ENVIRONMENT AUDIT -2022

SREE SANKARA COLLEGE
KALADY, ERNAKULAM

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 center of learning par excellence, 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 mold 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, professionalingenuity 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 ISO 140001 (Environment Management) person 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 M/s Sree Sankara College Kalady for giving us an opportunity to carry out the project of Environment Audit. We are extremely thankful to all the staff fortheir support to carry out the studies and for input data, and measurements related to the project of Environment audit.

1	Dr. Suresh A	Principal
2	Dr. Preethi Nair	IQAC Co-ordinator

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

2. **Mr. G. Krishnakumar,** Energy auditor Lead auditor ISO 140001

Yours faithfully

ATHUL ENERGY CONSULTANTS PVT. LTD. THRISSUR 680 020

Managing Director
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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.
- Biodegradable wastes are treated in a biogas plant installed in the hostel.
- Vermi compost plant is working well in the campus.
- Laboratory waste are well treated and connected to as separate pit
- E-wastes are being collected by AL Ameen Industries, Vazhakulam as the institution signed MoU with them.

Suggestions for improvement

- Internal inspection team to be formed which comprises staff and students for internal auditingof the waste management in the campus
- Separate incinerators are to be provided in the college to avoid the open incineration of wastes. One for general wastes and another one for incineration medical wastes such as sanitary napkins.
- Display the weight of segregated wastes that collected from the canteen, hostels and college in prominent locations which will be an eye-opener for all and it will help in reduce the waste generation.
- Monthly Records should be kept for segregated wastes which will help the administration to pinpoint the source and take necessary steps to reduce it.

GENERAL DETAILS

The general details of the M/s Sree Sankara College Kalady are given below in table.

Table 1: **GENERAL DETAILS**

Sl. No:	Particulars	Details
1	Name of the College	Sree Sankara College, Kalady
2	Address	Sree Sankara College Sankar Nagar, Mattoor, Kalady P.O., Ernakulam – 683 574048
3	Contact Person	Dr. Mini K D, Ph: 9605055445
4	E-mail ID	info@ssc.edu.in
5	Web site	www.ssc.edu.in
6	Type of Building	Educational Institution
7	Annual Working Days	180
8	Working Hours	9AM - 4PM
9	No: of students enrolled	2421
10	No : of teaching staff	133
11	No: of non-teaching staff	21
12	Total campus area	18 acres
13	Total Built Up area (M^2)	19078
14	Bio gas	Yes
15	Vermicomposting Unit	No
16	Incinerator	Yes
17	Segregation of Waste	Yes

ABOUT SREE SANKARA COLLEGE

Sree Sankara College, Kalady was founded in the year 1954 by Swami Agamananda, a social reformer and a foresighted scholar of Sri Ramakrishna Advaita Ashram. The institution was established with a view to perpetuating the memory and doctrines of the great saint and philosopher, Adi Sankaracharya and to nurture his birth place as a cultural citadel. The foundation stone was laid on 28 August, 1953 by His Highness the Maharaja of Travancore in the presence of The Maharaja of Cochin and several other distinguished personalities. The Sree Sankara College Association was formed in July 1954.

The vision & mission of the organization was to establish a Centre of Higher Learning with two major objectives —dissemination of knowledge in tune with a university curriculum and fostering community development.

The institution was raised to the status of a First Grade College in 1956. It is affiliated to the Mahatma Gandhi University and is included under sec.2 (f) and 12 (B) of the UGC act, 1956.

In June 1960, the patronage of the college became vested in His Holiness the Jagadguru Sri Sri Sankaracharya Swamigal of Dakshinamnaya. Currently, Sri Sri Bharathi Theertha Mahaswamigal, of Sringeri Mutt, steers the administration through a Board of Directors with Sri. K. Anand as the Managing Director.

The college has done consistently well in Curricular and Cocurricular activities. The National Assessment and Accreditation Council (NAAC), accredited the college by B++ Grade with 2.80 CGPA on a four-point scale. The Departments of Economics, Commerce, Sanskrit and Microbiology are approved Research Centres under the Mahatma Gandhi University.

VISION

To achieve excellence in higher Education, with a stress on, creativity, skill development, employability, personal values with social

MISSION

To mold good citizens with ingenuity, adaptability, social commitment and ethical values who can provide innovative leadership in all walks of life.

FIGURE 1: COLLEGE CAMPUS

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 andnatural 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 of waste management initiatives and installations of systems such as bio gas plant, vermin compost, incinerator and collection and segregation of waste in the campus etc and student's initiatives in waste management as a social cause.

ABOUT ENVIRONMENT POLICY OF COLLEGE

Sree Sankara College Kalady is a quality conscious college. It protects its own environment with its green campus initiatives and keeps the premises pollution free. Environment development is in tune with the educational policies implemented on the campus.

Environmental conscious administration, the management and the students of the college look after the environment carefully. Every year, during rainy season, we do tree plantation and carefully look after it.It's our own responsibility to preserve the work done on the campus related to the Environment. They regularly undertake plantation programme through NSS and Bhumithrasena, Birds Club International Units every year as per schedules. On World Environment Day (June 5), every year students from all departments encouraged to plant saplings in their own backyards at home to enhance environmental consciousness.

College already conducting course like environmental Science and Renewable energy management in its 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 fertilizer. 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 whichwill 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 10 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 best bio insecticide and thus the college avoided the usage of environmentally toxic precipices for environment. Here college is using fixed dome permanent structure biogas plant of size $1M^3$ 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.

Sree Sankara College installed $1M^3$ FRP bio gas plant in its CANTEEN for catering food wastes generated from college hostel and canteen. At presently this FRP water sealed plant is not functioning which needs to be repaired.

FIGURE 2: FRP BIO GAS PLANT

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. Vermi compost contains water-soluble nutrients and is an excellent, nutrient-rich organic fertilizer and soil conditioner. 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 alsothe wastes generated which are not fed into biogas such as Chicken bones etc. The vermi-compost plantsinstalled 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 thatthe 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 gibberellin 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 equipmentis 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: VERMIN COMPOST

Recommendation

We are recommended to maintain well the vermin compost

2. NON-BIODEGRADABLE WASTE

Materials that remain for a long time in the environment, without getting decomposed 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 wastes such as paper, plastic, sanitary napkins etc. The ash generated is used as manure after mixing with cow dung for plants. The ash generated from plastic will be treated separately.The ash generated from canteen where wood is used as a fuel is used as manure for plants. The college campus is promoting biodegradable packaging and reducing the consumption of plastic to a large extent.

FIGURE 4: OPEN TYPE INCINERATOR

Recommendation

We strongly recommend to provide one more incinerator for incinerating medical wastes such as sanitary napkins.

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. All the electronic wastes such as old computers, CPU, CDs etc are stored separately in the college

4. LABORATARY 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 an incinerator.

In Sree Sankara college ample ventilation is given in all laboratory. The natural illumination is also good.

Hazardous waste Management in College

Chemical waste that is generated in the laboratories such as acids/ bases is neutralized before disposal. Alternative protocols are followed to bypass carcinogenic, cytotoxic and heavy metal-containing chemicals, heavy metal-containing chemicals are reduced, concentrated, solidified and disposed of as solid waste. Non-hazardous liquid chemical waste is then disposed of in sinks and hazardous liquid chemical waste (very minimal) is stored

Suggestions for waste management

- Provide waste flow chart in the laboratory
- At present all the chemicals wastes are drained off into main drain.
- 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 in every buildings separately for girls, boys and staff.
- There is separate toilet facility for department heads, staff rooms, administrative department and common facility.
- Certain toilets are facilitated for the disabled. The campus is disabled-friendly with suitable hand rails and supports
- 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 is checked by housekeeping supervisor.
- Separate team is maintained by college to maintain the clean campus, removal of wastes from pets, collection wastes from bins, which is supervised by maintenance supervisor.

Figure 5 COLLECTION BINS

CONCLUSION

Environment audit is the best way to analyze and solve 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 analyzing 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 M/s Sree Sankara College Kalady had done various approaches in the past few years to ensure sustainable environment. Even though there is space for further improvement as mentioned in the executive summary, the college is a good example for the minimization of environmentissues in the existing conditions.

ANNEXURE

ISO 140001 Certificate

Certificate of Attendance

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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