

Green Audit Report (Environment, Electrical, Energy & Fire safety) of KISS Campus-3

YEAR 2017-2018

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

Acknowledgement

M/S. ENER VISION places on record its sincere thanks to the KIIT 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 (KISS & KIIT Nodal Officer) & maintenance team for their excellent co-ordination and help during the Third Party Inspection of services & Electrical Installation on 18th January 2018 to 13th Feb 2018.

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 March, 2018



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



Audit Team:

Mr. Chinmoy Dutta: *B.E. Electrical & Certified Energy auditor from Bureau of Energy Efficiency (EA 0985), 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*

Pranav Derasari -*Electrical Engineer with 15 years of working experience, has varied experience in execution, Electrical Designing & project management.*

Mr, Prabhakaran – M.Tech Electrical Engineer

Vivek Kumar – *Electrical Engineer*

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)

F.no.17/05/ESCO/SS/07

15th April, 2015

M/s. Ener-vision
Flat No.-802, EMP-06,
Evershine Millennium Paradise,
Takur Village, Kandivali(E),
Mumbai-400101, Maharashtra

Sub: Empanelment of Energy Service Company (ESCO) with the Bureau of Energy Efficiency (BEE)

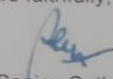
Sir,

This has reference to your application for re-empanelment/empanelment as an Energy Service Company with BEE in response to our advertisement for re-empanelment and fresh empanelment of ESCOs dated 12th February, 2015

Consequent to scrutiny and evaluation of your documents by SEBI accredited agencies CRISIL /CARE /ICRA in terms of the approved parameters for evaluation, we are pleased to inform that your company has qualified for empanelment with BEE as a **Grade 3** Energy Service Company (ESCO) .This empanelment would be valid thru 30th March, 2017. BEE has uploaded the list of all the empanelled ESCOs along with grading score assigned by CRISIL /CARE/ICRA on its website www.bee-india.nic.in for use by State/Central government/Public Sector agencies as well as by any other agency interested in implementing energy efficiency projects on performance contracting mode. Please acknowledge your acceptance to this letter.

Thanking You

Yours faithfully,


Sanjay Seth
Energy Economist

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

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4th Floor, Sewa Bhawan, R.K. Puram, New Delhi - 110 066 टेली / Tel : 26179699 (5 Lines) फैक्स / Fax : 91 (11) 26178352

Certification of the company



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Executive Summary:

Present status:

- In water management there is no meter to monitor the usage of water. Planning's for establishing new STP is in process.
- As the organic waste is used as feed stock for the animals, it is planning to construct a Bio gas digester in the campus.
- Usage of solar power by installing solar panels is limited to KISS campus-3 only and it is a on grid type.
- The quality of soil is good and the same has been tested in the lab and proved good.
- Plantation in the campus is very limited.
- Entire electrical system is healthy. Voltage variation were noticed. PF is little on lower side.

Areas to be improved:

- To stabilize the voltage entire electrical system of the university, need to be centrally monitored.
- Every place should have calibrated energy meter and old meters need to be calibrated.
- All the CFL, tube lights, metal halide lights should be replaced with LED energy efficient lights.
- Old inefficient AC's should be replaced with efficient AC's.
- Water consumption to be monitored by proper monitoring system and meters.
- There is huge scale of scope to enlarge the using of solar power.
- Circular has to be passed in the entire university to switch off the lights, AC,s PC's when not in use.

INTRODUCTION

About college -

Kalinga Institute of Social Sciences – KISS comprises of KISS foundation. KISS foundation is an NGO in India headquartered in Bhubaneswar Odisha. School, college and university is the educational wing of this initiative located at the intersection of food, education and empowerment.

Our aim is to break the vicious cycle of poverty and social isolation and to restore hope for a better future. We believe that every person has the right to access resources and opportunities in order to live and develop with dignity and to become an active and contributing member of our society.

KISS provides eco-friendly and green campus for the students. University gives higher education value in the fields of engineering, medicine, bio-technology, law and social sciences.

INFRASTRUCTURE DETAILS:

- **Administrative Building**
No. of floors- Ground + Three
Used for Admin officers and staff's cabins and working space. Conference halls & meeting rooms. KISS research labs.
- **Academic Building**
No of floors- Ground + Four
Consists of student's class rooms, labs, Faculty chambers & cabins, Library.
- **Library**
No of floors- Ground + One
- **Girls Hostel**
No. of floors- Ground + Four
1st floor to 4th floor- hostel rooms
Ground floor- Kitchen & Dining Area
- **Information Centre Building**

Note: Infrastructure has been the increased from the last financial year. As part of last year green audit recommendation gardens has been increased to improve the greenery of the university.

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 KISS University.

The specific objectives are:

1. To check the health of the electrical and electro-mechanical systems & equipment's.
2. To check the electrical & energy parameters and verifying with the design parameters.
3. To monitor the energy consumption pattern of the college.
4. Reviewing the campus with respect of fire safety.
5. To quantify the liquid and solid waste generation and management plans in the campus.
6. To assess the quality of the water and soil in each of the KISS campus.
7. To impart environment management plans to the college.
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 KISS University.
10. To impart environment management plans to the college.
11. To assess whether the measures implemented by each KISS Campus has helped to reduce the Carbon Footprint.

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 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 displeasing 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.

Electrical & Energy Auditing

To study & understand the health & energy efficiency of the equipment, quality of power used for the electro-mechanical installations and distribution systems of common utility like AC System, measurement of electro-mechanical parameters of the system and comparing the same against design parameter (standards if available) and also reviewing of the operation & maintenance of the buildings. Determine the adequacy, review the Systems & Procedures and recommend implementation strategies for further improvement of energy efficiency of the electrical & electro-mechanical systems at the KIIT university.

Fire Safety Auditing

A walkthrough the concerned premises. Review of the layout and drawings. Review of the existing firefighting systems in the premises. Review of the training and awareness regarding availability and operations of the firefighting systems in and across the organization.

WATER MANAGEMENT

Underground water is used in the KISS campus-3 which is pumping by 6 pumps. Purpose of water – Drinking (RO Plant), Kitchen, Bathrooms, Washrooms, Toilets & Gardening. Campus-3 is not having bore well. Pumps are directly pumping water to the overhead tanks of each building. Tanks on the hostel is having level sensor and is connected with three 6HP pumps operated in AUTO mode. Pumping of water to other buildings is done as per the requirement.

SL NO	PARAMETERS	Response	Remarks
1	Source of water	Underground/well	
2	No of underground tank	one	
4	Pumps & Water Meters	6 HP – 6 nos 1.5 HP – 1 nos Water meters are not installed	
6	Number of water tanks & Capacity	Hostel – 2 tanks (15000 Lit x 2 nos) Kitchen – 4 tanks (1000 lit x 4 nos) Academic & Admin – One tank each (15000 Lit x 1 nos each building) UGT – 1 lac Litre x 1 nos	
8	Quantity of water pumped every day	12000 L (approx.) No data is recorded.	Need to follow the ON/OFF timing instructions.
9	Any water wastage/why?	No Record. Globe valves in water pipes of each floor of all the buildings are absent.	Globe valves in water pipes of each floor of all the buildings are absent.
10	Water usage for gardening	20KL / day	
11	Waste water sources	Rest room, Bathrooms, kitchen	
12	Use of waste water	Gardening	
13	Rain water harvest available?	NO	
15	Any leaky taps	Nil (On inspection)	
16	Amount of water lost per day	No recorded data.	

SL NO	PARAMETERS	Response	Remarks
18	Any water saving techniques followed?	STP is under construction	

Water Quality assessment

Water samples from four different locations were collected and analyzed for its quality parameters. The major parameters analyzed include dissolved oxygen, acidity, alkalinity, chloride, hardness, pH, conductivity, total dissolved solids and salinity. The results are very good and are under the range.

SOIL QUALITY ASSESSMENT

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

Parameter	Location 1 (ground)
pH	7.2
Total Nitrogen (mg/kg)	2.5
Total organic carbon (%)	1.2
Phosphate (mg/kg)	0.2

SOLAR POWER PLANT

Solar power plant is installed in the campus-3 KISS. It has 75 KW rooftop solar plant. All the plants are fully functioning. Solar plants are well maintained and the generation units were recorded in the register. It is good to see that the present installed solar plant is meeting around 40% of the present energy consumption

WASTE MANAGEMENT

Waste management is important for an ecofriendly campus. In 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. The organic waste generated from this campus is used for livestock feed. In order to recycle the organic waste which is collected almost 180 KG per day one Bio gas plant is to be installed and the same is under construction.

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

GREENERY/PLANTATION

At present the plantation and the trees are very limited inside the campus. For fresh air and to decrease the pollutant particulates in the air the campus has to increase its plantation inside the campus. Using of day light in the buildings is very good. Especially in the academic block usage of daylight is excellent which helps in using the lights for a very limited hours.

CARBON FOOT PRINT

All the vehicles were parked outside of the campus gate. This helps to reduce the harmful emissions inside the campus.

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**

ELECTRICAL & ENERGY AUDIT:

Electrical System:

1. 3 / 1 Phase Voltage, any disturbance in supply Voltage.
Power quality was monitored in all the campuses main transformers LT panels incomer. 11kV line is step down to the 420 volts.
2. Load on each phase & Neutral, any abnormality in Voltage and current.
Load is uniformly distributed in all the three phases. There are still some ups and downs in the voltage profile.
3. Noise in neutral / Neutral to Ground Voltage
Noise in neutral is on lower side and is acceptable. last year recorded values.
4. Voltage and current Harmonic & Total harmonic distortions
Voltage and Current harmonics are little on higher side.
5. Power Factor is good.
6. Thermal Imaging of electrical system
Entire university is thermal scanned and found high temperatures locations which has been gradually serviced and now the temperature is normal and within the limit of 45 Deg C.
7. Review of Single line Power diagram.
At control rooms SLD is available and the same is verified and found OK.
8. Review of daily weekly and monthly checks and log sheet.
Checklist for the maintenance activity is introduced but need to follow the SOP for filling the checklist. Log sheet of daily energy consumption data is maintained. Complaint book is being maintained.
9. Safety review of the installed Electrical system.
RCCB's are installed but at some places they found bypassed and faulty which has been already replaced. MCB and other relays are installed.

HVAC system:

1. Inspect the AC's physical condition and its performances.
Physical conditions of AC indoor and outdoor is good. For old facilities AC's need to be upgradation.
2. Review of electrical parameters of AC machines.
All the electrical parameters like current, PF, KW and voltage are well within the limit of the rated parameters of the machine.
3. Review of service reports and analysis of the faults in the AC machines.
As for any issues in the AC machines inhouse maintenance team is resolving the issues. No record of servicing is recorded. Only the complaint register is maintained.
4. Review the performances of AC machines.
Performances of AC machines are good. But for some old AC units the efficiency has been reduced upto 10%.

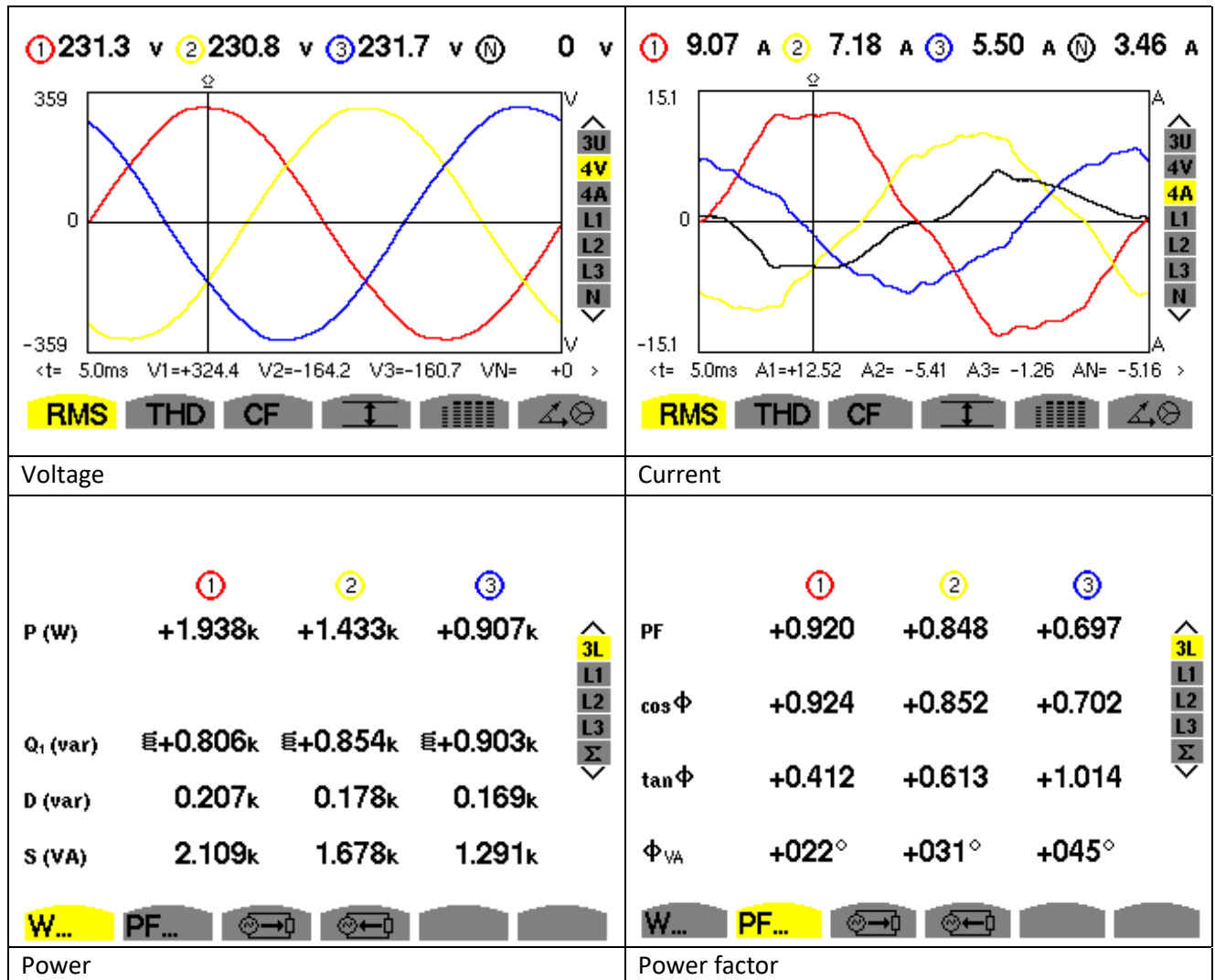
Analysis of the Electrical energy

1. Recording the energy consumption of each Panel incomers.
Last one year energy consumption data has been recorded and registered were maintained for tracking of consumption.
2. Analysis of the consumption of the units w.r.t to the load and time at incomers.
All the data has been analysed. There were places where the energy can be optimized.
3. Review of the Present Energy Measurement and Monitoring process exist.
Need to fine tune the method and tacking of the present energy consumption data recording method.

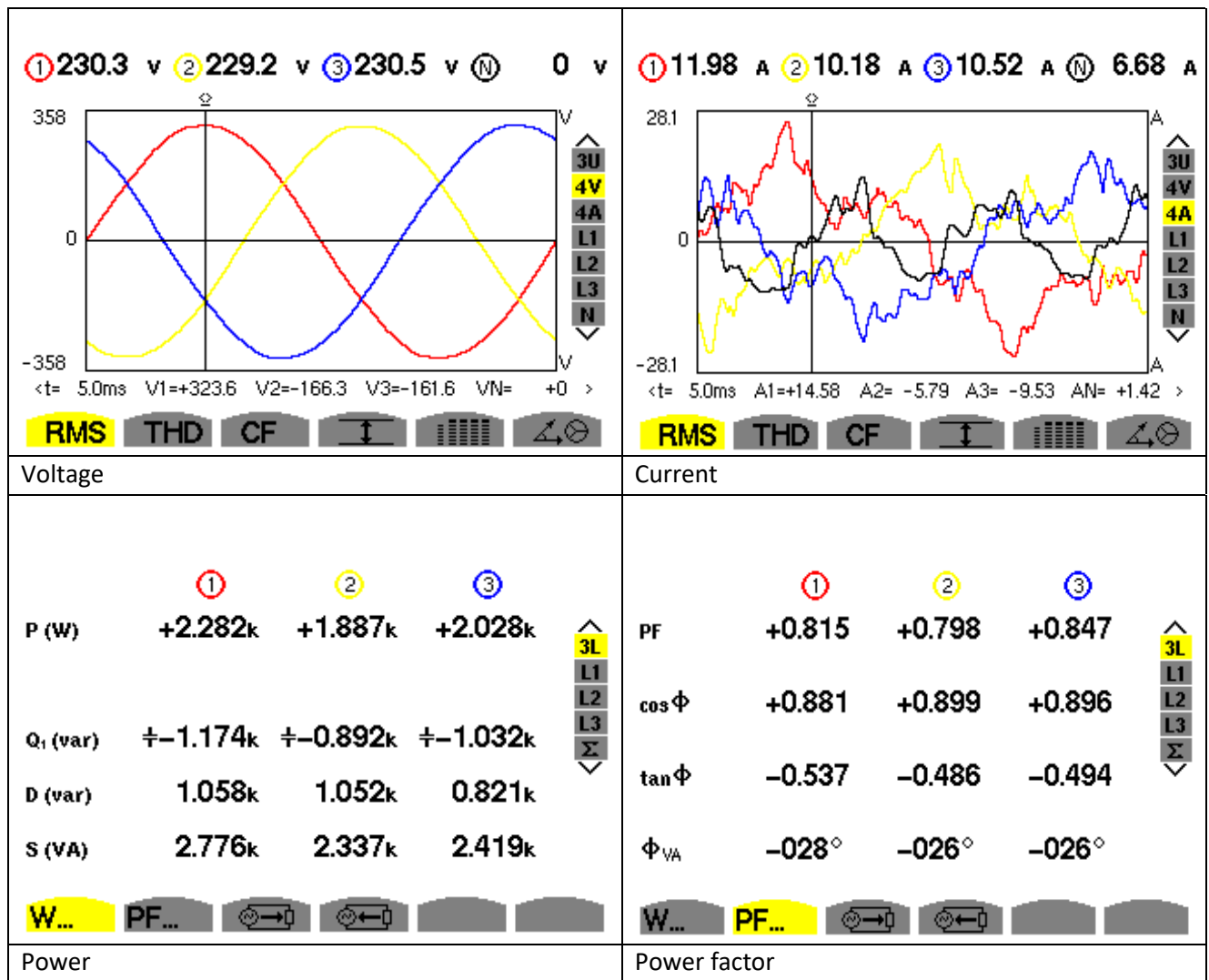
Power Quality:

Some of the Power Quality reports has been displayed in the report.

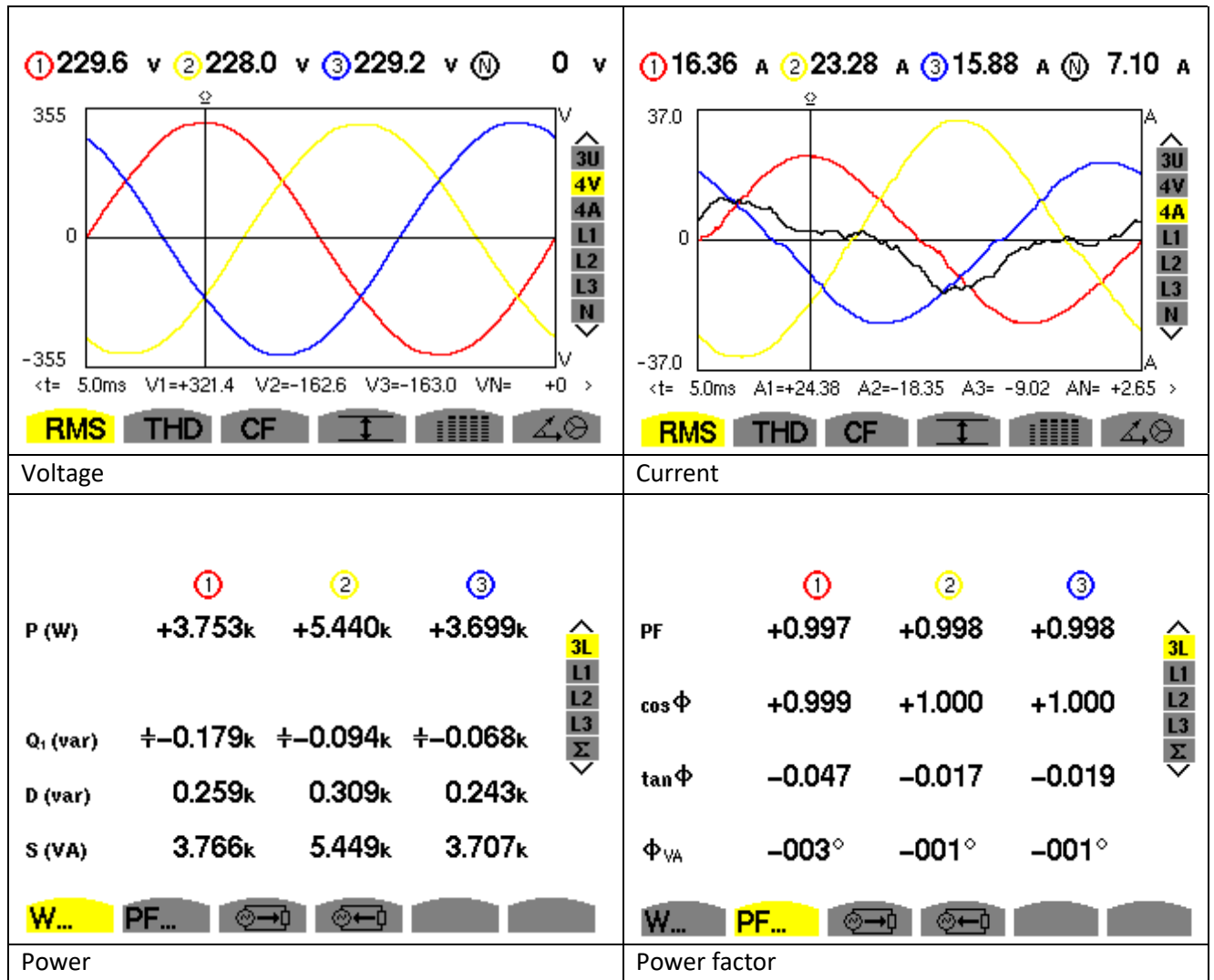
Screenshots during the recording session:



Screenshots during the recording session:



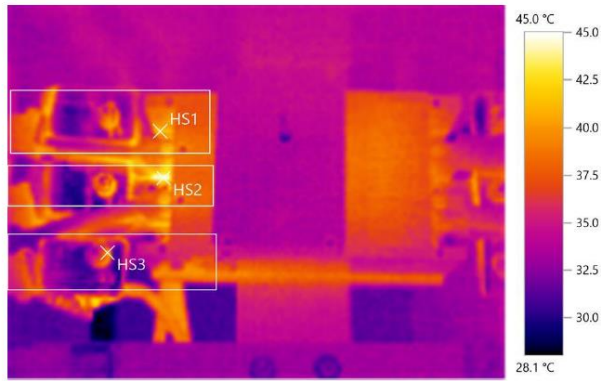
Screenshots during the recording session:



Thermal Report:

Control room Main LT Panel:

Academic MCCB feeder terminations:



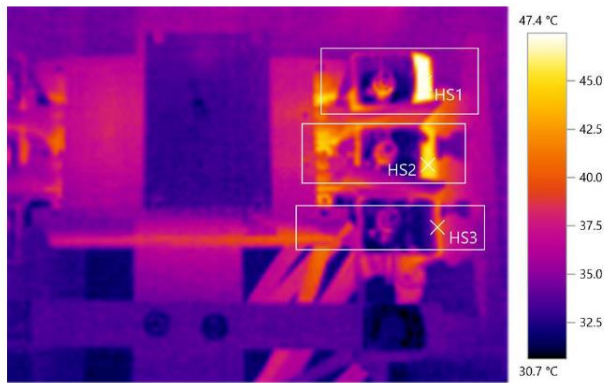
Picture parameters:

Emissivity: 0.95
Refl. temp. [°C]: 20.0

Picture markings:

Measurement Objects	Temp. [°C]	Emiss.	Refl. temp. [°C]	Remarks
Hot spot 1	41.3	0.95	20.0	Temperature found at B phase
Hot spot 2	45.0	0.95	20.0	Temperature found at Y phase
Hot spot 3	40.3	0.95	20.0	Temperature found at R phase

Hostel feeder no-21 MCCB feeder:



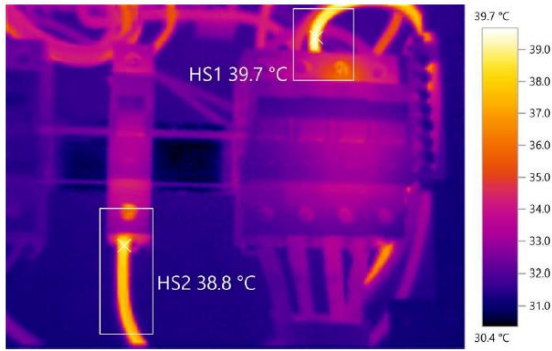
Picture parameters:

Emissivity: 0.95
 Refl. temp. [°C]: 20.0

Picture markings:

Measurement Objects	Temp. [°C]	Emiss.	Refl. temp. [°C]	Remarks
Hot spot 1	47.4	0.95	20.0	Temperature found at B phase
Hot spot 2	45.7	0.95	20.0	Temperature found at Y phase
Hot spot 3	40.7	0.95	20.0	Temperature found at R phase

AC DB admin building:



Picture markings:

Measurement Objects	Temp. [°C]	Emiss.	Refl. temp. [°C]	Remarks
Hot spot 1	39.7	0.93	19.0	Temperature recorded at termination
Hot spot 2	38.8	0.93	19.0	Temperature recorded at termination

Remarks: Temperature recorded is normal.

NOTE: All the heating issues has been resolved by the maintenance team and now the temperature at hotspots is less than 45 Deg C which is normal.

FIRE SAFETY:

Overall, the campus found healthy and free from fire threats. Fire extinguishers are installed in each building.