

GREEN ENERGY & ENVIRONMENT AUDIT REPORT | 2018

GREEN AUDIT REPORT - 2018

is presented to
**ADICHUNCHANAGIRI
UNIVERSITY**

Nagamangala Taluk, BG Nagara - 571 448

has successfully demonstrated knowledge on Energy conservation,
Water conservation, Bio diversity, Waste management, Indoor
Environmental quality, Carbon footprint.

10.01.2019

DATE



NISCHAY N
GREEN BUILDING CONSULTANT

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Green Auditing

The term “Green” means eco-friendly or not damaging the environment. This can acronymically be called as '**Global Readiness in Ensuring Ecological Neutrality**' (GREEN). 'Green Audit' can be defined as “systematic identification, quantification, recording, reporting and analysing of components of ecological diversity and expressing the same in financial or social terms”. 'Green Auditing', an umbrella term, is known by another name 'Environmental Auditing'. To implement the green audit other important aspects such as objective of green audit, drivers of green audit, future scope, benefits, and advantages are necessary to understand. The green audit practically involves energy conservation, use of renewable sources, rain water harvesting, and efforts of carbon neutrality, plantation, hazardous waste management & E-waste management. The concept of Green Audit, institutions are using it as a management tool to evaluate the environmental standards; institution can perform better and better for the sustainable development of the organization. The experiments on the nature by avoiding natural rules, this can be a one major reason behind that is Green Audit.



Adichunchanagiri University Campus.

Executive Summary

Colleges and Universities have broad impacts on the world around them, both negative and positive. The activities pursued by colleges can create a variety of adverse environmental impacts. But colleges are also in a unique position as educational institutions to be leaders in pursuing environmentally sustainable solutions. Adichunchanagiri University expresses its commitment to sustainability in many ways. It has taken a number of positive steps to reduce its environmental impact. But many areas remain in which substantial improvements can be made. This report serves to highlight university's many accomplishments, and to make recommendations for improving the College's environmental sustainability. The college conducted the Green Audit in academic year 2017 - 18 and strives to maintain eco-friendly atmosphere on the campus.

The initiatives taken by the college to make the campus Ecofriendly:

1. Energy conservation
2. Water conservation
3. Efforts for carbon neutrality
4. Hazardous waste management
5. E-waste management
6. Plantation

The college undertakes various activities through N.S.S. To create eco-friendly awareness among the students, college arranges special programs by inviting the eminent personalities, who in turn train and educate public. Students are encouraged to participate in eco-friendly activities.

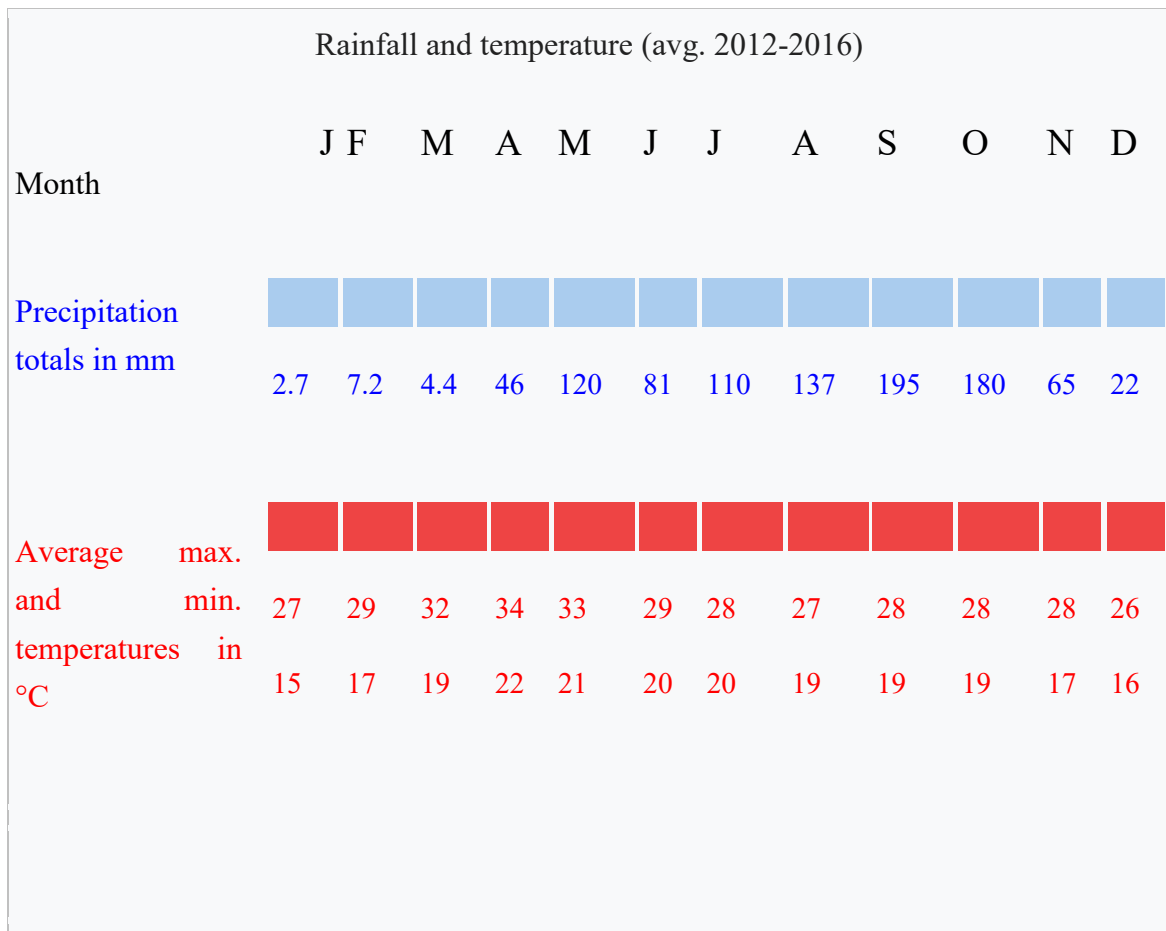
Awareness of Carbon Consumption:

Students and Staff members are made totally aware of pollution that are caused by use of vehicles. The carbon consumption awareness program improves to help in carbon emission at individual as well as social level and avoids Air and Noise pollution in the campus due to vehicles or any activity in it. Green Audit is the most efficient & ecological way to solve such an environmental problem. The experiments on the nature by avoiding natural rules, this can be a one major reason behind Green audit process. Green Audit is one kind of professional care which is the responsibility of each individual who are the part of economic, financial, social, environmental factor. It is necessary to conduct a green audit in college campus because student aware of the green audit, its advantages to save the planet & they become good citizen of our country. Thus Green Audit become necessary at the college level. Environmental auditing is essentially an environmental management tool for measuring the effects of certain activities on the environment against set criteria or standards. Depending on the types of standards and the focus of the audit, there are different types of environmental audit. Organizations of all kinds now recognize the importance of environmental matters and accept that their environmental performance will be scrutinized by a wide range of interested parties. Environmental auditing is used to Investigate, Understand and Identify.

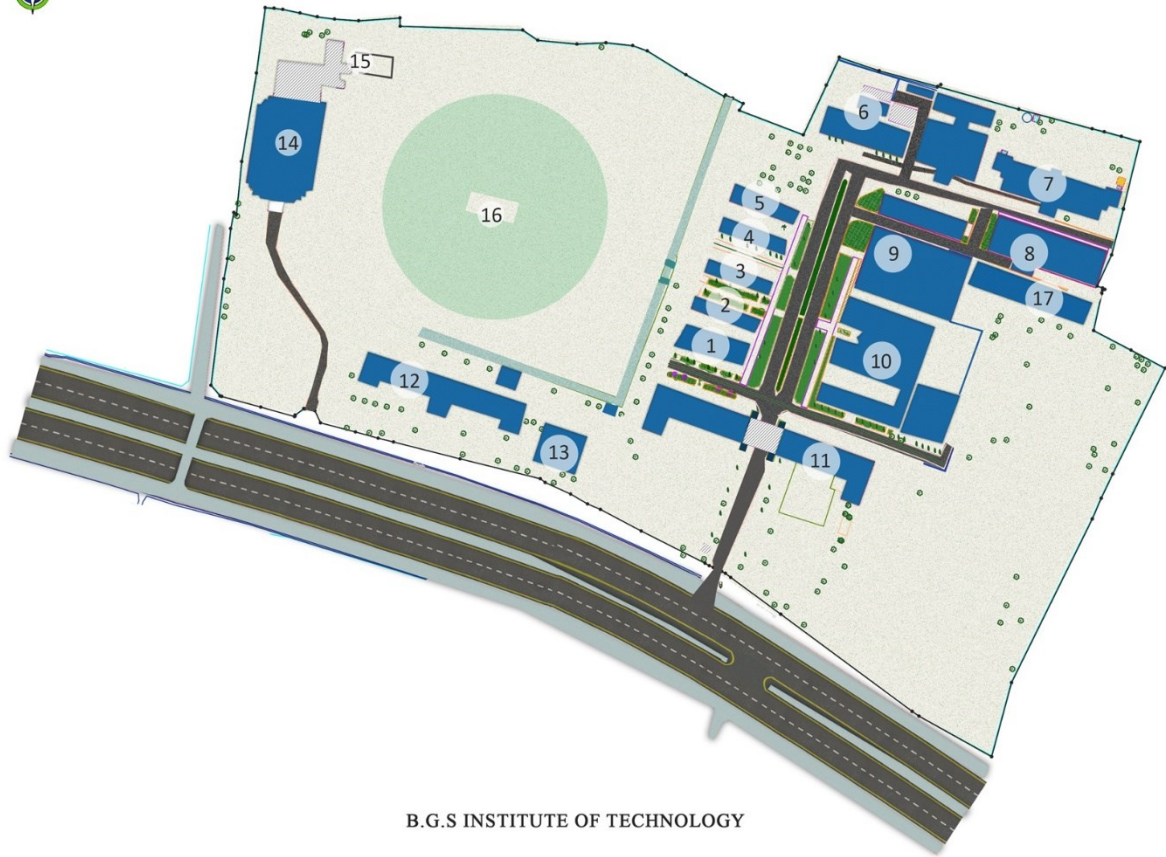
I. Site Selection.

- Bengaluru – Hassan National Highway (NH-75), Nagamangala Taluk, Mandya District, B G Nagar, Karnataka 571448.
- It is positioned at 12°57'53.60"N 76°43'40.90"E and covers an area of 112158.249 square meters, it has an average elevation of 796 meters.
- Seismicity, it lies in the seismically stable region, Zone III.

i. Climate Chart



ii. Master Plan



B.G.S INSTITUTE OF TECHNOLOGY

iii. Building details

Building No.	Building Name
1.	Civil Engineering Block
2.	Civil Engineering Block
3.	Civil Engineering Block
4.	Guest House Block
5.	Staff Block
6.	Boys Hostel 1 Block
7.	Boys Hostel 2 Block
8.	Workshop Block
9.	Teaching Block
10.	CS EC Block
11.	ADMIN Block
12.	Polytechnic Block
13.	Canteen
14.	AIMS Hostel
15.	STP
16.	Play ground
17.	Mechanical Block

II. Built Environment.

i. Ambient Air Quality

Air pollution has long term and short term impact on the biotic and abiotic component of the environment. The ambient air quality at the core zone of Adichunchanagiri University was monitored. The study area represents it is very calm environment with less pollutants.

➤ Ambient Air Quality Monitoring Results:(Annex A)

Station Name	Description	Date of sampling
Near Main Gate	Sensitive zone	05.02.2018

Sr.no	SO ₂ (µg/m ³)		NO _x (µg/m ³)		PM10(µg/m ³)		(CO) (µg/m ³)	
	Result	NAAQS	Result	NAAQS	Result	NAAQS	Result	NAAQS
1	5.5	≤80	7.7	≤80	53.05	≤100	BDL	≤4

National Ambient Air Quality Standards (NAAQS) BDL: Below Detection Limit

ii. Day lighting

It is maintained that all regularly occupied spaces are day lit, thereby improving health and well-being of students & teachers.

Sr.no.	Space	Prescribed Illumination Level (Lux)	Readings
1	Classroom	150-300	175
2	Lab	150-300	355
3	Library	200-300	248
4	CAD Lab	300	237

Source: IS 8827- 1978- affirmed in 2006

Please note that the illumination level is monitored only for daylight. Before starting the monitoring process, the artificial lighting fixtures were switched off.



Lux reading

iii. Noise Environment

The noise levels measurements were carried out using precision noise level meter. The noise level survey was carried out at five locations, located within the in campus of Adichunchanagiri University the major source of noise identified in the study area has been predominantly the vehicular movement.



Noise reading

III. Water Audit.

Water audit is an effective management tool for minimizing losses, optimizing various uses and thus enabling considerable conservation of water, the efforts of the institution in water usage and management is seen through following activities it is satisfactory and no unnecessary water wastage is noticed in the campus.

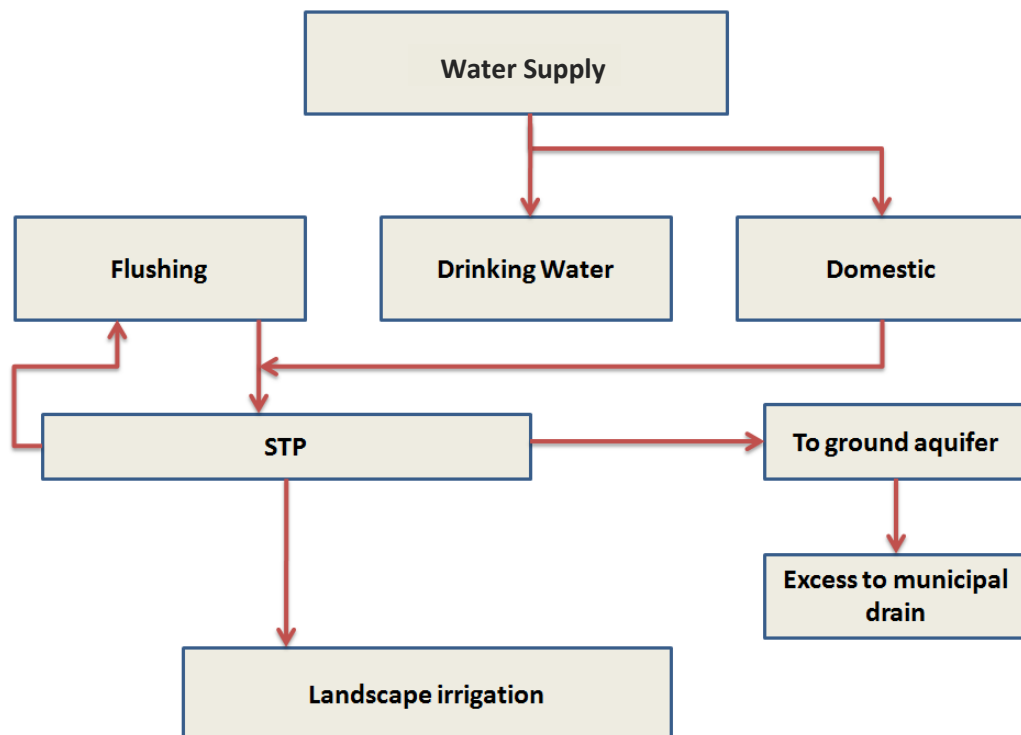
i. Water Supply and Usage

- Water source is bore water college has 5 bore well which satisfies the water demand. Currently water for the institution is sourced from nearby javaranahalli bore well.
- Water demand calculation based on WHO standard.

Year	Population	Demand @15 LPCD	Provision per 15% losses	Total demand
2017	1622	24330	3649.5	27979.5

Considering Lower limit of lpcd as per WHO is 15 lpcd

ii. Water Balance Chart



iii. Water quality

- The quality of Bore well water meets the potable water standards.
- The quality of waste water meets the prescribed values by State Pollution Control Board, as applicable.
- IS: 1500-2012 RO purified Drinking water is provided in each block.

Water quality of university campus

Sl No	Parameter	Bureau of Indian Standards (10500-1983) for drinking water quality	Raw Water Quality Analyzed before Treatment	Water Quality Analyzed After RO & UV Treatment
1	pH	6.5-8.5	7.3	7.3
2	EC μ hos/cm at 25°C	2250	1100	661
3	Turbidity NTU	1.0 - 5.0	12.5	2.1
4	Total Dissolved Solids, (mg/L)	500-2000	705	390
5	Hardness, (mg/L)	200-600	670	355
6	Chlorides,(mg/L)	250-1000	315	215
7	Nitrates, (mg/L)	45	2.2	2.1
8	Sulphates, (mg/L)	200- 400	245	230
9	Iron, (mg/L)	0.3-1.0	0.8	0.7
10	Fluorides, (mg/L)	1.0-1.5	1.6	1.4
11	E.coli, no/100 ml water	Nil	Nil	Nil

- Institution has adopted UV and RO water filtration system to provide drinking water to the staff and students in each floor.



iv. Rain water harvesting

- The institution has planned for rain water harvesting roof method to enhance ground water table and non-roof method is planned by channelizing the rain water to STP to reduce the treatment load of the STP and the treated water is used for in-situ applications.
- The rainwater harvesting system is designed to cater at least “one-day normal rainfall*” occurred in the last 5 years.
- The Average normal rainfall/ day is calculated:

Average normal rainfall (r)					
Location	Year	Peak rainy month	Total rainfall (mm)	Number of rainy days	Normal rainfall/day(mm)
Mandya	2012	October	132.1	15	8.8
	2013	October	95.5	15	6.3
	2014	October	184	15	12.2
	2015	November	192	15	12.8
	2016	July	142	15	9.4
Average normal rainfall/day (mm)					9.9
Average normal rainfall/day(m)					0.0099

* Rainfall information, from Indian Metrological Department data at <http://www.imd.gov.in>

Building Details			
Sl.No.	Building Name	Building Number	Roof Top Area (m ²)
1	CIVIL ENGG BLOCK	1	261.09
2	CIVIL ENGG BLOCK	2	261.09
3	CIVIL ENGG BLOCK	3	261.09
4	GUEST HOUSE BLOCK	4	266.79
5	STAFF BLOCK	5	266.79
6	BOYS HOSTEL 1 BLOCK	6	679
7	BOYS HOSTEL 2 BLOCK	7	887.58
8	LIBRARY AND ME BLOCK	8	801
9	WORKSHOP BLOCK	9	1,542.57
10	TEACHING BLOCK	10	1420
11	CS EC BLOCK	11	1625
12	ADMIN BLOCK	12	1826.77
13	Mechanical BLOCK	13	763
TOTAL			10,861.76

Rainwater Harvesting Calculations:

Sr.no	Surface type	Runoff coefficient (c)	Area (m ²) (a)	Impervious area (m ²) $I = (c \times a)$
1	Cemented roof	.95	10098.76	9593.82
Total impervious area in sq.m. (ΣI)				9593.82
Average normal rainfall in m (R)				0.0099
Total roof run-off volume in cu.m ($\Sigma I \times R$)				94.97

- The institution has total roof run-off volume of 94.97cu.m.



Rain water Recharge Pit



Rain water collection tank.

v. Use of Treated Waste Water

- The institution Uses treated waste water for in-situ applications, to reduce dependence on potable water
- 750 KLD capacity of Sewage Treatment Plant advanced technology of Moving Bed Bio Reactor wastewater treatment plant has been implemented.
- The quality of waste water to be used meets the prescribed values State Pollution Control Board, as applicable.
Students do not have any direct contact with the treated waste water.

IV. Energy Audit.

The “Energy Audit” is the key to a systematic approach for decision-making in the area of energy management. It attempts to balance the total energy inputs with their use, and serves to identify all the energy streams in a facility. It quantifies energy usage according to its discrete functions. Energy audit is an effective tool in defining and pursuing a comprehensive energy management program within a business. As per the Energy Conservation Act, 2001, passed by the government of India, energy audit is defined as “the verification, monitoring and analysis of use of energy including submission of technical reports containing recommendations for improving energy efficiency with cost benefit analysis and an action plan to reduce energy consumption.”

i. Energy audit objective

This energy audit assumes significance due to the fact that the BGS Institute of Technology electricity bill had crossed Rs. 34.5 Lakhs during 2017, and it was aimed at obtaining a detailed idea about the various end use energy consumption activities and identifying, enumerating and evaluating the possible energy savings opportunities.

➤ Adichunchanagiri University’s present energy scenario

The annual mean electricity consumption is around 457,154 KWH which is purchased power drawn from the State grid. The college is in the HT2A(II)N tariff category of CESCL with a contract demand of 200KVA. UPS are used for power backup.

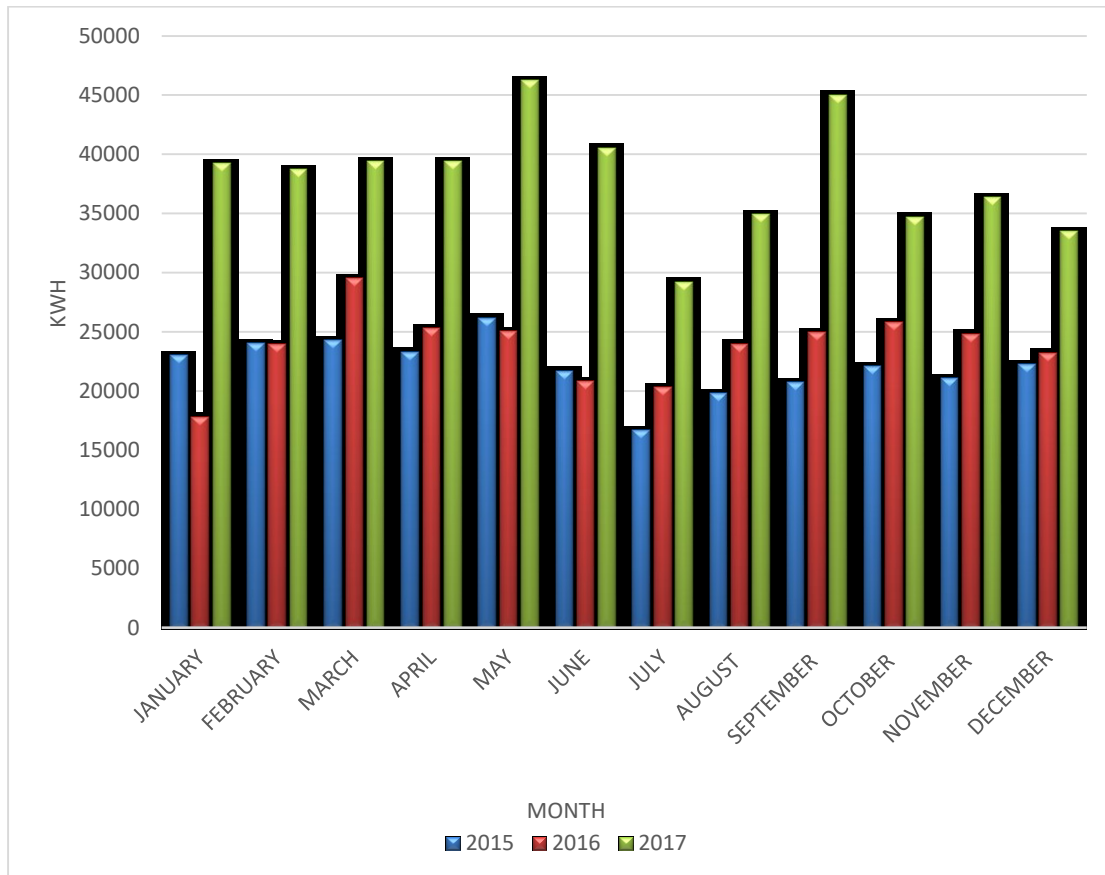
The energy consumption on campus is mainly in the form of electricity, apart from the use of LPG as cooking fuel in the hostels and canteen.

The electricity bill comprises two parts: one related to the energy consumed (per kWh or per unit energy consumed) and the other is the maximum demand charge (per kVA of maximum demand during the month) the contract demand is being maintained at 200 kVA, the institute is not paying any penalty to CESCL for drawing more than the contract demand.

➤ Electricity Consumption

Electricity Consumption per Year was 457154 kWh, Electrical Consumption per Month was 38096.16 kWh. Avg., Electrical Consumption per Day was 1269.8 kWh.

Monthly Energy Consumption



➤ Specific Energy Consumption (SEC)

The Specific Energy Consumption (SEC) is defined as the energy consumption per unit of product output. The specific energy consumption considering Students, faculty and staff members were calculated which forms the institute SEC and was taken as reference for comparison. The SEC was calculated to be 281.84 kWh/person/annum (for 2017 financial year) for the academic area and Rs. 2113.84 per person per annum.

➤ Segmentation

This energy audit report has segmented the energy consumption patterns by Departments/ hostels/ offices (lighting, cooling). The details are provided in table

Sr.no	Particular	No.s	Wattage (W)
1	Tube Lights	719	40
2	Incandescent bulbs	349	60
3	LED	670	12
4	Ceiling fan	640	75
5	Air conditioner	36	2000

➤ **ENERGY SAVING CALCULATION:**

1. Energy saving by replacing T12 tube & T8 tube light to LED bulb:

- Total no. of T12 & T8 tube light = 1333

Total power consumption = $719 \times 40W = 28760W = 28.76 \text{ kW}$

Total energy consumption = power consumption x operating hrs.

= $28.76 \text{ kW} \times 8 \text{ hrs.} = 230.08 \text{ kWh}$

Energy cost / day (1kWh=Rs7.5) = $7.5 \times 230.08 = \text{Rs.}1725.6/-$

Total annual energy cost = Energy cost / day x no. of days

= $\text{Rs.}1725.6 \times 280 \text{ days} = \text{Rs.} 483,168/-$

- Total no. of LED BULB = 719

Total power consumption = $719 \times 12W$

= $8628 \text{ W} = 8.6 \text{ kW}$

Total energy consumption = power consumption x operating hrs.

= $8.6 \text{ kW} \times 8 \text{ hrs.} = 68.8 \text{ kWh}$

Energy cost / day = $7.5 \times 68.8 = \text{Rs.}516/-$

Total annual energy cost = Energy cost / day x no. of days

= $\text{Rs.}516 \times 280 \text{ days} = \text{Rs.} 144,480/-$

- Annual cost saving = **Rs. 338,688**

Cost of LED BULB = Rs.150

Total cost of replacement = $150 \times 719 = \text{Rs.} 107,850.$

- Payback period = 3 month

2. Energy saving by replacing normal fan to energy efficient fan

- Total no. of Fan = 640

Total power consumption = $640 \times 75W = 48000W = 48 \text{ kW}$

Total energy consumption = power consumption x operating hrs.

= $48 \times 8 \text{ kWh} = 384 \text{ kWh}$

Energy cost / day = $7.5 \times 384 = \text{Rs.}2880/-$

Total annual energy cost = Energy cost / day x no. of days

= $\text{Rs.}2880 \times 280 \text{ days} = \text{Rs.}806400/-$

- Total no. of Energy efficient fan = 640

Total power consumption = $640 \times 50 = 32000W = 32 \text{ kW}$

Total energy consumption = power consumption x operating hrs.

= $32 \text{ kW} \times 8 \text{ hrs.} = 256 \text{ kWh}$

Energy cost / day = $7.5 \times 256 = \text{Rs.}1920/-$

Total annual energy cost = Energy cost / day x no. of days

= $\text{Rs.}1920 \times 280 \text{ days} = \text{Rs.}537600/-$

- Annual cost saving = **Rs. 268,800.**

Cost of Energy efficient fan = Rs.1200

Total cost of replacement = $1200 \times 640 = \text{Rs.} 768,000$

- Payback period = 2 year 10 months.

➤ **Energy Savings can be Achieved by Follow-Up the Recommendations**

Load	Before follow-up Recommendations		After follow-up Recommendations		% saving
	Energy consumed in kWh(8hrs)	Cost	Energy consumed in kWh(8 hrs.)	Cost	
Lighting	230	1725	68.8	516	70
Fan	384	2880	256	1920	33.4
Total	614	4605	324.8	2533.44	44.9

ii. On-Site Renewable Energy

- The institute has encouraged use of Renewable Technologies for On-Site Power generation, to minimize environmental impacts of using fossil fuels Institution has come up with solar agreement with TATA Power Solar on 16.01.2017 for installation of Solar Panels of Power Production Capacity of 100KWp ongrid solar rooftop system with MMS with data logging. TATA solar modules of poly crystalline technology having an efficiency of 16.5%.



iii. Solar Water Heating Systems

Encourage use of alternative sources of energy for water heating applications, to minimize the environmental impacts of using fossil fuels. Solar water heater panel of 125W is provided in each hostel building to meet hot water requirements for hostel students.

V. Health and Well-Being.

i. Campus design caters to differently able people

The institution has provided building design so that it caters to differently able people such as,

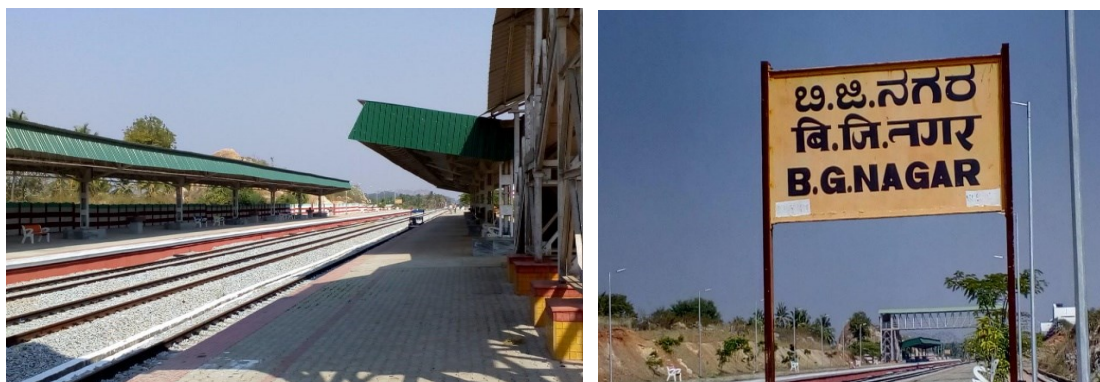
- Non-slippery ramps are provided.
- Lift 's is Provided
- Preferred parking for differently able.
- Wheel chair.

ii. Tobacco Smoke Control

The institution has taken care to eliminate exposure of students & teachers to tobacco smoke thereby reducing health impacts caused due to passive smoking.

iii. Basic Amenities

Institution has Provide access to basic amenities, so as to reduce negative impacts caused from automobile use and also make it easy for students, basic amenities such as bank, cafeteria, canteen, bus stop in front of the college, railway station within 1.5km and several other basic amenities, within a walking distance of 1 km from the building.



Railway station

VI. Waste Management Audit

- The waste management is in order with the installation of dust bins. The waste is segregated at source by providing separate dust bins for Biodegradable and Plastic waste.
- Daily cleaning is carried out and most of the non-biodegradable waste is lifted by the City Municipal service.
- Various types of chemical waste are collected and disposed by the Department of Chemistry.
- The E-waste and defective item from computer lab is being stored properly. The institution has decided to contact approved E- waste management and Disposal facility in order to dispose E-waste in scientific manner.
- Hazardous Waste, Radioactive Waste not found.
- Institution has designed a sewage treatment plant and will treat waste water to tertiary standards, so as not to pollute the water streams, Sewage treatment plant is provided for 750 KLD capacity of Sewage Treatment Plant advanced technology of MBBR wastewater treatment plant.

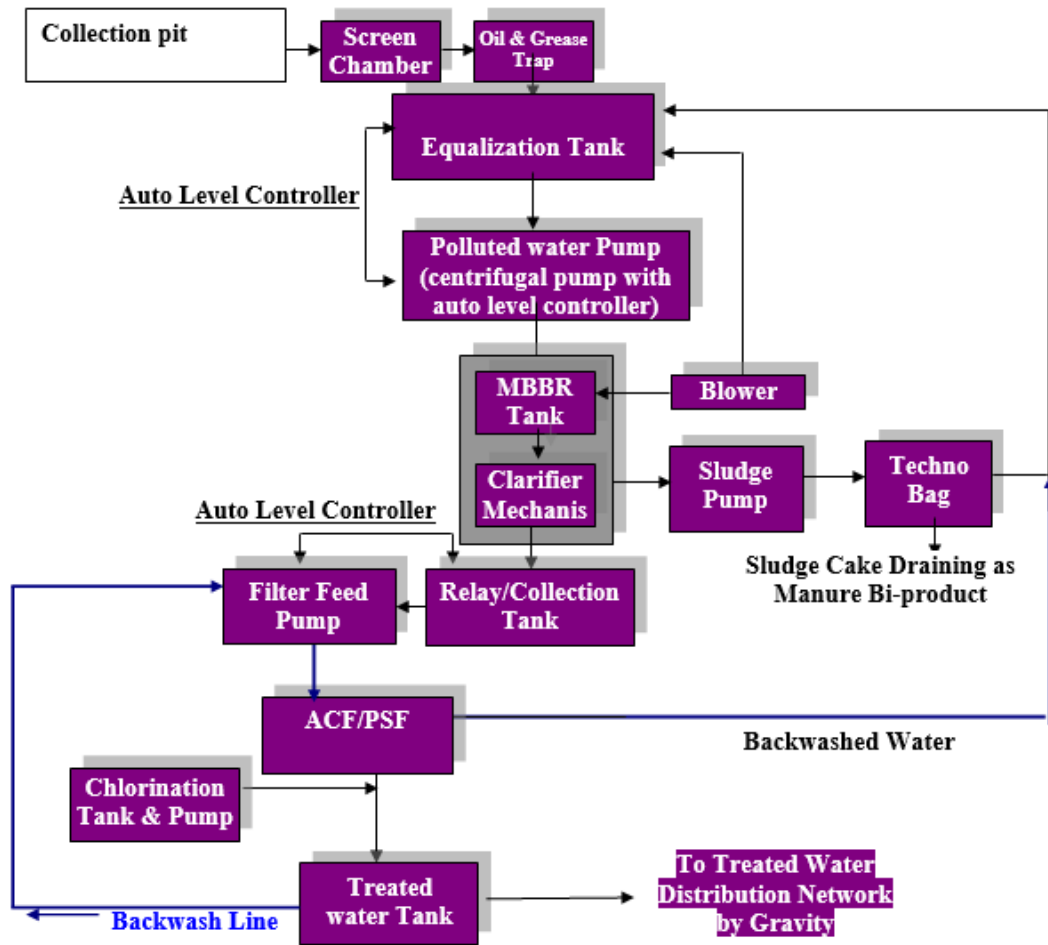


MBBR unit in Sewage Treatment Plant.



Screening unit in Sewage Treatment Plant.

GENERIC FLOW CHART: MBBR BASED DOMESTIC POLLUTED WATER POLLUTION CONTROL EQUIPEMNT AND SYSTEM



Hydraulic Flow Drawing for 750kld Sewage Treatment Plant.

Characteristics of Raw Sewage Water

Sl No	Description	Raw Water	Treated Water
1.	Design Capacity	750 KLD	750 KLD
2.	Average Feed Flow	18KL	18KL
3.	Peak/Max. Feed Flow	50KL	50KL
4.	Operating Hours	24 Hours	24 Hours
5.	PH	6.5 – 8.5	6.5 – 8.5
6.	BOD	250 – 400 mg/l	< 20 mg/l
7.	COD	400 – 600 mg/l	< 100 mg/l
8.	TSS	150 – 250 mg/l	< 50 mg/l
9.	Oil & Grease	30 – 80 mg/l	<10

VII. Biodiversity Audit.

- A scientific survey of flora and fauna of the campus is carried out covering rainy, winter and summer seasons during 2016-17.
- This biodiversity audit has revealed more than 626 trees as follows,

Sr.no	SCIENTIFIC NAME	LOCAL NAME	No's
1.	Grevillea robusta	Silver oak	1
2.	Millettia pinnata	Honge	56
3.	Saraca asoca	Ashoka tree	58
4.	Artocarpus Heterophyllus	Jack fruit	08
5.	Rose wood	Beetae	25
6.	Peepal(bodhi)	Arali	02
7.	Phyllanthus	Nelli	22
8.	Mangifera indica	Mango	23
9.	Azadirachta indica	Bevu	176
10.	Melia dubia	Hebevu	20
11.	Swieteniamacrophylla	Mahogany	10
12.	Rubiaceae	Tega	179
13.	Magnolia Champaca	Sampige	16
14.	Citrus x sinensis	Ketale	04
15.	Indian almond	Kadu badami	8
16.	Mulberry	Neralae	13
17.	Ficus drupacea	Goni mara	2
18.	Santalum album	Sandalwood	3

- Various species of Mammals, Aves, Arthropods and Annelids were also recorded. This indicated excellent composition of Flora and Fauna quite unique considering that the campus is situated in the heart of the city. Many birds are reported to breed in the campus seasonally.
- Animals and Birds most observed are as follows:

Sl.no	Scientific Name	Local Name
1.	<i>Leptocoma zeylonica</i>	Purple rumped sunbird
2.	<i>Nectarinia asiatica</i>	Purple sunbird
3.	<i>Parus cinereus</i>	Grey tit
4.	<i>Accipiter badius</i>	Shikra
5.	<i>Bubulcus ibis</i>	Cattle egret
6.	<i>Saxicoloides Fulicata</i>	Indian robin
7.	<i>Dicrurus macrocercus</i>	Black drongo
8.	<i>Pycnonotus jocosus</i>	Red whiskered bulbul
9.	<i>Merops orientalis</i>	Small green bee eater
10.	<i>Terpsiphone</i>	Paradise fly catcher
11.	<i>Ardeola Grayii</i>	Pond heron
12.	<i>Milvus migrans</i>	Black kite
13.	<i>Funambulus palmarum</i>	Squirrel
14.	<i>Euploea core</i>	Butterfly
15.	<i>Acridotheres tristis</i>	Common myna
16.	<i>Columba livia</i>	Rock pigeon
17.	<i>Strix occidentalis</i>	Spotted owlet
18.	<i>Haliastur indus</i>	Brahminy kite
19.	Anisoptera	Dragon flies
20.	<i>Tyto alba</i>	Barn owl
21.	<i>Prinia socialis</i>	Ashy prinia.
22.	Arachnothera	Spider hunter
23.	Psittaciformes	Green parrot
24.	Serpentes	Snake

VIII. Green Education.

- The institution organize many outreach and educational programs in a year with the involvement of students to increase public awareness on environment sustainability and green features of the campus.
- The whole campus involved in the Swachh Bharat Abhiyan by creating awareness around the institution regarding clean India mission by keeping their campus and its premises clean all the staffs and students participated and made the mission successful.



- Every year Environmental Day, Earth Day and Water Day is celebrated in the institution. Plantation activities are taken up to bring awareness and to increase the green coverage area in and around the campus.



IX. Transportation.

Vehicles are one of the largest contributors to both energy use & environmental pollution. The institute has encouraged students & teachers to adopt environment friendly transit systems to minimize Environmental impact from automobile use.

- Details on number of vehicles entering college campus:

Sl.No.	Vehicle	Number(Approx.)
1	Two wheeler	40
2	Car	6
3	Bus	2
4	College Cab	1

- Details on number of students & teachers coming by walk / own vehicles /school bus / Public Transport:

Sl.No.	Vehicle	No. of Commuter(Approx.)
1	Two Wheeler	65
2	College Cab	17
3	Car	15
4	Hostel Students(Walk)	855
5	Outside College Within 1km(Walk)	270
6	Public Transport (Bus and train).	400
TOTAL		1622

- From the above data:
- 94% of students & teachers come through walk & public transport.
 - Proximity to public transport, bus stop is located in front of the college, 1.5km from Railway station.
 - Parking Capacity adequate parking within the site to minimize disturbance caused due to parking on public Roads, thereby enhancing the quality of civic life.
- All these above values are taken into consideration for calculating CO₂ emission per year.

X. Carbon Neutrality and Institutional Footprint.

- The institutional footprint is categorized based on transportation, electricity usage and carbon neutralization through trees present in campus the below analysis is based on considering these emissions.
- This audit is to create awareness in Students and Staff members about the pollution that are caused by use of vehicles. The carbon consumption in different vehicles are calculated which are entering campus, the survey of different vehicles entering campus was done later the distance each vehicle travel to campus was noted and these values are taken into consideration for calculation to find CO₂ emission per day.

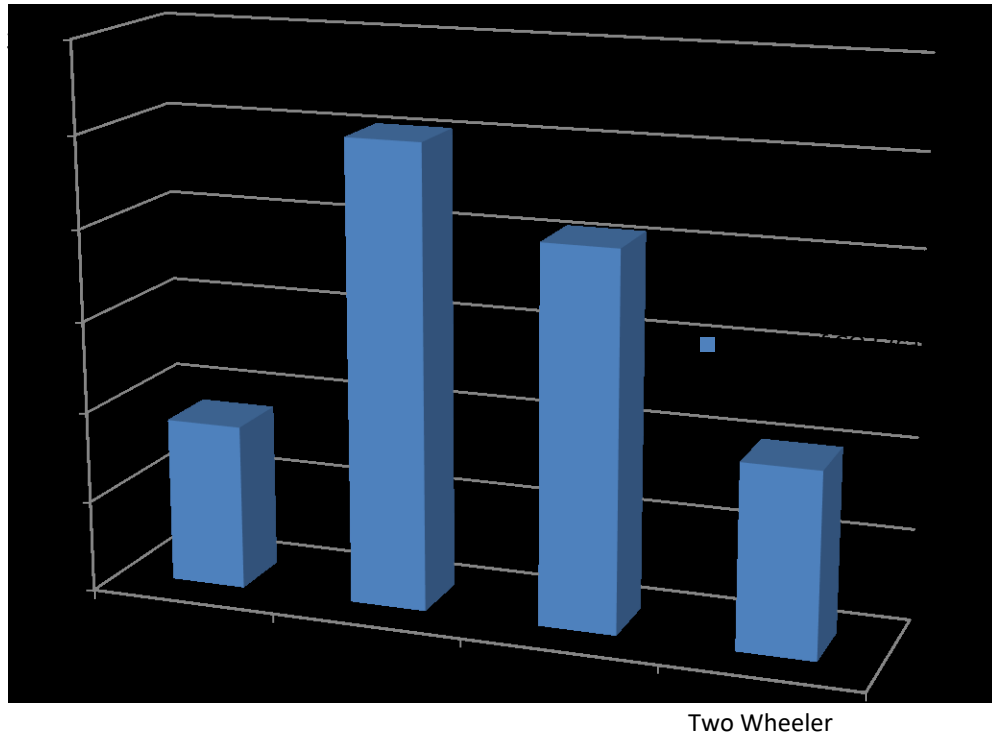
CO₂ Emission per Day through Different Vehicle.

Sr.no	Vehicle	Mileage	Avg .Travel distance two sides	Fuel Consumption(x)	Conversion factor(y)	CO ₂ emission per day(kg of CO ₂)(x*y)
1	College cab	10kmpl	25 km	2.5ltr	2.46	6.15
2	Petrol Car	15kmpl	16km	1.1ltr	2.14	2.354
3	Diesel Car	18kmpl	16km	0.89ltr	2.46	2.189
4	Two Wheeler	35kmpl	10km	0.28ltr	2.14	0.599

Total Emission from All Vehicles.

Sr.no	Vehicle	CO ₂ emission per for 250days/vehicle (a)	Number of vehicles (b)	Total CO ₂ emission (a*b)	Number of people	Per capita emission in specific vehicle
1	College cab	1537.5	1	1537.5	17	90.44
2	Petrol Car	588.5	3	1765.5	7	252.2
3	Diesel Car	547.25	3	1641.75	8	205.21
4	Two Wheeler	149.75	40	5990	65	92.15
Total Emission (Ton of CO ₂)				10.93(tCO ₂)		

Tonnes of CO₂ /Capita from Transport per Year

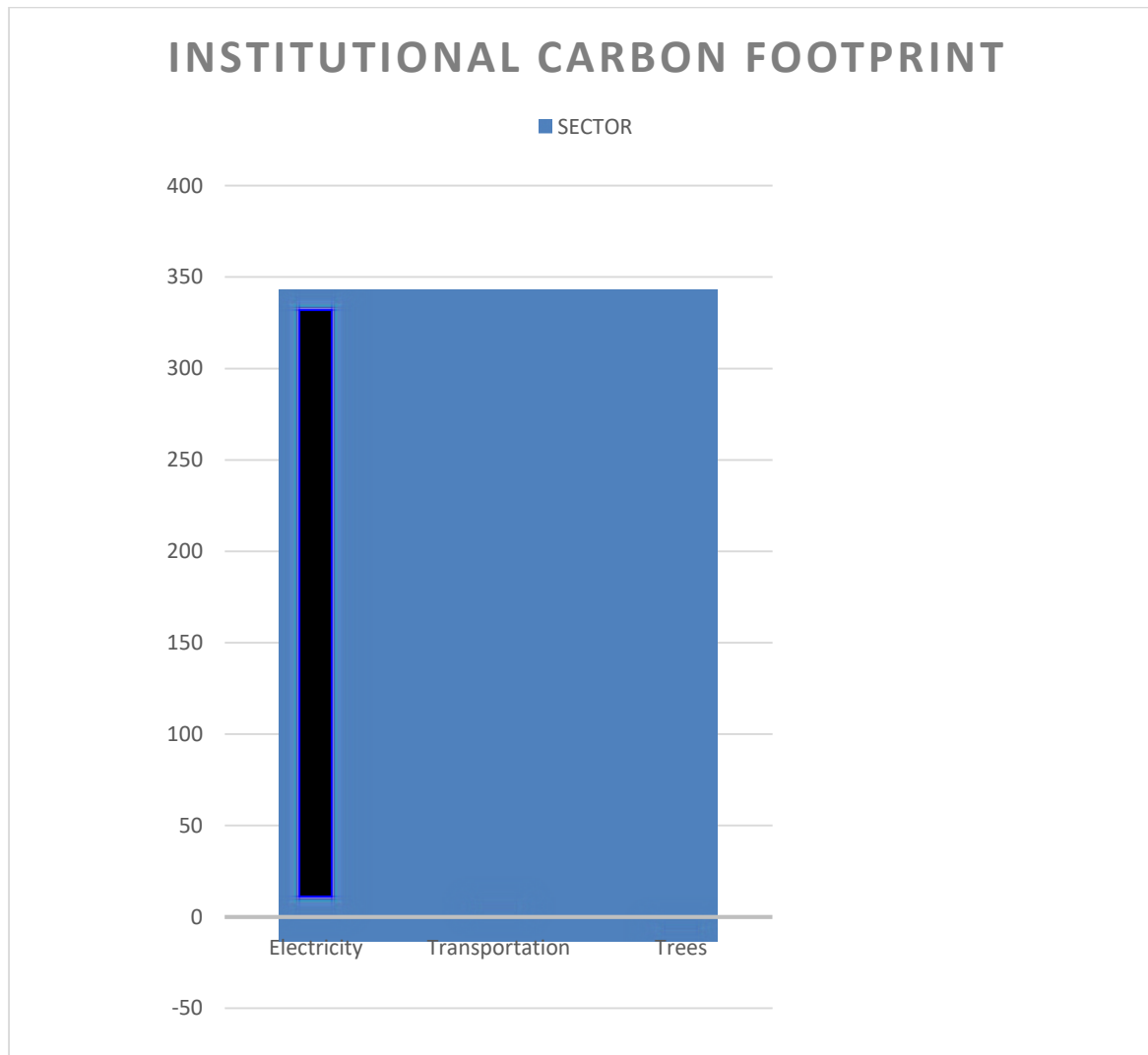


CO₂ Emission from Transport per Year

- CO₂ emission through electricity consumed per year,
The Indian electricity system is divided into two grids, the Integrated Northern, Eastern, Western, and North-Eastern regional grids (NEWNE) and the Southern Grid. Each grid covers several states. As the grids are interconnected, there is inter-state and inter-regional exchange, Karnataka comes under southern grid. The average India electricity generation emission factor is 0.89 kgCO₂e/kWh, for Karnataka electricity generation emission factor 0.75 kgCO₂e/kWh.
Data Source: CEA – All India Electricity Statistics – General Review 2011
- Electricity consumed per year 457154kwh /year X 0.75 =342.8tCO₂ emitted
- CO₂ gained through plantation, Tree can absorb 21.77kg per year, campus has 626 trees so 13.62 tons of CO₂ is absorbed.

➤ Institutional Carbon Footprint:

Sr.no.	Category	CO _{2e} gained in tones per year	CO _{2e} emitted in tones per year	Impact
1	Electricity (per kWh)	-	342.8	-ve
3	Transportation	-	10.93	-ve
4	Trees	13.62	-	+ve



Institutional Carbon Footprint

Conclusion.

1. Top Soil Preservation is done by vegetation control soil erosion, thereby reducing negative impacts to the site and surroundings, it has vegetated area of 22,468sq.m.
2. Institution has UV and RO water filtration system to provide safe drinking water.
3. 750 KLD capacity of Sewage Treatment Plant advanced technology of Moving Bed Bio Reactor wastewater treatment plant has been implemented. The institution uses treated wastewater for in-situ applications, to reduce dependence on potable water
4. The institute has encouraged use of Renewable Technologies for On-Site Power generation, to minimize environmental impacts Institution has come up with solar agreement with TATA Power Solar.
5. The institution organizes many outreach and educational programs in a year with the involvement of students to increase public awareness on environment sustainability and green features of the campus.
6. The Institution is showing very less negative impact in vehicular activity regarding CO_{2e} emission.

Suggestion and Recommendation.

1. Rainwater harvesting storage tanks to be increased to collect complete volume of rainfall and with suitable treatment it can be reused foreseeing future needs of water. Further, rainwater pits can be prepared at appropriate places identified with the assistance of Department of Geology and restoration activities may be initiated to sustain the health of ponds and wetlands around the campus.
2. The wastes generated can be used for promoting organic farming activities within the campus and the products can be used in hostels and canteens, with a plan to ensure the availability of organic food in the canteen and hostels for future.
3. Give preference to the most energy efficient and environmentally sound appliances available.
4. Vehicle pooling should be promoted both among students and faculty and use of bicycles should be promoted.
5. Ensure that all cleaning products used by college staff have a minimal detrimental impact on the environment, i.e. are biodegradable and non-toxic, even where this exceeds the Control of Substances Hazardous to Health (COSHH) regulations.
6. Green habitat concept should be adopted for all the building construction activities in future, which may help a long way in reducing energy usage, increasing aesthetic appeal of the buildings and class rooms, besides reducing carbon foot print.
7. Require that every staff and student member recognizes their responsibility to ensure that the commitments in the Environmental Policy are properly put into practice conduct environmental awareness workshops as a part of program.



Built Environment Sustainability & Transformation