



GREEN, ENERGY & ENVIRONMENT AUDIT REPORT

PSN COLLEGE OF ENGINEERING & TECHNOLOGY
MELATHEDIYOOR



IGNITE ENGINEERING
Chennai

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Executive Summary

The future of humankind depends very much on our ability to change our lifestyles and agree to follow a low consumption pattern of living in terms of resources taken from the globe and return to a sustainable development path at the earliest. The opportunity window for restoring nature to its prolonged state of hosting life forms to flourish under its caring environs is according to scientists, very short and lasting only up to 2030. Within this time, with the willing actions of every citizen wherever they are, coordinated and directed actions should start and continue thereafter till a balancing stage is reached where moderate use of resources and mitigation actions for healing the hurts already inflicted, balance positively to a sustainable nature.

Eco campus is a concept implemented in many educational institutions, all over the world to make them sustainable because of their mass resource utilization and waste discharge in to the environment. Psnct College believes that there is an urgent need to address these fundamental environmental problems and reverse the trends. The purpose of the audit was to ensure that the practices followed in the campus are in accordance with the Green Policy adopted by the institution.

Green Auditing of a Higher Education Institution is required as a part of Criterion VII (of the 7 criteria prescribed) under the Guidelines for Submission of the mandatory annual Internal Quality Assurance Report (IQAR) by Accredited Institutions.

It works on the several facets of 'Green Campus' including Water Conservation, Tree Plantation, Waste Management, Paperless Work, and Alternative Energy. With this in mind, the specific objectives of the audit was to evaluate the adequacy of the management control framework of environment sustainability as well as the degree to which the Departments are in compliance with the applicable regulations, policies and standards.

Initially a questionnaire survey was conducted to know about the existing resources of the campus and resource consumption pattern of the students and staffs in the college. In order to assess the quality of water and soil, water and soil samples were collected from different locations of the college campus and analysed for its parameters. Collected data was grouped, tabulated and analyzed. Finally a report pertaining environmental management plan with strength, weakness and suggestion on the environmental issue of campus are documented.

Introduction

Environmental audit or Green audit reflects evaluations that help us to identify environmental compliance and management system, implementation gaps, along with related corrective actions. Green audit is a useful tool to determine how and where the most energy or water resources are being used, the type and volume of waste generated and can then considerations be given on how to implement changes and make savings. It can create health consciousness and promote environmental awareness, values and ethics. Overall, it plays a vital role in imparting a better understanding of Green impact on campus to staff and students.

Need for green audit

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. On this context, it becomes imperative to adopt the system of the “Green Campus” for the Institutes which will lead to sustainable development. Besides, it also reduces a sizable amount of atmospheric carbon dioxide from the environment.

Green Audit is assigned to the Criteria 7 of NAAC, National Assessment and Accreditation Council which is a self-governing organization of India that accredits the institution according to the scores assigned at the time of accreditation. NAAC has made it mandatory that all Higher Educational Institutions should submit an annual Green Audit Report. Moreover, it is part of Social Responsibility of the Higher Educational Institutions to ensure that they contribute towards the reduction of global warming through Carbon Footprint reduction measures.

Objectives of the audit

- Understanding the current practices of sustainability with regard to the use of water and energy, generation of wastes, transportation, purchase of goods, etc;
- Establishing a baseline of existing environmental conditions with focus on natural and physical environment;
- Creating awareness among students and staff concerning real issues of environment and its sustainability;
- To create a report that document baseline data of good practices and provide strategies and action plans towards improving environmental quality for future.

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About the college

PSN College of Engineering and Technology(PSNCET), Tirunelveli, was established by the PSN Educational and Charitable Trust in the year 2001 under the leadership of Dr. P. Suyambu a multi – tasked personality with admirable academic brilliance.

The College is located at Melathediyoor, 12km away from Tirunelveli unfolding its grandeur over 27 acres of land. The College exhibits an attractive panorama conducive to education and research due to its serene surroundings covered by last rows green trees at the backdrop of mountains with birds chirping all time.

The College maintains high standards of excellence in the academic sphere and in the physical amenities and facilities intended to implement the educational programme. The College endeavours to enroll students who hold high standards of performance, discipline and achievement.



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In addition to the autonomous curriculum which is expected to provide a broad foundation of general education and a reasonable amount of specialization, a diversified programme of campus activities-social, recreational, cultural and spiritual-supplements and complements the academic study and provides facilities and opportunities for the development of individual talent, personal relationship and creative group life with high moral standards.

The campus is spread over an area of 27 acres of land with the green belt area of 2 acres. The college offers two shift with aided and self finance and value added courses. There are 450 students and 157 teaching faculty in the college which is promising to grow rapidly. PSNCET offers 10 UG, 9 PG and 5 PhD programmes. This institution has been recognized u/s (2f,12B) by UGC, accredited by NAAC

The College offers job-oriented courses, extra-curricular activities of various clubs and technologically advanced facilities accessible to the faculty, the students and the support staff. Here, each individual is encouraged to step beyond the confines of academic and administrative disciplines to explore and intervene in the larger interests of the PSN community that thrives on participation and the desire to venture into newer vistas.

Methodology

In order to perform green audit, the methodology included different tools such as preparation of questionnaire, physical inspection of the campus, observation and review of the documentation, interviewing key persons and data analysis, measurements and recommendations.

Onsite Visit

Field visit was conducted by the Green Audit Team. The key focus of the visit was on assessing the status of the green cover of the Institution, their waste management practices and energy conservation strategies etc. The sample collection (water, air) was carried out during the visits. The water samples from bore water were taken and air samples from different places of the campus were collected. The sample collection, preservation, and analysis were done in the scientific manner as prescribed by the standard procedures.

Focus Group Discussion

The Focus Group discussions were held with the Team members, staff members and the management focusing various aspects of Green Audit. The discussion was focused on identifying the attitudes and awareness towards environmental issues at the institutional and local level.

Energy and waste management

With the help of Teaching, Non- teaching staff, students, Administrative officer, and Supervisor the audit team has assessed the energy consumption pattern and waste generation, disposal and treatment facilities of the college. The monitoring was conducted with a detailed questionnaire survey method.

The study covered the following areas to summarize the present status of environment management in the campus:

- Water management
- Energy Conservation
- Waste management
- E-waste management
- Green area management
- Environmental Monitoring

Observations and Recommendations

Water Management

Observations

The study observed that the main source of water for the institute is received from recharge wells. Water is used for drinking purpose, toilets and gardening. The waste water from the RO water purifier is used for gardening purpose. During the survey, no loss of water is observed, neither by any leakages, or by over flow of water from overhead tanks. The data collected from all the departments is examined and verified. On an average the total use of water in the college is 50000L/day, which include 30,000 L/day for domestic, 10,000 L/day for gardening purposes and 10,000 L/day for drinking purpose.



Recharge bore well inside the campus

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Rainwater harvesting

Rain water harvesting units are also functioning for recharging ground water level. There are soaking pits available widespread all over the campus. The collected rooftop water is collected in the recharge wells. While, the rainwater from paved area are sent to recharge wells through storm water drains. The recharge wells are cleaned manually for every year and the storm water drains are cleaned as and when required.

Drinking water

The water used for drinking purposes is clean and well-maintained. There are 7 RO water Plant available on the campus to provide safe drinking water.



RO Water plant in the Campus

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Water Quality Assessment

Water samples from the college were collected and analyzed for its quality parameters. The major parameters analyzed include colour, odour, turbidity, dissolved oxygen, acidity, alkalinity, chloride, hardness, pH, conductivity, total dissolved solids and salinity. The results are presented in the end of the report.

Recommendations

- There is a need for monitoring and controlling overflow and periodically supervision drills should be arranged.
- Ensure that all cleaning products used by college staff have a minimal detrimental impact on the environment, i.e. they are biodegradable and non-toxic, even when this exceeds the Control of Substances Hazardous to Health (COSHH) regulations.
- Gardens should be watered by using drip/sprinkler irrigation system to minimize water use.
- Waste water treatment plant should be installed to recycle and reuse the water used for domestic purposes.
- Minimize wastage of water and use of electricity during the reverse osmosis process and ensure that the equipment used are regularly serviced and in good condition.

Energy Management

This indicator addresses energy consumption, energy sources, energy monitoring, lighting, appliance, natural gas and vehicles. Energy use is clearly an important aspect of campus sustainability and thus requires no explanation for its inclusion in the assessment. The study carried out also analyzed the use of alternate energy resources that are eco-friendly.

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Solar Plant Installed in Roof Top of College Campus



Solar Plant control unit

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Solar based Street Light are Installed in the Campus

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Biogas Plant

In PSNCET, kitchen waste is used to generate thermal energy for cooking and heating. The bio-gas produced from food waste, decomposable organic material and kitchen waste, consisting of methane and a little amount of carbon dioxide is an alternative fuel for cooking gas (LPG). Kitchen waste is processed and moistened to produce a suspension that subsequently undergoes a fermentation process. Fermentation produces biogas – a valuable energy source – that is desulphurised by biological means. Also, the waste materials can be disposed off efficiently without any odour or flies and the digested slurry from the bio-gas unit can be used as organic manure in the garden. The major components of the bio-gas plant are a digester tank, an inlet for feeding the kitchen waste, gas holder tank, an outlet for the digested slurry and the gas delivery system for taking out and utilizing the produced gas.

The College Campus is Equipped With 1m³ Capacity Bio Gas Plant to Promote the Alternate Energy Resources Method.

Eco-friendly technology allows for the production of renewable natural gas in the form of biomethane. The facility processes about 1000kg tons of kitchen waste every day – mainly the contents of organic waste from College Hostels, as well as leftover food from Campus canteens and expired food.

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1 M³ Capacity Bio Gas Plant Installed inside the Campus



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Observations

The energy is utilized in the Campus for lighting, space heating and cooling, running of laboratory instruments, appliances, water heating, ground water pumping, cooking and transportation.

The source of energy for all the buildings within the campus is through electricity only. The institution consumes about **401.54kW/day**. Besides, off Grid Solar Plant Installed in the Campus provides of the daily electricity requirement from solar energy.

The campus contains Lights and fans in use. The entire campus including common facility centers are equipped with LED lamps and LED tube lights, except at few locations. Solar streetlights are also installed in the campus.

Computers are set to automatic power saving mode when not in use. Also, campus administration runs on switch-off drill on regular basis.

Total annual energy consumption

S.No.	Energy source		Consumption
1	Electricity	Load	100250kW
		Solar power	2500Kw
2	Fuel	LPG	350
3	Fuel oil	Diesel	12500 litres

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Energy Rating

After the complete survey and analysis of the campus as per ISO 50001:2018 Energy Management System Standards, we rate the campus Score 4/5.

Recommendations

- The management should support more for renewable and carbon-neutral electricity options on any energy- purchasing consortium, with the aim of supplying all college properties with electricity that can be attributed to renewable and carbon-neutral sources.
- More LED lights should be installed to reduce power consumed for lighting.
- The campus administration should run switch–off drill on regular basis.
- In campus premises electricity should be shut down from main building supply after occupancy time, to prevent power loss due to eddy current.
- 5–star rated Air Conditioners, Fans and CFLs should be used.
- Cleaning of tube-lights/bulbs to be done periodically, to remove dust over it.

Waste Management

This indicator addresses waste production and disposal of different wastes like paper, food, plastic, biodegradable, construction, glass, dust etc. Furthermore, solid waste often includes wasted material resources that could otherwise be channelled into better service through recycling, repair, and reuse. Solid waste generation and management is a burning issue. Unscientific handling of solid waste can create threats to everyone. The survey focused on volume, type and current management practice of solid waste generated in the campus.

Observations

Liquid waste management

The waste water generated is disposed off into the underground sewage tanks through waste water drainage to municipal server. The 300cu.m per day Sewage Treatment Plant also Installed In the campus and Recycled water fed to Garden purpose.

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Sewage Treatment Plant Installed in the Campus



Sewage Settlement Tank

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Solid waste management

Waste generated from tree droppings and lawn management are major solid wastes generated in the campus. Separate dustbins are provided for Bio-degradable and Plastic waste in order to segregate them at the source itself.

Single sided used papers are reused for writing and printing in all the departments to minimize the usage of papers. Important and confidential reports/ papers are sent for pulping and recycling after completion of their preservation period. The exam papers are recycled through a collaboration with TNPL limited,Karur

Very less plastic waste is generated by some departments, office, garden etc Metal waste and wooden waste is stored and sent to authorized scrap agents for further processing. Glass bottles are reused in the laboratories.

The college has separate bins to collect biodegradable and non-biodegradable waste generated in the campus.Regular meetings are conducted with ground staff regarding the cleanliness of the campus and proper disposal of waste and proper paper Recycling Plant Installed in the campus and They Outsource the exam Papers regularly and Proper Tieup with TNPL,Karur



Waste recycling Plant

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E-waste Management

E-waste is a consumer and business electronic equipment that is near or at the end of its useful life. This waste makes up about 5% of all municipal solid waste worldwide. It is hazardous than other waste because electronic components contain cadmium, lead, mercury, and Polychlorinated biphenyls (PCBs) that can damage human health and the environment.

E-waste generated in the campus is of minimal quantity. It is being effectively managed, keeping in mind the environmental hazards that may arise if not disposed properly.

The cartridges of laser printers are refilled outside the college campus. Awareness programme was conducted by Management regarding E-waste Management. The E- wastes and defective items from computer laboratories are being stored properly and recycled in effective Manner.

The dismantled hardware of personal computers are used in PC trouble shooting lab. The dismantled electronic spare parts are immediately sold for reuse. The minimal amount of e-waste that is generated is taken by external vendor with Proper MOU.

Recommendations

- Use reusable resources and containers and avoid unnecessary packaging wherever possible.
- The management should take an initiative to purchase recycled resources when they are available.
- The bio-medical waste from clinic in the campus should be properly disposed by the State Government approved vendor.

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Green Area Management

This includes the plants, greenery and sustainability of the campus to ensure that the buildings conform to green standards. This also helps in ensuring that the Environmental Policy enacted, enforced and reviewed using various environmental awareness programmes.

Observations

Many trees are maintained in the campus to maintain the bio-diversity. Trees are provided with name boards also. Various tree plantation programmes are being organized at college campus through NSS (National Service Scheme) unit. This program helps in encouraging eco-friendly environment which provides pure oxygen within the institute and creates awareness among campus students. The plantation program includes various types of indigenous species of ornamental and medicinal wild plant species.



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Well Maintained Green area Management Inside the Campus

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Organic Farming

PSNCET Maintain well designed Organic farming inside the college campus They cultivate Fruits and Vegetables Through Organic Farming Mode.



Organic Farming Practices Inside the campus

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Student Involvement in seed Ball Throwing

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Student Involvement in Creating Environment Awareness around the village



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Tree Plantation in World Environment Day in the Campus

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Use of Bicycles:

Students and Non teaching staff residing in and around the campus commute to college by bicycles. The college has constructed a cycle shed to safeguard their vehicles. This also motivates the students and staff to come to the college by bicycle.

Public transport:

Approximately 70% of students and 50% of staff use public transport. The students also utilise van services. This transport pooling is a greening initiative by college to avoid environmental pollution and reduce Carbon foot printing Levels.

Roads:

Roads in college are laid with provision for rainwater to seep through easily. This enables the easy recharge of ground water.

Plastic free campus

The usage of plastic in college is minimal. The staff and the students are not encouraged to use one time use plastic, plastic bags and disposable plastic things throughout the campus.

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E - communication

The principal's office, all the Departments of the college, controller of examination office, and laboratories are very well connected with a good and efficient LAN network. Hence all the inter office correspondence is done through email. This reduces the usage of papers.

Recommendations

- Review periodically the list of trees planted in the garden, allot numbers to the trees and keep records.
- Establish a College Environmental Committee that will hold responsibility for the enactment, enforcement and review of the Environmental Policy.
- Environmental Committee shall be the source of advice and guidance to staff and students on how to implement this Policy.
- Ensure that an audit is conducted annually and action is taken on the basis of audit report, recommendation and findings.
- Indoor plantation to inculcate interest in students, Bonsai can be planted in corridor to bond a relation with nature.

Environmental monitoring

As part of green audit of campus, the Green Audit Assessment Team has carried out the environmental monitoring of campus. This includes Illumination, Noise level, ventilation and indoor air quality of the class rooms. It was observed that illumination and ventilation is adequate considering natural light and air velocity present. Noise level in the campus is well below the limit.

The following surveys were conducted:

1. Ambient Air Quality monitoring – Annexure 1
2. Lux monitoring – Annexure 2
3. Noise Monitoring-Annexure 3
4. Drinking Water Analysis-Annexure 4

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Ambient Air Quality Monitoring

Ambient air quality monitoring can help in providing a strategic solution towards air purification and help lead a safer life. Also, air quality monitoring in the college campus not only develops trust among the parents but ensures that the administration cares about their Students and Staff.



Ambient Air Quality monitoring in the campus

Lux Monitoring

Illumination is one of the most important environmental factors in the classroom. Many Doctors have discovered that lighting settings have significant impact on students' performance. So Lux monitoring can help in providing a Comfort Vision Environment to Students.

When assessing noise exposure in campus environments, it can be difficult to determine whether the level of sound has reached a point where it interferes with student learning and staff productivity, or worse, becomes a threat to their health and well-being.

Conclusion

Though the institution is predominantly an Engineering college, there is significant environmental research both by faculty and students. The environmental awareness initiatives taken by the management are substantial. The installation of solar panels, E-communication system practices & Waste paper recycling plant inside the campus are remarkable. Besides, environmental awareness programmes initiated by the administration proves that the campus is going green. The Herbal garden maintained by the College is highly appreciable and a book with all the floral species of the college is also available. Few recommendations are added for waste management and waste reduction using alternate eco-friendly and scientific techniques. This may lead to the prosperous future in context of Green Campus and thus aid in a sustainable environment and community development.

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Acknowledgement

We are grateful to the management and committee members of PSN College of Engineering &Technology, to award this prestigious project on green auditing. Further we sincerely thank the college staff for providing us the necessary facilities and co-operation during the audit. This ample co-operation helped us a lot in making this audit possible and successful.

FOR IGNITE ENGINEERING



ER.P.VIVEK M.E

LEED GREEN ASSOCIATE& CHARTERED ENGINEER