7.1.2 The Institution has facilities for alternate sources of energy and energy conservation measures

1. Solar Energy
2. Biogas plant
3. Wheeling to the grid
4. Sensor- based energy Conservation
5. Use of LED bulbs/ power efficient equipment

NEW HORIZON
COLLEGE
MARATHAHALLI
Permanently Affiliated to Bengaluru North University,
Recogaized by the Govt. of Karnataka Recognized under section 2 (f) of the UGC Act, 1956
Accredited by NAAC with 'A' Grade

GEO TAGGED PHOTOGRAPHS

Institution has facilities for alternate sources of Energy

- Alternate source of Energy
- Solar Plant, Wind Energy
- Energy Conservation Measures
- Led Bulb , sensory based energy

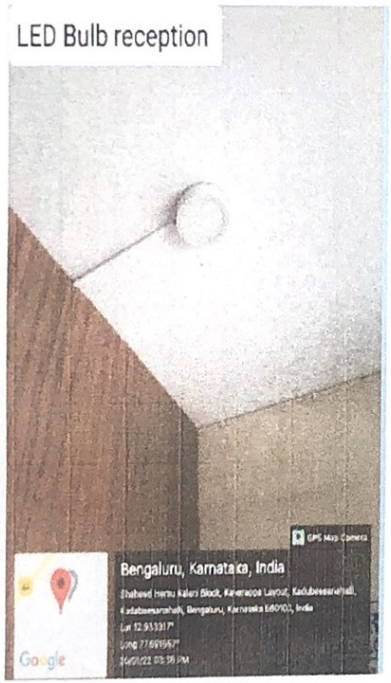
NEW HORIZON COLLEGE

MARATHAHALLI

Permanently Affiliated to Bengaluru North University,
Recognized by the Govt. of Karnataka Recognized under section 2 (f) of the UGC Act, 1956
Accredited by NAAC with 'A' Grade

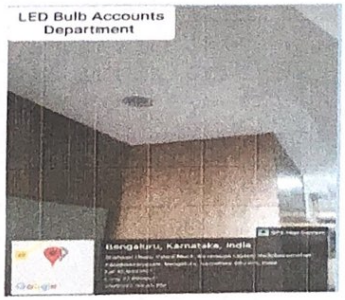
LED

LED Bulb reception

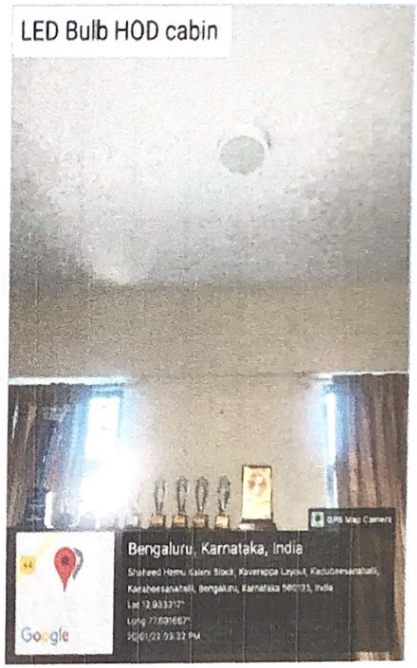


LED Bulb administration

LED Bulb Accounts Department



LED Bulb HOD cabin

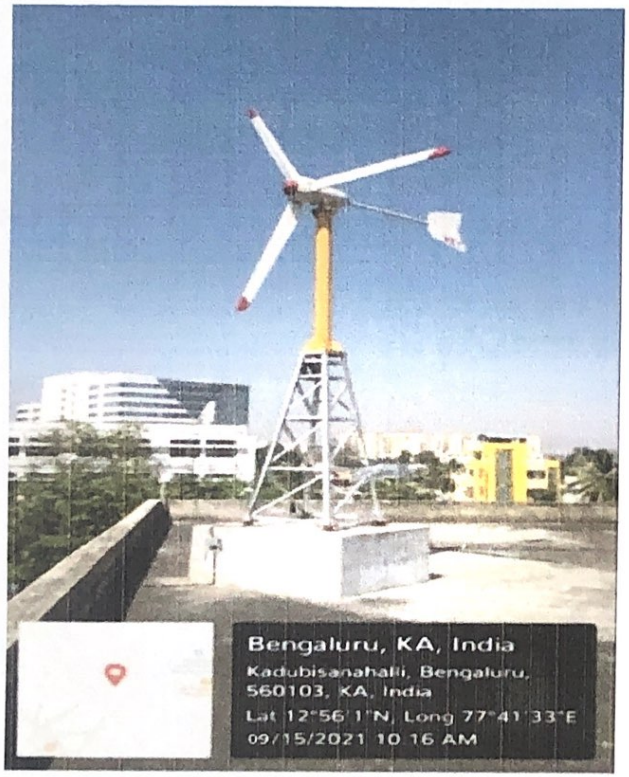


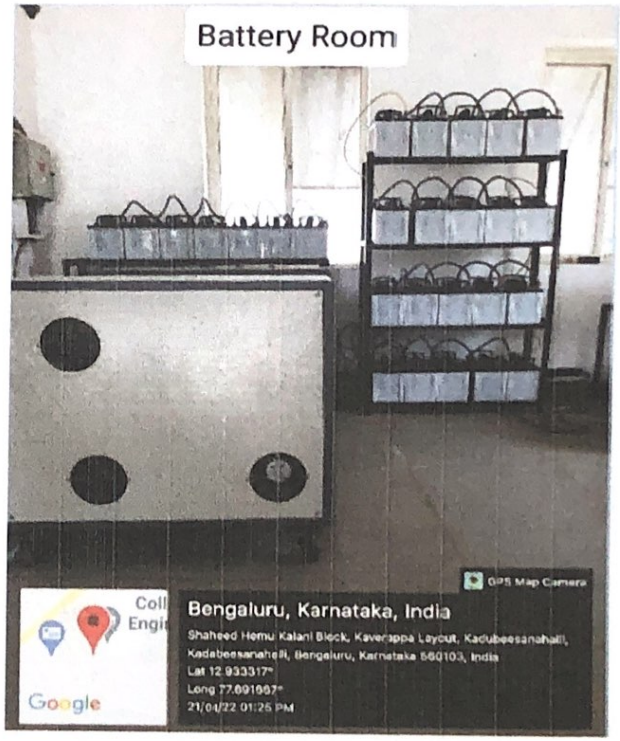
NEW HORIZON COLLEGE

MARATHAHALLI

Permanently Affiliated to Bengaluru North University.
Recognized by the Govt. of Karnataka Recognized under section 2 (f) of the UGC Act, 1956
Accredited by NAAC with 'A' Grade

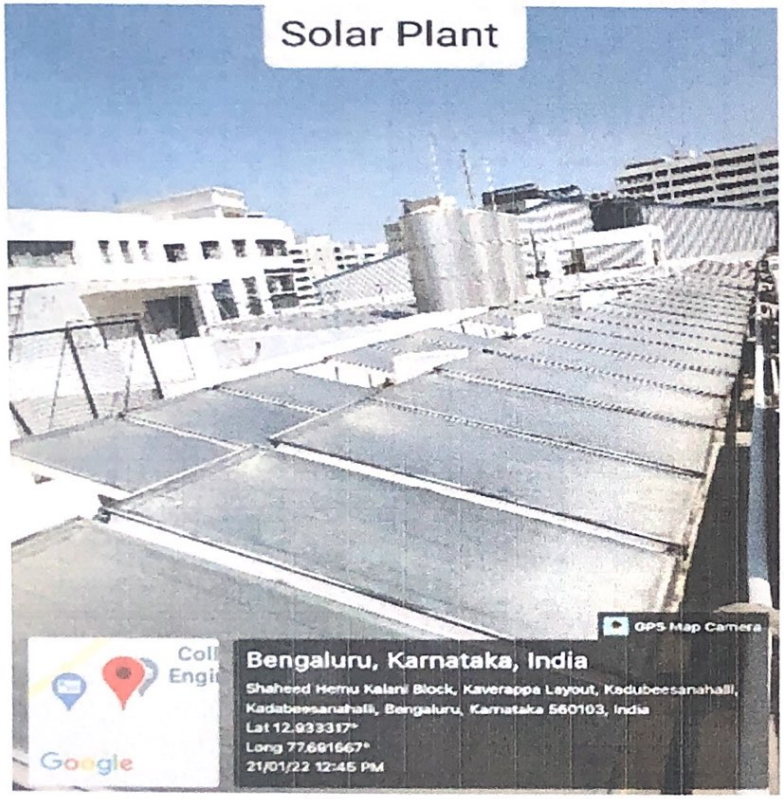
Wind Power & Battery room

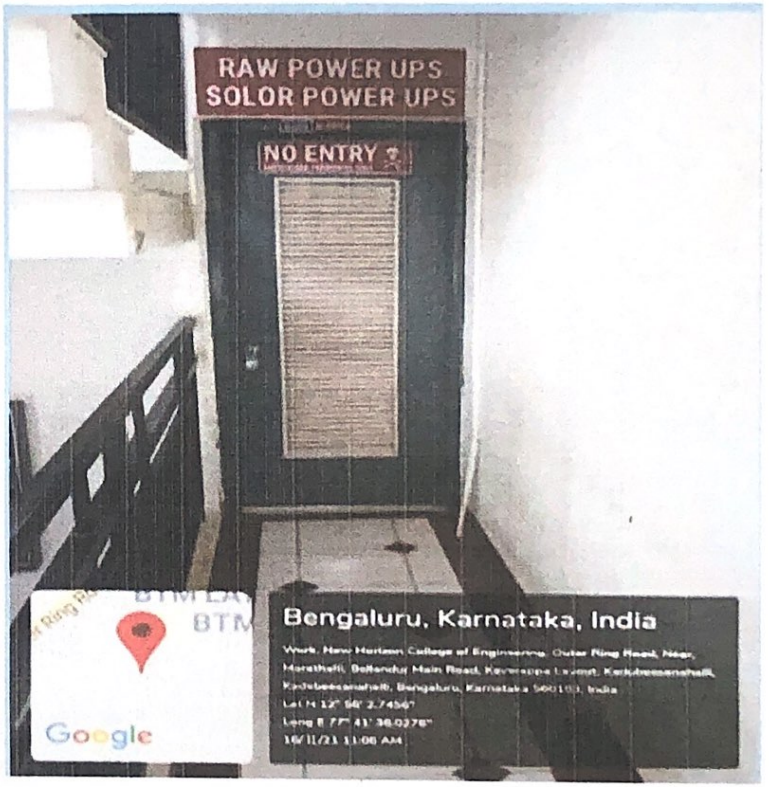




NEW HORIZON
COLLEGE
MARATHAHALLI
Permanently Affiliated to Bengaluru North University,
Recognized by the Govt. of Karnataka Recognized under section 2 (f) of the UGC Act, 1956
Accredited by NAAC with 'A' Grade

Solar Power





NEW HORIZON COLLEGE

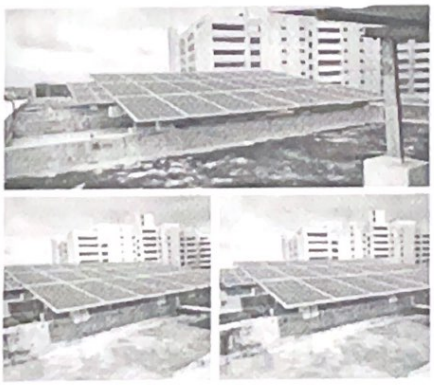
MARATHAHALLI

Permanently Affiliated to Bengaluru North University,
Recognized by the Govt. of Karnataka Recognized under section 2 (f) of the UGC Act, 1956
Accredited by NAAC with 'A' Grade

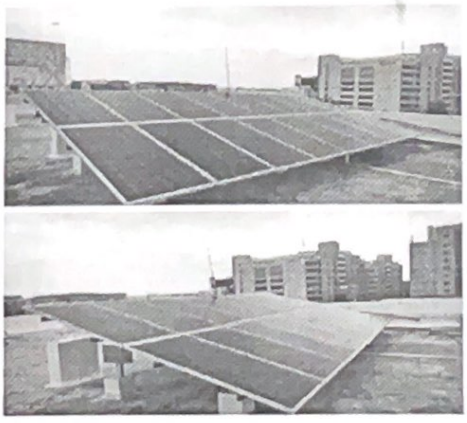
SRTPV (Solar Roof Top Photo Voltaic) system

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 a[illegible]d figure 5-9.



ure Solar rooftop PV system installed in SVP block



Solar rooftop PV system installed in NSB l[illegible]k

Principal
NEW HORIZON COLLEGE
Ring Road, Bellandur Post,
Bangalore - 560 103.

NEW HORIZON
COLLEGE
MARATHAHALLI
Permanently Affiliated to Bengaluru North University,
Recognized by the Govt. of Karnataka Recognized under section 2 (f) of the UGC Act, 1956
Accredited by NAAC with 'A' Grade

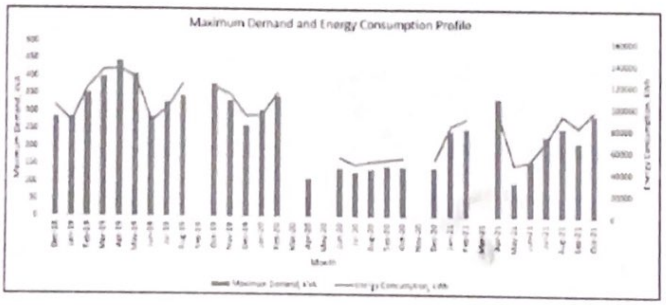
Electricity Consumption Data

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

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

Electricity Bill Parameters

Figure indicates the month wise recorded maximum demand and month wise energy consumption of the college campus for the last three years (Dec 2018 to Oct 2021).



Month wise Recorded Maximum Demand and Energy Consumption

From the maximum demand curve, it was observed that maximum demand registered during the month of March 2020 was found to be 446 kVA and is the peak demand during the last three years of billing period. Average of registered maximum demand during December 2018 to October 2021 is 349.33 kVA.

From the month wise energy consumption profile, it was observed maximum energy consumption was registered during April 2019. Average monthly energy consumption is 10,66,751 kWh.

Principal
NEW HORIZON COLLEGE
Ring Road, Bellandur Post,
Bangalore - 560 103.

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 The name plate specification rating of the DG set is shown in the table

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

DG set specifications

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

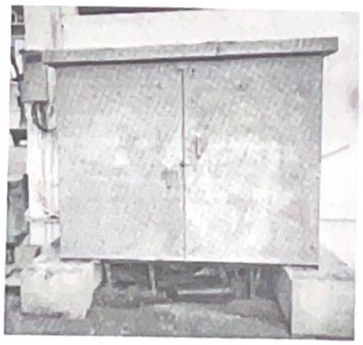
Principal
NEW HORIZON COLLEGE
Ring Road, Bellandur Post,
Bangalore - 560 103.

NEW HORIZON COLLEGE

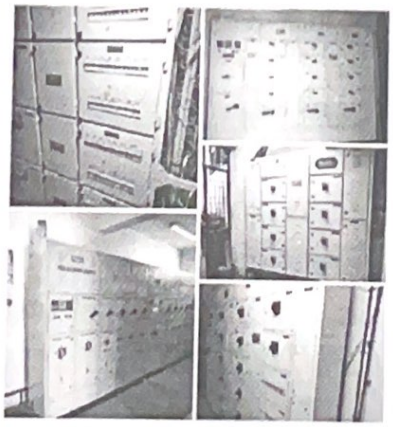
MARATHAHALLI

Permanently Affiliated to Bengaluru North University,
Recognized by the Govt. of Karnataka Recognized under section 2 (f) of the UGC Act, 1956
Accredited by NAAC with 'A' Grade

Power supply cables from the electrical panel room is distributed to the various distribution 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 shows the feeder pillar near the NSB block. The electrical panels located in various blocks sample pictures are given in figure



Feeder Pillar near NSB block



Electrical distribution panels in various blocks

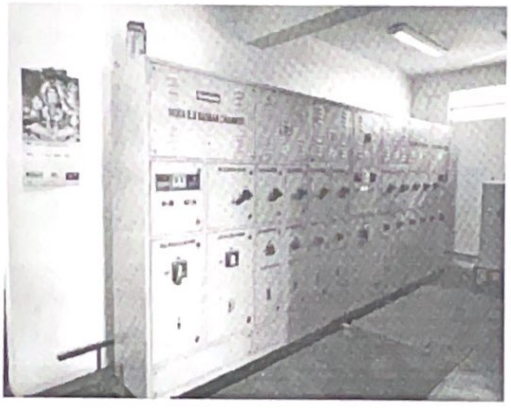
Principal
NEW HORIZON COLLEGE
Ring Road, Bellandur Post,
Bangalore - 560 103.

NEW HORIZON COLLEGE

MARATHAHALLI

Permanently Affiliated to Bengaluru North University,
Recognized by the Govt. of Karnataka Recognized under section 2 (f) of the UGC Act, 1956
Accredited by NAAC with 'A' Grade

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 One number of 400 kVAr rated capacitor bank have been installed at the main incomer panel for power factor improvement.



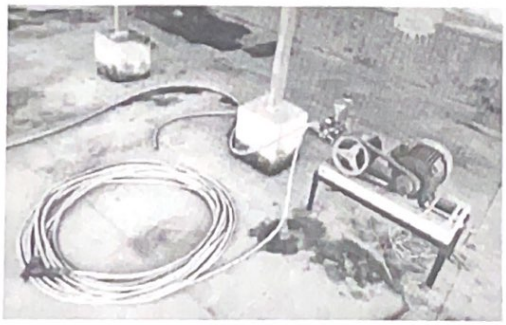
Electrical panel Room

APFC panel

Principal
NEW HORIZON COLLEGE
Ring Road, Bellandur Post,
Bangalore - 560 103.

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.



Pressurized water cleaning for SRTPV systems

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

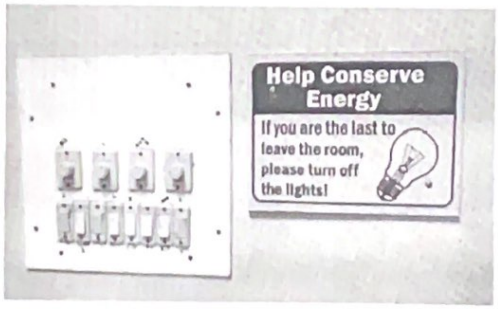
S. No.	Description	Phase	V	I	kW	kVA	kVAr	PF	Hz
1	Main LT Incomer	R	241.0	368.0	86.9	88.7	17.6	0.98	49.9
		Y	244.0	371.0	89.6	90.5	12.8	0.99	49.9
		B	243.6	382.0	92.1	93.1	13.1	0.99	50.0
					268.7				

Power parameters at main incomer panel room

Principal
NEW HORIZON COLLEGE
Ring Road, Bellandur Post,
Bangalore - 560 103

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



Sign boards to save energy

Principal
NEW HORIZON COLLEGE
Ring Road, Bellandur Post,
Bangalore - 560 103.

NEW HORIZON COLLEGE

MARATHAHALLI

Permanently Affiliated to Bengaluru North University,
Recognized by the Govt. of Karnataka Recognized under section 2 (f) of the UGC Act, 1956
Accredited by NAAC with 'A' Grade

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

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	CO_2 mitigations per year	Tons/year	7.65

Annual cost savings by installation of LED lights

Principal
NEW HORIZON COLLEGE
Ring Road, Bellandur Post,
Bangalore - 560 103.

NEW HORIZON COLLEGE

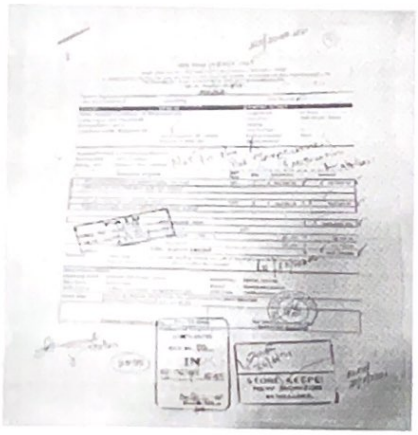
MARATHAHALLI

Permanently Affiliated to Bengaluru North University,
Recognized by the Govt. of Karnataka Recognized under section 2 (f) of the UGC Act, 1956
Accredited by NAAC with 'A' Grade

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 and figure

VRV Air Conditioning Unit



VRV Air Conditioning Unit – Purchase Invoice

Principal
NEW HORIZON COLLEGE
Ring Road, Bellandur Post,
Bangalore - 560 103.

NEW HORIZON COLLEGE

MARATHAHALLI

Permanently Affiliated to Bengaluru North University,
Recognized by the Govt. of Karnataka Recognized under section 2 (f) of the UGC Act, 1956
Accredited by NAAC with 'A' Grade

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 .

Use of LED lights

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

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

Principal
NEW HORIZON COLLEGE
Ring Road, Bellandur Post,
Bangalore-560 103

NEW HORIZON COLLEGE

MARATHAHALLI

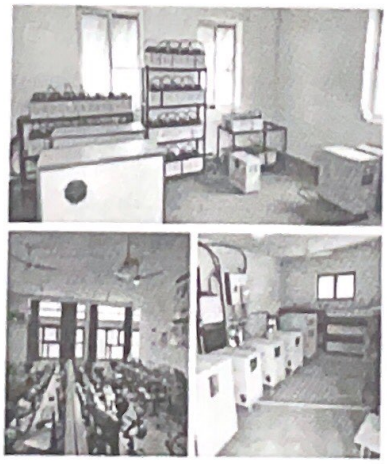
Permanently Affiliated to Bengaluru North University,
Recognized by the Govt. of Karnataka Recognized under section 2 (f) of the UGC Act, 1956
Accredited by NAAC with 'A' Grade

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 intention 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).

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



Well-ventilated and day-light integrated rooms

Principal
NEW HORIZON COLLEGE
Ring Road, Bellandur Post,
Bangalore - 560 103.

NEW HORIZON COLLEGE

MARATHAHALLI

Permanently Affiliated to Bengaluru North University,
Recognized by the Govt. of Karnataka Recognized under section 2 (f) of the UGC Act, 1956
Accredited by NAAC with 'A' Grade

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

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 ,Marathahalli Bengaluru"** during the September 2021 to October 2021.

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

No.14, S-1, 3rd Main, 14th Cross AECS Layout, B-Block, Singasandra, Bangalore - 560 068, Karnataka
80503 87500 www.eeellp.com info@eeellp.com

Principal
NEW HORIZON COLLEGE
Ring Road, Bellandur Post,
Bangalore - 560 103.

NEW HORIZON COLLEGE

MARATHAHALLI

Permanently Affiliated to Bengaluru North University,
Recognized by the Govt. of Karnataka Recognized under section 2 (f) of the UGC Act, 1956
Accredited by NAAC with 'A' Grade

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

EEELLP ACKNOWLEDGEMENT

EEELLP Team thanks the Management of **New Horizon College Marathahalli, 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

No.14, S-1, 3rd Main, 14th Cross, AECS Layout, B-Block, Singasandra, Bangalore - 560 068, Karnataka
80503 87500 www.eeellp.com info@eeellp.com

Principal
NEW HORIZON COLLEGE
Ring Road, Bellandur Post,
Bangalore - 560 103.