

TECHNICAL REPORT OF ENERGY AUDIT



Submitted to

**SACRED HEART COLLEGE (AUTONOMOUS)
TIRUPATTUR- 635 601, TAMIL NADU, INDIA**

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NATURE SCIENCE FOUNDATION

(A Unique Research and Development Centre for Society Improvement)
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1. Introduction

An energy audit is a survey in which the study of energy flows for the purpose of conservation is examined at an organization. It refers to a technique or system that seeks to reduce the amount of energy used in the Organization without impacting the output. The audit includes suggestions of alternative means and methods for achieving energy savings to a greater extent. Conventionally, electrical energy is generated by means of fossil fuels, hydraulic and wind. The availability of fossil fuels and their depletion rate, insist the need for alternate energy systems and conservation of electric energy. In general, the primary objective of an energy auditing and management of energy consumption is to offer goods or services at the lowest possible cost and with the least amount of environmental impact (Backlund and Thollander, 2015). The need for an energy audit is to identify the savings potential and cost reducing methods, understand the ways in which fuel is used, where, the waste occurs and find the scope for improvement.

An energy audit is proposed and conducted to ensure that energy saving practices are implemented and followed in Educational Institutions and Industrial sectors in a sustainable way. Preparation and completion of a questionnaire, physical examination of the campus, observation and examination of documentation, key person interviews, data analysis, measurements and suggestions are all part of the audit process. Energy audit involves several facts including energy savings potential, energy management, finding alternatives, etc. (Cabrera *et al.*, 2010; Rajalakshmi *et al.*, 2021). With these facts in mind, the audit's specific objectives are to assess the competence of the sustainability management and control system, as well as the departments' compliance with applicable rules, policies, and standards (Leon-Fernandez and Dominguez-Vilches, 2015). It has the potential to have a significant influence on the organization's operational cost as well as the environmental impact (Bae and Seol, 2006; Singh *et al.*, 2012).

Energy Conservation Building Code (ECBC) is established in the year 2017 which provides minimum requirements for the energy-efficient design and construction of buildings across India. It also provides two additional sets of incremental requirements for buildings to achieve enhanced levels of energy efficiency that go beyond the minimum requirements. Bureau of Energy Efficiency (BEE) came into force in 2002 towards implementation of energy saving practices in an organization. Energy-efficiency labels are information affixed to manufactured products and usually communicate the product energy performance (Ingle *et. al*, 2014). BEE has developed a scheme for energy efficiency labelling of buildings coinciding with the star ratings of the building at accelerating energy efficiency activities.

BEE Star Rating Scheme is based on actual performance of the building as well as equipment in terms of specific energy usage termed as 'Energy Performance Indicator' by means of star ratings labelled items used which will be useful for energy savings in a sustainable manner (Mishra and Patel, 2016). Energy audit programme provide aid in maintaining a focus on energy price variations, energy supply availability and efficiency, determining an appropriate energy mix, identifying energy-saving technology, retrofitting for energy-saving equipment and so on (Gnanamangai *et al.*, 2021, 2022 Rajalakshmi *et al.*, 2019) In general, an energy audit process dealt with the

driving conservation concepts into reality by giving technically possible solutions within a specified time limit while also considering the economic and other organizational issues (Asnani and Bhawana, 2015). It also dealt with the uncover ways to cut operating expenses or reduce energy use per unit of production in terms of savings. It serves as a “benchmark” for managing energy in the organization for planning more energy-efficient use across the board (Cabrera *et al.*, 2010).

2. Need for an Energy Audit

In an organization, the top three operating expenses are energy, labour and materials. Relating the manageability of the cost or potential cost savings in each of the above components, energy management is found to be the top ranker and thus energy management constitutes the essential part in reducing the cost. Energy Audit helps in understanding the ways energy and fuel are being used in any organization, and identifies the areas where wastes occur and the scope for improvement exists. The Energy Audit gives a positive orientation to the energy cost reduction, preventive maintenance quality control programmes and will help to keep focus on variations which occur in the energy costs, availability and reliability of supply of energy. The main objective of Energy Audit is to find ways to reduce energy consumption per unit of product output. The Energy Audit provides a “bench-mark” and a basic planning for managing energy and for more effective use of energy throughout the organization.

The Ecofriendly-campus concept essentially focuses on the efficient use of energy conservation and its savings opportunities in a sustainable way. It also gives importance for reduction of contribution to carbon emissions, carbon footprint calculation, use of star rated equipment, encouraging energy use conservation practices in all buildings, reduce the organization’s energy consumption, reduce wastes to landfill and integrating environmental considerations into all contracts and services considered to have significant environmental impacts (Anirudhan *et al.*, 2023) Auditing for Energy Management may be studied in terms of energy savings and opportunities. In general, energy cannot be seen, but we know it is there in wire, pipes and other non-living materials because it shows visible effects in the forms of heat, light and power. The energy consumption, energy sources, energy monitoring, lighting, vehicle movement, electrical and electronics appliances and transportation are addressed by this indicator.

Energy usage is an important aspect of campus sustainability and requires no explanation for its inclusion in the assessment (Shriberg, 2002). However, energy saving, and opportunities may be taken into consideration while energy is extensively used (Choy and Karudan, 2016). An old incandescent bulb uses approximately 50W to 100W while an energy efficient LED uses only less than 10 W which shows the positive indication on energy savings. Energy auditing deals with the conservation methods to reduce its consumption related to environmental degradation. In addition, suggestions and recommendations might be given after auditing which in turn useful for energy savings. Thus, it is essential for any environmentally responsible institution to examine its energy use practices at least once in two or three years using internal and external auditors (Sri Santhya *et al.*, 2022) The conduct of energy audit using internal and external energy auditors is playing important role in any organization in terms of energy management. The Energy audit is able to measure the impact of energy potential in an organization so that it helps in determining the better ways to manage the impact on

environment. In addition to liquid and solid wastes and electronic wastes energy potential and biodiversity audits, attempts may be made to measure the carbon footprint in the organization based on the amount of carbon emissions created by the electrical appliances, vehicles and human population. It takes into consideration the measure of bulk of CO₂ equivalents exhaled by the organization by which the carbon footprint accounting is done. It is necessary to know how much the organization is contributing towards sustainable development in terms of energy management is being done. It is therefore recommended to measure the carbon footprint in each organization which may be useful for maintaining the ecofriendly campus to the stakeholders (Sreekala *et al.*, 2023)

3. Aims and Objectives of an Energy Audit

An energy audit is a useful tool for developing and implementing comprehensive energy management plans of an organization. The aim of an energy audit is to identify the energy efficiency, conservation and savings opportunities at the premises of the audit sites in a systematic manner. The audit process is carried out as per the following.

- Review of energy saving opportunities and measures implemented in the audit sites.
- Identification of additional various energy conservation measures and saving opportunities.
- Implementation of alternative energy resources for energy saving opportunities and decision making in the field of energy management.
- Providing a technical information on how to build an energy balance as well as guidance to be sought for particular applications.
- Detailed analysis on the calculation of energy consumption, analysis of latest electricity bill of the campus, understanding the tariff plan provided by the central and State Electricity Board.
- List ways that the use of energy in terms of electricity, electric stove, kettle, microwave, LPG, firewood, Petrol, diesel and others.
- Analysis of electricity bill amount for the last two to three years, amount paid for LPG cylinders for last one year and amount paid for water consumption for human beings and watering to the plants.
- Use of incandescent (tungsten) bulb and CFL bulbs, fans, air conditioners, cooling apparatus, heaters, computers, photo copiers, inverter, generators and laboratory equipment and instruments installed in the organization (for example- 60-watt bulb x 6hours x number of bulbs = kwh).
- Alternative energy sources / nonconventional energy sources are employed / installed in the organization (photovoltaic cells for solar energy, windmill, energy efficient stoves, Biogas, etc.).
- Creating awareness among the stakeholders on energy conservation and Creating awareness among the stakeholders on energy conservation and utilization.

4. Benefits of an Energy Audit

- **Reduced Energy Expenses:** The most obvious benefit is that the less energy the Organization uses, the less money that the Organization will have to spend on energy costs.
- **Identify Problems:** An energy audit can also help to identify any issues that the equipment might have. For example, the auditor could find small leaks in the compressed air system. These leaks would cost a significant amount of money if it is not noticed. Auditors can also detect dangerous health risks like the carbon monoxide that's emitted from equipment that hasn't been vented properly. With a regular energy audit, the organization will be able to address these kinds of issues promptly to help ensure the health and safety of the staff members.
- **Increased Employee Comfort:** During the audit, the Organization might learn about changes that have been made regarding insulation and air sealing. Completing these enhancements will help create a more reliable and more efficiently cooled or heated space for the employees. In turn, more comfortable employees tend to be more productive, so not only will the Organization save on energy costs, but may also improve overall well-being.
- **Personalized Recommendations:** Working with an energy expert can help learn about new energy-efficient technologies. The professional will customize a plan, recommending which upgrades will give the most return on investment. These might include updated lighting systems, a new HVAC system, weatherization measures like insulation and air sealing and more. While some of the recommendations might have a substantial up-front cost that many of them will pay for themselves in a short period of time with significantly reduced energy expenses.
- **Show Environmental Concern:** By taking steps to be more energy efficient, the Organization will be showing the employees and clients that the organization cares about the impact on the environment.
- **Increased Property Value:** Using the recommendations of an energy auditor to make facility more energy efficient could also help to increase its overall worth. Things like solar panels, high-efficiency LED lighting, and weatherization procedures are all things that contribute to a higher property value.
- **Longer Equipment Lifespan:** An energy auditor might recommend to update some of the equipment for maximum energy savings. If the Organization decide to upgrade, it will not only save on energy costs, but also expect the equipment to last a long time. This is because newer, more energy-efficient equipment doesn't have to work as hard as older, outdated units to provide the same level of performance.
- **Energy audit evaluation:** Energy audits will evaluate the Organization "as a whole", the aim is to consider a wide range of available alternatives (Electrical, Mechanical, Thermal Water and Transportation).
- **Energy audit Opportunities:** The audit will not only inform about the opportunities but also provide information with financial analysis. This will enable prioritization based on financial benefit and return on investment. It provides technical information regarding the proposed energy conservation measures.
- **Analysing the quality of Energy Audit:** A good quality audit will investigate the historical energy usage and find the essential issues using statistical methods. It

provides information with emissions analysis to help understand the benefits of the decisions from an environmental standpoint. The audit provides benchmark information to help compare the energy use performance with others.

5. Procedures followed in an Energy Audit

In order to conduct an energy audit, several methods are adopted in the audit sites in which walk-through audit is conducted. The balance of total energy inputs with total energy outputs and identification of all energy streams in a facility are taken into account. The amount of energy used by each of its energy streams are calculated as per the methodology mentioned in the audit Manual. The top three operating expenses of the Organization are typically observed to be energy (both electrical and thermal), labour and materials. During the audit, physical verification of Lighting, Ceiling, Table and Exhaust Fans, A/C machines, Solar panels, Heaters, Generators, Uninterrupted power supply machines, ventilators, load fixtures and verification of installed energy efficient system's capacities are carried out. Inspection of when the cost or prospective cost savings in each of the above components are considered, energy always wins and the energy management task becomes a key cost reduction area.

The energy audit assisted in better understanding how energy and fuel are used in the Organization as well as identifying waste factors and development potential towards energy savings opportunities. Finally, after the audit process, the energy audit included suggestions for energy cost reduction, preventive maintenance and quality control activities, all of which are critical for the utility operations in the auditee (Organization).

The audit involved visiting the campus and physical verification of the loads and sources installed. The entire campus is divided into different sections and those sections are audited in which electrical fittings and energy supply are monitored. The production process flow is studied and electricity consumption are measured. Location of the electrical machines, conditions of them and their accessories are inspected through physical verification is observed as per the regulation of Indian Green Building Council and World Green Building Council (IGBC, 2021).

The energy bill from the supply utility company (Example: Tamil Nadu Electric Generation and Distribution Corporation Limited, Chennai) is audited and assessed for the load demand requirement and efficient consumption of energy. Stakeholders are interacted with the scope for improvement and energy management during the audit. Potential areas in which the scope of energy conservation and saving opportunities available in the current context have been identified and suggested for implementation to the Organization. It may be useful to check where carbon emission is prominent which could be taken into account to reduce. The audit involves visiting physical position of load and carry out inventory of load. Due measurement of electrical load of equipment and circuit is carried out. Energy bill received from Electricity Board is audited and studied for KWH requirement and how efficiently energy is used. Various factors are interacted, familiarized with energy audit and involved for successful and result oriented energy audit. Energy conservation and saving opportunities are identified during round and measurement for implementation.

6. Types of Energy Audit

The Energy Audit types depends on the following factors:

- Industry/ Organization type and its function
- Intense and the extent to which final audit is required, and
- The magnitude of cost reduction

Thus, Energy Audit can be classified into the following types.

- 1) Preliminary Energy Audit
- 2) Detailed Energy Audit
- 3) Potential and magnitude of Energy Audit
- 4) Comprehensive Energy Audit

6.1. Preliminary Energy Audit Methodology

Preliminary energy audit gives a quick access to:

- Estimating and establishing energy consumption in the organization
- Estimate the scope of audit
- Identify the areas of maximum energy consumption
- Identify the areas of improvement
- Setting benchmark
- Performing Preliminary energy audit uses existing data.

6.2. Detailed Energy Audit Methodology

The detailed Energy audit offers the most accurate estimation of energy savings and cost. A comprehensive audit provides a detailed energy implementation plans for a facility, as it evaluates all major energy consumption systems. It considers the effects of all projects, accounts for the energy use of all major equipment, and includes detailed energy cost saving calculations and project cost. Energy Balance is the key element in detailed energy audit. The estimated use is compared to utility bill charges. There are three phases in detailed energy audit

Phase I - Pre -Audit Phase

Phase II - Audit Phase

Phase III - Post Audit Phase

6.3. Potential and Magnitude of Energy Audit

A systematic and structured method is necessary for an efficient working of energy audit process. An initial site study is carried out for planning the procedures necessary for an audit.

Initial Site Study and Preparation for Detailed Auditing

An initial site study visit might take one or two days and gives the Energy Auditor an opportunity to meet the concerned person (Auditee), to familiarize with the site and to assess the procedures necessary to carry out the energy audit.

During the initial site visit the Energy Auditor carries out the following actions: -

- Discussing the aims of the energy audit with the audit study site's management.
- Discussing the economic factors associated with the recommendations of the audit.

- Analysing the major energy consumption data with the concerned person.
- Obtaining the available audit site drawings – building layout, electricity distribution, steam distribution, compressed air distribution, etc.
- Conducting Walk-through audit around site.

The main aims of this visit are:

- Finalising the Audit team members
- Identifying and analysing the main energy consuming areas during the audit.
- Identifying existing instrumentation/ additional metering required.
- To decide if any meters will have to be installed prior to the audit eg. kWh, steam, oil or gas meters.
- Identifying the instruments required for carrying out the audit.
- Planning the time management
- Collecting the macro data on major energy consuming areas.
- Conducting awareness meetings/ programmes.

6.4. Comprehensive Energy Audit

A comprehensive audit can take from several weeks to several months depending on the nature and complexity of the site to complete the audit process. Detailed study is carried out to establish and investigate the energy and material balances for specific departments. Possible checks of plant operations were carried out over extended periods of time, at nights and at weekends as well as during normal daytime working hours, to ensure that nothing is overlooked.

The audit report includes list of energy inputs and product outputs by major department or by major processing function and estimates the efficiency of each step of the Organization. The methods for improving the efficiency will be listed, and it also includes preliminary assessment of the cost of the improvements and expected payback on any capital investment needed. The audit report concludes with specific recommendations for detailed engineering studies and feasibility analysis. The comprehensive energy audit is useful in identifying the major energy consuming areas to be surveyed during the audit and to identify any existing instrumentation/ additional metering required. Proper care should be taken while identifying the instrumentation required for carrying out the audit and to plan the time management for collecting the macro data from energy consuming areas.

The information to be collected during the detailed audit includes:

1. Energy consumption by type of energy, by department/area, by type of process equipment, by end-use
2. Energy cost and tariff data
3. The distribution and generation of site services (eg. Electricity, Compressed air, steam).
4. Sources of energy and its supply (e.g. Electricity from the grid or self-generation)
5. Potential alternative for fuel substitution, process modifications and the use of co-generation systems (combined heat and power generation).
6. Energy conservation and management awareness training programs within the Organization.

The audit team collects the following baseline data:

- Major Equipment details, process/technology used
- Water consumption
- Fuel usage
- Capacity utilisation
- Electrical energy consumption
- Steam consumption
- Yield/ Efficiency

7. Carbon footprint

The Carbon footprint per year is calculated (www.carbonfootprint.com) based on electricity usage per year in which CO₂ emission from electricity and the sum of transportation per year in terms of number of the shuttle buses service operated by the Organization and number of cars, motorcycles and trucks entering in the Organization campus.

These factors are multiplied with total number of trips in each day and approximate travel distance of vehicles covered in each day with a coefficient (0.01) to calculate the emission of CO₂ in metric tons per year. Humans contribute to a massive increase of carbon dioxide emissions by burning fossil fuels, deforestation, and other industrial activities.

Methane (CH₄) is largely released by coal, oil, and natural gas industries. Anthropogenic activities are responsible for almost all of the increase in greenhouse gases in the atmosphere over the last 150 years. The largest source of greenhouse gas emissions from human activities is from burning fossil fuels for electricity, heat and transportation (Peters and Romi, 2014) (Plate 1).



Plate 1. Components of Carbon Foot Print

The Methodology of the Audit is presented in the following chart

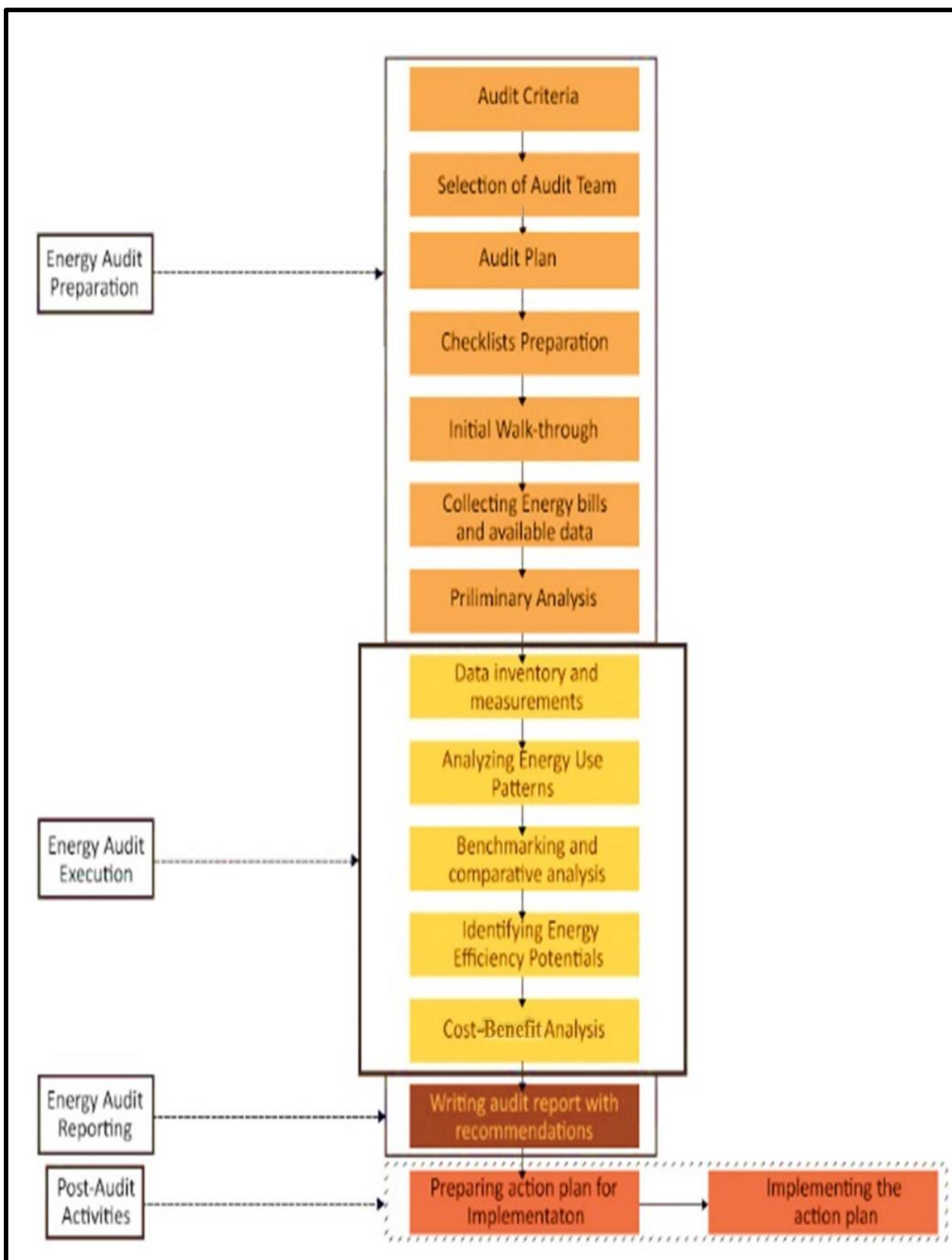


Plate 2. Flow chart of Energy Audit Methodology

8. Energy Audit Process

Energy audit is a sequence of tasks performed in a planned manner. It requires discussion, survey, collection of data, analysis and reporting.

8.1. Steps involved in an Energy Audit

- Step 1: Opening meeting among the audit team and auditees
- Step 2: Planning and organizing the energy audit
- Step 3: Conduct a walk-through audit at different sites
- Step 4: Macro data collection and observation
- Step 5: Analysis of data collected from the Organization
- Step 6: Best practices followed in the Organization towards energy savings
- Step 7: Recommendations for further improvement
- Step 8: Exit meeting after the audit to discuss about the audit findings

8.2. Systems studied during the Energy Audit

- Physical verification of lighting, fan, a/c machines, ventilators load fixtures.
- Verification of installed energy efficient systems.
- Inspection of Solar panel, Generators, Uninterrupted power supply machines.
- Inspect and verify the maintenance aspects of installed Generators and additional backup power sources.
- Analyse the electricity consumption through the supply utility company (Example: Tamil Nadu Electric Generation and Distribution Corporation Limited, Chennai).
- Review the potential usage of alternative energy resources.
- Review the energy conservation awareness among the stakeholders for optimum use of electricity and its savings.

8.3. Planning and organizing the Energy Audit

Planning and organizing are the integral part of the energy audit. An initial visit to the audit sites is organized and the areas to be inspected are listed. Following the listing, information on the energy consumption of various blocks in the recent past is obtained and a planned analysis is carried out.

8.4. Walk-through Audit Process

The main purpose of the walk-through audit is to obtain general information about the sites in which electrical energy is being used at the maximum. More specific information has been obtained from the maintenance and operational people during the time walk-through audit. It also included a walk-through of the facility to become familiar with the building's operation and a brief evaluation of facility utility bills (amount paid for electricity) and other operating data. During the audit the primary problem areas are discovered.

8.5. Macro Data collection and observation

Current level operation and practices within the campus are assessed and then the data regarding the number of electrical loads connected in each section are collected. The power ratings of each component and their respective hours of operation are also observed and documented for preparing the recommendations to the Organization.

8.6. Measurements in the Energy Audit process

An energy audit required measurements, such as the energy identification and quantification, and these quantities necessitate the instruments used in a consistent way. Some of the basic electrical parameters are monitored during the energy audit such as Voltage (V), Current (I), Power factor, active power (Kw), apparent power (demand in Kva), reactive power (Kvar), energy consumption (Kwh), frequency (Hz), harmonics, illumination level, etc.

9. About the Institution

9.1. Sacred Heart College (Autonomous)

Sacred Heart College is an affiliated First Grade College of Thiruvalluvar University. It is a minority institution, established and administered by the Salesians of Don Bosco (SDB). The first care of the management is to give Higher Education to the Catholic youth in a Christian atmosphere of peace, justice and social responsibility with a preferential option for the poor among them. The College is also open to students of all castes and creeds other than Catholics. Their religious beliefs are respected in this institution

Vision

We, the community of Sacred Heart College, inspired by the love of the Heart of Jesus and fundamental human values, following the educative system of Don Bosco, are committed to the creation of an educated, ethical, and prosperous society where equality, freedom and fraternity reign by imparting higher education to poor and rural youth which enables them towards integral human development.

Mission

In the field of Higher Education, we are committed to

- Academic excellence
- Healthy standards in extracurricular practices
- Social relevant research
- Courses leading to employment and entrepreneurship, and
- Continuous progress of the institution

Socially, we work towards

- Serving preferentially the underprivileged and rural youth
- Educating them to social consciousness of rights and responsibilities
- Rooting out social evils, building communities, and
- Promoting total literacy, education and development of the neighbourhood

Spiritually, we aim at

- Integrating ethical, cultural and political values
- Developing a sense of the Divine present in nature and in the human person
- This is done by means of group activities and personal guidance, in a family atmosphere

9.2. About Nature Science Foundation (NSF)

NSF is ISO 9001:2015, 14001:2015, 45001:2018 & 50001:2018 certified and registered with Ministry of Micro, Small and Medium Enterprise (MSME), Government of India Organization functioning energetically towards the noble cause of nature conservation and environmental protection. NSF is managed by a board of trustees of NSF Public Charitable Trust under the TN Societies registration Act 1975 (TN Act 27 of 1975) on 29th November, 2017 at Peelamedu, Coimbatore 641 004, Tamil Nadu, India with Certificate of Registration No. 114 / 2017. In addition, NSF has 12A, 80G and Form 10AC certificates for income tax exemption and implementing various Government schemes. The main motto of the NSF is to “Save the Nature to Save the Future” and “Go Green to Save the Planet”. NSF Branch Offices are also functioning effectively at Gorakhpur, Uttar Pradesh and Faridabad, Haryana, India to adopt the ‘Go Green Concept’ in a big way. NSF family is wide spread across India with over 115 state-wise Lead auditors to conduct Green and Environment Audits.

NSF is functioning strenuously to conduct different awareness programmes and implement various schemes to public and school / college students towards the noble cause of nature protection. Some of the programmes are also being organized for the benefit of tribal communities to create the supply chain for biodiversity conservation studies. The objectives along with vision and mission are illustrated to promote educational and environmental awareness programmes through social activities for enhancing the quality of life and to conserve nature from environmental pollutants using traditional and modern technologies for sustainable land management. NSF is educating the tribal community children through social service and towards the upliftment of tribes as a whole and make them as entrepreneurs.

International Eco Club Student Chapter (IECSC) has been established for Student volunteers and faculty members are encouraged to conduct National and International events, Student Technical Symposium, Distinguished lecture programme, Environment Day celebration, Ozone Day celebration, Project model exhibition, Awareness programmes on Environmental pollution, Biodiversity and Natural resources conservation etc. with the financial support of the Foundation. NSF is being released ‘Magazine’ and ‘Newsletter’ biannually to share the information about Environmental awareness programmes on biodiversity conservation, seminar on soil conservation, water management and solid waste management, restoration and afforestation programmes in Western Ghats of southern India.

In order to encourage the students, members of faculty, academicians, scientists, entrepreneurs and industrial experts those who are involving in nature protection and biodiversity conservation studies across the world, NSF tributes the deserved meritorious candidates with various awards and honours such as ‘Best Faculty Award’, ‘Best Women Faculty’, ‘Best Scientist Award’, ‘Best Student Award’, ‘Best Research Scholar Award’, ‘Best Social Worker Award’, ‘Young Scientist Award’, ‘Life-Time Achievement Award’ and ‘Fellow of NSF’. These award and honours will be given to the deserved meritorious candidates during the ‘Annual Meet and Award Distribution Ceremony’ which will be conducted every year during the first week of January.

NSF has introduced various types of Audits such as ‘Eco Audit’, ‘Green Audit’, ‘Energy Audit’, ‘Hygienic Audit’ Water & Soil Audit, Plastic Waste Management Audit, Biomedical Waste Audit, Solid Waste Management Audit, E-Waste Management Audit, Academic & Administrative Audits including ISO certification process to Academic Institutions, R&D Organizations and Industries towards the accreditation process as well as maintaining a hygienic eco-friendly environment to the stakeholders in their campus. All audits will be conducted as per the Checklist prepared by the NSF ISO Criteria and in compliance with Government Law and Environmental Legislations including World / Indian Green Building Council and the concept of Swachh Bharath Abhiyan under Clean India Mission. Green campus and Environment Policy, Purchase Policy, Energy Policy, MoU, International Eco Club Student Chapter.

Table 1. Audit processes are being conducted through the certified Auditors as per the guidelines of NSF

Audit	Certified Auditors	Certified Auditors
Green Audit	<ul style="list-style-type: none"> ● IGBC - Indian Green Building Council ● GBCRS - Green Building Code and Green Ratings Systems ● GRIHA – Green Rating for Integrated Habitat Assessment 	<ul style="list-style-type: none"> ➤ Dr. S. Rajalakshmi ➤ Dr. R. Mary Josephine ➤ Dr. B. Mythili Gnanamangai ➤ Er. N. Shanmugapriyan
Energy Audit	<ul style="list-style-type: none"> ● BEE - Bureau of Energy Efficiency ● LEED - Leadership in Energy and Environmental Design ● CII-Green Co – Green Co Rating System Felicitator 	<ul style="list-style-type: none"> ➤ Er. D. Dinesh Kumar ➤ Er. N. Shanmugapriyan ➤ Dr. N. Balasubramaniam ➤ Dr. P. Thirumoorthi ➤ Dr. G. Muruganath
Environment Audit	<ul style="list-style-type: none"> ● IGBC -Indian Green Building Council ● ASSOCHAM - Associated Chambers of Commerce and Industry of India ● FSRS – Fire Safety & Rescue Services 	<ul style="list-style-type: none"> ➤ Dr. S. Rajalakshmi ➤ Dr. A. Geetha Karthi ➤ Dr. R. Mary Josephine ➤ Dr. B. Mythili Gnanamangai ➤ Er. N. Shanmugapriyan
Hygiene Audit	<ul style="list-style-type: none"> ● FSMS – Food Safety Management System & Occupational Safety & Health (ISO 22000:2018) ● SBICM - Swach Bharath under India Clean Mission 	<ul style="list-style-type: none"> ➤ Mrs. Gaanaappriya Mohan ➤ Dr. R. Sudhakaran ➤ Dr. N. Saranya
Waste Management Audits	<ul style="list-style-type: none"> ● Water & Soil Audit, Plastic Waste Management Audit, 	<ul style="list-style-type: none"> ➤ Mrs. Gaanaappriya Mohan ➤ Dr. R. Sudhakaran ➤ Er. N. Shanmugapriyan

	Biomedical Waste Audit, Solid Waste Management Audit, E-Waste Management Audit as per the Checklist of NSF	
Academic & Administrative Audits	<ul style="list-style-type: none"> • Academic & Administrative Audits as per the NAAC Criteria and ISO implantation procedure • In compliance with the Environmental legislations and rules and regulations 	<ul style="list-style-type: none"> ➤ Dr. B. Anirudhan ➤ Dr. S. Gopalakrishnan ➤ Dr. S. Senthil Kumar
ISO Certification	<ul style="list-style-type: none"> • QMS (9001:2015), • EMS (14001: 2015), • OHS (45001: 2018), • ISMS (27001:2018), • FSMS (22000: 2018), • QMSMD (13485: 2016), • EnMS (50001: 2018) 	<ul style="list-style-type: none"> ➤ Dr. S. Rajalakshmi ➤ Dr. A. Geetha Karthi ➤ Mrs. Gaanaappriya Mohan ➤ Dr. R. Mary Josephine ➤ Dr. R. Sudhakaran

10. Audit Details

Date / Day of Audit	: 09.03.2023
Venue of Audit	: Sacred Heart College (Autonomous) Tirupattur- 635 601, Tamil Nadu, India
Audited by	: Nature Science Foundation, Coimbatore, Tamil Nadu, India.
Audit type	: Energy Audit
Name of the Auditing Chairman	: Dr. S. Rajalakshmi, ISO QMS, EMS, OHSMS and EnMS Auditor Founder & Chairman of NSF
Name of the Auditing Team Leader	: Dr. D. Vinoth Kumar, ISO QMS, EMS and EnMS Auditor Joint Director of NSF.
Name of the Lead Auditor	: Er. D. Dinesh Kumar, Certified BEE, IGBC, ASSOCCHEM, GRIHA & LEED Auditor
Name of the Energy Auditor	: Dr. N. Balasubramanian, Bureau of Energy Efficiency
Name of Subject Expert	: Mr. B.S.C. Naveen Kumar, Senior Faculty, Mahatma Gandhi National Council of Rural Education, Ministry of Higher Education, Hyderabad.
Name of the Eco Auditor	: Er. S. Srinivash, Tamil Nadu Fire and Rescue Services, Coimbatore
Name of Eco & Energy Officer	: Ms. T. Joys Ememmal, ISO QMS and EMS Auditor Programme Officer of NSF

11. Observations of the Energy Audit

Table 2. 11.1. Facilities visited during the Energy Audit

Date	Section where Energy Audit is conducted
09.03.2023	Administrative Block
	Power House
	Faculty Rooms
	Classrooms
	Seminar Halls
	Auditorium
	Laboratories
	Computer Centres
	Well, Sump and pumps.
	Sewage Treatment Plant
	Hostel
	Library

In the sections, the services offered are monitored, verified and analysed on the aspects of energy consumption. In all these areas lighting systems forms the major consumer of electrical energy. The electricity consumption charges are audited and studied for the load demand requirement and efficient consumption of energy. Stake holders are interacted and the scope for improvement has been discussed. Potential areas in which scope of energy conservation and saving opportunities available have been identified and suggested for implementation.

11.2. Systems Studied during the Energy Audit

1. Lighting fixtures are verified physically.
2. Installation of energy efficient lighting systems are verified.
3. Installation of safety systems are verified
4. Installation of power backup systems (generators and UPS) are verified on the aspect of maintenance and consumption.
5. The energy conservation awareness among the stakeholders for optimum use of electricity and its savings are reviewed.

11.3. Energy Consumption and Cost Profile

The following chart shows the profile of energy consumed and the cost for one year by the stakeholders (Fig.1 and Fig.2).

Figure 1. Electrical Energy Consumption Profile

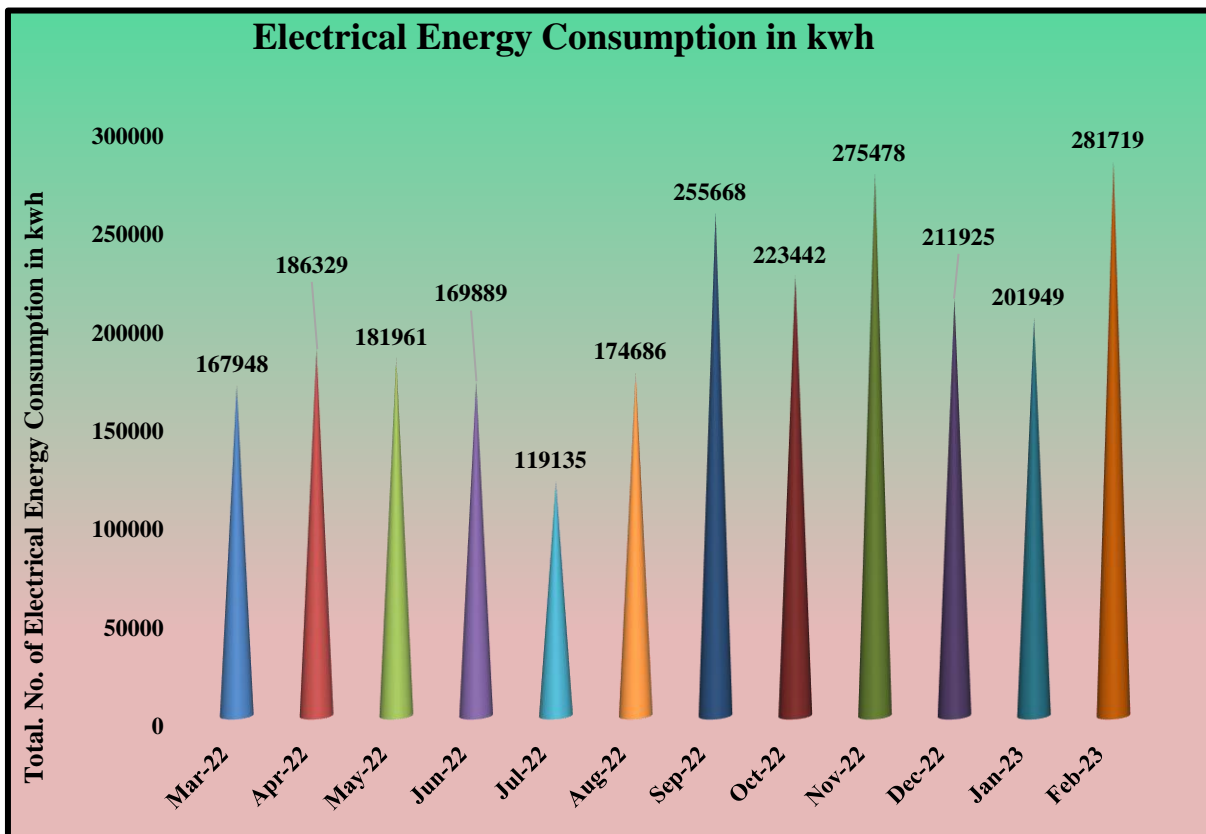


Figure 2. Overall Electrical Energy Consumption and Cost profile

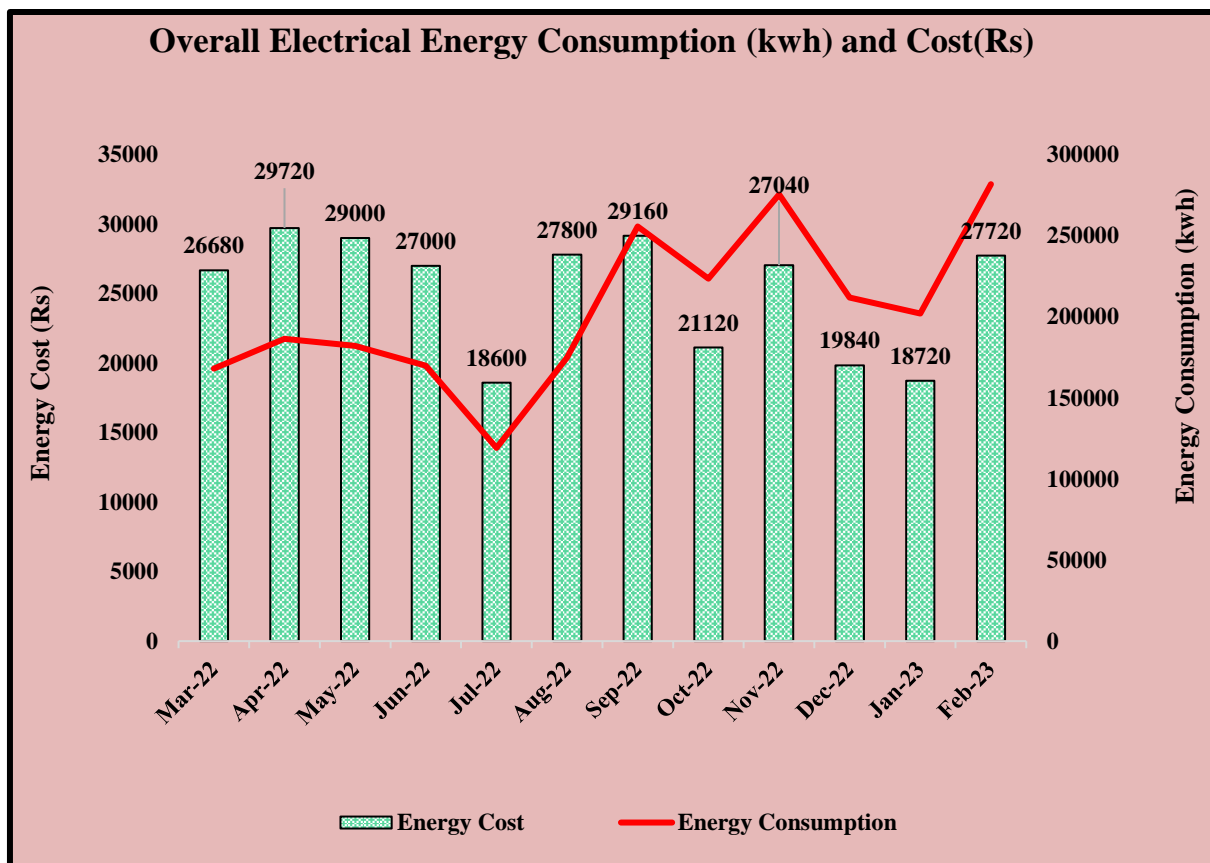


Table 3. Electrical Energy Consumption and Cost Profile in the Institution.

S.No	Months	Cost in Rs.	Rating / Capacity units in kWh
1.	March-22	26680	167948
2.	April-22	29720	186329
3.	May-22	29000	181961
4.	June-22	27000	169889
5.	July-22	18600	119135
6.	August-22	27800	174686
7.	September-22	29160	255668
8.	October-22	21120	223442
9.	November-22	27040	275478
10.	December-22	19840	211925
11.	January-23	18720	201949
12.	February-23	27720	281719

11.4. Power supply Equipment and Major Loads in the Campus**Table 4. Major Equipment related to Electrical energy utilization in Campus**

S.No	Equipment/ Utility	Rating/ Capacity	Quantity
1.	LED TV	80	27
2.	AC	2136	45
3.	AC	3225	1
4.	AC	1370	2
5.	Window AC	3450	3
6.	HP Laser Printer	550	37
7.	Canon Printer	530	44
8.	Canon Xerox/Printer	1008	1
9.	Epson Dot Matrix Printer	220	2
10.	Scanner	12.5	1
11.	Canon Legal Document Scanner	21	1
12.	Canon Scanner	46.5	1
13.	Legal Document Scanner	20.416	1

14.	Scanner	12.5	1
15.	Ahuja Amplifier	1500	7
16.	Studio Master Amplifier	1500	3
17.	Studio Master Amplifier	900	1
18.	Ahuja Amplifier	250	3
19.	Table Fan	64	6
20.	Table Fan	120	1
21.	Table fan	80	2
22.	Table Fan	116	1
23.	Wall Fan	64	23
24.	wall Fan	55	2
25.	Ceiling Fan	70	539
26.	Pedestal Fan	96	12
27.	LED Tube lights	20	811
28.	Tube Light	40	754
29.	LED Bulb	60	10
30.	LED Bulb	15	222
31.	LED Bulb	9	2
32.	LED Bulb	23	1
33.	Big Square LED panel	48	55
34.	LED Focus light	24	11
35.	Small Square LED panel	15	249
36.	LED spot light	5	44
37.	LED Top light	50	6
38.	LED Top light	40	10
39.	Philips LED Panel	36	34
40.	LCD Projectors	280	163
41.	CFL Bulbs	15	21
42.	UPS for Computer	420	20
43.	Speaker	700	67
44.	Speaker	1000	12

45.	Wifi device	13	45
46.	Bakery Rack Oven	1500	1
47.	Blue star Cooling Cabinet	192	1
48.	Bar code reader	0.7	1
49.	Water heater	1125	2
50.	Biometric Machine	3.5	4
51.	Exhaust	1500	6
52.	Exhaust	150	10
53.	Electrochemical analyser	220	1
54.	Halogen Lamp	150	1
55.	Tempo Heating equipments	1800	1
56.	Muffle Furnace	4000	4
57.	Fume hood	230	3
58.	Magnetic Stirrer	220	7
59.	centrifugal machine	180	3
60.	Heating mental	230	3
61.	Mechanic shaker	1000	2
62.	Water bath	1500	1
63.	Hot air oven	1500	3
64.	Microwave oven	1225	1
65.	Vacuum Machine	370	1
66.	Heat bath	1800	1
67.	Electric burner	1500	2
68.	Surface panel	18	1
69.	vacuum pump	370	2
70.	Computer	500	575
71.	Laptops	40	70
72.	Fume wood matter	230	1
73.	Focus light	400	53
74.	Focus light	1000	20
75.	Riso Copier	240	1

76.	Copier CZ180 Machine	220	1
77.	Gestetner Copier	35	1
78.	Electric kettle	1500	2
79.	Fridge	360	4
80.	Remote Screen	225	3
81.	Kyocera Xerox	1512	1
82.	Kyocera Printer Taskalfa	1386	2
83.	Kyocera Printer Taskalfa	1584	1
84.	Toshiba Printer	1920	1
85.	Wheat Flour Mill	750	1
86.	CCTV Camera	6	228

Table 5. Annual Energy Consumption of Fuels in the Institute

S.No	Month	Units Consumed (kWh)	Diesel Consumption (Liters)	Petrol Consumption (Liters)	LPG Consumption (kg)
1	March	Nil	960	556	110.5
2	April	Nil	925	529	115
3	June	Nil	968	620	112.5
4	July	Nil	985	610	143
5	August	Nil	945	545	145
6	September	Nil	956	585	140
7	October	Nil	980	562	138
8	November	Nil	992	605	152
9	December	Nil	985	568	151
10	January	Nil	970	593	148
11	February	Nil	956	580	139
12	March	Nil	983	573	150.5

Table 6. Transportation Facilities available in the Campus

S.No	Type of Vehicle	Fuel Used (Diesel in litres)	No. of Vehicles	Non-Pollution Certified (Y/N)
1.	Bus	Deisel	2	Y

Table 7. 11.5 Quantitative and Qualitative Measurement at the Institute

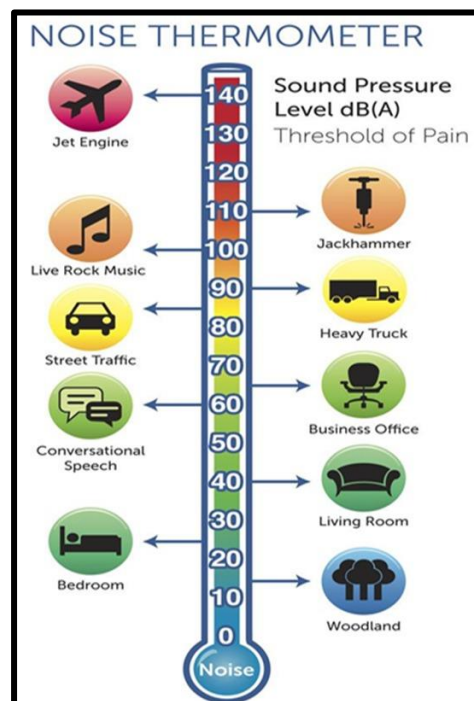
S.No	Requirements and checklists of the Energy audit	Conformity		
		Yes	No	NA
Mandatory Parameters				
1.	Have internal Energy audit procedures been developed and implemented by the Organization?	✓		
2.	Have programmes for the achievement of energy efficiency and conservation objectives been established and implemented as on date in the campus?	✓		
3.	Has a Management Representative, Electrical Engineer, Staff in charge been assigned for energy savings measures on power consumptions?	✓		
4.	Have programmes for the achievement of prescribed financial outlay for current bills for each building in the campus towards power consumptions?	✓		
5.	Has the organization ensured that personnel performing environmental specific tasks have the required knowledge on energy audit (e.g. education, training programme, seminar, workshop, camp, etc.)?	✓		
6.	Are objectives and targets documented towards energy audit periodically and any Register is maintained?	✓		
7.	Fluorescent (tube) lights, Incandescent lamp and sodium vapour lights are replaced with CFL / LED lamps	✓		
8.	Number of Uninterruptible power supply (UPS) and Power generators for power back-up to alternative current supply facility in each building	✓		
9.	Number of solar panels, solar lights, solar water heaters installed towards renewable energy utilization	✓		

10.	Ultra-violet lights and any other harmful lights used with safety precautions	✓		
11.	Attempt in reducing the energy expense and carbon footprint	✓		
12.	Disposal facility for hazardous items / materials arise from electrical gadgets, equipment and installation		✓	
13.	Natural / Mechanical air ventilation at Indoor / Outdoor auditorium, stadium, seminar halls, class rooms, etc.	✓		
14.	Sign boards indicating Switch OFF / ON, Danger at Electrical equipment and Power transformers in the campus towards creating awareness among the stakeholders as well as energy savings methods	✓		
15.	Transformer, Generators and UPS are protected properly with fencing and kept awareness boards on 'Dangers' and 'Warnings'	✓		
Supplementary Parameters				
1.	Signing of MoU with Govt. and NGOs to ensure about the energy conservation and efficiency in the campus	✓		
2.	Promoting ECON awareness and practice among the stakeholders is conducted periodically through Association, Clubs, Forums and Chapters	✓		
3.	The details of public transport, battery operated / electric vehicles, biofuel use, exhaust fans, boiling water system, chillers and geysers on energy savings mode	✓		
Exemplary Parameters				
1.	Projects and Dissertation works on the energy conservation and efficiency carried out by students and staff members	✓		
2.	Steps taken to take care of daylighting, AC machines heat emission and ecofriendly Refrigerators, etc.	✓		
3.	Are all monitoring electrical equipment appropriately maintained and calibrated?	✓		
4.	Steps taken towards the procurement of 3-5 star rated equipment during replacement old ones	✓		

11.6. Noise level Measurements, Analysis, and Interpretation in the Campus

Noise is all unwanted sound or set of sounds that causes annoyance or can have a health impact and noise level is measured in decibels (dB). Noise pollution is defined as consistent exposure to elevated sound levels that may cause adverse effects in humans or other living organisms. World Health Organization (WHO) defined environmental noise (sound produced by transport, industrial activities, construction sites, public works and services, cultural, sporting and leisure activities and neighbourhood) as noise from all sources with the exception of workplace noise and recognizes that noise pollution is an increasing problem. Prolonged exposure to loud noises (75 dB (A) over eight hours a day for years) can lead to hearing loss.

The body can also respond to lower noise levels. Level of noise are expected to be within 55 dB in residential areas, including institutions. Class room noise levels are supposed to be around 50 db (Table 8). From the graph above, it is evident that most of the noise level values across campus are above the normal permissible range.



Within the auditorium the noise levels were within range. Sound levels in other areas of campus are largely due to the interactions of people on campus than any other causes like construction or traffic. Sound Level Meter / Noise Thermometer are used to measure the noise level in the surroundings which converts the sound signal to an equivalent electrical signal and the resulting sound pressure level in decibels (dB) referenced to 20 μ Pa. Noise level prescribed by Central Pollution Control Board was presented in (Table 9).

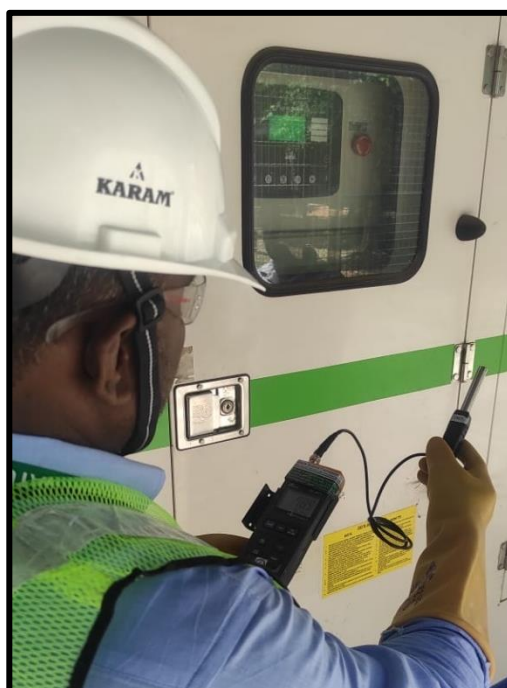
Table 8. Noise level at the Campus

S.No	Locations	Measurements (dB)	Major Noise Sources	Remarks
1.	Class room	54.56 \pm 1.3	Students and Staff members	No Noise Pollution
2.	Auditorium	54.50 \pm 1.6	Students	No Noise Pollution
3.	Seminar hall	55.47 \pm 0.6	Students	No Noise Pollution
4.	Library	25.73 \pm 2.8	Staff members	No Noise Pollution

5.	Laboratory	28.40 ± 0.4	Students	No Noise Pollution
6.	Canteen	27.70 ± 1.1	Publics	No Noise Pollution
7.	Open area	26.83 ± 0.5	Students and staff members	No Noise Pollution
8.	Parking area	27.6 ± 0.3	Vehicles	No Noise Pollution
	Mean	37.54		
	SE	1.30		
	CD	2.32		

Table 9. Noise Level Standard Prescribed by Central Pollution Control Board, India Government

Area Code	Zone	Limits in dB (A) Leq	
		Day Time	Night Time
A	Industrial	75	70
B	Commercial	65	55
C	Residential	55	45
D	Silence	50	40



Measurement of Noise level at various places in Sacred Heart College (Autonomous), Tirupattur, TN

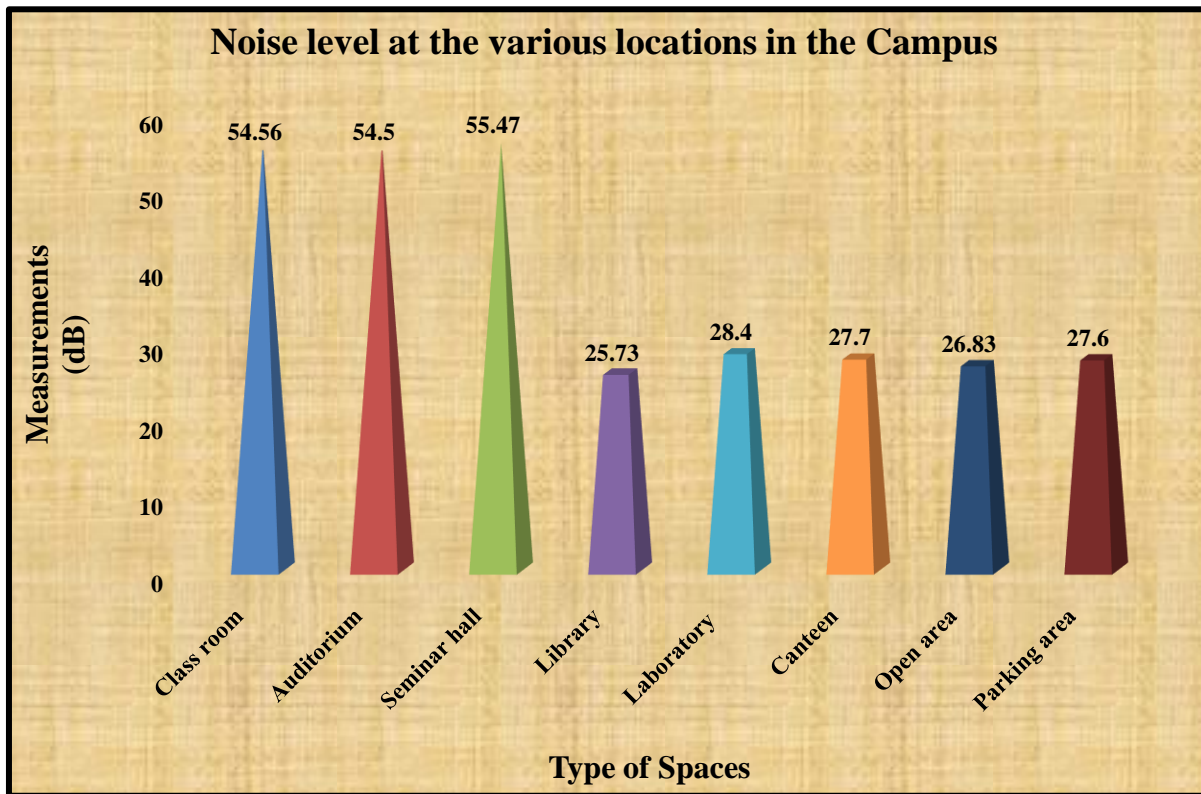


Figure 3. Noise level at the Campus

Calculation of Carbon Footprint at the Campus

The Carbon footprint calculation can be conducted based on the stage of Calculation as stated in www.carbonfootprint.com, which is the sum of electricity Usage per year (Padmini, 2007).

$$\begin{aligned}
 &\text{The CO}_2 \text{ emission from electricity} \\
 &= (\text{electricity usage per year in kWh}/1000) \times 0.84 \\
 &= (2450129 \text{ kWh}/1000) \times 0.84 \\
 &= 2058.108 \text{ metric tons}
 \end{aligned}$$

Notes:

Electricity usage per year = 2058.108 metric tons
 0.84 is the coefficient to convert kWh to metric tons

11.7. Ways to reduce Carbon Footprint

Evaluating and understanding the CO₂ emission can reduce the negative impact on the environment. Tiny changes can bring good impacts like when it comes to transportation, food, clothing, waste, etc., the following tips helps in reducing the carbon footprint (Vinoth Kumar et al., 2021)

Food

- Consumption of local and seasonal products.
- Limiting the consumption of meat and beef.
- Adopting sustainable fishing.
- Avoiding plastic packaging and practising the use of reusable bags.
- Sense of buying only necessary things.

Clothing

- Taking good care of clothes.
- Buying second hand products or borrowing
- Using the clothes made from recycled products with eco label

Transport

- Adopting carpooling practice, using cycles and public transport
- Usage of No Pollution certified vehicles.

Energy and waste

- Turning down the heating.
- Short showers
- Proper usage of water while brushing teeth or cleaning the dishes
- Proper care while charging the batteries.
- Selecting star rated equipment and EU Energy labelled products
- Reduce and recycle of wastes.

11.8. Light Intensity Measurement at the Campus

Light intensity or light output is used to measure whether a particular light source provides enough light for an application needed. There is a well-established light level recommendation for a wide range of applications in lighting industry and also for the type of space.

Understanding the light intensity helps to properly evaluate whether the space has adequate lighting conditions or not. Light intensity is measured in terms of lumens per square foot (foot-candles) or lumens per square meter (Table 10) (lux). Measuring the amount of light that falls on a surface allows to evaluate if the particular space has sufficient light to perform the tasks.

A light meter (lux meter) is used to measure the amount of light in a space/on a particular work surface. The light meter consists of a sensor that measures the light falling on it and provides the user with a measurable illuminance reading. Light meters are an especially useful tool for measuring light for safety or over-illumination.

The light intensity is usually measured by taking initial reading, where the lightings are turned off (Baseline measurement) and the final reading is taken by turning on the lights in the particular space (illuminated level). Subtracting the baseline measurement from illuminated level gives the light intensity of the particular room/space (Table 11)

Table 10. Standards for Comparison

S.No	Building Type	Space Type	Illuminances (LUX)
1.	Barracks / Dormitories	Bed Rooms	300
		Laundry Rooms	

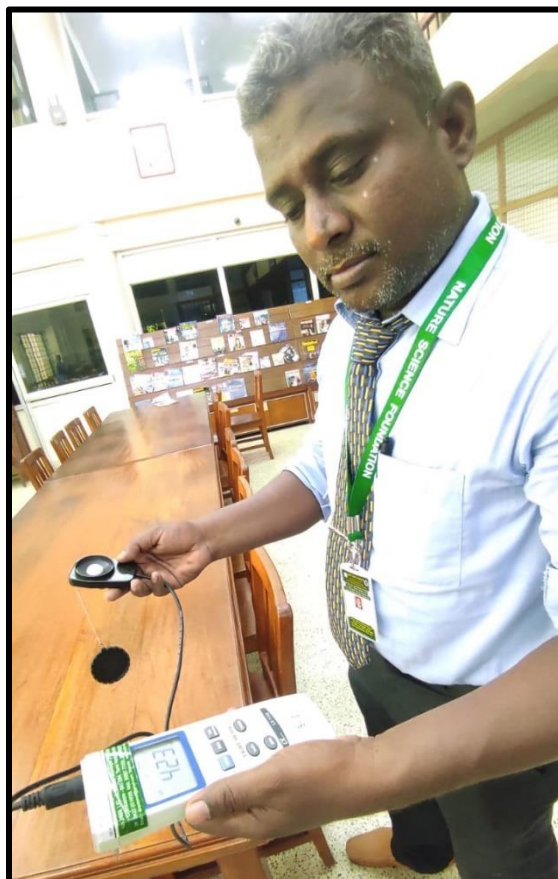
2.	Educational Buildings	Play Room, Nursery, Classroom, Lecture Hall	400
		Computer Practice Rooms	300
3.	Office Buildings	Single Offices, Open plan Offices	400
		Conference Rooms	300
4.	Hospitals	General ward Lighting	300
		Simple Examination	500
		Examination and Treatment Ward	1000
5.	Hotels and Restaurants	Kitchen	500
		Buffet	100
6.	Sports Facilities	Sports halls	300
7.	Circulation areas	Corridors and Stairs	500
		Cloak Rooms, Wash Rooms, Bath Rooms, Toilets	300
8.	Industrial areas	Metal working / Welding	300
		Simple Assembly	300
		Difficult Assembly	1000
		Exacting Assembly	3000-10000

Reference set of values for LUX

Source: lumitronlighting.com www.lumitronlighting.com/lighting_knowledge/LUX

Table 11. Light intensity measured at various locations in the Institute

S.No	Type of Spaces	Illuminances (LUX)
1.	Class room	313 ± 2
2.	Auditorium	434 ± 2
3.	Seminar hall	557 ± 2.6
4.	Library	324 ± 4.1
5.	Laboratory	404 ± 8
6.	Canteen	424 ± 23
7.	Open area	391 ± 9.64
8.	Parking area	418 ± 1
	Mean	408.58
	SE	28.44
	CD	50.68



**Light intensity measured at various locations in the Institute
Sacred Heart College (Autonomous), Tirupattur, TN**

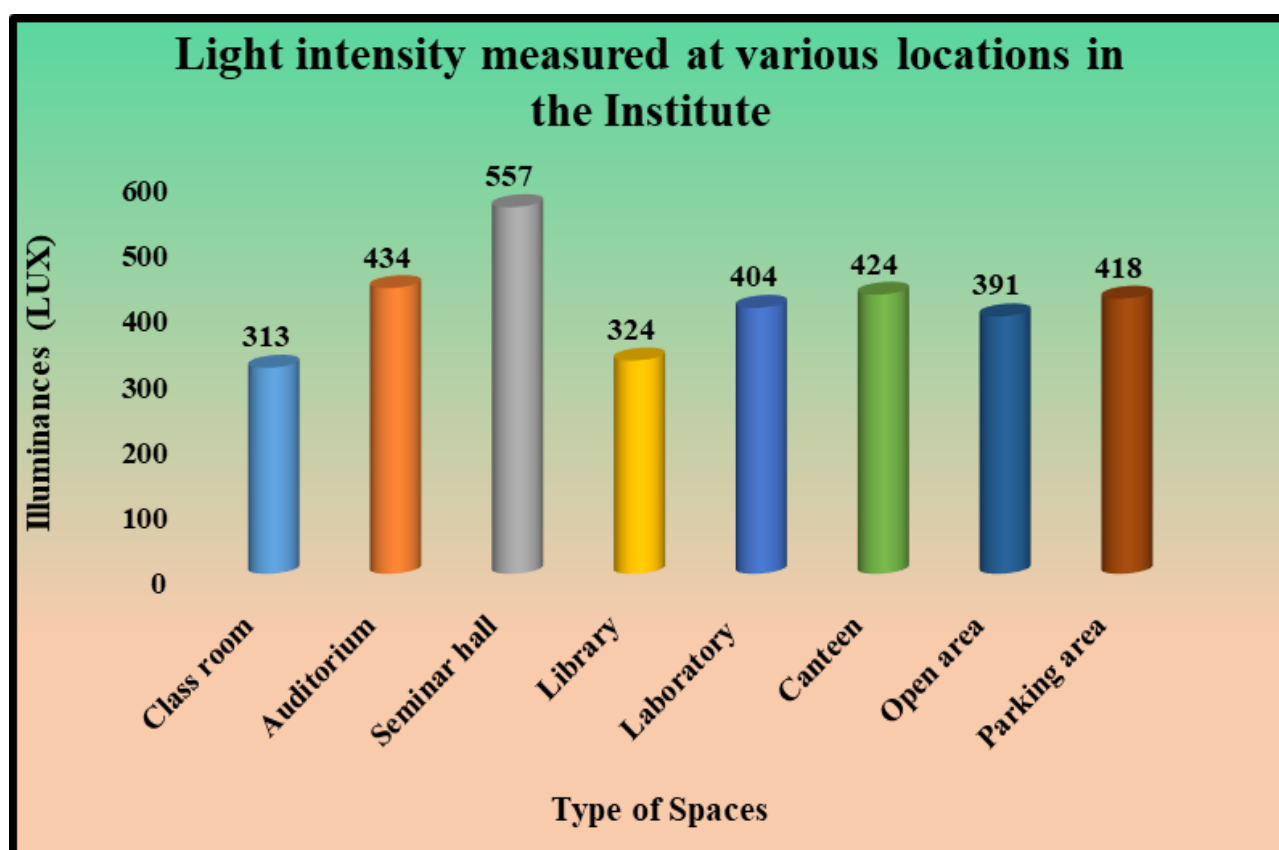


Figure 4. Light intensity measured at various locations in the Institute



Transformer, UPS and Power Rooms are well maintained in the Sacred Heart College (Autonomous), Tirupattur, TN



Generators Facility available in the Campus of Sacred Heart College (Autonomous), Tirupattur, TN



Energy Management and Conservation Activities in Sacred Heart College (Autonomous), Tirupattur, TN



Computer Room, Library and Laboratory Facility available in the Sacred Heart College (Autonomous), Tirupattur, TN



**Transport and Parking Area facility available in
Sacred Heart College (Autonomous), Tirupattur, TN**

12. Best Practices followed in the Organization

- Transformer, Generators and UPS are protected properly with fencing and kept awareness boards on 'Dangers' and 'Warnings'.
- Most of places, sign board of 'Switch ON' and 'Switch OFF' are kept towards saving energy measures to the stakeholders.
- Electrical wires, switch boxes and stabilizers are properly covered without any damage which will cause any problems to the staff and student members.
- Installed roof top solar power plan in two buildings.
- power generated through solar power plant is exported.
- HVLS Fans are fitted in the auditorium.
- Water level controllers are used.

- Power factor is maintained near to unity with APFC.
- STP is used for water recycling which is functioning well.
- Replaced old generation computers and TVs with LED monitors.
- Promoting ECON awareness and practice among the stakeholders are being conducted periodical through Association, Clubs, Forums and Chapters.
- Usage energy efficient light-emitting diode (LED) bulbs instead of incandescent and CFL bulbs.
- Maintenance of appliances and replaced old appliances in all laboratories
- Value added / Non-formal / Certificate / Diploma course on 'Energy and Environment Management Audits' are being conducted for the benefit of students and research scholars to become a certified Lead Auditor.
- Establishment of a system of carpooling among the staff members and students to reduce the number of four wheelers coming to the College.
- Discouraging the students and research scholars using two wheelers for their commutation in the campus.
- Switching off the lights, fan, air conditioners, equipment and instruments when they are not in use.

13. Suggestions for improving the energy efficiency and energy Conservation in the Organization

The energy audit included suggestions for energy cost reduction, preventive maintenance, and quality control activities, all of which are critical for utility operation in the audit sites.

- Procurement of equipment with energy efficiency (4-5 star rated equipment) during replacement may be considered.
- Daylight sensors can be implemented in future.
- Star rated fan can be used in near future.
- DG set Automatic syne can be implemented
- Optimal water usage and temperature settings may be used which are coming under automatic process towards energy savings.
- Continuous monitoring and analysis of energy consumption by dedicated team may be planned within the campus.
- Turn off electrical equipment when not in use
- Use computers and electronic equipment in power saving mode.
- Automatic switches with occupancy sensors in common areas
- Monthly use of electricity in the College may be reduced to a greater extent by means of undertaking a periodical energy audit.
- Regular monitoring of equipment in all laboratories and immediate rectification of any problems.
- Internal energy policy such as preventive maintenance and breakdown maintenance policy should be implemented.
- Separate representative for maintenance to be followed.
- Plan for diesel consumption need to be implemented
- Energy meter in each building to be implemented

- IOT based projects such as water sprinkler, Automatic light, A.C turn off, Water flow to be implemented, disposal for E- waste to be implemented.

14. Suggestions on Carbon Footprint in the Organization

- Establish a more efficient cooking systems like biogas operated machineries to save fossil gas in hostel kitchen and canteen.
- More use of generators, inverters, and UPS every day should be discouraged which could save electrical energy.
- Large number of ventilation and exhaust systems may be placed in auditorium, seminar and conference halls to reduce the carbon dioxide level among the participating students, scholars and staff members.

15. Conclusion

Considering the fact that the organization is a well-established, long time run establishment with good reputation, there is significant scope for conserving energy and make the campus as self-sustained in it. The energy conservation initiatives taken up by the institution are substantial. Energy efficient lighting schemes, awareness created among stakeholders and necessary power backups are being practiced by the institution.

There are some best Practices followed on Energy Audit in the Organization like Transformers, Generators and UPS are protected properly with fencing and kept awareness boards on ‘Dangers’ and ‘Warnings’. It is observed that the most of places, sign board of ‘Switch ON’ and ‘Switch OFF’ are kept towards saving energy measures to the stakeholders. Electrical wires, switch boxes and stabilizers are properly covered without any damage which will cause any problems to the staff and student members. Few recommendations, in addition, can further improve the energy savings of the Organization. This may lead to the prosperous future in context of Energy Efficiency Campus and thus sustainable environment and community development to the stakeholders in coming years to come.

16. Acknowledgement

Nature Science Foundation, Coimbatore, Tamil Nadu, India is grateful to the Management, Principal and Coordinator of Sacred Heart College (Autonomous), Tirupattur, Tami Nadu, India for providing us necessary facilities and co-operation during the energy audit process. This helps us in making the audit a success. Further, we hope that the best practices on sustainability followed by the Organization and recommendations and suggestions given by the NSF will boost the new generations to take care of the Electrical energy conservation, Energy saving measures and sustainability in compliance with the applicable regulations, policies and standards in the College Campus.

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-

Certificates of
Nature Science Foundation,
Coimbatore, Tamil Nadu.

- 1.ISO Certificate (QMS 9001:2015)
- 2.ISO Certificate (EMS 14001:2015)
- 3.ISO Certificate (OHSMS 45001:2018)
- 4.ISO Certificate (EnMS 50001:2018)
- 5.MSME Certificate
- 6.NGO Darpan NITI Aayog
- 7.12A Certificate
- 8.80G Certificate
- 9.10AC Certificate

Certificate of Registration



This is to Certify That The Quality Management System of



NATURE SCIENCE FOUNDATION

LIG II, GANDHIMAA NAGAR, PEELAMEDU, COIMBATORE - 641004, TAMILNADU, INDIA.

has been assessed and found to conform to the requirements of

ISO 9001:2015

for the following scope :

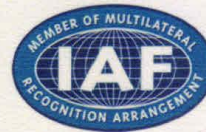
PROVIDING ENVIRONMENT, ENERGY, GREEN AND HYGIENE AUDITS
TO ACADEMIC INSTITUTIONS AND ORGANISATIONS
AS PER THE OWN CHECKLIST AND AWARDS TO
MERITORIOUS CANDIDATES.

Certificate No	20DQHY90	Issuance Date	: 08/01/2021
Initial Registration Date	: 08/01/2021	Date of Expiry*	: 07/01/2024
1st Surve. Due	: 08/12/2021	2nd Surve. Due	: 08/12/2022

DIRECTOR

ROHS Certification Pvt. Ltd.

408, Madhuban Building, 55, Nehru Place, New Delhi - 110 019, India
Phone : +91.11.41525522 | e-mail : info@rohs-certification.co.in | website : www.rohs-certification.co.in
The Registration is not a Product Quality Certificate, *Subject to successful completion of surveillance audits, Visit for verification on www.rohs-certification.co.in
Certificate is the property of ROHS and return when demanded



Certificate of Registration



This is to Certify That The Environmental Management System of



NATURE SCIENCE FOUNDATION

LIG II, GANDHIMAA NAGAR, PEELAMEDU, COIMBATORE - 641 004,
TAMILNADU, INDIA.

has been assessed and found to conform to the requirements of

ISO 14001:2015

for the following scope :

PROVIDING CONSULTANCY SERVICES FOR ENVIRONMENT, ENERGY, GREEN, HYGIENE, SOIL AND WATER, WASTE MANAGEMENT, BIOMEDICAL WASTE MANAGEMENT, E-WASTE MANAGEMENT, PLASTIC WASTE MANAGEMENT AND ACADEMIC AND ADMINISTRATIVE AUDITS TO EDUCATIONAL INSTITUTIONS AND INDUSTRIAL SECTORS AS PER THE OWN CHECKLISTS, START UP THE INTERNATIONAL ECO CLUB STUDENTS CHAPTER, OFFERING LEAD AUDITOR COURSE ON ENERGY AND ENVIRONMENT, AWARDS TO MERITORIOUS CANDIDATES.

Certificate No	22DEJI67	Issuance Date	: 21/05/2022
Initial Registration Date	: 21/05/2022	Date of Expiry*	: 20/05/2025
1st Surve. Due	: 21/04/2023	2nd Surve. Due	: 21/04/2024




DIRECTOR

ROHS Certification Pvt. Ltd.

D-5, 1st floor, Satec-2 Noida, Gurgaon Road, Noida-201301

e-mail : info@rohs-certification.co.in | website : www.rohs-certification.co.in

The registration is not a product quality certificate. *Subject to successful completion of surveillance audits. Visit for registration at www.rohs-certification.co.in
Certificate is the property of ROHS and users shall be notified.



CB-EMS-035



QCS MANAGEMENT PVT. LTD.
MANAGEMENT SYSTEMS CERTIFICATION

Certificate of Registration

ISO 45001:2018 (Occupational Health & Safety Management System)

NATURE SCIENCE FOUNDATION

ADDRESS: NO. 2669, LIG-II, GANDHI MANAGAR PEELAMEDU COIMBATORE - 641 004 TAMIL NADU, INDIA.

Scope of Certification:

PROVIDING TRAINING AND AUDITING SERVICES IN THE FIELD OF GREEN CAMPUS, ENVIRONMENT, ENERGY, OCCUPATIONAL HEALTH AND SAFETY, HYGIENE AND WASTE MANAGEMENT AT EDUCATIONAL INSTITUTES AND INDUSTRIAL SECTOR.

Certificate Number : QCS/EUAS/OHS/002

Issue Date : 03/08/2022
Expiration Date : 02/08/2023

1ST Surveillance Audit Within : 02/07/2023
2nd Surveillance Audit Within : 02/07/2024
Re-certification Due Date : 02/08/2025



Partha Bagchi
(Managing Director)

Validity of this Certificate is subject to Surveillance Audits to be conducted before scheduled due dates of surveillance audits as mentioned on the certificate, failing which the certificate will stand to be withdrawn and need to be treated as an initial certification process to reactivate its continuity on the register of EUAS and QCS. This Certificate is valid when confirmed by data listed on the (Euro Universal Accreditation Systems) EUAS" www.euas-ac.org. The authenticity & validity of this certificate may be re-affirmed by referring to our company website - www.qcspl.com. Lack of fulfillment of conditions as set out on the 'Certification Contract' (Annex 13) may render this certificate invalid. Any alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of law. This certificate remains the property of QCS and to be returned on request.

REGISTERED OFFICE: 37E/1(310) 2ND STREET, MODERN PARK, GREENAGE APARTMENT - 2ND FLOOR,
SANTOSH PUR, KOLKATA - 700075, WEST BENGAL, INDIA.
Email: info@qcspl.com. Call: +91 8697724963, +91 8902447427. Website: www.qcspl.com



Certificate of Registration

This is to certify that

NATURE SCIENCE FOUNDATION

**LIG II, GANDHIMAA NAGAR, PEELAMEDU, COIMBATORE - 641 004,
TAMILNADU, INDIA.**

has been independently assessed by QRO
and is compliant with the requirement of:

ISO 50001:2018

Energy Management Systems

For the following scope of activities:

PROVIDING CONSULTANCY SERVICES FOR ENVIRONMENT, ENERGY, GREEN, HYGIENE, SOIL AND WATER, WASTE MANAGEMENT, BIOMEDICAL WASTE MANAGEMENT, E-WASTE MANAGEMENT, PLASTIC WASTE MANAGEMENT AND ACADEMIC AND ADMINISTRATIVE AUDITS TO EDUCATIONAL INSTITUTIONS AND INDUSTRIAL SECTORS AS PER THE OWN CHECKLISTS, START UP THE INTERNATIONAL ECO CLUB STUDENTS CHAPTER, OFFERING LEAD AUDITOR COURSE ON ENERGY AND ENVIRONMENT, AWARDS TO MERITORIOUS CANDIDATES.

Date of Certification: 9th August 2022

2nd Surveillance Audit Due: 8th August 2024

1st Surveillance Audit Due: 8th August 2023

Certificate Expiry: 8th August 2025

Certificate Number: 305022080903EN



Chumant...

Head of Certification

Validity of this certificate is subject to annual surveillance audits to be done successfully on or before 365 days from date of the audit. (In case surveillance audit is not allowed to be conducted; this certificate shall be suspended / withdrawn).

The Validity of this certificate can be verified at www.qrocet.org

This certificate of registration remains the property of QRO Certification LLP, and shall be returned immediately upon request.

India Office : QRO Certification LLP

142, IInd Floor, Avtar Enclave, Near Paschim Vihar West Metro Station, Delhi-110063, (INDIA)

Website : www.qrocet.org, E-mail : info@qrocet.org

UDYAM REGISTRATION NUMBER		UDYAM-TN-03-0073706																												
NAME OF ENTERPRISE		M/S NATURE SCIENCE FOUNDATION																												
TYPE OF ENTERPRISE *		MICRO																												
MAJOR ACTIVITY		SERVICES																												
SOCIAL CATEGORY OF ENTREPRENEUR		GENERAL																												
NAME OF UNIT(S)		<table border="1"> <thead> <tr> <th>S.No.</th> <th colspan="3">Name of Unit(s)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td colspan="3">Green Campus, Energy and Environment Management Audits</td> </tr> </tbody> </table>				S.No.	Name of Unit(s)			1	Green Campus, Energy and Environment Management Audits																			
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OFFICIAL ADDRESS OF ENTERPRISE		<table border="1"> <thead> <tr> <th>Flat/Door/Block No.</th> <th>LIG-IL2669</th> <th>Name of Premises/ Building</th> <th colspan="2">GANDHIMAA NAGAR</th> </tr> </thead> <tbody> <tr> <td>Village/Town</td> <td>Gandhimannagar S.O</td> <td>Block</td> <td colspan="2">LIG-II</td> </tr> <tr> <td>Road/Street/Lane</td> <td>Peelamedu</td> <td>City</td> <td colspan="2">Coimbatore South</td> </tr> <tr> <td>State</td> <td>TAMIL NADU</td> <td>District</td> <td colspan="2">COIMBATORE , Pin 641004</td> </tr> <tr> <td>Mobile</td> <td>9566777255</td> <td>Email:</td> <td colspan="2">chairmannsf@gmail.com</td> </tr> </tbody> </table>				Flat/Door/Block No.	LIG-IL2669	Name of Premises/ Building	GANDHIMAA NAGAR		Village/Town	Gandhimannagar S.O	Block	LIG-II		Road/Street/Lane	Peelamedu	City	Coimbatore South		State	TAMIL NADU	District	COIMBATORE , Pin 641004		Mobile	9566777255	Email:	chairmannsf@gmail.com	
Flat/Door/Block No.	LIG-IL2669	Name of Premises/ Building	GANDHIMAA NAGAR																											
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State	TAMIL NADU	District	COIMBATORE , Pin 641004																											
Mobile	9566777255	Email:	chairmannsf@gmail.com																											
DATE OF INCORPORATION / REGISTRATION OF ENTERPRISE		28/11/2017																												
DATE OF COMMENCEMENT OF PRODUCTION/BUSINESS		12/03/2020																												
NATIONAL INDUSTRY CLASSIFICATION CODE(S)		<table border="1"> <thead> <tr> <th>SNo.</th> <th>NIC 2 Digit</th> <th>NIC 4 Digit</th> <th>NIC 5 Digit</th> <th>Activity</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>69 - Legal and accounting activities</td> <td>6920 - Accounting, bookkeeping and auditing activities; tax consultancy</td> <td>69201 - Accounting, bookkeeping and auditing activities</td> <td>Services</td> </tr> <tr> <td>2</td> <td>85 - Education</td> <td>8542 - Cultural education</td> <td>85420 - Cultural education</td> <td>Services</td> </tr> <tr> <td>3</td> <td>85 - Education</td> <td>8549 - Other education n.e.c.</td> <td>85499 - Other educational services n.e.c.</td> <td>Services</td> </tr> </tbody> </table>				SNo.	NIC 2 Digit	NIC 4 Digit	NIC 5 Digit	Activity	1	69 - Legal and accounting activities	6920 - Accounting, bookkeeping and auditing activities; tax consultancy	69201 - Accounting, bookkeeping and auditing activities	Services	2	85 - Education	8542 - Cultural education	85420 - Cultural education	Services	3	85 - Education	8549 - Other education n.e.c.	85499 - Other educational services n.e.c.	Services					
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DATE OF UDYAM REGISTRATION		26/02/2022																												

* In case of graduation (upward/reverse) of status of an enterprise, the benefit of the Government Schemes will be availed as per the provisions of Notification No. S.O. 2119(E) dated 26.06.2020 issued by the Mo MSME.

Disclaimer: This is computer generated statement, no signature required. Printed from <https://udyamregistration.gov.in> & Date of printing - 26/02/2022

For any assistance, you may contact:

1. District Industries Centre: COIMBATORE (TAMIL NADU)

2. MSME-DI: CHENNAI (TAMIL NADU)

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The screenshot shows the top section of the NGO DARPAN website. At the top left, there is the Government of India emblem, the text 'NGO', and the 'D ARPAN' logo. To the right, it says 'NITI Aayog, Government of India'. Below this is a dark navigation bar with links: Home, About Us, NGO Directory, Search NGOs, Report, Guidelines, Circulars, Help, Apply Grant, and Blacklisted NGOs. A 'Login/Register' button is on the right. The main banner features a photo of a community event with the text 'NGO DARPAN' and a message: 'In order to strengthen services of the portal, Government has decided to make PAN Number of VOs/NGOs mandatory.' Below the banner, a light blue bar says 'Please Update Your Profile'. A teal bar says 'Welcome, Nature Science Foundation'. A light blue box displays 'Your Unique Id: TN/2018/0187711'.



PROCEEDINGS OF THE COMMISSIONER OF INCOMETAX (EXEMPTIONS),
III FLOOR, ANNEXE BLDG. NO.121, MAHATMA GANDHI SALAI, CHENNAI-34

Present : G.M.DOSS, I.R.S
Commissioner of Income Tax (Exemptions)

** URNo. AACTN7857J/05/18-19/T-1105

Dated:03/09/2018

Sub: Registration u/s. 12AA of the Income tax Act 1961 - in the case of

"Nature Science Foundation"
LIG-II, 2669, Gandhimaa Nagar, Peelamedu, Coimbatore – 641 004.

Ref : Application in form 10 A filed on 28/03/2018

ORDER UNDER SECTION 12AA OF THE INCOME TAX ACT 1961.

1. The above Trust/Society/Association/ Company/ others/, bearing PAN AACTN7857J was constituted by Trust Deed / Memorandum of Association dated 29/11/2017 registered with Sub-Registrar's Office/ Registrar of Societies/Registrar of Companies/others on 29/11/2017.
2. ~~The Trust Deed / Memorandum of Association has subsequently been amended / modified / altered by a Codicil / Supplementary Deed / Amendment Deed / Alteration to Memorandum of Association/others dated XX/XX duly registered on XXXX.~~
3. The above TRUST filed an application seeking Registration u/s 12 AA of the Income tax Act, 1961.
4. On going through the objects of the TRUST and its proposed activities as enumerated in the Trust Deed / Memorandum of Association, I am satisfied about the genuineness of the TRUST as on date.
5. The application has been entered at Sl.No.1105 maintained in this office. The above Trust is accordingly registered as a PUBLIC CHARITABLE TRUST u/s 12 AA of the Income Tax Act, 1961 with effect from 29/11/2017.
6. It is hereby clarified that the Registration so given to the Trust/Institution is not absolute. Subsequently, if it is found that the activities of the Trust/Institution are not genuine or are not being carried out in accordance with the objects and clauses of the Trust Deed / Memorandum of Association submitted at the time of registration or modified with the approval of the Commissioner of Income-tax (Exemptions), Chennai or there is a violation of the provisions of Section – 13, the Registration so granted shall be cancelled as provided u/s 12 AA (3) or 12AA(4) of the Income Tax Act. Further, this approval is also subject to the Trust/Society/Association/Company/ Others/ complying to the provisions of the proviso to sec 2(15) of the Income Tax Act 1961.
7. Granting of Registration u/s 12AA does not confer any automatic exemption of income from taxation. The Trust/Institution should conform to the parameters laid down in Sections 11, 12, 13 and 115 BBC of the I.T. Act, 1961, to claim exemption of its income on year to year basis before the Assessing Officer.

** This Unique Registration No. URNo. AACTN7857J/05/18-19/T-1105 Should be mentioned in all your future correspondence.




Sd/-
(G.M.DOSS, I.R.S)
Commissioner of Income-tax(Exemptions), Chennai.

Copy to:

1. The Assessee.
2. The ACIT(Exemptions), Coimbatore Circle.
3. Office Copy.

//CERTIFIED TRUE COPY//


(N SRINIVASA RAO)
Asst. Commissioner of Income-tax (H.Qs)(Exemptions),
Chennai.



GOVERNMENT OF INDIA
INCOMETAX DEPARTMENT
OFFICE OF THE COMMISSIONER OF INCOME TAX (EXEMPTIONS)
Aayakar Bhawan, Annexe III Floor, 121 M.G. Road, Chennai 600 034

URN No. AACTN7857J/05/18-19/T-1105/80G

Date: 10.04.2019

Name of the Trust-/Society /Company/Institution : NATURE SCIENCE FOUNDATION
Address : LIG II 2669, GANDHIMAA NAGAR, PEELAMEDU, COIMBATORE - 641 004
PAN : AACTN7857J
Date of Application : 12.11.2018

Received
Raj S. Ponnur
17/07/19
17/07/2019

APPROVAL UNDER SECTION 80G(5)(vi) OF THE INCOME TAX ACT, 1961

The aforesaid Trust-/Society/Company/Institution has been registered u/s.12AA of the Income Tax Act with effect from 29.11.2017 vide AACTN7857J/05/18-19/T-1105 dated 03.09.2018. It is certified that donation made to **NATURE SCIENCE FOUNDATION at LIG II 2669, GANDHIMAA NAGAR, PEELAMEDU, COIMBATORE - 641 004** shall qualify for deduction u/s 80G(5)(vi) of the Income Tax Act, 1961, subject to the fulfillment of conditions laid down in clauses [i] to [v] of sub-section (5) of section 80G of the I.T Act, 1961.

- This approval shall be valid in perpetuity with effect from **A.Y. 2019-20** unless specifically withdrawn. **The details and validity of the certificate is available @ office.incometaxindia.gov.in**
- The Return of Income along with the Income & Expenditure Account, Receipts and Payments Account and Balance Sheet should be submitted annually to the Assessing Officer having jurisdiction over the case.
- No change in the Trust Deed/Memorandum of Association shall be effected without the prior approval of the undersigned i.e. **Commissioner of Income Tax (Exemptions), Chennai**.
- Every receipt issued to a donor shall bear the **Unique Registration Number** i.e. URN No. **AACTN7857J/05/18-19/T-1105/80G** and date of this order i.e. **10.04.2019**.
- Under the provisions of section 80G(5)(i)(a), the institution/fund registered u/s.12A, u/s.12AA(1)(b) or approved u/s.10(23C), 10(23C)(vi)(via), etc., shall have to maintain separate books of accounts in respect of any business activity carried on and shall intimate this office within one month about commencement of such activity.



Sd/-
(G.M.DOSS, I.R.5)
Commissioner of Income Tax (Exemptions)
Chennai.

Copy to:

- The applicant
- Guard File
- The DCIT(Exemptions) Coimbatore Circle.

//Certified True Copy//

(N. SRINIVASA RAO)
Assistant Commissioner of Income-tax (H.qrs)
(Exemptions), Chennai.

FORM NO. 10AC

(See rule 17A/11AA/2C)

Order for registration

1	PAN	AACTN7857J
2	Name	NATURE SCIENCE FOUNDATION
2a	Address	
	Flat/Door/Building	LIG-II, 2669
	Name of premises/Building/Village	GANDHIMAA NAGAR
	Road/Street/Post Office	Coimbatore South
	Area/Locality	COIMBATORE
	Town/City/District	Gandhimaanagar S.O
	State	Tamil Nadu
	Country	INDIA
	Pin Code/Zip Code	641004
3	Document Identification Number	AACTN7857JE2021501
4	Application Number	739995830271021
5	Unique Registration Number	AACTN7857JE20215
6	Section/sub-section/clause/sub-clause/proviso in which registration is being granted	01-Sub clause (i) of clause (ac) of sub -section (1) of section 12A
7	Date of registration	03-11-2021
8	Assessment year or years for which the trust or institution is registered	From AY 2022-23 to AY 2026-2027
9	Order for registration:	
	a. After considering the application of the applicant and the material available on record, the applicant is hereby granted registration with effect from the assessment year mentioned at serial no 8 above subject to the conditions mentioned in row number 10.	
	b. The taxability, or otherwise, of the income of the applicant would be separately considered as per the provisions of the Income Tax Act, 1961.	
	c. This order is liable to be withdrawn by the prescribed authority if it is subsequently found that the activities of the applicant are not genuine or if they are not carried out in accordance with all or any of the conditions subject to which it is granted, if it is found that the applicant has obtained the registration by fraud or misrepresentation of facts or it is found that the assessee has violated any condition prescribed in the Income Tax Act, 1961.	
10	Conditions subject to which registration is being granted	
	The registration is granted subject to the following conditions:-	

<p>o. This certificate cannot be used as a basis for claiming non-deduction of tax at source in respect of investments etc. relating to the Trust/ Institution.</p>	
<p>p. All the Public Money so received including for Corpus or any contribution shall be routed through a Bank Account whose number shall be communicated to Office of the Jurisdictional Commissioner of Income Tax.</p>	
<p>q. The applicant shall comply with the provisions of the Income Tax Act, 1961 read with the Income Tax Rules, 1962.</p>	
<p>r. The registration and the Unique registration number has been instantly granted and if, at any point of time, it is noticed that form for registration has not been duly filled in by not providing, fully or partly, or by providing false or incorrect information or documents required to be provided under sub-rule (1) or (2) of rule 17A or by not complying with the requirements of sub- rule (3) or (4) of the said rule, the registration and Unique Registration Number (URN), shall be cancelled and the registration and URN shall be deemed to have never been granted or issued.</p>	
<p>Name and Designation of the Registration Granting Authority</p>	<p>Principal Commissioner of Income Tax/ Commissioner of Income Tax (Digitally signed)</p>



Certificates of Energy Auditors

1. ISO Environment Management System (14001:2015) of Dr. S. Rajalakshmi, Founder & Chairman of NSF.
2. Indian Green Building Council (IGBC AP) Accredited Professional of Dr. B. Mythili Gnanamangai, Vice-Chairman of NSF.
3. Associated Chambers of Commerce and Industry of India (ASSOCHAM), of Dr. B. Mythili Gnanamangai, and Board of Directors (North Zone) of NSF.
4. Bureau of Energy Efficiency (BEE), LEED AP and GRIHA Certificates of Er. D. Dinesh Kumar, Energy Auditor of NSF.
5. ISO Energy Management System (50001:2018) of Dr. D. Vinoth Kumar, Joint Director of NSF



Certificate of Training

TNV hereby certifies that

S. Rajalakshmi

has successfully completed the 5 days

Auditor / Lead Auditor Training Course which meets the training requirements of the Exemplar Global and has been declared as competent in the following competency units

- EM: Environmental Management System
- AU: Management Systems Auditing
- TL: Leading Management Systems Audit Teams

ISO 14001:2015

Issue Date: 17th Jun. 2021

Training Date : 20th to 24th May. 2021

Certificate Number : 2106170721010105

Authorised Signatory
(Pragyesh Singh)

This course is certified by Exemplar Global vide registration number TN006669

Note: The course conforms to the principles and practice of ISO 14001:2015 Management Systems for compliance with standards. This certificate remains in force until 31/12/2023. This certificate is recognized by Exemplar Global. For any information or queries, please write to: Mail: info@isomindia.com





BUREAU OF ENERGY EFFICIENCY



Examination Registration No. : **EA-14056** Serial Number **9176**

Certificate Registration No. : **9176**

Certificate For Certified Energy Manager

This is to certify that Mr./Mrs./Ms. **Dinesh Kumar D**
 Son/Daughter of Mr./Mrs. **R M Dhanasekaran** who has passed the National
 Examination for certification of energy manager held in the month of **October 2011** is
 qualified as certified energy manager subject to the provisions of Bureau of Energy Efficiency
 (Certification Procedures for Energy Managers) Regulations, 2010.

This certificate shall be valid for five years with effect from the date of award of this certificate
 and shall be renewable subject to attending the prescribed refresher training course once in every
 five years.

His /Her name has been entered in the Register of certified energy manager
 at Serial Number **9176** being maintained by the Bureau of Energy Efficiency under the
 aforesaid regulations.

Mr./Mrs./Ms. **Dinesh Kumar D** is deemed to have qualified
 for appointment or designation as energy manager under clause (f) of Section 14 of the Energy
 Conservation Act, 2001 (Act No.52 of 2001).

Given under the seal of the Bureau of Energy Efficiency, this **7th** day
 of **February, 2013**

Secretary
 Bureau of Energy Efficiency
 New Delhi

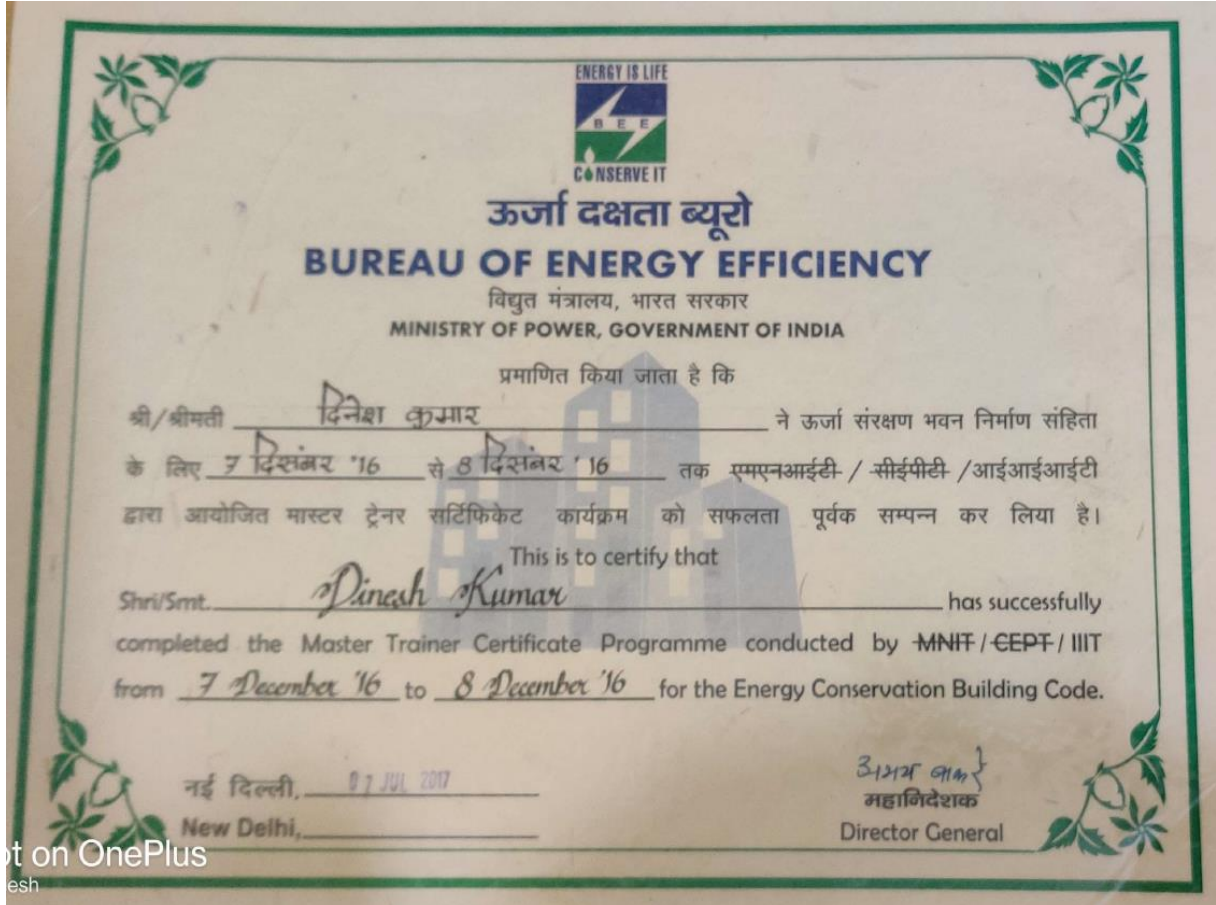
Digitally Signed: RAKESH KUMAR RAI

Sun Mar 01 10:58:55 IST 2020

Secretary, BEE New Delhi

Dates of attending the refresher course	Secretary's Signature	Dates of attending the refresher course	Secretary's Signature
22.12.2019			







Certificate of Successful Attainment

This is to certify that

DR. D. VINOTH KUMAR

HAS SUCCESSFULLY COMPLETED THE FIVE DAYS (40 HOURS)

LEAD AUDITOR COURSE

BY PASSING THE WRITTEN EXAMINATION BASED ON

ISO 50001:2018

ENERGY MANAGEMENT SYSTEMS

Examination Date: 15/07/2022

Certificate issue Date: 22/07/2022

Certificate registration number: QCS/TR/C/0056

Total Course duration: 40 hours CPD Credits Earned: 32

Remarks: Roughly one hour of study time equals to 1 CPD Credit.

This certificate can be validated online from the industry wide Global Professional Register at www.qcspl.com.

Partha Bagchi
(Managing Director)

QCS MANAGEMENT PVT LTD

Accredited by "CPD Accreditation Office UK"

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