemocytometer	20
4	Hutchinson's spirometer	2
5	Sphygmomanometer	5
6	Stethoscope	5
7	Permanent Slides for various tissues	100
8	Models for various organs	
9	Specimen for various organs and system	
10	Skeleton and bones	

11	Different Contraceptive Devices and models	
12	Muscle electrodes	1
13	Lucas moist chamber	1
14	Myographic lever	1
15	Stimulator	1
16	Centrifuge	1
17	Electronic Balance	1
18	Physical/Chemical Balance	7
19	Sherrington's Kymograph Machine polyrite	10
20	Sherrington Drum	10
21	Digital Kymograph drum	10
22	Perspex bath assembly (single unit)	10
23	Aerators	10
24	Act photometer	1
25	Rota rod	1
26	Pole climbing apparatus	1
27	Analgesiometer (Eddy's hot plate and radiant heat method's)	1
28	Convulsmograph	1
29	Plethymograph	1
30	Stereotaxic apparatus	1
31	CPP Conditioned place Preference Chamber	1
32	EIESA plate redder	1

Lab Number 3: Pharmacognosy

Equipment's		Count
1	Microscope	15
2	Digital balance (10 mg sensitivity)	2
3	Autoclave	1
4	Hot air oven	1
5	Refrigerator	1
6	Colony counter	1
7	Camera Lucida	15

8	Eye piece micrometre	20
9	Stage micrometre	10
10	Incinerator	1
11	Heating mantle	15
12	Vacuum pump	1

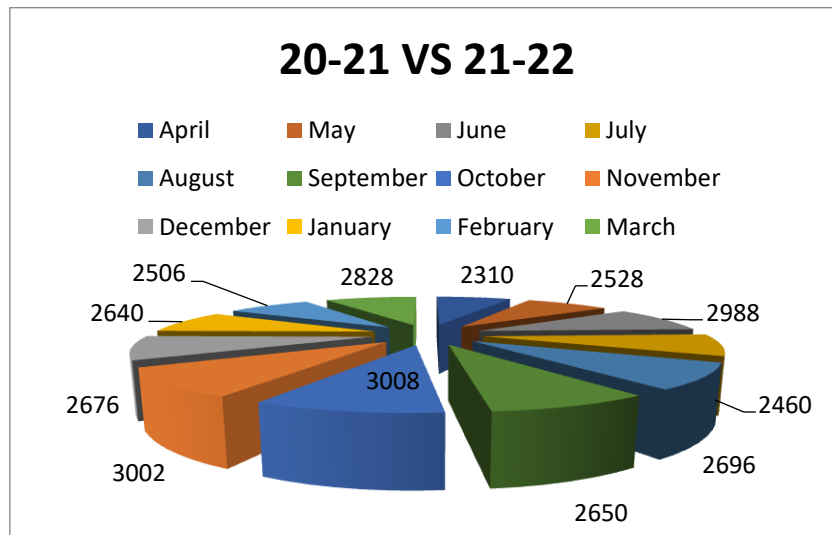
Lab Number 4: Chemistry

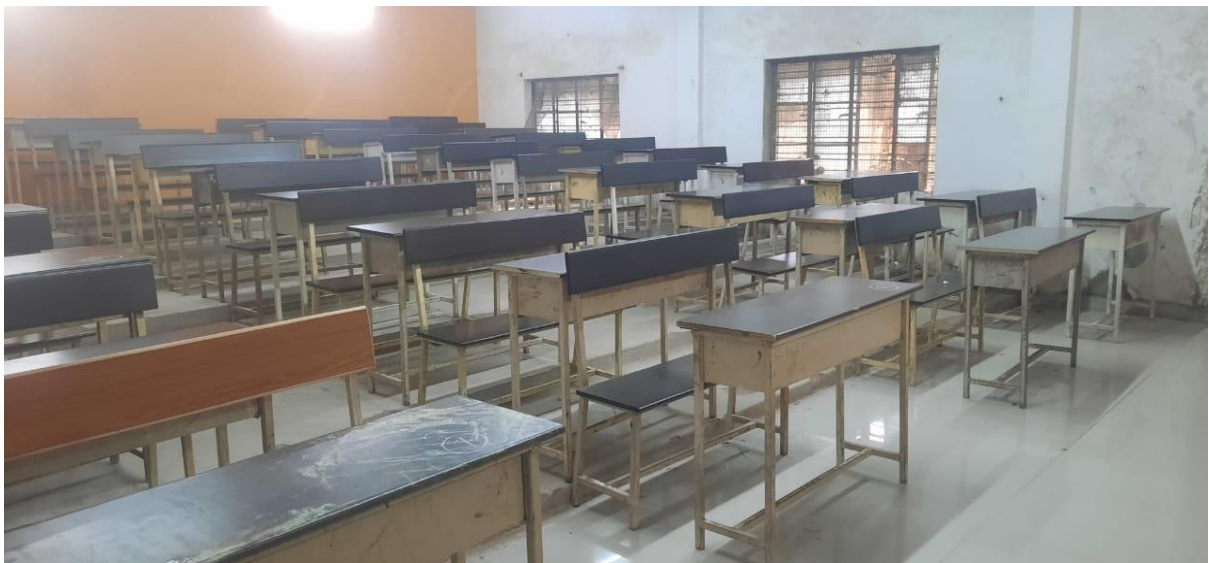
Equipment's		Count
1	Oven	3
2	Refrigerator	1
3	Analytical Balances for Demonstration	15
4	Digital balance	3
5	Suction pumps	3
6	Mechanical stirrers	4
7	Digital pH meter	3
8	Microwave Oven	1
9	Sonicetor	1
10	Colorimeter	3
11	UV-Visible Spectrophotometer	1
12	Flourimeter	2
13	Nephelo Turbidity meter	2
14	Flame photometer	2
15	Potentiometer	1
16	Conductivity meter	1
17	HPLC	1

Comparison of Electricity Consumption

This section presents comparison of electricity consumption. Comparison of 2021-2022 electricity consumption is done with 2020-2021 electricity data.

Month	Consumption (Kw)	Month	Consumption (Kw)
Apr-20	17656	Apr-21	5703
May-20	19792	May-21	3067
Jun-20	19965	Jun-21	2972
Jul-20	20722	Jul-21	3027
Aug-20	20079	Aug-21	2965
Sep-20	19438	Sep-21	2974
Oct-20	19653	Oct-21	3729
Nov-20	18090	Nov-21	3421
Dec-20	19124	Dec-21	3648
Jan-21	19912	Jan-22	3701
Feb-21	17211	Feb-22	3682
Mar-21	14863	Mar-22	8457







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



CERTIFICATE

ENVIRONMENT AUDIT

THIS CERTIFICATE IS PROUDLY PRESENTED TO

**Agnihotri College of Pharmacy,
Wardha**

Our team of Environmental Engineers have analyzed Environment-friendly practices followed by the Institution

Nikhil N Kamble
CEO



Seema N Kamble
Director

ACADEMIC YEAR 2021-2022



CERTIFICATE

GREEN AUDIT

THIS CERTIFICATE IS PROUDLY PRESENTED TO

**Agnihotri College of Pharmacy,
Wardha**

Our team of Environmental Engineers have analyzed Green, Energy,
and Environment practices followed by the Institution.

Handwritten signature of Nikhil N Kamble in blue ink.

Nikhil N Kamble
CEO



Handwritten signature of Seema N Kamble in blue ink.

Seema N Kamble
Director

ACADEMIC YEAR 2021-2022



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



CERTIFICATE

ENERGY AUDIT

THIS CERTIFICATE IS PROUDLY PRESENTED TO

**Agnihotri College of Pharmacy,
Wardha**

Our team of Environmental Engineers have analyzed Sustainable
Energy practices followed by the Institution.

Nikhil N Kamble
CEO



Seema N Kamble
Director

ACADEMIC YEAR 2021-2022