

TECHNICAL AUDIT REPORT

[Energy Audit]

Submitted to

**GOVERNMENT COLLEGE OF TECHNOLOGY,
THADAGAM ROAD, COIMBATORE - 641 013,
TAMIL NADU**

Date of Audit: 20.04.2023



Submitted by

NATURE SCIENCE FOUNDATION

(A Unique Research and Development Centre for Society Improvement)

[ISO Certified and Ministry of MSME Registered Organization]

No. 2669, LIG-II, Gandhi Managar, Peelamedu

Coimbatore 641 004, Tamil Nadu, India

Phone: 0422 2510006, Mobile: 9566777255, 9566777258

Email: director@nsfonline.org.in

NATURE SCIENCE FOUNDATION

(A Unique Research and Development Centre for Society Improvement)
ISO 9001:2015, 14001:2015, 45001:2018 & 50001:2015 Certified and Ministry of MSME Registered Organization
No. 2669, LIG - II, Gandhi Managar, Peelamedu, Coimbatore - 641 004, Tamil Nadu, India.
Email : director@nsf@gmail.com, director@nsfonline.org.in, Website : www.nsfonline.org.in
Office - 0422 - 2510006, Mobile : 95667 77255, 95667 77258.



RAJALAKSHMI, M.B.A., Ph.D., FNSF.

Mr. P. KANAGARAJ, FNSF.
Secretary

Certificate of Declaration

The Office of Nature Science Foundation, Coimbatore, Tamil Nadu declare that

1. Nature Science Foundation has conducted onsite green audit at **Government College of Technology, Thadagam Road, Coimbatore - 641 013, Tamil Nadu, India** by deputing certified Lead Auditors and Technical Experts.
2. On the basis of audit observations by the auditors and pertinent data collected from the Auditee, the Technical Report has been prepared and being submitted.
3. Data presented in the Technical Report are verified and to best of our knowledge, the data are authentic and reliable.
4. Nature Science Foundation declares that data generated were not shared with any third parties and the soft copy of the report is available with Nature Science Foundation's Office till its validity.
5. Provided the Auditee desired to publish or share the data with other agencies, Nature Science Foundation has no conflict of interest.
6. We at Nature Science Foundation express our deep sense of gratitude to the Management for given an opportunity to conduct green audit at their premises in compliance with NAAC criteria and for whole hearted support extended at the time of onsite audit. Our sincere thanks to NAAC, IQAC Coordinator and Head of the Departments of the Organization for their intangible assistance and cooperation extended to the audit team at the time of physical facility verification.

Date: 20/04/2022
Place: Coimbatore



Authorized signatory
Nature Science Foundation

Dr. P.V. Sreenivasan, M.Sc., M.Phil., Ph.D.,
Director
NATURE SCIENCE FOUNDATION
LIG-II, 2669, Gandhi Managar
Peelamedu, Coimbatore - 641 004
Tamil Nadu, India.

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1. GENERAL INTRODUCTION

1.1. Introduction

Green campus is an area of the Organization or the Organization as a whole itself contributing to have an infrastructure or development that is structured/planned to incur less energy, less water, less or no CO₂ emission and less or pollution free environment (Aparajita, 1995). Green Campus Audit is a tool to evaluate environment management system which is systematically executed to protect and preserve the environment. Green campus audit constitutes the environmental friendly practices and education combined to promote sustenance of green environment by adopting user-friendly technology within the campus. It creates awareness on environmental ethics, resolves environmental issues and offers solutions to various social and economic needs (APHA, 2017). It strengthens the concept of "Green Building" and "Oxygenated Building" which in turn provides a healthy atmosphere to the stakeholders.

1.2. Importance of National Building Code

National Building Code of India has a set of rules and guidelines that regulates construction and as well as ecofriendly activities of the campus. In order to achieve the minimum standards of welfare and safety of stakeholders of a campus, the Governing body lays down a set of guidelines to offer sustainable environment. In 1970, the National Building Code (NBC) was first published in India and the significant provisions of the Indian Building Code involve: 1. Structural safety of the building, 2. Earthquake-resistant building design, 3. Fire and life safety, 4. Solid waste management, 5. Accessibility for differently-abled and senior citizens, 6. Use of alternative building techniques and 7. Environmentally compatible building construction techniques like the use of solar power, rainwater harvesting, etc.

National building codes not only offer a standard benchmark that constructors must meet, but they also establish safety standards along with ecofriendly atmosphere of a campus for years to come. As extreme weather conditions and fires are growing rapidly in the country, it becomes vital that buildings and structures be built and designed using the current building codes to allow for maximum safety sustainability and resilience. For instance, new and updated building codes put much emphasis on conservation as energy and the waste is the most expensive byproduct of older regions. This will not only offer environmental benefits to future generations but will also regulate indoor air pollution to protect the health.

Before the introduction of National Building Codes of India in the construction industry, building commercial and residential properties used a lot of energy which adversely affected the environment. Thus, enforcing building codes to create low-energy buildings offers a tangible way for the company to help decrease the greenhouse gas emissions of the nation and in this way National building code offers multiple environmental benefits to various stakeholders. While safety is the primary objective, new building codes are making significant contributions toward solving energy issues. National building codes contain provisions relating to the use of environmentally compatible construction techniques like planting trees, landscaping, rainwater harvesting and renewable and non-renewable energy sources. These provisions allow

the constructors to use natural energy sources which in turn reduces the energy bills to a greater extent.

1.3. Role of Educational Institutions in natural resource conservation

In view of providing eco-friendly atmosphere to the stakeholders, educational institutions are focused on establishing and maintenance of green and eco-friendly campus without harming the environment. A clean and healthy surrounding in an organization determine the effective learning/teaching and provides a favorable learning environment to the students. Educational institutions are insisted by both Central and State Governments to provide green, healthier and eco-friendly atmosphere to the stakeholders. In addition, all the educational institutions are asked to save the environment for future generations and to solve the problems associated with environment through Environmental Education. Implementation of Swachh Bharath Abhiyan Scheme by the Indian Government through Educational Institutions imparted neat and clean environment at tribal, rural and urban areas across the country. Seminar, Conference, Workshop, training and awareness programmes on biodiversity conservation education, environmental awareness programmes, etc., may be conducted periodically by the Management and Administrative people of an organization for the benefit of the stakeholders.

1.4. Environment Friendly Campus

As stated earlier, Organization is liable to provide an eco-friendly atmosphere along with good drinking water facility to all the stakeholders. Manuring the cultivated plants/grown within the campus may applied with organic manure, cow dung, farmyard manure and vermicompost instead of using chemical fertilizers. All non-compostable and single-use disposable plastic items, plastic utensils, plastic straws and stirrers should be avoided. Demonstration / awareness programme on establishing plastic-free environment and utility of organic alternatives for all incoming and current students, staff and faculty should be organized. Reduction of use of papers alternated with e-services, e-circulars, etc., and proper disposal of wastes, recycling and suitable waste management system should be considered to establish environment friendly campus.

The term 'auditing' is to examine the management practices and to evaluate performance of an organization in relation to environmental issues. World along with Associated Chambers of Commerce and Industry of India (ASSOCHAM), Green Building Code and Green Ratings Systems (GBCRS), Green Rating for Integrated Habitat Assessment (GRIHA), Bureau of Energy Efficiency(BEE), Leadership in Energy and Environmental Design (LEED), CII-GreenCo - GreenCo Rating System (CII-GRS), Food Safety Management System & Occupational Safety & Health (FSMS), Swachh Bharath under India Clean Mission (SBICM) and International Standard Organization (ISO 2021) have formulated a series of standards in the field of environmental auditing. These standards are basically intended to guide organizations and auditors on the general principles common to the execution of environmental audits.

1.5. About Nature Science Foundation (NSF)

NSF is an ISO QMS (9001:2015), EMS (14001:2015), OHSMS (45001:2018) & EnMS (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 which is a Public Charitable Trust registered 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 12AA, 80G and Form 10AC certificates for income tax exemption and implanting various Government schemes. The main motto of the NSF is "Save the Nature to Save the Future" and "Go Green to Save the Planet". NSF family is wide spread across India with over 115 State wise Lead Auditors to conduct Green Audit (Table 1).

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 pertinent to biodiversity and natural resource conservation. NSF is being released "Magazine" and "Quarterly Newsletter" to share the information about Environmental awareness programmes on biodiversity conservation in Western Ghats of Southern India. In order to encourage the students, faculty members, academicians, scientists, entrepreneurs and industrial experts those who are involving in nature protection and biodiversity conservation activities across the world, NSF tributes the deserved meritorious candidates with various awards/honours and these awards will be conferred to them during the Annual Meet and Award Distribution Ceremony which will be conducted every year.

Apart from the "Green Audit", NSF has introduced various types of audits such as Hygienic Audit Water & Soil Audit, Plastic Waste Management Audit, Biomedical Waste Audit, Solid Waste Management Audit, E-Waste Management Audit, Academic & Administrative Audits 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 in compliance with ISO 17020 Criteria and Government Law and Environmental Legislations including World / Indian Green Building Council and the concept of Swachh Bharath Abhiyan under Clean India Mission.

1.6. About the Organization

The Government College of Technology, Coimbatore formerly known as Arthur Hope College of Technology, was started in July 1945. The Institute is one of the premier Engineering Institutions of the Country having a very large contribution to the academic and technological developments. Ever since that prestigious moment, it has set the standard of recognition standing out as an outstanding Institution with technical expertise. This Institution offers nine UG programs and eleven PG programs with recognized research supervisors to pursue Ph.D. Programs in all the branches of study. All departments have well qualified staff members and excellent infrastructural facilities. This Institute is supported by World bank funding under TEQIP in the Phase II to the tune of Rs. 12.5 crores along with two centres of excellence, each granted with Rs. 5 crores. The college has received BEST COLLEGE AWARD in the year 2010 from the State Government of TamilNadu and "GREEN CAMPUS OF THE YEAR - 2013" award from Dr.Rangasamy, Chief Minister of Pondicherry on April 4th for the measures taken on environmental activities. In addition, the Institute received a certificate from India Book of Records for the National symposium on Zero paper event. "Ideas are the source of innovation and innovation is the vital spark of all human change, improvement and progress". With this motto the institution has established Student Research Foundation (SRF) to initiate research and new product developments within the campus. Through SRF, innovative ideas from students are given funds and technical guidance required to develop them into full-fledged products and solutions. GCT has strong tie-ups with different industries, R&D labs and Public Sector companies. The industrial experts interact on a continual basis to revise and revamp the curriculum and keep it modern and relevant to the industry expectations.

GCT alumni association has been assisting students who suffer a financial crunch. Some of the GCT Alumni attained globally highest honour. To cite an event, twenty-four people who designed and advanced the Internet as the global, world-changing platform that it is today will be inducted into the Internet Hall of Fame. One among the 24 inductees is a GCT Alumni Dr. S. Ramani of 1962 batch, Electrical branch

VISION

To emerge as a centre of excellence and eminence by imparting futuristic technical education in keeping with global standards, making our students technologically competent and ethically strong so that they can readily contribute to the rapid advancement of society and mankind.

MISSION

- To achieve Academic excellence through innovative teaching and learning practices.
- To enhance employability and entrepreneurship.
- To improve the research competence to address Societal needs.
- To inculcate a culture that supports and reinforces ethical, professional behaviours for a harmonious and prosperous society.

1.7. Audit Team Details

Date of Audit	: 20.04.2023
Audit Site	: Government College of Technology, Thadagam Road, Coimbatore-641 013, Tamil Nadu, India
Inspection Body	: Nature Science Foundation Coimbatore, Tamil Nadu, India
Audit Scope	: Green, Environment, Energy Audits
Name of the Auditing Chairman	: Dr. S. Rajalakshmi ISO QMS, EMS, OHSMS and EnMS Certified Lead Auditor, Founder & Chairman of NSF
Name of the Auditing Team Leader:	: Dr. D. Vinoth Kumar ISO QMS, EMS and EnMS Certified Lead Auditor & Joint Director, NSF.
Name of the Lead Auditor for Green Audit	: Dr. B. Mythili Gnanamangai ISO QMS, EMS, IGBC and ASSOCEM Certified Lead Auditor & Vice-Chairman of NSF
Name of the Lead Auditor for Environment Audit	: Mr. B.S.C. Naveen Kumar Senior Faculty, Mahatma Gandhi National Council of Rural Education, Hyderabad Ministry of Higher Education, New Delhi
Name of the Lead Auditor for Energy Audit	: Er. D. Dinesh Kumar BEE, IGBC, ASSOCEM, GRIHA & LEED Certified Lead Auditor
Name of the Lead Auditor for Waste Management Audit	: Er. A. Karthick Bureau of Energy Efficiency Certified Auditor
Name of Lead Auditor for Soil & Water Audit and Air Quality	: Er. P. Shanmugapriyan BEE, IGBC, ASSOCEM, GRIHA & LEED Certified Lead Auditor
Name of Lead Auditor for Hygiene : Audit	: Ms. V. Sri Santhya ISO OHSMS and FSMS Certified Lead Auditor & Assistant Director of NSF

1.8. List of Instruments used in the Inspection Process

Nature Science Foundation conducts audits by using the listed instruments

- Oxygen Meter
- Carbon Dioxide Meter
- Light (LUX) Meter
- Sound Level Meter
- pH Meter
- TDS Meter
- GPS Meter
- Deluxe Water and Soil Analysis Kit
- Digital Clamp (Voltage) Meter

1.8.1. Oxygen Meter

Oxygen meter is used in the audit process to measure the oxygen level in the organization. The instrument is calibrated after using 20 times. Suitability of the instrument are range between 0 to 30 % O₂, resolution of 0.1%, accuracy is \pm (1% reading + 0.2 % O₂), response time is \leq 15 seconds, environment pressure range is 0.9 to 1.1 atmosphere, temperature range is 0 °C to 50 °C, 32 °F to 122 °F, temperature resolution is 0.1-degree, temperature accuracy is °C - \pm 0.8 °C & °F -



1.8.2. Carbon dioxide meter

Carbon dioxide meter is to measure the carbon level in the organization. The instrument is calibrated after using 20 times. Suitability of the instrument are range between 0 ~ 4000 ppm, resolution of CO₂ Meter is 1 ppm, accuracy is \leq 1,000 ppm, repeatability is \pm 20 ppm, temperature range between 0°C to 50°C, 32°F to 122°F, temperature Resolution is 0.1-degree, temperature accuracy is °C - 0.8°C, °F - 1.5°F.



1.8.3. Light (LUX) Meter

Light meter is to calculate the light intensity in the organization. Suitability of the instruments are, 5 ranges, ie. 40.00, 400.0, 4,000, 40,000, 400,000 Lux, operating temperature is 0 to 50 °C (32 to 122 °F), Operating humidity is less than 80% RH, Power consumption is DC 8 mA approximately. This Instrument will be calibrated yearly once or during non-functioning.



1.8.4. Sound Level Meter

Sound level meter is to measure the noise level in the organization. This instrument is calibrated yearly once or after using 20 times. Suitability of the instruments are measurement range is 30 - 130 dB, resolution is 0.1 dB, accuracy is (23 \pm 5 °C), Frequency of the instrument is 31.5 to 8,000 Hz, Operating temperature is 0 to 50 °C (32 to 122 °F), Operating humidity is less than 80% RH, Power consumption is DC 6 mA approximately.



1.8.5. pH Meter

pH meter is generally used to measure the pH level in water. It is calibrated 6 months once or after 20 times of its use. Suitability of the instrument are range of the pH meter is 0 - 14, accuracy is \pm 2%, resolution of the instrument is 0.1 pH, operating temperature is 0 to 50 °C (32 to 122 °F)



1.8.6. TDS Meter

TDS meter is generally used to measure the TDS level in water. Suitability of the meter are range of TDS meter is 0 – 9990 ppm (mg/L), operating temperature is 0 to 80 °C (32 to 176 °F) and accuracy is $\pm 2\%$. This meter is calibrated six months once or 20 times after its use.



1.8.7. GPS Meter

GPS meter is subjected to know the latitude and altitude, location, etc.,. Suitability of the GPS meter are, dimension is 2.1" x 4.0" x 1.3" (5.4 x 10.3 x 3.3 cm), Display resolution is 128 x 160 pixels an GPS Map features included in Continental Europe. It is calibrated six months once or after 20 times of the usage.



1.8.8. Deluxe Water and Soil Analysis Kit

Deluxe water and soil analysis kit is used to analyze the pH, TDS, salinity, turbidity, alkalinity dissolved oxygen of water.



1.8.9. Digital Clamp (Voltage) Meter

It is used to check the input and output voltage between two points of an electrical circuit of Alternating Current (AC) and Direct Current (DC) by means of the high resistance of the voltage that impede the flow of current.



1.9. Use of Personal Protective Equipment (PPE)

Personal Protective Equipment (PPE) refers to protective clothing for the eyes, head, ears, hands, respiratory system, body, and feet. It is utilized to protect individuals from the risks of injury and infection while minimizing exposure to chemical, biological, and physical hazards. PPE serves as the final line of defense when engineering and administrative controls are insufficient in reducing risks. Nature Science Foundation safeguards all the auditors by supplying PPE during the conduct of audits. PPE used are safety jackets, ear plugs, goggles, face shield, hand gloves, shoes, etc.,.

1.9.1. Safety jackets:

PPE includes safety vests and suits that can be used for inspection process which will protect body injuries from extreme temperatures, flames and sparks, toxic chemicals, insect bites and radiation.



1.9.2. Goggles and Face shield:

Goggles and face shield are used in the inspection process while inspecting items which would cause eye damage or loss of vision, spray or toxic liquids especially in chemistry labs, nearing the electric and electronic item.



1.9.3. Helmet:

PPE includes hard hats and headgears which will be required for tasks that can cause any force or object falling to the head. It also helps to resist penetration.

**1.9.4. Hand gloves:**

PPE includes safety gloves and should be used for tasks that can cause hand and skin burns, absorption of harmful substances, cuts, fractures or amputations. Selection of hand gloves is based on the application of use.

**1.9.5. Safety Boots:**

Foot protection is one of the most commonly used PPE and can differ depending upon the environment. Safety boots are used for tasks that can cause serious foot and leg injuries from falling or rolling objects, hot substances, electrical hazards, and slippery surfaces.

**1.9.6. Ear Plug:**

Ear plugs are used for tasks that can cause hearing problems and loss of hearing. Hearing protection devices reduces the noise energy reducing reaching and causing damage to the inner ear. This ear plug is mostly used near sound producing devices like power motors, genets, generators, etc.,



Opening and closing meeting with the Head of the Organisation, NAAC and IQAC coordinators.



2. ENERGY AUDIT

2.1. 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 energy. The availability of fossil fuels and their depletion rate, insist the need for alternate energy systems and conservation of conventional electricenergy. 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).

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 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 energy conservation concepts into reality by giving technically possible solutions within a specified time limit while 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 interms 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).

2.2. 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 of energy and fuel are being used in any organization and identifies the areas where wastes occur and the scope for improvement exists. 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 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 in carbon emissions, carbon footprint calculation, use of star rated equipment, encouraging energy use conservation practices, reduce the organization's energy consumption, reduce wastes to landfill. Of course integrating environmental considerations into all contracts and services considered to have significant environmental impacts. The energy consumption, energy sources, energy monitoring, lighting, vehicle movement, electrical and electronics appliances and transportation are addressed by this indicator.

2.2.1. 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. As mentioned earlier, aim of an energy audit is to identify the energy efficiency, conservation and savings opportunities at the audit sites in a systematic manner. The audit process involves following steps.

- Review of energy saving opportunities and measures implemented in an audit site.
- Identification of various energy conservation measures and saving opportunities.
- Implementation of alternative energy resources for energy saving opportunities and decision making.
- Providing a technical information on how to build an energy balance as well as guidance to be sought for particular application.
- Detailed analysis on energy consumption based on latest electricity bills and understanding the tariff plan provided by the Central and State Electricity Board.
- The utility of energy in terms of electricity, LPG, firewood, petrol, diesel and other resources to calculate carbon foot print analysis with in the campus.
- Utility of number if 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 to calculate the energy utilization.
- 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 utilization.

2.3. Procedures followed in an energy audit

Several methods are adopted in the energy audit, walk-through audit is one among them. 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 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 as per the regulation of Indian Green Building Council and World Green Building Council (IGBC, 2021). Physical verification of installed electrical appliances and when considering the cost or prospective cost savings in each of the above components, energy always wins and the energy management task becomes a key cost reduction area.

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; Leon-Fernandez and Dominguez-Vilches, 2015; Bae and Seol, 2006; Singh *et al.*, 2012). It may be useful to check where carbon emission is prominent which could be taken into account to reduce. 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).

2.4. 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).

2.5. Observations of the energy audit

During onsite audit following departments were verified for physical facility availability. In all these areas lighting systems forms the major consumer of electrical energy. In all the sections lighting fixtures, installed energy efficient lighting systems/safety systems were verified besides installed power backup systems (generators and UPS) were verified. The electricity consumption charges are audited and studied for the load demand requirement and efficient consumption of energy. The scope for improvement has been discussed with the auditee's. Potential areas in which scope of energy conservation and saving opportunities available have been identified and suggested for implementation.

2.6. Energy consumption and cost profile

The following chart shows the profile of energy consumed and the cost for one year by the auditee (Figs.1 & 2; Table 1).

Figure 1. Electrical energy consumption profile

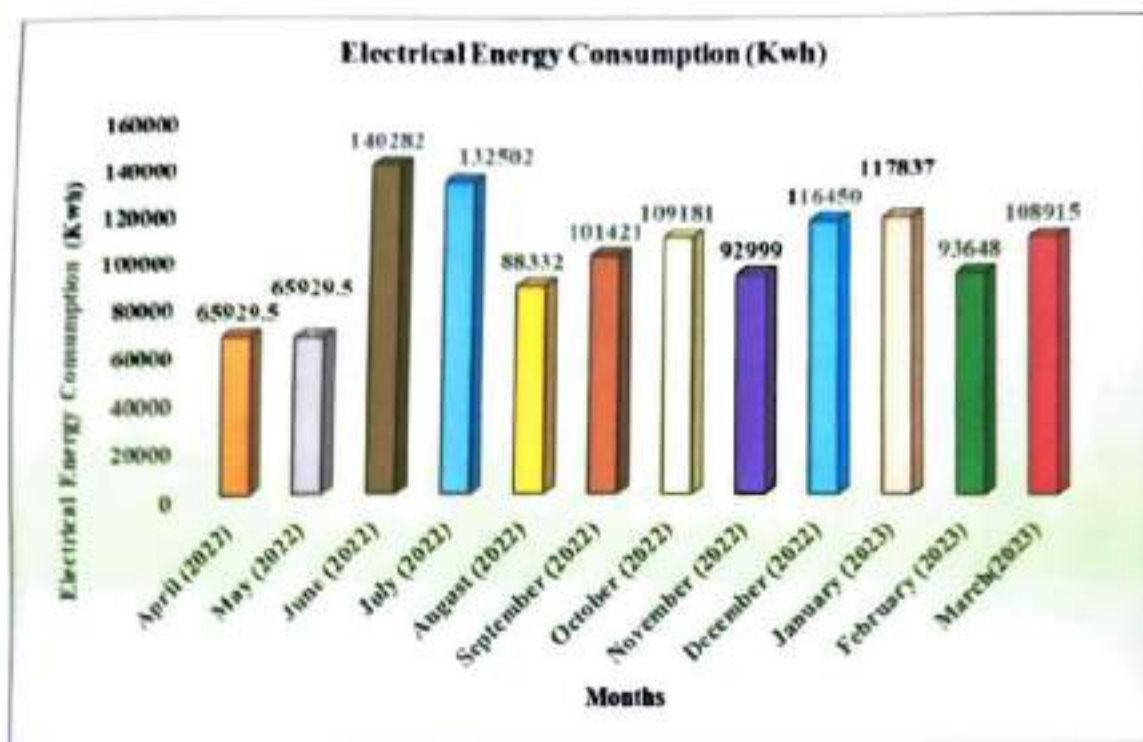


Figure 2. Overall electrical energy consumption and cost profile

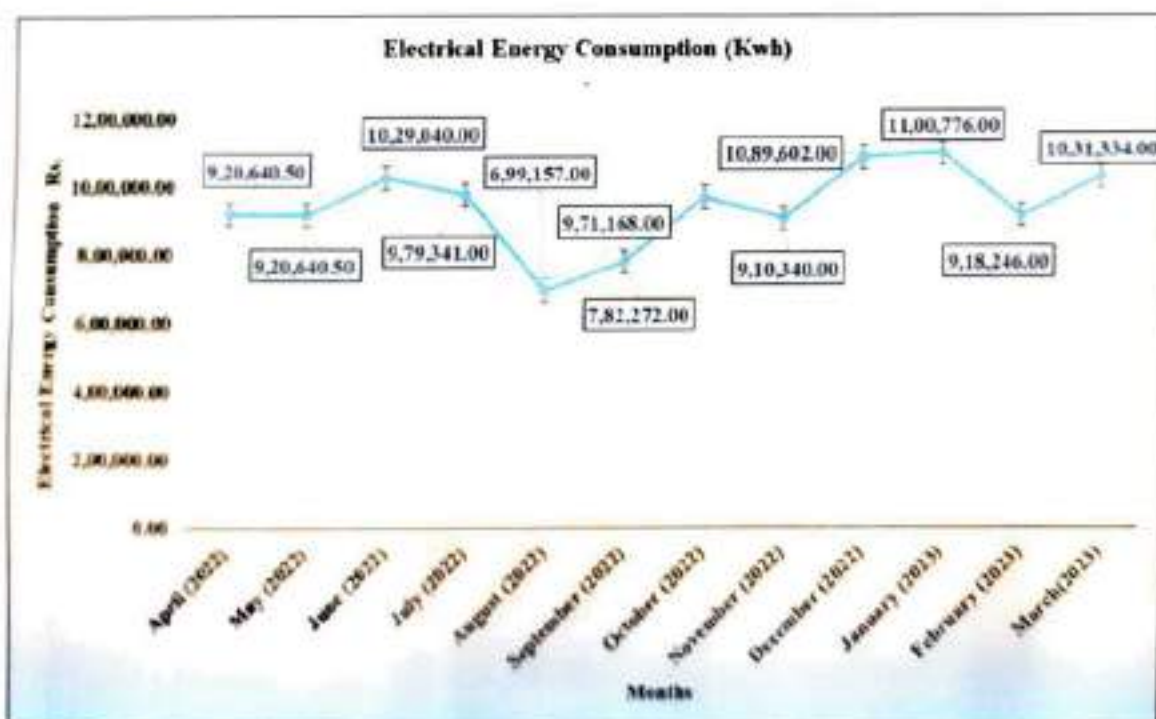


Table 1. Electrical energy consumption and cost profile in the Institution

S.No	Months	Rating / Capacity units in kWh	Cost in Rs.
1.	April (2022)	65929.5	9,20,640.5/-
2.	May (2022)	65929.5	9,20,640.5/-
3.	June (2022)	140282	10,29,040.0/-
4.	July (2022)	132502	9,79,341.0/-
5.	August (2022)	88332	6,99,157.0/-
6.	September (2022)	101421	7,82,272.0/-
7.	October (2022)	109181	9,71,168.0/-
8.	November (2022)	92999	9,10,340.0/-
9.	December (2022)	116450	10,89,602.0/-
10.	January (2023)	117837	11,00,776.0/-
11.	February (2023)	93648	9,18,246.0/-
12.	March (2023)	108915	10,31,334.0/-

2.7. Power consuming equipment and electrical appliances

Other than electrical energy from grid, energy generated using fossil fuels for the year April 2022 – March 2023 are presented in Table 2.

Table 2. Annual Energy Consumption of Fuels in the College

S.No	Month	Diesel consumption (Liters)	Petrol consumption (Liters)	LPG consumption (kg)
1	April	320	Nil	305
2	May	320	Nil	305
3	June	320	Nil	305
4	July	320	Nil	305
5	August	320	Nil	305
6	September	320	Nil	305
7	October	320	Nil	305
8	November	320	Nil	305
9	December	320	Nil	305
10	January	320	Nil	305
11	February	320	Nil	305
12	March	320	Nil	305

2.8. Calculation of carbon footprint

The carbon footprint analysis can be calculated based on the earlier reports as stated in www.carbonfootprint.com which is the sum of electricity usage per year (Padmini, 2007). According to the data provided by the Management, carbon emission due to electricity consumption and fossil fuels are presented hereunder.

The CO₂ emission from electricity

$$\begin{aligned}
 &= (\text{electricity usage per year in kWh}/1000) \times 0.84, \text{ where } 0.84 \text{ is the coefficient} \\
 &\text{to convert kWh to metric tons} \\
 &= (1233426 \text{ kWh}/1000) \times 0.84 \\
 &= 1036.1 \text{ metric tons}
 \end{aligned}$$

According to the above calculations, carbon emission due to electricity usage per year accounts for 1036.1 metric tons.

Transportation per year (Shuttle)

$$\begin{aligned}
 &= (\text{Number of the shuttle vehicle in the campus } (2) \times \text{total trips for shuttle bus} \\
 &\text{service each day} \times \text{approximate travel distance of a vehicle each day inside} \\
 &\text{campus only } (20 \text{ km}) \times 365/100) \times 0.01 \\
 &= ((2 \times 20 \times 1 \times 365)/100) \times 0.01 \\
 &= 1.46 \text{ metric tons}
 \end{aligned}$$

365 is the number of days per year

0.01 is the coefficient to calculate the emission in metric tons per 100 km for bus

a. Transportation per year (Car)

$$\begin{aligned}
 &= (\text{Number of cars entering the campus } \times 2 \times \text{approximate travel distance of a} \\
 &\text{vehicle each day inside campus only (in kilometers)} \times 365/100) \times 0.02 \\
 &= ((4 \times 20 \times 1 \times 365)/100) \times 0.02 \\
 &= 5.84 \text{ metric tons}
 \end{aligned}$$

365 is the number of days per year

0.02 is the coefficient to calculate the emission in metric tons per 100 km car

b. Transportation per year (Motorcycles)

$$\begin{aligned}
 &= (\text{Number of motorcycles entering the campus } \times 2 \times \text{approximate travel} \\
 &\text{distance of a vehicle each day inside campus only (in kilometers)} \times 365/100) \times \\
 &0.01 \\
 &= ((0 \times 20 \times 1 \times 365)/100) \times 0.01 \\
 &= 0 \text{ metric tons}
 \end{aligned}$$

365 is the number of days per year

0.01 is the coefficient to calculate the emission in metric tons per 100 km for motorcycles.

c. Total Carbon emission per year

$$\begin{aligned}
 &= \text{total emission from electricity usage} + \text{transportation (bus, car, motorcycle)} \\
 &= (1036.1 + 1.46 + 5.84 + 0) \\
 &= 1043.4 \text{ metric tons}
 \end{aligned}$$

2.9. Noise level measurements

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 neighborhood) 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 26). From the graph, it is evident that most of the noise level values across campus are above the normal or 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 3).

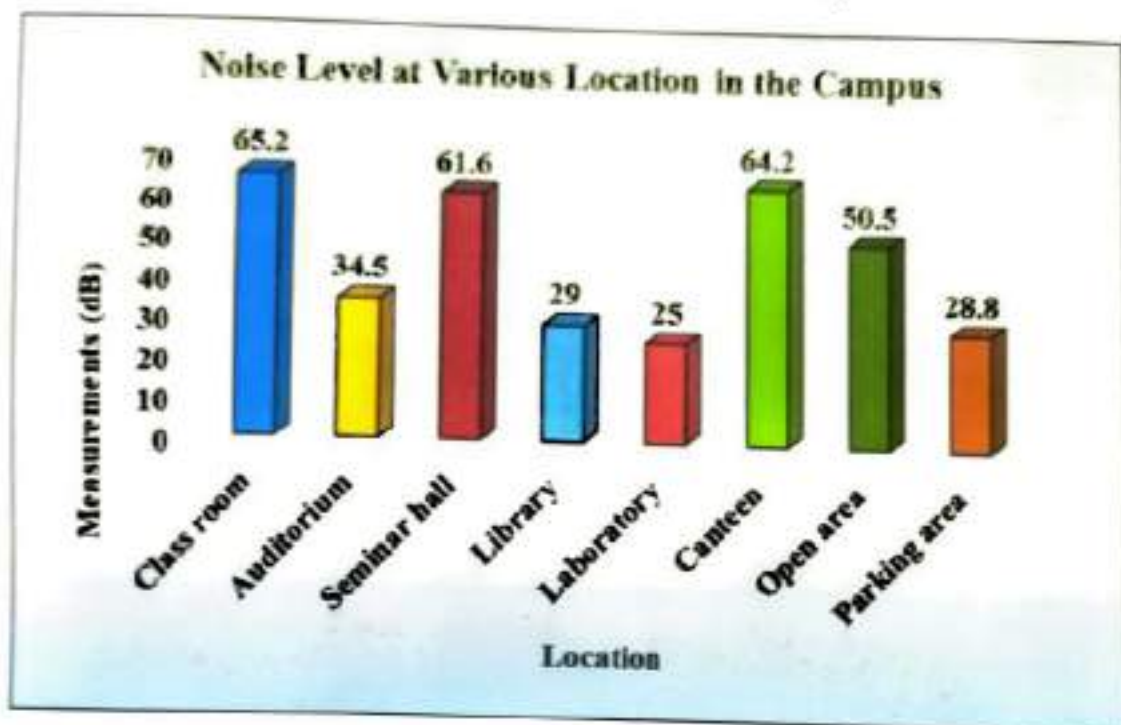
Table 3. Noise level at various location in the campus

S.No	Locations	Measurements (dB)	Major noise sources	Remarks
1.	Class room	65.2 \pm 3.5	Students and Staff	No Noise Pollution
2.	Auditorium	34.5 \pm 2.0	Students	No Noise Pollution
3.	Seminar hall	61.6 \pm 0.8	Students	No Noise Pollution
4.	Library	29.0 \pm 0.2	Staff members	No Noise Pollution
5.	Laboratory	25.0 \pm 2.6	Students	No Noise Pollution
6.	Canteen	64.2 \pm 1.1	Students and Staff	No Noise Pollution
7.	Open area	50.5 \pm 2.4	Students and staff	No Noise Pollution
8.	Parking area	28.8 \pm 0.2	Vehicles	No Noise Pollution
	Mean		47.21	
	SE		1.65	
	CD		2.95	

Table 4. Noise level standard prescribed by Central Pollution Control Board, Government of India

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

Figure 2. Noise level at various location in the campus

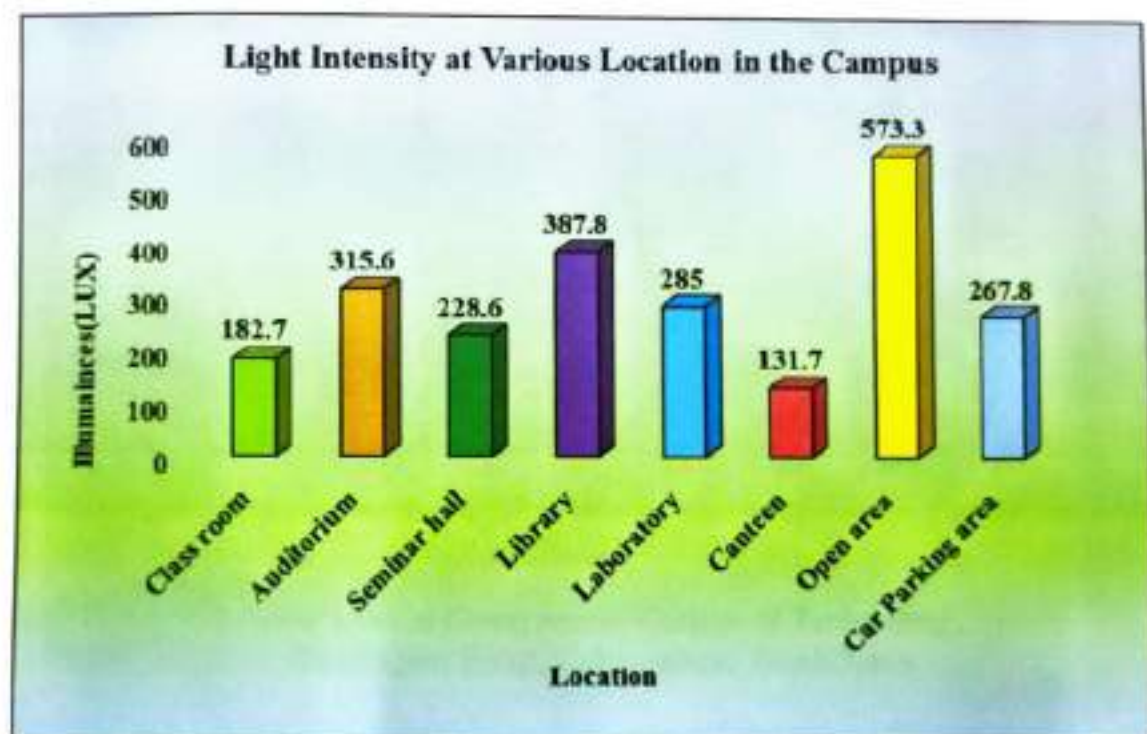


2.10. Light intensity measurement at the campus

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 28) (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 (Table 29).

Table 5. Light intensity measured at various locations in the Institute

S.No	Type of Spaces	Illuminances (LUX)
1.	Class room	182.7±3.3
2.	Auditorium	315.6±3.0
3.	Seminar hall	228.6±8.9
4.	Library	387.8±8.3
5.	Laboratory	285.0±8.9
6.	Canteen	131.7±4.6
7.	Open area	573.3±5.5
8.	Car Parking area	267.8±1.2
	Mean	358.5
	SE	20.6
	CD	36.68

Figure 2. Light intensity measured at various locations in the Institute

2.11. Voltage Measurement at the Campus

Voltage measurement in AC & DC at different places in the campus is measured using the clamp (voltage) meter to reduce the energy consumption.

S.No	Name of the Place	AC & DC Voltage Measurement [Volt (v)]
1.	Class Room	237.0
2.	Auditorium	236.0
3.	Seminar Hall	234.6
4.	Library	237.0
5.	Laboratory	237.6
6.	Canteen	239.6
7.	Hostel	235.3

2.12. Other facilities

Within the auditees premises, there are other facilities are available that are depicted as glimpses of photographs



**Solar Unit in Government College of Technology,
Thadagam Road, Coimbatore, Tamil Nadu**



Transformer Facility in the Campus



Noise Level and Light Intensity analysis in the Campus



**Parking Facility in Government College of Technology,
Thadagam Road, Coimbatore, Tamil Nadu**



**Voltage Analysis in Government College of Technology,
Thadagam Road, Coimbatore, Tamil Nadu**

2.13. Audit Observation

- Adequate awareness programmes are organized and conducted to the stakeholders for the proper handling and maintenance of the appliances.
- Standard Operating Procedure and user manual are adequately available for the operation and maintenance of utilities like DG, AC, UPS, lifts, etc.,
- Adequate external and vertical shading are provided to conserve energy.
- Natural ventilation through windows and shading is available adequately to reduce the energy consumption.
- It is observed that large foliage trees are planted inside the campus to reduce noise pollution.
- Low emitting lights are fixed as per the LPD mentioned in National Building Code (NBC) Part -11(Approach to Sustainability) for safety and comfort.
- External and internal signage lits are differentiated to conserve energy.
- 'Danger' and 'warning boards' are available near transformer, generator and UPS.
- Over deck and under deck insulation of roofs are available.
- Solar water heater and panel are available to maintain the sustainability.
- Building Integrated Photovoltaic system like power storage system, backup power supplies, wiring and safety disconnects are available.
- Adequate HVAC and day lighting facilities are observed.
- Outside air is introduced through windows for ventilation in the conditioned spaces.
- The metering system are appropriately monitored through maintenance of log books and sub meters.
- Five star rated appliances (lift, AC, Air cooler, Refrigerator, etc.,) are procured to conserve energy.
- All the fluorescent (tube) lights are replaced with LED lights to conserve energy.
- Awareness posters like 'Turn off when not in use', 'Save Energy', etc., are displayed for conserving energy.
- All are the artificial lighting system are monitored and controlled through partial availability of sensors.
- Lifts, escalators, moving walk path are adequately available in the campus.
- Operation and maintenance manual are observed in the on-site.
- No emissions and leaks are observed
- Instruments and equipment are properly calibrated and maintained.
- Noise level observed in the different location resulted in normal range.
- Adequate training and awareness programmes are conducted to the stakeholders for energy conservation.
- To optimize the energy campus has implemented solar panel, water heater, sensor lights, operation and maintenance, etc.,

2.14. Conclusion

Considering the fact that the organization is a well-established, there is significant scope for conserving energy, water and make the campus as self-sustained in it. The energy conservation initiatives taken up by the organization are substantial. Water conservation activities are also implemented and practiced. Proper facilities and procedures are followed for waste collection, segregation, disposal, recycle and reuse. Quality of Soil and Water observed to be good. Hygienic practices are monitored and maintained considering the health and sustainability of the stakeholders. Tree Plantation at appropriate locations are maintained to resist the indoor climate and conserve energy as per the National Building Code (Part 11 – Approach to Sustainability).

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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



Head of Certification

Validity of this certificate is subject to annual surveillance audits to be done successfully on or before 30th days from date of the audit.
If any surveillance audit is not allowed to be conducted, this certificate shall be suspended / withdrawn!

The validity of this certificate can be verified at www.qrocert.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, Hind Fajar, Sector Enclave, Near Panchsheel Vihar Metro Station, Delhi-110061, (INDIA)

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



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 conferred by data listed on the (Data shown on Accreditation Systems) EUAS' www.euas.in. The authenticity & validity of this certificate may be re-affirmed by referring to our company website: www.qcsindia.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: 3/7/10/10 2nd STREET, MODERN PARK, GREENAGE APARTMENT 2nd FLOOR,
SANTOSHPUR, KOLKATA - 700075, WEST BENGAL INDIA

Email: info@qcs.com, Call: +91 9827724002 -91 9822487617 Website: www.qcsindia.com


भारत सरकार
 Government of India
सूक्ष्म, लघु एवं मध्यम उद्यम विभाग
 Ministry of Micro, Small and Medium Enterprises


 MSME - Ministry of Small & Medium Enterprises
 MSME - Ministry of Micro, Small & Medium Enterprises

UDYAM REGISTRATION CERTIFICATE

Our small hands to make you LARGE

UDYAM REGISTRATION NUMBER	UDYAM-TN-83-007704																						
NAME OF ENTERPRISE	MS NATURE SCIENCE FOUNDATION																						
TYPE OF ENTERPRISE*	MICRO																						
MAJOR ACTIVITY	SERVICES																						
SOCIAL CATEGORY OF ENTREPRENEUR	GENERAL																						
NAME OF UNIT(S)	<table border="1"> <tr> <th>S.No.</th> <th>Name of Unit(s)</th> </tr> <tr> <td>1</td> <td>Green Campus, Energy and Environment Management Audit</td> </tr> </table>			S.No.	Name of Unit(s)	1	Green Campus, Energy and Environment Management Audit																
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OFFICIAL ADDRESS OF ENTERPRISE	<table border="1"> <tr> <td>Plot/Door/Block No.</td> <td>LJC-6L2607</td> <td>Name of Premises Building</td> <td>CAJYBDDHMA & NAGAR</td> </tr> <tr> <td>Village/Town</td> <td>Chandrasekharpet 5/7</td> <td>Block</td> <td>LJC-6L</td> </tr> <tr> <td>Post/Town/Zone</td> <td>Pattanam</td> <td>City</td> <td>Chennai - South</td> </tr> <tr> <td>State</td> <td>TAMIL NADU</td> <td>District</td> <td>CHENNAI - Palurambo</td> </tr> <tr> <td>Mobile</td> <td>9840771225</td> <td>Email</td> <td>chandraasad@gmail.com</td> </tr> </table>			Plot/Door/Block No.	LJC-6L2607	Name of Premises Building	CAJYBDDHMA & NAGAR	Village/Town	Chandrasekharpet 5/7	Block	LJC-6L	Post/Town/Zone	Pattanam	City	Chennai - South	State	TAMIL NADU	District	CHENNAI - Palurambo	Mobile	9840771225	Email	chandraasad@gmail.com
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State	TAMIL NADU	District	CHENNAI - Palurambo																				
Mobile	9840771225	Email	chandraasad@gmail.com																				
DATE OF INCORPORATION / REGISTRATION OF ENTERPRISE	28-11-2017																						
DATE OF COMMENCEMENT OF PRODUCTION/BUSINESS	12-03-2019																						
NATIONAL INDUSTRY CLASSIFICATION CODE(S)	<table border="1"> <thead> <tr> <th>S.No.</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>89 - Legal and accounting activities</td> <td>8920 - Accounting, bookkeeping and auditing activities; tax consultancy</td> <td>89201 - Accounting, bookkeeping and auditing activities</td> <td>Services</td> </tr> <tr> <td>2</td> <td>85 - Education</td> <td>8542 - Cultural education</td> <td>85421 - Cultural education</td> <td>Services</td> </tr> <tr> <td>3</td> <td>85 - Education</td> <td>8549 - Other education n.e.c.</td> <td>85491 - Other educational services n.e.c.</td> <td>Services</td> </tr> </tbody> </table>			S.No.	NIC 2 Digit	NIC 4 Digit	NIC 5 Digit	Activity	1	89 - Legal and accounting activities	8920 - Accounting, bookkeeping and auditing activities; tax consultancy	89201 - Accounting, bookkeeping and auditing activities	Services	2	85 - Education	8542 - Cultural education	85421 - Cultural education	Services	3	85 - Education	8549 - Other education n.e.c.	85491 - Other educational services n.e.c.	Services
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DATE OF UDYAM REGISTRATION	26-02-2022																						

In case of premature liquidation/cessation of status of an enterprise, the benefit of the Government schemes will be voided as per the provisions of Notification No. S.O. 11943 dated 26.06.2019 issued by the Mo, MSME.

*Disclaimer: This is a computer generated document. No signature required. Printed from udyamregistration.gov.in & Date of printing: 26/02/2022

For any assistance, you may contact

1. District Industrial Centre : CHENNAI - TAMIL NADU
2. MSME-06 : CHENNAI - TAMIL NADU

Visit : udyamregistration.gov.in | www.udyamregistration.gov.in | www.beachampion.gov.in



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MSME

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5. Certificates of Lead Auditors

1. Bureau of Energy Efficiency (BEE), LEED AP and GRIHA Certificates of Er. D. Dineshkumar, Energy and Environment Auditor of NSF.
2. Indian Green Building Council (IGBC AP) Accredited Professional of Dr. B. Mythili Gnanamangai, Vice-Chairman of NSF.
3. Tamil Nadu Fire and Rescue Service Certificate of Er. S. Srinivash, Energy Auditors of NSF.
4. Energy Management System ISO 50001:2018 Certificate of Dr. D. Vinoth Kumar, Joint Director of NSF.
5. ISO 17020:2012 certificate of Ms. V. Sri Santhya, Assistant Director of NSF.



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**

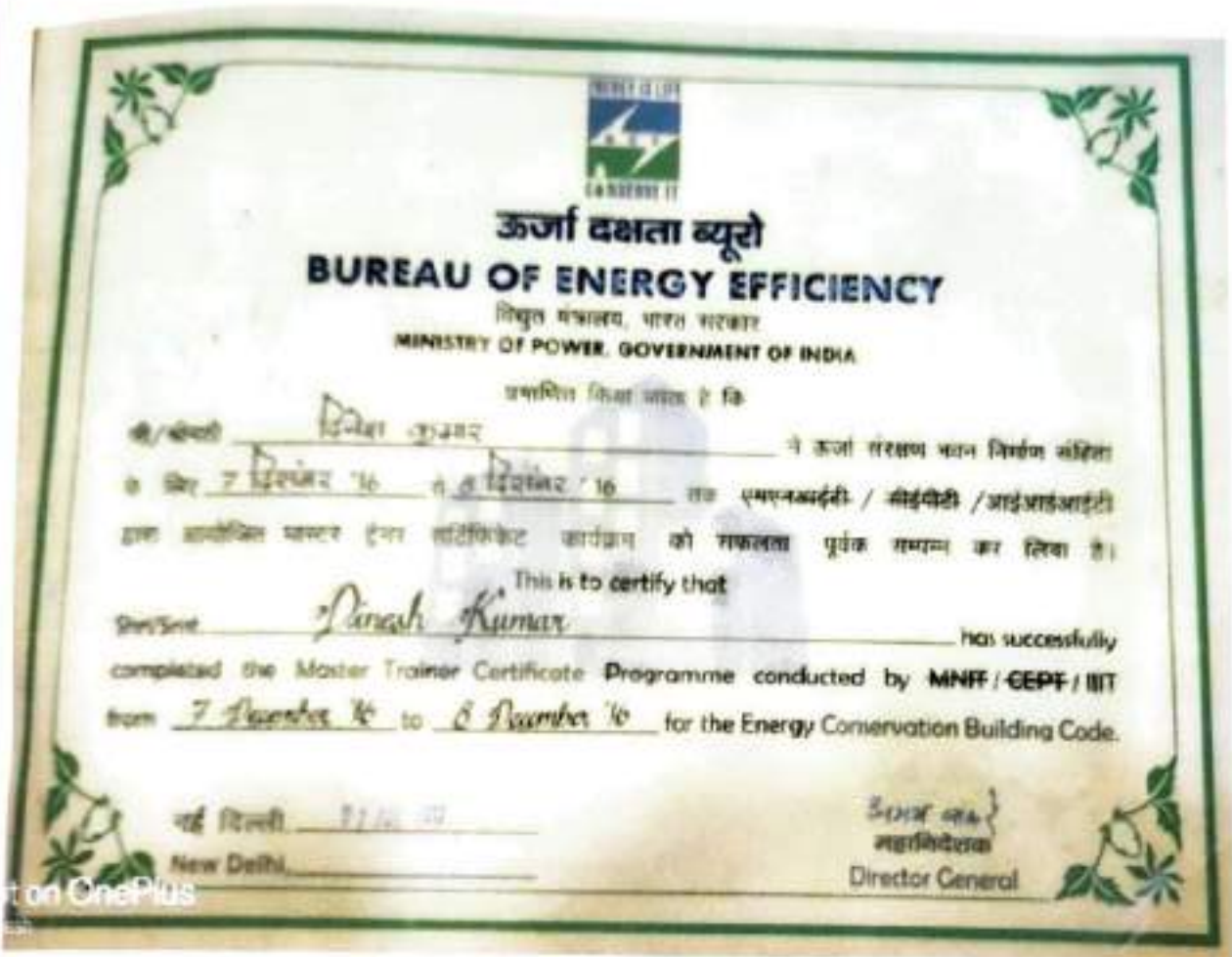
Secretary
 Bureau of Energy Efficiency
 New Delhi

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			







GREEN BUSINESS CERTIFICATION INC. CERTIFIES THAT

DINESH KUMAR D

HAS ATTAINED THE DESIGNATION OF

LEED AP[®] Building Design + Construction

for demonstrating the knowledge and understanding of green building practices and principles needed to support the use of the LEED[®] green building program.

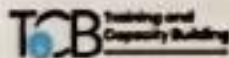
10531234-AP-BD+C

26 DEC 2014

25 DEC 2022

Mahesh Ramnigam

PROFESSOR & CHIEF EXECUTIVE OFFICER
GREEN BUSINESS CERTIFICATION INC.



CERTIFICATE OF PARTICIPATION

This certificate is awarded to

V. SRI SANTHYA

for participating in the Virtual Training on

Requirements of ISO/IEC 17020:2012 for Inspection Bodies

organized by

Training and Capacity Building (TCB) Cell, Quality Council of India

on

10-11 August 2023

Abh Jain

Abh Jain
Director & Head, TCB

Cart No. TCB/QCI/110823/06-012

QUEST (An eLearning Platform of TCB)



The CPD Accreditation Office

Certificate of Successful Attainment

This is to certify that

DR. D. VINOOTH 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 industrywide Global Professional Register at www.qcspi.com.

Partha Bagchi
(Managing Director)

QCS MANAGEMENT PVT LTD

Accredited by "CPD Accreditation Office UK"

H.O: 37E/1(310) 2ND STREET, MODERN PARK, SANTOSH PUR,

KOLKATA-700075, WEST BENGAL, INDIA

BRANCHES: INDONESIA, BANGLADESH, QATAR, SAUDI ARABIA,

TURKEY, UAE

WHATS APP: +918697724963/+918902447427.

EMAIL: info@qcspi.com, WEB: www.qcspi.com



QCS MANAGEMENT PVT LTD

