

Report of Green and Energy Audits as per the ISO/IEC 17020:2012 Standards



Submitted to

**M.G.R. COLLEGE
DR. MGR NAGAR, HOSUR - 635130, KRISHNAGIRI
TAMIL NADU, INDIA**

Date of Audit: 04.01.2023



Submitted by



NATURE SCIENCE FOUNDATION

[A Unique Research and Development Centre for Society Improvement]

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

Coimbatore 641 004, Tamil Nadu, India

Phone: 0422 2510006, Mobile: 9566777255, 9566777258

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Regd. No. 114 / 2017

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(A Unique Research and Development Centre for Society Improvement)
ISO 9001:2015, 14001:2015, 45001:2018 & 50001:2018 Certified and Ministry of MSME Registered Organization
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Dr. S. RAJALAKSHMI, M.B.A., Ph.D., FNSF.,
Chairman

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 ***M.G.R. College, Hosur - 635130, Krishnagiri, 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 in line with ISO/IEC 17020:2012 standards and NABCB guidelines and for whole hearted support extended at the time of onsite audit. Our sincere thanks to NAAC, IQAC Coordinators 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:
Place: Coimbatore

Authorized Signatory
Nature Science Foundation

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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. Green Audit is a tool to evaluate environment management system which is systematically executed to protect and preserve the environment. Green 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 (NBC)

National Building Code (NBC) of India has a set of rules and guidelines that regulates construction of buildings and as well as ecofriendly activities of the campus without harming the environment. In order to achieve the minimum standards of welfare and safety of stakeholders of a campus, the Governing body of Central and State Governments 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.

NBC is not only offer a standard uniform benchmark that constructors and environmentalists 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 to the stakeholders. For instance, new and updated building codes put much emphasis on conservation as energy and the degradable and non-degradable wastes are the most expensive byproduct of older regions. This will not only offer environmental benefits to future generations but will also regulate indoor air pollution and greenhouse gas emissions to protect the health of human beings.

Before the introduction of NBC in the construction industry, building commercial and residential properties used a lot of energy which adversely affected the sustainable 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. While safety is the primary objective, new building codes are making significant contributions toward solving energy issues relating to the use of environmentally compatible construction techniques like planting trees, landscaping, rainwater harvesting and renewable and non-renewable energy sources.

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. 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 quality of 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 Council (IGBC) 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.

Green Audit (ISO/IEC 17020:2012) comprised green campus, environment, energy, waste management (solid, liquid, municipal sewage, biomedical, plastic and electronic wastes), water, soil, air quality and hygienic audits are playing important role in 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 Government Law and Environmental and the concept of Swachh Bharath Abhiyan under Clean India Mission.

1.5. About Nature Science Foundation (NSF)

NSF is the 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 150 State wise Lead Auditors, Technical Experts and Auditors in training to conduct Green Audit.

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 conservation and environmental 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 including environmental protection. 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 which comprised of environment, energy, waste management, water, soil, air quality and hygienic audits, NSF has introduced academic & administrative audits including gender audit, biodiversity audit and ISO audit as per the checklist prepared by the NSF in compliance with Government Law and Environmental Legislations including Green Building Code and the concept of Swachh Bharath Abhiyan under Clean India Mission. These audits will be of more useful 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.

1.6. About the Organization

Established in the year 1988, M.G.R. College of Arts and Science has emerged as an outstanding institution of higher education in Hosur. It is a co-educational college affiliated to Periyar University, Salem and managed by the Adhiyamaan Educational and Research Institution Trust. It is located about 35 km from SE of Bangalore and 45 km from NW of Krishnagiri, the district headquarters. It's strategic location makes the college a much sought-after institute in the vicinity apart from its academic excellence. The college offers 12 U.G courses, 9 P.G courses and 4 Ph.D programmes besides several value-added courses. In recognition of its potential in the field of higher education, the NAAC has re- accredited the college with B+ grade and recognised it under section 2(f) and 12B of the UGC Act.

Renowned for its access to students from all strata of the society, the college mandates uniform for students which instils unity and veils differences. The sprawling, sylvan terrain of the campus brings students closer to the mother nature. The amicable environment of the classroom along with the dynamic teachers ignite the minds of students and promote their over all development. The laboratories are well-equipped and kept updated, which adequately refine the student's abilities. The library is well-stocked and has access to various journals and magazines. To facilitate recreation, the college has an extensive playground with well maintained courts and 1200 mts athletic track. The exquisite auditorium is the hub of cultural activities and also accommodates indoor games. The college offers on campus residential facility which provides an optimum balance for the fulfilment of both the academic and the co-curricular pursuits.

Vision

To elevate M.G.R College as a centre of excellence in the field of higher education by making it intellectually stimulating and academically rewarding with sustainable core competence in all its activities.

Mission

The vision of the college is attained by committing to excellence in arts and science education and research and development with perpetual interaction with industries with a holistic concern for values, environment and society.

1.7. Audit Team Details

1. **Date of Audit** : **04.01.2023**
2. **Audit Site** : **M.G.R. College**
Hosur - 635130, Krishnagiri,
Tamil Nadu, India
3. **Inspection Body** : **Nature Science Foundation**
Coimbatore, Tamil Nadu, India.
4. **Audit Scope** : **Green and Energy Audits as per ISO/IEC
17020:2012**
5. **Name of the Auditing
Chairman** : **Dr. S. Rajalakshmi**
ISO QMS, EMS and EnMS Certified Lead
Auditor, Founder & Chairman of NSF.
6. **Name of the Auditing Team
Leader** : **Dr. D. Vinoth Kumar**
ISO QMS, EMS and EnMS Certified Lead
Auditor & Joint Director, NSF.
7. **Name of the Lead Auditor for
Green Audit + Air Quality
Audit** : **Dr. R. Mary Josephine**
ISO EMS and EnMS Certified Lead Auditor.
8. **Name of the Lead Auditor for
Energy Audit** : **Er. A. Karthick**
Bureau of Energy Efficiency Certified Auditor.

1.8. List of Instruments used in the Inspection Process

During the on-site visit the below listed instruments are used by the Lead Auditors and Technical experts to check the specific parameters in the view of maintaining sustainability. All the instruments are calibrated by ISO 17025 accredited labs (JRST Technical Services, Chennai, Tamil Nadu and Instruments Calibration and Test Centre, Coimbatore, TN). The frequency of calibration is six months once or 20 times after its use.

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°C, temperature accuracy is 25°C.



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 ± 20 ppm, temperature range between 0°C to 50°C, 32°F to 122°F, temperature resolution is 0.1°C, temperature accuracy is at 25°C.



1.8.3. Light (LUX) Meter

Light meter is to calculate the light intensity in the organization. Suitability of the instruments are, 5 ranges. i.e., 40.00, 400.0, 4,000, 40,000, 400,000 Lux, operating temperature is 0 to 50°C, 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±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 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 reduce the noise energy 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 meetings with the Head of the Organization,
NAAC / IQAC Coordinators and NSF Inspection Team.**

2. GREEN AUDIT

2.1. Introduction

Green audit ensures the Organization's campus should have greenish with large diversity of trees, herbs, shrubs, climbers and lawns to reduce the environmental pollution and soil erosion; it is also useful in relation to biodiversity conservation, landscape management, irrigation/economic water utilization and maintenance of natural topography besides vegetation (Gamble and Fischer, 1972). For the benefit of stakeholders, solid waste management, recycling of water, disposal of sewage and waste materials (electronic and biomedical wastes), 'zero' use of plastics, single use plastic items, etc. should be followed consistently in the organization campus. Green Audit procedures includes the definition of green audit, methodology on how to conduct green audit at Educational Institutions and Industrial sectors as per the checklist based on National Building Code (NBC) Part 11 - Approach to sustainability and assessment of risk at 360° view (Arora, 2017).

2.2. Importance of green audit

The Management of the Organization (Auditee) should be exposed their inherent commitment towards making ecofriendly atmosphere through the green auditing and ready to encourage/follow all types of green activities (Leal Filho *et al.*, 2015). A clean and healthy environment will enhance an effective teaching/learning process. They should create the awareness on the importance of greenish initiatives through environmental education among the student members and research scholars. Green audit is the most effective, ecological approach to manage environmental complications (Rajalakshmi *et al.*, 2022). Green audit is a kind of professional care and a simple indigenized system about the environment monitoring in terms of planting more number of trees which is a duty of each and every individual who are the part of economical, financial, social and environmental factors. Green audit is a professional and useful measure for an Organization to determine how and where they are retaining the campus eco-friendly manner. It can also be used to implement the alleviation measures at win-win situation for the stakeholders and the planet. It provides an opportunity to the stakeholders for the development of ownership, personal and social responsibility.

2.3. Aims and objectives of green audit

- a. To recognize the initiatives taken towards establishing the green campus in terms of availability of flora and fauna diversity within study area.
- b. To assess the greenish nature of an Organization campus in terms of available vegetation which reflects on reducing the environmental pollution, soil erosion, biodiversity conservation, landscape management, natural topography and vegetation.
- c. To grow a greater number of oxygen releasing and carbon dioxide assimilating plants in the campus to give a pure atmosphere to the stakeholders.
- d. To identify and provide baseline information to assess the risk to the ecosystem due to developmental activities of the organization and resolve the same.
- e. To ensure proper utilization of resources available in the surrounding areas towards future prosperity of the humanity.
- f. To fix a couple of norms for disposal of all varieties of wastes and use green cover as a carbon sink.

2.4. Green audit observations

- It is observed that the Organization has facilities (ramp walk, lift, wheel chair, rest rooms, etc.,) for disabled and different age group people.
- Monitoring plan is available for the periodic checking at proper time interval to maintain sustainability.
- Adequate training and awareness programmes are conducted to the Stakeholders for sustainable development at all stages of building life cycle.
- More than 20% of open space is maintained as soft scapes (vegetation) to lower the energy conservation in the campus.
- Land scape design is planned to maintain the natural capacity of the site.
- Vegetation / vegetative structures are available around the building to reduce energy consumption and maintain indoor climates.
- Soil health is maintained well without using any chemical fertilizers.

2.4.1. Facilities for Human Comforts

As per the National Building Code part 11 (Approach to Sustainability) under elements of sustainability quality of plumbing services and buildings are maintained in line with the standard. Ramp walk facilities are implemented for the benefit of disabled and different age group people. Accessible toilet facilities are observed for the comfort of person with disability.

2.4.2. Natural topography, vegetation and monitoring

Natural topography means the original geographical features and natural resources of the Site. It is observed that the organization has the natural features like rocks, water resources, slopes, landscape, pathways, etc. Vegetation is the cultivation of a bunch of plants irrespective of the plant *taxa* for the covering of the area or ground topography. The observation at the campus indicated that there are more than 30% natural topography and vegetation. Monitoring plan for maintaining the vegetation and sustainability are evident through separate operation and maintenance team & their records for regular watering as per the micro climatic condition through irrigation.

2.4.3. Landscape design and soil erosion control

Landscape design is an important feature for any disasters to control especially with respect to the soil erosion. In general, soil erosion occurs if the design of the land is not altered so as to prevent the slope features by strong vegetation and use of a plant buffer zone as safe for escape of nutrients or fertilizers entering the streams. Observation revealed that the audited site has very good landscape design without disturbing the natural vegetation. Contour ploughing is being done at right angles to the slope wherever possible and ridges and furrows are properly maintained to break the flow of water down to the empty land. These activities are widely adopted to control soil erosion in the campus.



Facilities made for Soil Erosion Control in the Campus

2.4.5. Establishment of different gardens, vertical landscaping and roof gardens

It is observed that Organization has implemented and maintaining terrace gardens to lower the energy consumption. To maintain certain biomass critical for human health and also to reduce the bio-retention through water flow rates different types of gardens like ornamental garden is implemented in the campus (Vinoth Kumar *et al.*, 2023).



Ornamental Garden observed in the Campus

2.4.6. Survey of Flora and Fauna

Ensuring the rich biodiversity in the green campus is an important parameter which reflects the real-time ecosystem. In general, plants improve the outdoor air quality with increased oxygen levels and reduced temperature and carbon dioxide. The record on maintenance of the plant biomass and its management are important with respect to green campus initiatives. The existence of such plants and birds in the green campus are recorded for the rich flora and fauna which are being considered as a value addition to the campus.

It is evident that regular flora and fauna survey were performed by the Organization . Various vascular plant species were identified and plant specimens were freshly collected and their digital photographs were taken. The collected plant specimens have been identified using ‘The Flora of the Tamil Nadu Carnatic’ (Matthew,

1983) using the suitable Technical Experts. The most plants recorded are *Albizia lebbbeck*, *Azadirachta indica*, *Pongamia pinnata* and *Cocos nucifera* L. which are dominant trees species characteristic to the vegetation within the campus. Some of the shrub species like *Nerium oleander*, *Nerium indicum* and *Vinca rosea* are also rather common in the campus. Ground flora is comparatively sparse but fairly rich in undistributed areas. Some of the common weeds like *Euphorbia hirta* is found to be predominant. Species such as *Catharanthus roseus*, *Cynodon dactylon* are some common herbs in the campus. This campus is rich in grass species like *Andropogon pumilis*, *Apluda mutica*, *Cenchrus ciliaris*, *Asparagus racemosus* and *Commelina benghalensis*. Most of the species found are common in the campus, some of the species *Cucumis dipsaceus*, *Hybanthus*, *Bothriochloa compressa* and *Caralluma bicolor* is the rare species. Some endemic grass species like *Andropogon pumilus*, *Panicum psilopodium* and *Perotis indica* are also occurring in the campus.

The observations on fauna diversity indicated that the campus has a large number of living as well as visiting mammals, birds, grasshoppers, reptiles and termites. The campus has different family level diversities such as Papilionidae, Pieridae, Nymphalidae and Lycaenidae in which common butterfly species such as Mormon, Rose, Birdwing, Emigrant, Grass yellow, Gull Wanderer, Small Orange Tip, Plain Orange Tip, White Orange Tip, Evening and Grey are commonly observed. Grasshoppers, a group of insects belonging to the suborder Caelifera and they are probably most ancient living group of chewing herbivorous insects. Termites are most successful groups of insects on earth, colonising most landmasses which are also observed in the campus. Birds were observed by visual sightings and by calls also the avifaunal data were observed through the photographs. Reptiles and Amphibians are identified based on coloration, markings on the skin, background colour generally brown through subject experts (Beebee and Griffiths, 2000).

Table 1. List of endangered plants and Threatened Plants

S.No.	Endangered Plants	Threatened Plants
1.	<i>Araucaria angustifolia</i>	<i>Piper betle</i>
2.	<i>Pterocarpus santalinus</i>	<i>Polyalthia longifolia</i>
3.	<i>Ficus Carica</i>	<i>Carussa carandas</i>
4.	<i>Phyllanthus emblica</i>	
5.	<i>Bambusa vulgaris</i>	
6.	<i>Santalum abum</i>	

Predominant Plant species found in the Campus



Mangifera indica L.



Cocus nucifera L.



Eucalyptus globucus Labil



Phyllanthus emblica



Ficus carica



Azadiiracta indica L.

2.5. Measurement of carbon dioxide level in the campus

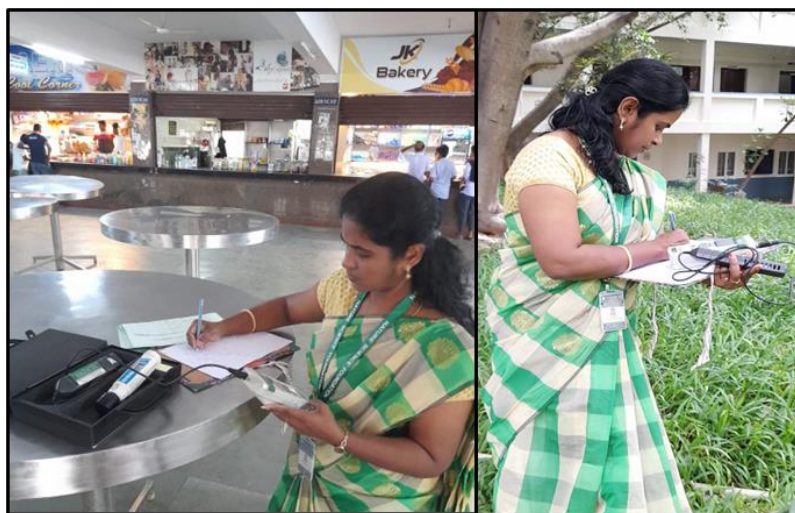
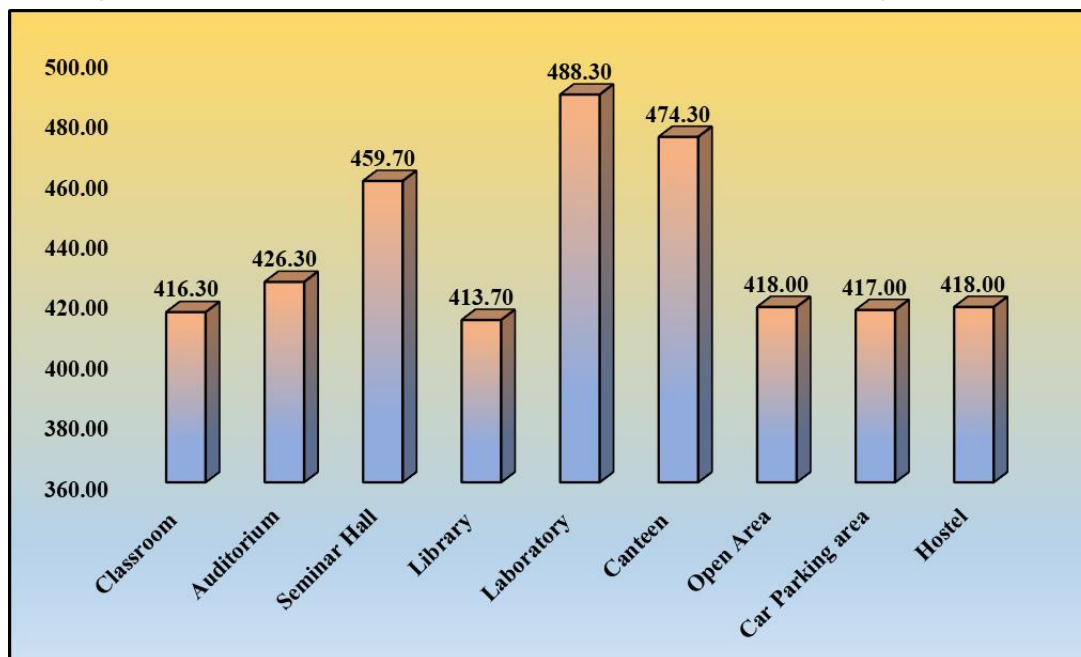
Climatic conditions of the earth changed now-a-days due to a massive increase in global warming and environmental changes including human population and human activities. In addition, primarily fossil fuel burning and an extensive usage enhances heat-trapping greenhouse gas levels in the atmosphere. Global warming is driven by human-induced emissions of greenhouse gases which resulted in paramount shifts in weather patterns. In general, a portable CO₂ Analyzer is used to measure the level of carbon dioxide in the atmosphere at different places across the campus.

Table 2. Measurement of CO₂ concentration in the Organization

S. No.	Different locations of the Organization's Campus	Carbon dioxide level (ppm)*	Remarks
1.	Classroom	416	Within permissible limits
2.	Auditorium	426.3	Within permissible limits
3.	Seminar Hall	459.7	Within permissible limits
4.	Library	413.7	Within permissible limits
5.	Laboratory	488.3	Within permissible limits
6.	Canteen	474.3.	Within permissible limits

7.	Open Area	418.0	Within permissible limits
8.	Car Parking area	417.0	Within permissible limits
9.	Hostel	418.0	
	Mean		436.85%
	SEC \pm		2.85
	CD at P=0.05%		5.07

Figure 1. Measurement of CO₂ concentration in the Organization



Measurement of CO₂ level at College Campus

2.6. Atmospheric oxygen level measurements analysis and interpretation

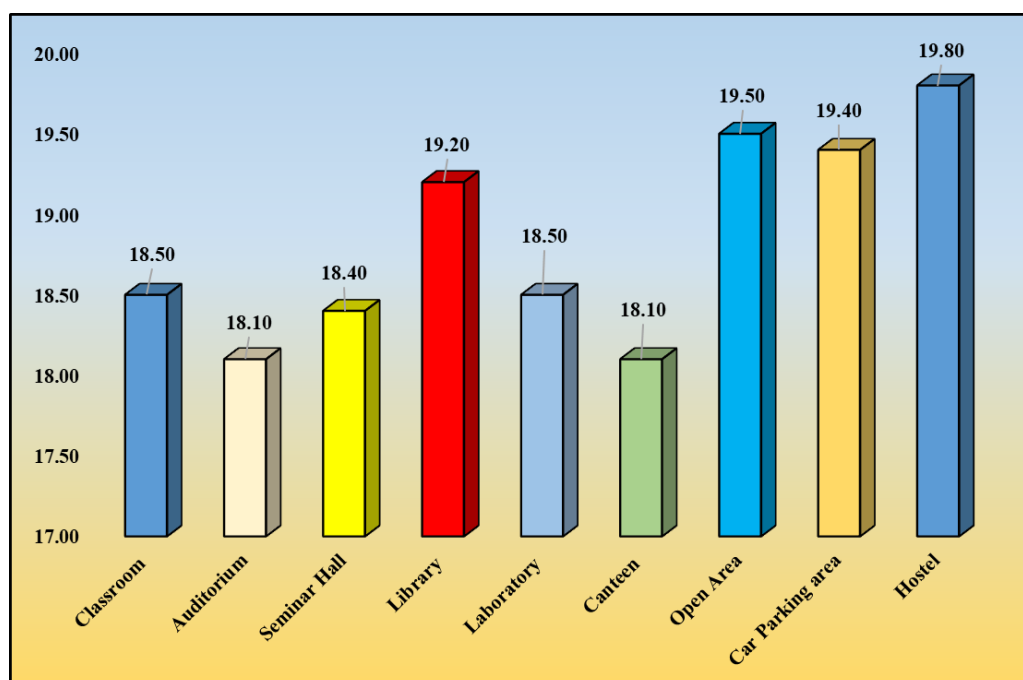
Oxygen level refers to the amount of oxygen available within the atmosphere or water bodies. Oxygen is produced/released as a by-product of photosynthesis, the metabolic activity of all green plants besides certain microbes. Oxygen plays a paramount role in metabolic activities like respiration and the energy-producing chemistry of all living organisms. In order to quantify the oxygen level, Oxygen Meter

is used. The atmosphere contains 18-21% oxygen concentration, 75-78.5% nitrogen and 2-3% other gases like carbon dioxide, neon and hydrogen. The amount of oxygen level in the atmosphere is determined by abiotic factors like altitude, latitude and longitude and biotic factors like plantations in the surroundings. If oxygen level is low in the atmosphere lead to headaches and shortness of breath to human beings. If it excess, it causes oxygen toxicity and oxygen poisoning by creating coughing, breathing trouble and damage the lungs to human beings. The oxygen level of different places at the campus are monitored and presented (Table 3).

Table 3. The oxygen concentration at different places of audited organization

S.No	Location	Oxygen Level (%)*	Remarks
1.	Classroom	18.5	O ₂ level is good
2.	Auditorium	18.1	O ₂ level is good
3.	Seminar Hall	18.4	O ₂ level is good
4.	Library	19.2	O ₂ level is good
5.	Laboratory	18.5	O ₂ level is good
6.	Canteen	18.1	O ₂ level is good
7.	Open Area	19.5	O ₂ level is good
8.	Car Parking area	19.4	O ₂ level is good
9.	Hostel	19.8	
	Mean		18.83%
	SEC ±		0.06
	CD at P=0.05%		0.10

Figure 2. The oxygen concentration in the Organization





Measurement of CO₂ level at College Campus

3. ENERGY AUDIT

3.1. 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 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.

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.

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. 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.

3.2. 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.

3.3. 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 being 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. 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. 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).

3.4. Energy audit observations

During onsite audit following departments were verified for physical facility availability.

- Adequate awareness programmes are organized and conducted to the stakeholders for the proper handling and maintenance of the appliances.
- 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.
- Over deck and under deck insulation of roofs are available.
- 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.
- 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.
- 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.

3.4.1. Lighting facilities

Electrical lighting facilities during day time increases the energy consumption, it is observed that sufficient day lighting facilities are available through windows which in turn reduce the energy consumption bill of the Organization. Artificial lighting facilities are regularly monitored and maintained. In some areas sensor lights are implemented to save energy. External and internal signage lits are made up of recycled material with maximum light intensity. In the buildings windows head are higher to penetrate day light.



Natural Lighting facilities observed during day time

3.4.2. Heat, Ventilation and Air Conditioning System (HVAC)

To save energy in the buildings there should be a proper plan for HVAC system. In the organization it is observed that adequate natural ventilation is implemented and practices. In some places exhaust fans are used for ventilation especially in the canteen and laboratories. To reduce the heat inside the building shading patterns are maintained by planting trees in and around the campus. Solar panels are implemented at the roof top to reduce the heat and to save energy. Air conditioning are provided at specific areas.



Ventilation facilities observed in the Campus

3.4.3. Steps taken to conserve energy

Energy conservation plays an vital role in maintaining the sustainability. It is observed that the Organization has replaced all the tube light with CFL / LED lamps, has proper metering and submetering facilities, availability of BEE star rated appliances in Air cooler, lift, AC, generator, etc., Solar water heater and panels are implemented to conserve energy. Instruments and meters are properly maintained and calibrated at regular intervals or annual maintenance plan is observed as one of the energy saving opportunity. Adequate energy saving awareness programmes are conducted to the stakeholders.



Energy conservation facilities observed in the Campus

3.5. Energy consumption and cost profile

The following chart shows the profile of energy consumed and the cost for one year by the auditee (Figures 3 & 4; Table 4).

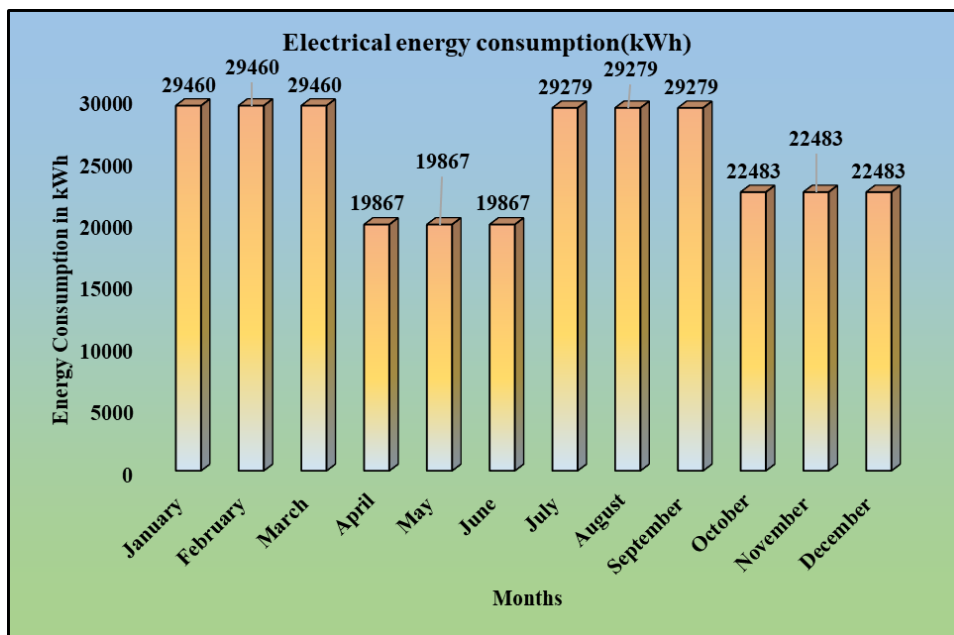


Figure 3. Electrical energy consumption profile

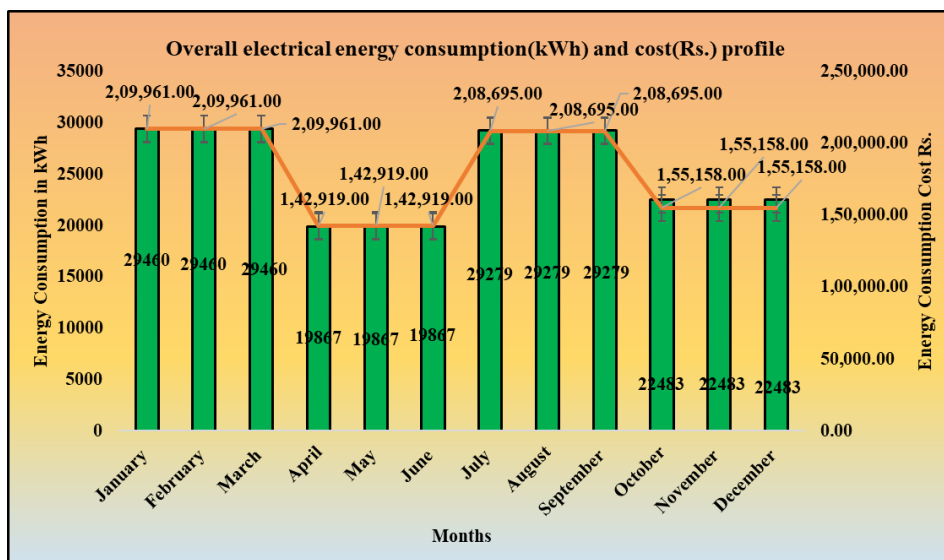


Figure 4. Overall electrical energy consumption and cost profile

Table 4. Electrical energy consumption and cost profile in the Institution

S. No	Months	Rating / Capacity units in kWh	Cost in Rs.
1.	January	29460	2,09,961.00
2.	February	29460	2,09,961.00
3.	March	29460	2,09,961.00

4.	April	19867	1,42,919.00
5.	May	19867	1,42,919.00
6.	June	19867	1,42,919.00
7.	July	29279	2,08,695.00
8.	August	29279	2,08,695.00
9.	September	29279	2,08,695.00
10.	October	22483	1,55,158.00
11.	November	22483	1,55,158.00
12.	December	22483	1,55,158.00

3.6. Power consuming equipment and electrical appliances

Other than electrical energy from grid, energy generated using fossil fuels for the year are presented in the Table 5.

Table 5. Annual Energy Consumption of Fuels in the College

S.No	Month	Diesel consumption (Liters)	Petrol consumption (Liters)	LPG consumption (kg)
1	January	70	-	589 kg
2	February	210	-	570 kg
-	March	210	-	532 kg
4	April	420	-	570 kg
5	May	210	-	494 kg
6	June	560	-	513 kg
7	July	210	-	551 kg
8	August	140	-	570 kg
9	September	210	-	570 kg
10	October	280	-	589 kg
11	November	490	-	589 kg
12	December	140	-	570 kg

3.7. 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).

3.8. 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. 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

$$\begin{aligned}
 &= (\text{electricity usage per year in kWh}/1000) \times 0.84, \text{ where } 0.84 \text{ is the coefficient} \\
 &\text{to convert kWh to metric tons} \\
 &= (303267 \text{ kWh}/1000) \times 0.84 \\
 &= 254.74 \text{ metric tons}
 \end{aligned}$$

According to the above calculations, carbon emission due to electricity usage per year accounts for 254.74 metric tons.

Transportation per year (Shuttle)

$$\begin{aligned}
 &= (\text{Number of the shuttle vehicle in the campus } (2) \times \text{total trips for shuttle bus} \\
 &\text{service each day} \times \text{approximate travel distance of a vehicle each day inside} \\
 &\text{campus only } (20 \text{ km}) \times 365/100) \times 0.01 \\
 &= ((12 \times 20 \times 1 \times 365)/100) \times 0.01 \\
 &= 8.76 \text{ metric tons}
 \end{aligned}$$

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)

$$\begin{aligned}
 &= (\text{Number of cars entering the campus } \times 2 \times \text{approximate travel distance of a} \\
 &\text{vehicle each day inside campus only (in kilometers)} \times 365/100) \times 0.02 \\
 &= ((75 \times 20 \times 1 \times 365)/100) \times 0.02 \\
 &= 109.5 \text{ metric tons}
 \end{aligned}$$

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)

$$\begin{aligned}
 &= (\text{Number of motorcycles entering the campus } \times 2 \times \text{approximate travel} \\
 &\text{distance of a vehicle each day inside campus only (in kilometers)} \times 365/100) \times \\
 &0.01 \\
 &= ((250 \times 20 \times 1 \times 365)/100) \times 0.01 \\
 &= 182.5 \text{ metric tons}
 \end{aligned}$$

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

$$\begin{aligned}
 &= \text{total emission from electricity usage + transportation (bus, car, motorcycle)} \\
 &= (254.74 + 8.76 + 109.5 + 182.5) \\
 &= 555.5 \text{ metric tons}
 \end{aligned}$$

3.9. 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) has 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. 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 the Table 6.

Table 6. 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

Source: IS: 12065 – 1987

Table 6. Noise level at various location in the campus

S.No	Locations	Measurements (dB)	Major noise sources	Remarks
1.	Class room	58.9	Students and Staff	No Noise Pollution
2.	Auditorium	55.1	Students	No Noise Pollution
3.	Seminar hall	57.2	Students	No Noise Pollution
4.	Library	34.6	Staff members	No Noise Pollution
5.	Laboratory	48.1	Students	No Noise Pollution
6.	Canteen	75.5	Students and Staff	No Noise Pollution
7.	Open area	76.5	Students and staff	No Noise Pollution
8.	Parking area	67.3	Vehicles	No Noise Pollution
9.	Generator area	64.7	Generator Sound	No Noise Pollution
	Mean	59.77		
	SE	2.37		
	CD	4.22		

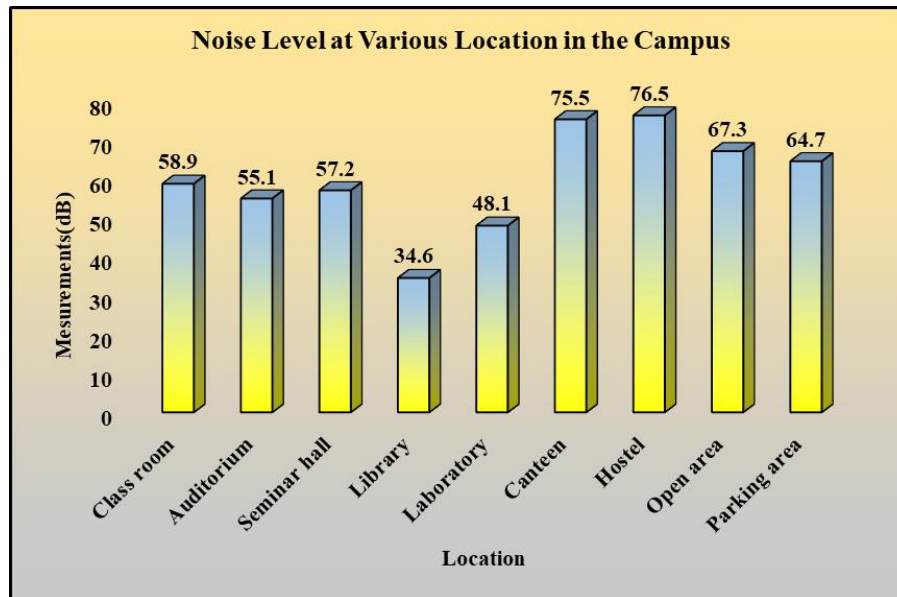


Figure 5. Noise level at various location in the campus



Noise level measured at the College Campus

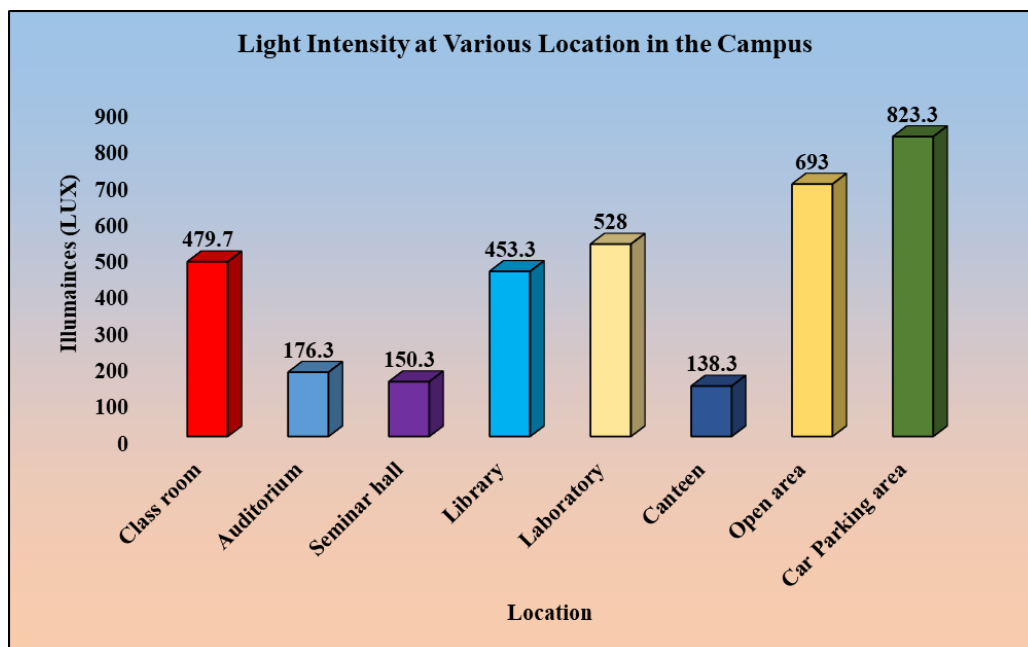
3.10. Light intensity measurement at the campus

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. Light intensity is measured in terms of lumens per square foot (foot-candles) or lumens per square meter (lux). 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.

Table 7. Light intensity measured at various locations in the College

S.No	Type of Spaces	Illuminances (LUX)
1.	Class room	479.7
2.	Auditorium	176.3
3.	Seminar hall	150.3
4.	Library	453.3
5.	Laboratory	528
6.	Canteen	138.3
7.	Open area	693
8.	Car Parking area	823.3
	Mean	382.48
	SE	10.67
	CD	19.02

Source: IS: 6665-1972

**Figure 6. Light intensity Measured at the campus**



Light intensity analysis in the Campus

3.11. 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.

Table 8. Voltage measured at various locations in the College

S.No	Name of the Place	AC & DC Voltage Measurement [Volt (v)]
1.	Class Room (AC)	233.67
2.	Auditorium (AC)	227.33
3.	Seminar Hall (AC)	236.33
4.	Library (AC)	229.67
5.	Laboratory (AC)	236
6.	Canteen (AC)	247.33
7.	Power Room (AC)	241.33
8.	Generator Area (AC)	238.33
9.	Battery (DC)	46.33
SD±		

Source: BEE, 2015, Bureau of Energy Efficiency



Voltage intensity measured at the College

3.12. 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. 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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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

1st Surveillance Audit Due: 8th August 2023

2nd Surveillance Audit Due: 8th August 2024

Certificate Expiry: 8th August 2025

Certificate Number: 305022080903EN



Chandana . .

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

Website : www.qrocert.org, E-mail : info@qrocert.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																												
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Mobile	9566777255	Email:	chairmansf@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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6. 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.

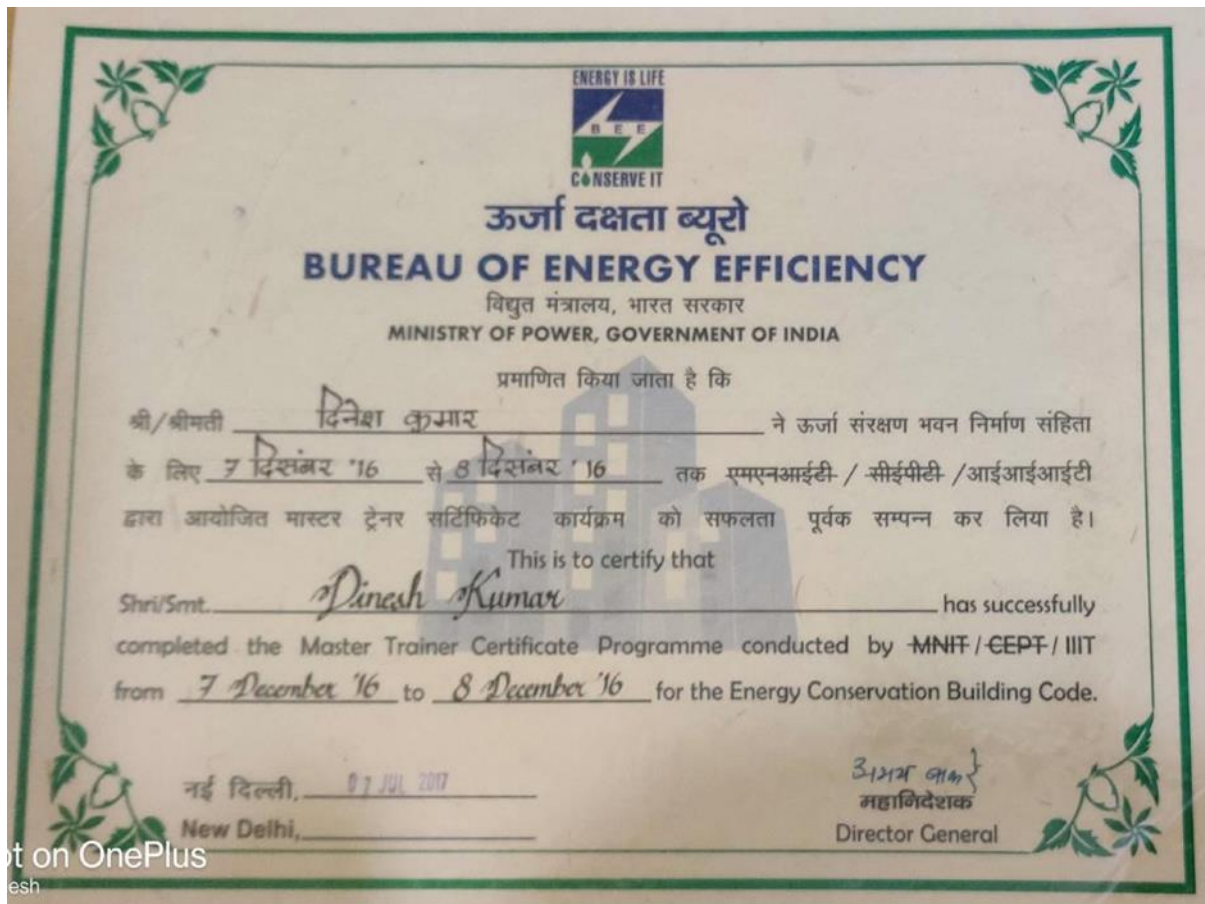
Mr./Mrs./Ms. **Dinesh Kumar D** is deemed to have qualified
 for appointment or designation as energy manager under clause (i) of Section 14 of the Energy
 Conservation Act, 2001 (Act No.52 of 2001).

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

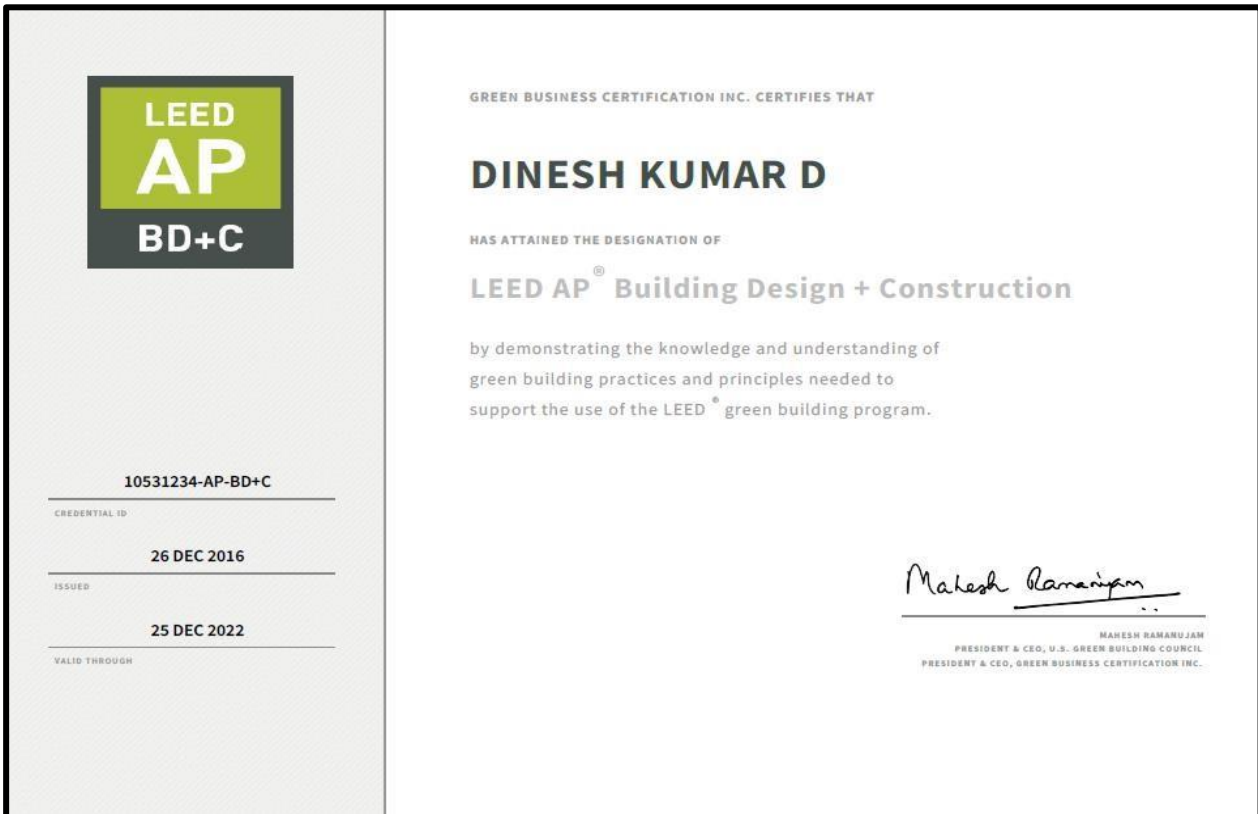
Dates of attending the refresher course	Secretary's Signature	Dates of attending the refresher course	Secretary's Signature
22.12.2019			



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esh









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 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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KOLKATA-700075, WEST BENGAL, INDIA

BRANCHES: INDONESIA, BANGLADESH, QATAR, SAUDI ARABIA,
TURKEY, UAE

WHATS APP: +918697724963/+918902447427,

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