NEW HORIZON
COLLEGE OF ENGINEERING

ENVIRONMENTAL IMPACT

Energy Conservation Report

Link - Refer P.No: 50 to 67
https://newhorizoncollegeofengineering.in/wp-content/uploads/2025/03/NHCE_Sustainability-report.pdf

GREEN AUDIT AND QUALITY AUDIT REPORT

ON

WATER AUDIT, ENERGY AUDIT,

WASTE MANAGEMENT AUDIT,

GREEN CAMPUS MANAGEMENT AUDIT

AND ENVIRONMENT AUDIT

OF

NEW HORIZON COLLEGE OF ENGINEERING

BELLANDUR MAIN ROAD, NEAR MARATHAHALLI,

BENGALURU – 560 103

2023-24

NEW HORIZON
COLLEGE OF ENGINEERING
New Horizon Knowledge Park, Ring Road, Marathalli
Autonomous College Permanently Affiliated to VTU, Approved by AICTE & UGC
Accredited by NAAC with 'A' Grade. Accredited by NBA

ECO ENERGIME ENGINEERS LLP

ENHANCING RESOURCE EFFICIENCY

GREEN AUDIT AND QUALITY AUDIT REPORT

OF

NEW HORIZON COLLEGE OF ENGINEERING

BELLANDUR MAIN ROAD, NEAR MARATHAHALLI,

BENGALURU – 560 103

2023-24

FOR MORE INFORMATION

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ACKNOWLEDGEMENTS

We are thankful to the management of **New Horizon College of Engineering, Bengaluru,** for the support, guidance and, giving us the opportunity to be involved in this very interesting and challenging assignment.

We would be happy to provide any further clarifications, if required, to facilitate the implementation of the recommendations.

We received full co-operation and support from the concerned personnel/ staff members of the college. They took key interest and gave valuable inputs during the course of study. We would like to thank:

Chairman – New Horizon Educational Institutions, Bangalore

And other Staff in personnel who have given full co-operation and support. They took a keen interest and gave valuable inputs during the course of study.

Certificate

This is to certify that M/s. Eco Energime Engineers LLP, Bengaluru has conducted **Green Audit** and **Quality Audit** that comprises of **Water Audit, Energy Audit, Waste Management Audit, Green Campus Management Audit, and Environment Audit** of **"New Horizon College of Engineering, Bengaluru"** during the **November 2023 to October 2024**.

The audit involves field visit, measurements and observations, verification of bills, log books, data base, maintenance registers and interview with staffs, and this gives an overview of the existing system. In an opinion and to the best of our information and according to the information given to us, said Quality Audit gives a true and fair view in conformity with auditing principles.

For Eco Energime Engineers LLP

Authorized Signatory

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Smart Solutions for
Sustainable Tomorrow **Eco Energime Engineers LLP**

EEELLP ACKNOWLEDGEMENT

EEELLP Team thanks the Management of **New Horizon College of Engineering, Bengaluru** for assigning this interesting work to us. We appreciate the cooperation extended to our team during the entire process.

Our special thanks to **The Registrar – Mr H N Suryaprakash & Team of colleagues** for giving us necessary support and inputs to carry out this very vital exercise.

We would like to thank Principal, the Head of Departments and staff members who were actively involved while collecting the data and conducting field measurements.

For Eco Energime Engineers LLP

Authorized Signatory

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DISCLAIMER

The audit team has prepared this report for **New Horizon College of Engineering, Bengaluru** based on input data submitted by the representatives of College complemented with the best judgment capacity of the expert team.

While all reasonable care has been taken in its preparation, details contained in this report have been compiled in good faith based on information gathered.

It is further informed that the recommendations are arrived following best judgments and no representation, warranty or undertaking, express or implied is made and no responsibility is accepted by Audit Team in this report or for any direct or consequential loss arising from any use of the information, statements or forecasts in the report.

For Eco Energime Engineers LLP

Authorized Signatory

5. ENERGY AUDIT

5.1. Facility Description

New Horizon College of Engineering, Bellandur campus receives power supply from the state electricity board (BESCOM – Bangalore Electricity Supply Company Limited) S7 Murgeshpalya at HT 11 kV. NHCE has availed power supply, with connection – RR. No 6083066719 (S7HT7) with 1HT2C2 tariff.

Incoming power supply from BESCOM is received at the transformer yard inside the college premises. The 11 kV rated HT power supply is stepped down to LT 433V, by one number of 500 kVA rated transformer. Transformer unit installed inside college premises is as shown in the figure 5-1.

Figure 5-1: Transformer unit Installed in the campus

The name plate details of transformer are given in table 4-1.

S. No.	Description	Units	Details
1	Rated Capacity	kVA	500
2	Rated Voltage Prim/Sec	kV	11/0.433
3	Rated Current Prim/Sec	A	2.6-24/6.66-64
4	Type of Cooling	-	ONAN
5	Frequency	Hz	50
6	Impedance	-	4.48%

S. No.	Description	Units	Details
7	Phase	-	3
8	Make	-	Kiran Power Rectification Services (P) Ltd. (KPRS)

Table 5-1: Name plate details of transformer

The LT supply from the transformer is taken to the main distribution panel located inside the Electrical panel room near the transformer yard. Electrical panel room is as shown in the figure 5-2. One number of 400 kVAr rated capacitor bank have been installed at the main incomer panel for power factor improvement.

Figure 5-2: Electrical panel Room

Figure 5-3: APFC panel

Power supply cables from the electrical panel room is distributed to the various distribuition panels placed inside the blocks. From the main LT sub-station panel room, power supply is catered to individual blocks. There is an feeder pillar installed near the NSB block. From this feedar pillar the power is supplied to SVP block, NSB block, RC block and JKR block. For all the other remaining blocks, the power is supplied directly from the LT sub-station panel room. Figure 5.4 shows the feeder pillar near the NSB block. The electrical panels located in various blocks sample pictures are given in figure 5.5.

Figure 5-4: Feeder Pillar near NSB block

Figure 5-5: Electrical distribution panels in various blocks

Two numbers of DG (Diesel Generator) sets are used for backup power supply, during power failure from BESCOM. DG set installed at the college premises is shown in the figure 5-6. The name plate specification rating of the DG set is shown in the table 5-2.

Figure 5-6: Diesel Generator (DG) sets

S. No.	Description	Unit	DG # 1	DG # 2
1	Rated Capacity	kVA	500	250
2	Rated voltage	Volts	415	415
3	Rated current	Ampere	696	347.8
4	Frequency	Hz	50	50
5	Power factor	-	0.80	0.80
6	Rated Demand	kVA	500	250
7	Rated Power	kW	400	200
8	Make	-	Caterpillar	Leroy Somer

Table 5-2: DG set specifications

5.1.1. Tariff Structure

The sanctioned contract demand of the campus is 475 kVA at specified voltage of 11 kV. Electricity supply from BESCOM is billed under 1HT2C2 schedule of tariffs. The tariff includes demand charges of Rs. 240 per kVA, and energy charges of Rs.8.20 per kWh.

The kVA demand charges @ Rs. 240/kVA of maximum demand recorded during the month or 85% of the contract demand, whichever is higher

5.1.2. Electricity Consumption Data

Details of electricity consumption for the last two years have been collected and Salient features of electrical energy details are given in table 5-3.

S. No.	Description	Unit	Details
1	Contract Demand	kVA	475
2	Demand Charges	Rs./kVA	240
3	Maximum Demand Recorded during last three years	kVA	446
4	Average Monthly Energy Consumption during last three years	kWh	87057.53
5	Average System Power Factor		0.987
6	Average Energy Charges considered for savings calculations	Rs./ kWh	9.73

5.1.3. SRTPV (Solar Roof Top Photo Voltaic) system

SRTPV (Solar Roof Top Photo Voltaic) system was installed at the terrace of SVP (Mechanical) block and in NSB block. The capacity of SRTPV installed in SVP block is of **25 kWp** rated and the capacity of SRTPV installed in NSB block is of **5 kWp** rated.

The SRTPV is off-grid system type with battery backup. During the audit, photo of SRTPV systems are collected and is shown in figure 5-8 and figure 5-9.

Figure 5-8: Solar rooftop PV system installed in SVP block

Figure 5-9: Solar rooftop PV system installed in NSB block

The solar power generated from **25 kWp** system installed in the SVP block is consumed by the electrical loads in the SVP block only. The 5 **kWp** system installed in NSB block supplies power to NSB block lighting loads.

The SRTPV system panels are well maintained and cleaned on regular basis. To remove the dust accumulated on the solar panel cells, pressurized water system is used for cleaning. The picture of the pressurized water cleaning system is given in figure 5.10.

Figure 5-10 Pressurized water cleaning for SRTPV systems

5.2. Measurements & Observations

Main LT incomer of Campus

The power parameters were observed at main LT incoming panel. The parameters such as incoming voltage, variation in load current, kW, kVA, kVAr, power factor and frequency were monitored from the existing meter installed in the main incomer panel. Summary of observed power parameters at the main LT incoming supply panel during typical working day is given in table 5-4.

S. No.	Description	Phase	V	I	kW	kVA	kVAr	PF	Hz
1	Main LT Incomer	R	241.0	368.0	86.9	88.7	17.6	0.98	49.9
		Y	244.0	371.0	89.6	90.5	12.8	0.99	49.9
		B	243.6	382.0	92.1	93.1	13.1	0.99	50.0
					268.7				

Table 5-4: Power parameters at main incomer panel room

The UPS power is supplied to computers and server loads. Each block has separate UPS system. Table 5.5 gives the list of UPS system available in each block and its rated capacity.

S. No.	Block	Capacity, kVA	Quantity, Nos.
1	Sub-station	15	2
2	Sub-station	3	1
3	SHK Block	20	1
4	SHK Block	15	1
5	SHK Block	3	1
6	SHK Block	3	1
7	SV Block	3	1
8	SV Block	3	1
9	SV Block	3	1
10	Library	30	1
11	Library	10	1
12	NSC Block	30	1
13	NSC Block	30	1
14	NSC Block	30	1
15	NSC Block	30	1
16	NSC Block	15	1
17	NSC Block	12.5	1
18	NSC Block	10	1
19	NSC Block	10	1
20	NSC Block	10	1
21	NSC Block - Solar	5	1
22	Auditorium	3	1
23	SMV	3	1
24	SMV	3	1
25	SBC Block	15	1
26	SBS Block	3	1
27	RC Block	3	1
28	JKR Block	5	1
29	SVP Block	25	1
30	CSB Block	15	1
31	CSB Block	5	1
32	CSB Block	100	1
33	CSB Block	5	1
34	Main Gate	1	1
35	Main Gate	2	1

S. No.	Block	Capacity, kVA	Quantity, Nos.
36	SVP Block	20	2
37	SVP Block - Solar	25	1
38	Store	1	1

Table 5-5: List of UPS and its rated capacity

Note: ***As part of regular practice the inverters and batteries are always kept in a separate room and electrical panel rooms are separate.***

5.3. Best Practices Implemented for Energy Conservation

During the study, observations were carried out on the usage of the inventories in the college building premises. In the intension of saving the electricity, various measures have been adopted in the college. Computers and AC units are used only during the working hours, after completion of class hours – fans, lights, computers and AC units are found to be turned OFF. This practice is followed across the college premises (class rooms, labs, staff rooms, office rooms, library and auditoriums).

5.3.1. Day-light Integration:

During the audit phase classrooms, Staff-rooms, computer lab, seminar hall, UPS & batteries room and library areas were surveyed for illumination levels and fresh air-circulation. It was observed most of the rooms are well ventilated and day-light integrated; sample photos are shown in figure 5-11 and figure 5-12.

Figure 5-11: Well-ventilated and day-light integrated rooms

Figure 5-12: Well-ventilated and day-light integrated Staff room and class room

5.3.2. Installation of LED lights

Many of the FTL in all the blocks of the campus are replaced with LED lights. LED tube lights are used in the class rooms, staff-rooms, corridors, hostel, dining area, building façade lighting and in the library area. Sample photo of LED lamp used in the some of the location of the college area are shown in figure 5-13.

Figure 5-13: Use of LED lights

The cost savings by installation of LED lights are given in table 5-6.

S. No.	Description	Unit	Values
1	Rated Wattage of LED lamps installed	W	20
2	Quantity of LED lamps installed	Nos	2513
3	Rated wattage of lamps used earlier	W	40
4	Savings per lamp by installation of LED lamps	W	20
5	Total savings	kW	50.26
6	Working hours per day	hours	8
7	No. of working days per year	days	250
8	Annual electricity savings	kWh	100520
9	Average electricity cost	Rs./kWh	9.73
10	Annual cost savings achieved per year	Rs. lakh/year	9.78
11	CO2 mitigations per year	Tons/year	85.44

Table 5-6: Annual cost savings by installation of LED lights

5.3.3. Installation of VRV and Inverter AC Systems

The conventional air cooled AC units are replaced with energy efficient VRV and Inverter type AC units. Purchase bills of energy efficient AC units are reviewed during the study and sample bill copy is given in figure 5-14 and figure 5-15.

Figure 5-14: VRV Air Conditioning Unit

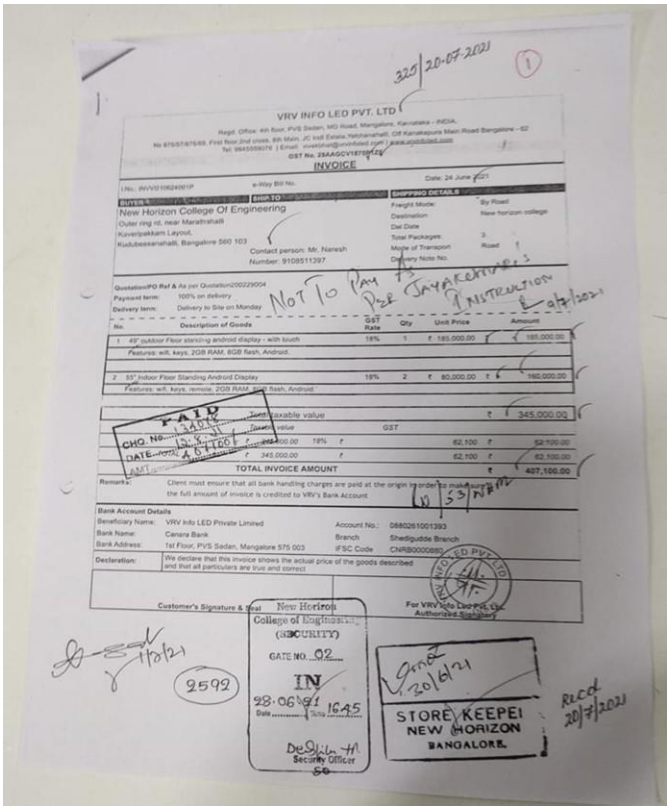


Figure 5-15: VRV Air Conditioning Unit – Purchase Invoice

The cost savings by installation of energy efficient VRV and inverter-based AC Units are given in table 5-7.

S. No.	Description	Unit	Values
1	Rated Tonnage of AC units installed	TR	50
2	SEC of VRV AC units	kW/TR	1.2
3	SEC of Conventional air cooled AC units	kW/TR	1.8
4	Difference in SEC	kW/TR	0.6
5	Savings due to installation of VRV AC units	kW	30
6	Realizable savings @60%	kW	18
7	Working hours per day	hours	2
8	No. of working days per year	days	250
9	Annual electricity savings	kWh	9000
10	Average electricity cost	Rs./kWh	9.73
11	Annual cost savings achieved per year	Rs. lakh/year	0.88
12	CO2 mitigations per year	Tons/year	7.65

Table 5-7: Annual cost savings by installation of LED lights

5.3.4. Installation of Solar Water Heater

Solar water heaters are installed in boys and girls hostel for generating hot water. Sample photo of solar water heater used in the college area are shown in figure 5-16.

Figure 5-16: Use of Solar Water Heater

The cost savings by installation of solar water heater are given in table 5-9.

S. No.	Description	Unit	Values
1	Solar water heater installed	L	5000
2	Total amount of heat produced	kCal/hr	150000
3	Electricity equivalent	kWh	174.4186
4	No. of working days per year	days	250
5	Annual electricity savings	kWh	43604.65
6	Average electricity cost	Rs./kWh	9.73
7	Annual cost savings achieved per year	Rs. lakh/year	4.24
8	CO2 mitigations per year	Tons/year	37.06

Table 5-9: Annual cost savings by installation of LED lights

5.3.5 Procurement of LED/LCD monitors

LED/LCD monitors are used for all the desktop computers in staff rooms and in computer labs. Sample photos of the computer labs are as shown in the figure 5-17.

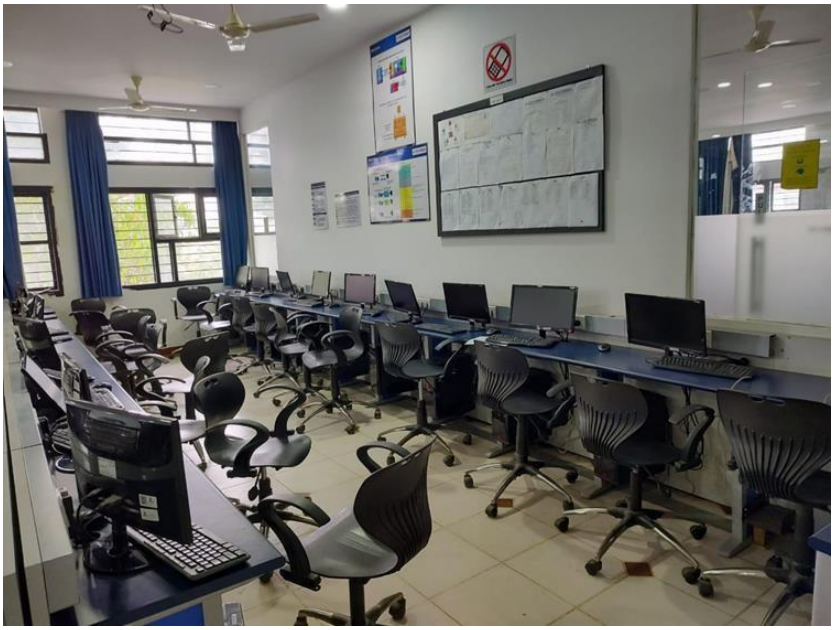
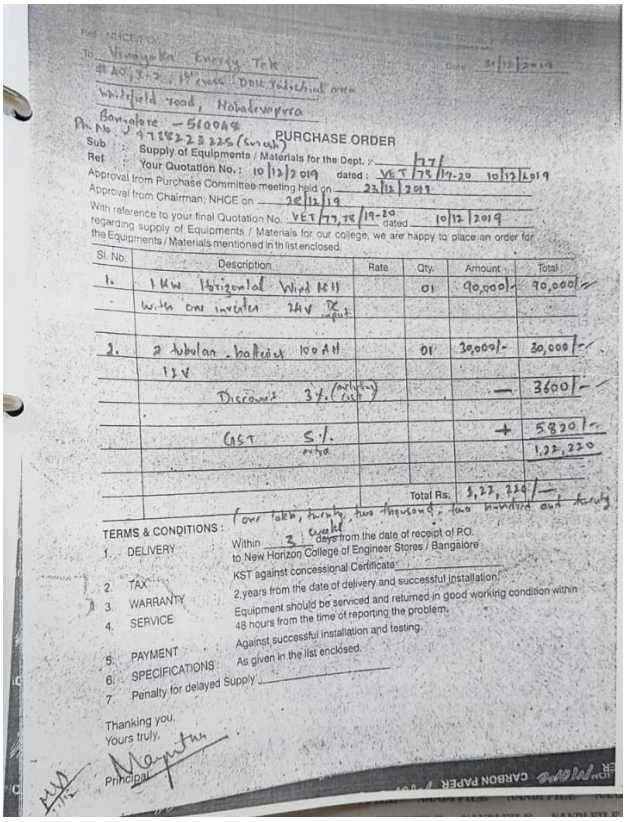


Figure 5-17: Use of LED monitors in the computer labs

5.3.5. Micro wind mill

Micro wind mill was installed in the terrace of SVP block which is of 1 kW. The power generated from this wind mill is used for illuminating the lights in the class rooms and two number of street lights during night time. Figure 5-18 shows the picture of wind mill installed in SVP block. Purchase order of the wind mill is as shown in the figure 5-19.

Figure 5-18: Micro wind mill installed in SVP block



PURCHASE ORDER

To Vinayaka Energy Tek
#20, 1st cross, DRK Technical area
Whitefield road, Mahadevapura
Bangalore – 560048
Ph No. : 9738828226 (Suresh)

Sub : Supply of Equipments / Materials for the Dept. : ET
Ref : Your Quotation No. : 10/12/2019 dated : VET/78/19-20 10/12/2019
Approval from Purchase Committee meeting held on 23/12/2019
Approval from Chairman, NHCE on 26/12/19

With reference to your final Quotation No. VET/77,78/19-20 dated 10/12/2019 regarding supply of Equipments / Materials for our college, we are happy to place an order for the Equipments / Materials mentioned in th list enclosed.

Sl. No.	Description	Rate	Qty.	Amount	Total
1.	1 Kw Horizontal Wind Mill with DOL inverter 24V DC input		01	90,000/-	90,000/-
2.	2 tubular batteries 100 AH 12V		01	30,000/-	30,000/-
	Discount 3% (on list cost)			—	3600/-
	GST 5% extra			+	5820/-
					1,22,220
			Total Rs.		1,22,220/-

Rupees one lakh, twenty two thousand, two hundred and twenty

TERMS & CONDITIONS :

1. DELIVERY : Within 3 days from the date of receipt of PO to New Horizon College of Engineer Stores / Bangalore
2. TAX : KST against concessional Certificate
3. WARRANTY : 2 years from the date of delivery and successful installation.
4. SERVICE : Equipment should be serviced and returned in good working condition within 48 hours from the time of reporting the problem.
5. PAYMENT : Against successful installation and testing.
6. SPECIFICATIONS : As given in the list enclosed.
7. Penalty for delayed Supply : _____

Thanking you,
Yours truly,
Principal

CARBON PAPER

Figure 5-19: Micro wind – Purchase Order

5.3.6. Usage of Sign boards

There were Sign boards stating ‘Switch off the lights and fans when not in use’ and ‘Save Energy’ posted in class rooms, staff-rooms, labs, libraries hostels and corridors. Sample picture taken during walk through is shown in the figure 5-20.

Figure 5-20: Sign boards to save energy

1.1.1. Complaints and Maintenance Register

There is a systematic process is in place for complaints and maintenance monitoring. The complaints are sent by email and recorded manually in the log register. Once the complaint is attended and fixed, manual sign of completion is obtained from the person raised the complaint and then the complaint gets closed in the register. The pictures of the complaint and maintenance register are shown in figure 5.21.

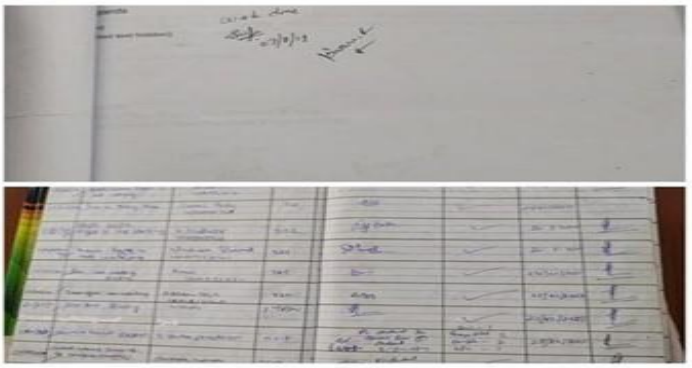


Figure 5-21: Complaints and Maintenance Register

1.2. Recommendations for Energy Audit

- Conduct training and awareness programs on energy conservation
- Demand optimization
- Replacement of conventional FTL lamps with energy efficient LED lamps in phased manner, as part of procurement practice
- Replacement of conventional fans with energy efficient fans in phased manner, as part of procurement practice.
- Installation of SRTPV (Solar Roof Top Photo Voltaic) system

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