



Criteria 7: Institutional Values and Best Practices

7.1.6 Quality Audits on Environment and Energy

Under this criterion Institute has undertaken the following initiatives, for the Academic Year 2023-24:

1. Green Audit
2. Energy Audit
3. Beyond the campus environmental promotional activities

About Green Audit

Green audit is defined as an official examination of the effects a college has on the environment. It helps to improve the existing practices with the aim of reducing the adverse effects of these on the environment concerned. Several institutions have applied various viewpoints to preserve the environment within the campus such as promotion of energy savings, recycling of waste, water use reduction, water harvesting etc.

Green audit can be a useful tool for an institute to determine how and where they are using the most energy or water or resources, an institute can then consider how to implement changes and make savings.

Zeal Institute of Management & Computer Application, Pune-411041 campus, is deeply concerned about the problem of global warming and environmental hazards due to the development and urbanization. Thus, the institute has taken steps to make campus green by conducting Green Audit.

About Energy Audit

Energy plays a key role in the development and growth of the economy. The Government of India has put special emphasis to ensuring adequate, reliable, secure and cost effective supplies and to utilizing energy resources efficiently while minimizing the negative impacts on the environment.

To ensure that there is sustainability of energy in the future, energy audit activities are necessary to determine suitable steps to be undertaken to use energy efficiently. An energy audit is an examination of the energy consumption of the equipment or system to ensure that energy is being used efficiently. An energy audit is a study of a plant or facility to determine how and where energy is used and to identify methods for energy savings. There is now a universal recognition of the fact that new technologies and much greater use of some that already exist provide the most hopeful prospects for the future. The opportunities lie in the use of existing renewable energy technologies, greater efforts at energy efficiency and the dissemination of these technologies and options.





Energy Audit of Zeal Institute of Management & Computer Application, Narhe, Pune-411041, campus is just one step towards our destination of achieving energy efficiency and we would like to emphasize that an energy audit is a continuous process.

About Environment Audit

An environment audit for institutes is a systematic process aimed at assessing an institution's environmental performance, identifying areas for improvement, and ensuring compliance with relevant regulations and sustainability practices. This audit evaluates how the institution interacts with the environment, how it manages resources, and what impacts its operations have on both local and global ecosystems. It helps the institution comply with environmental regulations, avoiding fines and penalties, identifying inefficiencies and resource waste can lead to significant cost reductions (e.g., energy savings, waste management), Positioning the institution as a leader in sustainability, which can attract students, staff, and stakeholders who value environmental responsibility.

Zeal Institute of Management & Computer Application, Pune-411041 campus, is deeply concerned about the environment protection. Thus, the institute has taken steps to make campus ecofriendly by conducting Environment Audit.

Beyond the Campus Environmental Promotional Activities

Beyond-campus environmental promotional activities are efforts aimed at extending the institutions commitment to sustainability and environmental awareness to the wider community. These activities focus on fostering environmental responsibility, education, and advocacy outside the boundaries of the campus. Zeal Institute of Management & Computer Application, Pune-411041 campus, has taken the various initiatives in this regard.

Reports Attached:

1. Green Audit
2. Energy Audit
3. Beyond the campus environmental promotional activities-Tree Plantation

Club Head

Director



Green Audit Report for Zeal Institute of Management & Computer Application"
Narhe, Pune-411041

GREEN AUDIT REPORT (2023-24)

Zeal Institute of Management & Computer Application

Pune-411041.

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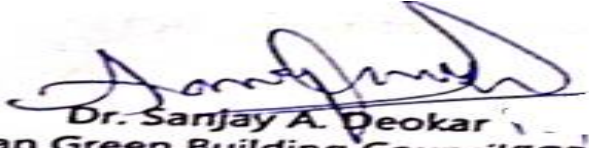
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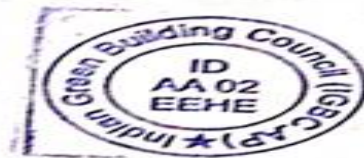


Preface

We are very grateful to the Management and Director of “**Zeal Institute of Management & Computer Application, Pune-411041 campus**”, for giving us an opportunity to carry out Green Audit of the institute. Further, we sincerely thank to all other college staff for providing us necessary facilities, required data and co-operation during the Green Audit. This helped us to complete the Green Audit successfully.


Further, we hope, this will boost the new generation to create healthy environment in the campus and propagate these views for many generations to come.


Dr. Sanjay A. Deokar
Indian Green Building Council (IGBC)
Accredited Professional
(ID:AA02EEHE)

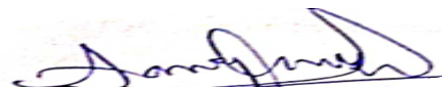


CERTIFICATE

This is to certify that "Supreme Electrical Energy and Consultancy Services, LLP", Pune has conducted Green Audit of "Zeal Institute of Management & Computer Application, Pune-411041 campus". It has been observed that the campus not only have implemented various Green measures in the campus for wellbeing of staff and students in the campus but also has separate Green policy of the campus which helps to maintain healthy environmental balance.


Dr. Sanjay A. Deokar
Indian Green Building Council (IGBC)
Accredited Professional
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Dr. Sanjay A. Deokar
BEE Certified Energy Auditor (EA- 4494)
Indian Green Building Council (AP)
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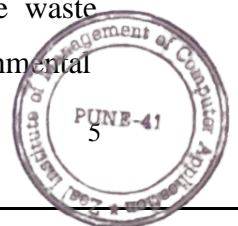


1. Executive Summary

Green audit is defined as an official examination of the effects a college has on the environment. It helps to improve the existing practices with the aim of reducing the adverse effects of these on the environment concerned. Several institutions have applied various viewpoints to preserve the environment within the campus such as promotion of energy savings, recycling of waste, water use reduction, water harvesting etc. Green audit visualizes the documentation of all such activities taking stock of the infrastructure of the college, their academic and managerial policies and plans. A green auditor will study an organization's environmental effects in a systematic and documented manner and will produce an environmental audit report. A clean and healthy environment aids effective learning and provides a conducive learning environment.

A clean and healthy environment aids effective learning and provides a conducive learning environment. Educational institutions now a day are becoming more sensitive to environmental factors and more concepts are being introduced to make them eco- friendly. To preserve the environment within the campus, various measures are applied by the several educational institutes to solve their environmental problems such as promotion of the energy management & conservation, waste management, rainwater harvesting etc. The activities pursued by colleges can also create a variety of adverse environmental impacts. Green audit is a way to show for the institute what type of carbon footprint they are leaving on the planet and guide them to reduce it. Green Audit involves the inspection of an institute to assess the total environmental impact of its activities. As a part of such practice, Green Audit was conducted to evaluate the actual scenario in the campus.

Green audit can be a useful tool for an institute to determine how and where they are using the most energy or water or resources, an institute 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 also create health consciousness and promote environmental



Green Audit Report for Zeal Institute of Management & Computer
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awareness, values and ethics. It guides all staffs and students for better understanding of green impact in the campus. Green audit promotes financial savings through optimum utilization of resources.

"Zeal Institute of Management & Computer Application, Pune-411041 campus" is deeply concerned about the problem of global warming and environmental hazards due to the development and urbanization. Thus, the institute has taken steps to make campus green by conducting Green Audit.

The baseline data prepared for the **"Zeal Institute of Management & Computer Application, Pune-411041 campus"**, will be a useful tool for campus greening, resource management, planning of future projects, and a document for implementation of sustainable development of the college. Existing data will allow the institute to compare its programmes and operations with those of peer institutions, identify areas in need of improvement, and prioritize the implementation of future projects. We expect that the management will be committed to implement the green audit recommendations to promote environment protection and sustainability. We are happy to submit this green audit report of **"Zeal Institute of Management & Computer Application, Pune-411041 campus"**, to the concerned authorities.



2. About the College

The Institution aims at imparting education that is man making, character building and creating an ideal citizen in the global perspective. Such education is imparted that may boost career opportunities for self-fulfilment.

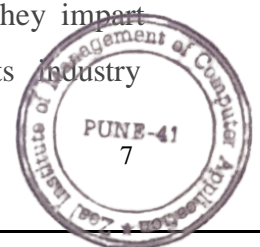
ZES has established in the year 1996, under the expert guidance of Shri. S. M. Katkar to provide quality education, Zeal Education Society has made a mark for itself as a renowned institute in the Pune region. ZES offer a team of highly qualified Staff, state of the art infrastructure and extraordinary vision that every student who is a part of the Zeal family marches out of the campus with top level confidence and abilities to be competent enough to face the cutting edge competition in the corporate world today. The society imparts knowledge from KG to PhD by establishing Zeal College of Engineering and Research, Zeal Polytechnic, Zeal Group of Management Institutes, Dnyanganga School, Dnyanganga Junior College, Dnyanganga College of Education and Silver Crest School. All the courses are approved by AICTE, New Delhi, recognized by DTE Govt. of Maharashtra & affiliated to Savitribai Phule Pune University. ZIMCA welcomes you to the one the finest management institutes in Pune region. We are committed to the proper progress of students for a flourishing career.

The Institute aims at bringing out the budding talents within each student and offer a motivating supervision to discover their capabilities which can help them become competent professionals.

The Institute extends its full support and guidance through well qualified staff who are more that eager to improve professional as well as personal skills and help the students explore their full potential.

ZIMCA offers state of the art infrastructure inclusive of a pleasant campus, up-to-date equipment and facilities that help the students to concentrate on their work. .

We have a team of highly qualified professors who strive to ensure that they impart knowledge which is sync with the University syllabus and the currents industry



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prerequisites. The amenities like Culture Centre, Music Studio, Dance Studio, TED Studio etc. have been offering opportunities to the students to showcase their talent.

The college is equipped with state of art infrastructural facilities like advanced class rooms, laboratories with high end equipment's, updated library, playground, gymnasium and auditorium. The college has hostel facility for the boys and girls in the campus. Vision and Mission of the institute is given below:

Vision:

To be recognized as Student-centric Institute Through Value-based Quality Education

Mission:

Emerge As a Remarkable Facilitator For Improving Employability Quotient of Young Graduates Through Business Management Education Which Eventually Contributes Decisively To The Sustainable Economic Growth.



3. Objectives of the Study

The main objective of the green audit is to promote the environment management and conservation in the college campus. The purpose of the audit is to identify, quantify, describe and prioritize framework of environment sustainability in compliance with the applicable regulations, policies and standards. The main objectives of carrying out the Green Audit are:

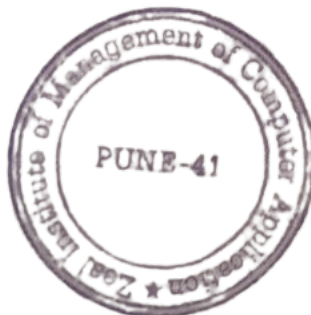
- To introduce and aware students to real concerns of environment and its sustainability.
- To secure the environment and cut down the threats posed to human health by analyzing the pattern and extent of resource use on the campus.
- To establish a baseline data to assess future sustainability by avoiding the interruptions in environment that are more difficult to handle and their corrections requires high cost.
- To identify, quantify, describe and prioritize framework of environment sustainability in compliance with the applicable regulations, policies and standards.
- To promote the environment management and conservation in the college campus.



4. Methodology

In order to perform the Green Audit, the methodology included different tools such as preparation of questionnaire, physical inspection of the campus, observation and review of the documentation, interviewing key persons and data analysis, measurements and recommendations. The study covered the following areas to summarize the present Status of environment management in the campus:

- Water Management.
- Energy Management & Conservation.
- Waste water Management.
- Green area Management.
- Indoor Environment



5. Observations and Recommendations

5.1 Water Management

This point towards level of water consumption, types of water sources, water storage strategies, water appliances and fixtures. A water audit is an on-site survey and assessment to determine the water use and hence improving the efficiency of its use.

a) Observations

The study observed that the well with 48-diameter X 20 ft. depth having more than 10 lack liter of water storing capacity is the main source of water. The same water is used for cleaning and for gardening. Liquid waste from the points of generation like the canteen and toilet etc. is being let out as effluent into a proper drainage facility. Internal staff does the cleaning twice in a year and register is maintained. The institute has separate R.O plant for drinking water purpose.

- ✓ It has been observed that no water leakage is found at cooler side or in toilets also.
- ✓ College has constructed rooftop rainwater harvesting system for water conservation. The rainwater collected through network of PVC pipe line which outlets into open well with proper land slope. This is used for watering the tree and plants in the campus through drip irrigation system. This ideal Rain Water Harvesting system has ensured the provision of water to plants in the campus for 3 months in critical summer season.



Green Audit Report for Zeal Institute of Management & Computer Application" Narhe, Pune-411041



(Rainwater harvesting arrangement the in the college building)



Green Audit Report for Zeal Institute of Management & Computer Application" Narhe, Pune-411041



(Open well for general water use arrangement in the Campus)



(R.O. Plant for drinking water)



b) Recommendations

- Need of monitoring, controlling overflow is essential and periodically supervision drills should be arranged. Filtering of suspended solids shall be ensured by providing suitable filtering media before letting the water into the collection tanks.
- Water efficient fittings & taps to be installed in toilets, bathrooms & to save water. Efficient and proper waste water disposal and recycling arrangement must be done.
- Drinking water testing has to be done once in 3 months. Water level monitoring & controlling overflow of water is necessary, for this implementation of automatic water level controller is essential.
- Minimize bore water use, thereby conserving water resources. Use pervious paver blocks in the campus to avoid the rain water run-off.
- The tank cleaning should be done twice in a month. Adopt IGBC Green policy in the campus.
- Install efficient water flush fixtures. Ensure continuous monitoring of water consumption, both on supply and demand side, to identify improvement opportunities in potable water efficiency.



5.2 Energy Management and Conservation

This indicator addresses energy consumption, energy sources, energy monitoring, lighting, appliance, natural gas and vehicles. Energy use is clearly an important aspect of campus sustainability and thus requires no explanation for its inclusion in the assessment.

a) Observations

Energy source utilized by all the departments and administrative section is electricity only. Total connected load is determined as 32 KW. All the departments and common facility centers are equipped with conventional 40 W tubes and 9w/18 W LED fixtures

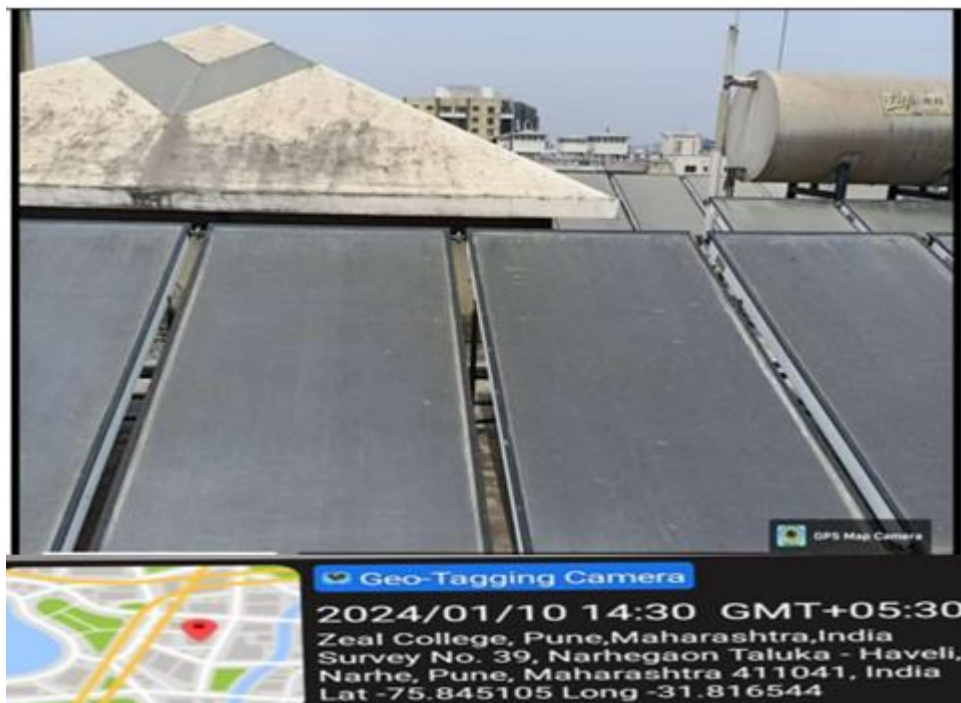
It has been observed that the use of 120 KW solar PV roof top renewable energy and 4000 liters per hour capacity roof top solar photovoltaic system at the girl's hostel is present in premises which help to minimize the environmental impacts of generating energy through fossil fuels.



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(120 KW roof top net metering Solar PV System in the Campus.)



(4000 Liter per/hr rooftop Solar PV hot Water System at Girls Hostel)

b) Recommendations

- Install integrated solar based LED street lights (12W/20W/30W) as per requirement. It can be fitted with timers to start & stop them automatically. Replace

old 40-watt T12 tubes by 18-watt LED tubes in a phased manner. Replace the existing ceiling fan (80W) by energy efficient brushless DC 28-Watt fans in a phased manner

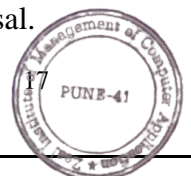
- Use occupancy sensors in office & staff rooms.
- Use sensor based 5-Watt LED bulbs in toilets and bathrooms.
- Enhance energy efficiency in the interior spaces, to optimize energy consumption, thereby reducing environmental impacts.

5.3 Waste Management

This indicator addresses waste production and disposal of different wastes like paper, food, plastic, biodegradable, construction, glass, dust etc and recycling. Furthermore, solid waste often includes wasted material resources that could otherwise be channeled into better service through recycling, repair, and reuse. Solid waste generation and its management is a burning issue. The survey focused on volume, type and current management practice of solid waste generated in the campus. The different solid wastes collected as mentioned above.

a) Observations

It is observed that solid waste is the highest source of waste out of total waste generated. Journal papers, Record files are the main sources of solid waste. The solid waste disposal method adopted by institute is that paper is collected in bins and handed over to concerned authority. The wet waste is generated only in common canteen and hostel mess. The large amount of waste generated from mess and canteen of the campus is collected and then it is sent through local municipal authority for processing. Chemicals are stored in cupboard. There is no hazardous waste generated at college, whereas the used chemicals are diluted with water and then discharged in sand pit. The institution's key operations have less impact on the environment as the college is very conscious of generating negligible waste. Waste characterization is the first critical step in successful waste management. Institute have a simple solid waste management system. It involves everything from collection to disposal.



Paper and paper products, pens, disposable drink containers, waste food in canteen and compostable organic material etc. are the waste products in college campus.

Adequate number of trash cans and dust bins are placed all over the campus. Waste is separately collected at different locations in bins based on the properties like disposable and non-disposable waste material. The vegetable waste from the canteen are arranged to be disposed regularly to keep the campus clean. Liquid waste generated from canteen comprises of food wastes, dairy products and domestic waste water is discharged in soak pit. The toilet waste is collected through piping system and discharged into septic tank.

There is a proper arrangement for building wastes segregation like dry, wet, plastic, paper, glass and biological wastes in the campus. Institute facilitate proper disposal for recycling of wastes, thereby avoiding such waste being sent to landfills.

E-waste of computers, electronic and electrical instruments/equipments is used for demonstration purpose to the students. Whereas outdated and scrap e-waste is handed over to local authorised scrap vendor. UPS batteries are exchanged with new batteries considering scrap values from the suppliers. The institute also takes benefit of the various buy back offers from the suppliers.

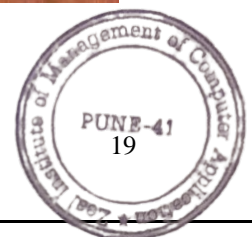
Garbage Compositing Plant: The ZES has 11 acres of campus full of trees and plants. Due to greenery on the open space, naturally it leaves some dried leaves, branches, and unnecessary grass in the campus. Besides, there is vegetable and kitchen waste from canteen, paper pieces etc in the campus. This great volume of waste resulted into the positive idea of the construction of the Composting Plant in the college campus. The college regularly collects all the waste from the campus and stores it in the cement concrete .Composting Tank having 20 ft length x 10 ft width x 5 ft height having the storage capacity of 28 tons of organic material which is used as fertilizer for growing plants in the college campus. This composting plant has helped to keep the college campus clean and provided fertilizer for campus trees, plants and botanical garden in our college. It has proved very effective to maintain the cycle to green wastes. College has taken initiative to treat domestic liquid waste generated in college itself by installing Sewage Treatment

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Plant/Effluent Treatment Plant.STP is also energy efficient as there is no any electricity consumption for treatment of sewage water.



(Segregation of Glass, Paper, Plastic and Biological Waste)



The quantity of the e-waste produced in the college has been systematically disposed off. The College is aware that e-waste is hazardous to the environment and health of the people and it needs to be recycled or disposed in appropriate ways. Every year or two, e-waste is collected and sent off for further recycling and appropriate disposal through the electronic equipment's distributor. He repairs and maintains the College electronic equipment for smooth functioning.

b) Recommendations

1. Reduce the absolute amount of waste that is produced from college staff offices. Make full use of all recycling facilities provided by City Municipality, local authority and private suppliers, including glass, cans, white, colored and brown paper, plastic bottles, batteries, print cartridges, cardboard and furniture.
2. E-waste should be collected by approved E-waste Management Company.
3. Provide sufficient, accessible and well-publicized collection points for recyclable waste, with responsibility for recycling clearly allocated.
4. Encourage the use of green consumables in the interior space that have low impacts on human health and the environment.

5.4 Green Area Management

This includes the plants, greenery and sustainability of the campus to ensure that the buildings conform to green standards. This also helps in ensuring that the Environmental Policy is enacted, enforced and reviewed using various environmental awareness programs.



a) Observations

Campus is located in very environment friendly area. Various tree plantation programs are being organized at college campus and surrounding areas by institute. This program helps in encouraging eco-friendly environment which provides pure oxygen within the institute and awareness among students. The plantation program includes various types of indigenous species of ornamental and medicinal wild plant species. Total green area in the campus is 4000 Square Meter. During trees/plants counting survey it is observed there are various trees in the institute campus which includes Neem,Sagwan, Kanchan,Bottle brush, Suru,Gulmohar,Rubber tree,Mango, Fig tree, Ashok, Badam, Chapa, Bakul, Arjun, Rain tree and many others which helps to keep healthy environment in the campus for the wellbeing of staffs and students. There are many initiatives taken by the college to make the campus ecofriendly.

- 1) The college maintains the plants and greenery around the campus.
- 2) The Tree Plantation drive are being conducted regularly.
- 3) Landscaping with trees and plants by using native species of local region to promote natural ecological conditions.
- 4) NSS volunteers had actively participated in cleaning & green area awareness activity organized at historical places.
- 5) Use of Bicycles/ Battery powered vehicles for intercampus transport.
- 6) Pedestrian Friendly pathways with pervious nature to prevent rainwater runoff.
- 7) Ban on use of plastics in campus.
- 8) Restricted use of vehicles- Organization of no Vehicle Days in the campus.



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(Plantation activities and Greenery in the Campus)



b) Recommendations

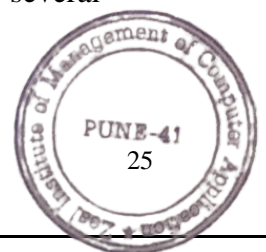
- Establish an institute level **Environmental Committee** that will hold responsibility for the enactment, enforcement and review of the Environmental Policy. The Environmental Committee shall be the source of advice and guidance to staff and students on how to implement this Policy.
- Celebrate every year **5th June as 'Environment Day'** and plantation activities on this day to make the campus Green..
- Ensure that greenaudit is conducted annually and action is taken on the basis of audit report, recommendation and findings. Promote environmental awareness as a part of course work in various curricular areas, independent research projects, and community service.
- Encourage students and staff for Green campus conversion: Green Campuses can have tremendous benefits, both tangible and intangible. The most tangible benefits are the reduction in water and energy consumption right from day one of occupancy. The energy savings could range from 20 - 30 % and water savings around 30-50%.

5.5 Indoor Environment

a) Observations:

Good indoor environmental quality is essential to the health, happiness and productivity of occupants. It is observed that indoor environment of the institute is moderate. The indoor plant species are not sufficient to create healthy environment. The requirement is to have at least one plant in every 100 sq.ft of carpet area of regularly office spaces. Plants like these help in absorbing toxins like formaldehydes. This can improve the indoor air quality inside the space, besides enhancing the aesthetics. There are several factors which impact the quality of indoor environment such as:

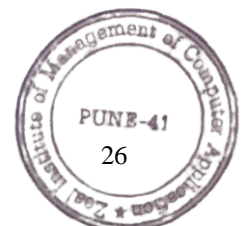
- Access to Day lighting



- Indoor air quality
- Availability of fresh Air
- Thermal Comfort
- Cleanliness and hygiene
- CO2 monitoring
- Ergonomics and Acoustics
- Connection to the outdoor environment

b) Recommendations:

- In Future encourage the use of eco-certified interior products that consider impacts through the life cycle, thereby resulting in lower environmental impacts.
- Provide adequate outdoor air ventilation, to avoid pollutants affecting indoor air quality.
- Provide good working environment to enhance the productivity and well-being of occupants.
- Minimize the exposure of building occupants and maintenance persons to hazardous indoor and outdoor pollutants, thereby enhancing indoor air quality and occupant health.
- Promote occupant wellbeing so as to enhance physical, emotional and spiritual well-being of building occupants (Staff and students). Encourage use of indoor plants like Bamboo palm/Areca palm, Lady palm, Rubber Plant, Peace Lily, Spider Plant, Money plant, Kentia palm, Queensland Umbrella, Boston fern, Aloe Vera, Snake Plant, Mother in law's tongue, Corn or cornstalk plant which helps to remove air pollutants, removes formaldehydes, benzene, trichloroethylene, removes household chemicals & carcinogens, absorbs carbon dioxide, gives off oxygen, resistance to insects and absorbs VOC.



6. Conclusion

In the **"Zeal Institute of Management & Computer Application, Pune"**, the audit process involved initial interviews with management to clarify policies, activities, records and the co-operation of staff and students in the implementation of mitigation measures. Staff and students were given training how to collect the data for the green audit process. In addition, the approach ensured that the management and staff are active participants in the green auditing process in the college. The baseline data prepared for the **"Zeal Institute of Management & Computer Application, Pune-411041 campus"**, will be a useful tool for campus greening, resource management, planning of future projects, and a document for implementation of sustainable development of the college. Existing data will allow the college to compare its programs and operations with those of peer institutions, identify areas in need of improvement, and prioritize the implementation of future projects. The green audit reports assist in the process of attaining an eco-friendly approach to the sustainable development of the college. Hope that the results presented in the green auditing report will serve as a guide for educating the college community on the existing environment related practices and resource usage at the college as well as spawn new activities and innovative practices. We expect that the management will be committed to implement the green audit recommendations. We are happy to submit this green audit report to the authorities of **"Zeal Institute of Management & Computer Application, Pune-411041 campus"**, .Based on the Green audit conducted at your institute you are complying with all-important requirements of NAAC committee.



Energy Audit Report

Zeal Institute of Management & Computer Application

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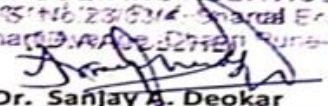
PREFACE

Energy management and audit is a process including Inspection, Survey & Analysis of energy flows for energy conservation in a building, a process or a system to reduce the amount of energy input into the system without negatively affecting the output. It is the translation of conservation ideas into realities, by evolving technically feasible solutions with economic and other organizational considerations within a specified time.

An energy audit is a study of a plant or facility to determine how and where energy is used and to identify methods for energy savings. There is now a universal recognition of the fact that new technologies and much greater use of some that already exist provide the most hopeful prospects for the future. The opportunities lie in the use of existing renewable energy technologies, greater efforts at energy efficiency and the dissemination of these technologies and options.

This Energy Audit of Zeal Institute of Management & Computer Application", Narhe, Pune-411041, campus is just one step towards our destination of achieving energy efficiency and we would like to emphasize that an energy audit is a continuous process. We have compiled a list of possible actions to conserve and efficiently utilize our scarce resources and identified their savings potential. The next step would be to prioritize their implementation. We look forward with optimism that the institute authorities, staff and students shall ensure the maximum execution of the recommendations and the success of this work. We are also thankful to the other staff members who were actively involved while taking measurements and conducting field study.



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Application", Narhe, Pune-411041

CERTIFICATE

This is to certify that "Supreme Electrical Energy and Consultancy Services, LLP", Pune has conducted Energy Audit of "Zeal Institute of Management & Computer", Narhe, Pune-411041. It has been observed that the campus has taken initiatives to implement various energy efficiency measures (ECM's) by identifying various energy conservation opportunities (ECO's) to conserve electrical energy but also started utilizing energy from hybrid renewable energy sources like wind Power and roof top Solar PV system.

SUPREME ELECTRICAL ENERGY &
India CONSULTANCY SERVICES
Ph No 23116236314 - Narhe, Pune-411041
Vimal Bhambhani
Dr. Sanjay A. Deokar
BEE Certified Energy Auditor (EA- 4494)
Indian Green Building Council (IGBC-AP)
Environmental Lead Auditor (ISO:14001-2015)



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LIST OF INSTRUMENTS USED:

Three Phase Power Analyzer (Dranetz, USA)

Single Phase Power Analyzer (ALM 10, Germany)

Lux meter, Power guard, Multimeter, Contact Thermometer, Tachometer.

SITE VISIT

Organization Name:	Zeal Institute of Management & ComputerApplication.
Site Name & Address:	Zeal Education Society's, Survey No. 39, Narhegaon, Taluka : Haveli, Pune (Maharashtra):411041 Website: zimca.in
Energy Auditor:	1. Dr. Sanjay A. Deokar (ME, PhD-Electrical Engg.) BEE Certified Energy Auditor (EA- 4494) Indian Green Building Council (AP) Chartered Engineer(IEI) Environmental Lead Auditor (ISO:14001-2015) [supremeelectricalenergy@gmail.com] [M:9823141287]



1. INTRODUCTION

1.1 Energy Audit

Energy plays a key role in the development and growth of the economy. The Government of India has put special emphasis to ensuring adequate, reliable, secure and cost effective supplies and to utilizing energy resources efficiently while minimizing the negative impacts on the environment. To ensure that there is sustainability of energy in the future, energy audit activities are necessary to determine suitable steps to be undertaken to use energy efficiently. An energy audit is an examination of the energy consumption of the equipment or system to ensure that energy is being used efficiently. This is one of the responsibilities of the Registered Electrical Energy Manager (REEM). This is a guideline for Registered Electrical Energy Manager (REEM) during their energy audit exercise. REEM should not be bound with this guideline but they have to establish their own justification in order to meet the facilities requirement according to the types and purposes such as offices, hotels, shopping complexes, hospital, college/universities etc

Objectives:

- i) To set minimum standards for undertaking detailed energy audit.
- ii) To guide REEM, asset owner and/or operator to identify Energy Conservation Measures (ECMs) in buildings.

1.2 Energy Audit Definitions

There are several definitions of an energy audit. Some guidebooks define energy audit as a systematic, documented verification process of objectively obtaining and evaluating energy audit evidence, in conformance with energy audit criteria and followed by communication of results to the client¹ (CIPEC 2002). In the Indian Energy Conservation Act 20012 (BEE 2008), an energy audit is defined as the verification, monitoring and analysis of the use of energy and submission of technical report containing recommendations for improving energy efficiency with cost benefit analysis and an action plan to reduce energy consumption. An energy audit is a



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study conducted to identify where, when and how much energy is being used in the business and how to reduce the cost of energy for the business. Even though there are several definitions, the objective or goal is the same which is to reduce the energy consumption without compromising comfort and quality of the building. This guideline is meant for REEM who have basic understanding on energy audits, for them to conform to the requirements of the Efficient Management of Electrical Energy Regulations 2008 (EMEER 2008).

1.2.1. Walk-through/preliminary Energy Audit

Walk-through audit is a process used to establish an overall picture of the potential of energy savings through visual inspection of the premises including air conditioning system, lighting, metering, building automation, building maintenance and other factors affecting energy consumption of the building. References to the records of equipment ratings, technical catalogues, operation and maintenance (O&M) manuals that are readily available will be very helpful to quickly determine whether equipment or systems are operating efficiently. Calculation, usually simple in nature, should be done to quantify the savings achievable for implementation of the identified Energy Conservation Measures (ECMs).

The walk-through/preliminary energy audit usually is carried out in one or two days by either REEM alone or with a team, depending on the size, complexity of the building and the scope of audit. Usually, simple instruments such as a clamp amp meter, thermometer, hygrometer (humidity meter) and lux meter will serve the purpose.

1.2. 2. Detailed Energy Audit

The detailed energy audit involves in-depth investigations into how the energy is currently being consumed, current performance of the existing systems and identification of various potential Energy Conservation Measures. It also gives the estimated cost and simple payback periods for all recommended Energy Conservation Measures.

The detailed energy audit involves the following four (4) main processes:

- i) Data collection
- ii) End-use load distribution



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- iii) Identification of Energy Conservation Measures
- iv) Reporting and presentation

1.3. Detail Energy Audit Process

1.3.1. Data Collection

One of the key tasks in Energy Auditing is the collection of all energy related data required by the REEM to apportion the total facility energy consumption into various energy end-uses. The collected data is then used to build a reliable picture of where and how much energy is being consumed and the cost of energy being used at the building. Data collection is one of the most laborious tasks in Energy Auditing and inability to collect the required data will lead to less reliable Energy Audit results.

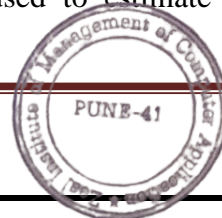
One of the difficulties faced by the REEM in order to establish the building's major end-use demands (air-conditioning, lighting and general equipment) is the limited or lack of building metering equipment. To be able to estimate reliably the major building's end-use demand, it is recommended that the REEM uses the following three steps to identify the building end-use demand:

- a) Desktop data collection
- b) Field data collection
- c) Cross checking of load demand data

The process of carrying out these three steps of data collection is explained in the following paragraphs:

a) Desktop Data Collection

The purpose of desktop data collection is to minimize the field energy related data collection by using all available facility data. It would be advisable during the initial process to collect preliminary building energy related data using a Building Detailed Audit form. This form allows the REEM to understand the nature of the audited building and areas to focus on during the auditing. The data collection through the form can be used to estimate the time and manpower required for the field data collection activity later.



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To minimize the time and manpower for the field data collection, the REEM should try to gather energy related data as much as possible using available resources such as:

- i) Architectural drawings (as built drawing)
- ii) Mechanical & Electrical drawings
 - Lighting circuit drawings (as built drawing)
 - Air conditioning system drawing and design manual (as built drawing)
 - Single line power supply schematic drawings (as built drawing)
- iii) Electrical energy bill historical data (for at least one year)
- iv) Load control systems such as timers, building automation system if any and others (as built drawing)

The REEM will use all desktop available energy related data to estimate the current building major energy end-uses.

The desktop data gathering should be considered as a first step of data collection, which will be complemented and verified during the Field Data Collection process.

b) Field Data Collection

The field data collection is a critical step for:

- i. Complementing the missing data, which the REEM could not find during the Desktop Data Collection process.
- ii. Verifying the accuracy of Desktop Data.
- iii. Understanding closely the building operations, energy wastages and building maintenance status.
- iv. Carrying out the necessary field measurements required to establish main incoming load profile, major energy end-uses such as Heating Ventilation and Air Conditioning (HVAC), lighting and others. Establishing actual building load apportioning.

c) Cross Checking of Load Demand Data

The accuracy of estimated end-use energy consumption will affect the accuracy of estimated energy savings of various building ECMs. Therefore, for reliable estimate of the building and end-use energy consumption, it is recommended to use the following approach:



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Use the field data collected to estimate the building's total and end-use energy consumptions. Due to a number of assumptions used in this method, in particular the equipment loading and time usage factors, the accuracy in estimating the building total end-use energy consumption may vary depending on the loads measured. For instance, due to the predictable nature of lighting load, this method allows reliable determination of the building lighting load.

Use appropriate data loggers to record the building and end-use load cycles. For example, it is recommended to record typical daily load profiles of main incoming for seven (7) days, one (1) to seven (7) days for HVAC system and one (1) hour to one (1) day for other equipments.

The logged data can be used to verify the accuracy of the estimated building total and end-use energy consumption generated by the desktop data collection. If there is a large deviation between the end-use loads estimated by desktop data collection and the end use loads estimated by field data collection, the REEM should alter the assumptions (equipment loading and time usage factors) applied in estimating the building equipment loads used in the desktop data collection to reduce these deviations to an acceptable range. REEM should take into account other factors such as seasonal variations and occupancy changes during the year that may affect overall energy consumption.

1.4 Analysis and Identification of Energy Conservation Measures (ECMs)

The effectiveness of an energy audit is related to the understanding in depth of the nature and operations of the audited building by the REEM. Knowing the acceptable level of comfort and tolerance for lighting, temperature and humidity level by employees are essential to come up with effective and acceptable ECMs.

1.5 About Institute & Facility Description: -

ZES has established in the year 1996, under the expert guidance of Shri. S. M. Katkar to provide quality education, Zeal Education Society has made a mark for itself as a renowned institute in the Pune region. ZES offer a team of highly qualified Staff, state of the art infrastructure and extraordinary vision that every student who is a part of the Zeal family marches out of the campus with top level confidence and abilities to be competent enough to face the cutting edge competition in the corporate world today. The society imparts knowledge from KG to PhD by establishing Zeal College of Engineering and Research, Zeal Polytechnic, Zeal Group of



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Management Institutes, Dnyanganga School, Dnyanganga Junior College, Dnyanganga College of Education and Silver Crest School. All the courses are approved by AICTE, New Delhi, recognized by DTE Govt. of Maharashtra & affiliated to Savitribai Phule Pune University. ZIMCA welcomes you to the one the finest management institutes in Pune region. We are committed to the proper progress of students for a flourishing career.

The Institute aims at bringing out the budding talents within each student and offer a motivating supervision to discover their capabilities which can help them become competent professionals.

The Institute extends its full support and guidance through well qualified staff who are more that eager to improve professional as well as personal skills and help the students explore their full potential.

ZIMCA offers state of the art infrastructure inclusive of a pleasant campus, up-to-date equipment and facilities that help the students to concentrate on their work. .

We have a team of highly qualified professors who strive to ensure that they impart knowledge which is sync with the University syllabus and the currents industry prerequisites. The amenities like Culture Centre, Music Studio, Dance Studio, TED Studio etc. have been offering opportunities to the students to showcase their talent.

The college is equipped with state of art infrastructural facilities like advanced class rooms, laboratories with high end equipment's, updated library, playground, gymnasium and auditorium. The college has hostel facility for the boys and girls in the campus. Vision and Mission of the institute is given below:

Vision:

To be recognized as Student-centric Institute Through Value-based Quality Education

Mission:

Emerge As a Remarkable Facilitator For Improving Employability Quotient of Young Graduates Through Business Management Education Which Eventually Contributes Decisively To The Sustainable Economic Growth.



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1.6 Methodology Adopted -

Pre-audit stage:

Defining scope of energy audit.

Forming an energy audit team.

Estimating time frame .

Collecting building information.

Energy audit stage:

Conducting site inspection and measurement.

Analyzing data collected.

Preparing energy audit report.

Post-audit stage:

Implementation of energy management opportunities.

Monitoring and review.

Energy Audit has conducted as per the guidelines of Bureau of Energy Efficiency (BEE)

- Relevant Data collection like inventory list of lighting fixtures, pumps, air conditioner and other equipment's.
- Measurement of main supply Voltage, Current, p.f., kW, kVAR, kVA and Voltage & Current Harmonics are done at the LT side of the Transformer and trend is recorded.



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- Measurement of power consumption load centers at distribution panels.
- Analysis of the past data for understanding the consumption pattern.
- Recommendation of energy improvement projects and methods to reduce the energy cost.
- Analysis of Techno-economic feasibility of the project with simple payback.

2. ENERGY CONSUMPTION PATTERN

2.1 Electricity Bills:-

The Electricity Bill of a utility consists of

- Maximum demand
- Load factor
- Power Factor (PF) incentive
- Time of Day Tariff (TOD tariffs)

Maximum Demand:

Maximum demand is the highest average kVA recorded during any one-demand interval within the month. The demand interval is normally 30 minutes, but may vary from utility to utility from 15 minutes to 60 minutes. The demand is measured using a tri-vector meter / digital energy meter.

Load Factor:

Load factor is the ratio of average load to maximum-billed load. It is an indicating parameter to show if maximum demand can be reduced. The monthly load factor is calculated as follows:

$$\text{Load Factor} = \frac{\text{Actual units consumed}}{\text{Maximum demand X No of hours per month X Average P.F.}}$$



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P.F incentives:

PF is the ratio of ACTIVE POWER to APPARENT POWER.

Thus,

$$PF = KW/KVA.$$

Hence, PF can be maintained by controlling the Maximum Demand. PF can also be improved by installing a capacitor bank at the connected load as per the requirement the rating of the capacitor bank directly depends upon the desired and the existing PF which is given by the relation:

$$kVAr \text{ Rating} = kW [\tan \phi_1 - \tan \phi_2]$$

Where,

KVAr rating= No. of capacitors required.

$\tan \phi_1$ =Existing Power Factor.

$\tan \phi_2$ =Improved Power Factor.

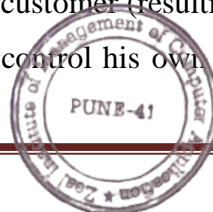
As per the MSEDCL tariff, whenever average power factor in a month, is more than 0.95, following incentives are offered:

For every 0.01 improvement of average PF above 0.95, an incentive of 1% of the amount of monthly energy bill, (excluding Regulatory Liability Charge (RLC), Demand Charges, Fuel and Other Cost Adjustment Charges (FOCA), Electricity Duty) is offered.

For PF of above 0.99 the effective incentive will amount to 5% of the energy charges, and for unity PF the effective incentive will amount to 7% of the energy charges.

TOD Tariff:

Time of Day metering (TOD), also known as Time of Usage (TOU) or Seasonal Time of Day (SToD), metering involves dividing the day, month and year into tariff slots and with higher rates at peak load periods and low tariff rates at off-peak load periods. While this can be used to automatically control usage on the part of the customer (resulting in automatic load control), it is often simply the customer's responsibility to control his own usage, or pay accordingly



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(voluntary load control). This also allows the utilities to plan their transmission infrastructure appropriately. See also Demand-side Management (DSM).

TOD metering normally splits rates into an arrangement of multiple segments including on-peak, off-peak, mid-peak or shoulder, and critical peak. A typical arrangement is a peak occurring during the day (non-holiday days only), such as from 1 pm to 9 pm Monday through Friday during the summer and from 6:30 am to 12 noon and 5 pm to 9 pm during the winter. More complex arrangements include the use of critical peaks, which occur during high demand periods. The times of peak demand/cost will vary in different markets around the world.

For all HT consumers the Time of Day (TOD) tariff is applicable in Maharashtra. For this purpose the day has been divided into 4 different time zones as given in table

Zone	Consumption during following hours of the day	Energy charge (p/u)
A	2200- 0600 hrs	-1.50
B	0600-0900 hrs	0
	1200-1800 hrs	0
C	0900- 1200 hrs	0.80
D	1800-2200 hrs	1.10

The Campus of ZES, (Zeal Institute of Management & Computer Application) is LT consumer with **188 KVA** contract demand and Zeal Education Society has installed **120 KW** roof top Solar PV net metering system. It generates **15000** units per month which are **30% of total energy consumption.**

Sr. No	Unit	Meter No.	Contract Demand	Connected Load capacity	Category
1	1	170019032730	188KVA	150KW	89LT-VII B I



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The total electricity bill for the year 2023-24 was **Rs.5570011.30**. The average monthly electricity bill of the campus for the year 2023-24 was **Rs. 464167.608**. The total energy consumption for the year 2023-24 was 491816 units. The average monthly energy consumption of the campus is 40984 KWh (units). In the year 2023-24 the average billed demand was **128KVA. The average power factor was 0.990.**

At present connected load of the institution is 32 KW

(Note: 1. The billing unit & yearly energy consumption is at actual mentioned on Electricity bill.)

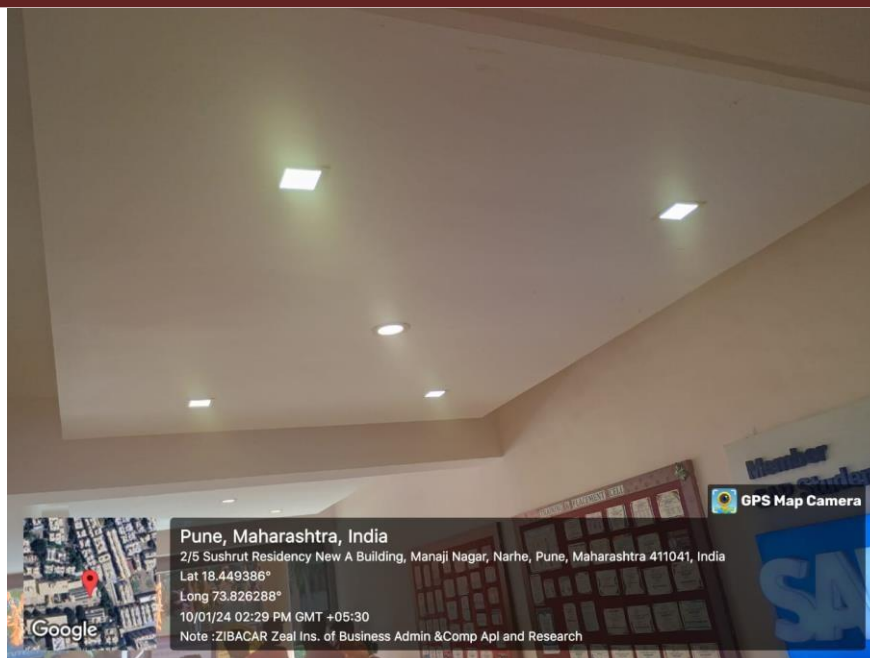
Energy Efficiency Measures Implemented in the Campus: It has been observed that campus has installed 20W all in one integrated solar based fixtures in the campus . The Institute has total lighting load 8KW, in which 2KW lighting fixtures are LED type. The 25% of Lighting load is Energy efficient (i.e.LED Fixures are installed in the building).



(20 W all in one integrated solar baed fixures with motion sensor system)



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(LED Fixures in the Campus)

Solar Rooftop Net Metering system in the Campus

Solar PV Roof Top Net Metering System: It has been observed that ZES has Installed 120 KW Net Metering Solar PV rooftop system in the campus which is generating 50000 KWh (Units) Per month. The energy consumption demand of the campus is 96000 units per month. It seems that installed solar PV roof top net metering system is fulfilling 30% energy demand of the campus.

It is strongly recommended to install another 200 KW solar PV roof top net metering system, which will substantially contribute to reduce power consumption from Grid as well as it helps to keep the environment clean. The payback period would be less than 4 years by taking the benefit of 30 % government subsidy. It has been observed that ZES has installed 4000 Liter per hr solar PV roof top hot water system at the girl's hostel

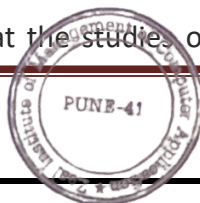
Important of Carbon Credit:

In India, being a tropical country, solar energy has largest potential than other green energy sources. But all technologies of electricity generation do have carbon footprint (CFP), which is



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the total amount of CO₂ and other GHG, emitted over the full life cycle of the processes. The utilization of solar energy is usually accomplished by using photovoltaic (PV) cells and modules. This technology is often referred to as low carbon or carbon neutral because they do not emit CO₂ during its operation. However, it is not carbon-free form of energy generation, because CO₂ emissions do arise in other phases of its life cycle such as during extraction, construction, maintenance and decommissioning. These cells are extracted from silica (quartzite sand) at high temperature. Production of silicon cells (called as silicon wafers) from silica can be regarded as the direct non-green part of the technology and contributes significant fraction to CFP. Solar technology is encouraged due to its low CFP compared with the fossil fuel technology and also for carbon credit (CC) by way of reduction of CO₂ emission in the environment. The CC trading (Emission trading) is an administrative approach that provides economic incentives for achieving reductions in the emission of pollutants and is a tradable permit scheme. International treaties such as the Kyoto Protocol set quotas on the amount of GHG which a country can produce. Countries in turn set quotas on the emissions of businesses. Again, the businesses that are over their quotas must buy CC for their excess emissions, while businesses that are below their quota can sell their remaining credits. Even, the credits can be exchanged between businesses or bought and sold in international markets (Chicago Climate Exchange and European Climate Exchange) at the prevailing market price. Study reveals that during 2005–06, European and Japanese Companies were the major buyers and China was the major seller of the CC. Again, the amount of CC earned is obviously associated with the amount of solar electricity produced, which usually depends on climatic conditions of the area and also the efficiency of the cells along with other prevailing conditions. Hence, there are large variations on the extent of solar energy production using PV cells and, consequently, on the CC earned as well as on the contribution of CO₂ emission to CFP. The solar energy is considered as an important alternative to mitigate GHG emission in India as the country receives considerable amount of solar radiation. In this context, it is posing a serious question whether this technology is reducing CFP or contributing to CFP and to what extent? This estimation is extremely important for planning the combination of energy generation system to be used in the country. Literature survey reveals that the studies on this aspect are very rare. This has



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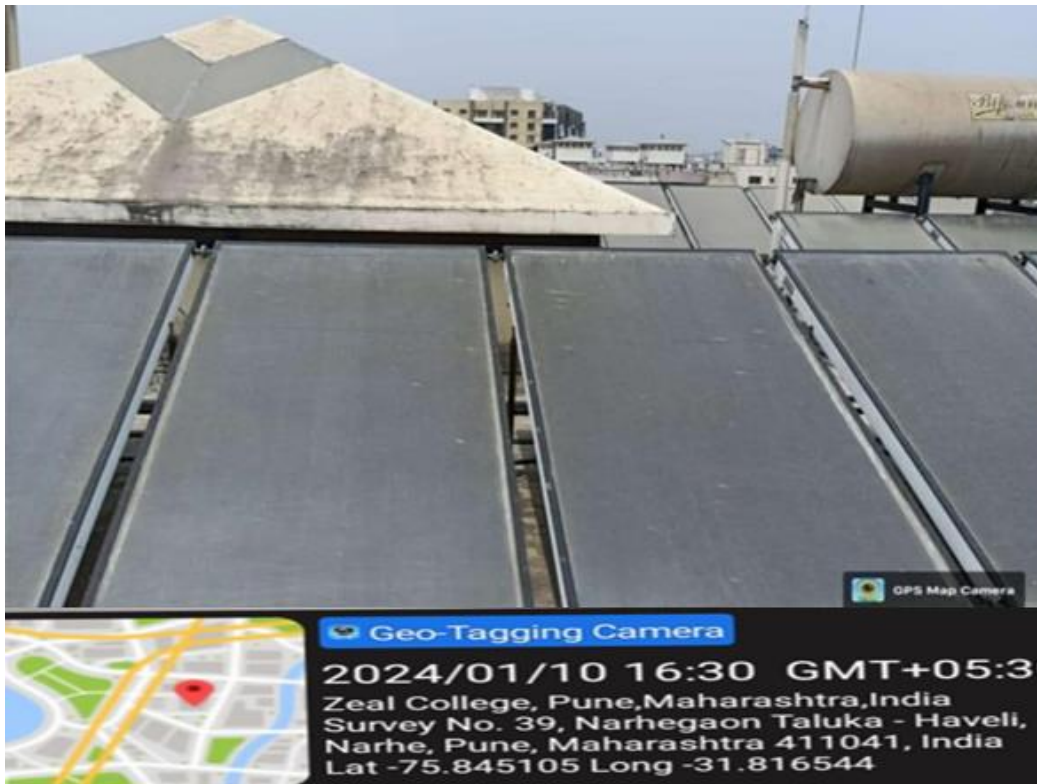
reinforced the present study to estimate the following: (i) to quantify the degree of solar energy production; (ii) to reveal the amount of carbon credit earned per megawatt-hour per year by using this green technology; and (iii) to quantify the amount of direct CO₂ generation per megawatt-hour per year during the extraction of silicon wafers used in a PV module using real-life data and also to highlight the contribution of this CO₂ to CFP in the India.



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(120KW Net metering solar PV Roof top system in the Campus)



(4000 Liter per Day rooftop Solar PV hot Water System at Girls Hostel)

Carbon Credit calculation for 200 KW Solar PV Plant

During 22 years, the 200 kW plant can generate (150000 KWh(Units))/per year with 300 clean sunny days, average 2.5 units per KW) 3300000 KWh(Units) Energy(3300Mwh).

On considering the average value of 0.932 tonnes of CO₂ emission reduction per megawatt-hour of electricity. In this Plant, CO₂ emission reduction per megawatt-hour for 22 years as per the calculation will be $3300 \times 0.932 = 3075$ tonnes.

As pointed out earlier, if this value is traded at the rate of 40\$/tonnes, then total reduction will be $3075 \times 40 = 123000\$$ *82 = Rs. 1,0086000.00 in 22 years.

3. ENERGY EFFICIENCY RECOMMENDATIONS

It has been observed that the load on the campus is not constant as well as during the time of day (TOD) energy consumption also varies significantly. The contribution of lightning load, fan load and computers are found to be dominant. So there is a wide area to reduce energy consumption by replacing the conventional appliances by new highly efficient appliances. This could find the major & economically viable solution to reduce energy consumption & ultimately leads to reduction in electricity bill. For calculating the power consumption, it is required to have the diversity factor, as the facility working period is considered the diversity factor is assumed to be 0.4 (i.e,40%) it signifies that the 40% load consumption out of 100% total connected load. The working days for the college premises are 240 days while working hours are 7 hrs this will give the exact energy consumption. The commercial rate according to tariff scheme is on an average Rs.12.0/unit. The required data will also include the various ratings of conventional as well as efficient appliances.



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3.1 Replace existing ceiling fan (70 W) by energy efficient fans (28 W BLDC Motor fans).

The overall benefit by this replacement is:

Old Fitting:

Type fitting	: 70W ceiling fans
No of Fitting	: 70 Nos.
Total Wattage	: 4900 Watts.
Operating Hours	: 270 days x 7 hours = 1890 hrs.
Electricity Consumed per year	: 9261(Units)
Electricity Rate	: Rs.12.0 per unit
Annual Electricity Cost	: Rs.1,11,132.00

New Fitting:

Type fitting	: 28 W Energy efficient fans
No of Fitting	: 70 Nos.
Cost of fitting	: Rs.3500 (per fitting)
Total Investment for fitting	: Rs. 2,45,000/-
Operating Hours	: 270 days x 7 hours = 1680 hrs.
Electricity Consumed per year	: 3704 kWh (Units)
Electricity Rate	: Rs.12.0 per unit
Annual Electricity Cost	: Rs. 44,452.80

Simple payback period:

Net annual saving	: Rs.1, 11,132.00- Rs.44452.00= Rs.66,680.00/-
Simple payback period	: Total Investment / Net Annual Saving
	: 1.66 Years.

Existing 70 W Fan

Proposed 28 W BLDC energy efficient fan





3.2 Sensor based solar operated led outdoor light

An LED based solar street lighting system aims at providing solar electricity for operating LED lights for specified hours of operation per day. Rapid developments in solar cells, LED lighting and energy storage are creating great opportunities for solar-powered solid-state lighting.

It is recommended to install more sensor based all in one integrated solar operated LED street lamp in the campus.

3.3 Principal/Director/Head of Department (HOD) cabin IOT automation:

Mobile based IOT system can be installed in the Principal/Directors/HOD cabin to control electrical devices in the campus. It will help to reduce energy consumption.

Load Factor Incentive: The Commission has retained the Load factor incentive for consumers having Load Factor above 75% based on contract demand. Consumers having load factor over 75% upto 85% will be entitled to a rebate of 0.75% on the energy charges for every percentage point increase in load factor from 75% to 85%. Consumers having a load factor over 85% will be entitled to rebate of 1% on the energy charges for every percentage point increase in load factor from 85%. The total rebate under this head will be subject to a ceiling of 15% of the energy charges for that consumer.



It is strongly recommended to maintain load factor above 0.75 to avail L.F incentives.

3.4 Energy efficiency of Water pumping systems:

The most significant savings in the energy consumption of a pumping system can be achieved by selecting the most appropriate pump technology and Energy efficient motors star rated motors. For an application with premium efficiency. This selection process starts with gaining a complete understanding of the application, fluid characteristics and flow demands. Matching the most appropriate pump construction with the optimum impeller design will result in the most cost-effective solution, both in terms of initial capital investment and long-term operating costs.

The correct sizing of the pump represents the next most significant economic opportunity to reduce energy consumption. Oversizing often occurs in the design phase by the customer, because it is quite common to add multiple safety factors to the required head and flow values. Therefore, an over-sized pump is selected and, consequently, the pump does not run within its best efficiency area during normal production, resulting in a considerable waste of energy.

Replacing a pump with a new, high-efficiency design reduces the energy consumption normally by between 3% and 20%, but in some cases, there can be as much as a 50% reduction.

Factors such as pipe size (diameter), overall pipe length, pipe surface roughness, as well as control valves will influence the system pressure drop and resulting energy consumption for the system. Replacing an over-sized pump with a more suitable design size brings a great potential for savings. In some cases, significant savings can also be achieved by modifying the existing pump with a different kind of impeller or adding a VSD. At the same time, it is imperative that you take care of energy efficiency while pumping procurement itself. Choosing pump manufacturers who have a good track record of energy efficient pumps will be advantageous. A minor drop in the energy efficiency of pumps across the plant can lead to a major cumulative loss to the system. Hence whenever you are procuring new pumps, always keep the energy efficiency of pumps as one of the deciding factors and opt for a reputed pump manufacturer that can provide you with good quality and energy efficient pumps.

3.4 Energy Saving in Computers: For energy savings, consider the following guidelines:

- Enable the sleep mode on your monitor if you aren't going to use your PC for more than 20 minutes.



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- Switch off both the CPU and monitor if you are not going to use your PC for more than 2 hours. **ENERGY STAR-labelled computers use 30%-65% less energy than computers without this designation, depending on usage. Consider buying a laptop for your next computer upgrade; laptops use much less energy than desktop computers.**

3.5 Replace the existing ordinary FTL-Copper Choke (1x40W+16W choke), with 20W LEDTube light.

The overall benefit by this replacement is:

Old Fitting:

Type fitting	: 1x40W MC FTL
No of Fitting	: 60 Nos.
Total Wattage Including Choke	: 56 W
Operating Hours	: 270 days x 7 hours = 1890 hrs.
Electricity Consumed per year	: 6350 kWh (Unit)
Electricity Rate	: Rs. 12 per unit
Annual Electricity Cost	: Rs.76,200/-

New Fitting:

Type fitting	: 20 W LED Tube
No of Fitting	: 60 Nos.
Cost of fitting	: Rs.350 (per fitting)
Total Investment for fitting	: Rs. 21,000/-
Operating Hours	: 270 days x 7 hours = 1890 hrs.
Electricity Consumed per year	: 2268 kWh (Unit)
Electricity Rate	: Rs. 12 per unit
Annual Electricity Cost	: Rs. 27,216/-

Simple payback period:

Net annual saving	: Rs. 76,200 - Rs. 27,216= Rs. 48984/-
Simple payback period	: Total Investment / Net Annual Saving : 15 days.



Energy Efficiency Measures Implemented in the Campus.

- ✓ Institute has implemented various energy efficiency measures in the campus i.e. Use of 9W/18W LED lights in the various building and LED Street Lights.
- ✓ Automatic Power Factor Correction Bank has installed at the distribution side which has helped to maintain power factor almost unity.
- ✓ Institute has started utilizing energy from renewable energy resources.



Energy Audit Report for "Zeal Institute of Management & Computer
Application", Narhe, Pune-411041

CONCLUSION

The Campus of ZES, (Zeal Institute of Management & Computer Application) is LT consumer with 188 KVA contract demand and Zeal Education Society has installed 120 KW roof top Solar PV net metering system. It generates 50000 units per months which is 30% of total energy consumption.

The total electricity bill for the year 2022-23 was **Rs.5570011.30**. The average monthly electricity bill of the campus for the year 2022-23 was **Rs. 464167.608**. The total energy consumption for the year 2022-23 was 491816 units. The average monthly energy consumption of the campus is 40984 KWh (units). In the year 2022-23 the average billed demand was 128KVA. The average power factor was 0.990. It has been observed that ZES has installed 4000 Liter per hr solar PV roof top hot water system at the girl's hostel.

At present connected load of the campus is 32 KW including electric motor load, lighting load, computer load and UPS Load and other load. Institute has implemented various energy conservation measures in the campus, which has helped to reduce large amount of Electrical Energy consumption.





Date: 10-02-2024

ACADEMIC YEAR: 2023-2024

CLUB NAME: Social Responsibility club

1. EVENT DETAILS

Day and Date	10-02-2024 11:00 am
Event Level	Institute level
Event Category	Social Responsibility
Event type	Co-curricular
Event Name	Tree plantation at Korigadh Fort
Event mode	Offline
Venue	Korigadh Fort
No. of Participants	105

2. EXECUTIVE SUMMARY:

ZIMCA organized a Tree plantation Korigadh Fort. Tree plantation projects often involve local communities, providing them with opportunities for employment, education, and empowerment. Trees also offer recreational spaces, improve aesthetics, and contribute to overall well-being in urban and rural areas. Trees play a crucial role in mitigating climate change by absorbing carbon dioxide during photosynthesis, thereby reducing greenhouse gas concentrations in the atmosphere. Shriram ugale, Naveen kumar monitored the event.

3. OUTCOME:

- 1) Tree plantation helps in conserving the environment by reducing soil erosion, improving air quality, and mitigating climate change through carbon sequestration.
- 2) Planting a variety of tree species contributes to biodiversity conservation by providing habitats and food sources for various plant and animal species.
- 3) Tree plantation plays a crucial role in ecosystem restoration efforts, particularly in areas affected by deforestation, habitat degradation, or natural disasters.





Photographs:



Students planting Trees.



[Handwritten Signature]

Club Head

[Handwritten Signature]

Director

**Zeal Institute of Management
 & Computer Application
 Pune - 411 041.**

