2023–2024

GREEN & ENERGY AUDIT REPORT of Kalinga Institute of Industrial Technology (KIIT, Deemed to be University U/S 3 of UGC Act 1956)

Prepared by

ENER VISION
(ISO 9001 CERTIFIED & BEE empaneled ESCO)
Kandivali EAST, MUMBAI

ENERVISION
We serve to save
An Empanelled ESCO of B.E.E

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Acknowledgement

M/S. ENER VISION places on record its sincere thanks to the KIIT DEEMED TO BE University Management giving us the opportunity for carrying out Green Audit (Environment, Electrical, Energy and Fire Safety Audit) of the KIIT University campuses. We also sincerely thank to Mr. Suvendu Panda (KIIT & KISS Nodal Officer) & Mr. S.N.Nayak (Chief Engineer Electrical KIIT Campus) & his maintenance team for their excellent co-ordination & help during the Third-Party Inspection of Green Audit on 8th August 2023.

Our engineers under the lead auditors Mr. Chinmoy Dutta – Chartered Electrical, Engineer & BEE Certified Energy Auditor, have carried out the power & facility audit.

Chinmoy Dutta

Place: Mumbai

Date: 14th January 2024

Chinmoy Dutta
(Chartered Elect Engineer & BEE Certified Energy Auditor EA-0985)
ENER VISION
(ISO 9001 Certified & BEE empanel ESCO)

About “ENER VISION”:

Established in 2007, ENER VISION is one of the leading providers of building energy management systems and solutions services with a scalable vertically– integrated business model. The Group operates with a footprint in three major cities in India supported by a service personal in Mumbai, Hyderabad, Bangalore and Gurgaon.

ENER VISION offers comprehensive energy-saving solutions for building environments, and BEE empanelled ESCO since 2010.

Our Mission:

To provide building owners with energy efficiency measures and products that are more sustainable, efficient and healthy than conventional building throughout all stages of a building's lifecycle

Our Vision:

To be recognized as the leading player in providing energy saving solutions to buildings

Certification of the company

ऊर्जा दक्षता ब्यूरो
(भारत सरकार, विद्युत मंत्रालय)
BUREAU OF ENERGY EFFICIENCY
(Government of India, Ministry of Power)

15 YEARS OF CELEBRATING THE MAHATMA

17/05/ESCO/22-23/ 4341 – 420 15th September,2022

Shri Chinmoy Dutta
Proprietor
ENER VISION
3, Bldg No 6, Thakur Village,
Kandivali East, Mumbai -400101

Sub: Empanelment of Energy Service Company (ESCO)

Dear Sir,

This has reference to your application for empanelment/ re-empanelment as an Energy Service Company with BEE in response to our advertisement for re-empanelment and fresh empanelment of ESCOs in the month of May, 2022.

Consequent to scrutiny and evaluation of your documents by SEBI accredited Grading Agencies CRISIL /CARE Advisory/ICRA Analytics/SMERA/ IRR Advisory in terms of the approved parameters for evaluation, BEE is pleased to inform that your company **ENER VISION** has qualified for empanelment with BEE as a **Grade 3** Energy Service Company (ESCO). This empanelment would be effective from 16th August, 2022 and will be valid till 15th August, 2024.

Further, the list of all the empanelled ESCOs along with grade assigned is uploaded on its website (www.beeindia.gov.in) for use by State/Central government/Public Sector agencies as well as by any other agency interested in implementing energy efficiency projects on ESCO mode. Please acknowledge your acceptance to this letter.

Yours faithfully,

(Arijit Sengupta)
Director

स्वहित एवं राष्ट्रहित में ऊर्जा बचाएँ Save Energy for Benefit of Self and Nation

चौथा तल, सेवा भवन, आर० के० पुरम, नई दिल्ली–110 066, वेबसाईट / Website : www.beeindia.gov.in
4th Floor, Sewa Bhawan, R.K. Puram, New Delhi-110 066 टेली / Tel.: 91 (11) 26766700, फैक्स / Fax: 91 (11) 26178352

Certification of the company

QRO
QUALITY RESEARCH ORGANIZATION

Certificate of Registration

This is to certify that

ENER VISION

BUILDING NO. 1C, FLAT NO. 03, NG SUNCITY PHASE-1, THAKUR VILLAGE, KANDIVALI (E), MUMBAI-400101 (MAHARASHTRA) INDIA

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

ISO 9001:2015

Quality Management System

For the following scope of activities:

ENERGY AUDIT & ENERGY MANAGEMENT, ELECTRICAL & FIRE SAFETY AUDIT, EM CONSULTANCY.

Date of Certification: 28th January 2021
1st Surveillance Audit Due: 27th January 2022
2nd Surveillance Audit Due: 27th January 2023
Certificate Expiry: 27th January 2024

Certificate Number: 3050210128170

QRO
EGAC
IAF

Head of Certification

Validity of this certificate is subject to annual surveillance audits to be done successfully on or before 365 days from date of the audit.
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Audit Team:

Mr. Chinmoy Dutta: B.E. Electrical & Certified Energy auditor from Bureau of Energy Efficiency, Ministry of Energy, Govt. of India and Chartered Engineer More than 28 years of experience in designing and Project Management of all types of Electrical, Automation & HVAC system. Handled various projects during his tenure. Also has hands on experience in Facility Management and has handled some of the prestigious facilities. Worked with TISCO, Siemens, Saudi Aramco, IPMSL & Pantaloon retail India. Audited Mall, Hotel and Corporate Buildings, Data Centers etc.

Mr. Pravin Shankar: Certified Energy auditor from Bureau of Energy Efficiency (EA 9892), Ministry of Energy, Govt. of India. Experience in designing and Project Management of all types of Electrical & HVAC system. Hands on experience in Facility Management.

Mr. D T Naik - Diploma in Electrical & Mechanical, PWD certified Electrical Supervisor, ISO 50,000 Certified energy auditor and HVAC auditor with 40 years of experience in design and execution of HVAC system.

Capt. Balasubramanian G S - An ex-Army officer with a certificate on firemanship from Nagpur Fire brigade College. He has also done his diploma in Industrial safety from Labour Institute of Madras. Apart from his career in Army, captain has been working in the field of training on fire safety and auditing of status of firefighting system in various organization for good around 25 years

Rahul Kalamata – Manger in Operations. B Tech Mechanical MSME certified Industrial safety NEBOSH Trained in Health and Safety Management at Work experience-7 years & National safety council trained fire safety auditor experience of Elect & Fire safety audit 400 sites (Warehouses – 50000 sq ft to 4 lakh sq ft), Mall, residence, Industry, Corporate offices, retail branches).
Abhishek Anand- Sr Engineer. B Tech Electrical experience in electrical audit of 300 plus sites. NEBOSH Trained in Health and Safety Management at Work
Experience – 7 years (Warehouses, Mall, residence, Industry, Corporate offices, retail branches)
Dipesh Mayekar – Sr. Supervisor. Diploma in Electrical Engineering. NEBOSH Trained in Health and Safety Management at Work Experience – 8 years. Audit experience of more than 400 plus site. (Warehouses, Mall, residence, Industry, Corporate offices, retail branches).

Executive Summary:

Eco campus is a concept implemented in many educational institutions, all over the world to make them sustainable because of their mass resource utilization and waste discharge in to the environment. Waste minimization plans for the educational institute are now mandatory to maintain the cleanliness of the campus. To find out the environmental performance of the educational institutions and to analyze the possible solutions for converting the educational campus as eco-campus the conduction of Green Auditing of institution is essential.

The Energy & Green auditing of KIIT Campuses enables to assess the life style, action and its impact on the environment. This is the first attempt to conduct green auditing of this college campus. This audit was mainly focused on greening indicators like consumption of energy in terms of electricity and fossil fuel, quality of soil and water, vegetation, waste management practices and carbon foot print of the campus etc.

Initially a questionnaire survey was conducted to know about the existing resources of the campus and resource consumption pattern of the students and staffs in the college. In order to assess the quality of water and soil, water and soil samples were collected from different locations of the college campus and analyzed for its parameters. Collected data was grouped, tabulated and analyzed.

Finally a report pertaining environmental management plan with strength, weakness and suggestion on the environmental issue of campus are documented.

On physical verification of the electrical system, it is noticed the maintenance team has done a good work. Physically the condition of wires, cables, breakers, panels, DB's, transformers, DG sets, etc are good. Entire university electrical system is thermal scanned and found normal as the temperature is less than 45 Deg C except in few places. These hotspots are also rectified during the time of audit and now it is normal. Earth pits are found good. AC machines were checked and are working with normal efficient range. Except at some places the maintenance has not been done which indeed are serviced properly during the period of audit.

- With respect of fire safety, all the campus are installed with proper fire-fighting systems and fire detecting systems. Signages are also in-tact. Fire extinguishers are installed in the campus. Smoke detectors and fire alarm system is absent for the campus which has to be installed.
- Water management is good but need to install meters to monitor the flow and usage of water. Records has to be maintained and reviewed by the superior. Main water pipe lines need to be installed with globe valves in each floor to regulate the water flow and minimize the water waste.
- Waste management system is good. All the garbage has to be properly maintained and measured. Need to maintain the records for different kinds of waste generation.
- Greenery and plantation inside the campus has been improved compared to last year. Plants & trees of different kinds with flowers are planted in much quantity to control the pollution and CO emissions.

- Rain water harvesting is implemented in the campuses. As lot of other buildings are under construction it is recommended to implement rain water harvesting which will help to reduce the water consumption from the underground.
- Energy is not monitored. Meters are installed only in the LT panel and these meters are also not working. Need to install IOT based energy meters in each and every panel which will give help to monitor and regulate the energy consumption. All the panels and DB's has to be serviced. All the unwanted openings need to be closed in all the panels and DB's.
- Install light sensor in the academic and admin buildings to synchronize the LED lights with day light. This will help to reduce the further energy consumption.
- Globe valves at floor level main water pipes are not installed due to which the water flow at lower floors is very high and this results in the water wastage. Install globe valves at the floor's main water pipe lines and set the valves accordingly to the maintain the water pressure.
- The policy on Green energy and sustainability requires improvement in all sectors.

INTRODUCTION

About college -
KIIT DU Bhubaneswar is one of the pioneer institutions for higher education in the state of Odisha.

The fundamental aim of KIIT DU is to impart sound learning to young students under circumstances congenial to their all-round development. It encourages the students to aim at excellence not only in academic pursuits, but also in every aspect of human endeavor to achieve perfection.

The students are prompted to strive for academic excellence so that in course of time they may take up suitable careers for the betterment of their lives and also of their families and society at large. The various co-curricular activities of the college especially the extension programs provide them with a rare social consciousness that motivates them to reach out to their fellowmen particularly the needy and the marginalized.

Vision Statement of KIIT DU -
To create self-reliant and liberated young citizen with traditional cultural values and moral integrity who will be agents of social transformation in their families and society.

MAPPING & DETAILS OF CAMPUS:

LIST OF BUILDINGS in KIIT/KISS/KIMS	
Number of academic buildings	29
Number of administrative buildings	13
Number of libraries(centrally)	11
Number of hostels	52
Number of cafeterias	12
Number of hospital buildings	7
KIIT TBI buildings/blocks	3
Number of convention centres	3
Number of central labs	4
Number of art galleries	1
Number of stadiums	2
Number of gyms	4
Number of sports complexes	3
Number of swimming pools	3
Number of OATs	6
Number of gardens	20
Number of guest houses	1
Electrical control room	4
Number of waste management systems	2
Bank & American Centre	1
Number of biogas plants	1
Number of workshops/sheds/repairing/manufacturing units, etc.)	4
Laundry house/annex building/meeting hall	3
Railway ticket counter/Post office	2
Blood bank	1
Founder Office/white house	2
Bank & ATM	2
Security House	7
Information centre	2
Store cum staff room	2
Archery office	1
Gas Bank	1
Birth complex	1
KISS Dining Hall/Kitchen	1
Workshop/dining hall	1
Pump house, changing room/toilet complex, dispensary, cottages	21

OBJECTIVES OF GREEN AUDIT -

The main aim objectives of this green audit are to assess the environmental quality and the management strategies being implemented in KIIT Campuses.

The specific objectives are:

1. To assess the quality of the water and soil in the KIIT campuses
2. To monitor the energy consumption pattern of the college
3. To quantify the liquid and solid waste generation and management plans in the campuses.
4. To assess the carbon foot print of the college
5. To assess whether the measures implemented by KIIT Campuses has helped to reduce the Carbon Footprint.
6. To impart environment management plans to the college
7. Providing a database for corrective actions and future plans.
8. To assess whether extracurricular activities of the Institution support the collection, recovery, reuse and recycling of solid wastes.
9. To identify the gap areas and suggest recommendations to improve the Green Campus status of the KIIT campuses.

TARGET AREAS OF GREEN AUDITING

Green audit forms part of a resource management process. Although they are individual events, the real value of green audit is the fact that they are carried out, at defined intervals, and their results can illustrate improvement or change over time. Eco-campus concept mainly focuses on the efficient use of energy and water; minimize waste generation or pollution and also economic efficiency.

All these indicators are assessed in the process of “Green Auditing of this educational institute". Eco-campus focuses on the reduction of contribution to emissions, procures a cost effective and secure supply of energy, encourages and enhances energy use conservation, promotes personal action, reduce the institute’s energy and water consumption, and reduce wastes to landfill, and integrate environmental considerations into all contracts and services considered to have significant environmental impacts. Target areas included in this green auditing are water, energy, waste, green campus and carbon footprint.

Auditing for Water Management

Water is a natural resource; all living organisms depend on water. While freely available in many natural environments, in human settlements potable (drinkable) water is less readily available. Groundwater depletion and water contamination are taking place at an alarming rate.
Hence it is essential to examine the quality and usage of water in the college. Water auditing is conducted for the evaluation of facilities of raw water intake and determining the facilities for water treatment and reuse. The concerned auditor investigates the relevant method that can be adopted and implemented to balance the demand and supply of water.

Auditing for Energy Management

Energy conservation is an important aspect of campus sustainability which is also linked with carbon foot print of the campus. Energy auditing deals with the conservation and methods to reduce its consumption related to environmental degradation. It is therefore essential that any environmentally responsible institution examine its energy use practices.

Auditing for Waste Management

Human activities create waste, and it is the way these wastes are handled, stored, collected and disposed of, which can pose risks to the environment and to public health.
Pollution from waste is aesthetically unpleasing and results in large amounts of litter in our communities which can cause health problems. Solid waste can be divided into three categories: bio-degradable, non-biodegradable and hazardous waste. Bio-degradable wastes include food wastes, canteen waste, wastes from toilets etc. Non-biodegradable wastes include what is usually thrown away in homes and schools such as plastic, tins and glass bottles etc. Hazardous waste is waste that is likely to be a threat to health or the environment like cleaning chemicals, acids and petrol. Unscientific management of these wastes such as dumping in pits or burning them may cause harmful discharge of contaminants into soil and water supplies, and produce greenhouse gases contributing to global climate change respectively. Special attention should be given to the handling and management of hazardous waste generated in the college. Bio-degradable waste can be effectively utilized for energy generation purposes through anaerobic digestion or can be converted to fertilizer by composting technology. Non-biodegradable waste can be utilized through recycling and reuse. Thus the minimization of solid waste is essential to a sustainable college. The auditor diagnoses the prevailing waste disposal policies and suggests the best way to combat the problems.

Auditing for Green Campus Management

Trees play an important ecological role within the urban environment, as well as support improved public health and provide aesthetic benefits to cities. In one year, a single mature tree will absorb up to 48 pounds of carbon dioxide from the atmosphere, and release it as oxygen. The amount of oxygen released by the trees of the campus is good for the people in the campus.
So while you are busy studying and working on earning those good grades, all the trees in campus are also working hard to make the air cleaner for you.

Auditing for Carbon Footprint

Burning of fossil fuels (such as petrol) has an impact on the environment through the emission of greenhouse gases into the atmosphere. The most common greenhouse gases are carbon dioxide, water vapours, methane, nitrous oxide and ozone. Of all the greenhouse gases, carbon dioxide is the most prominent greenhouse gas, comprising 402 ppm of the Earth’s atmosphere. The release of carbon dioxide gas into the Earth’s atmosphere through human activities is commonly known as carbon emissions. Vehicular

emission is the main source of carbon emission in the campus, hence to assess the method of transportation that is practiced in the college is important.

METHODOLOGY ADOPTED

The methodology adopted to conduct the Green Audit of the Institution had the following components:
Onsite Visit.
Four day field visit was conducted by the Green Audit Team. The key focus of the visit was on assessing the status of the green cover of the Institution, their waste management practices and energy conservation strategies etc. The sample collection (water, soil) was carried out during the visits. The water samples from two open wells and two tap water sources were taken and soil samples from three different places of the campus was collected. The sample collection, preservation, and analysis were done in the scientific manner as prescribed by the standard procedures.

Focus Group Discussion

The Focus Group discussions were held with the nature club, bird club, members, staff members and the management focusing various aspects of Green Audit. The discussion was focused on identifying the attitudes and awareness towards environmental issues at the institutional and local level.

Energy, waste management and Carbon foot print analysis Survey

With the help of teachers and students, the audit team has assessed the energy consumption pattern and waste generation, disposal and treatment facilities of the college. The monitoring was conducted with a detailed questionnaire survey method.

KIIT UNIVERSITY

OBJECTIVES OF ENERGY AUDIT -

The objective of an energy audit at a college or university is to evaluate and optimize energy consumption across campus facilities, aiming to reduce energy costs, enhance sustainability, and lower environmental impact. Specifically, an energy audit aims to:

1. Assess Current Energy Usage: Identify and quantify energy consumption patterns across buildings, labs, and other facilities.
2. Identify Energy Inefficiencies: Detect areas with high energy waste or excessive consumption.
3. Recommend Improvements: Suggest energy-saving measures such as upgrading equipment, improving insulation, or implementing renewable energy sources.
4. Reduce Carbon Footprint: Develop strategies to decrease greenhouse gas emissions, aligning with sustainability goals.
5. Enhance Cost Savings: Lower operational costs by reducing energy expenditures through efficient practices and technologies.
6. Promote Awareness and Education: Engage the campus community in energy conservation efforts, increasing awareness about energy-efficient practices.

Ultimately, the audit serves as a foundational step toward creating a sustainable, energy-efficient campus environment.

ENVIRONMENT POLICY:

- Establish environmental management systems to minimize harmful effects on environment, human, health and safety.
- Preventing pollution through continually monitoring and improving its environmental performance.
- Promote use of clean and safe technologies in order to utilize natural resources efficiently.
- Encourage transparency and communication of its commitment to sustainable development simultaneously increasing environmental awareness amongst the community at large.

KIIT DU Green and Environmental policy showcases only the outline. The Policy makers of the KIIT DU need to improve and add more policy terms in the field of Green, Environment & Sustainability such as:

- Policy on use of sustainable materials.
- Policy on effective use of energy efficiency practice's.
- Policy on energy efficient buildings and campus.
- Policy on control of carbon footprints.
- Policy on investment and selection of carbon intensive energy industries in terms of MOUs and Training & placements.

ENVIRONMENT MANAGEMENT PROGRAMME

♣ Conservation of Water Resources.

a) Judicious Management and conservation of water resource.
b) Ground Water Recharging.
c) Waste water management.

♣ Conservation of Energy.

a) Judicious Management and Conservation of energy.
b) Reduction in use of fossil fuels.
c) Promotion and use of Renewal energy sources.

♣ Solid waste and Garbage Management.

a) Proper disposal of Hospital waste (Biomedical & Clinic waste).
b) Conversion of biodegradable components into biogas and bio-fertilizers.
c) Recycling of waste paper.
d) Proper disposal of Non-biodegradable components.

♣ Plantation in open areas.

SURVEY FORMS:

A. Water management

1 Source of water
2 No of Wells
3 No of motors used
4 Horse power – Motor
5 Depth of well –Total
6 Water level
7 Number of water tanks
8 Capacity of tank
9 Quantity of water pumped every day
10 Any water wastage/why?
11 Water usages for gardening
12 Waste water sources
13 Use of waste water
14 Faith of waste water from labs
15 Whether waste water from labs mixed with ground water
16 Any treatment for lab water
17 Whether any green chemistry method practiced in labs
18 No of water coolers
19 Rain water harvest available?
20 No of units and amount of water harvested
21 Any leaky taps
22 Amount of water lost per day
23 Any water management plan used?
24 Any water saving techniques followed?
25 Are there any signs reminding peoples to turn off the water?

B. Energy audit

Room No. / name Electrical device/ items Number Power u sage time (hr/day)
Item: Bulbs (CFL, incandescent, LED); A/c, fan, computer, instruments

C. Waste management

Approximate of waste generated per day (in kg)
Office & Laboratories

Approximate	Biodegradable	Non - biodegradable	Hazardous	Others
<1Kg				
2-10Kg				
>10Kg				

Total strength of students, teachers, and Non-teaching staffs.

Waste generated in the college?

E-waste			
Hazardous waste			
Solid waste			
Canteen waste			
Liquid waste			
Glass			
Unused equipment			
Napkins			
Others (specify)			
Do you use recycled paper in college ?			
Any waste management methods used			

D. Carbon foot print analysis

1 Total number of vehicles used by the stakeholders of the college. (Per day)
2 No of cycles used
3 No of two wheelers used (average distance travelled and quantity of fuel and amount used per day)
4 No of cars used (average distance travelled and quantity of fuel and amount used per day)
5 No of persons using public transportation
6 No of persons using college conveyance
7 No of generators used per day
8 Amount of fuel used
9 Number of LPG cylinders used in canteen/labs
10 Use of any other fossil fuels in the college
11 Any suggestion to reduce the use of fuel

AUDIT STAGE

Green auditing in KIIT Campuses began with the assessment of the status of the green cover of the Institution followed by waste management practices and energy conservation strategies etc. The team monitored different facilities at the college, determined different types of appliances and utilities (lights, taps, toilets, fridges, etc.) as well as measuring the usage per item (Watts indicated on the appliance or measuring water from a tap) and identifying the relevant consumption patterns (such as how often an appliance is used) and their impacts. The staff and learners were interviewed to get details of usage, frequency or general characteristics of certain Appliance.

Data collection was done in the sectors such as Energy, Waste, Greening, Carbon footprint and Water use. College records and documents were verified several times to clarify the data received through survey and discussions. The environment samples including water, soil were from various location of the campus were collected and analyzed at School of Environmental Sciences, KIIT University.

Energy efficiency strategy for a university can help reduce overall energy consumption, lower costs, and improve sustainability. Here's a comprehensive plan tailored by & for a university setting:

1. Establish a Baseline and Set Goals

- **Conduct an Energy Audit**: KIIT is performing a 3rd party campus-wide energy audit to establish current energy usage, identify high-consumption areas, and detect inefficiencies which identifies in this report.
- **Set Reduction Goals**: KIIT is having its own Definition which defines realistic energy reduction targets (e.g., reduce energy consumption by 20% in five years or 50% by 2030). Goals should be aligned with broader university sustainability objectives.

2. Optimize Building Operations and Maintenance

- **Implement Building Automation Systems (BAS)**: Need to Integrate smart controls to automate lighting, heating, ventilation, and cooling based on occupancy and time of day. This optimizes energy usage in real-time.
- **Routine Maintenance**: KIIT engineering and maintenance team follows regular inspect and maintain HVAC, lighting, and other systems to keep them operating efficiently. Clean filters, lubricate moving parts, and check for leaks or malfunctions.
- **Retro-Commissioning**: KIIT is practicing periodical re-evaluate of existing building systems to ensure they function as designed. This process helps to identify opportunities to optimize performance and reduce energy consumption in systems like AC's, Lights, motors etc.

3. Upgrade Lighting Systems

- **Switch to LED Lighting**: Replacement of incandescent and fluorescent lights with energy-efficient LED lights across campus. LEDs use significantly less energy and have longer lifespans. Details mentioned in the report.

- **Install Motion and Daylight Sensors**: It is advisable to use motion sensors to turn lights off in unoccupied rooms and daylight sensors to adjust lighting levels based on natural light availability.
- **Optimize Outdoor Lighting**: KIIT Uses energy-efficient outdoor lighting with timers or solar-powered options to reduce energy used in pathways, parking lots, and building exteriors. But this is limited to some campuses. It is recommended to follow these practices for entire university.

4. Enhance HVAC Efficiency

- **Upgrade to High-Efficiency HVAC Equipment**: KIIT replaces outdated HVAC systems with energy-efficient models that meet or exceed Energy Star standards like VRV/F and PAC units.
- **Variable Speed Drives (VSDs)**: Installation of different VSDs on fans, pumps, and motors to reduce energy use by adjusting motor speed to meet demand is carrying out by the university for new buildings.

5. Improve Building Insulation and Windows

- **Upgrade Insulation**: It is recommended to improve insulation in walls, roofs, and floors of campus buildings to minimize heat loss in winter and heat gain in summer with use of different insulated materials for the building construction.
- **Seal Air Leaks**: KIIT maintenance team is carrying a job to identify and seal air leaks around windows, doors, and ducts to prevent unnecessary heating and cooling losses.
- **Install Energy-Efficient Windows**: KIIT is using Use double- or triple-glazed windows with low-emissivity (low-E) coatings to reduce heat transfer and improve indoor comfort for high rise and new buildings. It is recommended to use 3M film for all the south and west facing glass window buildings.

6. Encourage Renewable Energy

- **On-Site Solar and Wind Installations**: KIIT Installed solar panels on rooftops mounted solar farms on campus.
- **Power Purchase Agreements (PPAs)**: with the help of rooftop solar plant KIIT is practicing PPAs to purchase clean energy from off-site renewable sources at a fixed rate.
- **Solar Thermal Heating**: KIIT using solar thermal systems for water heating, which can reduce reliance on natural gas or electricity for hot water in dorms and cafeterias.

7. Implement Energy-Saving Practices for Staff and Students

- **Awareness Campaigns**: KIIT Energy committee is educating students, faculty, and staff about energy-saving behaviors, such as turning off lights and electronics when not in use.
- **Energy Competitions**: KIIT core branches is organizing inter-dormitory or inter-department energy-saving competitions to engage students of all branches and increase awareness.
- **Eco-Friendly Habits**: Different poster and signages have been displayed in the university to encourage power-saving modes on computers and devices, as well as the use of natural light where possible.

8. Reduce Water Heating and Consumption

- **Efficient Water Heaters**: Replace traditional water heaters with high-efficiency or tankless systems to save energy in dormitories and dining halls.
- **Low-Flow Fixtures**: It is recommended to Install low-flow faucets, showerheads, and toilets to reduce water usage, lowering the energy needed for water heating for entire campuses.
- **Water Recycling Systems**: KIIT is using graywater systems such as STP (sewage treatment plant) to recycle water for irrigation and non-potable applications, reducing overall water demand.

9. Implement Data Monitoring and Energy Management

- **Install Smart Meters**: It is recommended to Use advanced meters to track real-time energy usage, helping identify trends and detect waste.
- **Energy Management Software**: Use of energy management software to centralize data from smart meters, analyze usage patterns, and benchmark buildings is required for KIIT university.
- **Regular Reporting**: Instead of Annual Energy consumption report it is recommended to provide quarterly or annual reports on energy performance to demonstrate progress toward goals and identify areas for improvement.

10. Encourage Sustainable Transportation

- **Promote Public Transit**: KIIT is using EV's Electrical Buses and buggies for the transportation of students locally and within the campus..
- **Support Active Transportation**: KIIT developed all the campuses infrastructure which support walking and cycling, including bike racks and safe pathways.
- **Electric Vehicle Charging Stations**: KIIT Installed EV charging stations to encourage the use of electric vehicles by students and faculty.

11. Continuous Evaluation and Improvement

- **Ongoing Monitoring**: Regularly monitor energy usage to ensure systems are performing as expected and that savings are achieved.
- **Re-Evaluate Goals**: Periodically reassess energy efficiency targets to align with technological advancements, regulatory changes, and campus needs.
- **Feedback Loops**: Collect feedback from students and staff to refine energy-saving practices and address any challenges.

By implementing this process and strategies, the university can significantly reduce energy consumption, cut costs, and contribute to sustainability while creating a healthier learning environment for everyone on campus.

ENERGY AUDIT REPORT:

POWER QUALITY:

Power Quality of all campuses has been carried out by the power quality analyser and recorded for 24 hours to analyse the different electrical parameters. The summary of all the campuses are as follows and a sample power quality report is mentioned for campus-20

Summary of Power Quality:

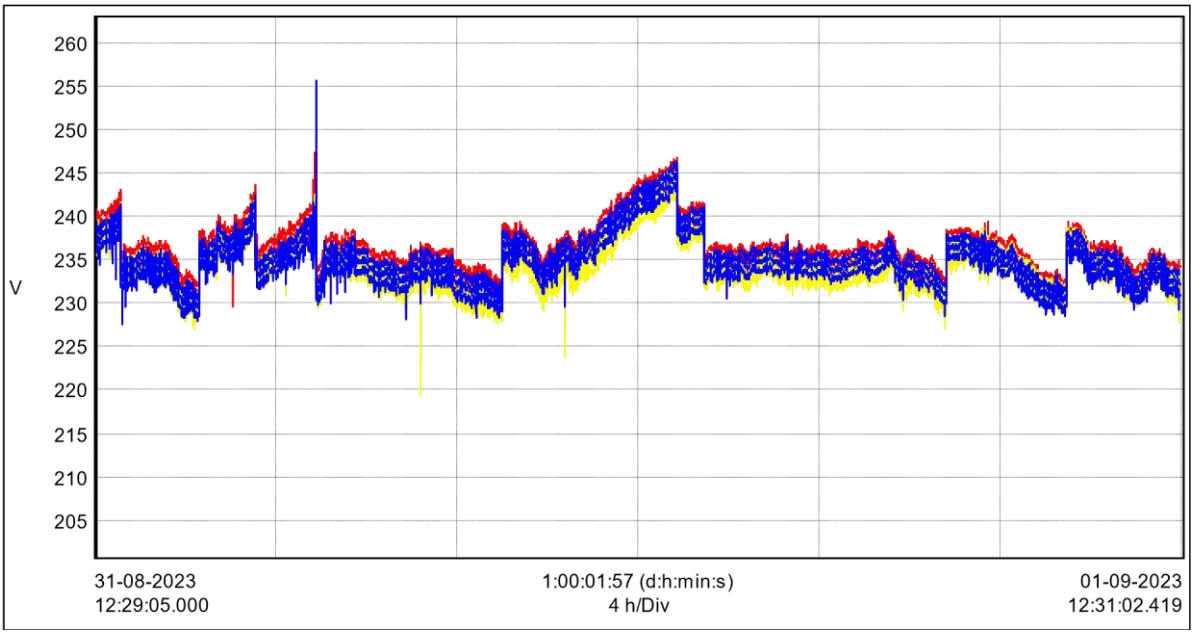
Campus	Voltage	Distribution of Load	Harmonics	Power factor
Campus-1	Little Fluctuations recorded	Uniformly distributed	Little on higher side	Avg is 0.98 which is normal.
Campus-2	Normal	Uniformly distributed	Within the limit	Avg is unity which is normal.
Campus-3	Normal	Uniformly distributed	Within the limit	Avg is unity which is normal.
Campus-4	Normal	Uniformly distributed	Within the limit	Avg is unity which is normal.
Campus-5	Normal	Uniformly distributed	Within the limit	Avg is unity which is normal.
Campus-6	Normal	Uniformly distributed	Within the limit	Avg is unity which is normal.
Campus-7	Normal	Uniformly distributed	Within the limit	Avg is unity which is normal.
Campus-8	Normal	Uniformly distributed	Within the limit	Avg is unity which is normal.
Campus-9	Normal	Uniformly distributed	Within the limit	Avg is 0.99 which is normal.
Campus-10	Normal	Uniformly distributed	Within the limit	Avg is unity which is normal.
Campus-11	Normal	Uniformly distributed	Within the limit	Avg is unity which is normal.
Campus-12	Normal	Uniformly distributed	Within the limit	Avg is unity which is normal.
Campus-13	Normal	Uniformly distributed	Within the limit	Avg is unity which is normal.
Campus-14	Normal	Uniformly distributed	Within the limit	Avg is 0.99 which is normal.
Campus-15	Normal	Uniformly distributed	Within the limit	Avg is unity which is normal.
Campus-16	Normal	Uniformly distributed	Within the limit	Avg is unity which is normal.
Campus-17	Normal	Uniformly distributed	Within the limit	Avg is unity which is normal.
Campus-18	Normal	Uniformly distributed	Within the limit	Avg is unity which is normal.

Campus-19	Normal	Uniformly distributed	Within the limit	Avg is 0.99 which is normal.
Campus-20	Normal	Uniformly distributed	Within the limit	Avg is unity which is normal.

Main Panel:

V_{rms} –

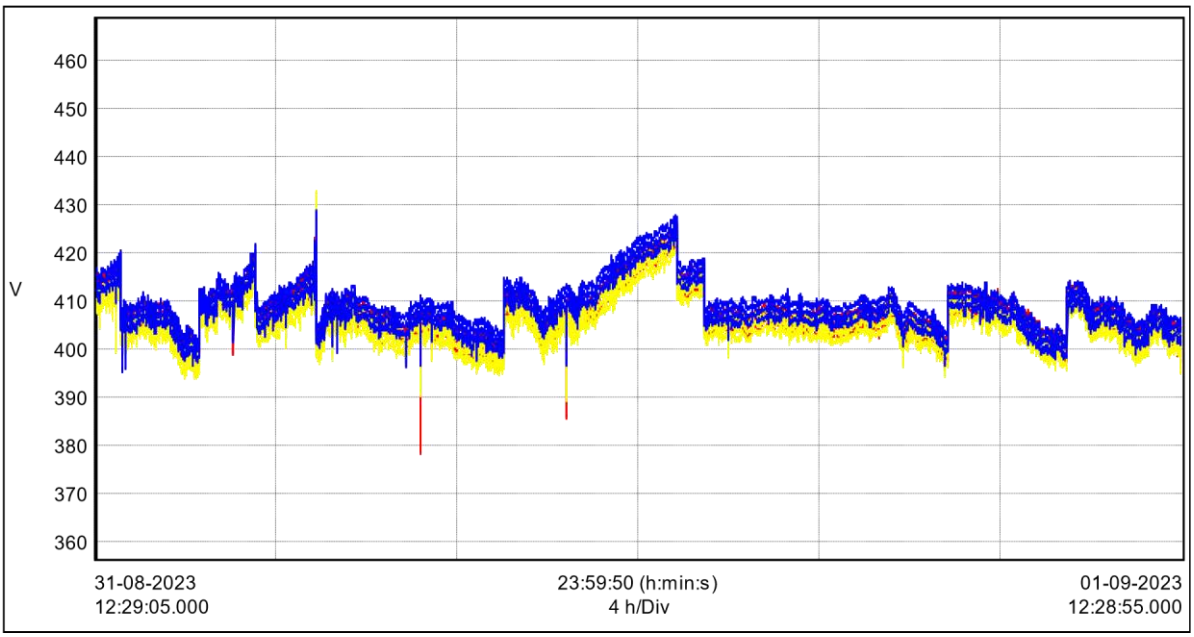
Name	Date	Time	Avg	Min	Max	Units	Duration	Units
V1 rms	31-08-2023	12:29 PM	236.09	223.30	247.40	V	23:59:55	(h:min:s)
V2 rms	31-08-2023	12:29 PM	234.46	219.60	245.70	V	23:59:55	(h:min:s)
V3 rms	31-08-2023	12:29 PM	235.13	227.70	255.70	V	23:59:55	(h:min:s)
VNE rms	31-08-2023	12:29 PM	0.08	0.00	5.50	V	23:59:55	(h:min:s)



Remarks: Average voltage is good and within the limit.

U_{rms} –

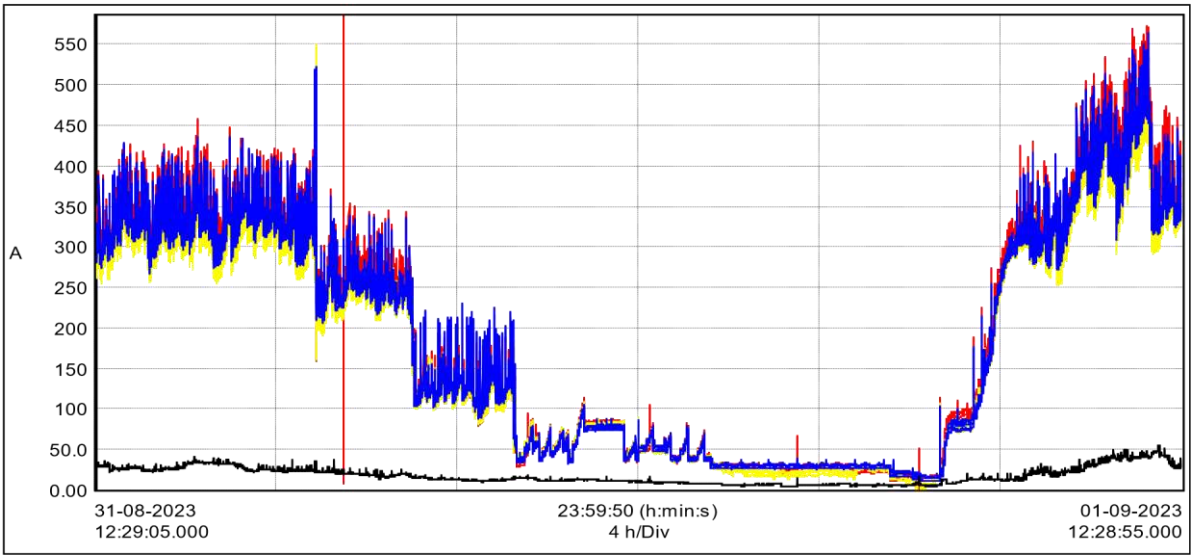
Name	Date	Time	Avg	Min	Max	Units	Duration	Units
U12 rms	31-08-2023	12:29 PM	407.53	378.50	426.40	V	23:59:55	(h:min:s)
U23 rms	31-08-2023	12:29 PM	405.78	389.40	433.00	V	23:59:55	(h:min:s)
U31 rms	31-08-2023	12:29 PM	408.97	395.20	428.90	V	23:59:55	(h:min:s)



Remarks – Average voltage is good and within the limit.

A_{rms} –

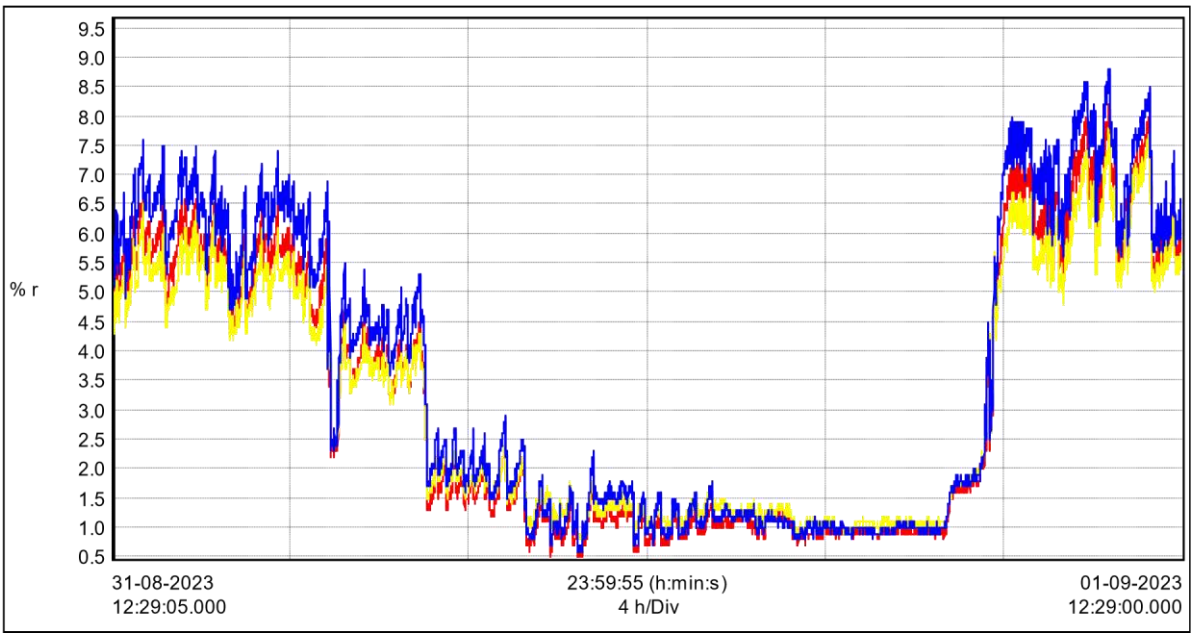
Name	Date	Time	Avg	Min	Max	Units	Duration	Units
A1 rms	31-08-2023	12:29 PM	238.30	0.00	701.50	A	23:59:55	(h:min:s)
A2 rms	31-08-2023	12:29 PM	216.97	0.00	551.00	A	23:59:55	(h:min:s)
A3 rms	31-08-2023	12:29 PM	227.61	12.00	564.50	A	23:59:55	(h:min:s)
AN rms	31-08-2023	12:29 PM	20.97	4.77	56.09	A	23:59:55	(h:min:s)



Remarks: Load is distributed uniformly in all the phases.

VThdr:

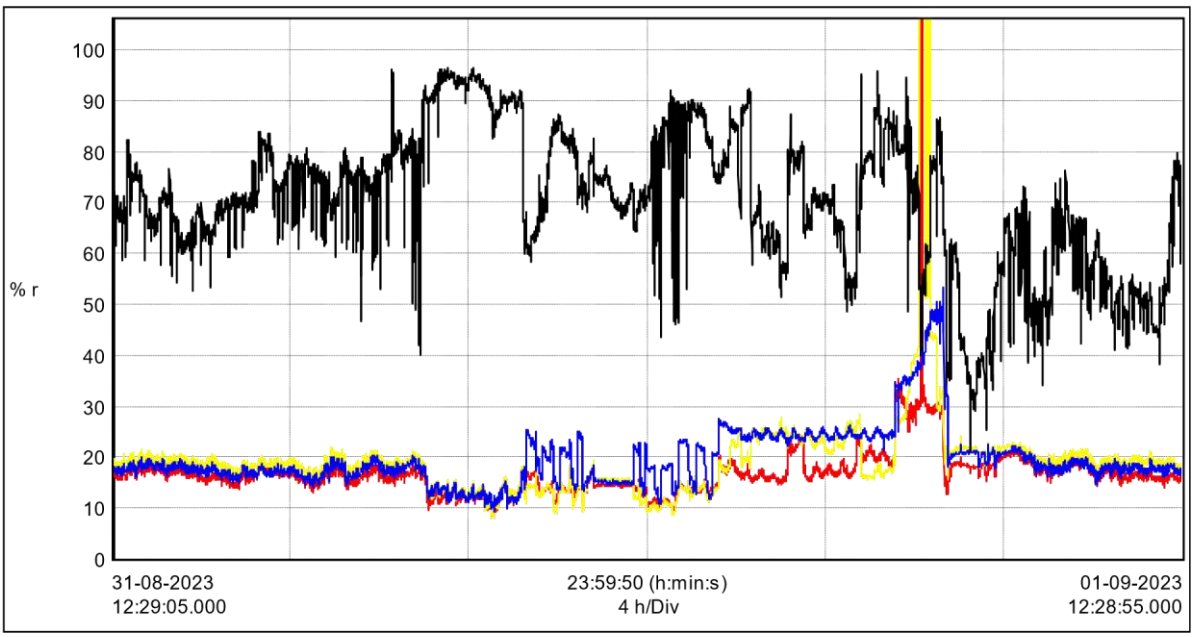
Name	Date	Time	Avg	Min	Max	Units	Duration	Units
V1 THDr	31-08-2023	12:29 PM	3.242	0.5	8.2	% r	23:59:55	(h:min:s)
V2 THDr	31-08-2023	12:29 PM	3.183	0.8	7.8	% r	23:59:55	(h:min:s)
V3 THDr	31-08-2023	12:29 PM	3.633	0.6	8.8	% r	23:59:55	(h:min:s)



Remarks: Voltage harmonic values are normal and are within the limit.

AThdr:

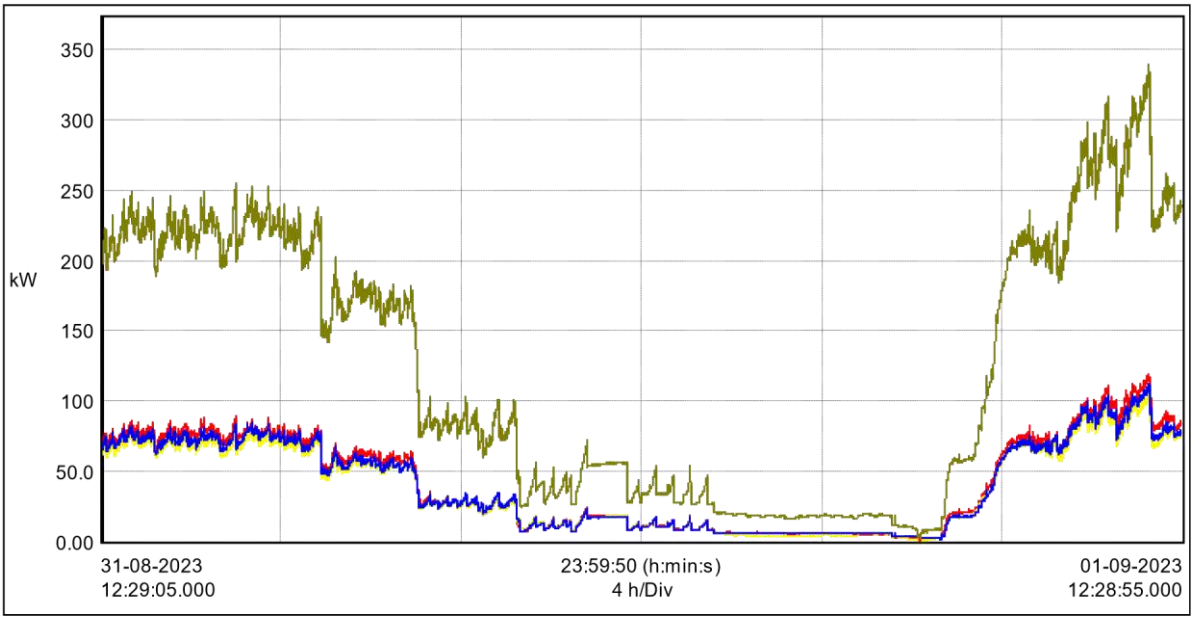
Name	Date	Time	Avg	Min	Max	Units	Duration	Units
A1 THDr	31-08-2023	12:29 PM	16.829	8.2	49.5	% r	23:59:55	(h:min:s)
A2 THDr	31-08-2023	12:29 PM	18.851	8.3	52.6	% r	23:59:55	(h:min:s)
A3 THDr	31-08-2023	12:29 PM	19.761	9.4	53.6	% r	23:59:55	(h:min:s)
AN THDr	31-08-2023	12:29 PM	70.938	21.5	96.6	% r	23:59:55	(h:min:s)



Remarks: Current harmonic values are low and within the limit.

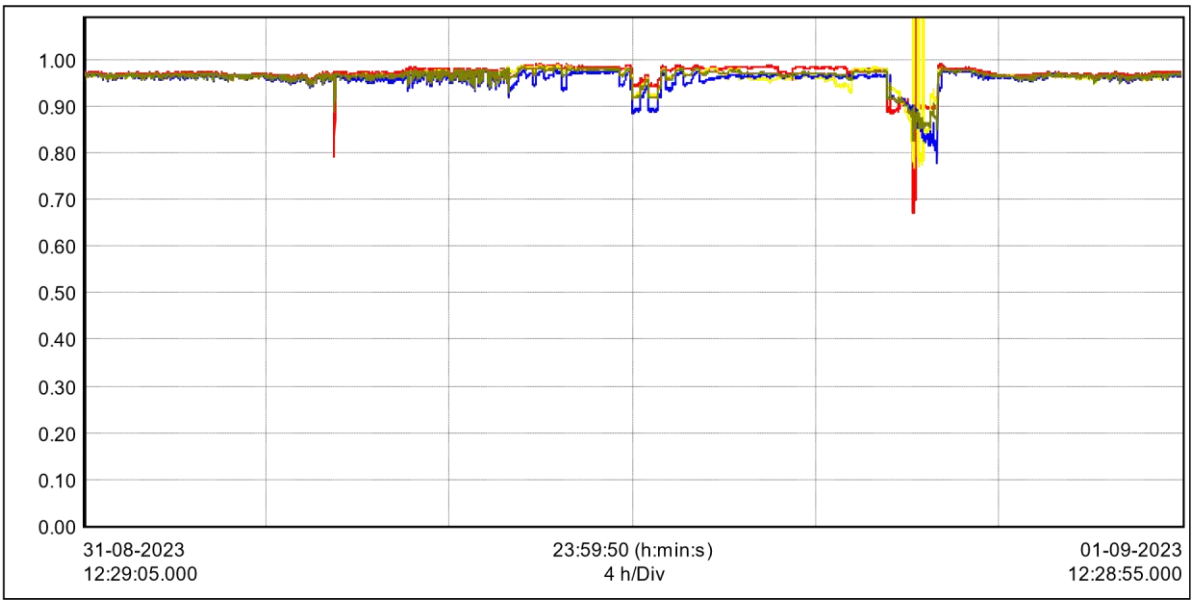
Power (KW):

Name	Date	Time	Avg	Min	Max	Units	Duration	Units
P1 (W)	31-08-2023	12:29 PM	43.2	0	119.97	W	23:59:55	(h:min:s)
P2 (W)	31-08-2023	12:29 PM	39.078	0	106.853	W	23:59:55	(h:min:s)
P3 (W)	31-08-2023	12:29 PM	41.002	2.67	113.211	W	23:59:55	(h:min:s)
PT (W)	31-08-2023	12:29 PM	123.28	3.803	340.034	W	23:59:55	(h:min:s)



Power Factor:

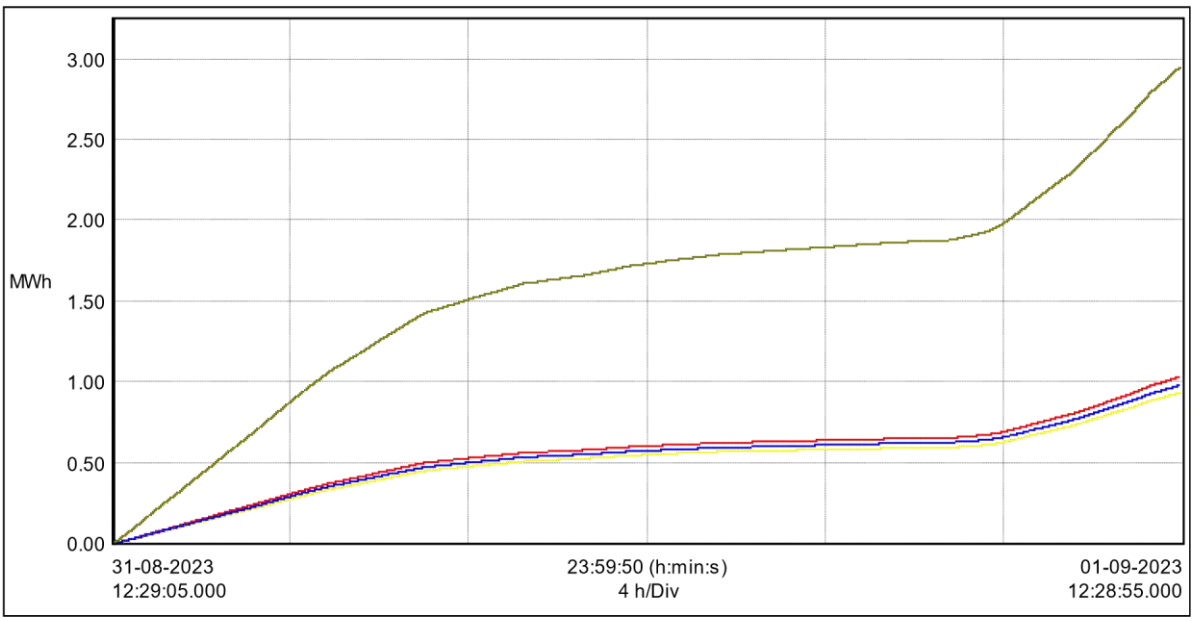
Name	Date	Time	Avg	Min	Max	Duration	Units
PF1	31-08-2023	12:29 PM	0.97	0.67	0.99	23:59:55	(h:min:s)
PF2	31-08-2023	12:29 PM	0.96	0.77	0.99	23:59:55	(h:min:s)
PF3	31-08-2023	12:29 PM	0.96	0.78	0.98	23:59:55	(h:min:s)
PFT	31-08-2023	12:29 PM	0.96	0.83	0.99	23:59:55	(h:min:s)



Remarks: Avg Power factor values are good.

Energy:

Name	Date	Time	Max	Units	Duration	Units
Ep1 (Wh)	31-08-2023	12:29 PM	1.04	Wh	23:59:55	(h:min:s)
Ep2 (Wh)	31-08-2023	12:29 PM	937.82	Wh	23:59:55	(h:min:s)
Ep3 (Wh)	31-08-2023	12:29 PM	983.98	Wh	23:59:55	(h:min:s)
EpT (Wh)	31-08-2023	12:29 PM	2.96	Wh	23:59:55	(h:min:s)



Remarks: Total unit consumption during this recording session that is for 24 hours is 2959 units.

Detection of Hotspot and repair and maintenance of feeders

Hotspot leads to various problems like I^2R loss, unbalanced condition and harmonic injection. Using thermography, different cables and feeders are checked for higher temperature. Temperature above 40 degree centigrade is identified as hotspot zone. Thus faulty feeders and cables are replaced and all maintenance are done like checking of lugs fitting or any wear and tear etc.

List of some of the repair and maintenance work carried out (energy audit)

Problems	Solution
Hot spot are noticed in most of the places in the AC panels and outdoor MCB boxes.	Service the cable terminations by proper alignment of cables, lugs and tightening of nut bolts. Also replace the outdoor units MCB's boxes with new one.
Insulation of all the AC condenser units are damaged and are exposed to the sunlight, water, dust, etc. There is a reduction in the performance of the machine	All the refrigerant pipes from the outdoor to indoor units has to be insulated with new thick coated sheet.
Due to bad AMC services, there is a chocking of filters of the indoor units which than results in the formation of	A proper cleaning of the filters has been done to check the pressure of the refrigerant gas in the pipes lines. Need

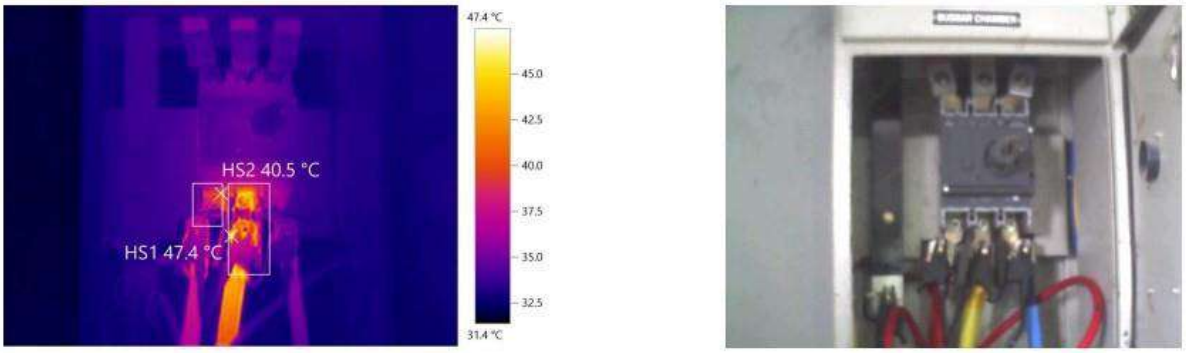
ice on the surface of indoor unit coils. This will end up with cooling of the machine itself but not the room. Also the terminals are heating and deposited with carbon content which results in the drop of voltage. Because of poor maintenance and servicing there will be a reduction in the efficiency by 10-15 %	to check working of thermostat of every machine during its AMC servicing. All the terminations serviced and cleaned.
Some of the capacitor banks are found faulty.	faulty capacitor banks are replaced

From the data calculated it was found that the efficiency are improved from 85% of the existing to 89%.Thus a change 4% leads to 380000 units of energy saving.

Hence amount saved =380000 KwH ×5.85= **Rs** 22,23,000.00 / at the rate Rs 5.85/ per unit.

Some of the hotspots are as follows:

AC panel-1 main incomer:



Picture data: **Date:** 04-09-2023 **Time:** 15:17:03 **File:** IV_23511.BMT

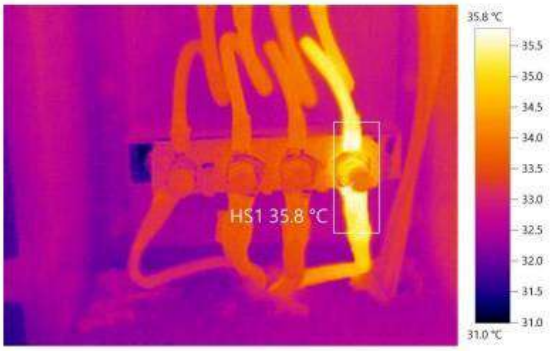
Emissivity: 0.88 **Refl. temp. [°C]:** 19.0

Picture markings:

Measurement Objects	Temp. [°C]	Emiss.	Refl. temp. [°C]	Remarks
Hot spot 1	47.4	0.88	19.0	Temperature found in Y phase.
Hot spot 2	40.5	0.88	19.0	Temperature found in R phase.

Remarks: temperature now is normal but may increase in future. Need to do the relogging andcrimping properly.

C 5th AC outdoor terrace MCB:



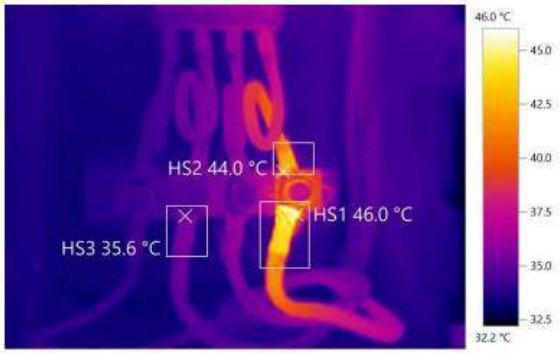
Picture data:	**Date:**	04-09-2023	**Emissivity:**	0.88
	Time:	14:49:33	**Refl. temp. [°C]:**	19.0
	File:	IV_23488.BMT		

Picture markings:

Measurement Objects	Temp. [°C]	Emiss.	Refl. temp. [°C]	Remarks
Hot spot 1	35.8	0.88	19.0	Temperature found in B phase.

Remarks: temperature now is normal but may increase in future. Need to do the relogging and crimping properly

B 3rd AC Outdoor terrace MCB:



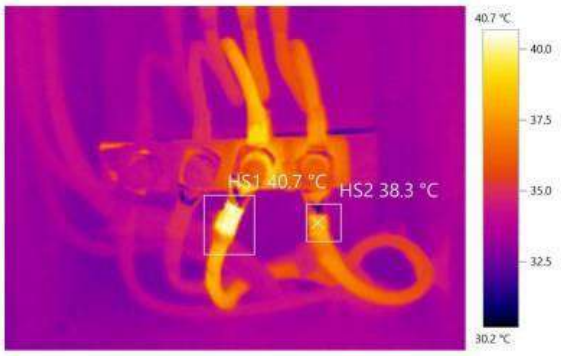
Picture data:	**Date:**	04-09-2023	**Emissivity:**	0.88
	Time:	14:54:08	**Refl. temp. [°C]:**	19.0
	File:	IV_23503.BMT		

Picture markings:

Measurement Objects	Temp. [°C]	Emiss.	Refl. temp. [°C]	Remarks
Hot spot 1	46.0	0.88	19.0	Temperature found in B phase.
Hot spot 2	44.0	0.88	19.0	Temperature found in B phase.
Hot spot 3	35.6	0.88	19.0	Temperature found in R phase.

Remarks: temperature now is normal but may increase in future. Need to do the relogging and crimping properly

A 3rd AC outdoor MCB terrace:



Picture data:	**Date:**	04-09-2023	**Emissivity:**	0.88
	Time:	14:55:44	**Refl. temp. [°C]:**	19.0
	File:	IV_23506.BMT		

Picture markings:

Measurement Objects	Temp. [°C]	Emiss.	Refl. temp. [°C]	Remarks
Hot spot 1	40.7	0.88	19.0	Temperature found in Y phase.
Hot spot 2	38.3	0.88	19.0	Temperature found in B phase.

Remarks: temperature now is normal but may increase in future. Need to do the relogging and crimping properly

AC panel-2 main incomer:

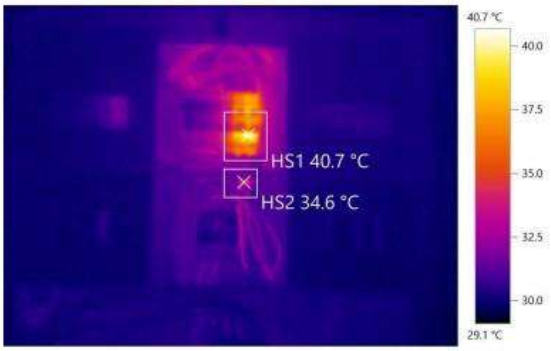
Picture data:	**Date:**	04-09-2023	**Emissivity:**	0.88
	Time:	15:25:22	**Refl. temp. [°C]:**	19.0
	File:	IV_23520.BMT		

Picture markings:

Measurement Objects	Temp. [°C]	Emiss.	Refl. temp. [°C]	Remarks
Hot spot 1	51.2	0.88	19.0	Temperature found in Y phase.
Hot spot 2	42.3	0.88	19.0	Temperature found in B phase.

Remarks: temperature now is normal but may increase in future. Need to do the relogging and crimping properly

3rd floor LDB:



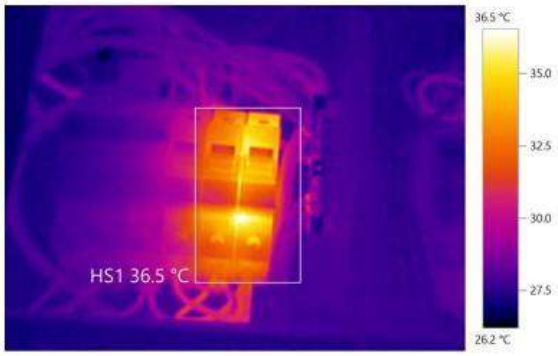
Picture data:	**Date:**	04-09-2023	**Emissivity:**	0.88
	Time:	16:02:05	**Refl. temp. [°C]:**	19.0
	File:	IV_23562.BMT		

Picture markings:

Measurement Objects	Temp. [°C]	Emiss.	Refl. temp. [°C]	Remarks
Hot spot 1	40.7	0.88	19.0	Temperature found at MCB Body.
Hot spot 2	34.6	0.88	19.0	Temperature found in Y phase.

Remarks: temperature now is normal but may increase in future. Increase the MCB rating.

Basement LDB:



Picture data:	**Date:**	04-09-2023	**Emissivity:**	0.88
	Time:	17:06:29	**Refl. temp. [°C]:**	19.0
	File:	IV_23610.BMT		

Picture markings:

Measurement Objects	Temp. [°C]	Emiss.	Refl. temp. [°C]	Remarks
Hot spot 1	36.5	0.88	19.0	Temperature found at MCB Body.

Remarks: temperature now is normal but may increase in future. Increase the MCB rating.

Old transformer replaced with new ones

The efficiency of the transformer can be defined as the intensity or the amount of power loss within a transformer. Therefore, the ratio of the secondary winding's power output to the primary winding's power input.
Efficiency = ((Power O/P) / (Power O/P + Copper Losses + Core Losses)) × 100%

Generally, the efficiency of a normal transformer is extremely high that ranges from 96% to 99%. So the efficiency of the transformer cannot be decided through high accuracy by measuring input and output directly. The main dissimilarity among the readings of input and output and input of instruments is very small that an instrument error will cause an error of the 15 % orders within the transformer losses.

Additionally, it is not convenient and expensive to include the essential loading devices of the exact ratings of voltage & power factor (PF) to load the transformer. There is also a large amount of power wastage & no information is obtainable from a test regarding the number of transformer losses like iron & copper.

The transformer losses can be determined through the accurate method would be to calculate losses from short circuit & open-circuit tests, so that efficiency can be determined

From an open circuit test, the iron loss like P1 = P0 or Wo can be determined

From the short circuit test, the copper loss on full loads like Pc = Ps or Wc can be determined

Copper loss on a load x times full load = $I_2^2 R_{02}$ => x^2 Pc

Transformer efficiency (η) = $V_2 I_2 \cos\Phi$ / $V_2 I_2 \cos\Phi$ + Pi + x^2 Pc

In the above equation, the result of instrument readings can be restricted to losses simply so that overall efficiency can be achieved from it is very accurate as compared with the efficiency attained through direct loading.

All-Day Efficiency

As we discussed above that the transformer ordinary efficiency can be given as

Ordinary Efficiency of Transformer = Output (Watts)/Input (Watts)

However, in some kinds of transformers, their performance cannot depend on their efficiency. For instance, in distribution transformers, their primaries always energized. However, their secondary windings will supply a slight load most of the time in a day

Once transformer secondary's will not supply any load, after that only transformer's core losses are significant & copper losses are not present.

Copper losses are significant only once transformers are loaded. Therefore, for these transformers, losses like copper are mostly less important. So the performance of the transformer can be compared based on the energy used in a single day.

The transformer's all-day efficiency is less always as compared with normal efficiency of it.

Factors that affect the efficiency of a transformer include the following

- The current heating effect in a coil
- Induced eddy current's Heating Effect
- Iron Core's Magnetization.
- Leakage of Flux

How to Improve the Efficiency of Transformer?

There are different methods to improve the efficiency of transformers like loop area, insulation, coils resistance, and flux coupling.

Loop area

Insulation

The insulation among core sheets must be ideal to prevent eddy currents.

Primary and Secondary Coil's Resistance

The material of primary and secondary coils must be stable so that their electrical resistance is extremely little.

Flux Coupling

Both the coils of the transformer must be wound in such a manner that flux coupling among the coils is utmost as power transfer from one coil to another will takes place during flux linkages.

Thus, this is all about an overview of the efficiency of the transformer. Transformers are electrical devices with high efficiency. So, most of the transformer's efficiency will range from 95% to 98.5%.

As per the electricity bill and energy consumption pattern total savings by replacing a less efficient transformer with a new one is found to be 500kwh for a month.

Hence amount saved 1131000 units* 5.85/ =Rs 66,16,350.00 / at the rate Rs 5.85/ per unit

Use of LED light at various Campuses in KIIT for lighting purpose.

LED bulbs are designed to be a more energy-efficient light source, by using a semiconductor to convert electricity into light. LEDs emit very little heat. In comparison, incandescent bulbs release 90% of their energy as heat and CFLs release about 80% of their energy as heat. Lifetime: LED lighting products typically last much longer than other lighting types.LED lighting produces **less waste light and more useful lumens** than other lighting technologies. If you replaced all the lighting in your office, school or other facility with LEDs, you could see as much as a 60% to 70% improvement in your overall energy efficiency

Advantages of LED lighting system

- Better lumens and longer lamp life. High efficacy and lower power consumption
- Provide high brightness and excellent illumination even in high ceiling areas
- Extraordinary long life of LED's and high end electronic driver (over 30000 burning hours) ensure zero maintenance
- No UV or IR radiations, environment friendly as it does not contain mercury
- Application: Residence, showrooms, cove light, hospital premises, educational institutions, corridors

40 Watt CFL Tube light changed to 10 Watt LED light.

Total number of tube-light :6320

Total load using CFL: 6320×40 watt=252800 W
Total load using LED: 6320×18 watt= 113760 W

Electrical consumption using CFL

252800 Watt×12 hours per day×300 days= 9,10,080 units

Electrical consumption using LED

113760 Watt×12 hours per day×300 days= 4,09,536 units

Energy saved= 9,10,080 units - 4,09,536 units
= 5,00,544 units

Hence amount saved Rs 29,28,182.4 /- at the rate Rs 5.85/ per unit as per new tariff

Replacement of single phase induction type conventional ceiling fan with BLDC motor ceiling fan

For years, ceiling fans used to come with the same hardware of induction motor which typically consumed **70-80 watts** for a standard ceiling fan. But in the last few years, a new technology called **BLDC** is being used to make fans consume a lesser amount of energy, without compromising much on the air delivery. **BLDC** stands for **brush-less direct-current motor**, a special type of motor which has permanent magnet instead of electromagnets found in a conventional induction motor. BLDC motor has important advantages over induction motor like low electricity consumption, lesser noise generation and better lifespan.

The super-efficient 5-star rated BLDC fans that are available in the market generally use a different type of motor (BLDC motor) which further facilitates efficient blade designs, making ceiling fans far more efficient. Most of the BLDC ceiling fans are 5-star rated consuming 25-40 watts of energy, which is about 40-70% less than the regular old fans. Also, BLDC fans do not require installation of an additional regulator which saves 200-500 rupees upfront. Instead, they are controlled wirelessly with the help of remote just like air conditioners.

Advantages of BLDC Motor Used in BLDC Fan

Prominent advantages of BLDC motor over induction motor is summarized as:

- Lower Electricity Consumption (65% savings)
- Longer backup on Inverters (even on Solar)
- Improved reliability
- Noise reduction
- Longer lifetime

Total number of fans : 6536
single phase induction type conventional ceiling fan: 75 Watt
BLDC fan:30 Watt

(6536*75)-(6536*30)=4,90,200-1,96,080=2,94,120 Watt
Yearly calculation considering the fan running on a daily basis of 15 hours each day for a period of 300 days.
2,94,120*15*300= 13,23,540KwH

Hence amount saved Rs.77,42,709/ at the rate Rs 5.85/ per unit

Replacement of 3 star Air conditioners with 5 star AC

Air conditioners with 5 star ratings are often preferred over ACs with low ratings. The reason can be power consumption, maintenance cost and more. Besides, 5 star or higher rating ACs are chosen because of their efficiency to cool the inside of the room or hall, way faster than other ACs with low ratings. A star rating appliance or AC showcases its energy efficiency. The more the number of stars, the more will be the appliance's energy efficiency. Generally, the star rating starts from 1 and ends at 5. More stars labelled on an AC depict its energy efficiency and hence, are more likely chosen by people.

The following points elaborate the differences between a 5 star AC and a 3 star AC-

- Cooling and power efficiency in a 5 star AC is higher than the AC with 3 stars
- 5 stars AC consumes less energy as compared to 3 stars ACs; hence, lets a user save money on electricity bills.
- ACs with 5 stars have a better build than those with 3 stars.
- Usually, 5-star ACs have a bigger condenser when comparing it with 3 star AC, which eventually results in better heat exchange
- 5 star ACs produce less heat than 3 stars ACs
- ACs with 5-star ratings can be used round the year
- ACs with higher ratings are considered powerful as they cool the room faster

There are numerous factors that affect the AC power consumption, a few among them are written below-

- Number of people in a room affects the AC power consumption. For example- a room of 20-25 people requires multiple ACs, whereas a room with 3-5 people requires a single AC to cool the room.

- Total number of electrical appliances inside the room generate more heat, which eventually increases the AC power consumption to cool the room.

- 5 star rated AC helps in saving energy, whereas, 1 star or 2 star AC demonstrates higher AC power consumption.

- The temperature outside and inside the room affects the AC electricity consumption. If the temperature outside is more than 35 degrees, the AC requires more electricity to cool the room.

- The choice of AC like window AC, Inverter AC, split AC, central AC affects the AC power consumption.

- The size of the room plays a major role when it comes to AC power consumption. The larger or bigger the room is, the more will be the AC power consumption. Similarly, smaller rooms do not consume higher AC electricity consumption

Energy Calculation

7650 AC @1.5ton each

There are two varieties of ac used 1.5 ton single phase and 3.5 ton 3 phase.

No of 1.5 ton AC =4038

No of 3.5 ton AC =650

For 1.5 ton three star AC

Energy consumed on yearly basis at 10hrs running per day=
1104watt*4038*10*8365=16271524.8units

Hence Energy consumed 16271524.8 KwH.

For 3.5 ton three star AC

Energy consumed on yearly basis at 10hrs running per day=
2614.5watt×650×10*365=6202901.25units

Hence Energy consumed 6202901.25 KwH.

Total energy consumed for three star AC

=16271524.8 KwH +6202901.25 KwH=22474426.05 KwH

For 1.5 ton five star AC

Energy consumed on yearly basis at 10hrs running per day=
840watt*4038*10*365=12380508 units

Hence Energy consumed 12380508 KwH.

For 3.5 ton three star AC

Energy consumed on yearly basis at 10hrs running per day= 1939watt×650×10×365=
4600277.5units

Hence Energy consumed 4600277.5 KwH.

Total energy consumed for three star AC

=12380508 KwH+4600277.5 KwH= 16980785.5KwH

Hence total saving from 3 star AC to 5 star AC

= 22474426.05 KwH -4600277.5 KwH= **5493640.55 KwH**

Hence amount saved = 5493640.55KwH ×5.85= Rs3,21,37,797.217/ at the rate Rs 5.85/ per unit

It was observed few machines are under performing. This is due to age of the machines and construction work, It is recommended to clean the coil frequently to improve the performance.

It was noticed that there is maintenance activity process for the AC system but Weekly/Monthly maintenance checklists are good. The maintenance checklist is as follows:

Check and clean condenser coils.

Check and clean drain pan (If installed).

Check and clean condensate drains to prevent water overflow.

Leak test all coils and connections for Freon leaks.

Check capacitors for hazardous leaks.

Clean and sanitize evaporator coil [in place] for mold and mildew prevention. [Removal for cleaning additional charge]

Check and clean filters.*

Check thermostat calibration & battery life.

Check all supply vents for proper air circulation.

Test heating elements for trouble-free operation.

Check safety controls.

Check Lubricate motor and blower bearings.

Note all corrosion spots and apply protective film, on equipment as needed.

Inspect, clean and spray controls and switches.

Check all electrical components for proper operation.

Check all wire connections and replace, as needed.

Check all relays for trouble-free operation.

Inspect and clean contactor points.

Test compressor's running current.

Document motor amperages to compare to future visits.

Check refrigerant flow control device.

Test and monitor refrigerant pressures.

Check operating temperatures and temperature drop across coils.

Provide a detailed report upon completion of a maintenance visit

Looking at the age of the AC machines, the fouling of the oil inside the refrigerant pipe is noticed. Oil fouling of heat transfer surfaces of air conditioning and refrigeration systems, will cause a loss of about 7% efficiency the first year, 5% the second year and 2% per year the following years.

As the machines were ran at min set temp at all the time and due to the its age factor, the wear and tear of the machine increased, which decreases the machine life.

It is recommended to use Thermo conductive Refrigerant Oil with Special ANTI FRICTION Additive for all types of Refrigeration and Air-conditioning equipment this will help to improve the energy consumption by 10% and improve cooling.

Also the length of the refrigerant pipes between the indoor and outdoor units of ground floor and 1st floor is more. This causing the decrease in the pressure of the refrigerant in the pipe.

Analysis of Chiller Plants:

1. Since the condensers are exposed to lot of dust from the roads, radiated heat, hot air from the condensers of split units and exposure East to West sun shine, the efficiency and performance of the condensers is de-rated. Frequency of condenser fin cleaning is frequent which reduces the life of condensers. It is required to provide shade, guard from dust and radiant heat, provide cold air at the inlet of the condensers to improve performance and efficiency of the condensers to save energy.

2. The operating procedure has to be corrected. since two chillers are operated, they need 350gpm at the design flow rate of 2.4gpm/TR, however two pumps operating provides 940gpm with all the valves of non-working chillers kept open, these mixes return water with chilled water and also unnecessarily

causes erosion of tubes, from the load study it appears that one pump is sufficient to provide circulation. The chiller staging along with one pump has to be established.

3. The AHU's need total up gradation and cleaning. Cleaning of walls and insulation to be provided for walls and floor, filters to be thoroughly cleaned, HEPA treated fresh air to be supplied as per ASHRAE standard to maintain required humidity in the operation theatres, all infiltration to be sealed. Duct should be cleaned by robotic duct cleaner and ducts should be disinfected as per health care standards.

Replacement of conventional water cooler with star rated water purifier.

Total number of water purifiers=236@40 litres

Energy consumed in conventional model=236(number of purifier)*800Watt*10hr*300days= 5,66,400units

Energy consumed in star rated purifier =236(number of purifier)*450Watt*10hr*300days= 3,18,600units

Hence energy saved using star rated purifier =5,66,400units - 3,18,600units

=247800 unit

Hence amount saved =247800KwH ×5.85= Rs 14,49,630/ at the rate Rs 5.85/ per unit

Diesel saving : 38,395 litres

Conclusion:

Sl No	Description	Observation / Recommendations
1	Power Distribution System	Overall Electrical distribution is in good condition.
2	Protection System	All Panel feeders are checked annually and maintained. MCCB are tested annually. All DB's have RCCB and same are tested once in six month. It is recommended to install IoT base advance fault detection system on all DB's.
3.	IR testing of cables	Major Power Cables IR values are above 200 M Ohms. This is good
4.	HOT Spot test of Power Distribution system	Entire distributions systems are thermal scanned by TESTO German make, calibrated Thermal Imager. Few cable termination the temperature was noticed 50 to 60 Deg C. These are serviced and thermal scanned once again. Temp after service is below 40 Deg C.

5	Power Quality of Normal Power / DG Power / UPS Power	Power quality of Normal / UPS / DG Powers were monitored and Voltage, Current Waveforms are found normal. Voltage is quite Stable, Both Voltage and Current Harmonics are within limit. There is no Noise noticed between Earth and Neutral.
6	Energy Monitoring	Energy is monitored on Main and sub meter installed on each Panels Main Incomer on daily basis. This is recommended to install IoT base remote energy monitoring system. This will help to track all load properly, optimize energy consumption.
7	Water Pumping	Water Pump are operating based on the level sensor. All the valves are checked on monthly basis to stop any leakages.
8	Air Conditioning System	Most of the AC machines ET type and some window. The filters of the AC machines are found cleaned. CFM is measured and found ok, KW/ Tr is also good.
9	Electrical Rooms	Overall the elect room and panels are found neat and cleaned.

1. Energy Audits and Benchmarking
   - Conduct an Energy Audit: Assess current energy use to identify areas of inefficiency. This audit helps prioritize improvements and often reveals hidden issues, like air leaks or outdated insulation.
   - Benchmarking: Use tools like Energy Star's Portfolio Manager to track energy usage and compare it to similar buildings. This helps set realistic goals for energy reduction.
2. Upgrading Insulation and Air Sealing
   - Improve Insulation: Adding or upgrading insulation (in walls, roofs, and floors) can significantly reduce heating and cooling costs by minimizing heat loss in winter and heat gain in summer.
   - Seal Air Leaks: Check for leaks around doors, windows, ducts, and other openings, then seal them. Proper air sealing reduces drafts, improves comfort, and lowers heating/cooling demands.
3. Modernizing HVAC Systems
   - High-Efficiency Equipment: KIIT has replaced outdated HVAC systems with energy-efficient models that meet or exceed Energy Star ratings such as VRV/VRF and PAC units.
   - Variable Frequency Drives (VFDs): KIIT has installed VFDs on fans and pumps to adjust motor speed according to demand, which reduces energy consumption in the central library building.
   - Advanced Controls: Use smart thermostats and occupancy sensors to adjust heating, ventilation, and cooling based on occupancy and time of day.
4. Lighting Upgrades
   - Switch to LEDs: All the conventional lighting systems were replaced with LED lighting which is more energy-efficient and longer-lasting than traditional lighting. LED retrofits can significantly cut lighting costs.

- Daylighting and Occupancy Sensors: It is recommended to use daylighting controls and occupancy sensors to automatically adjust artificial lighting, reducing energy consumption when spaces are unoccupied or naturally lit.

5. Water Heating Efficiency
   - High-Efficiency Water Heaters: KIIT is replacing old water heaters with high-efficiency models, such as heat pump water heaters or tankless systems in hostels.
   - Low-Flow Fixtures: KIIT installed low-flow faucets and showerheads to reduce water usage, which in turn decreases the energy required for water heating which is limited to some hostels and academic buildings. It is recommended to install the fixtures for entire university

6. Windows and Doors Improvements
   - Upgrade Windows: KIIT is using Energy-efficient windows with low-emissivity (low-E) coatings and double or triple glazing reduce heat transfer and improve indoor comfort for all their upcoming and ongoing building projects.,

7. Building Automation Systems (BAS)
   - Automated Controls: It is recommended to Integrate a BAS for centralized control of lighting, HVAC, and security systems. This allows for monitoring, scheduling, and adjusting settings based on occupancy, time, and weather.
   - Real-Time Monitoring: A BAS can provide real-time energy monitoring to identify unusual energy use patterns and make immediate adjustments.

8. Renewable Energy Integration
   - Solar Panels: KIIT Installed rooftop -mounted solar panels to generate electricity on-site, reducing reliance on the grid and lowering energy costs.
   - Solar Thermal Systems: KIIT Uses solar thermal systems to preheat water, which can cut down on conventional water heating costs.

9. Building Envelope Improvements
   - Green Roofs or Cool Roofs: It is recommended to use Green roofs which provide insulation and reduce stormwater runoff, while cool roofs reflect more sunlight and absorb less heat, reducing cooling demands.
   - Exterior Insulation Finishing Systems (EIFS): It is recommended to add EIFS to exterior walls improves insulation and reduces thermal bridging, further enhancing energy efficiency. This will decrease the energy by 6% in the HVAC systems.

10. Regular Maintenance and Optimization
    - Routine HVAC and Lighting Maintenance is been carried out by the KIIT maintenance and engineering department. Regularly maintenance helps to optimize HVAC and lighting systems to keep them running efficiently.
    - Retro-Commissioning: KIIT is periodically re-evaluating and adjusting building systems to ensure they operate as intended, especially after upgrades such as LED lights, Window ACs, water pumps.

Water Quality assessment

Water samples from four different locations were collected and analyzed for its quality parameters. The samples includes two well water which are the main water source of the college campus and two tap water samples which is used for canteen and drinking water cum cooler systems. The samples were collected, preserved and transported to school of Environmental Sciences and analyzed for various physio-chemical parameters. The major parameters analyzed include dissolved oxygen, acidity, alkalinity, chloride, hardness, pH, conductivity, total dissolved solids and salinity. The results are presented in the Table 1.

The results are comparable with the values of drinking water standards prescribed by different agencies.

Table-1 Results of water quality

Parameters	Well water 1	Tap water 1
Dissolved Oxygen (mg/l)	6.72	7.36
Acidity (mg/l)	56	22
Alkalinity (mg/l)	16	18
Chloride (mg/l)	27.7	36.2
Hardness (Total)	Nil	Nil
Total Dissolved Solids (ppm)	102	127
Total coliform	Nil	Nil

Water Management

The sources of water used in the College are two wells present in the campus. These wells are recharging with rainwater from the roof. A total of 18000L of water is pumped out from the well every day (Table 2). Wastage of water from the lab is reduced by adopting microscale analysis.
An average of 3, 60,000 L of water is used by the College per month.

Table 2.

SL NO	PARAMETERS	Response	Remarks
1	Source of water Well		
2	No of Wells 2		
3	No of motors used 3		
4	Horse power –	Motor 5HP-2 1 HP -1	

SL NO	PARAMETERS	Response	Remarks
5	Depth of wel	12m - well no:1 15m- well no: 2	
6	Number of water tanks	8	
7	Capacity of tank	2000 L-3 3000 L-2 1000L -1 6000L-1	
8	Quantity of water pumped every day	18000 L	
9	Any water wastage/why?	Nil	
10	Water usage for gardening	500 L / day	
11	Waste water sources	Rest room	
12	Use of waste water	Nil	
13	Rain water harvest available?	Yes	
14	No of units and amount of water harvested		
15	Any leaky taps	Nil	
16	Amount of water lost per day	Nil	
17	Any water management plan used?	Water management audit conducted	
18	Any water saving techniques followed?		
19	Are there any signs reminding peoples to turn off the water?	Yes	

Details of Ground Water Recharging arrangements of different campuses

SL	LOCATION	DIA OF BORE	QUANTITY	REMARKS
01	CAMPUS-9(A-block)	6”	1	Completed
02	CAMPUS-9(B-block)	6”	1	Completed
03	CAMPUS-9(SCHOOL BACK SIDE)	6”	1	Completed
04	CAMPUS-5(WEST SIDE)	8”	1	Completed
05	CAMPUS-5(SOUTH SIDE)	8”	1	Completed
06	KP-6(C-BLOCK)	8”	1	Completed
07	KP-6(A-BLOCK)	6”	1	Completed
08	CAMPUS-11(MAIN GATE)	8”	1	Completed
09	CAMPUS-11(LH SIDE)	6”	1	Completed
10	CAMPUS-11(DIPLOMA HOSTEL)	6”	1	Completed
11	CAMPUS-16(LH BACK SIDE)	6”	1	Completed
12	CAMPUS-18(BH SIDE)	5”	2	Completed
13	CAMPUS-18(ARYAPALLI SIDE)	5”	2	Completed

RAIN WATER HARVESTING

Here are the details of building which are equipped with rain water harvesting.

Sl no	Campus	Places	SQFT
1	11	GH QC-VI	58307
2	11	Kiit school of chemical	11925
3	15	Kp-VI(A & B)	110000
4	15	Kp-VI©	571592
5	16	BH	84600
6	16	GH	98600
7	18	BH	37004
8	18	Academic Block	34262
		T O T A L -	10, 06,290 sq. ft

Rain fall (Average) in Bhubaneswar per year – 64.1 inch
I inch rain fall per Sq. feet = 2.358 ltrs. Of water
So 64.1 inch rain fall = 64.1 X 2.358 = 151.147 ltrs. / sq. feet
Total rainwater collected – 10, 06,290 X 151.147 = 15, 20,97,714 ltrs / year
152 million ltrs. / Year water recharged through rooftop catchment.

Use of Sensors for overhead water tanks.

Sensors are used to detect the water level in the overhead water tanks . Thus by using sensors water level can be detected and appropriate switching of motor can be done. There are two sensors , one to indicate the lower level and one to indicate the upper cutoff level which shows the tank is full.By using this sensors unnecessary running of motor and spilling of water can be prevented.Motor gets turned on only when the water level reaches the lower cutoff point and gets off at the upper point.

No of Motors : 145@2 Hp
145*1492= 2,16,340watt
Energy saved= 0.5hours*45*1492=33,570 Watth= 33.57 KwH (daily basis)
Hence energy saved for one year= 216,340*0.5 hours*365 =39,482.05 KwH
Energy saving=39,482.05 KwH *Rs 5.85/=Rs
Hence amount saved Rs 2,30,969.99 /- at the rate Rs 5.85/ per unit


5HP/3 PH
DIGITAL PUMP SECURITY SYSTEM

SOLID WASTE MANAGEMENT OF KIIT UNIVERSITY

Biomass power is **electricity generated from renewable organic waste that would otherwise be dumped in landfills, openly burned, or left in the woods as fodder for forest fires**. Different amounts of greenhouse gases would be released if the same waste was burned or buried. Energy from waste is therefore better than landfill, providing the residual waste being used has the right renewable content and is matched with a plant that is efficient enough at turning the waste to energy. INCINERATION: Incineration technology is complete combustion of waste (Municipal Solid Waste or Refuse derived fuel) with the recovery of heat to produce steam that in turn produces power through steam turbines. The flue gases produced in the boilers have to be treated by an elaborate air pollution control system

The organic waste generated from different campuses of KIIT University is managed by biogas plants (04nos.) installed at campuses Organic waste based bio-gas plant of 4 x 500 kgs / day capacity is installed in KIIT . It supplements a part of heating requirements in kitchen. The locations of the biogas plants are as follows:

a) Campus – 5 (KIMS) – It manages the waste from KP-6, KIMS, KP-9 (Block – A, B, C), KP-7 (Block – A, B, C)
b) Campus – 3 – KIIT School of Technology, QC – 3, QC – 4
c) Campus – 12, Near Rose Garden – Diploma boy's hostel, KP-5, KP-5(A), KIIT School of Film & Media, International Hostel, Campus-12, KP-2 hostel, KP-3 hostel.
d) Campus – 11- KSBT, Campus – 16 & Law hostels, Diploma Girl's hostel, KSBT hostels.

BIOGAS PRODUCTION FROM BIOGAS PLANTS INSTALLED AT KIIT 2022 - 2023

Total number of biogas plants at KIIT – 04nos.
Capacity – 500 Kg / day (Organic Waste)
Biogas production capacity on 100% loading – 35 Cu / Meter / Day
Generation details :

Month	Year	Biogas Generated In Cu. Mtr.	Units Equivalent Electrical Kwh Generated	Remarks
January	2022	1920	3840	
February	2022	2245	4490	
March	2022	2448	4896	
April	2022	2410	4820	
May	2022	460	920	Summer Vacation
June	2022	380	760	Summer Vacation
July	2022	1275	2550	
August	2022	1650	2300	
September	2022	2100	4200	
October	2022	2080	4160	
November	2022	2160	4320	
December	2022	2000	4000	

Month	Year	Biogas Generated In Cu. Mtr.	Units Equivalent Electrical Kwh Generated	Remarks
January	2023	2070	4140	
February	2023	2265	4530	
March	2023	2360	4720	
April	2023	2380	4760	
May	2023	380	760	Summer
June	2023	380	760	Summer
July	2023	1410	2820	
August	2023	1680	3360	
September	2023	2080	4160	
October	2023	2165	4330	
November	2023	2215	4430	
December	2023			

Total production in the year 2022-2023 is 41420 KwH.

Standard LPG Cylinder cost Rs.1079.00 for a 14.2 kg cylinder.

Therefore the amount of saving from generation of bio-fuel which is used for cooking is 242307.00/ per year at the rate 5.85/ per unit.


ORGANIC WASTE


CONTROL PANEL


ORGANIC WASTE
BASED BIOGAS PLANT
DESIGNED AND INSTALLED
BY
MAILHEM ENGINEERS PVT. LTD.
PUNE (INDIA)
(AN ISO 9001 : 2008 CERTIFIED COMPANY)
TEL. : 020 25650057 Mob.: 09373597455
E-mail : info@mailhem.com
Website : www mailhem.com
INLET CHAMBER

SOLAR POWER PLANT OF KIIT UNIVERSITY:

The rooftop of academic buildings, hostels and other buildings are free from shadow hence solar PV panels are installed.Solar power station with grid inter-active system of 1050 KWP capacity to generate electrical power during day time. It meets 12% power requirement during day time.
The system was commissioned and synchronized with grid on last week of July 2018.

Generation from 2021-2022

	1	2	3	4	5	6	7	8	9	10
Month	kp6	qc7	kp5	KP5A	Annex	qc 4	dental	qc 3	Campus 15	campus 3
Mar-22	7804	14174.4	13283.2	15659.6	8479.6	10670	28972.8	10294.80.	12198.4	23507.2
Feb-22	6932.4	12308.4	15146.8	9038.8	7102	9178	25676.8	9056.8	10812.4	19986.4
Jan-22	6638	11835.2	15273.6	9176.4	6393.6	9003.2	24678.4	7592.8	10068.8	19207.2
Dec-21	5455.6	9818.8	3723.2	7581.6	4875.6	7397.2	20389.6	7132.4	8622	15952
Nov-21	5433.6	9690.8	4861.2	7265.2	4962.28	7378.8	20081.6	6945.6	8598.4	16003.2
Oct-21	6026	10375.6	12534.8	8226.4	5726.4	8185.2	22282.4	7786.8	9492	17986.4
Sep-21	5006	8872	11057.2	6876	4912.4	6865.2	18524.8	6563.2	7924.4	15272
Aug-21	5777.2	10462	12690.4	7697.6	5734	7990.8	21657.6	7744	9284	18094.4
Jul-21	5940	10861.6	1397.8	8228	5992.4	8340.4	22508.8	8165.2	9628.4	18820
Jun-21	5264.4	9525.2	12408.4	7366.8	5249.6	7351.6	19806.4	7141.2	8466.8	16609.6
May-21	6220	11300.8	14743.6	8774	6286.4	8652.8	23430.4	6612	8030	19712
April 2021	7801.6	13437.6	7845.6	10889.6	7746	10808	28926.4	6648.8	12505.6	24129.6
Total	74298.8	132662.4	124965.8	106780	73460.28	101821.2	276936	81388.8	115631.2	225280

The total generation from solar from all the installation at 10 unit for the year 2021-2022 is 1313224.48 KWH =13.13 Lakh KWH.
Hence the amount saved is 76,82,363.208/-at the rate Rs 5.85/ per unit as per new tariff.

SOLAR POWER GENERATION AT KIIT 2022 - 2023

Month	Year	Units Generated	Remarks
January	2022	90,948	
February	2022	1,19,867	
March	2022	1,25,238	
April	2022	1,45,044	
May	2022	1,35,772	
June	2022	1,27,453	
July	2022	1,05,664	
August	2022	87,881	Rainy Season
September	2022	99,053	
October	2022	96,895	
November	2022	1,15,383	
December	2022	1,14,203	

SOLAR POWER GENERATION AT KIIT 2023-2024

Month	Year	Units Generated	Remarks
January	2023	1,13,256	
February	2023	1,08,980	
March	2023	1,24,643	
April	2023	1,14,280	
May	2023	1,27,922	
June	2023	1,31,648	
July	2023	1,06,103	
August	2023	1,00,598	
September	2023	1,07,932	
October	2023	87,596	Cloudy Weather
November	2023	1,22,522	
December	2023		

The total generation from solar from all the installation at 10 unit for the year 2022-2023 is 13,74,227kwh.
Hence the amount saved is 80,39,227.95 /--at the rate Rs 5.85/ per unit as per new tariff.


24/02/21 4:06 PM


28/02/21 11:31 AM

Solar water heating system is **a device that helps in heating water by using the energy from the SUN**. This energy is totally free. Solar energy (sun rays) is used for heating water. Water is easily heated to a temperature of 60-80 degC.Solar water heating systems collect the thermal energy of the sun and use it to heat water in homes and businesses. The systems can be installed in any climate to reduce utility bills and are composed of three main parts: the solar collector, insulated piping, and a hot water storage tank.Both solar water heating systems and solar photovoltaic (PV) systems involve collector panels, however, they are different technologies. Solar water heating systems use radiation from the sun to generate heat for water, whereas PV systems produce electricity.Solar water heating systems can either rely on electric pumps to circulate water (active) or rely on thermodynamics (passive). Active solar water heating systems are more common in residential and commercial use. Passive solar water heating systems are typically less expensive, but they are also less efficient.

Advantages

- Solar Energy is a natural and Renewable resource, abundant in nature, which can be used for free.
- Water can be heated on cloudy days too. The solar heater uses diffused energy in the atmosphere to heat the water.
- Reduces carbon footprint.
- Requirement of less maintenance.
- Energy payback period is 5–10 years.
- It’s a one-time investment that goes a long way. Solar Water Heaters can easily last 15–20 years.
- Save money on your electric bills because of reduction in the consumption.
- Government also provide rebate on electricity bills as an incentive to encourage more people to use Renewable Energy.
- Cheaper Installation Rate.
- Environment friendly.
- Protecting air quality.
- Protecting water quality.

INSTALLATION OF ROOF TOP SOLAR HOT WATER HEATER SYSTEM

SL NO	CAMPUS	NAME OF THE BUILDINGS (ID)	LPD
1	CAMPUS-1	Kings' Palace - 4	500
2	CAMPUS-2	KIIT Polytechnic Boys' Hostel	1000
3	CAMPUS-3	Queen's Castle-1 BLOCK (A+B+C)	3000
4		Queen's Castle-1 Block D	1000
5		Queen's Castle-2	3000
6		Queen's Castle-3	2000
7		Queen's Castle-4 (Block A,B &C)	5000
8		Queen's Castle-4 (Block D)	2000
9	CAMPUS-4	King's Palace-1 (Block A)	2000
10		King's Palace-1 (Block F)	1000
11		King's Palace-2	3000
12		King's Palace-3	2000
13	CAMPUS-6	Queen's Castle-8	3000
14	CAMPUS-7	KSOM Hostel (Block - A, B & C)	3000
15		KSOM Girl's Hostel (Block D)	1000
16	CAMPUS-8	King's Palace-12	3000
17	CAMPUS-10	King's Palace-7(A & B)	4000
18		King's Palace-7(C)	3000
19		King's Palace-7(D)	2000
20		King's Palace-7(E)	3000
21		King's Palace-7(F)	2000
22	CAMPUS-11	Queen's Castle-6 A	3000
23		Queen's Castle-6 B	1000
24		King's Palace-8	6000
25		King's Palace-8 (Block B)	2000
26	CAMPUS-12	Kings' Palace-5	4000
27		Kings' Palace-5A	2000
28		King's Palace-14	4000
29		New Boys' Hostel (KP-15)	4000
30	CAMPUS-13	Kings' Palace-16	3000
31	CAMPUS-15	King's Palace-6(Block A & B)	5000
32		King's Palace-6(Block C)-A/C.	2000
33	CAMPUS-16	King's Palace-11(Non AC)	3000
34		King's Palace-11(Block-A-AC)	1000
35		Queen's Castle-7 (Block A)	3000
36		Queen's Castle-7 (Block B)	2500
37	CAMPUS-17	KSRM B/H Non-AC(Block A&B)	1000

38		KSRM Girl's Hostel (Block C)	500
39		KSRM Boys Hostel AC (Block D)	1000
40		Queen's Castle-5	2000
41	CAMPUS-18	KIIT International Hostel	1000
42		King's Palace-8(Block C)	2000
43	CAMPUS-20	King's Palace-10 (Block A)	2500
44		King's Palace-10 (Block B)	2000
		TOTAL	107000

100 LPD system saves 140 ltrs of diesel
Thus 1,07,000 lpd system saves 1,49,800 ltrs of diesel.
100 lpd of solar water heating system saves 1500 units of electricity per year.
Hence total units of electricity saved per year is 16,05,000 units (16.05 lakh kWh).
Therefore yearly we save Rs 93,89,250/ at the rate Rs 5.85 per unit as per new tariff.

Soil Quality assessment

Soil samples were collected from four locations of the campus and analyzed for the basic parameters. The results are tabulated and presented in the table 3.

Table 3

Parameter	Location 1 (ground)	Location 2 (Teak plantation)	Location 3 (Butterfly garden)
pH	7.1	7.5	7.3
Total Nitrogen (mg/kg)	2.6	2.3	1.9
Total organic carbon (%)	1.1	1.2	1.4
Phosphate (mg/kg)	0.1	0/05	0.6

Waste management

Waste management is important for an ecofriendly campus. In a college different types of wastes are generated, its collection and management are very challenging. The following data provide the details of the waste generated and the disposal method adopted by the college.

Total number of stakeholders in the college: 2025

Total number of building (Class rooms, canteen, office, auditorium, library etc): 36

Table 5. Different types of waste generated in the college and their disposal

Types of waste	Particulars	Disposal method
E-Waste	Computers, electrical and electronic parts	Direct selling
Plastic waste	Pen, Refill, Plastic water bottles and other plastic containers, wrappers etc	Direct selling
Solid wastes	Damaged furniture, paper waste, paper plates, food wastes	Reuse after maintenance energy conversion
Wastewater	Washing, urinals, bathrooms	Soak pits
Glass waste	Broken glass wares from the labs	Direct selling
Sanitary Napkin		Napkin Incinerators

Waste management Practices adopted by the college

For the last few years, college is following zero organic waste protocol throughout the campus. The food waste generated by the students and staffs are taken by them to their own home, so that, minimum waste is generated inside the campus. In addition, the organic waste generated in the canteen is used as feed for biogas plant and the biogas is used as fuel in college canteen.
Vegetable waste and other leaf litters were used to feed in the vermin-compost pit and the resulting vermin-cast is used as manure in the garden. The chemicals from the laboratories are disposed in a sealed tank along with water, so that the chemicals undergo neutralization with the water

WASTE UTILIZATION AT KIIT, KIMS & KISS:

a) Waste water treatment :

i) KIIT - 2 X 100 KLD STP for treatment of waste water

ii) KIMS – 1 X 300 KLD STP for waste water and 1 X 2000 KLD STP for waste water treatment.

iii) KISS – 1 X 400 KLD STP for waste water at KISS - II and 1 X 350 KLD STP for waste water at KISS – III

The treated water is utilized at gardening and plantation. Excess water is allowed in public drain.

b) Solid waste management :

Organic wastes collected from different hostels are fed to biogas plants installed at different campuses.

Biogas plants:

i) KIIT – 3 X 500 Kg / day capacity

ii) KIMS – 1 X 500 Kg / day capacity

iii) KISS - 1 X 1000 Kg / day , 2 X 500 Kg / day capacity

(Bio gas generated from 1000 Kg / day plant is 75 Cu. Mtr. And from 500 Kg / day plant is 35 Cu. Mtr.)
Benefits:
Total biogas generated is - 275 Cu.mtr. Approx. per day and value of 1 Cu. Mtr. Biogas is Rs.17.50 p. Total benefit is Rs.4812.50 p say Rs.4, 800.00 per day.
Running the pumps and motors of the biogas plant consume electricity which is Rs.300.00 per day.
Net benefit from biogas is Rs. 4,500=00 per day.

2000 KLD STP:

How KIIT is reducing carbon emissions:

1. Conducting a Carbon Inventory
   - Gather Data: KIIT is tracking all sources of greenhouse gas emissions on campus, including energy use in buildings, transportation, waste disposal, water usage, and any on-campus industrial processes. (details mentioned in the report)
   - Categorize Emissions: Dividing emissions into *Scope 1* (direct campus emissions, e.g., heating and campus vehicles), *Scope 2* (indirect emissions from purchased energy), and *Scope 3* (indirect emissions, e.g., student commuting, waste).
   - Establishing a Baseline: By using the gathered data, KIIT establish a baseline year to measure future reductions against which is 2030.

2. Setting Clear Emissions Reduction Goals
   - Define Targets: KIIT has set measurable, time-bound emissions reduction targets, such as cutting emissions by 50% over ten years or achieving net-zero by 2040.
   - Align with Larger Commitments: KIIT has aligned with international standards (like the Paris Agreement or the Science-Based Targets initiative) & joined different climatic and sustainable programs.

3. Developing an Action Plan
   - Prioritize High-Impact Areas: KIIT Focuses on areas with the most significant carbon reduction potential, like energy use, transportation, and waste.
   - Establish a Timeline: Short-, medium-, and long-term goals have been set by KIIT, KISS & KIMS to milestones for tracking progress.

4. Energy Efficiency and Renewable Energy Integration
   - Upgrade Campus Buildings: KIIT is upgrading and retrofitting its buildings one-by-one with energy-efficient lighting, insulation, and HVAC systems. Implement smart systems for heating, cooling, and lighting based on occupancy.
   - Increase Renewable Energy Use: KIIT installed with 200 MWP rooftop solar power plant .

5. Sustainable Transportation
   - Promote Public Transport: Partner with local transit authorities to provide discounted or free passes for students and staff, reducing single-occupancy vehicle usage.
   - Support EVs and Carpooling: KIIT has installed EV charging stations with dedicated parking spots. Consider switching campus vehicles to electric or hybrid models.

6. Waste Reduction and Recycling
   - Implement Waste Reduction Programs: KIIT has conducted many programs and encouraged recycling, composting, and proper disposal of waste materials. Establish waste diversion goals to reduce landfill contributions.
   - Minimize Food Waste: All the food waste in the hostels as used as energy source for Bio Gas plant and as manure/food for live-stock.

- Promote Reuse and Responsible Purchasing: It is recommended to implement these policies in the programs which are: Use sustainable materials and products on campus, and promote the use of reusable containers and materials among students and staff.

7. Water Management
   - Efficient Fixtures and Irrigation: KIIT is installed with low-flow faucets, showers, and toilets to reduce water usage. Implement drip irrigation or rainwater harvesting for campus landscaping.
   - Water Recycling: STP plant is installed in the KIIT to recycle the grey water

8. Education, Awareness, and Engagement
   - Engage the Campus Community: KIIT is creating workshops, campaigns, and courses to raise awareness about carbon reduction and sustainability practices among students, faculty, and staff.
   - Green Teams and Sustainability Clubs: Programs to Support student-led initiatives, green teams, or clubs to foster peer-driven change on campus are driven by different KIIT societies

9. Carbon Offsetting and Carbon Sequestration
   - On-Campus Sequestration: At present vegetation and plantation is carried our vastly in the campus and programs like campuses reforestation, soil carbon capture through sustainable landscaping, or green roofs to naturally absorb carbon.

10. Continuous Monitoring and Reporting
    - Regular Audits: KIIT is Conducting regular emissions audits to assess progress, track data accurately, and identify any areas needing improvement.
    - Annual Reporting: 3rd party Annual audit report on sustainability is submitted with updates on emissions reductions, energy use, and other environmental metrics.
    - Revisit Goals and Strategies: However KIIT management is regularly updating and refining carbon reduction goals and action plans based on progress, emerging technologies, and policy changes.

Details of savings

ABSTRACT SHEET OF ELECTRICAL LOAD FOR KIIT,KIMS & KISS				
SL NO	**LOCATION**	**SUB STATION CAPACITY**	**CONNECTED LOAD IN KW**	**REMARKS**
1	Campus -1	250KVA	413	
2	Campus -2 & 4	750KVA	1069	
3	Campus -3(HIGH RADIUS)	2 X1000KVA	2885	
4	Campus -3(PHY-CHEM)	2X1000KVA	3036	
5	Campus -3 (KP-7 A&B)	1000 KVA	743	
6	Campus -6	750KVA	1211	
7	Campus -7	1000KVA	1682	
8	Campus - 8	750KVA	1480	
9	Campus -9	1000KVA	1784	
10	Campus -16(KP-8)	1000 KVA	717	
11	Campus -11(AUDITORIUM)	750KVA	675	
12	Campus- 11(KSBT)	1000 KVA	977	
13	Campus -12	3x1000 KVA	3632	
14	Campus -13	1000KVA	1363	
15	Campus-14	1000KVA	868	
16	Campus -15	750KVA	1034	
17	Campus -16	750KVA	1277	
18	Campus-17(KSRM)	1000KVA	906	
19	Campus -18	750KVA	807	
20	Campus-20,(KP-10 A&B,New Library)	2X750KVA	1628	
21	KP-7 (C,D,E,F)	750KVA	1094	
22	QC-8	750KVA	536	
23	QC-5	750KVA	416	
24	KIIT RESIDENCY	250 KVA	251	
	TOTAL LOAD OF KIIT		30484	
	TOTAL LOAD OF KIMS		15763	
	TOTAL LOAD OF KISS		1975	
	TOTAL LOAD OF KIIT,KIMS & KISS		**48222**	**SAY 48 MW**

KIIT, Deemed to be University, 2022-2023

Project	Name	KWH SAVED	LAKH KWH	Amount(Rs)
1	Installation of Solar water heating system on the top of hostel building	16,05,000	16.05	93,89,250.00
2	Use of LED light at various Campuses in KIIT for lighting purpose	5,00,544	5.00	29,28,182.40
3	Rooftop Solar Installation	13,74,227	13.742	**80,39,227.95**
4	Energy generation from Biomass (waste products)		.414	242307.00

5	Dedicated feeder from Chandaka grid			37,63,861.85
6	Use of Sensors for overhead water tanks.	39,482.05	0.394	2,30,969.99
7	Replacement of single phase induction type conventional ceiling fan with BLDC motor ceiling fan	13,23,540	13.23	77,42,709.00
8	Replacement of 3 star Air conditioners with 5 star AC	5493640.55	54.93	3,21,37,797.21
9	Replacement of conventional water cooler with star rated water purifier	247800	2.47	14,49,630.00
10	Old transformer replaced with new ones	1131000	11.31	66,16,350.00
11	Detection of Hotspot and repair and maintenance of feeders	380000	3.8	22,23,000.00
	TOTAL		120.91	**7,47,63,285.40**

PROPOSALS FOR FUTURE PROJECTS :

- Setting up renewable energy advance courses for students.
- Solar steam generation for cooking based on solar concentrator mechanism.
- Cold room powered from bio-gas and solar.
- Solar pumping system for gardening and general purpose.
- More solid waste management programme.

- The total consumption of electricity has increased in the year 2023-2022 then 2022-22 due to increase in the number of students, connected load.

- However the specific consumption of electricity is 35.01 and electric saving is 55% due to various energy saving measures.

OPERATION AND MAINTENANCE OF STPs AND BIOGAS PLANT INSTALLED AT KIIT:

1 – O & M Expenditure for STPs installed – Rs. 90.00 lakhs / Annum

2 – O & M Expenditure for Biogas plants installed - Rs. 33.00 lakhs / Annum

Operation and Maintenance of STPs includes manpower engagement, supply of chemicals and consumables, replacement of defective spares and devices.
Similarly for Biogas plants O & M includes engagement of operators, use of required chemicals and bacteria cultures.

Green Campus:

SL	NAME OF THE PLANT	C-1	C-2	C-3	C-4	C-5	C-6	C-7	C-8	C-9	C-11	C-12	C-13	C-14	C-15	C-16	C-17	C-18	ROAD	ROSE GARDEN	TOTAL
1	Acasia		1					2		1			50			1					**55**
2	Agasti																				**0**
3	Aglonoma									500											**500**
4	Almond							100	100						200						**400**
5	Akalpa Red											64									**64**
6	Akalpa white											132									**132**
7	Akash malli		1		4	17		36								2			44		**104**
8	Altapus							4													**4**
9	Amala							19													**19**
10	Amra																				**0**
11	Ambeda																				**0**
12	Arica Pam		33	400	35	100	500	100	36	350	76	108		30	500	68		130	882	100	**3448**
13	Arjun	1				25	11	26			16					3			25		**107**
14	Arubenda																				**0**
15	Ashoka			15				5							2						**22**
16	Aswastha						4	3			1			1	1	3			10		**23**
17	Bahara							3													**3**
18	Bamboo				1		15	28	12	14		10				3			17		**100**
19	Bara						1	2				1				2			18		**24**
20	Barakuli							2			1								2		**5**
21	Baruna							3													**3**
22	Basanga	1						6													**7**
23	Beetel																				**0**
24	Bela					15	2	18											1		**36**
25	Bhuin Limba		1																		**1**
26	Big Golden			100																	**100**

27	Big Pam							150				12								**162**
28	Big Tree											72								**72**
29	Bottle brush (Green)				2							43						70		**115**
30	Bottle brush (Yellow)						33	35	75		2				13	1		35	40		**234**
31	Bottle Pam			100		138	35	15		71	1		90						130		**580**
32	Bougainvillea							50		60		45			46	30			310	50	**591**
33	Boula	5	15	80	66	80		80	80		75	41	30	21	10	50		9	1		**643**
34	Burutola							40													**40**
35	Cassia							10							2				41		**53**
36	Chaina Pam						30	50	15						35						**130**
37	Chakunda	2						5				16			1	3		20	77		**124**
38	Champa	3			2		1	25	2	30	6	29			62			61			**221**
39	Chandan					15		25											9		**49**
40	Chatiani	6			1			18	1	52	48					1			125	2	**254**
41	Chena Phula							10								1					**11**
42	Cheri			250	17	130	20	48	104	189	146	138	100		157	56		102	234	11	**1702**
43	Coconut	2		30	2	2				35		1				1				20	**93**
44	Cone Cups																			1	**1**
45	Croton		8				112	26	10			90				4			5		**255**
46	Custard apple							7													**7**
47	Cycus							27													**27**
48	Dalimba	2					1	3	1						2						**9**
49	Debadaru	1	5	270	5	98	14	31		25						1					**450**
50	Dhaura							7													**7**
51	Defandekiya									200											**200**
52	Farkaria							19											22	1	**42**
53	Fasi							6													**6**

54	Fern									250										**250**
55	Frustel Pam					10		11	58		68				25	45			3		**220**
56	Fykus		13	25	13	158	118	37	42	165	79	92	30		18	76			38	20	**924**
57	Gambhari							8													**8**
58	Ganga Seuli	2						10					10		5				180		**207**
59	Gaudi Chudi							7				35	35		4				263	3	**347**
60	Ghusali									3											**3**
61	Godibana							18		41		50	138		21			80	110	64	**522**
62	Grape																				**0**
63	Green Pam								18											20	**38**
64	Gua				21		128	10	64		12					16					**251**
65	Hedge							1000													**1000**
66	Henna			62																	**62**
67	Hinjala			15																	**15**
68	Hilkonia							500		500											**1000**
69	Ixora									300											**300**
70	Jamia				1								3						8	3	**15**
71	Jamun	1				15		5		3	2				3				72		**101**
72	Jamurool																				**0**
73	Jatrofa																				**0**
74	Jhaun																				**0**
75	Jui								50						15						**65**
76	Jhaun						3														**3**
77	Juniper (Green)	9					22		1		19										**51**
78	Juniper (Yellow)								22		15									28	**65**
79	Junipus							8				1									**9**
80	Kadamba	5				65		4	1		21	17	130		42	28		5	96	5	**419**
81	Kadia							11							7			40		57	**115**

82	Kantiya Pam									20										**20**
83	Kamini			200		500		60	100			204	50		300			310	54	115	**1893**
84	Kanchana			20				2							32	5				20	**79**
85	Kaniari						33	10		81		8		100					500		**732**
86	Kapa							7			10	7									**24**
87	Karamanga							6		3											**9**
88	Karanja	1				140	30	50		2				50	3	9			77	1	**363**
89	Karbaira				4	8	8	5													**25**
90	Kasia												20		4						**24**
91	Katha Champa			5			25	31	1	24			5		52	2		5	172	35	**357**
92	Kendu							5													**5**
93	Khajuri Pam							60		6		16								25	**107**
94	Krushnachura	56				168	19	9		56		28	138	22	3	25			134	17	**675**
95	Lemon				1		1	3				1			1	1			1		**9**
96	Lily																		6	4	**10**
97	Lavender								1										7		**8**
98	Madhumalati							30							15				10		**55**
99	Maha Nimba	16			2			17	1	21		1			21	15			8		**102**
100	Malli		25	100												2					**127**
101	Mandara				1			60		215					1	3		8	180	75	**543**
102	Mango	18	3	160	87	118	32	400	14	59	17	44	140	140	23	5		6	2	5	**1273**
103	Manjuati														744						**744**
104	Mehogani							2			11				75	1			15	30	**134**
105	Mentalia					25	28	21	22	69	15				50	8					**238**
106	Mini torato										1									115	**116**
107	Musunda							7			1	44								4	**56**
108	Nag Lingam						21												25		**46**
109	Nageswari																				**0**
110	Narakuli																				**0**

111	Naspati																			**0**
112	Neem	1	1			338	16	55		41	8		100	1	7	9			163		**740**
113	Oau																	15		10	**25**
114	Oil Palm			10																	**10**
115	Orange															2					**2**
116	Other								135												**135**
117	Padma																				**0**
118	Paladhua							8													**8**
119	Paneer								8												**8**
120	Pam						611	80	4		22	24			368				5		**1114**
121	Pam (Green)							70													**70**
122	Pam Yellow									6											**6**
123	Pam Red									4											**4**
124	Panasa				1	7	2	6		3		10		7	4	11		5	5	7	**68**
125	Papeya																				**0**
126	Parijata																				**0**
127	Parkeria			100																	**100**
128	Passa																				**0**
129	Patoli							5										20	142	15	**182**
130	Patraranji							10													**10**
131	Peepal															2					**2**
132	Pesta Badam		2	125	7	250	42	22	13	13	59	71	100	25	23	39		12	314	3	**1120**
133	Phula															1					**1**
134	Pijuli	7	2		15		5	4	3			8			4	1					**49**
135	Plubago							98													**98**
136	Putrajiba			200				10							3			25	5		**243**
137	Radhachura							35							32	16					**83**
138	Radhachura			68		122		30			14		188		61				378	8	**869**
139	Rakta Chandan						10	12													**22**

140	Rangani						30	150		300			60							**540**
141	Rapis Pam							10	1	200									20	**231**
142	Red crotan																	5		**5**
143	Red Pam								4											**4**
144	Red Star lata												100							**100**
145	Red Tikoma																	20		**20**
146	Rojia				5			70	15		26						53		131	**300**
147	Rose																		5000	**5000**
148	Rose wood																			**0**
149	Round											78								**78**
150	Rubber						1													**1**
151	Rudraksha							1											1	**2**
152	Sahada							2												**2**
153	Sajana						1	1	2					3						**7**
154	Sala							8				68								**76**
155	Salapa Gua				5						5									**10**
156	Salstak															1				**1**
157	Sapeta	2						5		4										**11**
158	Scaphera							25					25		7					**57**
159	Silver Oak			25				13										65		**103**
160	Simili									3	1									**4**
161	Sirisha							3							24			1		**28**
162	Sisu				1			3												**4**
163	Sorisa Fula							15												**15**
164	Soubhagya Sundari	1																		**1**
165	Spathodia					25		50	6	200					16	7		20	5	20	**349**
166	Sthala Padma			10				7												**17**
167	Sugandharaj							3												**3**
168	Sunari														3	2		14		**19**

169	Swarna Champa							30												**30**
170	Tagara	10	10				270	350	330		130	133	500		73	7		5	25	65	**1908**
171	Tala				32		100	4													**136**
172	Tala Pam			30																	**30**
173	Taronila																		18		**18**
174	Temple Tree									4											**4**
175	Teak (Saguan)									6		13			1				1		**21**
176	Teamaruga									84											**84**
177	Teniplus (Green)																		15		**15**
178	Tentuli							3			1										**4**
179	Thuja			45	11		2	35		23								15			**131**
180	Tikoma							5													**5**
181	Tora	1													40						**41**
182	Unknown Tree								46	175		2			203						**426**
183	Verigated Cena																				**0**
184	Vinista								5	33									15		**53**
185	White Flower											123									**123**
186	Yellow Grass																				**0**
187	Yellow Panda																				**0**
Total :		**153**	**120**	**2445**	**342**	**2569**	**2337**	**4696**	**1403**	**4444**	**909**	**1880**	**2042**	**400**	**3364**	**569**		**981**	**5220**	**6111**	**39985**

Total number of plant species identified 187.
Total number of plants in the campus 1880.























REVIEW OF FIRE SAFETY

Fire Safety Management:

	Comments	Remarks
Has the fire risk assessment been carried out?	YES	
Is the fire risk assessment record available?	NO	
Have the identified means to reduce or remove the significant hazards been carried out?	YES	
Have the means to control the risk and protection of people in the event of fire been carried out?	YES	
Have staff been suitably trained for these measures?	YES	
Is there suitable monitoring of fire safety measures in place?	YES	
Can it be demonstrated that monitoring is regularly carried out?	YES	
Is the risk assessment properly reviewed, particularly if the premises or its use significantly changed?	YES	

Fire Prevention — General:

	Comments	Remarks
Is there an effective system for ensuring that the quantities and storage of all types of flammable materials are reasonable and properly controlled?	YES	
Are all areas clean and tidy with no inappropriate storage and all combustible waste properly placed in designated containers?	NO	
Is all waste regularly collected and placed in a safe place ready for collection?	YES	
Are smoking areas properly marked and used?	YES	
Are all employees in high risk areas properly informed of the particular risks and the means to control these risks?	YES	
Prior to leaving the premises, are all areas inspected for potential fire and unnecessary equipment turned off?	YES	

Are there suitable means to control the risk of arson?	YES	
Have all staff received basic fire prevention instruction?	YES	
Do staff understand the need to report any potential fire hazards?	YES	
Do staff understand the role of self-closing and other fire-resisting doors — the need to keep them closed and free of obstruction to ensure that they will control the spread of fire and smoke?	YES	
Are all fire-resisting and smoke-stop doors, especially those on hold-open devices, closed at night?	YES	
If any permit-to-work systems are in place, are they operated correctly at all times?	YES	

Fire Prevention — Electrical Safety:

	Comments	Remarks
Is the entire electrical installation in order?	YES	
Have all electrical systems and equipment been tested in accordance with the provisions of the Electricity at Work Regulations 1989?	YES	
Has all remedial work been carried out or the items withdrawn?	YES	
Are records regarding regular testing of installation, equipment and portable appliances up to date?	YES	
Is the use of flexible electrical cable and extension leads kept to a minimum and only short lengths used?	YES	
Are the electrical circuits free of any evidence of overloading?	YES	
Is electrical equipment (eg light bulbs/fittings and any electrical heating appliances) kept well away from combustible materials?	YES	
Are staff aware that only trained personnel authorized by management can make repairs or alterations to electrical systems and equipment?	YES	

Heating and Cooking Appliances:

Are all heating appliances securely fixed in position, suitably guarded and with an adequate clear space free of storage of any kind? - YES
Is the entire heating installation in good order? - YES
Are all cooking appliances securely fixed in position, properly maintained and used only for their originally intended purpose? - YES
Are arrangements for liquid or gaseous fuel supplies for heating and cooking equipment easily accessible with well-marked shut-off valves? - YES
Are appropriately qualified and registered contractors used to carry out all installation and maintenance of liquid or gaseous fuel supply equipment? - YES
Are staff aware that only trained personnel authorised by management can make repairs or alterations to liquid or gaseous fuel-fired equipment and fuel supply systems? - YES

Fire Prevention — Buildings, Plant and Machinery:

Are all fire or smoke barriers in good condition with any openings for pipes ducts, etc properly protected by provision of fire-resisting materials or fire dampers? - YES
Are fire dampers tested regularly for correct operation and results recorded? - YES
Are there proper systems and procedures in place to control work on new buildings and/or alterations, repairs and decoration of premises, such that no fire hazards are introduced? - YES
Are regular checks undertaken and recorded of the condition of all fire safety measures within the premises? - YES

Fire Prevention — Means of Escape:

Are fire exits of a sufficient number and of sufficient width to enable the people present in any and all areas to evacuate safely? - YES
Do all final exits lead to a place of total safety? - YES
Are all fire exits readily available? - YES
Are all final exits and intermediate doors easily operable from the inside without the use of a key? - NO
Are all corridors, gangways and stairways forming part of escape routes free from obstruction and not used for storage? - YES
Are floor and stairway surfaces in good condition and free from tripping and slipping hazards, particularly including any external stairs and paths? - NO
Are fire-resisting and smoke-stop doors in good condition, with fully operating self-closing devices and the doors closing fully onto rebates? - YES
Do all doors on escape routes open in the direction of travel? - YES
Are all escape routes clearly and properly signed throughout their lengths, with internal doors not forming part of a route clearly labelled as such? - NO
Are all escape routes provided with adequate lighting at all times of the day and night? - NO
Is adequate emergency lighting provided and is it fully serviceable? - NO
Have appropriate provisions been made for the safety of persons with special needs, such as the young, old or disabled? - NO

Actions in the Event of Fire:

Are there clearly defined written fire action and emergency evacuation procedures, including provision for ensuring that everyone is out of the building? - NO
Are all employees fully aware of these procedures and their own particular duties and responsibilities in the event of an evacuation? - YES
Are suitable "Fire Action" notices prominently displayed around the premises? - NO
Have appropriate staff been appointed to take control in the event of a fire (Fire Marshal) and to summon the fire brigade for all fires, no matter how small? - YES
Are there sufficient fire wardens available to provide for all working hours (including lunch and tea breaks), taking into account holidays and sick leave? - NO
Have appropriate arrangements been made for dealing with those who are not normally on the premises such as members of the public, visitors and contractors? - NO
Are the fire evacuation assembly areas in safe locations, clear of the building and away from fire brigade vehicle access and parking? - YES
Are there alternative evacuation areas available in the event that the nominated ones are not available? – NO
Are emergency evacuation routes and procedures checked by carrying out drills at least once per year? - YES

Fire Prevention — Fire Detection and Alarm Systems:

Can a fire alarm be raised without placing anyone in danger? - YES
Is the fire alarm system in full working order? - NO
Are there sufficient fire alarm call points located near to every exit from each floor and from each building? - NO
Are all alarm call points unobstructed and clearly visible? - YES
Are the audible signals from the fire alarm operated weekly and clearly audible throughout the premises?- NO

Fire Prevention — Portable Fire-fighting Equipment

Is there adequate provision of portable fire extinguishers which are suitable types for the fire risks where they are positioned? - YES
Are all portable fire extinguishers and fire blankets suitably located, positioned on brackets securely fixed to the wall and available for immediate use — not obstructed or hidden? - YES
Are the locations of all portable fire extinguishers and fire blankets clearly identifiable even without the provision of appropriate signs? - YES

Fire Prevention — Notices and Fire Safety Signs:

Are sufficient appropriate fire safety notices and signs used throughout the premises? - YES
Are all fire safety signs throughout the premises present, undamaged and clearly visible? - YES
Do all "panic bar" fire exit doors have suitably positioned "Push Bar to Open" signs? - NO

Fire Service Facilities and Liaison:

Is there adequate access to the site and all buildings to enable fire brigade vehicles to get close enough for fire-fighting and rescue purposes? - YES
Are all fire hydrants in the vicinity clearly indicated and accessible? - YES
Is the fire brigade familiar with the premises and any particular special hazards relating to the premises or the activities within it? - YES

Fire Prevention — Testing, Maintenance and Records:

Are the fire detection and alarm system tests carried out and recorded? - NO
Are the emergency escape lighting systems properly tested, maintained and these recorded? - NO
Are the portable fire extinguishers and fire hoses properly tested, maintained and these recorded? - YES
Is the automatic sprinkler system properly tested, maintained and these recorded? - YES
Are any other fixed fire suppression systems properly tested, maintained and these recorded? - YES
Are any smoke or heat control systems properly tested, maintained and these recorded? - NO
Are all automatically closing doors or shutters and similar properly tested, maintained and these recorded? - NO
Are any emergency generators properly tested, maintained and these recorded? - YES
Are any evacuation or fire-fighting lifts properly tested, maintained and these recorded? - YES
Are their suitable records of the regular fire safety maintenance tests? - NO
Are there suitable records of fire evacuation drills? - YES

Other Green Initiatives taken in KIIS by the KIIT management:

- **KISS has diligently been working and fulfilling UN's Millennium and Sustainable Development Goals over the years.**
- **Under KISS's green initiative, the foundation has taken significant steps by implementing projects which have directly benefited the overall environment and ensured access to affordable, reliable, sustainable and clean energy for all.**

	
1000 KG Biogas plant	**600 KWP Solar photovoltaic plant**
	
Fully mechanized steam kitchen	**SOLAR WATER HEATING SYSTEM**

KISS's Clean Energy Initiatives Timeline:

- 2010 – KISS installed steam based cooking system for mass cooking.
- 2011- KISS has completed 50 KW solar power plant
- 2012 - KISS has installed 10,000 LPD solar water heating system for cooking purpose.
- 2012 - KISS has installed 1000 KGPD organic waste based biogas plant.
- 2013 –Technical survey and estimate prepared for 500KWp rooftop solar power station.
- 2013 – KISS has set up 400KLD STP for waste water treatment for recycling and reuse.
- 2014 – 500 KW rooftop solar power station started functioning successfully.
- 2015 – Two more steam based kitchens installed for KISS-2 & KISS-3.
- 2015 – Solar lantern distribution program started for the State.
- 2016 – Another 50KWp solar power system added on rooftop of new higher education building of KISS-3.
- 2016 – KISS has set up 300 KLD Bio STP for new campus.

KISS's Renewable Energy Initiatives in rural communities Timeline:

- 2014 – An impact assessment study was made jointly by power Finance Corporation and SECI (Solar Energy Corporation of India) of solar power station at KISS. They were very happy and wanted to involve KISS in distribution of 50k solar lanterns in different interior village of Odisha.
- 2015 – Start of Solar Lantern distribution program by KISS throughout Odisha State to Non-electrified villages. Total 50,000 solar lanterns were distributed among villagers.

CO2 REDUCTION BY STEAM COOKING:

- FOOD QUANTITY / DAY: 19,750 Kg
- FUEL REQUIRED / DAY: 740 ltrs. Diesel and 97 Kg LPG
- CO2 Generated by cooking – 2700 Kg / day
- CO2 Otherwise Generated by Conventional Cooking process – 3950 Kg / day
- Reduction in CO2 emission -1250 Kg / day
- Total CO2 reduction since 2010 – 3000 ton

ENVIRONMENT CARE:

- Water recycled and reused by STP – 210,000,000 ltr.s / Year
- Rain Water Harvesting : Roof top rain water is channelized for recharging ground water level 45,00,000 ltr.s / year
- Initiative for Ecological Balance through plantations Integrated Farming Activities.
- Organic waste management and biogas generation.
- Awareness Campaign and Training to Students.
- CO2 Reduction by steam cooking, Solar water heating, biogas use and solar power use – 1486 tons / year.

DIFFERENT ROOFTOP INSTALLATIONS AT KISS:

	
Dining Area	**Academic building**
	
Boys hostel	**Vocational building**

SEWAGE TREATMENT PLANT:

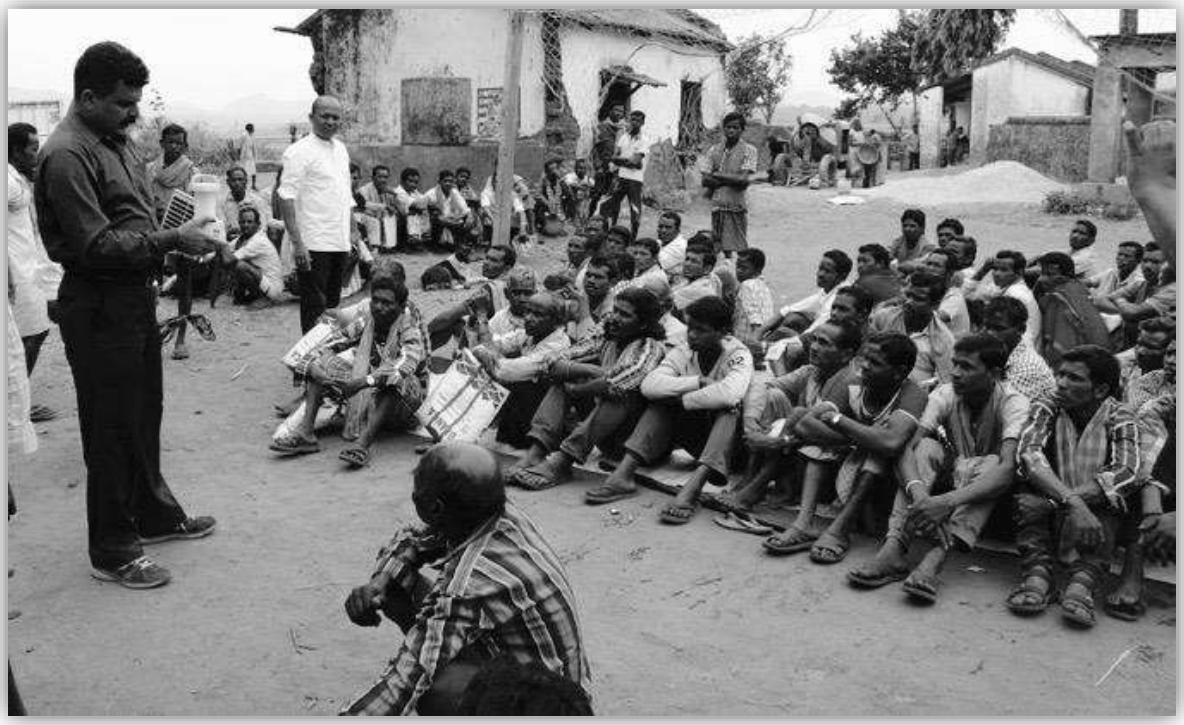
BIO GAS PLANT:

STEAM BASED COOKING:

SATELLITE CENTERS:

- We have 20 satellite centers in different districts of Odisha.
- In all centers we are adopting renewable energy technologies, farming and livelihood training programmes.
- Various vocational training programmes for students and their parents close to their communities. Satellite Center becomes nodal center.
- Contribution towards CO2 reduction and climate change goals will be achieved through these satellite centers in coming years.

Solar Lanterns distributions project by KIIS:



SOCIAL CONTRIBUTION TOWARDS A BETTER LIVING BY SOLAR LANTERNS:

- 50,000 households got benefits with an indirect benefit to 200,000 people.
- Energy conservation leading to less use of non-renewable resources.
- Awareness about cost effective renewable resources
- Multipurpose usage for everyday household activities including children's education.

Energy Conservation activities

Kalinga Institute of Industrial Technology , KIIT, deemed to be University has taken various measures and programmes for energy conservation and efficient utilization of energy source. In the year 2022 -23, a two day seminar on "Waste to Utility " was conducted on 5/12/2022-7/12/2022. Regularly many guest lectures on energy conservations are conducted by School of Electrical Engineering, campus 3. In these entire event more 80-90% participation both from students and faculties have participated. Other than that school is also conducting various energy audit programmes for effective utilization of various electrical

equipments.Insulation of the wires connecting the PV system.Old capacitors of ceiling fans are replaced with new capacitor in the laboratories, office rooms, hostel rooms.Slogans and banners are displayed in premises to create energy saving awareness.

Some of the activities are listed as below.

1.Talk series on "Energy security and Environmental concern" was conducted on 6th February 2023 by School of Electrical Engineering, KIIT deemed to be University. The talk was delivered by Dr. Sanath Kumar Saha, Hony Professor, Rani Rashmoni Green University, Government of West Bengal.

2. Group discussion on the topic"Energy for future" held on 12th Dec, 2022.

3.Two day workshop was conducted on “Role of Non-conventional energy for Sustainable development” on 11/09/2022 to 12/09/2022.

4.Webinar on Sustainable Energy was conducted on 15th January, 2023 at KIIT School of Electrical Engineering in hybrid mode.

KIIT School of Electrical Engineering (SOEE) organized a webinar on ‘Sustainable Mining’ recently. The webinar was inaugurated by Prof. Dr. B. K. Nayak, Dean, SOEE. Mr. Soumya Prakash Patra, General Manager & HOD, Electrical Department, NALCO, Angul.

5. **Plantation drive** was conducted to save nature on 3rd december 2022.Students from different branches participated in the drive.

6.Test series on Energy security and energy efficiency held on 20th Feb, 2023 at KIIT.

SUGGESTIONS AND RECOMMENDATIONS:

Water Management

The water sources are safe in terms of contamination. The students are taking back the food waste as per the zero waste management strategy of the college. It helped in reducing the consumption of water for washing.

The wells can be recharged with rainwater from rooftops of new building. The area of the rooftop is 33108.68m2 Approximately 102532 m3 of water can be harvested from the roof area of new building.

Rainwater for laboratory purposes – Construction of a 10000L rainwater harvesting tank can satisfy the need of laboratory, especially in distillation units where water lost as coolant. The rain water from harvesting tank can be used as source water as well as coolant for the distillation unit. The rain water can also be used as source for drinking water. The coolant water can be recycled through a separate plumbing system.

The capacity of distillation unit in the college is 1 L / hour. The amount of water used as coolant for 1L of distilled water is 60L. Annually, the unit require approximately 1500L of water as coolant and this much water can be saved with the construction of the harvesting tank.

The BMC club can arrange awareness programs for water conservation. There should be a proper monitoring of water consumption pattern in the campus. BMC can also conduct water quality monitoring during specific intervals. The canteen waste can also be subjected to aerobic composting by setting-up of few composting yards in the campus. This will provide a chance for the students to learn by seeing and operating such compost yards by them. Also a good practice of managing their own waste (from lunch box) instead of carrying them back home they can be trained in operating the compost yard ,by using their lunch time waste to produce good organic manure.

Energy management

The energy audit recommends to avoid the use of more energy consuming electrical appliances and to replace with more environment friendly and energy efficient appliances (for example five stars rated Air conditioner) in the college. The potential of renewable energy sources have to be explored.

All the campuses should be monitored by the IOT based energy monitoring system. All the electrical DB’s/Distribution boxes should be converted to smart DB’s.

As the college has a very large roof area for installing solar panels so that it can be effectively used for generating power. The college has started steps in installing the solar panels for office.

It is recommended to install the following solar powered appliances in the campus;

Solar powered water heater and cooker in the college canteen

Solar powered street lights and LED display board

Green Campus:

In order to increase the carbon credit and greenery of the campus, it is recommended to plant more indigenous and evergreen / fruit trees inside the campus.

Waste Management :

Try to avoid the use of plastic in the campus, and to encourage the use of biodegradable materials as alternatives. Try to achieve the goal of plastic free campus. Leaf litter from the campus can be effectively used for aerobic/ vermin composting, so that the composted material can also be used as good manure. Recycle the paper waste instead of incinerate or burning.