Green Aura

Built Environment Sustainability & Transformation

GREEN AUDIT REPORT | 2020

BGS Institute of Technology

GREEN AUDIT REPORT - 2020

is presented to

BGS Institute of Technology

Bengaluru – Hassan National Highway (NH-75), Nagamangala Taluk,
Mandya District, B.G Nagara, Karnataka 571448

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

07.05.2021

DATE

NISCHAY N
GREEN BUILDING CONSULTANT

Green Aura
Built Environment Sustainability & Transformation

Acknowledgement

Green Audit Assessment Team thanks the management of BGS Institute of Technology, Adichunchanagiri University for assigning this important work of Green Audit. We appreciate the cooperation to us for completion of study.

Firstly, we would like to pay my obeisance to the almighty and would like to start this study with blessings of His Holiness **Param Poojya Jagadguru Sri Sri Sri Dr. Nirmalanandanatha Mahaswamiji** an ardent disciple of His Holiness **Bhairavaikya Jagadguru Padmabhushana Sri Sri Sri Dr. Balagangadharanatha Mahaswamiji.**

Our special thanks are due to:

Principal – Dr. B K Narendra
Prof & Head, Dept. of Civil Engg – Dr. T Mahadevaiah

We are also thankful to other staff members who were actively involved in giving us necessary inputs to carry out this very vital exercise for Green Audit.

Disclaimer

Green Audit Team has prepared this report for BGS Institute of Technology 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 calculations are arrived following best estimates 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.

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Green Auditing

The term “Green” means eco-friendly or not damaging the environment. This can acronymic ally is 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 and 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.

BGS Institute of Technology - 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 environmental impacts. But colleges are also in a unique position as educational institutions to be leaders in pursuing environmentally sustainable solutions. BGS Institute of Technology 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 BGS Institute's many accomplishments, and to make recommendations for improving the College's environmental sustainability. The college conducted the Green Audit in academic year 2020 - 21 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. E-waste management
5. Plantation
6. Sustainable Development Goals

The college undertakes various activities through Eco Club, 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.

Accelerating Education for the SDGs through Green Audit

Institutions have a critical role to play in the achievement of the SDGs. Education, research, innovation and leadership will be essential in helping society to transform into pathways of sustainable development. This is why we encourage universities and knowledge institutions to implement sustainability in their core operations.

Universities have a unique and critical role in helping the world achieve the Sustainable Development Goals (SDGs) through their research, teaching, operations and community leadership.

Green Audit is a BGS Institute's strategic initiative to engage in particular towards the Sustainable Development Goals (SDGs).

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 such that student will be 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.

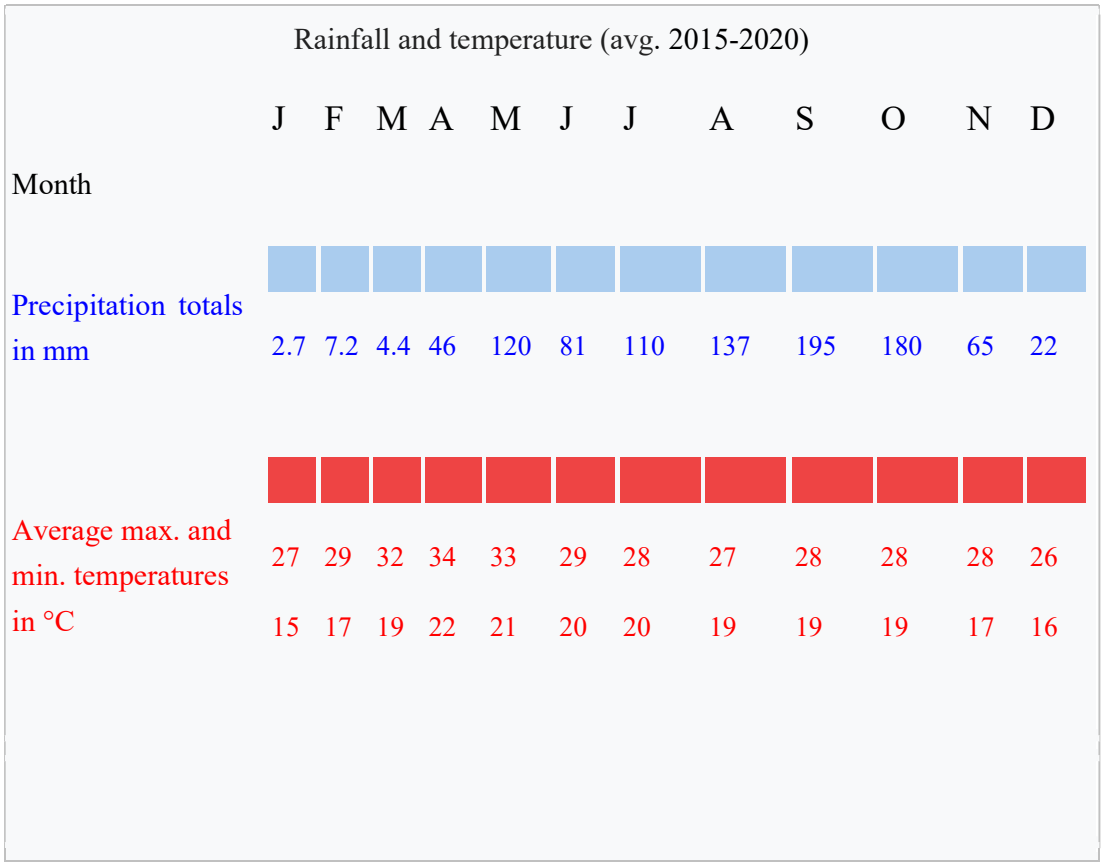
I. Site details

i. Location

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.

ii. Climate Chart



iii. Master Plan

iv. Block 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. Green Cover

BGS Institute of Technology has retained some site features to minimize site damage and associated negative environmental impacts such as, greenery within the campus, thereby providing habitat and promoting biodiversity. Top Soil Preservation is done to protect the top soil and control soil erosion, thereby reducing negative impacts to the site and surroundings, BGSIT is having a vegetated area of 22,468sq.m.

ii. Development Footprint

BGS Institute of Technology has more than 60% of open space i.e. open space is more than the building footprint. Institution is having Campus Area of 85,642 sq.m, Rooftop area of 10,861.76 sq.m, Vegetated area of 22,468 sq.m and Building Footprint of 34,127 sq.m.

iii. Day lighting

BGS Institute of Technology has maintained that all regularly occupied spaces are daylit, thereby improving health and well-being of students & teachers.

Classroom view

The institution is having more opportunity to save energy in buildings by maximizing the use of daylight there is no need for artificial lighting during daylight hours without causing variation in thermal comfort due to climate and building's design.

Classroom view

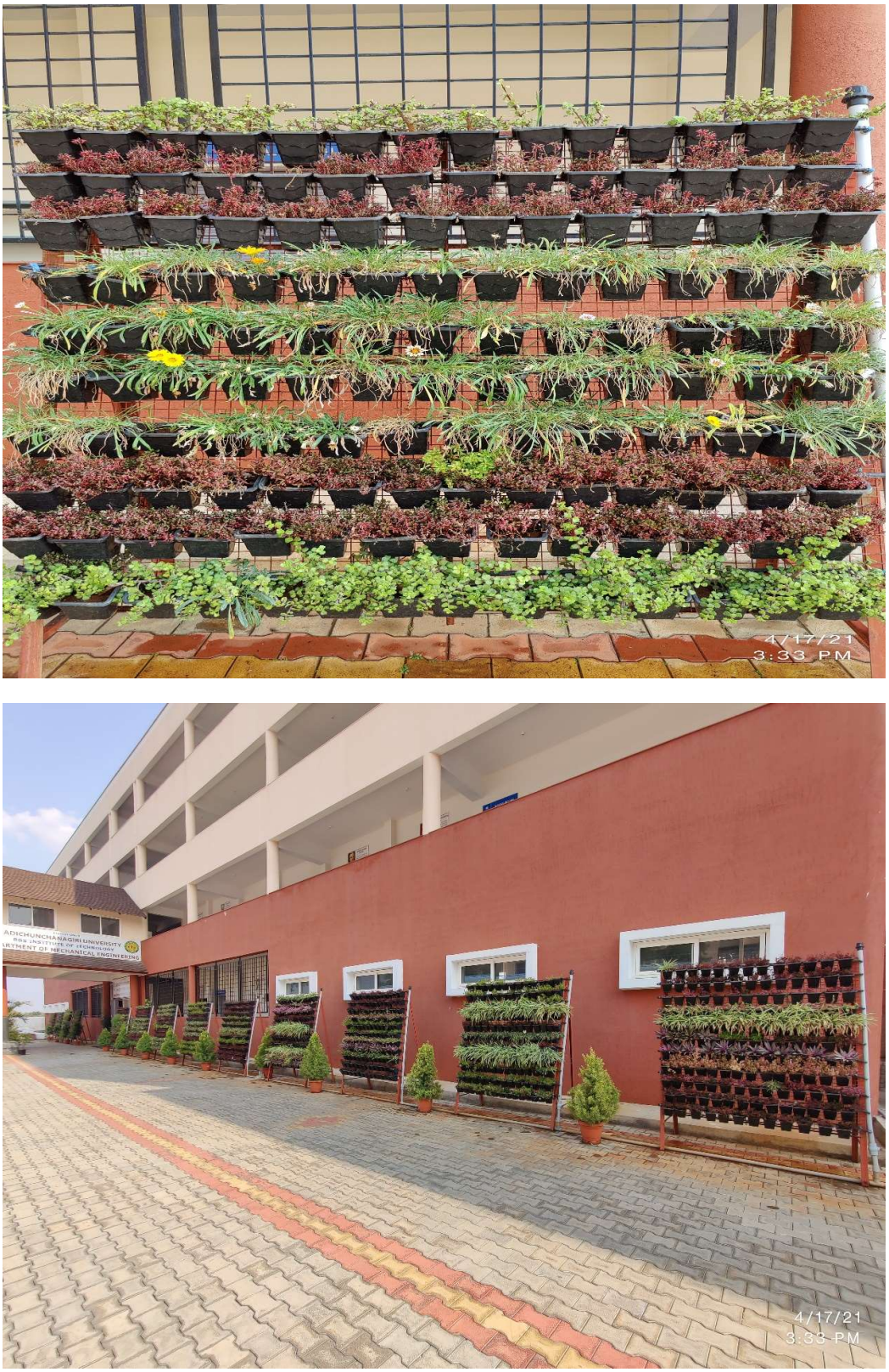
iv. Outdoor Light Pollution Reduction

To Reduce light pollution to increase night sky access and enhance the nocturnal environment. The institute has designed exterior lighting such that no external light fixture emits more than 5% of the total initial designed fixture Lumens, at an angle of 90 degrees or higher from nadir i.e. straight down.

v. Heat Island Reduction, Non-roof and roof

Institution has implemented measures to reduce the heat islands to minimize impacts on microclimates and human and wildlife habitats.

Majority of exposed non-roof impervious areas are under tree cover with open grass pavers and more than 95% of the parking spaces are under cover.



Vertical greenery systems, used as a strategy for urban heat island mitigation.

Solar panels reduced the amount of heat reaching the roof by an incredible more than 35%, keeping a building's roof 5 degrees cooler than portions of a roof exposed to sunlight directly

Parking spaces are under cover.

III. Biodiversity Audit.

A scientific survey of flora and fauna of the campus is carried out covering rainy, winter and summer seasons during 2019-20, this biodiversity audit has revealed more than 1350 trees, various species of Mammals, Aves, Arthropods and Annelids were also recorded. This indicated excellent composition of Flora and Fauna. Many birds are reported in the campus seasonally. Institution has started naming the trees and plants with their botanical name and numbering. Biodiversity audit has revealed different species as follows,

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

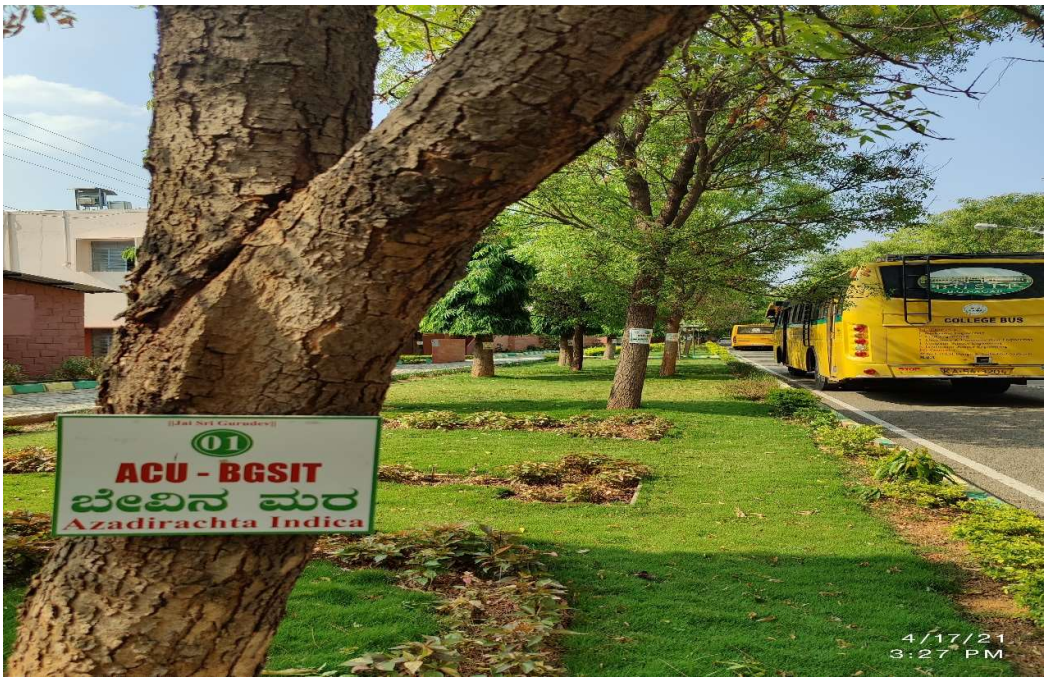
Various species of Mammals, Aves, Arthropods and Annelids were also recorded. This indicated excellent composition of Flora and Fauna quite unique considering that the campus is situated in the heart of the city. Many birds are reported to breed in the campus seasonally.

Animals and Birds most observed are as follows:

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

On an average campus is having about 150 trees and plant tree saplings that can mature into fully grown-up trees with large canopy in the next 5 to 8 years.

Institution is Minimizing disturbances and restoring vegetation in the campus, so as to promote habitat and biodiversity.



World Water Day and World Forest Day 2021 was celebrated by planting 150 tree samplings on 22/3/2021

IV. Water Audit

Water audit is an effective management tool for minimising 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 borewell.

Water demand calculation based on WHO standard.

Year	Population	Demand @15 LPCD	Provision per 15% losses	Total demand
2020	1,907	28,605	4,291	32,896

Considering Lower limit of lpcd as per WHO is 15 lpcd

ii. Water quality

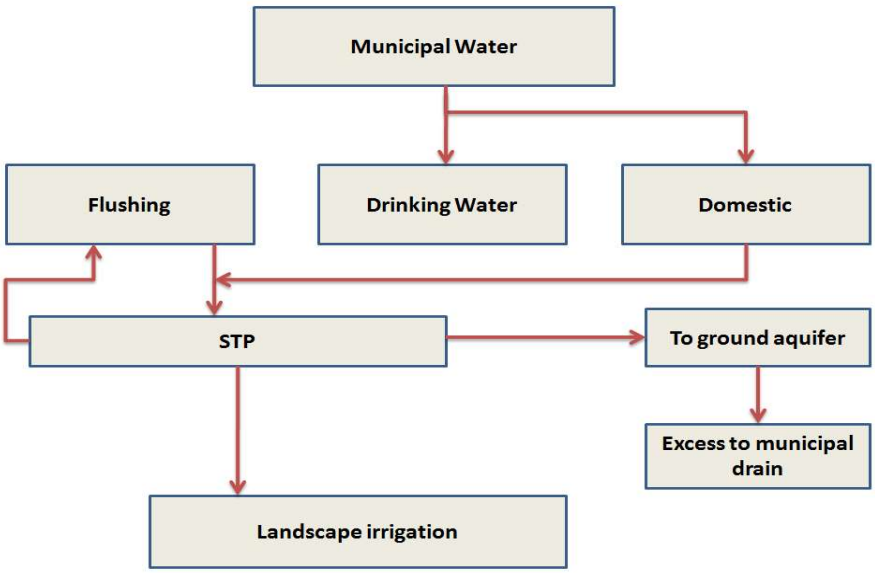
The quality of Bore well water meets the potable water standards.

Institution has adopted UV and RO water filtration system in each floor in each block to provide drinking water to the staffs and students

Campus Drinking Water quality analysis report

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	7.1
2	EC µmhos/cm at 25˚C	2250	1090	550
3	Turbidity NTU	1.0 - 5.0	13	2.2
4	Total Dissolved Solids, (mg/L)	500-2000	720	350
5	Hardness, (mg/L)	200-600	660	340
6	Chlorides,(mg/L)	250-1000	318	220
7	Nitrates, (mg/L)	45	2.4	1.9
8	Sulphates, (mg/L)	200- 400	245	230
9	Iron, (mg/L)	0.3-1.0	0.7	0.6
10	Fluorides, (mg/L)	1.0-1.5	1.5	1.2
11	E.coli, no/100 ml water	Nil	Nil	Nil

iii. Water Balance Chart



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 recharge pits.

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	2014	October	184	15	12.2
	2015	November	192	15	12.8
	2016	July	142	15	9.4
	2017	September	318	15	21.2
	2018	March	255	15	17
Average normal rainfall/day (mm)					14.52
Average normal rainfall/day(m)					0.014

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

Total roof run-off volume calculation:

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	679.00
7	BOYS HOSTEL 2 BLOCK	7	887.58
8	LIBRARY AND ME BLOCK	8	801.00
9	WORKSHOP BLOCK	9	1,542.5
10	TEACHING BLOCK	10	1420.0
11	CS EC BLOCK	11	1625.0
12	ADMIN BLOCK	12	1826.7
13	Mechanical BLOCK	13	763.00
TOTAL roof top area (m^2)			10,861.76

Sr.no	Surface type	Runoff coefficient (c)	Area (m2) (a)	Impervious area (m2) I = (c × a)
1	Cemented roof	.95	10,861.76	10,317.95
Total impervious area in sq.m. (Σ I)				10,317.95
Average normal rainfall in m (R)				0.014
Total roof run-off volume in cu.m (Σ I × R)				144.45

The institution has total roof run-off volume of 144.45 cu.m. Institution is having a rain water harvesting tank of capacity 1,50,000.

Rain water harvesting tank

v. Rain water recharge pit

The institution is having rain water recharge pits to enhance ground water table and also by providing more vegetated area.

4 numbers of recharge pits 15 feet deep Recharge Pit are located in the institution the rain water recharge pit allows the rain water to restore ground water. Considering the catchment area, rate of percolation of the soil and depth of ground water level the recharge pit is made near to the bore well in order to recharge the underground aquifers and help water infiltration in one area. The recharge pit is filled with stones of different sizes at the bottom, from large gaps for the water to pass through a mesh between sand and stones and prevents the sand from escaping. A layer of soil and leaves of plant acts as a filter for pure water which percolates through soil layer and then into bedrock. Thus rain water used for recharging the ground water level

Rain water Recharge Pit

Rain water collection tank.

vi. Water efficient landscape

Institution has implemented water efficient landscape by limiting the turf area in the campus to conserve water and landscaped area is planted with drought tolerant and native species.

vii. Waste Water Treatment and Reuse

To reduce the dependence on potable water, Institute is having an on-site treatment system to handle 100% of waste water generated in the campus, to the quality standards suitable for reuse, as prescribed by Central (or) State Pollution Control Board, as applicable and Using treated waste water for at least 25% of the total water required for landscaping and flushing purpose. Institution is using 100% for landscaping.

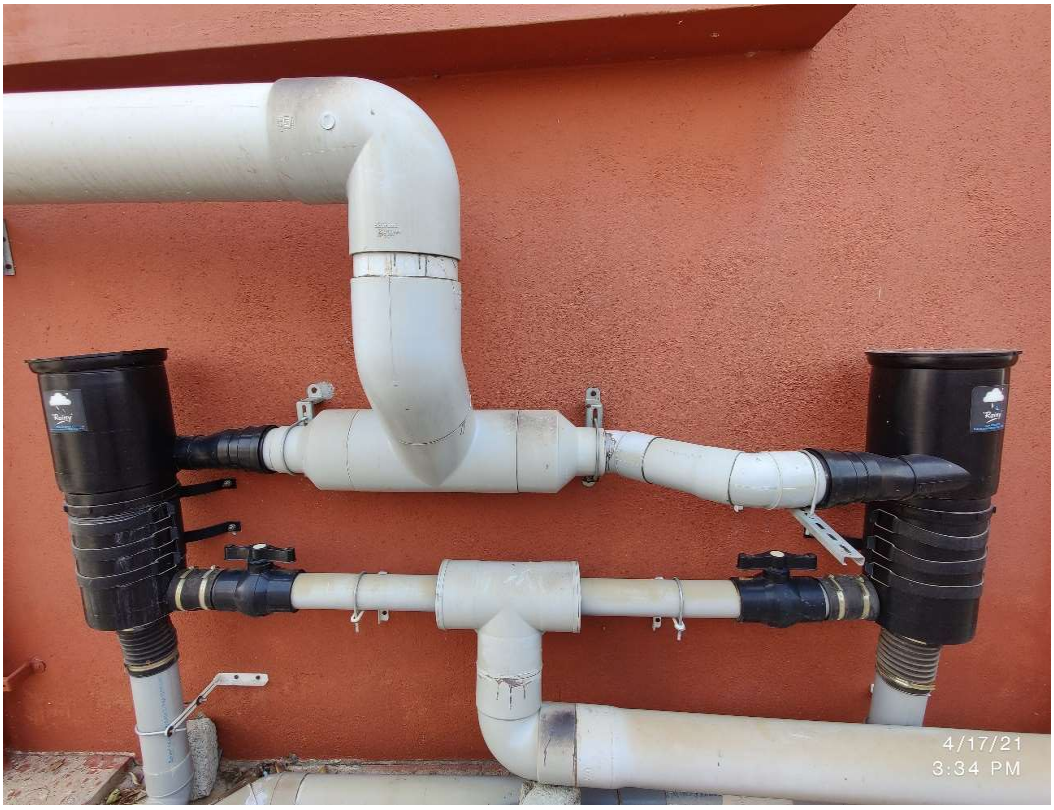
Treated waste water used for flushing.

Treated waste water used for landscaping.

viii. Operation and maintenance:

Proper operation & maintenance of rainwater drain facility has been implemented for their effective use. The following measures will be followed:

a. Inspection of Recharge Pit after every major storm for the first few months after construction. Annual inspection of filter and recharge pits will be conducted.
b. Quarterly cleanouts and removal of debris from all drainage inlets and outlets
c. Periodic removal and disposal of accumulated sediments from rainwater drains running all around the site.



480LPM capacity filter

ix. Quality Control:

Measure considered for removal of total suspended solids from Storm water by Periodical cleaning process will be carried out to improve the TSS removal efficiency for both the rain water storage and Recharge Pit.

V. 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. 27 Lakhs during 2020, 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.

BGSIT present energy scenario

The annual mean electricity consumption is around 1330 KVA which a purchased power drawn from the State grid. The college is in the HT2C(I) 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 1330 KVA, Electrical Consumption per Month was 110 KVA. Avg., Electrical Consumption per Day was 3.5KVA.

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	LED Lights	547	20
2	Ceiling fan	168	45
3	Air conditioner	44	2000
4	CFL and incandescent bulbs	331	40
5	Tube lights	933	40

ii. Daylighting Harvesting for Energy saving

The institution has made sure artificial lighting is turned on only when right amount of lighting necessary to compensate daylight, this allows optimal illuminance while minimizing energy consumption. Natural lighting will not always be enough to fully meet indoor lighting needs, but the Institution made sure to use only when required

The sizes and locations of windows has made sure maximum daylight reaches all the regularly occupied areas South-facing windows allow most winter sunlight into the building but little direct sun during the summer, so shading is provided along with curtains to reduce when required. North-facing windows admit relatively even, natural light, producing little glare so shading is provided along with curtains to reduce glare when required East- and west-facing windows provide good daylight penetration in the morning and evening and contribute little to solar heating during the winter.

Optimizing window placement to maximize the use of daylight are passive measures, because they don't require any type of control system to operate. Using daylighting harvesting, on the other hand, is an active measure and Institution is successful in it.

iii. On-Site Renewable Energy

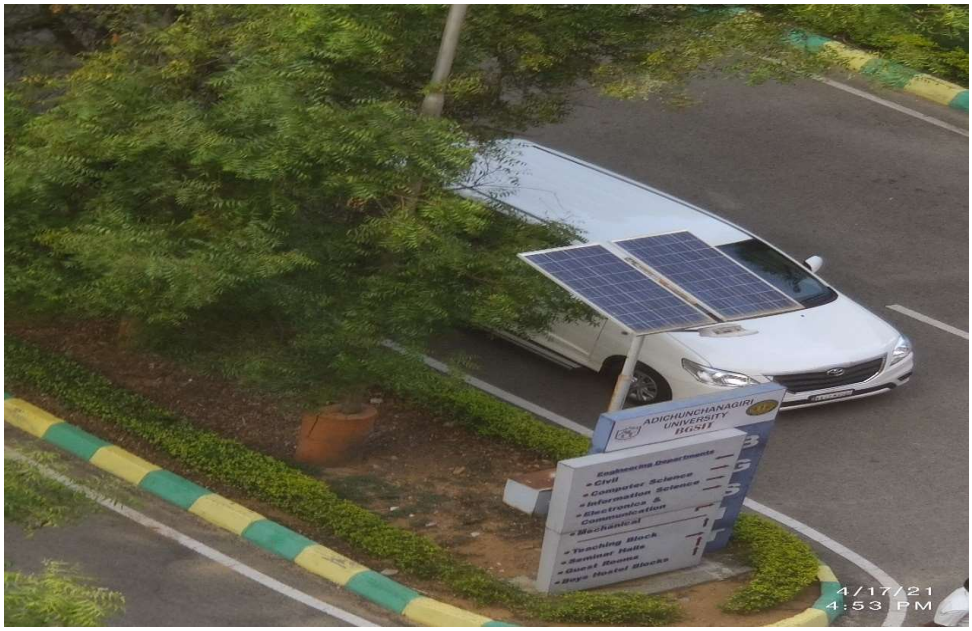
The institute has encouraged use of Renewable Technologies for On-Site Power generation, to minimize environmental impacts of using fossil fuels. Institution has come up with solar agreement with TATA Power Solar and installed Solar Panels of Power Production Capacity of 100KWp ongrid solar rooftop system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

100KV SRTPV on grid power plant is installed in the campus and 270 no. of PV Panel is installed in the campus.

Roof top solar panel

Roof top solar panel

Institution has procured 15 solar street light which will be installed very soon.



iv. 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.

Solar hot water system

VI. Health and Well-being.

i. Campus design caters to differently able people

The campus design ensures to caters differently abled and senior citizens. Following measures are being implemented for differently abled and senior citizens,

- Non-slippery ramps.
- Lifts with braille assistance.
- Preferred parking for differently abled.
- Wheel chair.
- Uniformity in floor level for hindrance-free movement in exterior common areas
- Easy access to the main entrance of the buildings
- Appropriately designed preferred car park spaces having an easy access to the building's main entrance or closer to the lift lobby

Lift with braille assistance.

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. Ozone Depletion

The refrigerant selected for the Air Conditioning System eliminates the emission of compounds that contribute to ozone depletion and global warming. The Air conditioning equipment has been selected with HFC based refrigerant R 410A.

iv. Fire suppression system

The main fire suppression system used is hand held fire extinguishers and are Halon free. Institution has not used any Halon based fire suppression system. Carbon dioxide B C Fire Extinguisher.

v. 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.

College Canteen

Railway station

vi. Breakout spaces

To enhance physical, emotional and spiritual well-being of campus occupants, the campus has breakout spaces by providing facilities such as, but not limited to gymnasium, yoga, meditation, indoor games, outdoor games, playground, etc.,

Play Ground

Gymnasium

Institution has provided Healthcare, Emergency & Security Facilities within the campus with AIMS Hospital and other initiatives such as first-aid/ clinic, pharmacy, emergency alarm, surveillance system etc., in the campus.

vii. Awareness programs

Awareness Program on Corona Do's & Don'ts was organized by Pre-Engg. Department & NSS Unit on 16th March 2021 at BGS Seminar Hall.

By Dr. Sagar B.G Medical Superintendent, Adichunchanagiri Hospital & Research Center, AIMS, BG Nagara & Dr. Shashikanth S K, Assoc. Prof Dept. of Community Medicine, AIMS, BG Nagara were the chief guests. They created awareness about Corona Virus, Do's & Don'ts and vaccination during corona outbreak.

Corona Do's & Don'ts

VII. Waste Management Audit.

Institution facilitate segregation of waste at source to encourage reuse or recycling of materials, thereby avoiding waste being sent to landfills. 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 strongly believes in 3R's **Reduce, Reuse** and **Recycle** of waste as follows,

Reduce: Institution has replaced the use of paper in admissions of the candidates, filling of the examination forms, cash book etc. This has drastically helped in reduction of use of paper. The students also encouraged to use both the sides of the paper for writing tests and are asked to use the paper binding for their academic practical records instead of plastic. Notice and circulars are shared to faculty through email.

Reuse: 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, which can be reused.

Electronic goods are put to optimum use; the minor repairs are set right by the Laboratory assistants and teaching staff; and the major repairs are handled by the Technical Assistant and are reused. BGSIT has entered into MoU with SOGO Synergy which buys our damaged computers and other non-reparable e-waste and issues a Recycling certificate. SOGO Synergy has a State-Of-The-Art Warehouse measuring 20,000 sq. feet meant for storage, dismantling and recycling of electronic waste with the support of latest technology. The equipment which cannot be refurbished for re-use is dismantled and remanufactured into raw materials (i.e. metals, plastics, glass) to be marketed as recyclable. The company assures that the E-waste does not end up in a landfill. It is sent to an agency authorized by Karnataka State Pollution Control Board (KSCB) for disposal, which processes E-waste in a Zero dumping technology. UPS Batteries are recharged / repaired / exchanged by the suppliers. The waste compact discs and other disposable non-hazardous items are used by students for decoration.

The Wet Waste generated from the institution has entered into an arrangement with a local farmer, who collects wet waste and left over food every evening and uses the same as fodder to his live stock.

Farmer collecting the wet waste from the college canteen.

Recycle: 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. Students and staff members are given sufficient information regarding the effective management of the waste generated in the campus.

Organic Waste Management

To ensure effective waste management, so as to avoid organic waste being sent to landfills and to improve sanitation & health. Institution has Installed an on-site waste treatment system for handling organic (food and garden) waste generated in the campus, including buildings. The generated manure or bio-gas will be utilized as appropriate.

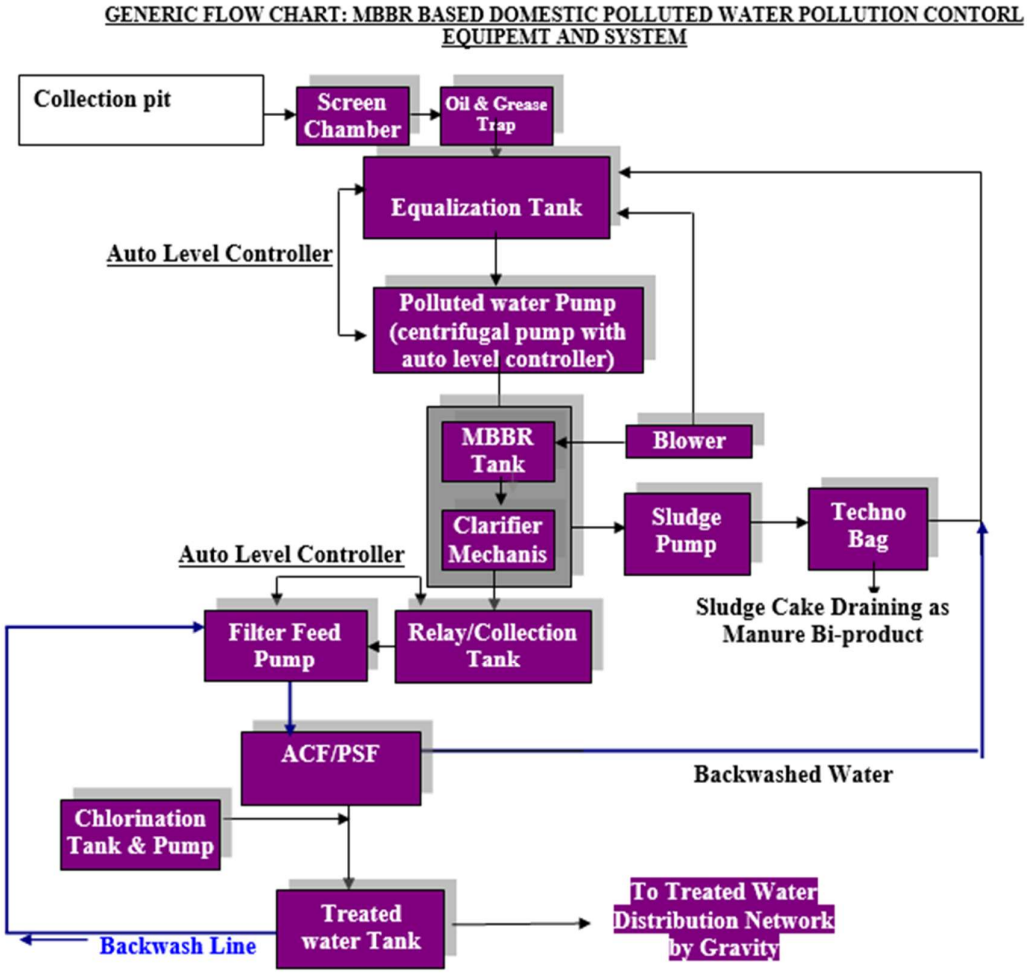
Institution is practicing organic waste composting method by implementing the pipe composting undertaken to compost the biodegradable waste collected from Boy's Hostel. The raw waste was put to active composting without any source separation and pulverization. It is a kind of vermi-composting, often called Tube Composting, carried out within a PVC tube.

Tube Composting

Sewage Treatment Plant

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.



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

x. Waste water generated calculation

Minimize the use of municipal water and reduce load on waste water systems, project team selected the low flow flush and flow plumbing fixtures for the project building.

Flush fixture	Daily uses	Flow rate LPF	Duration Flush	Occupant users	Sewage generation
Water closet full flush					
Male	1	6	1	500	3000
Female	1	6	1	600	3600
Water closet half flush					
Male	0	4	1		0
Female	2	4	1	500	4000
Urinal					
Male	2	0.5	1	600	600
Female	0	0.5	1		0
Flow fixture	**Daily uses**	**Flow rate LPM**	**Duration Sec**	**Occupant users**	**Sewage generation**
Lavatory faucet	3	6	15	600	2700
Health faucet	1	6	15	500	750
Total daily volume					14650.00
Total daily flushing volume					11200.00
Total monthly volume					322300.00
Annual working days					260
Annual volume (lit/yr)					38,09,000

As per the calculation annual waste water generation is 380,900lit/yr.

VIII. Green Education.

The institution promotes green education by involving students, local communities to increase awareness levels and encourage implementation of eco-friendly practices through Eco Club.

Eco Club helps the students to understand environment, environmental law and their role in the environmental protection. The institution conduct lot of programmes and awareness initiatives relating to protection of environment. In this regard many activities are conducted by the club periodically, such activities include many outreach and educational programmes in a year with the involvement of campus occupants, local communities 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 were participated and made the mission successful in the whole campus.

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.

Adichunchanagiri University – BGS Institute of Technology, BG Nagara, has Conducted Plantation Program on behalf of **"World Environment Day"** on 05th June 2020. Plantation Program was organized by Civil Dept. & NSS Unit at BGSIT Campus.

The Principal, The Registrar Evaluation, ACU, Finance Officer, ACU, HOD's, NSS Program Officer, Staff members, Non-teaching staff and Horticulture workers actively participated in the program.

World Water Day and World Forest Day 2021 was celebrated on 22/3/2021 by Adichunchanagiri University BGS Institute of Technology. The program was graced by the chief guest Dr. B Nagappa, Former Scientific Officer, Karnataka State Pollution Control Board, Bangalore, Dr. B K Narendra, Principal, BGSIT, Dr. T Mahadevaiah, Professor and Head, Dept. of Civil Engg. Dr. T Mahadevaiah extended warm welcome to the guest and the gathering. Dr B K Narendra, honoured the chief guest and in his presidential remarks stated about the importance and preservation of water.

Adichunchanagiri University BGS Institute of Technology, Celebrated world **Environment day** by doing activities such as the planting of trees and highlighting the urgency to increase the green cover. The plantation programme was headed by his Holiness Param Poojya Jagadguru Sri Sri Sri Dr. Nirmalanandanatha Maha Swamiji.

World Environmental Day 2021 Celebration on 05/06/2021

On the occasion of World Environmental Day plating of sapling program was arranged on 5th July 2021 in the BGSIT Campus. More than 50 saplings were planted in the campus.

Sapling Program on Environmental Day 2021 Celebration

As a part of societal activity **"Rural development program"** was organized at Brahmadevanahalli. The program was organized with the objective of Empowering, Educating, creating environment awareness among the stake holders. On this occasion Hon'ble Vice Chancellor Dr S Chandrasekhar Shetty addressed the gathering and distributed computers and also Nali kali (enjoy while learning) desks and tables were distributed to the schools 11 Schools which comes under Brahmadevanahalli Gram panchayat.

As a part of environmental initiative, tree samplings were planted around the village with the help of all the members of society activity along with Brahmadevanahalli volunteers.

The guests of the program highlighted mainly on the need and importance of protecting the Environment and also educating the rural students with latest facilities. All the members of the committee agreed to work on developing this village as a model village in the areas of **Education, Environment, Empowerment** of all the people.

"Clean Campus Mission" was organized on 01/02/2021. On this day, the NSS volunteers and students gathered to clean around the campus and shopping complex in front of the college campus. NSS volunteers enthusiastically collected plastic wastes, tea cups and glass bottles spread around the campus. The volunteers collected all the waste and trash bags to the place where the university has arranged for waste disposal. The whole cleaning drive was quite inspiring and motivating for the NSS team members.

The main aim of the program was to remove the garbage/ plastic around campus. The Principal, HODs, NSS Program Officer, Staff members & NSS Volunteers actively participated in the program. It was very well appreciated by the general public.



Clean Campus Mission.

An **"IGBC Student Chapter"** is being established with the following objectives: Spread awareness on Green Buildings amongst the student community. Ignite the idea of green in young minds, thereby facilitating India to become one of the global leaders in embracing green building concepts by 2025.

BGS Institute of Technology is a **Member of Indian Green Building Council** and **IGBC Student chapter** is launched in the campus.

The IGBC Student Chapter will benefit from activities such as:

- Training sessions for students
- Presentations and lectures by experts on Green Buildings
- Opportunities to participate in IGBC Events
- Internship opportunities for Students on Green Building
- Green Building Missions
- Design competition
- Participation in Chapter meetings

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.

i. Pedestrian Network

To Encourage safe and comfortable walking experience by providing well designed interconnected pedestrian network within the campus between main buildings and basic amenities, with proper shading and adequate illumination levels.

Keeping campus occupant's safety as a priority, considering National highway as a risk factor while commuting between campus. Institution has come up with subway, which is an alternative route which avoids main road also it is less congested, environmental friendly and simply more scenic and enjoyable.

ii. Sustainable Transportation

Institution has provided access to Sustainable Transportation by providing Shuttle service and Public transport.

Number of vehicles entering college campus:

Sl.No.	Vehicle	Number(Approx.)
1	Two wheeler	45
2	Car	9
3	Bus	3
4	College Cab	1

Number of students & teachers coming by walk / own vehicles /school bus / Public Transport:

Sl.No.	Vehicle	No. of Commuter(Approx.)
1	Two Wheeler	75
2	College Cab and Bus	200
3	Car	20
4	Hostel Students(Walk)	760
5	Outside College Within 1km(Walk)	350
6	Public Transport (Bus and train).	500
TOTAL		1905

- 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 CO_2 emission per year.

Sustainable transportation through Electric car, to travel inside the campus.

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.

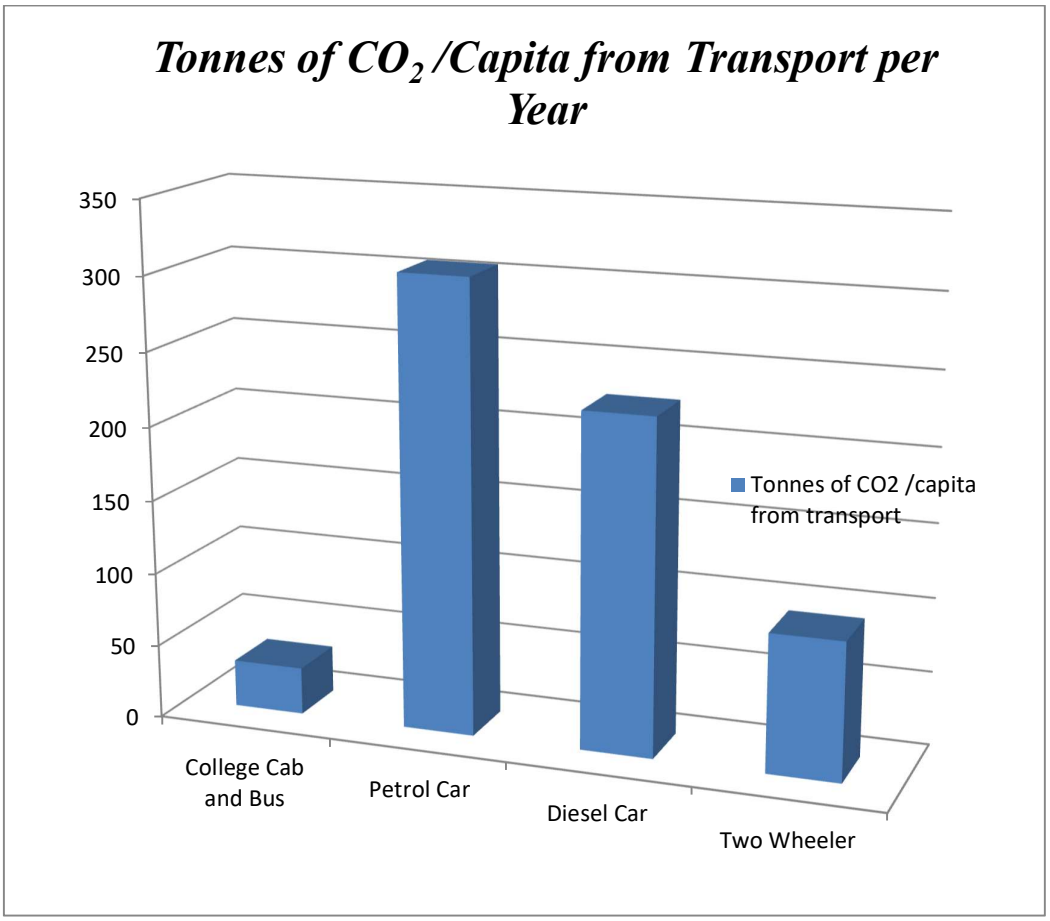
This audit is to create awareness in Students and Staff members about the pollution that are caused by use of vehicles. The carbon consumption in different vehicles are calculated which are entering campus, the survey of different vehicles entering campus was done later the distance each vehicles travel to campus was noted and these values are taken into consideration for calculation to find CO_2 emission per day.

CO_2 Emission per Day through Different Vehicle. (Due to Covid19 situation data mentioned below are only for reference for future implementations).

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 bus	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 260days/vehicle (a)	Number of vehicles (b)	Total CO_2 emission (a*b)	Number of people	Per capita emission in specific vehicle
1	College Bus	1599	4	6396	200	31.98
2	Petrol Car	612	5	3060	10	306
3	Diesel Car	567	4	2268	10	226.8
4	Two Wheeler	155.74	45	7008.3	75	93.44
	Total Emission (Ton of CO_2)			18.73(tCO_2)		



CO_2 Emission from Transport per Year

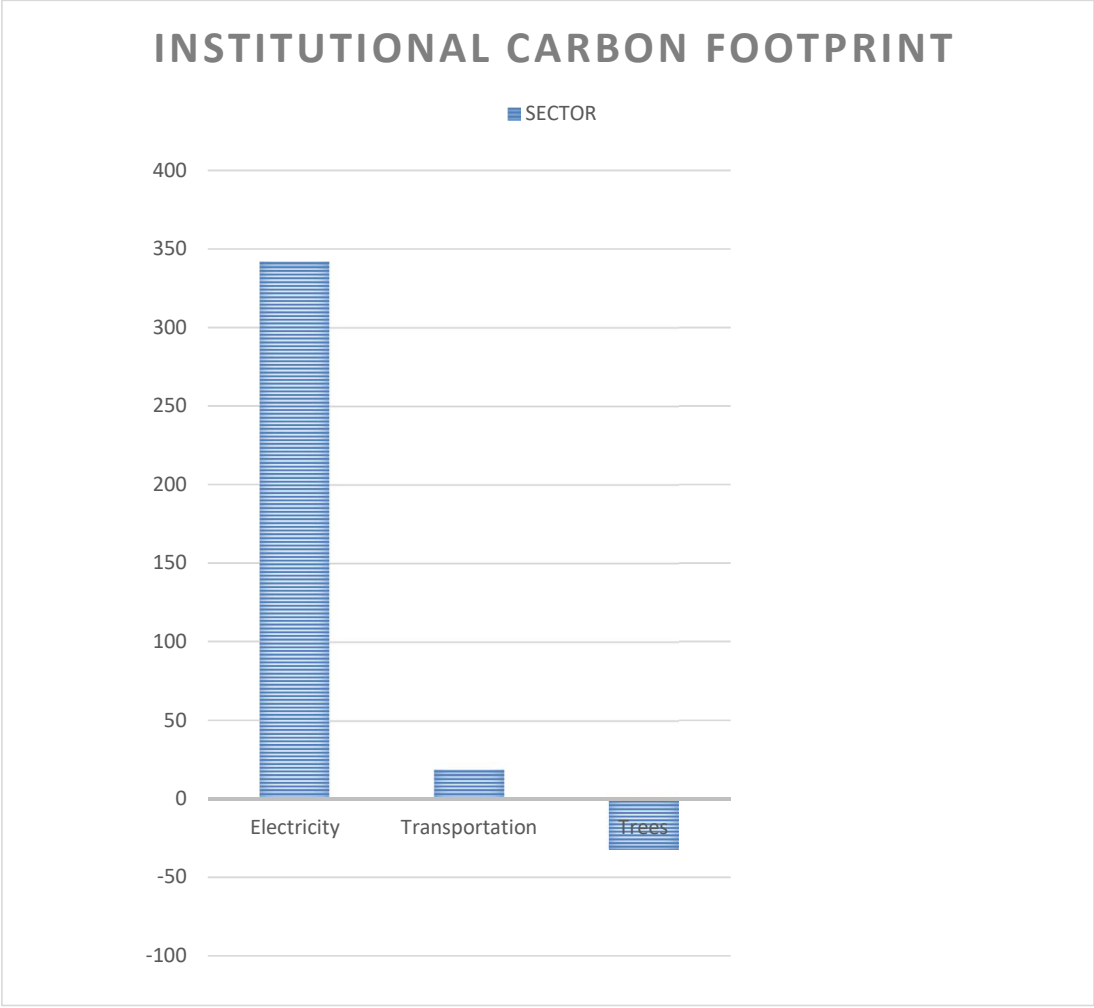
- CO_2 emission through electricity consumed per year,
  The Indian electricity system is divided into two grids, the Integrated Northern, Eastern, Western, and North-Eastern regional grids (NEWNE) and the Southern Grid. Each grid covers several states. As the grids are interconnected, there is inter-state and inter-regional exchange, Karnataka comes under southern grid. The average India electricity generation emission factor is 0.89 $kgCO_2e/kWh$, for Karnataka electricity generation emission factor 0.75 $kgCO_{2e}/kWh$.
  Data Source: CEA – All India Electricity Statistics – General Review 2011

- Electricity consumed per year 457154kwh /year *0.75 =342tCO_2 emitted

- CO_2 gained through plantation, Tree can absorb 21.77kg per year, campus has 1500 trees so 32 tons of CO_2 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	-ve
3	Transportation	-	18.73	-ve
4	Trees	32	-	+ve



Institutional Carbon Footprint

XI. Suggestion and Recommendation

1. Waste water treatment and reuse, to reduce the dependence on potable water, suggesting University to completely utilize on-site treated water to minimum 50%, to the quality standards suitable for reuse, as prescribed by Central (or) State Pollution Control Board for landscaping and flushing purpose.
2. Training on sustainability should be provided.
3. Use of E-books be promoted for students and faculty members specially in present COVID situation.
4. Energy monitoring to be done strictly by conducting energy auditing every year.
5. Practice Institutional Ecology- Set an example of environmental responsibility by establishing institutional ecology policies and practices of resource conservation, recycling, waste reduction, and environmentally sound operations.
6. Energy star rated appliances usage to be made mandatory
7. In future refrigerant selected for the Air Conditioning System to be selected with HFC based refrigerant like R 410A.
8. Sanitary waste: Sanitary napkin burning machine/destroyer called as incinerator" in the ladies' washroom to be installed in every ladies' toilet for a greener tomorrow.
9. Develop a butterfly garden that arouses appreciation towards flora and fauna diversity.
10. Every year Environmental Day, Earth Day and Water Day to be celebrated to create awareness about Environment.
11. Plantation activities to be followed in regular intervals to increase the green coverage area in and around the campus.
12. Students & teachers to be encouraged to come by walk / Public Transport:
13. Vehicle entry prohibited signage to be placed inside the campus
14. Students & teachers to be encouraged to bicycle and battery powered vehicle and Signage to be placed for bicycle and battery powered vehicle
15. Plastic ban signage to be placed inside the campus
16. Adopt the proposed Environmentally Responsible Purchasing Policy, and work towards creating and implementing a strategy to reduce the environmental impact of its purchasing decisions.
17. Ensure participation of students and teachers in local environmental issues.
18. Renovation of cooking system in the canteen to save gas by installation solar water heater system with heat pump.
19. Involve All Stakeholders- Encourage involvement of government, foundations, and industry in supporting interdisciplinary research, education, policy formation, and information exchange in environmentally sustainable development.


Green
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