



St. Joseph College of Teacher Education for Women Ernakulam



CRITERION VI

6.1.3 Institution Maintains Transparency in its Financial, Academic Administrative and Other Functions

Additional Information

Submitted to

**National Assessment and Accreditation Council (NAAC)
3rd Cycle of Assessment**



**ST. JOSEPH COLLEGE OF TEACHER EDUCATION FOR WOMEN ERNAKULAM
KOCHI-682035, KERALA**

6.1.3 Additional Information

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ST. JOSEPH COLLEGE OF TEACHER EDUCATION FOR WOMEN,
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FINANCIAL POLICY DOCUMENT



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FINANCIAL POLICY

St. Joseph College of Teacher Education for women, Ernakulam believes in transparency and responsible financial management to ensure quality education. The Financial Policy Document outlines the principles, guidelines, and procedures related to the institution's financial operations.


Objectives:

The objectives of the Financial Policy are the following:

1. To ensure transparency in matters relating to finance
2. To be judicious in the use of finance
3. To be responsible in financial management
4. To ensure the fulfilment of its mission of providing quality education to the downtrodden irrespective of caste, creed or community.

Measures Adopted:

1. To carry out financial transaction in keeping to the rules and regulations put forth by the Government
2. To maintain transparency in financial management by carrying out annual audit.
3. Cash books, Vouchers and Receipts to be maintained for financial transactions.
4. All transaction above the sum of Rs.10000 to be paid by cheque and not by cash.
5. A finance and Purchase committee to be constituted for a period of three years to carry out the financial transactions of the institution
6. The institution has a provision for providing financial Support to staff for the Research and professional development.


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7. Schemes and measures involving financial support for the welfare and of the faculty and students to be designed and implemented with the approval of the Educational Agency.
8. Accounts of funds and donations received and its expenditure to be maintained accurately.
9. The Principal and Bursar are the authorized signatories for holding Joint Accounts of the Institution.
10. Scholarships and freships provided to the needy students is to be approved by the scholarship committee.
11. Funds received for projects must be allocated for the purpose alone.
12. Financial transactions of less than 50,000 can be made with the approval of the Finance cum Purchase committee but for transactions exceeding 50,000 the approval of the Management Council required.
13. Budget to be prepared annually.
14. Land or building to be purchased in the name of the Institution with the approval of the Management council.
15. Assets register to be maintained.
16. Any asset purchased out of Government Funds or any other funding agency to be labelled under the fund.

The Financial policy will be reviewed and updated to adapt to changing circumstances, regulations, and financial priorities with the consent of the Management council as per the demands of the time


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GREEN AUDIT



ST JOSEPH COLLEGE OF TEACHER EDUCATION FOR WOMEN

ERNAKULAM, KERALA

EXECUTED BY



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January 2022



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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. Hence an evaluation is needed to understand where it stands in the path to be an environment friendly, talent nurturing educational institution. This Green Audit was done with the aim to assess and rate the sustainable nature of the campus. The college vision is “to enlighten and empower women in rural and suburban society and enable them to act as agents of social transformation and acquire knowledge of self and surroundings and to make the world a better place”. And in the **social goals**, it is written as “**to make the students aware of the pressing global issues and the moral responsibility to handover to the coming generation an eco-friendly life style and an earth free from pollution, filth, bigotry and corruption**”. It was observed by us from the students’ participation during the green audit.



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ACKNOWLEDGEMENTS

We express our sincere gratitude to the management of M/s St. Joseph College of teacher education for Women Ernakulam for giving us an opportunity to carry out the project of Green 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 Green audit.

1. Dr. Alice Joseph Principal
2. Dr. Josephine Joseph IQAC Co coordinator

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

GREEN 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. Ashok KMP**
Energy Manager of Bureau of Energy Efficiency, GRIHA Certified Professional
3. Mr. Jaideep P.P Sr. Project Engineer

Yours faithfully



Managing Director
Athul Energy Consultants Pvt Ltd



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GREEN AUDIT SUMMARY

- ❖ St. Joseph College of teacher education for Women taken considerable effort for maintaining the green and sustainable campus.
- ❖ Staff and student's collaboration of NSS unit is held responsible for maintenance of greenery inculcating a sustainable culture among the student's community.
- ❖ By recognizing the importance of making healthy youth, management taken initiatives and built a badminton and volleyball courts, food ball ground in the college surrounded with lush of greeneries.
- ❖ Rain water collection of capacity 50 kl is installed in the college.
- ❖ College well maintaining vegetable garden , Ornamental Garden , Plantain garden etc in the college

Suggestions for improvement

- ❖ Water meter to be installed for measuring water consumption per day.
- ❖ Practice Institutional Ecology- Set an example of environmental responsibility by establishing institutional ecology policies and practices of resource conservation.
- ❖ Road map for the tree plantation to be done along with the master plan of the college. Gave importance for the oxygen generating plants and lush green trees.
- ❖ Display boards are to be placed in the, herbal, botanical garden areas with name of trees in that areas.




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**GENERAL DETAILS**

The general details of the s St. Joseph College of teacher education for Women are given below in table.

TABLE 1: GENERAL DETAILS

Sl. No:	Particulars	Details
1	Name of the College	St. Joseph College of teacher education for Women
2	Address	St. Joseph College of teacher education for Women Kovilvattom Road , Near MG Road, Kacheripady Ernakulam Kerala 682035 Ernakulam -6872035
3	Contact Person	Dr. Sr. Alice Joseph (Principal)
4	Contact Phone number & E mail	0495-2260495 stjosephtrainingcollege@hotmail.com
5	Web site	www.stjosephcte.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	218
10	No: of teaching staff	19
11	No: of non-teaching staff	12
15	Total campus area	74R
16	Total Built Up area	614.87m ²
17	No: of hostel	01(Women)

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ABOUT ST. JOSEPH COLLEGE OF TEACHER EDUCATION FOR WOMEN ERNAKULAM

St. Joseph College of Teacher Education for Women, Ernakulam is established and managed by the Carmelite Nuns (Congregation of Mother of Carmel, CMC) who consider the up liftment of women and children as their 'Divine Call'. The institution is an important organ of the congregation fulfilling this command at any cost. The college established in 1957 located in the heart of Kochi city, is a minority institution, affiliated to Mahatma Gandhi University, Kottayam. It is owned and run by Vimala Province of the Congregation of Mother of Carmel (CMC). This edifice of learning and holistic enrichment nestles on 2 acres 31.5 cents calm and serene ground and is a unique blend of the old and new architectural styles. General discipline is scrupulously maintained and academic oriented culture is in place

Mission

The college strives for the integral liberation of women through life oriented education, transforming them to responsible citizens who respond proactively to the global challenges with courage and commitment, build a just social order, and be stewards of this universe as modelled in the person of Jesus Christ.

Vision

Keeping to the spirit of our founder Saint Chavara Kuriakose Elias we dream of forming empowered teachers who lead a life imbued in faith in God, realizing their full potential and passionately contributing to build a learned society rooted in love and unity.

Motto

Let light be a source of enlightenment



Figure 1 MAIN BUILDING



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GREEN AUDIT

The whole world is on the road to a sustainable development, and the environment conservation is the top priority among the list as every human activity has its effect on their surroundings, which is the environment. Hence be it a house, a commercial building, an industrial building, or any other construction will disturb the balance of the environment. It is very important to do a detailed study about the effects on the environment. This is conducted under the name of *Green Audit*, which can be defined as *the official examination of the effects a company or other organization has on the environment, especially the damage that it causes*. The objectives of the green audit can be listed as follows:

- Including participants from every section of the organization in the auditing process.
- Understanding the environment by drawing a simple sketch of the total area.
- Identifying the activities in the premises and listing them.
- Calculating the resource consumption like the land and water.
- Assessing the waste management and disposal.
- Study the energy usage pattern.
- Identify the good practices.
- Suggest the viable solutions to improve the sustainable nature of the institution.
- Compile the report with the above-mentioned details.
- Conduct a walkthrough audit to check the suggestions implemented by the institution and suggest for further improvements
- Verify all the points with actual measurements is it is meeting the performance and gave suggestions for improvement




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CAMPUS ENVIRONMENT

The environment in and around the college campus plays an important part in maintaining a healthy atmosphere in nurturing talents. Trees are the major source of the oxygen we breathe, and receiver of the carbon dioxide we exhale. The sustainability of an ecosystem depends on the number of plants and trees in and around the surroundings. The open space in the college is used for gardening, buildings are built up without disturbing the sustainable nature of land scape of the area.

Ultimately the campus is maintaining natural equilibrium with open spaces, buildings, trees, birds along with human interactions



FIGURE 2: CAMPUS VIEW

Scientific studies are proved that the nature can able to cure any diseases and this will reduce the stress among students during theirs studies and also increase the compassion among them and to nature. Ultimately the campus is maintaining natural equilibrium trees, birds and water bodies with human beings. Gardens and landscape are an aesthetic delight and it promotes attentiveness of students. Persons exposed to plants have higher level of positive feelings (pleasant, calm) as opposed to negative feelings (anger, fear).



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SUSTAINABLE CONSTRUCTION OF BUILDINGS

Energy consuming devices installed to achieve the comfort levels for the occupants of the building gives rise to heat generation which adversely affects the environment within the building and in the surrounding. Buildings are thus the major pollutants that affect the urban air quality and contribute to climate change. Buildings are the major consumers of energy during their construction, operation and maintenance.

St. Joseph College of teacher education for Women has developed an ecological design in their buildings and adopted minimum negative impact on ecosystem. Their approach to the constructional activities consciously is to conserve energy and ecology and avoid the adverse effects of ecological damage.

St. Joseph College of teacher education for Women management constructed the building to optimum utilisation of land and classrooms and with abundant light and natural ventilation. Maximum day light ingress and natural ventilation increases the indoor air quality and avoid the sick building syndrome. The whole facility and buildings are designed to maximum and optimum utilisation of land without affecting the natural hill area



FIGURE 3: BUILDING VIEW



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CARBON DIOXIDE LEVELS

Air quality is a major area of concern inside a building. The percentage share of oxygen and carbon dioxide should be such that the occupants are able to perform their tasks without any discomfort. This is generally done through a provision of fresh air duct for the air conditioning systems or by providing windows. Numerous factors need to be considered for the design and fabrication of the fresh air supply system like the number of occupants, weather pattern and air quality of the location, and so on. For the human comfort, production of carbon-dioxide (CO₂) within a building space is the prime area of consideration. This is associated with respiration which produces CO₂. As a result, the carbon-dioxide levels will increase if ventilations are not provided.

As per various standards (like the ASHRAE Standard 62.1-2016), indoor CO₂ concentrations up to 1200 ppm is considered acceptable. For a typical outdoor condition, this value may change from 300 to 500 ppm.

The measurements were recorded along different locations inside the campus and the peak values are given in the following sections. The key concentration was on the study of carbon dioxide levels.

Table 2 CO₂ LEVELS IN BUILDING

Sl. No.	AREA	Measured CO ₂	Standard CO ₂ level (Range)	Remarks
Main Block				
1	Class room in First Floor	550	300-500	Good
2	Corridor	625	300-500	Good
4	Staff room	600	300-500	Good
1	Class room Second Floor	550	300-500	Good
2	Corridor	550	300-500	Good
3	Class room for M ED	530	300-500	Good
4	Principal Office	480	300-500	Good
5	Office	460	300-500	Good



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1. VEGETABLE GARDEN

It is a garden that exists to grow vegetables and other plants useful for human consumption. Gardening can provide students with hands-on learning opportunities while increasing environmental awareness and vital experience in problem-solving. The vegetable gardens are changing the eating habits of the students

Gardens are a wonderful way to use the college campus as a classroom, reconnect students with the natural world and the true source of their food, and teach them valuable gardening and agriculture concepts and skills that integrate with several subjects, such as math, science, art, health and physical education, and social studies, as well as several educational goals, including personal and social responsibility. They gain self-confidence and a sense of "capableness" along with new skills and knowledge in food growing — soon-to-be-vital for the 21st century students become more fit and healthy as they spend more time active in the outdoors and start choosing healthy foods over junk food.



Figure 4 VEGETABLE GARDEN



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2. GREENERY IN THE COLLEGE

St. Joseph College for teacher education for Women located heart of Ernakulam town 74 R of land mainly covered by trees and it is well protected by management. Educational institutions serve as important incubators for developing a ‘green ‘sense among students and teachers and create a new generation of professionals to drive the future change. Green sense is the sensitivity towards environment that is addressed in our decisions, practices and general lifestyle. In St, Joseph College for teacher education for women teaching sustainability and environment not in books but it is demonstrated in the campus.



FIGURE 5: SCENIC COLLEGE PERIPHERALS



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3. LIVE BOUNDARY WALL OF THE COLLEGE

The college is maintained a separate microclimatic zone in the urban city of Ernakulam by maintaining a thin and in certain areas thick boundary layer of trees around the college. Due to this boundary layer protects the college from dust and noise pollution to large extent. In this microclimate zone the temperature and humidity, particulate matter, oxygen concentration, carbon dioxide levels are different from the city and thus maintaining a comfort atmosphere to students.



Figure 6 LIVING BOUNDARY WALL

4. ORNAMENTAL GARDEN

The beauty of the flower garden is clearly evident through the ornamental plants grown here. They provide us with visual delight and beauty is their main trait. They are grown mainly for decorative purposes and create a pleasant atmosphere throughout the garden



Figure 7 ORNAMENTAL GARDEN



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5. OXYGEN PARK

Green space in the college where you can go for morning and evening walks, as well as for picnics. Oxygen Park is a location where we can rest and release all our stress by nature. In this aesthetic location with ample ventilation take us into heaven in the earth. This park is anything but regular with its many sections for, children, fitness enthusiasts, and just about anyone who wants to spend some quiet time amidst nature. Fitness enthusiasts, get here for some fresh air and undisturbed yoga sessions. Undisturbed nature along with water bodies enhances your creativity due to comfort feeling to mind along with abundant supply of oxygen. In this oxygen park classes are conducted by college which are increasing the creativity and it is practical way of learning methods to understand nature



Figure 8 OXYGEN PARK

6. PETS

Animals plays an important role in many people’s lives. Many studies indicated that pets will reduce the anxiety and blood pressure. Findings suggested that the social support to a pet provides a person feel more relaxed and reduction in stress. Pets develop great empathy, higher self-esteem, and increase of participation in social and physical activities. This attributes student’s emotional development



Figure 9 PETS IN COLLEGE



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7. SILENT ZONE

Now a day's silent zones are getting important in academic institutions. The noise pollution leads to stress and other medical and neurotic problems to children's and also creativity and absorption capacity of knowledge is also going down. For reduction of academic stress level there is space for complete relaxation which gives the importance of silence zone. St. Joseph College for teacher education for Women have aerated certain silent zones in the college itself. . Natural silence zones are also crated in the college campus where there is no sound other than natures sound.



Figure 10 SILENT ZONE

8. OPEN GROUNDS

Education is incomplete without sports and games. Sports and games are **beneficial in teaching us punctuality, responsibility, patience, discipline, and dedication towards our goal.** The importance of games and sports in student's life is immense. It has proved to be very therapeutic in nature. Sports help improve stronger social skills, such as dispute management and sport-based interaction. **Sports inculcate the feeling of fairness in a child and it encourages them to be committed, taking defeat in a positive manner.** It teaches us to be joyful, united, and appreciative in life. Students are the youth of our Nation, and they need to be energetic, physically active, and mentally fit. By understanding the responsibility to make its students as healthy s St. Joseph College for teacher education for Women built and maintained football ground, volley and badminton court in a greenery surroundings. .



Figure 11 OPEN PLAY GROUND



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9. AUDITORIUM

There is main auditoriums are maintained the college main building top floor. The stage is located in the centre like open theatre. Nature playing a vital role in this stage because it will create only sound not echo or noise during the show. Due to the stage is designed in open model the sound reflections are less and getting natural light also giving a scenic beauty to the auditorium.



Figure 12 AUDITORIUM

10. SPECIAL INITIATIVES OF COLLEGE

I. DISABLED FRIENDLY:

Disability is only disabling when it prevents someone from doing what they want or need to do. Government of India signed the UNCRPD (United Nations Convention on the Right Of Persons with Disabilities) on 1st October 2007. In this article 9 says about the requirements of disabled persons on accessibility to buildings. As per the signed UNCRPD Indian Parliament passed an act as RPD (Right to Persons Disability) act on March 2016. As per new act, all buildings should have ramps at the entry, exit, lifts for higher floors, separate toilet with suitable arrangements such as hand rails etc.

WATER AUDIT

The requirement of water for the college, hostels and gardening etc are met by supply from one OPEN well and from KWA water and one bore well for emergency requirements. The water from OPEN are mainly used for gardening by using 1.5HP motor pump. The water from Kerala Water Authority collected in 25KL concrete tank. This water is pumped into Overhead tank of capacity 8KL using 1.5HP motor. For meeting emergency requirements one bore well connection also in the college.. This bore well water is pumped into 25KL tank of KWA.

The water from different wells are checked in an accredited laboratory in time to time to ensure its portability.



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1. WATER USAGE AREAS

UTILITIES

The labs have the highest tap points whereas the toilet accounts for the major consumption. The water outlet points in the college campus and hostel are listed in the following table.

Table 3 LIST OF WATER TAPS

Location	No: of taps
Washing area taps	06
Toilets for students	15
College compound and garden	12
Kitchen	08
Staff rooms	41
Total	



Figure 13 BOREWELL AND WATER TANK

2. RAIN WATER HAVESTING

Rainwater harvesting (RWH) is a technique of collection and storage of rainwater into natural reservoirs or tanks, or the infiltration of surface water into subsurface aquifers (before it is lost as surface runoff). There are different methods for artificial rain water harvesting. Ground water recharging by different means and collection of rain water for direct use by installation of rain water collection tank. Ground water recharging methods are decided by detailed study of rain fall, geological and hydrogeological



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mapping of the area etc. Another method of rainwater harvesting is rooftop harvesting. With rooftop harvesting consists of installation of pipes, filtration unit, by pass valve, tanks pumps etc.

Rainwater harvesting for ground water recharge.

Advantages

- Conservation of water for future use
- Biological purity of water is good
- It is environment friendly, controls soil erosion and flood and provides sufficient soil moisture even during summer months
- It provides a natural distribution system between recharge and discharge points
- Quality improvement by infiltration through the permeable media
- Water stored underground is relatively immune to natural and man-made catastrophes




Figure 14 RAIN WATER COLLECTION TANK

SUGGETIONS FOR WATER CONSERVATION AND GROUND WATER RECHARGING.

The water overflowed from rain water harvesting tank can be used for recharging their ground water by making a pit using coconut shells, sand stones etc as recharging pit.

- The use of biomass in the form coconut shells can be used to cover the foot of the trees which can behave as recharging soak pits




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STUDENTS INITIATIVES AND OUT REACH ACTIVITIES

CARE FOR NATURE

In connection with World Environment Day Observation, National service Scheme Volunteers college conducting various programmes in every year. In connection with NSS camp one day is named as Care for nature. Under this session are conducted by Mr. K.K Reguraj, Farm superintendent, KUFOS about importance of Mangrove protection in the eco system. Under his guidance 50 samplings are done in MANGALAVANAM at Ernakulam.



Figure 15 CARE FOR NATURE

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*എറണാകുളം സെന്റ് ജോസഫ് കോളേജ് ഓഫ് ടീച്ചർ എഡ്യൂക്കേഷനിലെ വിദ്യാർത്ഥിനികൾ മംഗളവനത്തിൽ കണ്ടൽചെടികൾ നട്ടു.

മംഗളവനത്തിൽ കണ്ടൽചെടികൾ നട്ടു

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കൊച്ചി: എറണാകുളം നഗരത്തിലെ പച്ചതുരുത്തായ മംഗളവനത്തിൽ വിദ്യാർത്ഥികൾ കണ്ടൽചെടികൾ നട്ടു. എറണാകുളം സെന്റ് ജോസഫ് കോളേജ് ഓഫ് ടീച്ചർ എഡ്യൂക്കേഷനിലെ വിദ്യാർത്ഥിനികൾ ആണ് കോളേജ് ഫിഷറീസ് സമുദ്രപഠന സർവ്വകലാശാല (കുഫോസ്) ഫാം സൂപ്രണ്ട് കെ.കെ.രാജുരാജിന്റെ നേതൃത്വത്തിൽ മംഗളവനത്തിൽ കണ്ടൽ ചെടികൾ നട്ടത്. കോളേജിൽ നടക്കുന്ന പ്രകൃതി പഠനക്യാമ്പിന്റെ ഭാഗമായി നടന്ന കണ്ടൽചെടികളെ അറിയുക എന്ന പരിപാടിയുടെ ഭാഗമാണ് വിദ്യാർത്ഥിനികൾ മംഗളവനം സന്ദർശിച്ച് കണ്ടൽചെടികൾ നട്ടത്. കെ.കെ.രാജുരാജ് ക്യാമ്പിൽ ക്ലാസ്സെടുത്തു. കോളേജ് പ്രിൻസിപ്പൽ സിസ്റ്റർ ഡോ.ആലീസ് ജോസഫ്, ക്യാമ്പ് കോഡിനേറ്റർ ഡോ.സ്മിത ജോസ്, വിദ്യാർത്ഥി പ്രതിനിധികളായ അഞ്ജന വിജയൻ, രോസാലിയ ജോർജ് എന്നിവർ പ്രസംഗിച്ചു.

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CONCLUSION:

Green Audit is the most efficient & ecological way to solve such an environmental problem. Green Audit is one kind of professional care which is the responsibility of each individual who are the part of economic, financial, social, environmental factor. Green audits can “add value” to the management approaches being taken by the college and is a way of identifying, evaluating and managing environmental risks (known and unknown). The green audit reports assist in the process of attaining an eco-friendly approach to the development of the college.

The auditors observed during the campus visit and after the conversation with the staff and students of M/s St. Joseph College of Teacher Education for Women that they have taken continuous and considerable effort in several years for nurturing and maintaining the green coverage over the campus which is being well appreciated by us.



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ANNEXURE - 1

GRIHA CP CERTIFICATE



GREEN RATING FOR INTEGRATED HABITAT ASSESSMENT

GRIHA CERTIFIED PROFESSIONAL CERTIFICATE

This is to certify that

Ashok K M P

has qualified as a **GRIHA Certified Professional For V. 2015**

Date of issue: 19th June 2020

Note : This certification is valid only for GRIHA version 2015.

Chief Executive Officer
GRIHA Council



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ENVIRONMENT AUDIT



ST JOSEPH COLLEGE OF TEACHER EDUCATION FOR WOMEN

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.



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ACKNOWLEDGEMENTS

We express our sincere gratitude to the management of M/s St. Joseph College for teacher education for Women Ernakulam 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 Dr. Alice Joseph Principal
- 2 Dr. Josephine Joseph 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. Lead auditor ISO 50001, Certified energy auditor of BEE**

Yours faithfully



Managing Director
Athul Energy Consultants Pvt Ltd



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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 behind the canteen.
- ❖ Non-biodegradable wastes are incinerated which installed near the playground.

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.
- ❖ 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 give the administration to pinpoint the source and can take necessary steps to reduce it.




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**GENERAL DETAILS**

The general details of the St. Joseph College for teacher education for Women are given below in table.

Table 1 GENERAL DETAILS

Sl. No:	Particulars	Details
1	Name of the College	St. Joseph College for teacher education for Women
2	Address	St. Joseph College for teacher education for Women Kovilvattom Road , Near MG Road, Kacheripady Ernakulam Kerala 682035 Ernakulam -6872035
3	Contact Person	Dr. Sr. Alice Joseph (Principal)
4	Contact Phone number & E mail	0495-2260495 stjosephtrainingcollege@hotmail.com
5	Web site	www.stjosephcte.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	218
10	No: of teaching staff	19
11	No: of non-teaching staff	12
15	Total campus area	74R
16	Total Built Up area	614.87m ²
17	No: of hostel	01(Women)
18	Bio gas plant	01 (Fixed concrete 10m3)

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ST. JOSEPH TRAINING COLLEGE FOR WOMEN-ERNAKULAM

St. Joseph College of Teacher Education for Women, Ernakulam is established and managed by the Carmelite Nuns (Congregation of Mother of Carmel, CMC) who consider the up liftment of women and children as their 'Divine Call'. The institution is an important organ of the congregation fulfilling this command at any cost. The college established in 1957 located in the heart of Kochi city, is a minority institution, affiliated to Mahatma Gandhi University, Kottayam. It is owned and run by Vimala Province of the Congregation of Mother of Carmel (CMC). This edifice of learning and holistic enrichment nestles on 2 acres 31.5 cents calm and serene ground and is a unique blend of the old and new architectural styles. General discipline is scrupulously maintained and academic oriented culture is in place

Mission

The college strives for the integral liberation of women through life oriented education, transforming them to responsible citizens who respond proactively to the global challenges with courage and commitment, build a just social order, and be stewards of this universe as modelled in the person of Jesus Christ.

Vision

Keeping to the spirit of our founder Saint Chavara Kuriakose Elias we dream of forming empowered teachers who lead a life imbued in faith in God, realizing their full potential and passionately contributing to build a learned society rooted in love and unity.

Motto

Let light be a source of enlightenment



Figure 1 FRONT VIEW OF COLLEGE



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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, 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

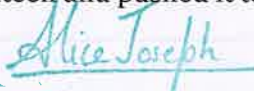
1. BIODEGRADABLE WASTES

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.




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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.



Figure 2 BIO GAS PLANT

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.



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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 floating fixed dome concrete dome Type biogas plant of size 10 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

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. 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.




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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).

II. WASTE GENERATED FROM PETS

The wastes generated from Pets (Different varieties of birds, rabbit etc) are collected separately and used as base manure after mixing with vermi compost as bio fertilizer for plants in the college.

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



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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 3 INCINERATOR

2. 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.




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FACILITIES PROVIDED BY COLLEGE FOR WASTE MANAGEMENT COLLECTION

- Toilets in every floor of all buildings separately for girls, and 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)
- Separate team is maintained by college for maintain the clean campus, collection wastes from bins etc.





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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 St. Joseph College of Teacher Education for Women 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.





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ANNEXURE

➤ BEE Accredited energy auditor certificate

 **BUREAU OF ENERGY EFFICIENCY**

Examination Registration No.: **EA-7597**
Accreditation Registration No.: **AEA-0275**



Certificate of Accreditation

This is to certify that Mr./Ms. **Santhosh. A** having its trade/registered office at **Kerala** has been given accreditation as accredited energy auditor. The certificate shall be effective from **2nd** day of **November, 2017**.


The certificate is subject to the provisions of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

This certificate shall be valid until it is cancelled under regulation 9 of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.


On cancellation, the certificate of accreditation shall be surrendered to the Bureau within fifteen days from the date of receipt of order of cancellation.

Your name has been entered at AEA No. **0275** in the register of list of accredited energy auditors. Your name shall be liable to be struck out on the grounds specified in regulation 8 of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

Given under the seal of the Bureau of Energy Efficiency, Ministry of Power, this **12th** day of **February, 2018**


Secretary,
Bureau of Energy Efficiency
New Delhi




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➤ **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:



Intertek India Private Limited




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ENERGY AUDIT



ST JOSEPH COLLEGE OF TEACHER EDUCATION FOR WOMEN

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January 2022



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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. An energy audit is essential first step to reduce energy cost and greenhouse emissions. Audit is defined as the systematic review and implementation of a firm's data statements, records, operations and performance for a specified purpose. Energy audits is a systematic study or survey to identify how energy used in its own facility. In addition, identifying the energy savings opportunities in the building Behavioural Change through the student education can provide greatest benefit at least cost. Even small savings in each households make dramatic change in the society and for nation. The idea of energy conservation and sustainability will be percolated to society through students will have long standing effect and successful too

This report 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 preparing an initial skeleton for the report.

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ACKNOWLEDGEMENTS

We express our sincere gratitude to the St Joseph College of Teacher Education for Women for giving us an opportunity to carry out the project of Energy 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 energy audit.

- 1 Dr. Alice Joseph Principal
- 2 Dr. Josephine Joseph IQAC Co coordinator


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

ENERGY AUDIT TEAM

- 1 Mr. Santhosh A Accredited Energy Auditor No - AEA 0275
- 2 Mr. Jaideep P P Senior Project Engineer


Yours faithfully




Managing Director
Athul Energy Consultants Pvt Ltd

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EXECUTIVE SUMMARY

I. ENERGY SAVING PROPOSALS:

TABLE 1: EXECUTIVE SUMMARY -ENERGY

Sl. no	Energy conservation measures	Annual Energy Savings kWh	Annual Financial Savings Rs	Investment Rs	Simple payback period Months
1	Replacement of Ceiling fans with BLDC fans 5 star rated – 25 nos	1,344	10,080	87,500	104
2	Replacement of Fluorescent lights with LED – (T8 & T12 with 20W) – 22 nos	659	4,939	8,800	21
Total		2,003	15,019	96,300	

II. AUDIT SUMMARY - ACTIONS

The actionable summary of the audit report given in the table below.

TABLE 2: ENERGY AUDIT SUMMARY - ACTIONS

Sl No:	Particulars	Location	Action to be taken	Remarks
1	Energy efficiency – Replacement of ceiling fans with BLDC fans	Office, staff rooms, Classrooms	Change the existing old ceiling fans with BLDC fans	Power Consumption will get reduced
2	Replacement of Fluorescent lights with LED lights	Office, staff rooms, Classrooms	Change the existing fluorescent lights with LED lights	Power Consumption will get reduced



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III. PRESENT ANNUAL ENERGY CONSUMPTION

The present annual energy consumption has been analysed in table below

> COLLEGE

TABLE 3: PRESENT ANNUAL ENERGY CONSUMPTION-COLLEGE

Particulars	Unit	Quantity	Gross calorific value (kCal)	Million kCal (Toe)	Percentage of distribution (%)
Electricity (KSEBL)	kWh	10000	860	0.86	66.15
Diesel (approx.)	Litres	400	11000	0.44	33.85
Total				1.30	100

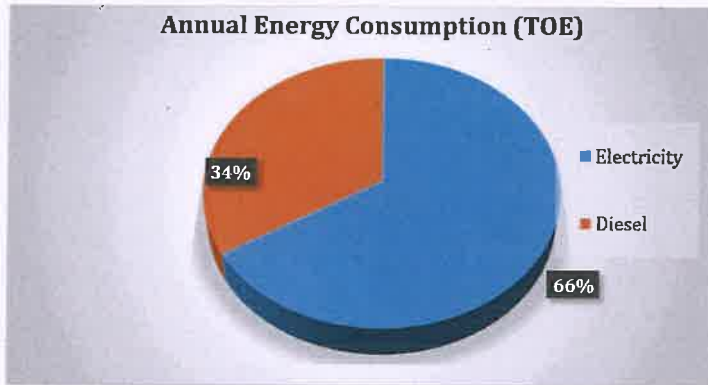


FIGURE 1: ANNUAL ENERGY CONSUMPTION – COLLEGE



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IV. ENERGY PERFORMANCE INDEX (EPI)

EPI based on the energy consumption in last year. The projected energy consumption after the implementation of energy saving proposals in the college given in the table below.

TABLE 4: ENERGY PERFORMANCE INDEX

Sl. No:	Energy Performance and climate impact	Unit	Baseline	Projection
1	Annual Electricity Consumption	kWh	10,000	7,997
2	Annual electricity consumption	TOE	0.86	0.69
3	Annual Diesel Consumption	Litre	400	400
4	Annual Diesel Consumption	TOE	0.38	0.38
5	Total Energy Consumption	TOE	1.24	1.07
6	Energy Performance Index	TOE/Sq. m	0.002016686	0.001736533
7	Annual Specific Electricity Consumption	kWh/Student	45.87	36.68
8	Annual Specific Electricity Consumption	kWh/Sq. m	16.26	13.01
9	Annual Specific Electricity Consumption	TOE/Student	0.003944954	0.00315478
10	Annual Carbon Footprint- Electricity	Ton CO ₂	7.90	6.32
11	Annual Carbon Footprint- Diesel	Ton CO ₂	1.07	1.07

Note: Unit conversions:

- TOE = 10 million kCal (BEE energy audit manual)
- MWh of electricity = 0.79 Ton of CO₂ (www.cea.gov.in)
- Ton of LPG = 2.99 Ton of CO₂ (www.cea.gov.in)
- Kg of LPG = 10500 kCal (BEE energy audit manual)
- kWh of electricity = 860 kCal (BEE energy audit manual)



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V. CARBON FOOT PRINT

Carbon footprint often used as short hand for carbon emission (usually in Tones) being emitted by an activity or by organization; this is an important component in ecological footprint or the depicting the biological space reduction in the earth. Various environment protection and energy conservation connected with carbon footprint. The college took its accountability to protect nature and taken few steps for the carbon neutral campus

1. Protecting and conserving trees inside and outside the campus through various students' activities
2. Replacement of old fluorescent tubes with energy efficient LED lights
3. Sustainable construction of buildings for natural ventilation and light in the classrooms and laboratories.

TABLE 5 CARBON FOOT PRINT

Particulars	Energy consumption reduction (kWh)	Carbon Emission reduction	% of total
Installation of 25kVA solar power plant in the college	30000	21.1	99.5
Replacement of conventional lights with LED 9 and 20W bulb and FTLs	59	0.04	0.5
Total	30059	21.14	100

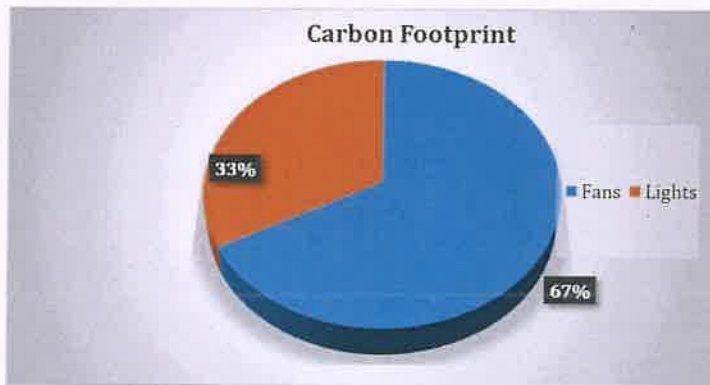


FIGURE 2: CARBON FOOT PRINT



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INTRODUCTION

I. ENERGY AUDIT

An energy audit is a key to assessing the energy performance of an energy consuming facility and for developing an energy management program. The typical steps of an energy audit are:

- Preparation and planning
- Data collection and review
- Plant surveys and system measurements
- Observation and review of operating practices
- Data documentation and analysis
- Reporting of the results and recommendations

1.1. Definition of energy auditing

In the Indian Energy Conservation Act of 2001 (BEE 2008), an energy audit is defined as:

"The verification, monitoring and analysis of the use of energy and submission of technical report containing recommendations for improving energy efficiency with cost-benefit analysis and an action plan to reduce energy consumption."

1.2. Objectives of Energy Auditing

The objectives of an energy audit can vary from one plant to another. However, an energy audit is usually conducted to understand how energy issued within the plant and to find opportunities for improvement and energy saving. Sometimes, energy audits are conducted to evaluate the effectiveness of an energy efficiency project or program. As per the request from the institution, we have assessed the energy consumption and saving opportunities at present scenario.

Methodology for the study

The methodology adopted for energy audit starts from historical energy data analysis, power quality analysis, monitoring of operational practices, system evaluation, cost benefit analysis of the energy conservation opportunities, and prepare plan for implementation. The proposals given in the report includes economical energy efficiency measures to reduce facilities unnecessary energy consumption and cost. The energy conservation options, recommendations and cost benefit ratio, indicating payback period are included in this report.

Scope of Work

The Scope of Work includes:

1. Historical energy data analysis.
2. Electrical, Mechanical and Thermal energy analysis.
3. Power Quality Analysis.



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II. ST JOSEPH COLLEGE OF TEACHER EDUCATION FOR WOMEN

St. Joseph College of Teacher Education for Women, Ernakulam established and managed by the Carmelite Nuns (Congregation of Mother of Carmel, CMC) who consider the up lift of women and children as their 'Divine Call'. The institution is an important organ of the congregation fulfilling this command at any cost. The college established in 1957 located in the heart of Kochi city, is a minority institution, affiliated to Mahatma Gandhi University, Kottayam. It owned and run by Vimala Province of the Congregation of Mother of Carmel (CMC). This edifice of learning and holistic enrichment nestles on 2 acres 31.5 cents calm and serene ground and is a unique blend of the old and new architectural styles. General discipline scrupulously maintained and academic oriented culture is in place.

Mission

The college strives for the integral liberation of women through life-oriented education, transforming them to responsible citizens who respond proactively to the global challenges with courage and commitment, build a just social order, and be stewards of this universe as modelled in the person of Jesus Christ.

Vision

Keeping to the spirit of our founder Saint Chavara Kuriakose Elias, we dream of forming empowered teachers who lead a life imbued in faith in God, realizing their full potential and passionately contributing to build a learned society rooted in love and unity.

Motto

Let light be a source of enlightenment



FIGURE 3: COLLEGE



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III. GENERAL DETAILS

The general details of the College given below.

TABLE 6: GENERAL DETAILS

Sl. No:	Particulars	Details
1	Name of the College	St. Joseph College of Teacher Education for Women
2	Address	St. Joseph College of Teacher Education for Women, Ernakulam
3	Contact Person	Dr. Sr. Alice Joseph (Principal)
4	E-mail ID	stjosephtrainingcollege@hotmail.com
5	Website Details	www.stjosephcte.in
6	No: of Shifts	01
7	No: of students	218
8	No: of teaching staffs	19
9	No: of non-teaching staffs	12
10	Total campus area	74 R
11	Total built up area(m ²)	614.87



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IV. LOAD BALANCE- ELECTRICAL

Load balance among the connected loads in the college is given in the figure below. The detailed connected load details are given in Annexure 2

TABLE 7: LOAD BALANCE

Particulars	Sanjoe Block	Heritage Block	Total
	<i>kW</i>	<i>kW</i>	<i>kW</i>
Light Loads	3.66	1.31	4.97
Fan Loads	7.44	4.68	12.12
AC Loads	5.4	0	5.4
Office & Other Power Loads	5.32	5.79	11.11
Other Miscellaneous Loads	2	2	4
Total Load (kW)	23.82	13.78	37.6

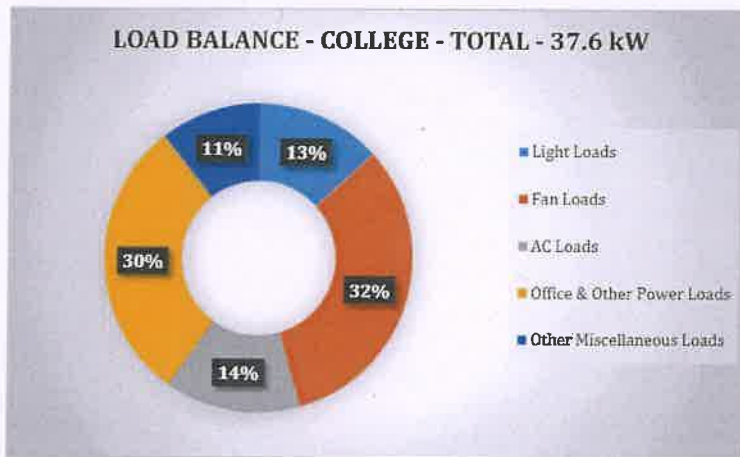


FIGURE 4: LOAD BALANCE-COLLEGE



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ENERGY & UTILITY DESCRIPTION

In this section, the single line diagrams of electricity and water are given which provides an overview of the energy flow in the building.

1. SINGLE LINE DIAGRAM – ELECTRICAL

The electrical single line diagram of the college given below:

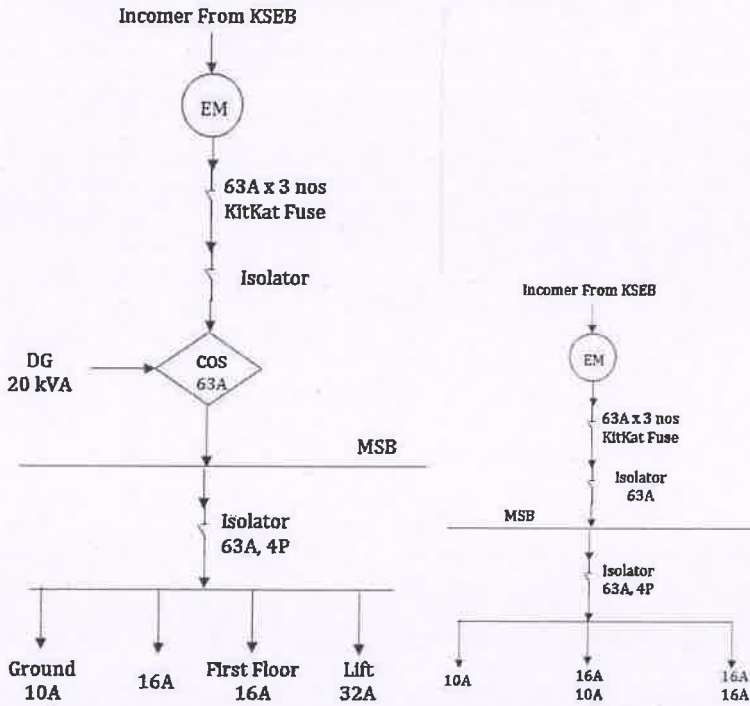


FIGURE 5: SINGLE LINE DIAGRAM – COLLEGE & JUBILEE BLOCK



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II. SINGLE LINE DIAGRAM - WATER

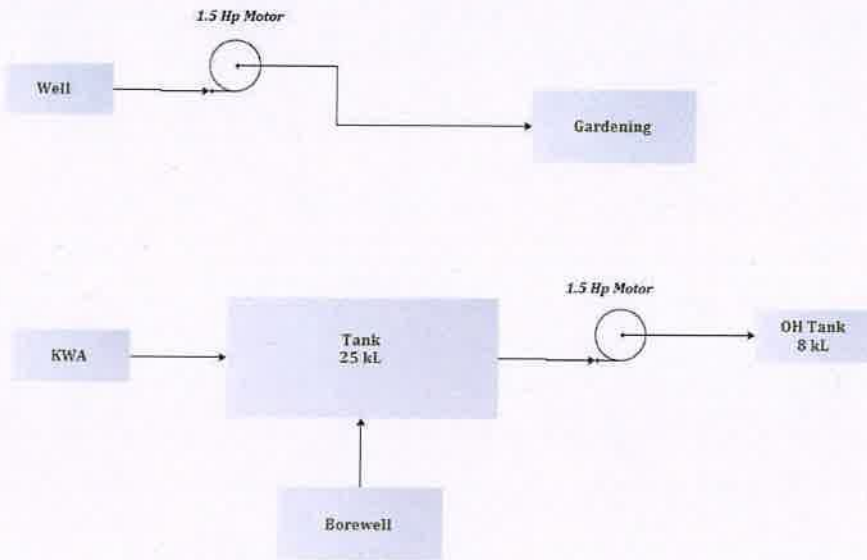


FIGURE 6: SINGLE LINE DIAGRAM - WATER



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ENERGY ANALYSIS

The different type's energy usage given in this section. The major source of energy to the college is electricity. The other energy sources are Diesel for which the pattern of consumption described below.

I. ELECTRICITY CONSUMPTION ANALYSIS

The major source of electricity to the college is electrical connection from the KSEBL. A diesel generator provided in the college, but it is only used during the power failures.

I. DESCRIPTION OF ELECTRICITY BILL

Base line data given below is based on the Electricity bill provided by the electricity supplier to the College.

TABLE 8: KSEB BILL ANALYSIS

Particulars	Sanjoe Block	Heritage Block
Consumer No	1155468006702	1167444009777
Electrical section	Ernakulam Central	Ernakulam Central
Approved connected Load	24	20
Measured connected load	23.82	13.78
Tariff	LT-6A/Three	LT-6B/Three
Average monthly consumption (kWh)	294	513
Average monthly electricity charges (Rs)	3539	3000



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II. TARIFF RATES ANALYSIS

The average monthly energy and demand charges for the college block is represented in Fig.

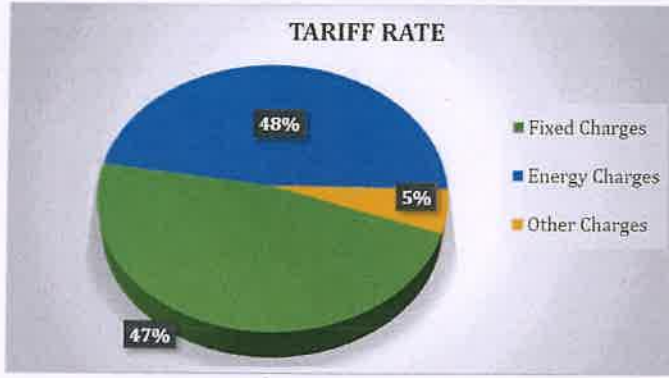


FIGURE 7: TARIFF RATE ANALYSIS - COLLEGE

Inference

- i. The total energy charges during the past one year were Rs 20,236 /-

III. UNINTERRUPTIBLE POWER SUPPLY (UPS)

UPS provided at different building for labs and office. Details of the UPS given below:

TABLE 9: UPS DETAILS

Block	Floor	Room No	Location	UPS Details		Battery Details	
				Rated Power(kVA)	Make	Make/Type/Nos	Volt/A h
College	Ground	2	Office	3	Safe Power	Safe power/Tubular/4	12/110
		7	Computer Lab	5	Supra	Supra/Tubular/5	12/80

Suggestions

- i. Proper ventilation should provide for UPS and batteries.
- ii. UPS room should be kept neat and clean.
- iii. Petroleum jelly should applied to the battery terminals for better life.



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DIESEL GENERATOR


Diesel generator used in the college as backup supply. The following table gives the basic details of diesel generator in the facility.

TABLE 10 DG DETAILS

Sl. No	Generator Details			Engine Details		
	Rated kVA	Make	Serial No	Rated kW	Make	Serial No
1	20	KEL		16	Kirloskar	

Inference & Suggestions | **I.** The diesel consumption for DG not recorded properly. A logbook to monitor the diesel consumption (L) and unit consumption (kWh) shall be maintained and record it after its running.




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RENEWABLE ENERGY INTEGRATION

The Sun is an inexhaustible, reliable and non-polluting source of power. Since the inception of life on earth, the only energy that was available came from the sun. The time is now approaching when humankind will again depend upon the sun as dominant energy source. We are aware that fossil fuels are not going to last forever. Of the numerous renewable sources of energy known to humankind, Solar Photo Voltaic or SPV is one that has the potential to supply power for our future needs. The advantages of solar power are:

- 1) The solar energy more evenly distributed in the world than wind or biomass.
- 2) It is well proven and demonstrated technology
- 3) It promises to be most cost-effective renewable power at high volumes.

College has installed 25kW on grid solar system.



Figure 8 25 kWp SOLAR POWER PLANT



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ANNEXURE - 1

I. ENERGY SAVING PROPOSAL - 1

REPLACEMENT OF CEILING FANS IN THE OFFICE WITH ENERGY EFFICIENT BLDC FANS

Background

A BLDC fan takes in AC voltage and internally converts it into DC using SMPS. The main difference between BLDC and ordinary DC fans is the commutation method. A commutation is the technique of changing the direction of current in the motor for the rotational movement. In a BLDC motor, as there are no brushes, so the commutation done by the driving algorithm in the Electronics. The main advantage is that over a period, due to mechanical contact in a brushed motor, the commutators can undergo wear and tear; this thing eliminated in BLDC Motor making the motor more rugged for long-term use. To explain, BLDC technology in simpler terms, BLDC uses a combination of Permanent Magnets and Electronics to achieve the kind of efficiency and performance, it delivers. A BLDC fan composes of 3 main components: - 1. Stator 2. Rotor 3. Electronics

Proposal

Replace the ceiling fans with BLDC in the as per preference of operating hours as office areas, staff rooms, classrooms and in hostels the calculation for the savings is given in the table.

TABLE 11: EC PROPOSAL 1

Particulars	Units	Values
Power of existing ceiling fans at full speed	Watts	60
Power of BLDC fans at full speed	Watts	28
Difference in Wattage	Watts	32
Avg No: of working hours/day	Hrs	8
No: of working days per year (Average)	Nos	210
No: of working hours per annum	Hrs	1680
Number of Ceiling Fans operating	Nos	25
kWh Saving per Annum	Rs	1344
Cost per kWh (Average)	Rs	7.5
Annual Financial Savings	Rs	10080
Cost of BLDC Fans	Rs	3500
Investment for BLDC Fans	Rs	87500
Simple Payback period	Months	104
Summary		
Annual unit savings	kWh	1344
Total savings	Rs	10,080.00
Total investment	Rs	87,500.00
Payback period	months	104



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ENERGY SAVING PROPOSAL - 2

REPLACEMENT OF FLUORESCENT TUBES WITH ENERGY EFFICIENT LED LIGHTS

At present LED lights are used in some areas. Replacement of Fluorescent lights done in phase manner with LED lights as per preference of operating hours as office areas, staff rooms and in security cabin, hostel. The calculation for the savings given in the table.

TABLE 12: EC PROPOSAL 2

Particulars	Units	T12	T8
Power of Fluorescent lights	Watts	40	36
Power of proposed LED tube	Watts	20	20
Difference in Wattage	Watts	20	16
Avg No: of working hours/day	Hrs	8	8
No: of working days per year (Average)	Nos	210	210
No: of working hours per annum	Hrs	1680	1680
Number of Lights operating	Nos	10	12
kWh Saving per Annum	Rs	336	322.56
Cost per kWh (Average)	Rs	7.5	7.5
Annual Financial Savings	Rs	2520	2419.2
Cost of LED tube	Rs	400	400
Investment for LED lights	Rs	4000	4800
Simple Payback period	Months	19	24
Summary			
Annual unit savings		kWh	658.56
Total savings		Rs	4939.2
Total investment		Rs	8800
Payback period		months	21



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ANNEXURE 2

CONNECTED ELECTRICAL LOADS

I. COLLEGE

➤ Light and Fan load - Sanjoe Block

TABLE 13: LIGHT AND FAN LOADS - COLLEGE

Floor	Location	T5	T8	T12	LED Tube Light	LED	LED	CFL	CFL	Halogen	LED Square	Ceiling Fan
		28	36	40	20	5	9	11	45	15	85	60
Ground	Corridor			2	1	2						1
	Multipurpose Hall		4	4	5							11
	Malayalam classroom		1	1								3
	Physical science class cum lab		1		1							3
	Toilet							1				
	Guest room			2								3
	University room			2								2
	Science Lab			1			1					1
First	Corridor			1	1							1
	Admin Office				4							5
	Principal office			1		1						3
	Conference room			2				1				2
	Classroom 13	1	1									3
	HOD room											1
	Classroom 19							1				1
	Classroom 18			1								1
Classroom 17					2						2	

	Toilet							1				
	Staff room						16					8
	Seminar Hall						8	16				7
	Malayalam classroom 2		1									2
	Mathematics classroom 2			2								2
	Classroom 45		1									
Second	Toilet					1						
	Classroom 30			1								1
	English class cum lab		1	3								3
	Classroom 31		1	3								7
	Math's class cum lab			1								3
	Social science class cum lab			1								3
	Life science class cum lab			1								3
	Prayer room						8					
Third	Corridor			1					1			
	IQAC			1	1							1
	Corridor			1					1			
	Auditorium		3	3					2	2	36	3
Total Nos		1	16	33	15	12	25	24	2	36	3	122
Total kW		0.03	0.58	1.32	0.3	0.06	0.225	0.264	0.09	0.54	0.255	7.32

➤ Computer and Other Equipment

TABLE 14: COMPUTER AND OTHER EQUIPMENT - COLLEGE

Location	PC	Printer	Xerox	Fridge	Projector	TV	Speaker	Water purifier	Coffee maker
Corridor	120	120	600	150	80	110	150	120	350
Ground	Multipurpose Hall				1				
	Malayalam classroom	1			1				



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	Physical science class cum lab	1								
	Guest room				1					1
First	Admin Office	9		1						
	Principal office	1								
	Conference room	1			1					
	Classroom 13	1								
	Classroom 17	3	1							
	Staff room	3								
	Seminar Hall						1			
Second	English class cum lab	1								
	Math's class cum lab	1								
	Social science class cum lab	1								
	Life science class cum lab	1								
	Corridor								1	
	Auditorium						2			
	Total Nos	24	1	1	2	3	1	4	1	1
	Total kW	2.88	0.12	0.6	0.3	0.24	0.11	0.6	0.12	0.35



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II. Heritage Block

> Light and Fan load – Heritage Block

TABLE 15: LIGHT AND FAN LOADS – COLLEGE

Floor	Location	T8	T12	LED Tube Light	LED	CFL	LED	Ceiling Fan	Wall Fan
		36	40	20	9	11	12	60	60
Ground	Corridor				3	7			
	Classroom 53	1	1					2	
	Classroom 55	1						2	
	Classroom 57	1	1					2	
	Classroom 58			1				2	
	Classroom 59	2						2	
	Prayer Hall			4				6	
	Physio room			1				2	
	Visitors Hall		1					1	
First	Seminar Hall	3		1				10	
	Corridor			2		1			
	Staff room	1			1			2	
	Library	1						2	
	Principal room	1						1	
	Classroom	6						7	
Second	Psychology Lab	1						2	
	Bursar	1						1	
	Library cum reading room	1						17	5
	Research block - ICT Lab						6	6	
	Research block - Corridor						2		
	Research block - Room						4	5	
Digital library cum Research block						2	1		
Total Nos		20	3	9	4	8	14	73	5
Total kW		0.72	0.12	0.18	0.04	0.09	0.17	4.38	0.3



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➤ **Computer and Other Equipment**

TABLE 16: COMPUTER AND OTHER EQUIPMENT - COLLEGE

Floor	Location	PC	Printer	Xerox	Speaker	Water purifier
		120	120	600	150	120
Ground	Corridor					1
First	Seminar Hall				1	
	Library	1	1			
Second	Library cum reading room	2		3		
	Research block - ICT Lab	23				
	Research block - Room	4				
	Total Nos	30	1	3	1	1
	Total kW	3.6	0.12	1.8	0.15	0.12

III. AC LOADS

TABLE 17: LOAD MATRIX-AC

Location	Make	Type	Capacity	EER	Star rating	Rated Power
			TR			Watts
Seminar Hall	General	Split	1.5		0	1800
Seminar Hall	General	Split	1.5		0	1800
IQAC	General	Split	1.5		0	1800



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ANNEXURE-3

I. ABBREVIATIONS

AVG	:	Average
BEE	:	Bureau of energy efficiency
CO ₂	:	Carbon dioxide
KSEB	:	Kerala State Electricity Board.
DB	:	Distribution Board
EC	:	Energy Conservation
IEEE	:	The Institute of electrical and electronics engineers
IS	:	Indian Standard
KSEBBL	:	Kerala State Electricity Board Limited
KVA	:	kilo Volt Ampere
kVAh	:	kilo volt Ampere Hour
kVAR	:	kilo volt ampere
kW	:	kilo Watts
kWh	:	kilo watt hour
LT	:	Low tension
MAX	:	Maximum
NSS	:	National Service Scheme
SLD	:	Single Line Diagram

II. REFERENCES:

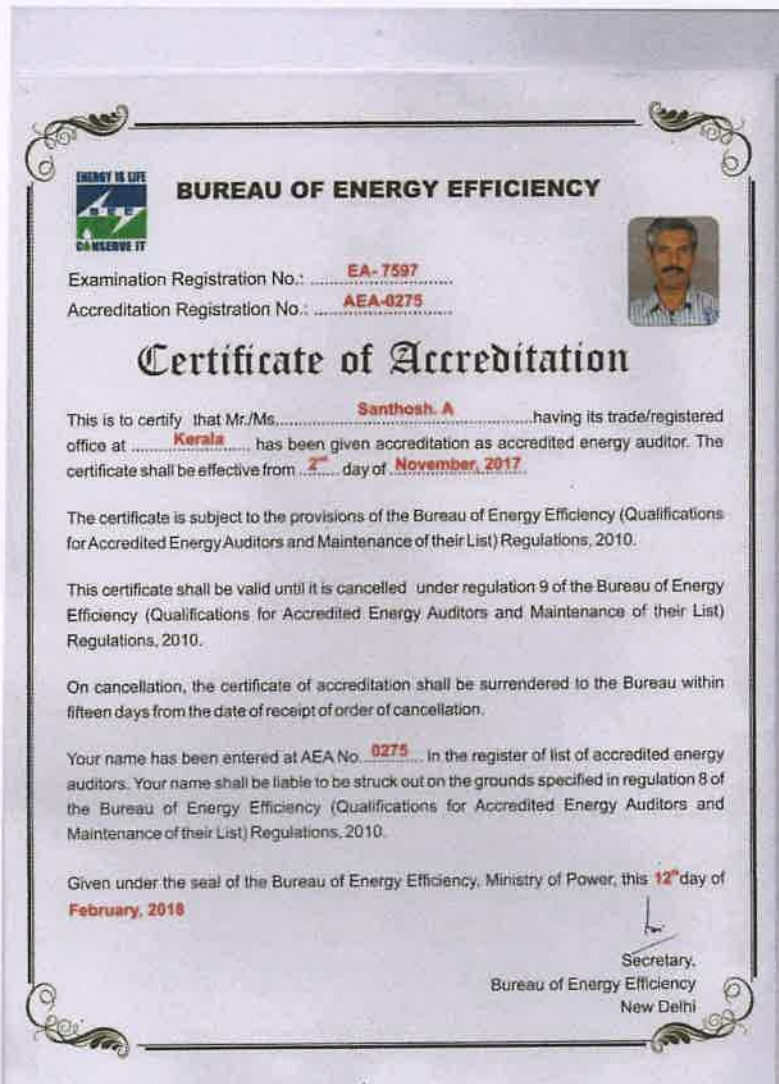
- Handbook on energy audit and environment management by TERI.
- Bureau of Energy Efficiency (BEE) books for certification of Energy Auditors & Managers.



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III. CERTIFICATES

I. BEE Accreditation Certificate



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II. EMC Empanelment certificate



Energy Management Centre - Kerala
(Department of Power, Govt of Kerala)

CERTIFICATE OF EMPANELMENT

This is to certify that M/s.Athul Energy Consultants Pvt Ltd(4/2, Capital Legend Building, Korapath Lane, Rowund North, Thrissur)is empanelled as Energy Audit firm in Energy Management Centre Kerala to conduct mandatory energy audit as per Government of Kerala G.O (Rt) No.2/2011/PD dated 01.01.2011.

Empanelment No:
EMCEEA-0811F-3


Scope/Area	Building	Industry -Electrical	Industry Thermal
	Yes	Yes	Yes

This empanelment is valid up to 01/02/2024
Issuing Date: 02/02/2021
Place: Thiruvananthapuram

Director,
Energy Management Centre - Kerala

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Dr. Alice Joseph
Principal in Charge
St. Joseph College of Teacher
Education for Women,
Ernakulam