



NPR College of Engineering & Technology

NPR Nagar, Natham, Dindigul - 624401, Tamil Nadu, India.

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai.

An ISO 9001:2015 Certified Institution.

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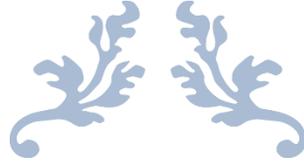


CRITERION 7 – INSTITUTIONAL VALUES AND BEST PRACTICES

KEY INDICATOR 7.1 INSTITUTIONAL VALUES AND SOCIAL RESPONSIBILITIES

Metric No 7.1.6. Quality Audits on Environment and Energy Regularly Undertaken by the Institution measures

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AUDIT REPORT

NPR College of Engineering and Technology

NPR Nagar, Natham, Dindigul



13 NOV – 14 NOV 2021

IGNITE ENGINEERING

Madurai

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1. THE IDEA OF GREEN AUDIT

The rapid urbanization at local and global levels has paved way for several environmental and ecological crises.

Green audit or Environmental audit is a general term that can reflect various types of evaluations intended to identify environmental compliance and management system implementation gaps, along with related corrective actions.

It aims to analyze the environmental practices within the campus which will have an impact on the eco-friendly ambience. It is essentially an environmental management tool for measuring the effects of certain activities on the environment against set criteria or standards.

Environmental auditing is carried out when a development is already in place, and is used to check on existing practices, assessing the environmental effects of current activities. Environmental auditing therefore provides a 'snap-shot' of looking at what is happening at that point in time in an organization.

2. GOALS OF GREEN AUDIT

- The objective of this green audit is to secure the environment and cut down the threats posed to human health by analyzing the pattern and extent of resource usage in the campus.
- To ensure the environmental policy adopted by the college is followed strictly.
- To suggest the best protocols for adding to the sustainable development.
- To bring out a status report on environmental compliance.

3. CONTEXT OF THE AUDIT

A nation's growth starts from its educational institutions, where the ecology is thought as a prime factor of development associated with environment. A clean and healthy environment aids effective learning and provides a pleasant learning environment.

If self-enquiry is a natural and necessary outgrowth of a quality education, it could also be stated that institutional self-enquiry is a natural and necessary outgrowth of a quality educational institution. Thus, it is imperative that the college evaluate its own contributions toward a sustainable future. 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.

The National Assessment and Accreditation council (NAAC), New Delhi has made it mandatory from the academic year 2016 – 2017 onwards that all Higher Educational institutions should submit an annual Green Audit Report.

Green auditing and the implementation of mitigation measures is a win-win situation for the college and the learners.

4. BENEFITS OF THE AUDIT

- More efficient resource management to provide basis for improved sustainability
- To create a green campus
- To enable waste management through reduction of waste generation, solid- waste and water recycling.

- Recognize the cost saving methods through waste minimizing and managing
- Point out the prevailing and forthcoming complications
- Authenticate conformity with the implemented laws
- Empower the organizations to frame a better environmental performance.
- Enhance the alertness for environmental guidelines and duties
- Impart environmental education through systematic environmental management approach and Improving environmental standards
- Benchmarking for environmental protection initiatives
- Financial savings through a reduction in resource
- Developing an environmental ethic and value systems in youngsters

5. STATEMENT OF ASSURANCE

This audit has been conducted in accordance with *the International Standards for the Professional Practice of Auditing*. In our professional judgement, sufficient and appropriate audit procedures were completed and evidence gathered to support the accuracy of the conclusions reached and contained in this report. The conclusions are based on a comparison of the situations as they existed at the time of the audit with the established criteria.

6. ABOUT THE COLLEGE

NPR College of Engineering and Technology (NPR CET) is affiliated to Anna University, Tamil nadu. It is situated at Natham which is 27 kms away from Dindigul and 35 kms away from Madurai, Tamil Nadu. The campus is spread over 100 acres of lush green environment with lots of green cover and pristine surroundings. The college recognizes the growing necessity to prepare the students from the rural and semi-urban sectors of India to be employable. The institute aims to provide suitable industry engagement and career opportunities for students.



With comprehensive coverage of all aspects and types of technical education, NPR CET has been created with an exalted aim of bringing students especially from the rural areas into the fields of Engineering and Technology. They offer a unique chance for any student who wishes to pursue further education.

7. METHODOLOGY

In order to perform green audit, the methodology involved different tools such as preparation of questionnaire, conducting surveys, physical inspection of the campus, observation and review of the documentations available, analyzing the environmental parameters, interviewing key persons and data analysis, measurements and recommendations.

Onsite Inspection

The Green Audit Assessment Team started the audit at the premises of institution from 13th November 2021 to 14 November 2021.

Focus Group Discussion

Staff members and management people were a part of this discussion. The discussion was focused on identifying the attitudes of people and their awareness towards environmental issues at the institutional, regional and global level. The discussion revolved around three key questions:

- Are the students eco-conscious?
- Do they consider the Institution to be eco-friendly?
- What are the environmental issues that should be given top priority?

Data Collection

In preliminary data collection phase, exhaustive data collection was performed using different tools such as observation, survey communicating with responsible persons and measurements.

Areas covered

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
- Greening practices in college

8. OBSERVATIONS AND RECOMMENDATIONS

8.1 Water Management

Water while freely available in many natural environments, in human settlements potable water is less readily available. Water should be used wisely to ensure that drinkable water is available for all, now and in the future. A small drip from a leaky tap can waste more than 180 liters of water to a day. It is therefore essential that any environmentally responsible institution should examine its water use practices.

A water audit is an on-site survey and assessment to determine the water use and hence improving the efficiency of its use. Water auditing was conducted for the evaluation of facilities for raw water intake and determining the facilities available for water treatment and reuse. The relevant method that can be adopted and implemented to balance the demand and supply of water was investigated during the audit.

8.1.1 Observations

Water is used for drinking purpose, canteen, toilets, laboratory and gardening in the college. The college obtains its water source from 4 wells available within the campus. This ensures everybody gets clean water for drinking. During the survey, no loss of water was observed, by any leakages, or by over flow of water from overhead tanks.

Rainwater harvesting unit: The campus has adopted rain water harvesting by roof top harvesting. Rain water harvesting structures were found in each building to harvest rain water. The harvested rainwater was used in recharge of the ground water table and also diverted into the wells.

This system covers total area of:

- 28077 sq.ft in the college building,
- 10,658 sq.ft in Boys hostel I,
- 10,652 sq.ft in Boys Hostel II, and
- 6761 sq.ft in Girls Hostel.

Also, 11 soak pits in the size of 45 inches x 55 inches are available to harvest the rain water.



Rainwater harvesting system

Liquid waste management: A mini **water treatment plant** is available within the campus. The waste water from domestic usage (grey water) is recycled and used for gardening. This is one of the greening initiatives taken by the management.



Water recycling plant

They have a **central RO plant** with a capacity of 2000 l/hr to provide water for drinking and cooking.



Reverse osmosis plant

8.1.2 Recommendations

- There is a need for monitoring and controlling overflow and periodically supervision drills should be arranged.
- 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.
- The cleaning products used by staff should have a minimal detrimental impact on the environment. They should be biodegradable and non-toxic.
- Adopt methods such as drip irrigation in gardens

8.2 Energy Use and Conservation

Energy use is clearly an important aspect of campus sustainability and thus requires no explanation for its inclusion in the assessment. An old incandescent bulb uses approximately 60W to 100W while an energy efficient light emitting diode (LED) uses only less than 10W. This indicator addresses energy consumption, energy sources, energy monitoring, lighting, appliances, and vehicles. Energy auditing deals with the conservation and methods to reduce its consumption related to environmental degradation. It is therefore essential that any environmentally responsible institution examine its energy use practices.

8.2.1 Observations

The source of energy for all the buildings within the campus is through electricity only. The institution consumes about

912.98kW/day. However, 20kW of the daily electricity requirement is supplied from **solar energy**.

The power requirement for lighting of the organization is **44.458kW/day**. About 10.89% (i.e. **4.844kW**) is met by **832 tubelights**. This is yet another energy conservation strategy being followed by the management.

Equipment like Computers is used in power saving mode. The campus administration runs switch –off drill on regular basis. Electricity was shut down after occupancy time in all the classrooms and laboratories as one of green practices for energy conservation.



Solar panels in the campus



Solar panel Control Unit

Bio Gas Plant

The main objective of the Bio gas Plant is to evaluate the viability of biogas generated from Food / Vegetable / Kitchen waste which is available in the Residence where currently these wastes are being thrown out and we hereby proposing the biogas plant and thereby providing the alternate solution by replacing the usage of conventional LPG gas. Biogas can be obtained from any kind of fermentable wastes such as animal dung, vegetable waste, kitchen waste, food waste, Human feces, Fruit waste or any kind of wet organic waste etc. Biogas is a clean and efficient fuel which can easily replace petrol, diesel and LPG. The application varies from cooking, lighting, power generation, irrigation, refrigeration and room heating. Apart from fuel gas, we can get good quality of manure from the wastes, is an added benefit of biogas production

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

Technical aspects:

- 1. Production Process:** Methanogenic bacteria naturally available in Cow dung is fed into the digester as an initial startup and mass propagation of microbial culture takes and biogas production starts within 15 to 20 days under anaerobic condition. After micro-organisms development, start feeding Food waste into biogas digester. Waste is mixed with water and loaded inside. The biogas produced from the digester is supplied in pipe lines for Thermal application / power generation. The digested slurry which comes out of the biogas digester is going to the fields as enriched manure.
- 2. Quality Standards:** Methane gas coming out from the plant is as good as CNG or LPG. It's burning process and thermal efficiency is also of similar nature.
- 3. Production Capacity:** The total installed capacity of the plant is
 - 1 cubic meter of biogas production per day which is equivalent to ~ 0.4 to 0.5 kilogram of LPG.



1m³ Capacity Bio gas Plant Installed In College Campus

8.2.2 Recommendations

- The management should support more of 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.
- LED lights should be installed to reduce power consumed for lighting.

8.3Waste Management

Pollution from waste is aesthetically unpleasant and results in large amounts of litter in our communities which can cause health problems. Solid waste can be divided into two categories: general waste and hazardous waste. This indicator addresses waste production and disposal of plastic waste, construction waste, paper waste, food waste, and recycling. The minimization of solid waste becomes mandatory for a sustainable

college. The prevailing waste disposal policies were reviewed and the ways to combat the problems were suggested.

8.3.1 Observations

Waste generated from tree droppings and lawn management is major solid waste 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.

Chemical waste generated in laboratories that are potentially hazardous are segregated. Very less plastic waste (0.1Kg/day) 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.

8.3.2 Recommendations

- The amount of waste generated from classrooms and staff rooms can be minimized.

- Full use of all recycling facilities provided by City Municipality and private suppliers can be utilized for waste disposal.
- Sufficient, accessible and well-publicized collection points can be made available for recyclable waste, with responsibility for recycling clearly allocated.

8.4E-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.

8.4.1 Observations

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. Administration Awareness programmes are being conducted regarding E-waste Management in various departments. The E-wastes and defective items from computer laboratories are being stored properly.

The dismantled hardware of personal computers are used in PC trouble shooting lab. This is put to use to conduct practical courses. The dismantled electronic spare parts are immediately sold for reuse. The minimal amount of e-waste that is generated after reusing is sent to recycler at specific intervals.

8.4.2 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.

8.5 Green Area Management

Trees play an important ecological role within the urban environment, as well as support improved public health and provide aesthetic benefits to cities. In one year, a single mature tree will absorb up to 48 pounds of carbon dioxide from the atmosphere, and release it as oxygen. Trees within the campus will have a positive impact on our mental health as well. This helps in ensuring that the Environmental Policy of the institution is enacted, enforced and reviewed using various environmental awareness programmes.

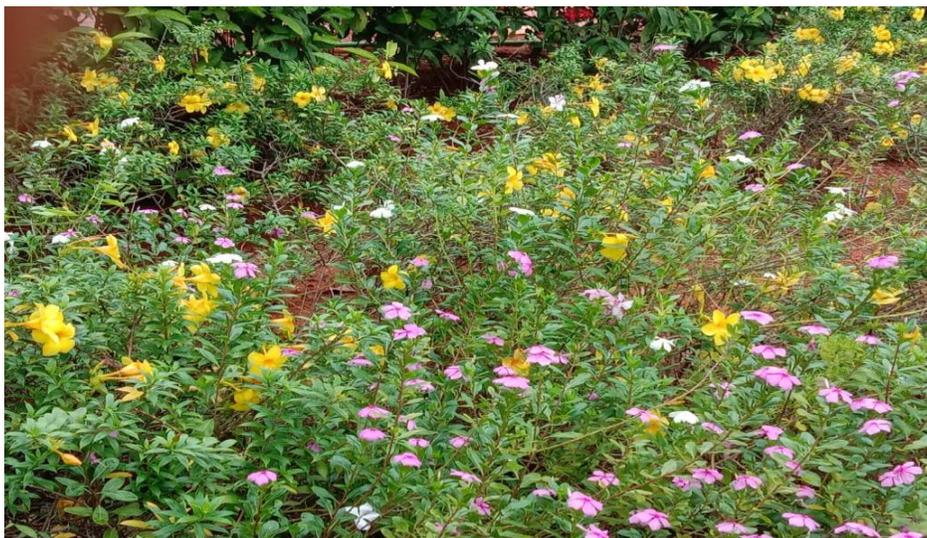


Herbal garden



8.5.1 Observations

The entire campus is covered with trees, small plants, ornamental plants and mini gardens. Neem trees are found in majority. Neem seeds are collected and utilized for pest and disease management. Various tree plantation programs are being organized by the NSS unit of the college.



There are more than 1100 medicinal plants found within the campus and several ornamental plants decorating the buildings.



8.5.2 Recommendations

- The college can promote environmental awareness as a part of course work in various curricular areas, independent research projects, and community service.
- Establish a College Environmental Committee that will hold responsibility for the enactment, enforcement and review of the Environmental Policy of the institution. The 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 necessary action is taken on the basis of audit report, recommendation and findings.

8.6 Green Practices in the Institution

The college has been adopting several greening practices for many years. The college has also ensured to adopt to greening practices in their regular daily life through the following initiatives:

Use of Bicycles:

The Non-teaching staff residing in and around the campus commutes to college by bicycles. The college has constructed one cycle shed for such employees to safeguard their vehicles. This also motivates the staff to come to the college by bicycle.

Public transport:

All the students make use of the college bus facility provide by the college. Approximately 90% students and 80% of staff use the college bus. The students do not use personal transport to attend the college. This transport pooling is a greening initiative by college to avoid environmental pollution.

Plastic free campus

The usage of plastics in college is minimal. The staff and the students are not encouraged to use impermissible size plastic bags throughout the campus.

Paperless office

The college administration follows paperless office system. The President office, the principal 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 use of papers.

9. 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 and Regularly Doing the Monitoring Period Of Six Month Frequency.

The following surveys were conducted:

1. Ambient Air Quality monitoring – Annexure 1
2. Lux monitoring – Annexure 2
3. Noise Monitoring-Annexure 3



Lux and noise monitoring

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 school campus not only develops trust among the parents but ensures that the administration cares about their Students and Staff



Air Quality monitoring

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.



Lux monitoring

Noise Monitoring

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.



Noise monitoring

The Environmental monitoring tests were carried out in an NABL accredited laboratory. The test reports were as follows:



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TEST REPORT

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AMBIENT AIR MONITORING

Report No :	EL-NO-AR-71-11-2020	Report Date :	21.11.2020
Customer Name & Address M/s. NPR Group of Colleges NPR Nagar, Natham, Dindigul, Tamil Nadu - 624401.	Sample Reference No :	EL-NO-AR-71-11-2020	
	Sample Description :	Ambient Air	
	Sample Drawn By :	Laboratory	
	Sample Collected Date :	17.11.2020	
	Qty of Sample Received :	Filter Paper(2 nos) & Approx 25 ml Solution(4 nos)	
	Sample Received On :	17.11.2020	
	Test Commenced On :	17.11.2020	
	Test Completed On :	20.11.2020	
	Sampling Method :	EL-SOP-ARS-01 to 11	
	Sample Mark:	Entrance of Engineering Block	

S.No	Name of the Test	Test Method	Units	Results	Max. Annual Average Limits of NAAQs
1.	Ammonia (as NH ₃)	CPCB Guidelines, Volume I, NAAQMS/36/2012-13	µg/m ³	<5.0	100
2.	Arsenic (as As)	CPCB Guidelines, Volume I, NAAQMS/36/2012-13	ng/m ³	<0.1	6.0
3.	Benzene (as C ₆ H ₆)	IS 5182 (Part 11): 2006 (Reaffirmed 2017)	µg/m ³	<0.5	5.0
4.	Benzo [α] Pyrene (as C ₂₀ H ₁₂)	CPCB Guidelines, Volume I, NAAQMS/36/2012-13	ng/m ³	<0.5	1.0
5.	Carbon Monoxide (as CO)	Instruments Manual Based SOP No.EL-SOP-ARS-17	mg/m ³	<1.2	2.0
6.	Lead (as Pb)	IS 5182 (Part 22) : 2004 (Reaffirmed 2014) Clause No.5	µg/m ³	<0.5	0.5
7.	Nickel (as Ni)	CPCB Guidelines, Volume I, NAAQMS/36/2012-13	ng/m ³	<1.0	20
8.	Oxidants (as Ozone O ₃)	IS : 5182 (Part IX) - 1974 (Reaffirmed 2014)	µg/m ³	<10.0	100
9.	Oxides of Nitrogen (as NO ₂)	IS 5182 (Part 6) : 2006 (Reaffirmed 2017)	µg/m ³	9.5	40
10.	Particulate Matter (as PM ₁₀)	IS 5182 (Part 23) : 2006 (Reaffirmed 2017)	µg/m ³	42.3	60
11.	Particulate Matter (as PM _{2.5})	EPA 40 CFR Part 50 – Appendix L	µg/m ³	21.8	40
12.	Sulphur Dioxide (as SO ₂)	IS 5182 (Part 2) : 2001 (Reaffirmed 2017)	µg/m ³	5.5	50

<--- End of Report --->

Notes :
The concentrations of the parameters tested in the above location are within the prescribed annual average limits of NAAQs tolerance limits.

<p>Report Confirmed By :</p> <p><i>K. K. K. K.</i></p>	 <p>Authorized Signatory R.S.DINAKARAN Quality Manager</p>
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Terms :

- This test report shall not be reproduced in full or part without the written approval of the Laboratory.
- The test results relate only to the test item tested and results apply to the sample "as received conditions".
- This test results does not account the MU value in the statement of conformity unless or otherwise specified in the report.
- The laboratory is not responsible for information provided by customer and it does not come under the scope of accreditation.
- This test item will not be retained more than 10 days from date of issue of test reports, unless or otherwise requested by customer.
- Total liability of our laboratory is limited to the invoice amount and any dispute arising out of this report is subject to Madurai Jurisdiction only.
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- Sample is not drawn by laboratory unless stated in the report, if the sample drawn by the customer, the laboratory is not responsible for sampling stage.
- (BDL) - Below Detectable Limit; (DL) - Detectable Limit; (MU) - Measurement Uncertainty; (NA) - Not Applicable; (CFU) - Colony Forming Unit.
- (*) Mark indicates the test does not comes under scope of accreditation and (#) Mark indicates the tests are subcontracted to other accredited laboratory.



10. Conclusion

Though the institution is predominantly an undergraduate college, there is significant environmental research both by faculty and students. The environmental awareness initiatives taken by the management are substantial. The installation of water recycling plant and paperless work system are remarkable. Besides, environmental awareness programmes initiated by the administration prove the campus is going green. 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.

11. Acknowledgement

We are grateful to the management and committee members of NPR College of Engineering and 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

A handwritten signature in blue ink, appearing to read 'P. Vivek', is positioned above the name of the signatory.

Er. P.Vivek ME

Chartered Engineer

Lead Green Associate