CERTIFICATE FOR GREEN AUDIT

Certificate Number: PSQC271

This is to certify that, we have conducted a **GREEN AUDIT** in VIMAL JOTHI ENGINEERING COLLEGE, Jyothi Nagar, Chemperi (PO), Kannur – 670 632, Kerala during 17/04/2023 – 18/04/2023. The Audit investigates the following activities.

1. Coverage of matured trees (nearly 1956 trees available in the college campus)
2. Assessment of RO plant and water distribution network
3. Implemented many flowers, shrubs and indoor plants
4. Analysis of waste water treatment in STP and treated water utilization
5. Future expansion of Solar PV & Thermal energy systems for regular activities
6. Evaluation of solid and E-waste management system
7. Plan for implementing solar water heating system in hostel area to pre-heat the water
8. Identification of expansion of green coverage for planting more trees
9. Survey on Bio-diversity and plan for improvement of Birds, Reptile and Amphibian

The detailed campus Greenery Coverage and initiatives are presented in the Audit Report.

Authorized Auditor

G. ARIVARASAN
BEE Certified Energy Auditor (EA-21875)
Lead Auditor – ISO 14001, EMS
P S QUALITY CERTIFICATION PVT. LTD.
(Consultancy – Accreditation & Certification) Auditing & Training
E-mail: info@psqualitycertifications.com
Web Site: www.psqualitycertifications.com
CIN: U74999TN2020PTC138625

Signature Not Verified

Principal.VJEC

CERTIFICATE FOR ENERGY AUDIT

Certificate Number: PSQC272

This is to certify that, we have conducted an **ENERGY AUDIT** in VIMAL JYOTHI ENGINEERING COLLEGE, Jyothi Nagar, Chemperi (PO), Kannur – 670 632, Kerala during 17/04/2023 – 18/04/2023. The Audit team has identified 07 Energy Conservation Proposals (ENCONs) and summary of the energy audit is given below.

Description/Year	2022-2023		
Annual Electricity Consumption (kWh)	55,500 kWh		
Annual LPG consumption (kg)	25650 kg		
Summary of Energy Conservation (ENCON) Proposals			
Description	**Parameters**		
	Present	**After**	**Savings**
Annual Energy Consumption	93,168 kWh + 9240 Kg of LPG	55500 kWh + 8568 kg of LPG	37668 kWh + 672 kg of LPG
Annual Energy Cost	Rs. 24.61 lakhs	Rs. 11.93 lakhs	12.68 lakhs
Simple Payback Period	-	-	1.5 years

Equipment's/Systems Audited

Electrical System	Thermal System
All major electrical equipment's	Inverter, UPS and battery system
Electrical Distribution system	Diesel, generators, pumps and motors
Lightings, Fans and Air conditioning system	LPG for cooking application
Rooftop solar PV system	Boiler and Steam distribution System

The detailed Energy Conservation Proposals are presented in the Audit Report.

Authorized Auditor

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CERTIFICATE FOR ENVIRONMENTAL AUDIT

Certificate Number: PSQC273

This is to certify that, we have conducted an **ENVIRONMENTAL AUDIT** in VIMAL JYOTHI ENGINEERING COLLEGE, Jyothi Nagar, Chemperi (PO), Kannur – 670632, Kerala during 17/04/2023 – 18/04/2023. This Audit highlights the energy balance sheet indicating various energy carriers associated with the regular activities of the institution and their CO2 mapping.

Environmental system: CO2 Balance sheet (2022-2023)

S.No	Energy Consumption & CO_2 Emission			CO_2 Neutralization		
	Description	Annual Usage	CO_2 Emission (Tons/Annum)	Description	Annual Usage	CO_2 Emission (Tons/Annum)
1	Electrical Energy	55800 kwh	67.5	Matured Trees	1954 Nos	42.59
2	Diesel	1746 Liters	66.00			
3	LPG Consumption	8568 kg	285.56			
	Total Emission		419.06	**Total Neutralized**		**42.59**
Balance CO_2 to be Neutralized				376.47 Tons/Annum[1]		
CO_2 Accountability for NCN Campus				386.85 Tons/Annum[1]		

(Calculated based on the weighted average of total strength of students, teaching and technical staff = 2108)

System Audited

Electricity Consumption	Usage of Chemicals, Salts, Acids & Cleaning Agents
Diesel Consumption (Transport + DG)	Biogas Plants
LPG Consumption	RO Plant and Water distribution system
Solid and E-waste Handling & Management	STP and waste water utilization

The detailed environmental aspects & impacts are presented in the Audit Report.

Authorized Auditor

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Signature Not Verified

Principal.VJEC

GREEN, ENERGY & ENVIRONMENT AUDIT

DETAILS OF THE CLIENT

VIMAL JYOTHI ENGINEERING COLLEGE

Chemperi (PO), Kannur - 670632, Kerala, India.

Approved by AICTE, New Delhi | Affiliated to APJ Abdul Kalam Technological University (KTU).

VIMAL JYOTHI
ENGINEERING COLLEGE
JYOTHI NAGAR, CHEMPERI – 670632, KANNUR, KERELA
Affiliated to APJ Abdul Kalam Technological University, Approved by AICTE
ISO 9001 : 2015 Certified | Accredited by Institution of Engineers (India), NBA, NAAC
Ph: 0490 2212240, 2213399 Email: office@vjec.ac.in Website: www.vjec.ac.in

DATE OF AUDIT

17/04/2023 to 18/04/2023

(Audited and Accounted for the period of 2022-23)

AUDIT CONDUCTED AND SUBMITTED BY

P S QUALITY CERTIFICATION PVT LTD

No.415, F4, Ist Floor, Asha Vignesh Apartment, Ambattur, Tamil Nadu 600 053.

Mobile: +91- 81240 88335, 044 - 4959 1335

Signature Not Verified

Principal.VJEC

GREEN AUDIT REPORT

DETAILS OF THE CLIENT

VIMAL JYOTHI ENGINEERING COLLEGE

Chemperi (PO), Kannur - 670632, Kerala, India.

Approved by AICTE, New Delhi | Affiliated to APJ Abdul Kalam Technological University (KTU).

VIMAL JYOTHI
ENGINEERING COLLEGE
JYOTHI NAGAR, CHEMPERI – 670632, KANNUR, KERELA
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OUR EARTH, OUR HABITAT, OUR HOME

Signature Not Verified

Principal.VJEC

Acknowledgements

P S QUALITY CERTIFICATION PVT LTD, No. 415, F4, I Floor, Asha Vignesh Apartment, Ambattur, Tamil Nadu 600 053 is thankful to the Management and Technical team members of **VIMAL JYOTHI ENGINEERING COLLEGE,** Kerala, India for providing an opportunity to conduct a detailed Green, Energy and Environment Audit process for the college premises.

It is our great pleasure, which must be recorded here that the management of **VIMAL JYOTHI ENGINEERING COLLEGE** extended all possible support and assistance resulting in expeditious completion of the audit process. The audit team appreciates the cooperation and guidance extended during course of site visit and measurements. We are also thankful to all those who gave us the necessary inputs and information to carry out this very vital exercise of green audit. Finally, we offer our sincere thanks to all the members in the Institution.

Audit Team Members	
Mr. G. ARIVARASAN	BEE Certified Energy Auditor (EA-21875) Lead Auditor-ISO-14001:2015 (EMS).

Audit Conducted, Complied and Verified by,

(Mr. G. ARIVARASAN)
BEE Certified Energy Auditor (EA-21875)
Lead Auditor–ISO 14001, EMS
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Principal.VJEC

Contents

Executive Summary

This section presents a brief summary of the results of the detailed green audit carried out at VJEC, Kannur during April 2023.

The audit was mainly targeted at identifying practical, sustainable and economically viable Resource saving opportunities in all sections of the facility, resulting from a detailed study and analyses of technical parameters. The audit involved using a wide range of sophisticated, portable, diagnostic and measuring instruments to generate refined data and facilitate complex analyses to give a more reliable basis for evaluation of energy saving potential and economic viability.

VJEC has its building located at Kannur, Kerala. A sprawling 30 acres campus located in the foothill of Western Ghats with lush greenery. The major resources used are energy and water. In addition, the ecosystem of the campus including the biodiversity and sustainability have been assessed.

The study has identified opportunities for saving resources, improving compliance and maximising eco friendliness of the campus.

A summary list of recommendations is given at the end of the report.

SAY NO TO POLLUTION & YES TO RECYCLE

Signature Not Verified

Principal.VJEC

Introduction

1.1 BACKGROUND

Vimal Jyothi Engineering College (VJEC) is an educational project of the Archdiocese of Thallassery established in the year 2002 and is managed by Meshar Diocesan Educational Trust. The college is approved by AICTE and affiliated to APJ Abdul Kalam Technological University (KTU). VJEC is a self-financing catholic minority institution aiming at generating fervor for Engineering and Technology in students. Here we inspire, nurture and foster them to realize their career potential in the field of Engineering and Technology.

With profound insight into the resource requirements of the higher education system, VJEC has proudly set up world-class infrastructure complemented with intellectual capital in the form of competent faculty.

Digital library, industry supported project labs, language lab, and student chapters of professional bodies such as IEEE, ISOI, IETE, SAE, and CSI offer an extensive range of resources, opportunities and services to the outcome based teaching learning process. Effective implementation of quality control processes ensure Engineering graduates with the expected level of knowledge, skill and attitude.

The institution offers ten undergraduate programs in engineering and two post graduate programs. Six undergraduate programs, CE, ME, CS, EC, EE and AE are accredited by NBA, New Delhi.

The lush green surroundings of buildings

Vimal Jyothi Engineering college is an emerging institute of excellence in Engineering Education located on the Chemperi, Kannur, Kerala. The VJEC campus has a beautiful and serene atmosphere ideally suited for technical education. The infrastructure and facilities available on campus are amongst the very best. It is a wholly self-contained campus comprising of everything that students on campus would ever require.

In order to take care of aesthetic dimensions of the campus, considerable efforts have been made in the recent past to beautify the campus. Greenery in terms of the grass, permanent green plants, trees and flowers have been laid down all over the campus. Horticulture maintenance and development has been meticulously monitored to keep up with the changing weather.

VJEC provides full-fledged and marvelous infrastructure. A sprawling 30 acres campus located in the foothill of Western Ghats with lush greenery. Spacious and well-furnished Class Rooms, seminar halls, Department library, Central Library, Digital Library and E-Learning Resources. Adequate number of ICT enabled classrooms/Tutorial rooms for each department. Centralized computer centre, well-equipped laboratories with exclusive machines and major equipments. The Administrative Office, Board room, HOD's Cabins, individual cubicle of faculty are well equipped and having internet connectivity. Library constructed in 1000 sq mt of carpet area with 325 sq mt of reading space and 200 seating contains 46152 books Digital library facility to access e-journals & e-books. Air conditioned conference Halls, Interview Rooms, Auditoriums, Laboratories, IEDC Cell, Placement Cell, R&D Cell, Examination Cell etc., Research lab/project lab for each department Well equipped Laboratories with state of art equipments. Comfortable sick rooms, prayer halls for all religions and amenities Availability of indoor and outdoor sports facilities. Psychiatric Counselor for students. Bank along with ATM, Postal Service, Reprographics, Stationery store etc are available Round a clock internet facility with 600 Mbps Speed for more than 700 computers with 24 hour power backup. 50KWh energy through in house solar power generation. Three diesel generators with capacity 62.5,125,250 KVA ensures the uninterrupted power supply.

The institution provides diverse facilities to support academic and administrative activities:

Seminar Halls and Board Rooms: Equipped with ICT facilities, these spaces cater to academic discussions and conferences. Multipurpose Hall: Designed for large gatherings(up to 1500), this hall accommodates various events and activities. Training and Placement Center: Focused on career development, this center plays a crucial role in connecting students

with industry opportunities. Interactive Classrooms: Specially designed for academic activities and conferences, these rooms enhance engagement and collaborative learning. Sports Facilities: Outdoor sports amenities include a 200-meter track, football and cricket fields, volleyball and basketball courts, badminton courts, and kho kho grounds. Gymnasium: A well-equipped gymnasium featuring multi-gym stations, weight training equipment, and facilities for various exercises, promoting physical fitness among students. Hostels: Separate hostels for boys and girls, along with staff quarters, contribute to a conducive living environment. Cafeteria, Parking, and General Stores: Essential amenities for the convenience of students and staff. Industry-Supported Labs: Collaboration with industries enriches laboratory facilities, ensuring relevance to real-world applications. Infrastructure for Sustainability: Energy conservation units, including a grid-connected solar power plant (50KW), biogas plant, rainwater harvesting(35L Ltrs), and wastewater treatment plant, underscore the commitment to environmental responsibility. Facilities for Differently Abled: Ensuring inclusivity, the institution provides facilities that cater to the needs of differently-abled individuals such as ramps, lift and toilet for differently abled.

Vimal Jyothi Engineering College has strategically developed its infrastructure to create a holistic educational environment that nurtures academic excellence, technological proficiency, and overall well-being. The institution's commitment to sustainability, inclusivity, and a balanced curriculum is reflected in its state-of-the-art facilities and resources.

Vimal Jyothi Central Library, spanning 1000 sqm across two floors within the administrative block, stands as a hub for knowledge and research in the institution. Leveraging digital technology, the library has adopted an Integrated Library Management System (ILMS) and offers seamless access to an extensive array of e-resources, journals, and books. The library is an integral part of the academic ecosystem, fostering a culture of continuous learning and research. Physical Library Infrastructure: The library, with a seating capacity for 200 users, subscribes to 92 journals and has a collection of 46,152 volumes encompassing 30,181 titles across diverse domains of Science and Technology. Organized using the Dewey Decimal Classification Scheme, the library adopts an open access system for easy navigation and accessibility for all users. Digital Transition and ILMS: In a strategic move to enhance library services, the institution transitioned from Del Plus & New Gen Lib to the leading Library Management Software, KOHA, in 2021. This transition, supported by a Cloud Server, has streamlined library operations, including membership registration and the issue/return of books. Barcode technology facilitates efficient tracking, with student

using barcoded identity cards for library membership. Online Public Access Catalog (OPAC): The library's Online Public Access Catalog (OPAC) is accessible remotely via [https://library.vjec.ac.in/], providing users with the flexibility to explore the catalog and resources from anywhere, both on and off the campus. A Touch Screen Kiosk further enhances accessibility for users seeking information within the library premises. Digital Library Platform and Connectivity: Collaborating with KTU, the library utilizes Knimbus as its primary digital library platform. Sixteen LAN-connected desktops equipped with Wi-Fi and internet facilities provide students and faculty with easy access to a plethora of library links, including DELNET, NDL, and NPTEL. The library ensures comprehensive coverage with a high-quality photocopier and scanner for duplicating hard copy materials. Webpage Integration and E-Resources: The library has a dedicated webpage integrated into the college's website, serving as a gateway to all subscribed e-resources. This approach enhances visibility and accessibility to digital assets, ensuring that the academic community can seamlessly explore and benefit from the rich collection of online materials. E-Magazines and Additional Subscriptions: The college subscribes to Magzter, offering access to over 7500 online magazines, journals, newspapers, and e-books in multiple languages, including English, Hindi, and Malayalam. This extensive digital repository enriches the academic experience, providing students and faculty with diverse perspectives and contemporary insights.

With the objective of improving, it is environmental in the campus VJEC requested P S Quality Certifications to carry out an environmental audit of its campus at VJEC, Kannur. The objective of ‘Environmental Audit’ is to optimize the use of all forms of resources such as energy, water, materials and surroundings. It would also help to reduce/eliminate the adverse impact of their use. More importantly, the recommendations from the audit would result in significant cost benefits for VJEC. Accordingly, the audit team conducted the audit with an intensive field study. This report is based on field study and subsequent analyses of data.

1.2 SCOPE OF THE STUDY

The green audit was conducted with the following scope of work to cover the impact of resources used in various areas of the campus.

- Conducted 'Awareness Programme on 'green audit '
- Assess the inputs, outputs and wastage for each resource usage area
- Asses water management practises
- Asses the solid waste management practices
- Evaluate the compliance with regulatory and other requirements
- Analyse the air and noise pollution in the campus
- Assess the green cover and plant diversity.
- Evaluate the performance of sewage treatment system
- Identify measures for improving the campus environment

1.3 AUDIT APPROACH

Green Audit is a process of systematic identification, quantification, recording, reporting and analysis of components of environmental diversity of various establishments. It aims to analyse environmental practices within and outside of the concerned sites, which will have an impact on the eco-friendly ambience.

Green audit can be a useful tool for a college to determine how and where they are using the most energy or water or resources; the college can then consider how to implement changes and make savings. It can also be used to determine the type and volume of waste, which can be used for a recycling project or to improve waste minimization plan. It can create health consciousness and promote environmental awareness, values and ethics. It provides staff and students better understanding of Green impact on campus. If self-enquiry is a natural and necessary outgrowth of a quality education, it could also be stated that institutional self-enquiry is a natural and necessary outgrowth of a quality educational institution. Thus, it is imperative that the college evaluate its own contributions toward a sustainable future. As environmental sustainability is becoming an increasingly important issue for the nation, the role of higher educational institutions in relation to environmental sustainability is more prevalent.

Goals of Green Audit

- The objective of carrying out Green Audit is securing the environment and cut down the threats posed to human health.

- To make sure that rules and regulations are taken care of
- To avoid the interruptions in environment that are more difficult to handle and their correction requires high cost.
- To suggest the best protocols for adding to sustainable development

Benefits of Green Audit

- It would help to prepare plan to protect the environment.
- Recognize the cost saving methods through waste minimization and management.
- Point out the prevailing and forthcoming impacts on environment.
- Ensures conformity with the applicable laws.
- Empower the organizations to frame a better environmental performance.
- It portrays a good image of an institute, which helps building better relationships with the group of interested parties.

The audit was carried out by undertaking a field visit to the site during April 2023. During the field visit, a number of on-site measurements were taken and observations made for various equipment in the campus along with collection of resource consumption, equipment and operational data from the administration and technical departments. Discussions were held with concerned Technical / Managerial staff to fully understand the working requirements to arrive at practically reliable solutions. The audit team collected relevant data and made key measurements.

The following areas were covered as part of the study:

- Bio diversity and ecology
- Carbon footprint
- Health and hygiene
- Flora and fauna
- Water use, distribution and management
- Solid waste generation and disposal
- Air and noise pollution assessment
- Assessment of compliance requirements
- Waste water disposal
- E- waste management

After carrying out the measurement & field study, the preliminary observations of the study were discussed with the management. The report presents the field measurements, operation

data, data analysis, key observations made, and recommendations for achieving optimum use of resources and for mitigating adverse impact on environment. The recommendations are followed by cost-benefit analysis. Major emphasis is laid on short and medium term measures. The ultimate aim of this exercise is to enable the management to understand and prioritize environmental improvement measures identified through the study.

1.4 CAMPUS DESCRIPTION

Vimal Jyothi Engineering College (VJEC) is an educational project of the Archdiocese of Thallassery established in the year 2002 and is managed by Meshar Diocesan Educational Trust. The college is approved by AICTE and affiliated to APJ Abdul Kalam Technological University (KTU). VJEC is a self-financing catholic minority institution aiming at generating fervor for Engineering and Technology in students. Here we inspire, nurture and foster them to realize their career potential in the field of Engineering and Technology.

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The institution offers ten undergraduate programs in engineering and two post graduate programs. Six undergraduate programs, CE, ME, CS, EC, EE and AE are accredited by NBA, New Delhi.

1.5 SOURCES OF ENVIRONMENTAL IMPACTS

The major sources of environmental impact are water use, energy use, solid wastes, effluents, air pollution and noise.

Campus Environment System

2.1BIO DIVERSITY

Biodiversity is the amount of variety of life on Earth. It is the number of different species of plants, animals, and microorganisms. It includes organisms from Earth's vastly different ecosystems, including deserts, rainforests, coral reefs, grasslands, tundra, and polar ice caps. Biodiversity contributes to ecosystem as follows:

- Increase ecosystem productivity; each species in an ecosystem has a specific niche a role to play.
- Support a larger number of plant species and, therefore, a greater variety of crops.
- Protect freshwater resources.
- Promote soils formation and protection.
- Provide for nutrient storage and recycling.
- Aid in breaking down pollutants.
- Contribute to climate stability.
- Speed recovery from natural disasters.
- Provide more food resources.
- Provide more medicinal resources and pharmaceutical drugs.
- Offer environments for recreation and tourism.

Despite being in the thick of the city, VJEC boasts of wide bio diversity due to its vast greenery and the water body nearby.

2.2 IMPORTANT PLANT SPECIES IN THE CAMPUS

Trees play a critical role for people and the planet. Numerous studies have demonstrated that the presence of trees and urban nature can improve people's mental and physical health, children's attention and test scores, the property values in a neighborhood, and beyond. Trees cool our urban centers. Trees are essential for healthy communities and people. The benefits that trees provide can help cities and countries meet 15 of the 17 internationally supported United Nations Sustainable Development Goals.

The VJEC campus has a good species diversity. Species diversity is a measurement of an ecosystems species richness and species evenness. Species richness refers to number of different species in an eco-system. Species evenness is the variation in the abundance of individuals per species within the community.

DESCRIPTION- FLORA	**QTY**
Banana	26
Jack	6
Mango	221
Peepal Tree	4
Neam	30
Banyan Tree	4
jamun tree	20
Guava	10
Pomegranate	5
Sandalwood tree	1
Coconut	228
Ashoka tree	171
kapok silk cotton tree	1
Fig Tree	1
Golden shower	90
Indian Almond tree	16
Pungam	42
Poo arasan	3
Bamboo Tree	79
Teak	119
Pupal tree	4
Dwarf schefflera	8
Mimusops elengi	27
Malaysian Wood	31
Ornamental Plants	748
Fan palm	61
Total	**1956**

By increasing the species diversity in its ecosystem, VJEC has increased both the efficiency and productivity, thus making more resources available for other species within the ecosystem.

2.3 NAMING OF PLANT SPECIES

Binomial Nomenclature is a widely used, formal system of naming a species. The nomenclature consists of two names, both of which are derived from Latin. However, it can be derived from other languages too. Such a name is called a binomial name or a scientific name.

The generic name or the initial part of the name highlights the genus to which an organism belongs. The second part, or the specific name, identifies the exact species to which the organism falls under, within the genus. The botanical names of various plant species in VJEC campus are given in the following table.

Sl.No	Common Name	Botanical Name	Total Number of trees available
1	Neem Tree	Azadirachta indica	30
2	Bullet Wood Tree	Mimusops elengi	27
3	Jack Fruit Tree	Artocarpus heterophyllus	6
4	Banana Tree	Musa paradisiaca	26
5	Banyan Tree	Ficus benghalensis	4
6	Jamun Tree	Syzygium cumini	20
7	sandalwood Tree	Santalum album	1
8	Fig Tree	Ficus Rellussa	1
9	Peepal Tree	Ficus religiosa	4
10	Guava tree	Psidium guajava	10
11	Pomegranate Tree	Punica granatum	5
12	Thorny Bamboo	Bambusa Velgarius	79
13	Indian-almond	Terminalia catappa	16
14	kapok silk cotton tree	Ceiba pentandra	1
15	Poovarasan tree	Thespesia Populnea	14
16	Pungam Tree	Millettia pinnata	45

17	Sapodilla Tree	Manilkara zapota	24
18	Thankani Tree	Casuea Fislula	90
19	Deek Tree	Deek	119
20	Hors Deng	Umbrala Tree	8
21	Pathari Tree	Spothida companilata	31
22	Ashoka Tree	Poliyanthea lanehpolia	171
23	Mango Tree	Mangifera indica	221
24	Coconut Tree	Cocos nucifera	10
25	Visiri Vazai	Ravenala form	61
26	Ornamental Plants	Victoria Amazonica	748
	Total		**1956**

2.4 LISTING OF AMPHIBIANS, REPTILES, MAMMALS ETC.,

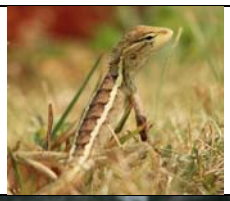
Amphibians play a pivotal role in ecosystem as secondary consumers in many food chains. Tadpoles have significant impact in nutritional cycling. They are herbivorous to omnivorous and are the prey items for both invertebrates and vertebrates. Adult amphibians are the best biological pest controllers. Invertebrates and vertebrates also predate them. Because of their importance in ecosystem, decline or extinction of their population has significant impact on other organisms along with them.

From the ecological perspective, amphibians are regarded as good ecological indicators. Due to high degree of sensitivity, either during tadpole stage or as adults, they respond to very slight change in the environment. Such responses have been used to indicate habitat fragmentation, ecosystem stress, impact of pesticides, and various anthropogenic activities.

Mammals always play a vital role for whichever ecosystem they live in. Mammals are typically important for maintaining services and functions associated with sustaining a balanced ecosystem, such as playing the prey-predator role in the environment, seed dispersal.

Reptiles play an important role in the balance of an Ecosystem. In most ecosystems, reptiles are the vital part of food chains and they play a huge role as both the prey species and the predators in ecosystems. They also play the role of a pollinator. The reptiles eliminated many serious agricultural pests.

The list of various amphibians. Mammals and reptiles spotted in VJEC campus is given in the following table.

Species	Zoological name	Picture
Cow	Bos indicus	
Rat snake	Ptyas mucosa	
Squirrels	Sciuridae	
Rat	Rattus	
Garden Lizard	Calotes versicolor	
Stray dogs	Canis lupus familiaris	
Monkey	Cercopithecidae	

2.5 LIST OF BIRD DIVERSITY

Birds occupy many levels of trophic webs, from mid-level consumers to top predators. As with other native organisms, birds help maintain sustainable population levels of their prey and predator species and, after death, provide food for scavengers and decomposers. Many birds are important in plant reproduction through their services as pollinators or seed dispersers. Birds also provide critical resources for their many host-specific parasites, including

lice that eat only feathers, flies adapted for living on birds, and mites that hitchhike on birds from plant to plant and even between countries.

Bird's name	**Zoological name**	**Picture**
Woodpecker	Picidae	
Indian cuckoo	Cuculus micropterus	
Indian sparrow	Passer domesticus	
Common myna	Acridotheres tristis	
Pigeon	Columba livia	
Parrot	Psittacula eupatria	
Crow	Corvus	

GREEN COVER

VJEC maintains a variety of trees and botanical gardens containing several plants and shrubs. About 25% of the total area is under green cover. The dense green cover of the campus is visible in the satellite image shown below.

Vimal Jyothi Engineering College, Kannur located in pollution free area with adequate natural vegetation.

Signature Not Verified

Principal.VJEC

It is also an active participant of Swachh Bharat Mission (SBM). Swachh Bharat Abhiyaan or Clean India Mission is a countrywide campaign initiated by the Government of India in 2014 to eliminate open defecation and improve solid waste management. The mission is aimed at progressing towards target 6.2 of the Sustainable Development Goals Number 6 established by the United Nations in 2015.

To nurture the growth of the plants and to dispose the garden waste. VJEC has created a system for composting. Compost is a type of organic matter that can be added to soil to help plants grow.

Composting involves decomposition of flowers, leaves, grass scrapings and yard trimmings over time to create a nutrient-rich organic material that can be added to the soil. The practice decreases the waste generated in the campus. The advantages of composting include

- **Waste reduction.** Composting allows recycle of natural wastes helps minimize the environmental impact. Otherwise, these wastes were being burnt resulting in air pollution and degradation in aesthetic environment.
- **Soil enrichment.** Compost helps soil retain more moisture and nutrients. It also prevents erosion by breaking up compacted soil.
- **Lower need for synthetic fertilizers.** Unlike many synthetic fertilizers, compost is free of harmful chemicals and adds organic material to the soil

2.6 CAMPUS HYGIENE

Ensuring that the college is well maintained is not only conducive to productivity; it also increases the likelihood of attracting more students. Though everyone aims to keep themselves personally very clean, not much importance is given for keeping the surroundings clean. The sources of water are constantly being polluted. Unhygienic surrounding invites mosquitoes and flies. Environmental hygiene or sanitation thus helps to reduce the incidences of those diseases, which are commonly acquired or transmitted through contaminated water, food and drinks. These include gastrointestinal diseases like diarrhoea, dysentery, cholera etc. and insect-borne infections like malaria, dengue, plague, filariasis, etc. Because of its universal use, water can be the channel for spreading various diseases like typhoid, cholera, dysentery etc.

VJEC has a campus-cleaning schedule in place, which enables it to maintain highest standards of hygiene and sanitation.

2.7 CARBON FOOT PRINT AUDITING

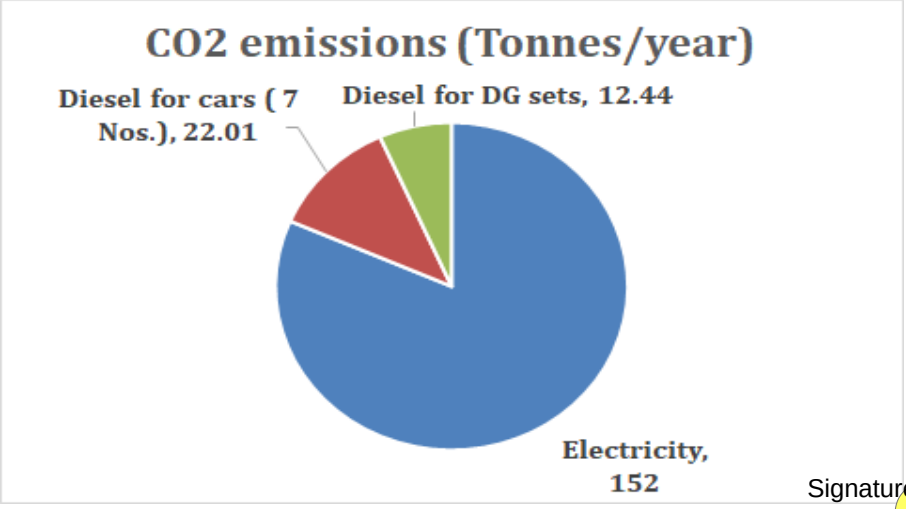
According to World Health Organization (WHO), a carbon footprint is a measure of the impact and organization's activities have on the amount of carbon dioxide (CO2) produced through the burning of fossil fuels and is expressed as a weight of CO2 emissions produced in tonnes per year. The emissions can be direct or indirect. Direct emissions include the use of energy and transport. The use of electrical energy in the premises is also taken into account as its generation at the source emits carbon di oxide. Indirect emissions for example, pertains to energy consumed in the manufacture of various materials used in the campus and also transport emissions of the students/staff using public transport, visitors and other service providers visiting the campus.

The main source of energy used in the campus is electricity from Kerala State Electricity Board Limited (KSEB). In times of power shutdown, the Diesel Generators are operated which use HSD as a fuel. Diesel is also used for cars used by VJEC.

The annual energy consumption for the plant during the year 2022-23 is given below in the table.

Energy source	**Annual Quantity**	**Annual Cost**	**CO_2 emissions (Tonnes/year)**
Electricity	1,84,873 kWh	Rs.15,71,667	152
Diesel for cars (7 Nos.)	8340 litres	Rs. 5,75,460	22.01
Diesel for DG sets	4713 litres	Rs. 3,29,910	12.44
Total		**Rs. 24,77,037**	**186.45**

Thus, the VJEC campus emits 186.45 Tonnes of CO2 per year only through its energy use.



CO2 sequestration

S.No	Common Name	CO2 sequestered kg per year	Total Number of trees available	Total CO2 sequestered
1	Banana	*55*	26	1430
2	Jack	*37*	6	222
3	Mango	*44*	221	9724
4	Peepal Tree	*13*	4	52
5	Neam	*17*	30	510
6	Banyan Tree	*7*	4	28
7	jamun tree	*35*	20	700
8	Guava	14	10	140
9	Pomegranate	*8*	5	40
10	Sandalwood tree	*21*	1	21
11	Coconut	*42*	228	9576
12	Ashoka tree	*23*	171	3933
13	kapok silk cotton tree	*16*	1	16
14	Fig Tree	*8*	1	8
15	Golden shower	*17*	90	1530
16	Indian Almond tree	*32*	16	512
17	Pungam	*34*	42	1428
18	Poo arasan	*26*	3	78
19	Bamboo Tree	*2*	79	158
20	Teak	*34*	119	4046
21	Pupal tree	*17*	4	68
22	Dwarf schefflera	*12*	8	96
23	Mimusops elengi	*22*	27	594
24	Malaysian Wood	*16*	31	496
25	Ornamental Plants	*0.5*	751	375.5
26	Fan palm	*3.1*	61	189.1
Total CO2 sequestered in the campus per year				4264102

The Matured Trees contributes for reduction of 42.64 Tons of CO2 emission/Annum

CO2 absorption by trees and plants has been calculated as per the methodology given in Annexure – 1.

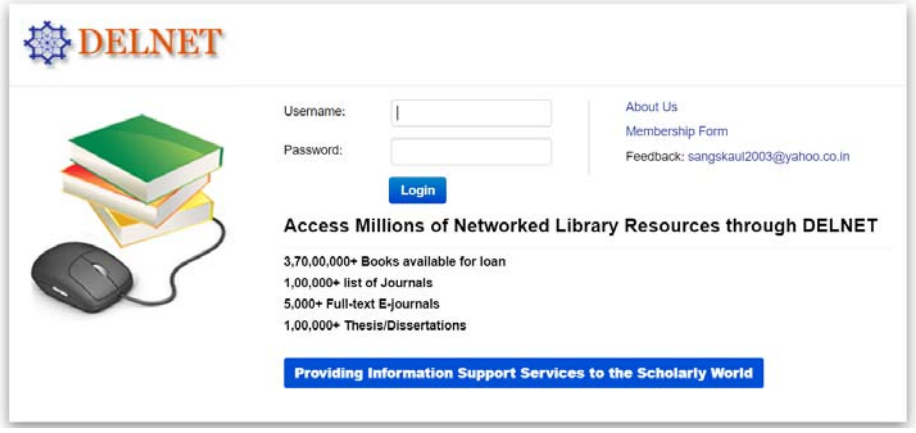
The total CO2 emissions from the campus is 186.45 Tonnes per year. Due to the greening activities, the CO2 absorption in the campus is 42.64 Tonnes per year.

2.8 HEALTH HAZARDS AND RISK/SAFETY ASSESMENT

Students, staff, and faculties are involved in activities that exposed them to a range of minor to severe or even fatal accidents in academic settings. Managing work environment risks is crucial to any safety and health prevention program. Working activities in academic sites, such as laboratory, may be accompanied by a variety of hazardous risks. While students, staff, and faculties need to stay alert and aware at all times to avoid accidents, the administration needs to know the most common causes for college accidents and be able to identify in advance the risk factors to prevent them

2.9 REDUCTION IN PAPER USE

VJEC has been using paperless office concept through its electronic documentation management environment, which provides an alternative to the workflow and storage issues associated with paper files. This helps in combating deforestation by cutting down the demand on paper, which is mostly made available through deforestation. The effects of deforestation on the global environment have been adverse and consequently affected the survival of humans and other organisms on the planet. Reducing the demand for paper enhances the greening and is a practical action towards reversing the climate change effects with far reaching impacts on the survival of various species. The following screenshots evidence the use of software that seek to displace paper.



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Engineering College Chemperi

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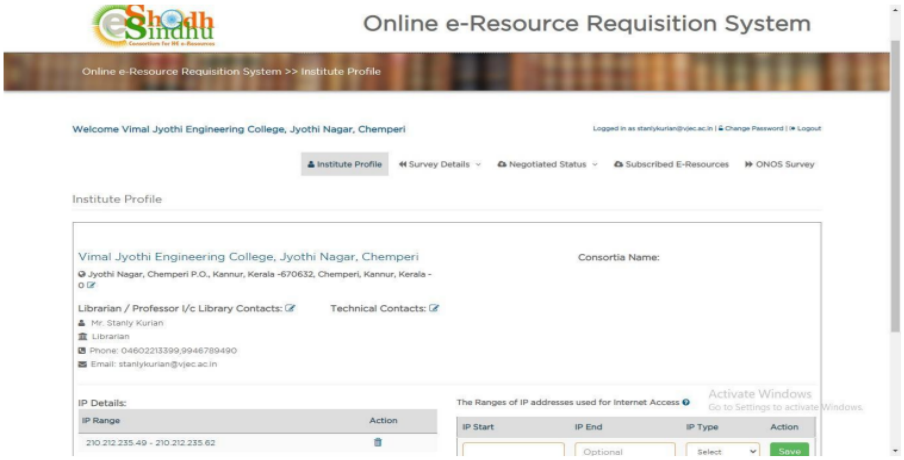

Signature Not Verified

Principal.VJEC

Best practices and recommendations

3.1 Best Practices

Restricted entry of automobiles

The college does not allow entry to all vehicles inside the campus. Only the fraternity of college can enter with their vehicles. In the college campus, only restricted automobiles can enter and most of them park in the parking area. This results in safety as well as reduction in air pollution. The measure also does not disturb the species thronging the campus.

Landscaping

Every year during rainy season, college takes the initiative of plantation inside the college campus. It has nursery and promote different NGO and institute for plantation. College takes the advantage of free plant from nursery and plantation takes place every year inside the campus.

Effective waste segregation

Due to persistent awareness and creation of a system, methodical waste segregation is in practice.

Recommendations

- Promote reuse of one-side used paper
- Reuse envelopes that are received by the university
- Encourage planting of fruit bearing trees which can be used by campus residents
- Declare the campus plastic free and implement it thoroughly
- Formulate an environment policy for the college
- Establish a system for safe disposal of an E-waste

- Energy Efficiency: Assess the organization's energy usage and identify areas for improvement. Recommend installing energy-efficient lighting, upgrading HVAC systems, and implementing smart energy management systems to optimize energy consumption.
- Renewable Energy Sources: Explore the possibility of integrating renewable energy sources like solar panels or wind turbines. Calculate potential savings and environmental benefits that can be achieved through the adoption of clean energy.
- Waste Management: Evaluate the organization's waste management practices. Recommend implementing recycling programs, composting initiatives, and reducing single-use items. Encourage the use of eco-friendly materials and proper disposal methods.
- Water Conservation: Analyze water consumption and identify strategies to conserve water. Suggest installing low-flow fixtures, implementing rainwater harvesting systems, and raising awareness about water-saving habits among employees.
- Transportation and Commuting: Assess the organization's transportation practices. Encourage carpooling, public transportation usage, and the adoption of electric or hybrid vehicles. Promote remote work options to reduce commuting-related emissions.

- Sustainable Procurement: Review procurement policies and recommend sourcing products and services from environmentally responsible suppliers. Encourage the use of recycled materials, energy-efficient equipment, and eco-friendly packaging.

- Employee Engagement: Develop awareness campaigns and training programs to educate employees about sustainable practices. Encourage them to participate in green initiatives and provide incentives for eco-friendly behaviour.
- Monitoring and Reporting: Implement a system to regularly monitor and report on sustainability metrics. This will help track progress, identify areas for further improvement, and demonstrate the organization's commitment to sustainability.

Annexure-1

How to calculate the amount of CO2 sequestered in a tree per year

It is estimated that our agroforestry trees, planted in tropical climates, will sequester atmospheric carbon dioxide at an average of 50 pounds of carbon dioxide per tree per year. The rate of carbon sequestration depends on the growth characteristics of the tree species, the conditions for growth where the tree is planted, and the density of the tree's wood. It is greatest in the younger stages of tree growth, between 20 to 50 years.

The methodology is explained below

1. Determine the total (green) weight of the tree.
2. Determine the dry weight of the tree.
3. Determine the weight of carbon in the tree.
4. Determine the weight of carbon dioxide sequestered in the tree
5. Determine the weight of CO2 sequestered in the tree per year

Determine the total (green) weight of the tree

The algorithm to calculate the weight of a tree is:

W = Above-ground weight of the tree in pounds

D = Diameter of the trunk in inches

H = Height of the tree in feet

For trees with D < 11:

W = 0.25D2H

For trees with D >= 11:

W = 0.15D2H

Depending on the species, the coefficient (e.g. 0.25) could change, and the variables D2 and H could be raised to exponents just above or below 1. However, these two equations could be seen as an “average” of all the species’ equations.

The root system weighs about 20% as much as the aboveground weight of the tree.

Therefore, to determine the total green weight of the tree, multiply the aboveground weight of the tree by 120%.

Determine the dry weight of the tree

This is based on an extension publication from the University of Nebraska.

This publication has a table with average weights for one cord of wood for different temperate tree species. Taking all species in the table into account, the average tree is 72.5% dry matter and 27.5% moisture.

Therefore, to determine the dry weight of the tree, multiply the weight of the tree by 72.5%.

Determine the weight of carbon in the tree

The average carbon content is generally 50% of the tree's total volume.

Therefore, to determine the weight of carbon in the tree, multiply the dry weight of the tree by 50%.

Determine the weight of carbon dioxide sequestered in the tree

CO_2 is composed of one molecule of Carbon and 2 molecules of Oxygen.

The atomic weight of Carbon is 12.001115.

The atomic weight of Oxygen is 15.9994.

The weight of CO_2 is C+2*O=43.999915.

The ratio of CO_2 to C is 43.999915/12.001115=3.6663.

Therefore, to determine the weight of carbon dioxide sequestered in the tree, multiply the weight of carbon in the tree by 3.6663.

Determine the weight of CO_2 sequestered in the tree per year

Divide the weight of carbon dioxide sequestered in the tree by the age of the tree.

ENERGY AUDIT REPORT

DETAILS OF THE CLIENT

VIMAL JYOTHI ENGINEERING COLLEGE

Chemperi (PO), Kannur - 670632, Kerala, India.

Approved by AICTE, New Delhi | Affiliated to APJ Abdul Kalam Technological University (KTU).

VIMAL JYOTHI
ENGINEERING COLLEGE
JYOTHI NAGAR, CHEMPERI – 670632, KANNUR, KERELA
Affiliated to APJ Abdul Kalam Technological University, Approved by AICTE
ISO 9001 : 2015 Certified | Accredited by Institution of Engineers (India), NBA, NAAC
Ph: 0490 2212240, 2213399 Email: office@vjec.ac.in Website: www.vjec.ac.in

DATE OF AUDIT

17/04/2023 to 18/04/2023

(Audited and Accounted for the period of 2022-23)

AUDIT CONDUCTED AND SUBMITTED BY

P S QUALITY CERTIFICATION PVT LTD

No.415, F4, Ist Floor, Asha Vignesh Apartment, Ambattur, Tamil Nadu 600 053.

Mobile: +91- 81240 88335, 044 - 4959 1335

LEAKS MAKE YOUR FUTUR25E

BLEAK.....

Signature Not Verified

Principal.VJEC

EXECUTIVE SUMMARY

Electrical and Thermal Energy Process

A detailed was conducted in **Vimal Jyothi Engineering College.** The audit team has identified ***12 Energy Conservation Proposals (ENCONs)*** and summary of the Energy Audit Process is given below.

Description/Year	2021-22	2022-23
Annual Electricity Consumption (kWh)	93,168	55,500
Annual LPG Consumption (kg)	9,240	8568

Summary of Energy Conversion (ENCON) Proposals		
Description	**Parameters**	
	Present	**After**
Annual Energy Consumption	93,168 kWh + 9240 Kg of LPG	55500 kWh + 8568 kg of LPG
Annual Energy Cost	Rs. 24.61 lakhs	Rs. 11.93 lakhs

Equipment's/Systems Audited:

Electrical System	Thermal System
• All major electrical equipment's	• Inverter, UPS and Battery System
• Electrical distribution system	• Diesel generators, Pumps and motors
• Lightings, Fans & Air Conditioning system	• Roof top solar PV system
	• LPG for cooking application

The detailed Energy Conservation Proposals are presented in the Audit Report.

Audit Conducted, Complied and Verified by,

(Mr. G. ARIVARASAN)
BEE Certified Energy Auditor (EA-21875)
Lead Auditor–ISO 14001, EMS
P S QUALITY CERTIFICATION PVT. LTD.
(Consultancy – Accreditation & Certification) Auditing & Training
E-mail: info@psqualitycertifications.com
Web Site: www.psqualitycertifications.com
CIN: U74999TN2020PTC138625

Contents

Executive Summary

This section presents a brief summary of the results of the detailed energy audit carried out at VJEC, Kannur during April 2023.

The audit was mainly targeted at identifying practical, sustainable and economically viable Resource saving opportunities in all sections of the facility, resulting from a detailed study and analyses of technical parameters. The audit involved using a wide range of sophisticated, portable, diagnostic and measuring instruments to generate refined data and facilitate complex analyses to give a more reliable basis for evaluation of energy saving potential and economic viability.

VJEC has its building located at Chemperi, Kannur, Kerala. The building occupies an area of 30 Acers. The main energy source to the facility is electricity, which is obtained from Kerala State Electricity Board Limited (KSEB). The institute has three DG set for back-up power of 62.5,125,250 KVA. The following table gives total cost of energy sources of the last three years i.e., 2021, 2022, and 2022.

The study has identified an annual energy saving potential of 252207 kWh (amounting to Rs.20.46 lakhs and 10 % of the total bill) of electricity with involvement of technology change. The total cost of implementation for the proposals is estimated to be Rs. 55.53 lakhs.

A summary list of recommendations, the saving potential and implementation cost is given In the next page. The details of various proposals are given in detail in this report:

Summary of recommendations

S.No	Particulars	Energy Savings, kWh/year	Cost Savings, Rs. Lakh(s)/year	Investment Rs. Lakh(s)	Payback Period, months
1	Increase temperature setting of air conditioners to 25^0C	69120	5,52,296	nil	nil
2	Replace 40 W Fluorescent tube lights by 26 w led tube lights	45360	3,62,880	1,81,440	12
3	Replace existing ceiling fans by energy efficient BLDC FANS.	74,367	5,94,936	74,37,000	108
4	Install a 60 kw solar power plant in the terrace of the building	63,360	5,38,560	36,00,000	91

Annual Monetary savings – Rs. 20.49 Lakhs

CHAPTER 1

Introduction

1.1 BACKGROUND

Vimal Jyothi Engineering College (VJEC) is an educational project of the Archdiocese of Thallassery established in the year 2002 and is managed by Meshar Diocesan Educational Trust. The college is approved by AICTE and affiliated to APJ Abdul Kalam Technological University (KTU). VJEC is a self-financing catholic minority institution aiming at generating fervor for Engineering and Technology in students. Here we inspire, nurture and foster them to realize their career potential in the field of Engineering and Technology.

With profound insight into the resource requirements of the higher education system, VJEC has proudly set up world-class infrastructure complemented with intellectual capital in the form of competent faculty.

Digital library, industry supported project labs, language lab, and student chapters of professional bodies such as IEEE, ISOI, IETE, SAE, and CSI offer an extensive range of resources, opportunities and services to the outcome based teaching learning process. Effective implementation of quality control processes ensure Engineering graduates with the expected level of knowledge, skill and attitude.

The institution offers ten undergraduate programs in engineering and two post graduate programs. Six undergraduate programs, CE, ME, CS, EC, EE and AE are accredited by NBA, New Delhi.

Vimal Jyothi Engineering college is an emerging institute of excellence in Engineering Education located on the Chemperi, Kannur, Kerala. The VJEC campus has a beautiful and serene atmosphere ideally suited for technical education. The infrastructure and facilities available on campus are amongst the very best. It is a wholly self-contained campus comprising of everything that students on campus would ever require.

In order to take care of aesthetic dimensions of the campus, considerable efforts have been made in the recent past to beautify the campus. Greenery in terms of the grass, permanent green plants, trees and flowers have been laid down all over the campus. Horticulture maintenance and development has been meticulously monitored to keep up with the changing weather.

VJEC provides full-fledged and marvelous infrastructure. A sprawling 30 acres campus located in the foothill of Western Ghats with lush greenery. Spacious and well-furnished Class Rooms, seminar halls, Department library, Central Library, Digital Library and E-Learning Resources. Adequate number of ICT enabled classrooms/Tutorial rooms for each department. Centralized computer centre, well-equipped laboratories with exclusive machines and major equipments. The Administrative Office, Board room, HOD's Cabins, individual cubicle of faculty are well equipped and having internet connectivity. Library constructed in 1000 sq mt of carpet area with 325 sq mt of reading space and 200 seating contains 46152 books Digital library facility to access e-journals & e-books. Air conditioned conference Halls, Interview Rooms, Auditoriums, Laboratories, IEDC Cell, Placement Cell, R&D Cell, Examination Cell etc., Research lab/project lab for each department Well equipped Laboratories with state of art equipments. Comfortable sick rooms, prayer halls for all religions and amenities Availability of indoor and outdoor sports facilities. Psychiatric Counselor for students. Bank along with ATM, Postal Service, Reprographics, Stationery store etc are available Round a clock internet facility with 600 Mbps Speed for more than 700 computers with 24 hour power backup. 50KWh energy through in house solar power generation. Three diesel generators with capacity 62.5,125,250 KVA ensures the uninterrupted power supply.

The institution provides diverse facilities to support academic and administrative activities:

Seminar Halls and Board Rooms: Equipped with ICT facilities, these spaces cater to academic discussions and conferences. Multipurpose Hall: Designed for large gatherings(up to 1500), this hall accommodates various events and activities. Training and Placement Center: Focused on career development, this center plays a crucial role in connecting students with industry opportunities. Interactive Classrooms: Specially designed for academic activities and conferences, these rooms enhance engagement and collaborative learning. Sports Facilities: Outdoor sports amenities include a 200-meter track, football and cricket fields, volleyball and basketball courts, badminton courts, and kho kho grounds. Gymnasium: A well-equipped gymnasium featuring multi-gym stations, weight training equipment, and facilities for various exercises, promoting physical fitness among students. Hostels: Separate hostels for boys and girls, along with staff quarters, contribute to a conducive living environment. Cafeteria, Parking, and General Stores: Essential amenities for the convenience of students and staff. Industry-Supported Labs: Collaboration with industries enriches laboratory facilities, ensuring relevance to real-world applications. Infrastructure for Sustainability: Energy conservation units, including a grid-connected solar power plan

(50KW), biogas plant, rainwater harvesting (35L Ltrs), and wastewater treatment plant, underscore the commitment to environmental responsibility. Facilities for Differently Abled: Ensuring inclusivity, the institution provides facilities that cater to the needs of differently-abled individuals such as ramps, lift and toilet for differently abled.

Vimal Jyothi Engineering College has strategically developed its infrastructure to create a holistic educational environment that nurtures academic excellence, technological proficiency, and overall well-being. The institution's commitment to sustainability, inclusivity, and a balanced curriculum is reflected in its state-of-the-art facilities and resources.

Vimal Jyothi Central Library, spanning 1000 sqm across two floors within the administrative block, stands as a hub for knowledge and research in the institution. Leveraging digital technology, the library has adopted an Integrated Library Management System (ILMS) and offers seamless access to an extensive array of e-resources, journals, and books. The library is an integral part of the academic ecosystem, fostering a culture of continuous learning and research. Physical Library Infrastructure: The library, with a seating capacity for 200 users, subscribes to 92 journals and has a collection of 46,152 volumes encompassing 30,181 titles across diverse domains of Science and Technology. Organized using the Dewey Decimal Classification Scheme, the library adopts an open access system for easy navigation and accessibility for all users. Digital Transition and ILMS: In a strategic move to enhance library services, the institution transitioned from Del Plus & New Gen Lib to the leading Library Management Software, KOHA, in 2021. This transition, supported by a Cloud Server, has streamlined library operations, including membership registration and the issue/return of books. Barcode technology facilitates efficient tracking, with students using barcoded identity cards for library membership. Online Public Access Catalog (OPAC): The library's Online Public Access Catalog (OPAC) is accessible remotely via [https://library.vjec.ac.in/], providing users with the flexibility to explore the catalog and resources from anywhere, both on and off the campus. A Touch Screen Kiosk further enhances accessibility for users seeking information within the library premises. Digital Library Platform and Connectivity: Collaborating with KTU, the library utilizes Knimbus as its primary digital library platform. Sixteen LAN-connected desktops equipped with Wi-Fi and internet facilities provide students and faculty with easy access to a plethora of library links, including DELNET, NDL, and NPTEL. The library ensures comprehensive coverage with a high-quality photocopier and scanner for duplicating hard copy materials. Webpage Integration and E-Resources: The library has a dedicated webpage integrated into th

college's website, serving as a gateway to all subscribed e-resources. This approach enhances visibility and accessibility to digital assets, ensuring that the academic community can seamlessly explore and benefit from the rich collection of online materials. E-Magazines and Additional Subscriptions: The College subscribes to Magzter, offering access to over 7500 online magazines, journals, newspapers, and e-books in multiple languages, including English, Hindi, and Malayalam. This extensive digital repository enriches the academic experience, providing students and faculty with diverse perspectives and contemporary insights.

With the objective of improving, it is environmental in the campus VJEC requested P S Quality Certifications to carry out an environmental audit of its campus at VJEC, Kannur. The objective of 'Energy Audit' is to optimize the use of all forms of resources such as energy, water, materials and surroundings. It would also help to reduce/eliminate the adverse impact of their use. More importantly, the recommendations from the audit would result in significant cost benefits for VJEC. Accordingly, the audit team conducted the audit with an intensive field study. This report is based on field study and subsequent analyses of data.

1.2 SCOPE OF THE STUDY

The energy audit was conducted with the following scope of work to cover the energy utilisation in various areas of the campus.

- Conducted 'Awareness Programme on 'Energy Conservation '
- Assess the inputs, outputs and wastage for each usage area
- Develop benchmarks for energy consumption
- Evaluate the tariff and optimisation of tariff
- Assess potential for renewable energy sources
- Evaluate the carbon footprint
- Identify energy saving measures
- Discussion and brainstorming of the measures evolved
- Cost benefit analysis of the evolved measures.

1.3 AUDIT APPROACH

As per the Energy Conservation Act, 2001 "Energy audit" means the verification, monitoring and analysis of use of energy including submission of technical report containing recommendations for improving energy efficiency with cost benefit analysis and an action plan to reduce energy consumption. The audit was carried out by undertaking a field visit to the site during April 2023. During the field visit, a number of on-site measurements were taken for various equipment in the campus along with collection of energy consumption, equipment and operational data from the administration and technical departments. Personnel Discussions were held with concerned Technical / Managerial staff to fully understand the working requirements to arrive at practically realizable solutions. The audit team collected relevant data and made key measurements.

The following areas were covered as part of the study:

- Tariff
- Electrical Systems : Distribution and management
- Air conditioners
- Lighting
- Ceiling and pedestal fans
- UPS
- Servo stabilisers
- Computers
- CCTV system
- DG sets

After carrying out the measurement & field study, the preliminary observations of the study were discussed with the management. The report presents the field measurements, operational data, data analysis, key observations made, and recommendations for achieving energy use efficiency for each of the above-mentioned equipment/area. The recommendations are followed by cost-benefit analysis. Major emphasis is laid on short and medium term measures. The ultimate aim of this exercise is to enable the management to understand and prioritize energy efficiency measures identified through the study.

1.4 CAMPUS DESCRIPTION

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The institution offers ten undergraduate programs in engineering and two post graduate programs. Six undergraduate programs, CE, ME, CS, EC, EE and AE are accredited by NBA, New Delhi.

1.5 ENERGY SOURCES

The main source of energy used in the campus is electricity from Kerala State Electricity Board Limited (KSEB). In times of power shutdown, the Diesel Generators are operated which use HSD as a fuel. Diesel is also used for buses and cars used by VJEC.

1.6 ENERGY CONSUMPTION & ENERGY COST

Annual energy consumption for the plant during the year 2022-23 is given below in the table.

Energy source	**Annual Quantity**	**Annual Cost**
Electricity	55,500kWh	Rs. 4,40,000
Diesel for cars	1746 litres	Rs. 1,83,330
Diesel for DG sets	4713 litres	Rs. 4,94,865
Total annual energy cost		**Rs. 11,22,195**

The electricity tariff of KPTCL applicable for VJEC is LT2B (Private Educational Institutions & Hostels). Accounting to the tariff one unit or kWh is charged at Rs.7.50. In addition, a fixed charge of Rs. 6720 is also charged. The connected load for VJEC is 315 kVA. The cost of diesel is Rs 105 per litre.

Campus Energy System

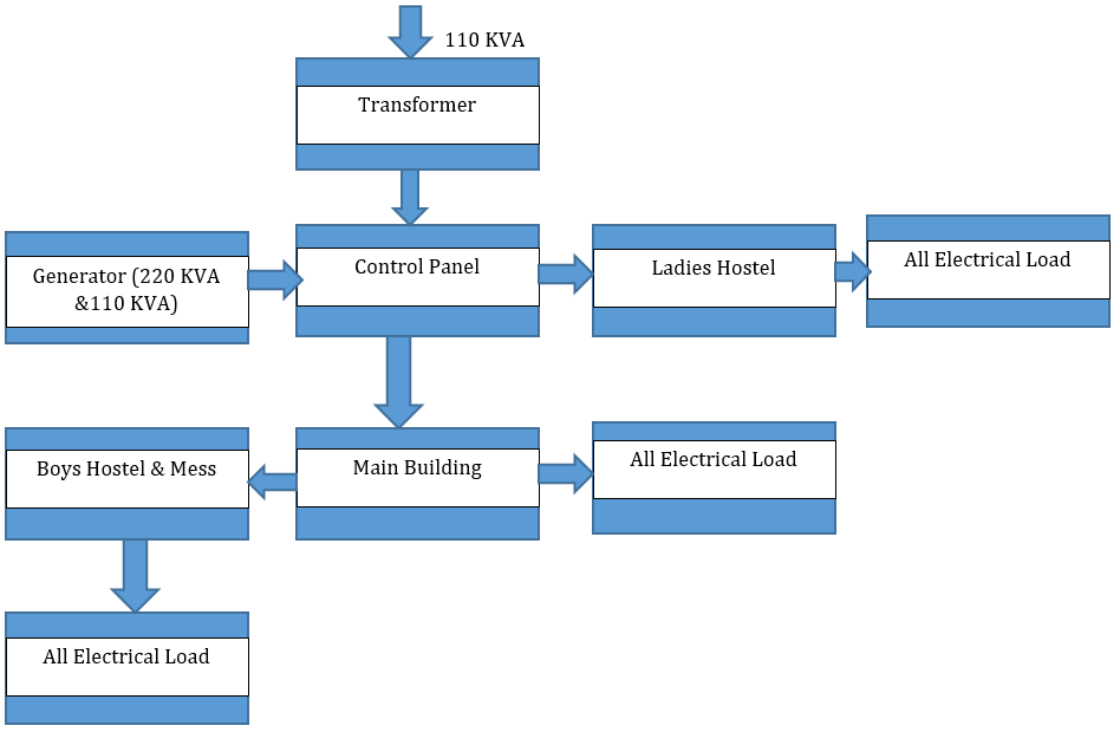
2.1 ELECTRICAL SYSTEM

VJEC has an LT connection with a connected load of 315 kVA Transformer with Kerala State Electricity Board Limited (KSEB). The service details are given below.

Tariff	Category of Consumer	Unit charges (Rs./kWh)	Fixed charges (Rs./kW)
LM2B2	Private Educational Institutions & Hostels	Rs.8.00	6720+Demand Charges

However, the supply is 3 phase most of the loads in use are of single phase. The premises has three DG set of 62.5,125,250 KVA, which acts a standby and is operated during power failure period from grid. The single line diagram of the electricity system is given below.

From the main panel board the incoming 3 phase 440 V supply three separate feeders supply power to College block and Hospital block. The three 62.5,125,250 KVA DG set is connected to the panel board through a bus coupler.



2.2 ELECTRICAL ENERGY USE PATTERN

The electrical energy consumption for various months is given in the following graph.

Energy consumption is found to be lower during the month of Apr-May, which could be due to lower energy requirements for air conditioners. The peak energy consumption is during the month of Feb-March in which 41744 kWh was consumed.

The energy cost varies directly in proportion to energy consumed. The energy bill consists of two components. The variable component, which depends on the energy consumed, determines the energy cost. The fixed component is to be paid at the rate of Demand Charges for a connected load of 315 kVA. This to be paid every month as fixed charges.

2.3 DIESEL GENERATING (DG) SETS

The plant is equipped with three DG set of 62.5,125,250 KVA. It is used in times of power cuts and power shortage. There is no metering and monitoring of electrical energy generated from DG set. However, the diesel consumption is monitored and the annual consumption is around 143.5 litres amounting to Rs. 15,067. The month wise diesel consumption is given in the figure below.

2.4 ENERGY BALANCE

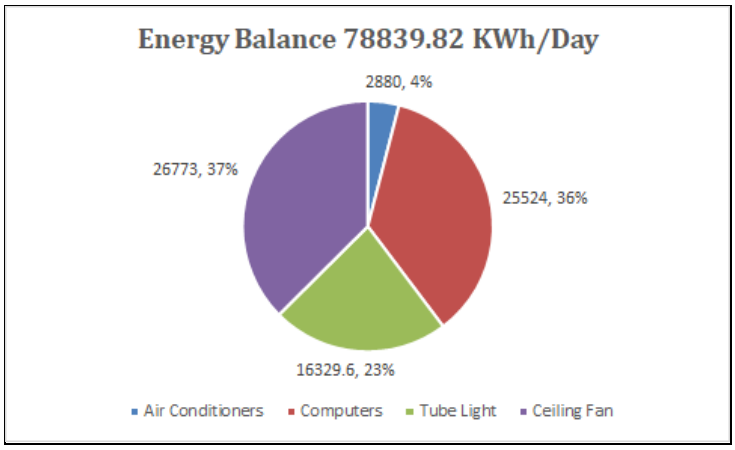
Energy balance entails analysis of the site's energy use, identifying the sources of energy, determining the amount of the energy supplied and detailing what the energy is used for. The power measurements have been taken for various loads and based on this an energy balance has been made. The energy balance details are shown in the following figure.

APPLIANCES	No. of Units	Power (Watts)	Total Power (Watts)	Avg. Usage/ day(Hrs.)	Avg. Energy Usage/ day(Kwh)	Avg. Energy Usage/ month(Kwh)
AirConditioner	48	1000	48000	2	96.00	2880.00
Celling Light LED	24	9	216	4	0.86	25.92
CFL	128	60	7680	4	30.72	921.60
Computer	709	200	141800	6	850.80	25524.00
Exhaust Fan	5	200	1000	6	6.00	180.00
Celling Fan	2479	60	148740	6	892.44	26773.20
Fridge	8	200	1600	12	19.20	576.00
Heater	6	1000	6000	4	24.00	720.00
LED Celling	7	18	126	6	0.76	22.68
LED Tube	451	20	9020	6	54.12	1623.60
Printer	42	150	6300	1	6.30	189.00
Projector	28	230	6440	3	19.32	579.60
Purifier	9	300	2700	24	64.80	1944.00
Speaker	80	6	480	1	0.48	14.40
Television	36	150	5400	3	16.20	486.00
Tubelight	2268	40	90720	6	544.32	16329.60
9W LED	31	9	279	6	1.67	50.22
Total Connected Load			**476501**	**Total Avg. Energy Usage/month**		**78839.82**

Total Connected Load - 476501 Watts

Average energy usage per month - 78839.82 KWH

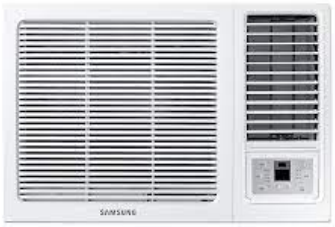
The energy balance shows the dominance of Ceiling fan which turns out to be energy guzzlers. They consume 37% of the total energy consumption. Lighting and fans also account for a significant portion of the energy consumed. The summary of the energy balance is shown in the following figure.



Energy Conservation Opportunities

3.1 INCREASE TEMPERATURE SETTING OF AIR CONDITIONERS TO 25^0C

Maximum energy is consumed by the air conditioners in the campus. The energy consumption of the AC's is very sensitive to the set temperature. Increasing the air-conditioner temperature setting by just 1^0C can save about 6 per cent of electricity consumption, according to the Bureau of Energy Efficiency. A temperature of 25^0C is sufficient to satisfy human comfort as per International stands. An increase from 21^0C to 25^0C will result in 24% saving in energy consumption. Hence, it is suggested to maintain a set temperature of 25^0C in all the air conditioners throughout the campus.



High energy guzzling window air conditioners.

Split air conditioners without any star rating.

Energy consumption for Air conditioners per day	96 kWh
Percentage energy savings by raise in the set temperature from 21^0C to 25^0C	24%
Annual energy savings	24% x 96 x 25 days x 12 months
	69120 kWh/year
Annual monetary savings	69120x 8.00
	Rs. 5,52,296

3.2 REPLACE 40 W FLOURESCENT TUBELIGHTS BY 26 W LED TUBELIGHTS

VJEC has already installed a number of LED tube-lights in an effort to save energy. However, there are still 2268 nos. of 36 W tube-lights, which consumes twice the energy needed for conventional tube-lights. It is suggested to replace these lamps by 26 W LED tube-lights as and when the existing tube fails.

Energy consumption for 40 W FTL lamps	544.32 kWh
Energy consumption by replacing existing lamps with 26 W LED.	544.32 x 26/36
	393.12 kWh
Energy savings per day	544.32 – 393.12 = 151.2 kWh
Annual energy savings	151.2 kWh x 25 days x 12 months
	45360 kWh/year
Annual monetary savings	45360 x 8.00
	Rs. 3,62,880
Investment	Rs. 1,81,440
Payback period	12 months

3.3 REPLACE EXISTING CEILING FANS BY ENERGY EFFICIENT BLDC FANS

VJEC has 2479 nos. of ceiling fans each of 60 W capacity. The energy consumption of ceiling fans is 892.4 kWh/day. It is suggested to replace the existing fans by more efficient Brush Less Direct Current (BLDC) fans which will consume only 26 W. Since the payback period is very high, only selected fans, which are continuously in operation, may be replaced initially.

Energy consumption for existing fans	892.4 kWh
Energy consumption by replacing existing fans with 26 W BLDC fans	892.4 x 26/60
	644.51 kWh
Energy savings per day	892.4 – 644.51 = 247.89 kWh
Annual energy savings	247.89 kWh x 25 days x 12 months
	74,367 kWh/year
Annual monetary savings	74,367 x 8.00
	Rs. 5,94,936
Investment @ Rs.3000 per fan	Rs. 74,37,000
Payback period	108 months

3.4 INSTALL A 60 KW SOLAR POWER PLANT IN THE TERRACE OF THE BUILDING

In order to promote the use of green energy, many establishments have installed solar PV systems. VJEC campus has adequate roof space to accommodate a 60 kW solar power plant. The system can be online with net metering or it can be connected to the LT side of the campus electrical network.

Average energy generation per kW of solar PV	4 kWh per day
Potential for energy generation with a 60 kW power plant.	60 x 4 = 240 kWh/day
Annual energy savings	240 kWh x 22 days x 12 months
	63,360 kWh/year
Annual monetary savings	63,360 x 8.50
	Rs. 5,38,560
Investment @ Rs.60,000 per kW	Rs. 36,00,000
Payback period	91 months

ENVIRONMENT AUDIT REPORT

VIMAL JYOTHI ENGINEERING COLLEGE

Chemperi (PO), Kannur - 670632, Kerala, India.

Approved by AICTE, New Delhi | Affiliated to APJ Abdul Kalam Technological University (KTU).

VIMAL JYOTHI
ENGINEERING COLLEGE
JYOTHI NAGAR, CHEMPERI – 670632, KANNUR, KERELA
Affiliated to APJ Abdul Kalam Technological University, Approved by AICTE
ISO 9001 : 2015 Certified | Accredited by Institution of Engineers (India), NBA, NAAC
Ph: 0490 2212240, 2213399 Email: office@vjec.ac.in Website: www.vjec.ac.in

DATE OF AUDIT

17/04/2023 to 18/04/2023

(Audited and Accounted for the period of 2022-23)

AUDIT CONDUCTED AND SUBMITTED BY

P S QUALITY CERTIFICATION PVT LTD

No.415, F4, Ist Floor, Asha Vignesh Apartment, Ambattur, Tamil Nadu 600 053.

Mobile: +91- 81240 88335, 044 - 4959 1335

PLASTIC POLLUTES OUR LANDS: WHY ARE THEY SEEN IN YOUR HAND?

Signature Not Verified

Principal.VJEC

Acknowledgements

P S QUALITY CERTIFICATION PVT LTD, No. 415, F4, I Floor, Asha Vignesh Apartment, Ambattur, Tamil Nadu 600 053 is thankful to the Management and Technical team members of **VIMAL JYOTHI ENGINEERING COLLEGE,** Kerala, India for providing an opportunity to conduct a detailed Green, Energy and Environment Audit process for the college premises.

It is our great pleasure, which must be recorded here that the management of **VIMAL JYOTHI ENGINEERING COLLEGE** extended all possible support and assistance resulting in expeditious completion of the audit process. The audit team appreciates the cooperation and guidance extended during course of site visit and measurements. We are also thankful to all those who gave us the necessary inputs and information to carry out this very vital exercise of green audit. Finally, we offer our sincere thanks to all the members in the Institution.

Audit Team Members	
Mr. G. ARIVARASAN	BEE Certified Energy Auditor (EA-21875) Lead Auditor-ISO-14001:2015 (EMS),

Audit Conducted, Complied and Verified by,

(Mr. G. ARIVARASAN)
BEE Certified Energy Auditor (EA-21875)
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CIN: U74999TN2020PTC138625

Signature Not Verified

Principal.VJEC

Contents

Executive Summary

This section presents a brief summary of the results of the detailed green audit carried out at VJEC, Kannur during April 2023.

The audit was mainly targeted at identifying practical, sustainable and economically viable Resource saving opportunities in all sections of the facility, resulting from a detailed study and analyses of technical parameters. The audit involved using a wide range of sophisticated, portable, diagnostic and measuring instruments to generate refined data and facilitate complex analyses to give a more reliable basis for evaluation of energy saving potential and economic viability.

VJEC has its building located at Kannur, Kerala. A sprawling 30 acres campus located in the foothill of Western Ghats with lush greenery. The major resources used are energy and water. In addition, the ecosystem of the campus including the biodiversity and sustainability have been assessed.

The study has identified opportunities for saving resources, improving compliance and maximising eco friendliness of the campus.

A summary list of recommendations is given at the end of the report.

Introduction

1.1 BACKGROUND

Vimal Jyothi Engineering College (VJEC) is an educational project of the Archdiocese of Thallassery established in the year 2002 and is managed by Meshar Diocesan Educational Trust. The college is approved by AICTE and affiliated to APJ Abdul Kalam Technological University (KTU). VJEC is a self-financing catholic minority institution aiming at generating fervor for Engineering and Technology in students. Here we inspire, nurture and foster them to realize their career potential in the field of Engineering and Technology.

With profound insight into the resource requirements of the higher education system, VJEC has proudly set up world-class infrastructure complemented with intellectual capital in the form of competent faculty.

Digital library, industry supported project labs, language lab, and student chapters of professional bodies such as IEEE, ISOI, IETE, SAE, and CSI offer an extensive range of resources, opportunities and services to the outcome based teaching learning process. Effective implementation of quality control processes ensure Engineering graduates with the expected level of knowledge, skill and attitude.

The institution offers ten undergraduate programs in engineering and two post graduate programs. Six undergraduate programs, CE, ME, CS, EC, EE and AE are accredited by NBA, New Delhi.

Vimal Jyothi Engineering college is an emerging institute of excellence in Engineering Education located on the Chemperi, Kannur, Kerala. The VJEC campus has a beautiful and serene atmosphere ideally suited for technical education. The infrastructure and facilities available on campus are amongst the very best. It is a wholly self-contained campus comprising of everything that students on campus would ever require.

In order to take care of aesthetic dimensions of the campus, considerable efforts have been made in the recent past to beautify the campus. Greenery in terms of the grass, permanent green plants, trees and flowers have been laid down all over the campus. Horticulture maintenance and development has been meticulously monitored to keep up with the changing weather.

VJEC provides full-fledged and marvelous infrastructure. A sprawling 30 acres campus located in the foothill of Western Ghats with lush greenery. Spacious and well-furnished Class Rooms, seminar halls, Department library, Central Library, Digital Library and E-Learning Resources. Adequate number of ICT enabled classrooms/Tutorial rooms for each department. Centralized computer centre, well-equipped laboratories with exclusive machines and major equipments. The Administrative Office, Board room, HOD's Cabins, individual cubicle of faculty are well equipped and having internet connectivity. Library constructed in 1000 sq mt of carpet area with 325 sq mt of reading space and 200 seating contains 46152 books Digital library facility to access e-journals & e-books. Air conditioned conference Halls, Interview Rooms, Auditoriums, Laboratories, IEDC Cell, Placement Cell, R&D Cell, Examination Cell etc., Research lab/project lab for each department Well equipped Laboratories with state of art equipments. Comfortable sick rooms, prayer halls for all religions and amenities Availability of indoor and outdoor sports facilities. Psychiatric Counselor for students. Bank along with ATM, Postal Service, Reprographics, Stationery store etc are available Round a clock internet facility with 600 Mbps Speed for more than 700 computers with 24 hour power backup. 50KWh energy through in house solar power generation. Three diesel generators with capacity 62.5,125,250 KVA ensures the uninterrupted power supply.

The institution provides diverse facilities to support academic and administrative activities:

Seminar Halls and Board Rooms: Equipped with ICT facilities, these spaces cater to academic discussions and conferences. Multipurpose Hall: Designed for large gatherings(up to 1500), this hall accommodates various events and activities. Training and Placement Center: Focused on career development, this center plays a crucial role in connecting students with industry opportunities. Interactive Classrooms: Specially designed for academic activities and conferences, these rooms enhance engagement and collaborative learning. Sports Facilities: Outdoor sports amenities include a 200-meter track, football and cricket fields, volleyball and basketball courts, badminton courts, and kho kho grounds. Gymnasium: A well-equipped gymnasium featuring multi-gym stations, weight training equipment, and facilities for various exercises, promoting physical fitness among students. Hostels: Separate hostels for boys and girls, along with staff quarters, contribute to a conducive living environment. Cafeteria, Parking, and General Stores: Essential amenities for the convenience of students and staff. Industry-Supported Labs: Collaboration with industries enriches laboratory facilities, ensuring relevance to real-world applications. Infrastructure for Sustainability: Energy conservation units, including a grid-connected solar power plan

(50KW), biogas plant, rainwater harvesting(35L Ltrs), and wastewater treatment plant, underscore the commitment to environmental responsibility. Facilities for Differently Abled: Ensuring inclusivity, the institution provides facilities that cater to the needs of differently-abled individuals such as ramps, lift and toilet for differently abled.

Vimal Jyothi Engineering College has strategically developed its infrastructure to create a holistic educational environment that nurtures academic excellence, technological proficiency, and overall well-being. The institution's commitment to sustainability, inclusivity, and a balanced curriculum is reflected in its state-of-the-art facilities and resources.

Vimal Jyothi Central Library, spanning 1000 sqm across two floors within the administrative block, stands as a hub for knowledge and research in the institution. Leveraging digital technology, the library has adopted an Integrated Library Management System (ILMS) and offers seamless access to an extensive array of e-resources, journals, and books. The library is an integral part of the academic ecosystem, fostering a culture of continuous learning and research. Physical Library Infrastructure: The library, with a seating capacity for 200 users, subscribes to 92 journals and has a collection of 46,152 volumes encompassing 30,181 titles across diverse domains of Science and Technology. Organized using the Dewey Decimal Classification Scheme, the library adopts an open access system for easy navigation and accessibility for all users. Digital Transition and ILMS: In a strategic move to enhance library services, the institution transitioned from Del Plus & New Gen Lib to the leading Library Management Software, KOHA, in 2021. This transition, supported by a Cloud Server, has streamlined library operations, including membership registration and the issue/return of books. Barcode technology facilitates efficient tracking, with students using barcoded identity cards for library membership. Online Public Access Catalog (OPAC): The library's Online Public Access Catalog (OPAC) is accessible remotely via [https://library.vjec.ac.in/], providing users with the flexibility to explore the catalog and resources from anywhere, both on and off the campus. A Touch Screen Kiosk further enhances accessibility for users seeking information within the library premises. Digital Library Platform and Connectivity: Collaborating with KTU, the library utilizes Knimbus as its primary digital library platform. Sixteen LAN-connected desktops equipped with Wi-Fi and internet facilities provide students and faculty with easy access to a plethora of library links, including DELNET, NDL, and NPTEL. The library ensures comprehensive coverage with a high-quality photocopier and scanner for duplicating hard copy materials. Webpage Integration and E-Resources: The library has a dedicated webpage integrated into th

college's website, serving as a gateway to all subscribed e-resources. This approach enhances visibility and accessibility to digital assets, ensuring that the academic community can seamlessly explore and benefit from the rich collection of online materials. E-Magazines and Additional Subscriptions: The college subscribes to Magzter, offering access to over 7500 online magazines, journals, newspapers, and e-books in multiple languages, including English, Hindi, and Malayalam. This extensive digital repository enriches the academic experience, providing students and faculty with diverse perspectives and contemporary insights.

With the objective of improving, it is environmental in the campus VJEC requested P S Quality Certifications to carry out an environmental audit of its campus at VJEC, Kannur. The objective of 'Environmental Audit' is to optimize the use of all forms of resources such as energy, water, materials and surroundings. It would also help to reduce/eliminate the adverse impact of their use. More importantly, the recommendations from the audit would result in significant cost benefits for VJEC. Accordingly, the audit team conducted the audit with an intensive field study. This report is based on field study and subsequent analyses of data.

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1.2 SCOPE OF THE STUDY

The environmental audit was conducted with the following scope of work to cover the impact of resources used in various areas of the campus.

- Conduct a 'Awareness Programme on 'Environment '
- Assess the inputs, outputs and wastage for each resource usage area
- Asses water management practises
- Asses the solid waste management practices
- Evaluate the compliance with regulatory and other requirements
- Analyse the air and noise pollution in the campus
- Evaluate the performance of sewage treatment system
- Identify measures for improving the campus environment

1.3 AUDIT APPROACH

Environmental auditing is essentially an environmental management tool for measuring the effects of certain activities on the environment against set criteria or standards. VJEC recognises the importance of environmental matters and accepts that its environmental performance will be scrutinised by a wide range of interested parties. Environmental audit

is used to investigate understand and identify environmental aspects and impacts. These are used to help improve existing human activities, with the aim of reducing the adverse effects of these activities on the environment.

An environment audit can be defined as a management tool comprising systematic, documented, periodic and objective evaluation of how well environmental organization, management and equipment are performing with the aim of helping to safeguard the environment by facilitating management control of practices and assessing compliance with company policies, which would include regulatory requirements and standards applicable.

The audit was carried out by undertaking a field visit to the site during April 2023. During the field visit, a number of on-site measurements were taken and observations made for various equipment in the campus along with collection of resource consumption, equipment and operational data from the administration and technical departments. Discussions were held with concerned Technical / Managerial staff to fully understand the working requirements to arrive at practically reliable solutions. The audit team collected relevant data and made key measurements.

The following areas were covered as part of the study:

- Water use, distribution and management
- Solid waste generation and disposal
- Air and noise pollution assessment
- Assessment of compliance requirements
- Carbon footprint
- Bio diversity and ecology
- Waste water disposal
- E- waste management
- Medical waste management

After carrying out the measurement & field study, the preliminary observations of the study were discussed with the management. The report presents the field measurements, operational data, data analysis, key observations made, and recommendations for achieving optimum use of resources and for mitigating adverse impact on environment. The recommendations are followed by cost-benefit analysis. Major emphasis is laid on short and medium term measures. The ultimate aim of this exercise is to enable the management to understand and prioritize environmental improvement measures identified through the study.

1.4 CAMPUS DESCRIPTION

Vimal Jyothi Engineering College (VJEC) is an educational project of the Archdiocese of Thallassery established in the year 2002 and is managed by Meshar Diocesan Educational Trust. The college is approved by AICTE and affiliated to APJ Abdul Kalam Technological University (KTU). VJEC is a self-financing catholic minority institution aiming at generating fervour for Engineering and Technology in students. Here we inspire, nurture and foster them to realize their career potential in the field of Engineering and Technology.

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Digital library, industry supported project labs, language lab, and student chapters of professional bodies such as IEEE, ISOI, IETE, SAE, and CSI offer an extensive range of resources, opportunities and services to the outcome based teaching learning process. Effective implementation of quality control processes ensure Engineering graduates with the expected level of knowledge, skill and attitude.

The institution offers ten undergraduate programs in engineering and two post graduate programs. Six undergraduate programs, CE, ME, CS, EC, EE and AE are accredited by NBA, New Delhi.

1.5 SOURCES OF ENVIRONMENTAL IMPACTS

The major sources of environmental impact are water use, energy use, solid wastes, effluents, air pollution and noise.

Campus Environment System

2.1 WATER AUDIT

Water auditing is a systematic & scientific examination of water accounts of the facility. It provides a rational, scientific framework that categorizes all water use in the system. It is a tool to overcome shortage, leakage and losses in the system. Water audit, helps to identify steps that need to be taken to reduce water use and losses. Comprehensive Water Audit can give a detailed profile of distribution system and water users thereby facilitating easier & effective management of resources and improved reliability. It may also prove as an effective tool for realistic understanding & assessment of present performance level of the service for future expansion.

Water auditing process involves checking of sector-wise water use against project planning and losses actually realized on the projects. Elements of water audit include a record of the amount of water produced (total water supply), water delivered to metered users, water delivered to unmetered users, water loss and suggest measures to address water loss (through leakages and other unaccounted for water losses).

Water audit leads to-

(a) Reduced water losses,

(b) Improved financial performance,

(c) Improved reliability of supply system,

(d) Enhanced knowledge of the distribution system,

(e) Efficient use of existing supplies,

(f) Better safeguard to public health and property,

(g) Improved public relations,

(h) Reduced legal liability, and

(i) Reduced disruption, thereby improving level of service to customers.

Water supply and distribution

- Number of bathrooms – 204
- Number of Water outlets in Bath rooms - 466
- Number of water outlets in washing area - 63
- Total water outlets in the campus –1421
- Water taps in laboratories - 37
- Number of wells – 3 Open well 2 bore wells
- Number of ponds - 2 (chemperi 30ft[20 hp], chalimparamba 25 ft[3 hp])
- Water pumps – 10 (7.5 hp x 2, 10 hp, 5 hp x 2)
- Number of wells : 3
  - chalimparamba- 30ft , 15 hp
  - Near to Sanjose hostel-45 ft, 1 hp
  - Near to valliyamattam block - 45 ft, 1.5 hp
- Quantity of water pumped – 95000 liters/day
- Total water in the overhead tanks – 513000 L

Water charges paid – No water charges
(No municipal water supply, Using water from own well)

Number of water tanks for water storage -22

Main block Water tank(4) - (1000+20000x3) Liters	61,000
ME block water tank (3) - (30000+20000+10000)Liters	60,000
EC Block (2) - 25000 Liters	25,000
PG Hostel (3) - (30000+10000x2)Liters	50,000
Girls Hostel(3) -(1.5 lakh+1000+20000) Liters	1,71,000
Sanjose Hostel(3) - (100000x2+20000) Liters	1,20,000
Santhom Hostel(3) - (10000x2+1000)Liters	21,000
Guest House(1) - 5000 Liters	5,000
Total water tank capacity in Liters	5,13,000

. There is no Tap maintenance schedule with the maintenance department; the leakage problem will be solved by them only when they get any compliant.

The total number of students,faculty and staff in the campus is 2108. For an average consumption of 252484 litres per day, the per capita water consumption is 120 litres. This is in line with the accepted norms. Assuming 1 litre per sq foot the water requirement for garden area of 73101 sq ft is about 3 Kl per day.

Rainwater harvesting:

The premises has provided arrangements for rain water harvesting. The rainwater harvesting system comprises components of various stages - transporting rainwater through pipes or drains, filtration, and for recharge. The catchment of a water harvesting system i.e the terrace in the various blocks of VJEC is the surface, which directly receives the rainfall and provides water to the system. Coarse mesh has been provided at the roof to prevent the passage of debris appropriate conduits are provided that carry rainwater from the catchment or rooftop area to the harvesting system. Conduits in VJEC are of polyvinyl chloride (PVC) pipes, The Water collected goes through a filter bed, which is used to remove suspended pollutants from rainwater collected over roof. The filter unit has a chamber filled with filtering media such as fibre, coarse sand and gravel layers to remove debris and dirt from water before it enters the recharge structure. The premises has provided effective arrangements for rain water harvesting. The rainwater collected from the roof of university building are collected through pipes and delivered into 3 Nos. of rainwater harvesting pits, from where it percolates into the ground. Similar arrangement has been provided for collecting rainwater from the terrace of arts and science college building.

2.2 AIR POLLUTION MANAGEMENT

Air pollution consists of chemicals or particles in the air that can harm the health of humans, animals, and plants. It also damages buildings. Pollutants in the air take many forms. They can be gases, solid particles, or liquid droplets. People experience a wide range of health effects from being exposed to air pollution. Effects can be broken down into short-term effects and long-term effects.

Short-term effects, which are temporary, include illnesses such as pneumonia or bronchitis. They also include discomfort such as irritation to the nose, throat, eyes, or skin. Air pollution can also cause headaches, dizziness, and nausea. Bad smells made by toilets, bathrooms, garbage, or sewer systems are considered air pollution, too. These odors are less serious but still unpleasant.

Long-term effects of air pollution can last for years or for an entire lifetime. They can even lead to a person's death. Long-term health effects from air pollution include heart disease, lung cancer, and respiratory diseases such as emphysema. Air pollution can also cause long-term damage to people's nerves, brain, kidneys, liver, and other organs.

In VJEC campus the sources of air pollution are ambient sources and DG set stack when it is in operation. The results of the ambient air monitoring and DG set stack emissions are given in the annexure. Fugitive emissions i.e uncontrolled air pollution created by blowing of dust by wind has been kept under control by well tarred roads. Also sprinkling of water on the soil also arrests air pollution. Since the DG sets are operated only during the power cuts, air pollution is not an area of concern for VJEC.

2.3 NOISE POLLUTION MANAGEMENT

Noise pollution can be defined as any disturbing or unwanted noise that interferes or harms humans or wildlife. Although noise constantly surrounds us, noise pollution generally receives less attention than water quality and air quality issues because it cannot be seen, tasted, or smelled. Noise pollution has a negative impact on wildlife species by reducing habitat quality, increasing stress levels, and masking other sounds. Excessive noise pollution in working areas can influence psychological health. Noise pollution can cause headaches, high blood pressure, respiratory agitation, racing pulse, and, in exposure to extremely loud, constant noise, gastritis, colitis and even heart attacks may occur. Noise affects brain responses and people's ability to

focus, which can lead to low-performance levels over time. Like other sound waves, too much noise when it goes to the brain leads to lower response rates as well as making the mind dull. It is also poor for memory, making it hard to study. The studies have shown that students living near railway stations or airports have problems in learning. Studies show that the occurrence of aggressive behaviour, disturbance of sleep, constant stress, fatigue, depression, anxiety, hysteria and hypertension in humans as well as animals can be linked to excessive noise levels. The level of irritation increases with increased noise, and people tend to become less and less patient. These, in turn, can cause more severe and chronic health issues later in life.

Since VJEC is an academic institution noise pollution is much less than the allowable limits. Whenever the DG set is in operation some noise pollution is created. However the DG set is containerised due to which the noise pollution is contained. The results of the noise pollution are given in the annexure.

2.4 ENERGY USE AND ENVIRONMENTAL IMPACT

The electricity use in campus appears to be a clean source of energy. However this electricity is produced in power plants which burns fossil fuels such as coal. The burning of coal in the power plant causes local pollution in the form of suspended particulate matter and also releases Carbon dioxide, oxides of nitrogen and oxides of sulphur. Carbon dioxide is responsible for global warming. Oxides of sulphur and nitrogen result in acid rain.

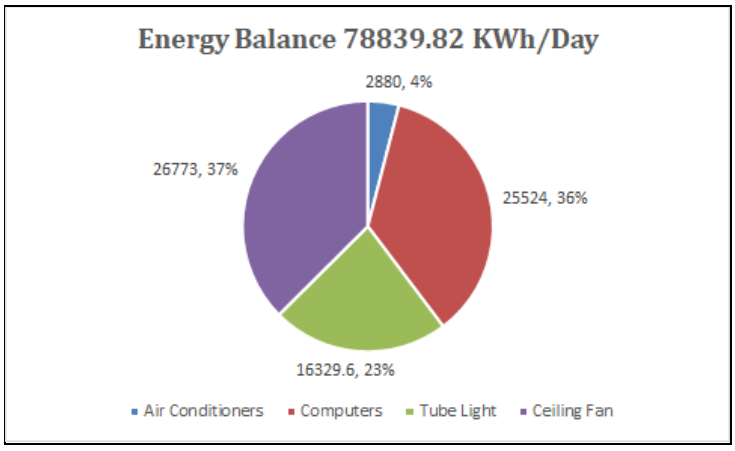
The main source of energy used in the campus is electricity from Kerala State Electricity Board Limited (KSEB). In times of power shutdown the Diesel Generators are operated which use HSD as a fuel. Diesel is also used for cars used by VJEC.

The annual energy consumption for the plant during the year 2022-23 is given below in the table.

Energy source	**Annual Quantity**	**Annual Cost**	**CO_2 emissions (Tonnes/year)**
Electricity	1,84,873 kWh	Rs.15,71,667	152
Diesel for cars (7 Nos.)	8340 litres	Rs. 5,75,460	22.01
Diesel for DG sets	4713 litres	Rs. 3,29,910	12.44
Total		**Rs. 24,77,037**	**186.45**

The electricity tariff of KSEB applicable for VJEC is LT2B (Private Educational Institutions & Hostels). Accounting to the tariff one unit or kWh is charged at Rs.7.50. In addition, a fixed charge of Rs. 230 upto 50kW is also charged. The connected load for VJEC is 315 kVA. The cost of diesel is Rs 90 per litre.

The energy balance shows the dominance of Air conditioners which turns out to be energy guzzlers. They consume 31% of the total energy consumption. Lighting and fans also account for a significant portion of the energy consumed. The summary of the energy balance is shown in the following figure.



The study has identified an annual energy saving potential of 252207 kWh (amounting to Rs.20.49 lakhs and 46 % of the total bill) of electricity with involvement of technology change. The total cost of implementation for the proposals is estimated to be Rs. 112.18 lakhs.

A summary list of recommendations, the saving potential and implementation cost is given below.

Sl,No	Particular	Energy savings, Kwh/year	Cost Savings, Rs. Lakhs/Year	Investment Rs. Lakhs	Payback Period, Month
1	Increase Temperature setting of Air Conditioners to 25^0C	69120	5,52,296	nil	nil
2	Replace 40 W Flourescent Tubelights By 26 W Led Tubelights	45360	3,62,880	1,81,440	12
3	Replace Existing Ceiling Fans By Energy Efficient Bldc Fans	74,367	5,94,936	74,37,000	108
4	Install A 60 Kw Solar Power Plant In The Terrace Of The Building	63,360	5,38,560	36,00,000	91

2.5 SOLID WASTE MANAGEMENT

Solid waste management systems cover all actions that seek to reduce the negative impacts on health, environment and economy. Solid waste consists mainly of several recyclable materials such as paper and cardboard. Inside the educational institutes, especially universities, e-waste arising out of electrical and electronic gadgets used in the campus such as used Printer cartridges, Bulbs, tube lights etc., Withering of leaves from the garden and garden trimmings are also contributors to solid waste. Without an effective management program, solid waste can have detrimental impacts on the environment. An inefficient municipal solid waste management system may create serious negative environmental impacts like infectious diseases, land and water pollution, obstruction of drains and loss of biodiversity.

Considerable solid waste is generated in the campus. The waste mostly consists of paper and other biodegradable wastes. All these wastes are collected through individual bins and disposed through the corporation waste collection system. The solid wastes are segregated and disposed through recyclers.

2.6 ENVIRONMENTAL AWARNESS INITIATIVE

Awareness has been created to avoid use of plastics in the campus. Students, faculty and staff have been sensitized to switch off electrical gadgets whenever not in use.

Overall recommendations

1) Water meter may be provided to measure the water pumped from well and borewell.
2) Record of water-consumed everyday may be maintained in a register.
3) Periodic cleaning of overhead tanks may be carried out and the date of cleaning / due date of cleaning may be marked near the overhead tanks.
4) All leaking taps should be identified through daily walkthroughs and repair/ replacement should be done.
5) As a water conservation, measure the water dripping from the air conditioners may be collected and used as distilled water for applications in lab and topping for batteries.
6) In washbasins, the existing taps may be replaced with spring-loaded taps to save water.
7) For gardening, sprinkler system can be used to minimize water use.
8) Students should be sensitized on water savings
9) Posters may be prominently displayed for saving water.
10) More trees may be planted along the compound wall to minimize air pollution
11) Pollution under Control (PUC) certificate may be periodically obtained through monitoring.
12) Awareness posters are required to be displayed for energy savings.
13) Energy metres may be provided for each block and monitored on daily basis.
14) Activities involving students may be carried out on special occasions such as World environment day, etc...

COMPLETION OF THE REPORT

This synopsis report is prepared as a part of the Energy, Environment and Green Audit process conducted at **VIMAL JYOTHI ENGINEERING COLLEGE**, Kannur, Kerala, India by **P S QUALITY CERTIFICATION PVT LTD,** No.415, F4, I Floor, Asha Vignesh Apartment, Ambattur, Tamil Nadu 600 053.

Signature Not Verified

Principal.VJEC

Data Collection: Gather comprehensive data on the organization's energy consumption patterns, including electricity, gas, and other fuel sources. This data will serve as a baseline for analysis and comparison.

Building Envelope: Assess the building's insulation, windows, doors, and roofing. Recommend improvements to enhance energy efficiency, such as weather-stripping, adding insulation, or upgrading to energy-efficient windows.

Lighting: Evaluate the lighting systems and recommend energy-efficient alternatives like LED lighting. Consider occupancy sensors, daylight harvesting, and task lighting to optimize energy usage.

HVAC Systems: Analyze heating, ventilation, and air conditioning (HVAC) systems. Recommend regular maintenance, upgrades to energy-efficient models, and programmable thermostats to optimize energy consumption.

Equipment Efficiency: Assess the efficiency of equipment and appliances, such as office equipment, kitchen appliances, and industrial machinery. Recommend ENERGY STAR certified products and energy-efficient replacements where applicable.

Renewable Energy Integration: Explore the feasibility of integrating renewable energy sources like solar panels or wind turbines. Calculate the potential savings and environmental benefits that can be achieved through the adoption of clean energy.

Behaviour Change: Educate employees about energy-saving practices and encourage behaviour changes, such as turning off lights when not in use, utilizing power-saving features on computers, and unplugging unused devices.

Energy Management Systems: Recommend implementing an energy management system to monitor and control energy usage. This will help identify inefficiencies, set targets, and track progress over time.

Financial Incentives: Research available financial incentives, grants, or tax credits for energy efficiency improvements. Provide recommendations on how the organization can take advantage of these opportunities.

Reporting and Monitoring: Develop a system for ongoing monitoring and reporting of energy usage. This will help track progress, identify areas for improvement, and ensure energy-saving measures are effective.

Renewable Energy Sources: Consider incorporating renewable energy sources like solar panels, wind turbines, or geothermal systems into your energy infrastructure. These options can help reduce carbon emissions and reliance on fossil fuels.

Energy Efficiency: Implement energy-efficient practices such as using LED lighting, installing smart thermostats, and upgrading to energy-efficient appliances. These changes can significantly reduce energy consumption and costs.

Waste Management: Focus on improving waste management practices by implementing recycling programs, composting initiatives, and reducing single-use items. Encourage employees and stakeholders to participate actively in these efforts.

Water Conservation: Evaluate water usage and identify areas where conservation measures can be implemented. Installing low-flow fixtures, rainwater harvesting systems, and using water-efficient irrigation methods are excellent steps towards conserving water.

Transportation: Encourage the use of alternative transportation methods, such as carpooling, biking, or public transportation. Additionally, consider incorporating electric vehicles into your fleet, if feasible.

Green Procurement: Opt for environmentally friendly products and materials when making purchasing decisions. Look for eco-labels, prioritize products with recycled content, and choose suppliers with sustainable practices.

Employee Engagement: Raise awareness and educate employees about the importance of green practices. Encourage them to participate in sustainability initiatives and provide incentives for their involvement.

Certificate of Registration

ISO 14001:2015

This is to Certify that
Environmental Management System of

VIMAL JYOTHI ENGINEERING COLLEGE

JYOTHI NAGAR, CHEMPERI(PO), KANNUR-670632, KERALA, INDIA.

has been assessed and found to conform to the requirements of

ISO 14001:2015

for the following scope :

IMPARTING EDUCATIONAL PROGRAMS LEADING TO B.E. AND M.E. DEGREES

IAF CODE : 37

Certificate No	: **21EEMZ45**		
Initial Registration Date	: 26/02/2021	Issuance Date	: 26/02/2021
Date of Expiry	: 25/02/2024		
1st Surv. Due	: 26/01/2022	2nd Surv. Due	: 26/01/2023

Director

EGAC Accredited
EMS Certification
CAB # 012226

MEMBER OF MULTILATERAL RECOGNITION ARRANGEMENT
IAF

(Scan to Verify)

Signature Not Verified

Principal.VJEC

Assurance Quality Certification LLC

Head Office: Sharjah Media City, SHAMS, Sharjah, UAE. e-mail: info@aqcworld.com
Key Location: A-60, Sector - 2, Noida, Uttar Pradesh, 201301, India.

**Validity of the Certificate is subject to successful completion of surveillance audit on or before of due date. (in case surveillance audit is not allowed to be conducted, this certificate shall be suspended/withdrawal).*

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IAF CODE : 37

Certificate No	: **24EEMQ53**		
Initial Registration Date	: 26/02/2024	Issuance Date	: 26/02/2024
Date of Expiry	: 25/02/2027		
1st Surv. Due	: 26/01/2025	2nd Surv. Due	: 26/01/2026

Director

EGAC Accredited EMS Certification CAB # 012226

MEMBER OF MULTILATERAL RECOGNITION ARRANGEMENT IAF

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Principal.VJEC

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Head Office: Sharjah Media City, SHAMS, Sharjah, UAE. e-mail: info@aqcworld.com
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ISO 50001:2018

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VIMAL JYOTHI ENGINEERING COLLEGE

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has been assessed and found to conform to the requirements of

ISO 50001:2018

for the following scope :

IMPARTING EDUCATIONAL PROGRAMS LEADING TO B.E. AND M.E. DEGREES

Certificate No	: **21EEnMW26**		
Initial Registration Date	: 26/02/2021	Issuance Date	: 26/02/2021
Date of Expiry	: 25/02/2024		
1st Surv. Due	: 26/01/2022	2nd Surv. Due	: 26/01/2023

Director

EGAC Accredited
EnMS Certification
CAB # 012226

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Principal.VJEC

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Key Location: A-60, Sector - 2, Noida, Uttar Pradesh, 201301, India.

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has been assessed and found to conform to the requirements of

ISO 50001:2018

for the following scope :

IMPARTING EDUCATIONAL PROGRAMS LEADING TO B.E. AND M.E. DEGREES

Certificate No	: **24EEnMO34**		
Initial Registration Date	: 26/02/2024	Issuance Date	: 26/02/2024
Date of Expiry	: 25/02/2027		
1st Surv. Due	: 26/01/2025	2nd Surv. Due	: 26/01/2026

Director

EGAC Accredited
EnMS Certification
CAB # 012226

MEMBER OF MULTILATERAL RECOGNITION ARRANGEMENT IAF

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