Athul ENERGY CONSULTANTS

Athul Energy, we stand for Quality, Reliability and Efficiency

No: AEC/GAC/30

18-12-2021

Audit Certificate

This is to certify that **M/s Pocker sahib Memorial Orphanage College Thirurangadi , Malapuram** have successfully completed the **Environment Audit** of their buildings and campus conducted on 12th November 2021 . They have submitted all necessary data and credentials for scrutiny.

We, **Athul Energy Consultants Pvt Ltd**, Thrissur congratulate the Management, Executive Director, Principal, staff members and students for the successful completion and participation in the audit report process.

ATHUL ENERGY CONSULTANTS PVT LTD THRISSUR 680 020

Managing Director

Athul Energy Consultants Pvt Ltd

Athul Energy Consultants Pvt Ltd
CIN: U74999KL2016PTC046898
info@athulenergy.com
www.athulenergy.com

Registered Office:
4/2, Capital Legend Building
Korapath lane, Round-North
Thrissur-680020, Kerala
+91 7356111990

Branch Office:
F-7, James Square
Asian paint Chowkady, GIDC
Ankleshwar-393002, Gujarat
+91 7356111991

ENVIRONMENT AUDIT – 2021

POCKER SAHIB MEMORIAL ORPHANAGE COLLEGE TIRURANGADI, MALAPURAM

EXECUTED BY

ATHUL ENERGY CONSULTANTS PVT LTD

4th FLOOR, CAPITAL LEGEND BUILDING,

KORAPPATH LANE, ROUND NORTH, THRISSUR, KERALA-680020

Ph: +91 735611199/0-6 Web: www.athulenergy.com E-Mail: info@athulenergy.com

November 2021

B R I E F C O N T E N T S

LISTOFTABLES

LISTOFFIGURES

PREFACE

Every institution should be imparting knowledge about the campus environment and its surroundings through activities that follows the principles of sustainability and waste management. Hence an evaluation is needed to understand where it stands in the path to be an environment friendly, and in talent nurturing educational institution.

This Environment Audit was done with the aim to assess mainly on waste management of the campus. The college vision is "To become a centre par excellence of learning, where the best in humans is unveiled, based on human values, focused on life enhancement and constructive in adapting to the needs of the world". The mission of college is "to mould individuals into successful and vibrant professionals facilitating comprehensive and rounded formation, to function as effective and empathetic human beings, grounded with courage of conviction, personal integrity, professional ingenuity and social commitment "and it was we observed by us from the students' participation during the environmental audit.

This report is compiled by the BEE certified energy auditor and environment consultant along with the project engineers who are experienced in the field of energy, environment and management. The student volunteers made a mammoth contribution with data collection and in preparing an initial skeleton for the report.

ACKNOWLEDGEMENTS

We express our sincere gratitude to the management of M/s PSMO College Thirurangadi Malapuram for giving us an opportunity to carry out the project of Environment Audit. We are extremely thankful to all the staffs for their support to carry out the studies and for input data, and measurements related to the project of environment audit.

Dr. Azeez K Principal
IQAC Co Ordinator

ENVIRONMENT AUDIT TEAM

1. Mr. Santhosh A
Registered Energy Auditor of Bureau of Energy Efficiency (BEE – Govt. of India)
Accredited Energy Auditor No – EA 7597

2. Mr. G . Krishnakumar Environment expert , ISO 140001 lead auditor

3Mr. Harikrishnan , Project Engineer – B-Tech

Yours faithfully Managing Director Athul Energy Consultants Pvt Ltd

ENVIRONMENT AUDIT SUMMARY

❖ College segregated the waste from college, canteen, and hostels and treated in a scientific manner.

❖ Separate storage provisions are done for metal and plastics, LED bulbs in college. ❖

Biodegradable wastes are treated in a biogas plant installed behind the hostel ❖

Non-biodegradable wastes are incinerated near to boys toilet block

❖ Electrical incinerators are installed in the ladies toilets and comfort stations.

Suggestions for improvement

❖ Internal inspection team to be formed which comprises of staff and students for internal auditing of the waste management in the campus

❖ Introduce 'refuse plastic' concept in college inventories. This will increase the awareness among students and staffs and will seep into their behaviour

❖ . Provide waste flow chart in the laboratory

❖ Do s and Don'ts in the laboratory while conducting experiments

❖ Standard disposal procedure in the laboratory for all chemicals used in the lab ❖ Separate bins and containers for control wastes and special control wastes, reusable items etc. in laboratory

❖ Display the weight of segregated wastes that collected from the canteen, hostels and college in prominent locations which will be an eyeopener for all and it will help in reduce the waste generation.

❖ Monthly Records should be kept for segregated wastes which will give the administration to pinpoint the source and can take necessary steps to reduce it.

GENERAL DETAILS

The general details of the PSMO College are given below in table.

GENERAL DETAILS

The general details of the PSMO College are given below in table.

1 Name of the College PSMO College

2	Address	Saudabad, Tirurangadi
		Malapuram -676306
3	Contact Person	Dr. Azeez K
4	Contact Phone number Fax No:	0494-2460336
		0494-2460635
5	Web site & E-mail ID	www.psmocollege.ac.in mail@psmocollege.ac.in

6	Type of Building	Educational Institution
7	Annual Working Days	210
8	No: of Shifts	Day Shift (One) (9AM -4PM)
9	No: of students enrolled	1876
10	No: of teaching staff	78
11	No: of non-teaching staff	30
12	Total campus area	20.92 Acre
13	Total Built Up area M2	11634
14	No of PG courses	16
15	No of U G courses	08
17	Bio gas pant	Yes
18	Compost Unit	Pipe compost
19	Incinerator	Yes

ABOUT PSMO COLLEGE

Sprawling over 20,92 acres of land and situated at a distance of 13Km from Calicut University Campus , 8Km from Parapangadi railway ststion 13Km from Calicut . Pocker Sahib Memorial Orphanage College , Tirurangadi is a leading institute affiliated to Calcut University .The college is accredited NAAC A grade in its second cycle The college established in 1968 in this socially and educationally back ward region by a noble mission of imparting higheir education to all irrespective anything but with special emphasis on the education of Muslim and other minority communities. The PSMO college alumni proven that this noble mission made successful evidenced by of its alumni placed I various capacities across the world.

The founder and former General Secretory of Tirurangadi Muslim Orphanage Committee(PSMO) MK. Haji Sahib, as to be remembered for his humanitarian concerns of under preivileged section of society across Malabar area. PSMO is foremost orphanage in the Kerala started in 1943 and PSMO is one of the feeder institutions under this Tirurangadi Muslims Orphanage Committee.The college is estsblished on 1968 as aided Junior college and it is upgraded to first grade college from 1972 and PG College in 1980 .At present college have

10UG programmes, 8 PG programmes and 5 reasearch programmes are offered. The institution has afully computerized libraray with morthan 50,000 books and 90 periodicals . Libraray having well equipped digital resource centre with lot of e- books, animations, videos , lectures etc in its collection. College is one of ASAP centre since 2013. Various clubs such as energy and environment conservation club, Bhumithra sena, Nature club etc functioning well in the college which improves the interactive and social skills among the students.

Vision

To achieve national and international recogonition as a premier academic institution through an extraordinary student centred , value based , teaching learning practices and quality research output

Mission

Align the academic endeavors of te college with the best nationally anfd globally To collaborate with institutions of eminence leading to elevated student experiences To establish student centered instructional ecosystem with active leaning practices

To provide top class exposure to research in terms of thought and material support

Figure 1 FRONT VIEW OF COLLEGE

ABOUT ENVIRONMENT AUDIT

The ICC defines Environmental Auditing as: **"A management tool comprising a systematic, documented, periodic and objective evaluation of how well environmental organization, management and equipment are performing with the aim of safeguarding the environment and natural resources in its operations/projects."**

A clean and healthy environment aids effective learning and provides a conducive learning environment. There are various efforts around the world to address environmental education issues. Environmental conditions may be monitored from angles that are relevant to Indian requirements, without stress on legal issues or compliance. This innovative scheme is user friendly and totally voluntary. The environmental awareness helps the institution to set environmental examples for the community and to educate young learners.

Here we can mainly divide this report waste management initiatives and installations of systems such as bio gas plant, vermicompost, incinerator and collection and segregation of waste in the campus etc and students initiates in waste management as a social cause

Figure 2: PSMO COLLEGE CAMPUS

WASTE MANAGEMENT

Waste is generally termed as 'a resource at the wrong place'. The college authorities are aware of the possible methods and have installed waste management measures like biogas systems. The waste clearance measures associated with different types of wastes are briefly given below. In this college normally three types of wastes are generated and we can divide the same as,

1. Bio degradable
2. Non bio degradable and
3. E-waste

1. BIODEGRADABLE WASTES

Biodegradable waste includes any organic matter in waste which can be broken down into carbon dioxide, water, methane or simple organic molecules by micro-organisms and other living things by composting, aerobic digestion, anaerobic digestion or similar processes also includes some inorganic materials which can be decomposed by bacteria. These materials are non-toxic to the environment and mainly include the natural substances like Plants and animals waste, even the dead plants and animals, fruits, paper, vegetables, etc. get convert into the simpler units, which further get into the soil and are used as manures, biogas, fertilizers, compost, etc.

The biodegradable wastes are mainly from the college canteen and pushed it to the Biogas plant. The bio-slurry is used as manure to the plantation.

I. BIO GAS PLANT

Biogas is the mixture of gases produced by the breakdown of organic matter in the absence of oxygen (anaerobically), primarily consisting of methane and carbon dioxide. Biogas is a renewable energy source Biogas is produced by anaerobic digestion with methanogen or anaerobic organisms, which digest material inside a closed system, or fermentation of biodegradable materials. This closed system is called an anaerobic digester, bio digester or a bioreactor.

Biogas is a renewable, as well as a clean, source of energy. Gas generated through bio digestion is non-polluting; it actually reduces greenhouse emissions. No combustion takes place in the process, meaning there is zero emission of greenhouse gasses to the atmosphere; therefore, using gas from waste as a form of energy is actually a great way to combat global warming. Another biogas advantage is that, unlike other types of renewable energies, the process is natural, not requiring energy for the generation process. In addition, the raw materials used in the production of biogas are renewable.

Bio gas plant reduces soil and water pollution. Consequently, yet another advantage of biogas is that biogas generation may improve water quality. Moreover, anaerobic digestion deactivates pathogens and parasites; thus, it's also quite effective in reducing the incidence of waterborne diseases.

Bio gas generation produces organic fertiliser. The by-product of the biogas generation process is enriched organic (digest ate), which is a perfect supplement to, or substitute for, chemical fertilizers. The fertilizer discharge from the digester can accelerate plant growth and resilience to diseases, whereas commercial fertilizers contain chemicals that have toxic effects and can cause food poisoning, among other things.

The biogas plant converts food wastes into methane gas and usable bio fertilizers which will used for plants. The methane gas from the biogas plant is used in the canteen for cooking purpose and for heating drinking water hot water. Approximately 100 kg of LPG /month is saved by using biogas plant. The bio maneuver from the biogas plant is used for gardening, agriculture and for trees. This bio

waste is also act as best bio insecticide and thus the college avoided the usage environmentally toxic precipices for environment. Here college is using fixed dome permanent structure biogas plant of size 4 M^3 for treating bio waste. The slurry coming from the plant is collected in drums and reused after diluting with water for agriculture and for gardens. The methane gas is used in the canteen for hot water generation which is used for drinking and tea making.

II. VERMI-COMPOST

It is the product of the decomposition process using various species of worms, usually red wigglers, white worms, and other earthworms, to create a mixture of decomposing vegetable or food waste, bedding materials, and vermicast. Vermicomposting contains water-soluble nutrients and is an excellent, nutrient-rich organic fertilizer and soil conditioner.[3] It is used in farming and small scale sustainable, organic farming.

The major source of raw material for vermi-compost is the leaves in the college campus and also the wastes generated which are not fed into biogas such as Chicken bones etc. The vermi-compost plants installed near to the scrap yard in the college campus

Benefits of Vermi-compost

a. For Soil

- ❖ Improves soil aeration
- ❖ Enriches soil with micro-organisms (adding enzymes such as phosphatase and cellulose) ❖

Microbial activity in worm castings is 10 to 20 times higher than in the soil and organic matter that the worm ingests

❖ Attracts deep-burrowing earthworms already present in the soil

❖ Improves water holding capacity

b. For Plant growth

❖ Enhances germination, plant growth, and crop yield.

❖ Improves root growth, Enriches soil with micro-organisms, adding plant hormones such as auxins and gibberellic acid.

c. For Economic

❖ Bio wastes conversion reduces waste dumping in landfills.

❖ Elimination of bio wastes from the waste stream reduces contamination of other recyclables collected in a single bin (a common problem in communities practicing is single-stream recycling) ❖ Creates low-skill jobs at local level.

❖ Low capital investment and relatively simple technologies make vermicomposting practical for less developed agricultural regions.

d. For Environmental

❖ Helps to close the "metabolic gap" through recycling waste on-site.

❖ Large systems often use temperature control and mechanized harvesting, however other equipment is relatively simple and does not wear out quickly

❖ Production reduces greenhouse gas emissions such as methane and nitric oxide (produced in landfills or incinerators when not composted).

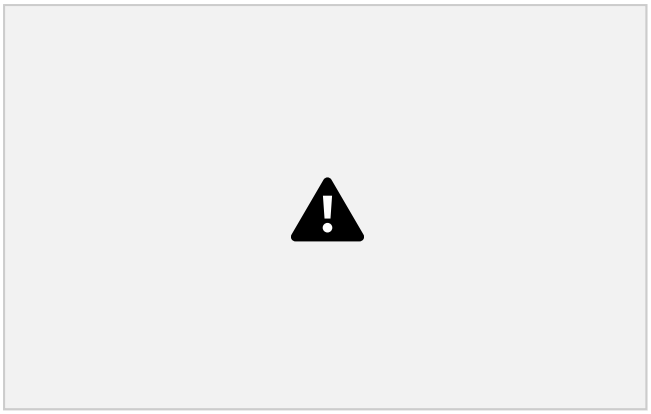

Figure 3 PIPE COMPOST UNIT

2. NON-BIODEGRADABLE WASTE

Materials that remain for a long time in the environment, without getting decompose by any natural agents, also causing harm to the environment are called non-biodegradable substances. These materials are metals, plastics, bottles, glass, poly bags, chemicals, batteries, etc. But as these are readily available, convenient to use, and are of low cost, the non-biodegradable substances are more often used. But instead of returning to the environment, they become solid waste which cannot be broken down and

become hazardous to the health and the environment. Hence are regarded as toxic, pollution causing and are not considered as eco-friendly.

Many measures are taken these days, concerning the use of non-biodegradable materials. The **three 'R'** concept which says **Reduce-Recycle -Reuse** is in trend, which explains the use of the non biodegradable materials. As we already discuss that these substances do not decompose, or dissolve easily so can be recycled and reuse. And one can help in reducing this waste by instead of throwing the plastics and poly bags in the garbage; it can be put in the recycling bags to use again.

Non-recyclable wastes are collected and burned once in a month using incinerator places inside the campus itself. The recyclable wastes are sorted out into categories and supplied it to the collecting units.

I. **INCINERATOR**

The objective of waste incineration, in common with most waste treatments, is to treat waste to reduce its volume and hazard, whilst capturing (and thus concentrating) or destroying potentially harmful substances. Incineration processes can also provide a means to enable recovery of the energy, mineral and/or chemical content from waste. Basically, waste incineration is the oxidation of the combustible materials contained in the waste. Waste is generally a highly heterogeneous material, consisting essentially of organic substances, minerals, metals and water. During incineration, flue-gases

are created that will contain most of the available fuel energy as heat. The organic substances in the waste will burn when they have reached the necessary ignition temperature and come into contact with oxygen. The actual combustion process takes place in the gas phase in fractions of seconds and simultaneously releases energy. Where the calorific value of the waste and oxygen supply is enough, this can lead to a thermal chain reaction and self-supporting combustion, i.e. there is no need for the addition of other fuels.

The incinerator is used for incinerating non-biodegradable waste such as paper, plastic, sanitary napkins etc. The ash generated are as for manoeuvre after mixing with cow dung for plants. The ash generated from plastic will be treated separately.

The ash generated from canteen were wood is used as a fuel is used as manoeuvre for plants. The college campus promoting biodegradable packaging and reducing the consumption of plastic to a large extent.

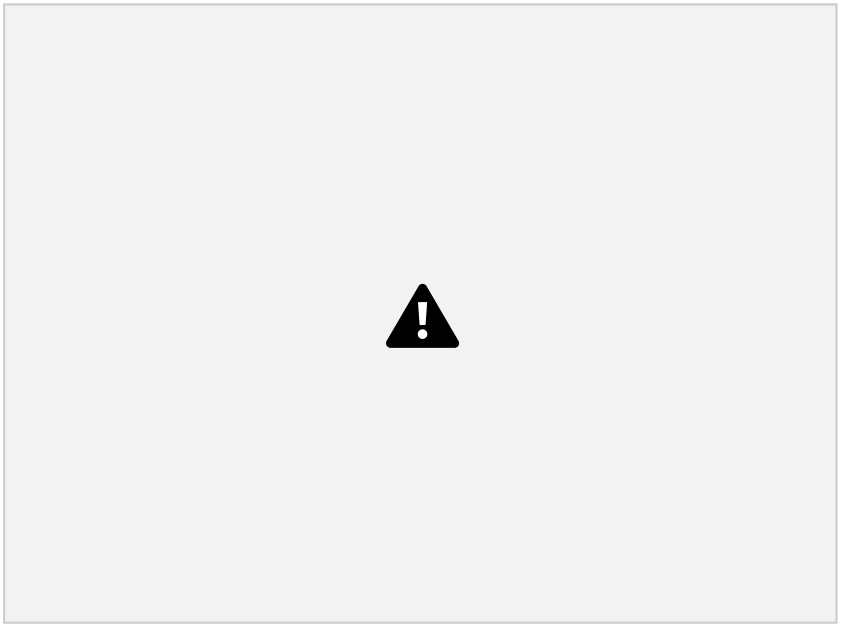

FIGURE 4 INCINERTOR IN LADIES TOILET

3. ELECTRONIC WASTE

Electronic waste or e-waste describes discarded electrical or electronic devices. E-waste or electronic waste is created when an electronic product is discarded after the end of its useful life. The rapid expansion of technology and the consumption driven society results in the creation of a very large amount of e-waste in every minute. Used electronics which are destined for refurbishment, reuse, resale, salvage recycling through material recovery, or disposal are also considered e-waste. Informal processing of e-waste in developing countries can lead to adverse human health effects and environment pollution. Certain components of some electronic products contain materials that render them hazardous, depending on their condition and density.

Recommendation

College has to sign an agreement for disposing the electronic wastes with a approved agency of Kerala State Pollution board for the same. For the time being it can be collected and stored in a fixed space near to common toilet and herbal garden area.

4. LABORATORY WASTES

It is the clear responsibility of the lab users to ensure safe and correct disposal of all wastes produced in the course of their work. Laboratory wastes can be divided into multiple ways such as wastes as of

- ❖ controlled wastes such as dirty paper, plastic, rubber, wood etc which can be collected in a bin and incinerated in an incinerator
- ❖ Special control wastes such as Brocken glass wares of lab, sharp edge items, needles etc which needs to collected in a separate bin or container and dispose in a safer way. While collecting in these materials should not have any chemicals in it.

Wastes generated from laboratory experiments which is required multiple disposable mechanisms. (Acid, alkalis, salts of inorganic compounds)

The acids alkalis are to be disposed by wash down procedure by using excess water after maintaining its PH value. The material which is in the RED LIST should not be washed down it should be collected and treated separately (Heavy metals, mineral oils, hydrocarbons, cyanides, fluorides, nitrites etc. The solvents, mineral oils are to separately incinerate in a incinerator.

In the food, microbiology laboratory the wastes are of biodegradable which can be treated in the biogas or in vermicomposting plant. Other chemicals will be treated by wash down procedure. In PSMO ample ventilation is given in all laboratory. The natural illumination is also good.

Suggestions for waste management

❖ Provide waste flow chart in the laboratory

❖ Do s and Don'ts in the laboratory while conducting experiments

❖ Standard disposal procedure in the laboratory for all chemicals used in the lab ❖ Separate bins and containers for control wastes and special control wastes, reusable items etc. in laboratory

FACILITIES PROVIDED BY COLLEGE FOR WASTE MANAGEMENT COLLECTION

- Toilets blocks and comfort stations are provided for boys and girls
- Separate amenity block is provided for staff
- There is separate toilet facility for department heads, staff rooms, administrative department and common facility.
- Certain toilets are facilitated for disable friendly with suitable hand rails and support mechanisms.
- Bins are provided in various areas of Campus for segregated collection of bio degradable (food,) and non-bio degradable wastes (Plastic, bottles)
- Every day cleaning and sanitisation is done at each and every toilet by cleaning personnel which used to check by housekeeping supervisor.
- Separate team is maintained by college for maintain the clean campus, removal of wastes from pets, collection wastes from bins, which is supervised by maintenance supervisor.

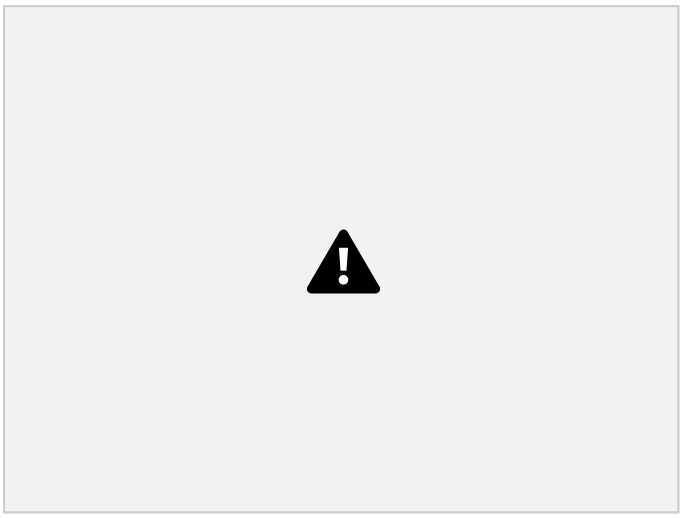

Figure 5: OLD LED BULB COLLECTION

STUDENT ACTIVITIES FOR ENVIRONMENTAL CONSERVATION Due to Kovid lock down of college in the last Academic year there is not much off line and field activities are conducted in the college but online activities like seminars , classes are conducted for environment protection .

.

CONCLUSION

Environment audit is the best way to analyse and solving the critical issues of waste management. Environment audit can add value to management approach being taken by college for identifying, collecting, segregating and processing of waste generated in the college campus. By analysing the waste generation in each segment such as biodegradable, non-degradable, R waste etc. gave an indication of waste generation and thus put control for the same to reduce the environmental impacts in due course.

The findings in the report shows that college perform fairly well in waste management issues and taken considerable efforts in a responsible manner. During audit and the conversations with the college team, we observed that PSMO College done various approaches in the past few years to performing well to sustainable environment. Even though there is space for further improvement that mentioned in the executive summary, the college is a good example for the minimisation of environment issues in the existing conditions.

ANNEXURE

BEE Accredited energy auditor certificate