

ENVIRONMENT AUDIT – 2020



CHRIST COLLEGE, IRINJALAKUDA (AUTONOMOUS) THRISSUR, KERALA

EXECUTED BY



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BRIEF CONTENTS

| | |
|---|-----------|
| PREFACE..... | 3 |
| ACKNOWLEDGEMENTS..... | 4 |
| ENVIRONMENT AUDIT SUMMARY | 5 |
| GENERAL DETAILS | 6 |
| ABOUT CHRIST COLLEGE, IRINJALAKUDA(AUTONOMOUS) | 7 |
| ABOUT ENVIRONMENT AUDIT..... | 9 |
| WASTE MANAGEMENT | 9 |
| FACILITIES PROVIDED BY COLLEGE FOR WASTE MANAGEMENT COLLECTION | 16 |
| CONCLUSION | 17 |
| ANNEXURE..... | 18 |

LIST OF TABLES

| | |
|---------------------------------------|----------|
| TABLE 1: GENERAL DETAILS | 6 |
|---------------------------------------|----------|

LIST OF FIGURES

| | |
|--|-----------|
| FIGURE 1: CHRIST COLLEGE CAMPUS | 8 |
| FIGURE 2: BIO GAS PLANT | 10 |
| FIGURE 5: GIRLS HOSTEL INCINERATOR &PORTABLE INCINERATOR IN LADIES TOILET | 14 |



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 ISO 140001 Environment Management certified person 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 **Christ College, Irinjalakuda (Autonomous)**, 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. The environment audit conducted in the March 2021

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

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2. Mr. Ashok K M P

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Yours faithfully

Managing Director
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ENVIRONMENT AUDIT SUMMARY

- ❖ College segregated the food waste from college.
- ❖ 12M³ dome type bio gas plant is installed behind of canteen for treating food wastes. The bio gas is used in canteen for cooking
- ❖ College is having 49 acre of vast campus with 2300 of plants. In most of the areas the leaves and branches of trees are fall down in its area and allowed to self-decaying to earth.
- ❖ Separate storage provisions are done for metal and plastics in college
- ❖ 1 number of incinerates are fitted in the college girl's hostel
- ❖ Electric incinerator installed in girl's toilet
- ❖ E- Wastes are collected and kept in a separate room and MOU for collecting E waste is in progress.
- ❖ Plastic wastes are collected and segregated and send to local bodies for scientific disposal

Suggestions for improvement

- ❖ Separate zones to be provided to collect metals, glass waters and plastics in the college.
- ❖ Provide waste flow chart in the laboratory
- ❖ Do s and Don'ts in the laboratory while conducting experiments
- ❖ Pipe compost plant to be installed in the college as demonstration purpose.
- ❖ Separate bins and containers for control wastes and special control wastes, reusable items with colour coding. All the bins have numbering and keep a register with location details.
- ❖ Separate incinerator to be provided for incinerating stationary waste
- ❖ 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 a indicator for control of the same.

GENERAL DETAILS

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

| Sl. No | Particulars | Details |
|--------|--------------------------------------|---|
| 1 | Name of the College | Christ College (Autonomous) |
| 2 | Address | Christ Nagar, Irinjalakuda Thrissur -680125 |
| 3 | Contact Person | Principal |
| 4 | Contact Phone number & E -mail | 0480-2825258 office@christcollegeijk.edu.in |
| 5 | Web site | www.christcollegeijk.edu.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 | 4514 |
| 10 | No: of teaching staff | 210 |
| 11 | No: of non-teaching staff | 46 |
| 12 | No: of departments | 27 |
| 13 | No : UG courses | 28 |
| 14 | No: of PG courses | 18 |
| 15 | Total campus area | 49 Acre |
| 16 | Total Built Up area | 37190M ² |
| 17 | No: of hostel students | Boys 415 Ladies 203 |
| 18 | No: of plants in college | 2277 |
| 19 | No: of various species | 244 |
| 20 | Carbon Sequestration (ton) per annum | 119 |
| 21 | Grounds and stadiums | Volley ball court -3No: and Basketball-4No: Hand ball court -2 No: Hockey Field and, Net ball, Tennis, Kho-Kho courts -1 No: each, Athletic or cricket stadium -1 No: Football field -1No: and Indoor stadium under construction. |

TABLE 1: GENERAL DETAILS



ABOUT CHRIST COLLEGE, IRINJALAKUDA(AUTONOMOUS)

Christ College was started in 1956, by the Devamatha Province of the Carmelites of Mary Immaculate (CMI), an indigenous religious congregation founded in 1831 by Saint Chavara Kuriakose Elias. A religious priest and versatile genius, who envisioned education as a tool for liberation and development. Founded as per the provisions of the Indian Constitution, part III, Article 30(1) and administered by Christ College Educational Society, (Regd. No. 137/75), this college is a minority institution, affiliated to Calicut University and re-accredited by NAAC with highest grade 'A'. Christ College is dedicated to Jesus Christ, and has as its motto "**Jeevitha Prabha**", which means "**Light of Life**". Following recommendation from state government, the college has been conferred the "**Autonomous status**" by University Grants Commission (UGC) during the year 2015, the Diamond Jubilee year of the college. Christ College is part of a century-old tradition of CMI education that is at its heart, Christian and specifically catholic. It offers an ideal vision of education that is aware of and responsive to the challenges of the nation's present situation.

Vision

Moulding an enlightened generation by developing the potential of individuals through quality higher education and moral value inculcation.

Mission

To impart quality education, imbued with Indian ethos and enriched with universal values. To mould our youth as intellectually competent, psychologically integrated and morally upright social beings.

To train them as responsible citizens of our nation who champion the cause of justice, love, truth and peace.

To emancipate them from the clutches of "Adharma" and "Ahamkara" to true freedom and fraternity.

The management believes that the secret of success of our College is a community of teachers who are committed to their vocation by being professionally competent, spiritually mature, humane in dealings, and ever open to new horizons of knowledge



FIGURE 1: CHRIST COLLEGE CAMPUS

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, vermi-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. Laboratory Wastes
4. 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 bio-degradable 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 2: 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 180 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 concrete permanent structure biogas plant of size 12 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.

Recommendation

Suitable arrangements to be done for distributing the slurry from the new bio gas plant installed behind the canteen.

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 vermi-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.

In Christ College is of vast 49 acre campus most of the plant leaves are allowed to self-decompose there itself and thus they become rich in fertility. The leaves collected from other areas (Garden and road) are also deposited in the forest area of college.

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

- ❖ Biowastes conversion reduces waste dumping in landfills.
- ❖ Elimination of biowastes 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).

Recommendation

- ❖ We recommend to install a vermi compost plant in the campus to bio degradable solid waste which we cannot treat by bio gas plant. The compost formed from vermi compost can be used for our gardening and plants. This is set an example for students for studying and practising to treat the wastes.
- ❖ As a demonstration we can install pipe compost plant for vegetable garden creation in the college

SEGREGATION OF WASTE

Segregation of our waste is essential as the amount of waste being generated today caused immense problem. There are certain items are not Bio Degradable but can be reused or recycled in fact it is believed that a larger portion of the waste can be recycled, a part of can be converted to compost, and only a smaller portion of it is really waste that has no use and has to be discarded. The segregation waste at the first point important because we can reduce cost involved for the final segregation and treatment cost. At present college is collecting and segregating the wastes in scientific manner.

- ❖ The colour coding of waste bins Organic is Green, Glass is Yellow, Paper is White, Metal is Grey, Plastic is Blue, Hazard is Red
- ❖ Numbering of each bins and keeping a register for its location.
- ❖ 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

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, 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 3: Girls Hostel incinerator & Portable incinerator in Ladies Toilet

Recommendation

Common incinerator is to be provided in the college. This is for incinerating unwanted other substances like stationery waste etc.

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.

Summary

College separate marked space to be created in the college for collecting E waste and signed an MOU with external pollution control board recognised parties are in progress.

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, 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 an 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 NCERC 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 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.
- 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 Christ college (Autonomous) 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 Certified Professional



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:



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