

ENVIRONMENT AUDIT - 2021-22



MES COLLEGE MARAMPALLY

Aluva, Ernakulam, Kerala

EXECUTED BY



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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 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 **MES College Marampally, Aluva**, 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.

- | | |
|---------------------------|---------------------------------------|
| 1. Adv. A A Abul Hassan | Chairman, College Managing Committee |
| 2. Jb. M A Mohammed | Secretary, College Correspondent |
| 3. Jb. T M Zakeer Hussain | Treasurer, College Managing Committee |
| 4. Dr. Ajims P Mohammed | Principal |
| 5. Dr. Jasmine PM. | Vice Principal & IQAC Co-ordinator |
| 6. Shri Abdul Jabbar CI | Junior Superintendent |

Also congratulating our Environment audit team members for successfully completing the assignment in time and making their best efforts to add value.

ENVIRONMENT AUDIT TEAM

- 1. Mr. Krishnakumar G.**
Lead Auditor, ISO 140001, Environment Management and Certified energy auditor.
- 2. Mr. Ashok K M P**
Registered Energy Manager of Bureau of Energy Efficiency (BEE – Govt. of India)
Accredited Energy Manager No – EA 25612
- 3. Mr. Jaideep PP**, Project Engineer

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 in college.
- ❖ Bio gas plant is installed behind canteen for treating the bio waste from canteen
- ❖ Two numbers of incinerates are fitted in the college for treating the sanitary waste.
- ❖ Electric incinerator installed in girl's toilet
- ❖ Separate zones to be provided to collect metals, glass waters and plastics in the college
- ❖ Vermi-compost plant can be installed for treating the leaf and stationary wastes.
- ❖ Separate bins and containers for control wastes and special control wastes, reusable items etc.

Suggestions for improvement

- ❖ Provide waste flow chart in the laboratory
- ❖ Do s and Don'ts in the laboratory while conducting experiments
- ❖ Internal waste survey to be conducted in every month as collect all the waste items in the college and weighed and keep a track record of the same will use as an indicator for control of the same.



GENERAL DETAILS

The general details of the MES Marampally are given below in table.

TABLE 1: GENERAL DETAILS

SL. NO	PARTICULARS	DETAILS
1	Name & Address of college	MES College Marampally, Aluva, Ernakulam Kerala 683107
2	Contact person	Dr. Raphika PM Assistant Professor & Programme officer of EECC Department of Electronics, MES College Marampally.
3	Location: Latitude & Longitude	10.1066° N, 76.4115° E
4	No. of Teaching staff	146
6	No. of Non-Teaching staff	60
7	No of students	2685
8	Building area	18885m ²
9	Land area	25 acres
10	Number of UG programs	17nos
11	Number of PG programs	09 nos
12	Number of departments	19nos
13	Hostel mates	150 nos
14	Average annual working days	263 days, (139 for odd and 124 for even semester)
15	DG Set	50 kVA (2 each)
16	Transformer	200 kVA (1 No)

ABOUT MES COLLEGE

M.E.S College -Marampally, situated in the KSRTC Route of Alva-Perumbavoor route., is the dream child of the MES Group of institutions in the field of Higher education. MES Group foreseen that this college requirement would cater to the educational needs of the suburban villages, in and around Aluva and Perumbavoor. M.E.S. College Marampally is a Government Aided college affiliated to Mahatma Gandhi University, Kottayam, established in the year 1995. The College has reaccredited by NAAC with A+ Grade (CGPA, 3.38) which is the first ever highest grade in the State as per the revised process of accreditation.

The Principal, the teaching staff, and the non-teaching staff work together as a well-knit team. The dedication, competence, and diligence of the staff have raised the reputation of the college within a short span of time. The college encourages many co-curricular activities, thus playing a major role in molding the personality and empowering the young ladies to rise to the challenges in their daily life. The main thrust is to make them respond creatively and positively to the various needs of the society and the community they live in. Thus, the NSS, NCC, Career Guidance, AIDS Awareness Cell, Reader's Club and Nature Club function effectively. Apart from these, various Enrichment Programs are being planned and conducted for the holistic development of the students.

The Campus, spread out in a hilly stretch surrounded by lush greenery, is a sure sight of delight for a lover of nature. The College is also in close vicinity to the river Periyar and very near to the city of Kochi and the International Airport, the satellite view of the college is shown in the following Figure 1. The academic building of the college is marked with the college name. The college ground is located west of this building. There is a plantation of banana plants south of the college ground. The College hostel building is located south of this plantation. Other main buildings are located south of the academic building.

The College offers Seventeen UG Programmes such as Computer Applications (BCA), B.Sc. Electronics, Business Administration (BBA), B.Com. (Model II), B.Com. (Taxation), B.Sc. Biotechnology, B.Sc. Microbiology, B.Sc. Physics (Model II) B.Sc. Mathematics (Model II), B.A. English, (Three Main) B.A. Arabic (Model II), B.Sc. Psychology, B. Voc. Logistics Management, B. Voc. Animation & Graphic Design, B. Voc. Software Development & System Administration, B. Voc. Fashion Designing & Management and B. Voc. Industrial Instrumentation & Automation and Nine Post Graduate programmes viz. M.Sc. Biotechnology, M.Sc. Electronics, M.Com. M.Sc. Microbiology, M.Sc. Biochemistry, M.A. English Language and literature, M.Sc. Computer Science, MHRM and M.Sc. Physics.

ABOUT ENVIRONMENT AUDIT

The ICC defines Environment 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 biogas plant, vermin-compost, incinerator and collection and segregation of waste in the campus etc and students initiates in waste management as a social cause.

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.



FIGURE 1: BIO GAS PLANT

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 (digestive), 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 be 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 manure from the biogas plant is used for gardening, agriculture and for trees. This bio waste also acts as the best bio insecticide and thus the college avoided the usage of environmentally toxic pesticides for the environment. Here the college is using a fixed dome permanent structure biogas plant of size 4 M³ 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 vermin-cast. Vermicompost 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 vermicompost is the leaves in the college campus and also the wastes generated which are not fed into biogas such as chicken bones etc. The vermicompost plants are installed near to the scrap yard in the college campus.

III. Pipe Compost

Pipe composting is a kind of vermicomposting often called as worm tube composting which is carried out by using PVC tube. This is a simpler method for treating wastes of lower volume.

Benefits of Vermicompost

a. For Soil

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

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.



Figure 2: Incinerator in college and ladies toilets

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. MES Marampally signed MOU for processing E-waste generated from the college.

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 Broken 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 MES Maramapally have ample ventilation is given in all laboratory. The natural illumination is also good.

Suggestions for waste management

- ❖ Existing FRP Biogas plant is not working which needs to be repaired
- ❖ The pit near to canteen Kitchen having all types of wastes (kitchen waste. Plastic glass wares etc.)
Proper segregation of wastes is required for better waste management system
- ❖ Presently open pit is used for incinerating the non-biodegradable waste which needs to change with incinerator. Separate incinerator for ladies' hostel for treating sanitary napkins because it contains the blood stains hence it is treated as medical wastes.
- ❖ 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.
- ❖ Internal waste survey to be conducted in every month as collect all the waste items in the college and weighed and keep a track record of the same will use as an indicator for control.



FACILITIES PROVIDED BY COLLEGE FOR WASTE MANAGEMENT COLLECTION

- Toilets in every floor of all buildings separately for girls, boys and staff.
- There is separate toilet facility for department heads, staff rooms, administrative department and common facility.
- Bins are provided in various areas of Campus for segregated collection of biodegradables (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.



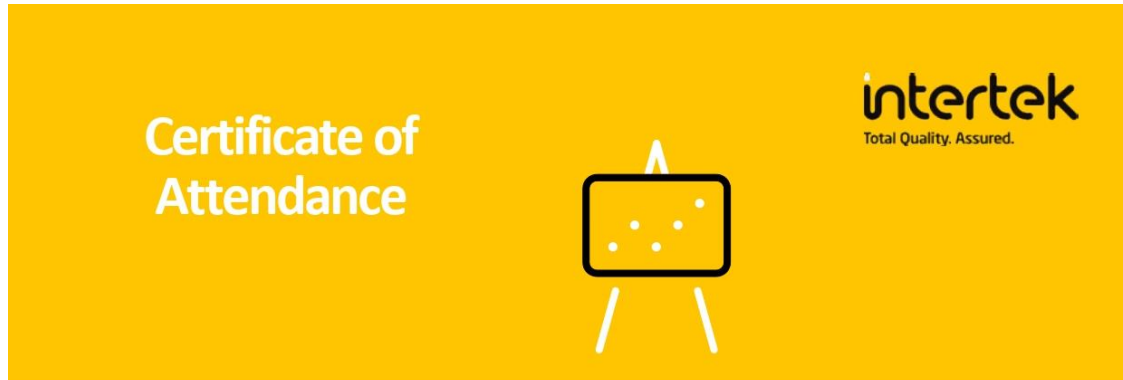
CONCLUSION

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 MES Marampally 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.

ANNEXURE

➤ EnMs ISO certificate



G KRISHNAKUMAR

has attended the following live virtual classroom course:

Transition training for Environment Management System as per ISO 14001:2015


Course is designed to explain:

- Requirements of ISO 14001:2015 in context of audit.
- Key changes from ISO 14001: 2004 to 14001:2015

Session Duration: 16 Hours

CERTIFICATE NUMBER
2020260507

TRAINING DATE:
25th & 26th May, 2020



Authorising Signature:



Intertek India Private Limited