GREEN & ENVIRONMENT AUDIT REPORT

for

Y. S. ARTS & K. S. SHAH COMMERCE COLLEGE

DEVGADH BARIA, GUJARAT

Y. S. ARTS & K. S. SHAH COMMERCE COLLEGE DEVGADH BARIA GUJARAT-389380

Established—1965

GREEN & ENVIRONMENT AUDIT REPORT WITH ACTION PLAN 2019 - 2024

Prepared by

Universal Consultancy, Vadodara
GUJ\VDD\17959 dated 17-10-2007
IGBC-AP, GRIHA-PATRON, IGBC-FELLOW
MIE, Member-INTACH, Member-IGBC,
Chartered Engineer (India)

GRIHA--PATRON **IGBC--FELLOW** **ASHRAE—MEMBER** **INTACH—MEMBER** **GEM--CP**

COPYRIGHT

N. K. Ojha
Universal Consultancy
Vadodara
9825821684
navinojha13@gmail.com
1st of July, 2024

PREFACE

The National Assessment and Accreditation Council, (NAAC) assessment is mandatory for all the recognized Higher Educational Institutions of this country. Criterion VII in the name of Institutional Values & Best Practices is a part of NAAC Manual and all Higher Education Institutions are supposed to comply to this Criterion too at the time of applying for the assessment.

This criterion carries 100 credits and various measures adopted by the Institution regarding Environment Friendly approach such as Water Efficiency, Rain Water Harvesting, Ground Water Recharge, Reduce-Reuse-Recharge strategies for Water, Energy Efficiency, Energy Performance Index of the building, Hybrid Energy, Indoor Environmental Quality, Eco-friendly building material, Low ODP & VOC material, Post Occupancy Waste Management, Energy Audit, Water Audit, Green Policy of the campus, Green measures beyond the fence are considered. Barrier free environment is also the part of this criterion.

Higher Education Institutions are required to submit compliance to above said measures adopted in Environment friendly approach adopted on their campus. This can be concluded in Green & Environment along with the Water & Energy Audit. The Institution has also to spell out the Green Policy for their campus development and operation.

Moreover, it is part of Corporate Social Responsibility of the Higher Educational Institutions to ensure that they contribute towards the reduction of global warming through Carbon Footprint reduction measures.

Hon'ble Prime Minister Narendra Modi on 02-11-2021 gave a five-pronged target for India and finally committed to a Net Zero emission target by 2070, joining the likes of the US, the UK and China.

This will be possible only and only if we inculcate Environment friendly approach and importance of Water, Energy, Air, Space and Earth to coming generation.

Y. S. Arts & K. S. Shah Commerce College, Devgadh Baria is applying for NAAC accreditation and hence the College Management has decided to conduct an external Green Evaluation by a competent Green Auditor along with a Green Audit Assessment Team headed by ***Dr. M. N. Gohil*** , and assisted by ***N. K. Ojha, of Universal Consultancy, Vadodara.***

Green Audit or Environment Audit has also focussed on the Carbon Footprint reduction measures being implemented by the College Management. The auditing was done for the period extending from 01-04-2018

The concept, structure, objectives, methodology, tools of analysis, time frame and cross-cutting themes of the audit are discussed in this report.

N. K. Ojha
01-07-2024

ACKNOWLEDGMENT

Universal Consultancy Team thanks Y. S. Arts & K. S. Shah Commerce College, Devgadh Baria for assigning this important work of Green & Environment Audit.

We appreciate the cooperation extended to our team during the entire process. Our special thanks are due to ***Dr. M. N. Gohil & Team IQAC*** with his colleagues for giving us necessary inputs to carry out this very vital exercise of Green & Environment Audit. We are also thankful to the members of Green & Environment Audit Committee, who were actively involved while collecting the data and conducting field measurements

Efforts have been made to prepare the Report useful for the College Teachers, Staff and the Students, as well as all Professionals to study and learn the Concept, Management and the Technical Feasibility of implementing the Report in the College. This is the unique activity jointly performed by a Team.

I congratulate ***Dr. M.N. Gohil,*** and his entire team of the College, staff and other professionals for undertaking this very vital exercise of Green & Environment Audit.

A word of thanks again to ***Dr. Pooja N. Patel,*** for co-ordinating the entire exercise of Green & Environment Audit and making available required documents promptly without which this Audit was difficult.

N. K. Ojha
01-07-2024

TABLE OF CONTENTS

GREEN & ENVIRONMENT AUDIT REPORT

WITH ACTION PLAN (2019 – 2024)

FOR

Y. S. ARTS & K. S. SHAH COMMERCE COLLEGE, DEVGADH BARIA

1. Context

1.1 NAAC requirements for Institutional Values & Best Practices

Criterion VII under Manual for Self-Study Report refers to: ***Institutional Values and Best Practices***

An Educational Institution operates in the context of the larger education system in the country. In order to be relevant in changing national and global contexts an Educational Institution has to be responsive to the emerging challenges and pressing issues. It has a social responsibility to be proactive in the efforts towards development in the larger contexts. This role of the institution is reflected in terms of the kinds of programmes, activities and preferences (values) that it incorporates within its regular functioning. The extent to which an institution is impactful in this is a sure reflection of its quality.

Every Institution has a mandate to be responsive to at least a few pressing issues such as gender equity, environmental consciousness and sustainability, inclusiveness and professional ethics, but the way it addresses these and evolves practices will always be unique.

Every Institution faces and resolves various kinds of internal pressures and situations while doing this. Some meaningful practices pertinent to such situations are evolved

within the institution and this helps smooth functioning and also lead to enhanced impact.

Such practices which are evolved internally by the institution leading to improvements in any one aspect of its functioning – academic, administrative or organizational, - are recognized as a "***Best Practices***". Over a period of time, due to such unique ways of functioning each institution develops distinct characteristic which becomes its recognizable attribute. A few of ***Best Practices*** proposed are as below.

- ***Fostering Social responsibility in young minds through community engagement***
- ***Adaptive success strategies for holistic and multidisciplinary education.***
- ***Promoting Academic Excellence Through Enriched Knowledge***
- ***Making students as leaders in all walks of life***
- ***Strategic Footprints of Growth and Development***
- ***Moulding Men and Women for Service to the Nation***
- ***Promoting Health & Wellness through Physical Education***

The focus of Criterion VII is captured in the following Key Indicators:

1. ***Institutional Values and Social Responsibilities***
2. ***Best Practices***
3. ***Institutional Distinctiveness***

1. ***Institutional Values and Social Responsibilities*** The Institution organizes gender equity promotion programmes. The Institution displays sensitivity to issues like climate change and environmental issues. It adopts environment friendly practices and takes necessary actions such as – Energy Conservation, Rain Water Harvesting, Waste Recycling

(solid/liquid waste management, e-waste management), Carbon Neutral, Green Practices etc.

The Institution facilitates the differently abled (Divyangjan friendliness), effective dealing of location advantages and disadvantages (situatedness), explicit concern for human values and professional ethics etc. In other words, the concerns for social responsibilities as well as the values held by the institution are explicit in its regular activities.

2. ***Best Practices*** Any practice or practices that the Institution has internally evolved and used during the last few years leading to positive impact on the regular functioning of the institution can be identified as "Best Practice/s". These are not any activity prescribed by some authority. At some point in time the Institution evolves some innovation or a change in some aspect of functioning. This practice is relevant mainly within the Institution at a given point in time. It could be in respect of teaching learning, office practices, maintenance and up keep of things or dealing with human beings or money matters. But adopting that practice has resolved the difficulty or has brought in greater ease in working in that aspect.

   In brief, these "Best Practices" are relevant within the Institutional context and may pertain to either academic or administrative or organizational aspects of institutional functioning.

   The Y. S. Arts & K. S. Shah Commerce College, Devgadh Baria has taken care and worked in depth towards "Best Practices", which will be dealt in detail in later part of this Report.

3. ***Institutional Distinctiveness*** Every Institution would like to be recognized for certain of its attributes which make it "Distinct", or, one of its kinds. Such attributes characterize the Institution and are reflected in all its activities in focus and practice. The Y. S. Arts & K. S. Shah Commerce College, Devgadh Baria has excelled in this area too, which will be dealt in detail in later part of this Report.

1.2 NAAC Criterion VII

This Green & Environment Audit Report for the College incorporates all the key indicators of Criterion VII and has also voluntarily incorporated many Green Building norms and a few innovative approaches for Green and Sustainable development of the College infrastructure.

The Green & Environment Audit Report is based on IGBC / GRIHA / ECBC / NBC /ASHRAE norms. All baseline case is considered as per above given provisions as stated by National and International standards.

Then design case is worked out to conserve water and energy. Also, indoor environmental quality and post occupancy waste management system is studied and guided to convert existing campus into zero discharge campus.

The Innovative approach such as Zero Discharge Campus, Net Zero Building, Zero Emission Campus and Water Positive Campus is studied and discussed in detail with College Authorities to explore possibilities in these fields too and make the College as Case Study for all the Students, Staff, Visitors and Students/Staff of adjoining Colleges/Universities.

The College to Act and Project itself as Motivator in Sustainable Development field.

2. Profile of Y. S. Arts & K. S. Shah Commerce College, Devgadh Baria

2.1 Brief History:

Y.S Arts & K.S Shah Commerce College, is situated in Devgadh Baria, serving the three most poor talukas of Gujarat. In very lap of nature, hills of Devgadh surrounds the building of college.

The college was founded by late His Highness Maharaja Jaideepsinghji of Baria giving his Rajmahal as college building in 1964. The aim was to upliftment and empowerment of Adivasis by education. A trust was formed by him named Baria Higher Education Society who conducts the college since the foundation.

Today college is recognized by UGC under 12(f) & 2(b). It is affiliated with Gujarat University offering as many as five major subjects in arts faculty and one in commerce faculty. It also runs one of the biggest PG center in Gujarat University. College is accredited with grade "B" by NAAC.
The college with it's unique mission and vision has won the best college award in 1984-85 and holds prominent position in field of sports. It has produced may champions and won general sports championship many times.

The college has been fortunate to have mentors like Maharaja Jaideepsinghji, his daughter Urvashideviji. The college built the new building with generous donations by Shri K. S. Shah UGC and TSP Dahod like agencies have always funded college with generous grants.

2.2 Milestones:

- Impart holistic education with emphasis on character, culture and value.
- Determine priorities for academic planning policies and programs based on the learner needs rather than institutional preferences.
- Update academic and management practices towards total quality management and promote quality in all spheres.
- Maintain educational excellence through a shared vision and team effort.
- Use educational technology to enrich the teaching and learning process by regularly improving infrastructural resources and employ the best technology.
- Provide opportunities for personal growth and development of the individual students.
- Promote overall development of students through co-curricular activities and sports.
- Evolve into a role model for other institutions of higher education in backward or tribal areas.

2.3 Administration & Management:

The entire administration is managed by the Principal of the College, who is assisted by the Vice-Principal and several committees to assist in his functioning.

The power of administration is diffused among different constituents of administration. The College believes in democratic functioning of administration within the framework provided by the University and Government of Gujarat. The basic structure of administration of organization is decentralized.

The success of the institution depends on its decision-making process, strategic planning and teamwork. The Principal, Vice-Principal, members of the various committees and Heads of various Departments play a vital role in the entire administrative process. The vital decisions concerning academic and administrative issues are generally unanimous and collective.

Each body or units of the College are involved in the decision making process.

COURSES OFFERED AT COLLEGE

The College offers Graduate programme in with following Departments.

B.A Gujarati	B.A Hindi	B.A Economics	B.A Sanskrit
B.A. English	M.A Gujarati	M.A Hindi	M.A Economics
M.A Sanskrit	M.A. English	B.Com Accounts	B.Com Statistics

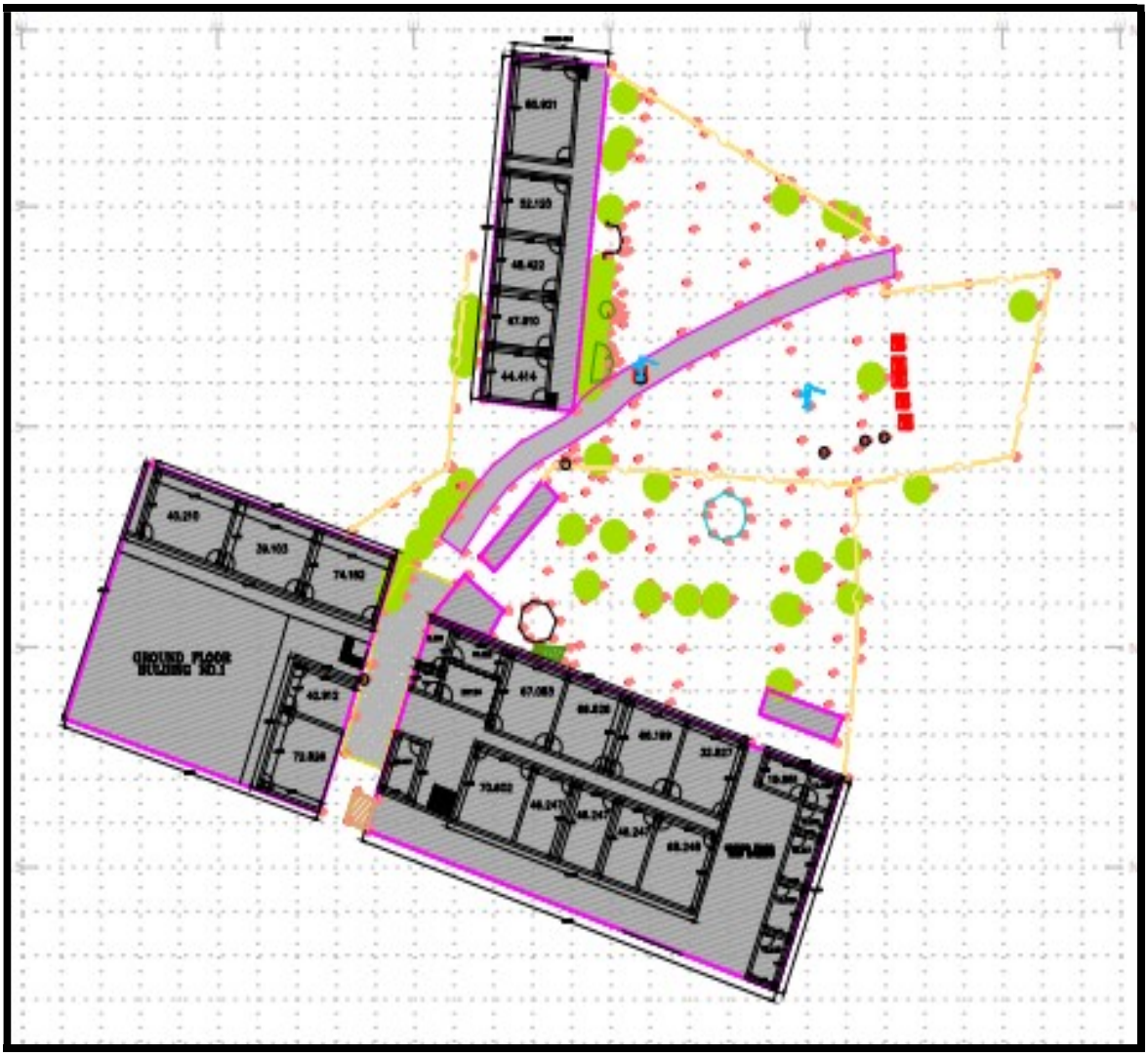
2.4 Students, Faculty & Staff Strength

Sr. No.	Programme	No. of Students		No. of Teaching / Admin. Staff including temporary	
		Boys	Girls	Male	Female
1	All Courses	1294	1624	26	7
	TOTAL-----2951				

This occupancy is required to calculate the potable water required and the likely waste generated on campus.

2.5 Physical Structure & Features

1. **The College Campus is spread over 8 acres of land** i.e 23,685 sq. mt. i.e 2,54,943.22 sq. ft.
2. ***The total built up area*** on the campus is 4,318 sq.mt. i.e. 46,478.57 sq. ft.
3. ***The landscape, flower bed, shrubs, tree plantation area*** is 2,000 sq. mt. i.e 21,527.82 sq. ft.
4. ***There are about 30 number of two wheelers*** of students and staff parked on the campus during working days.
5. ***There are about 0 number of bicycles*** of students and staff parked on the campus during working days.
6. ***There are about 5 numbers of four wheelers*** of students and staff parked on the campus during working days.
7. There are about ***80 number of trees*** (70 fully grown trees and 10 semi-grown trees) on the campus.
8. The College has one LT connection of 54 Kw and it consume on an average 3500 units per month for interior/exterior lighting and electric equipment system in the college building.
9. The College has a facility for continuous ***water supply*** system. The college meets with its water demand through water bores in the campus.
10. ***The College has following facilities and Infrastructure.***
    1. Main Building
    2. Playground
    3. Swimming Pool



COLLEGE CAMPUS LAYOUT

3. Concept

The term 'Environmental Audit' or 'Green Audit' means differently to different people. Terms like 'assessment', 'survey' and 'review' are also used to describe similar activities. Furthermore, some organizations believe that an 'Environmental Audit' addresses only environmental matters, whereas others use the term to mean an audit of health, safety and environment-related matters.

Although there is no universal definition of Green Audit, many leading companies/institutions follow the basic philosophy and approach summarized by the broad definition adopted by the International Chambers of Commerce (ICC) in its publication of Environmental Auditing (1989). The ICC defines Environmental Auditing as:

A management tool comprising a systematic, documented, periodic and objective evaluation of how well environmental organization, management and equipment are performing with the aim of safeguarding the environmental and natural resources in its operations/projects.

However, the outcome of Green Audit should be established with concrete evidence that the measures undertaken and facilities in the institution under Green Auditing lead to the reduction of Carbon Footprint, which has been historically defines as the total set of greenhouse gas emissions caused by an individual, event or organization and expressed as '***carbon dioxide equivalent'***.

4. Objectives of Green Auditing

The objective of Green Auditing is its most imperative component. A well-defined objective enables the Green Auditor as well as his Team to conduct the auditing without deviating from the focus. Achievement in terms of Carbon Footprint reduction needs to be assessed in both quantitative and qualitative terms.

- To assess whether the measures implemented by the College have helped to reduce the Carbon Footprint.
- To assess whether investments made in increasing awareness among students regarding electricity, biodiversity and environment have helped the College to achieve the required carbon dioxide emission and absorption in the campus.
- To assess whether non-academic activities of the College support the collection, recovery, reuse and recycling of solid waste that harm the environment.
- To identify gaps and suggest recommendations to improve the Green Campus status of the institution.
- A 'Green Audit' was conducted by the College which also included a detailed report of waste generated, methods of management and suggestions for improvement.
- Subsequently, Green Protocol was framed and the principles of scientific waste management, namely the '3 R's: Reduce, Reuse, and Recycle' were adopted.
- Green Protocol framed by the College emphasizes prevention/reduction of waste at its source. A number of unique initiatives have been implemented to promote

reduction of plastic waste on campus which earned special felicitation from social organizations.

- Replacement of single use plastic in College campus and in canteen counters with reusable steel glasses, promotion of cloth college bags instead of non-biodegradable rexene bags, encourage the use of steel water bottles and lunch boxes in place of plastic, avoidance of flex boards, plastic files and use of digital display boards during Seminars/Conferences, banning of plastic covering on student projects, encouragement of steel food containers, promotion of green protocol through messages in the campus display board are some of the plastic waste reduction initiatives.

- To promote the principles of 'reuse' and 'recycle', competitions of "Best out of Waste" organized in which the students of the college upcycled into beautiful works of art out of waste materials.

- To identify the usefulness and correct implementation of all the pro-active measures taken by College Administration in various fields including transportation, landscaping, indoor environmental quality, rain water harvesting, ground water recharge, post occupancy waste management system, energy and water conservation/efficiency etc.

- Undertake Water Audit & Energy Audit. Implement corrective measures for Energy and Water Efficiency.

- Introduce innovative approach in form of Zero Discharge Campus, Net Zero Building, and Water Positive Building.

- Develop College campus as a Case Study for students/staff and visitors.

- Finally contribute to the Prime Minister's call for Zero Emission by 2070.

- Recently, Hon'ble Governor of Gujarat State has also emphasized on cleanliness drive and the Higher Education Department of Gujarat State has issued notification for Post Occupancy Waste Management System functioning effectively in all University and college campuses of Gujarat state.

- The Green and Environment Audit has also incorporated above para in its Report and suggestions and recommendations to be implemented as said.

4.1 Green & Environment Audit Assessment Team

- The College Administration must formed a "***Green & Environment Audit Assessment Team"*** to look into the documentation of Green & Environment Audit Report and also to look into the implementation as narrated in the Report and take corrective measures.

- Also, to implement Suggestions/Recommendations of the Report in letter and spirit.

5. Methodology Adopted

The methodology adopted to conduct the Green and Environment Audit of the College campus has the following components.

5.1 Onsite Visit

The Green & Environment Audit Assessment Team started the audit at the College during the month of June, 2019 which extended for about 6 weeks and coming years. Greenhouse gas emission and carbon footprint reduction through adoption of green energy and energy-efficient measures were assessed.

The key focus was on Sustainable Development including Assessing the status of the green cover of the College campus, Water Efficiency, Water Conservation, Rain Water Harvesting, Ground Water Recharge, Energy Efficiency, Energy Efficient lighting fixtures and Equipment Day lighting, Wellbeing of occupants, Indoor Environmental Quality and Post Occupancy Waste Management System.

5.2 Focus Group Discussion & Seminar

The Focus Group included the Green Audit Team assessment members, staff members and officials from management. The discussion was focused in identifying the attitudes and awareness towards environmental issues at the institutional, district, national and global level. The discussion resolved around following key questions:

(i) Do the members of the group consider themselves eco-conscious?

(ii) Do they consider the Institution to be eco-friendly?

(iii) What do they think are the issues that need to be given top priority?

(iv) How to develop the campus as Case Study?

(v) How to motivate and encourage students and staff for Water & Energy Conservation and use it efficiently?

(vi) How to create awareness amongst students and staff for above said para (v)

(vii) Can we be the first College in State to introduce "***Green Building***" six months part time ***Certificate programme?***

(viii) How to develop the campus into "***Zero Emission***" campus and be the beginner to fulfil the commitment given by Hon'ble Prime Minister to the world.

6. Carbon Footprint Reduction

6.1 Office / Building Survey

Information on Office-based environmental impacts like built-up area, utility bills, energy-saving devices and IT equipments was collected. This information added to the carbon footprint data, generating a fairly clearer picture of the College's annual greenhouse gas emissions and impact of the reduction measures undertaken.

6.2 Carbon Footprint

- **Carbon footprints** is historically defined as *the total set of greenhouse gas emissions caused by an individual, event, organization or product, expressed as* ***carbon dioxide equivalent.***
- ***Carbon Footprint is measured in tCO_2. tCO_2eq stands for "Tones of CO_2 equivalent"***
- Our *'Carbon Footprint'* is a measurement of all GHG we individually produce to live. The amount of GHG produced depends on our lifestyle and consumption pattern.
- It also depends on how a product is made which we are consuming. If GHG production is more, then we say our carbon footprint is more. If it is less then we say our carbon footprint is small. We should strive to achieve a carbon footprint as small as possible.
- The largest amount of greenhouse gas emission-almost 80%-comes from the energy sector.
- Oil, coal and natural gas- all fossil fuels- supply most of the energy to run vehicles, & generate electricity for industries.
- This sector is responsible for about three-fourth of CO_2 emissions, one-fifth of CH_4 emissions, & large qty. N_2O.

- There are many other sectors such as Agriculture and Animal Husbandry, Deforestation, Waste & Waste water, Residential & Commercial buildings etc. leading to carbon footprint.
- In this report we have concentrated to carbon footprint because of vehicles and electricity consumed and carbon handprint considering landscape, flora and fauna.
- Data collected from the following sources were taken into consideration to calculate carbon footprint emission and reduction. The floristic richness of the campus – total number of plants, trees, shrubs – was estimated. The impact of alternate green energy production and consumption to reduce fossil fuel-based energy was assessed, e.g the number of CFL, LED, tube lights and electronic chokes was counted. The Carbon Footprint Calculator was used to arrive at conclusions.
- Carbon Footprint Calculator enables the measurement of carbon emission by the College. Besides, by Breaking down the value to key 'carbon drivers', the College can know how much of carbon footprint comes from which type of behaviour (high power-consuming incandescent bulbs vs. LED lights, solid waste management, etc.).

6.3 Carbon Audit Tools & Analysis

The Carbon Audit tools and analysis methodology were developed collectively by the Green Audit Assessment Team and based on that the audit was conducted in ten major thematic areas.

1. Flora & Carbon Footprint Reduction
2. Sustainable Site
3. Water Efficiency & Water Audit
4. Energy Efficiency & Energy Audit
5. Indoor Environmental Quality
6. Eco-friendly Commuting Practices --Green Transportation

7. Green Construction Material
8. Health & Comfort
9. Post Occupancy Waste Management System

6.4 Flora & Carbon Footprint Reduction

The large area of the College goes live with its green policy. The manifestation of the "Go Green" tree campaign truly finds expression in every nook and corner of the College to a great extent. For example, it is worthy to mention that despite the region being an arid region the College through its efforts towards environmental protection has ensured the plantation and successful maintenance 80 number of trees ensuring a pristine green cover for the students, faculties, and also for the wildlife that includes animals, birds and reptiles. Hence also as part of the pedagogy a Botanical Garden has been established which serves as a centre for ecological consciousness and learning. For the students and for the community at large, a beautiful Garden has also been developed to help the people appreciate the gift of nature, especially during the months of summer. Further, regularly, the campus conducts plantation drive with various stakeholders including the alumni and public representatives. The biodiversity surveys conducted by various departments has documented following flora fauna in campus;

Carbon footprints is historically defined as *the total set of greenhouse gas emissions caused by an individual, event, organization or product, expressed as* ***carbon dioxide equivalent.***

Floristic status of the College

About 560 to 700 fully grown trees shall be raised in 1 acre of land. This depends on the type of soil, the species/family of the tree and the spacing. However, with the normal spacing of 6 x 10 feet, the total number of trees shall be taken up as 600/acre. This is a theoretical consumption. The Green & Environment Audit Team of the College counted the number of plants: full-grown trees (above 10 years), semi-grown trees (below 10 years), shrubs and lawn (sq.ft. area).

The following table will illustrate these figures

Sr. No.	Particular of Flora	Designation
1	Full –grown trees	70
2	Semi –grown trees	10
3	Bushes (including floriculture plants)	50
4	Lawn	21,527.82 sq. ft.

Tool to Measure Carbon absorption by flora in the campus

Assumptions

1. Number of mature trees in 1 acre = 700
2. Carbon absorption capacity of 700 trees is equivalent to carbon emitted by a speeding car for 26,000 miles
3. 26,000 miles = 41,843 km
4. Average kilometres covered by a car per litre of petrol is 20 km
5. Total quantity of petrol consumed by the car (41,843/20) = 2092 litres

The carbon emitted by a car due to consumption of 1 litre of petrol is 2.3 kg CO_2. At this rate the total quantity of carbon emitted by 2092 litres of petrol (2092 x 2.3 kg) = 4812 kg CO_2 or 4.8 tonnes of CO_2.

Therefore, the carbon absorption of one full-grown tree is 4812/700 = 6.8 kg CO_2.

The footprint calculation is based on the standard unit of 1 litre petrol = 2.3 kg CO_2.

6.5 Carbon Absorption by Flora

Carbon absorption capacity of one full-grown tree = 6.8 kg CO_2.

1) Therefore, the carbon absorption capacity of 70 full-grown trees in the campus of the College (70 x 6.8 kg CO_2.) = **476 kg or 0.47 tonnes of CO_2.**

2) The carbon absorption capacity of 10 semi-grown trees is 50 % of that of full- grown trees. Hence, the carbon absorption (10 x 3.4 kg CO_2.) = **34 kg or 0.03 tonnes of CO_2.**

3) There are 50 bushes of various species being raised in the gardens of the College. Carbon absorption of bush plants varies widely according to the species. Certain bushes absorb as high as 49,000 g CO_2. per plant, whereas some others absorb as low as 150 g CO_2 per plant. In the absence of a detailed scientific study and botanical survey, the per-plant carbon absorption was assumed to be 200 g (in consultation with environment scientists). Based on this, the total carbon absorption of 50 plants was calculated to be 50 x 200g = 10,000 g or **10 kg or 0.01 tonnes of CO_2.**

4) The Green & Environment Audit Assessment team looks after the maintenance of landscape on the campus. Buffalo variegated grass, Mexican grass and indigenous grass species are being raised and maintained in the lawn. The total area of

the lawn is 21,527.82 sq. ft. The carbon absorption capacity of 10-sq.ft. area of lawn is 1 g CO_2. Hence, 21,527.82 sq. ft. of lawn absorbs **2152 g or 2.152 kg CO_2. per day**. At this rate, the total carbon absorption per year (2.152 kg x 365) = 785.48 kg or **0.78 *tonnes*** per year.

The grand total of carbon absorption by the flora in the College Campus is (1+2+3+4) = 1.29 tonnes.

This is the sink effect of the flora in the campus.

Tool to measure oxygen emission by flora in campus

According to the Arbor Day Foundation, 'a mature leafy tree produces as much oxygen in a season as 10 people inhale in a year'.

A person breathes 7 or 8 litres air per minute. Air is about 20% oxygen. But the exhaled air has about 15% oxygen, and hence the net consumption is about 5 %. Therefore, a person uses about 550 litres of pure oxygen each day.

6.6 Oxygen Emission by Flora

The number of litres in 1 kilogram depends on the density of the substance being measured. Litre is a unit of volume, and kilogram a unit of mass. Litres and kilograms are approximately equivalent when the substance measured has a density of close to 1 kilogram per litre.

On an average, one full–grown tree produces nearly 260 pounds or 117.6 kg of oxygen each year. Two mature trees can provide enough oxygen for a family of four.

1) Total oxygen emitted by 70 full –grown trees per year (117.6 kg x 70) = 8232 kg or **8.23 *tonnes.***

2) Total oxygen emitted by semi- grown trees (58.8 kg x 10) = 588 kg or **0.58 tonnes** (oxygen emission in 50 % of that of the fully grown trees).

3) Total oxygen emitted by 50 bushes is calculated based on the following oxygen –inhaling requirement per person per day. A normal human being requires 550 litres of oxygen per day. 400 bushes produce enough oxygen per day to enable a person to breathe adequate quantity of oxygen of 550 litres. Total quantum of oxygen produced by 400 plants per day is 550 litres of oxygen.

   Taking 400 plants as one unit, the number of units of bushes in the campus (50/400) = 0.125

   Total quantity of oxygen produced by 0.125 units (0.125 x 550 litres) = 68.75 litres of oxygen per day.

   The annual production of oxygen at this rate (68.75 x 365) = 25,094 litres or kg of oxygen, which is approximately **25.09 tonnes of oxygen.**

4) Lawn is an incredible oxygen –making machine. A 25-sq.ft. area will supply enough oxygen to support one person for a day. Quantitatively speaking, this area of grass produces 550 litres of oxygen per day.

   The total area of lawn in the campus is 21,527.82 sq. ft. In units, the value (21,527.82/25) = 861 units, which produce (861 x 550 litres of oxygen) = 4,73,550 litres of oxygen per day. Total quantity of oxygen produced by the 21,527.82 sq. ft of lawn per year (4,73,550 litres/day x 365) = 17,28,45,750 litres or approximately **1,72,845 tonnes.**

6.7 Carbon Footprint Reduction Table

- **Carbon dioxide absorption**

Sr. No.	Flora	Quantity of CO_2 (tonnes)
1	70 Full –grown trees	0.47
2	10 Semi –grown trees	0.03
3	50 Bushes	0.01
4	21,527.82 sq. ft. Lawn	0.78
	Total	**1.29**

- ***Oxygen emission by flora***

Sr. No.	Flora	Quantity of O_2 (tonnes)
1	70 Full –grown trees	8.23
2	10 Semi –grown trees	0.58
3	50 Bushes	25.09
4	21,527.82 sq. ft. Lawn	1,72,845
	Total	**1,72,878.9**

GREEN COVER ON CAMPUS

GREEN COVER ON THE CAMPUS

7. Energy Efficiency

Energy conservation is the utmost important in Green & Environment Audit. Entire Nation and all States of our country are canvassing and encouraging people of India to save energy. We are falling short of energy as compared to its generation and usage.

Ministry of New and Renewable Energy, Government of India of India is promoting use of Green and Hybrid Energy. Government of India has come up with ECBC code-2005 revised in 2017 with amendment in 2022. All Public buildings, Institutions, Commercial complexes, Factory buildings Residential complexes have to follow ECBC-2017 norms.

College must take a pro-active step of procuring LED lighting fixtures and BEE star rated electrical equipment and ceiling fans for all its spaces

7.1 Implementation of ECBC/ASHRAE/LPD Norms

The College has yet to undertaken Energy Audit for its campus Building, which should be taken up soon.

Even then College Administration has taken up series of steps to reduce the energy consumption on the campus. College has taken a policy decision to install LED lighting fixtures only and purchase all electric equipment with minimum BEE 3 Star Rating.

The College has further taken a decision to retrofit its buildings as energy efficient / green buildings and construct all its new buildings as energy efficient / green buildings.

The College designs the building to comply with Energy Conservation Building Code (Revised Version May, 2017) (or)

ASHRAE Standard 90.1-2010 (without amendments) through one of the following approaches:

Performance based approach (Whole building simulation) OR Prescriptive approach. Energy Efficient Buildings have savings over more than 40% in electric consumption over ECBC norms or ASHRAE norms. The College confirms that the total annual energy consumption of the building should not exceed the total base case energy consumption computed, as per ECBC (or) ASHRAE Standard 90.1-2010.

The Lighting Power Density (LPD) in the building interior, exterior and parking areas are reduced by minimum 10% over ECBC base case.

Compliance for the lighting power density is shown either through 'Building Area Method' or 'Space Function Method'. Exterior areas illuminated by lighting only is considered for lighting power density calculations. The LPD includes power consumption of complete fixture, including lamps and ballasts

7.2 Total Energy Consumption & Equivalent CO2

The data based on electrical bills collected from College reveals that the total Electrical energy units consumed on Campus per month is approx. **3500** ***(KWh)***. This includes ***air conditioners***, which consumes about ***50%*** of electricity

Hence total annual energy consumption is 3500 x 12 = 42,000 units per annum.

One Unit equals 1000 watts (1KWhr.) It requires 0.538 Kg or approximately ½ Kg of coal to produce 1 unit of electricity.

Total quantity of coal required to produce ***42,000*** units of electricity is (42,000 x 0.538 Kg coal) = 22,596 Kg or 22.59 tons of coal.

Co_2 emission by coal

One Kilogram of coal emits 2.86 Kg. of CO_2 thereby increasing the carbon footprint which in turn contributes to global warming.

Therefore 22.59 tons of coal consumed indirectly by the College through consumption of 42,000 units of electricity led to the emission of (22,596 Kg of coal x 2.86 Kg CO_2) = 64,624.56 Kg or ***64.62 tons of CO_2 the atmosphere.***

7.3 Solar Panels on Grid

The College has not installed Solar Panels on the roof top

College must install Solar Panels.

7.4 Energy Efficiency & Conservation

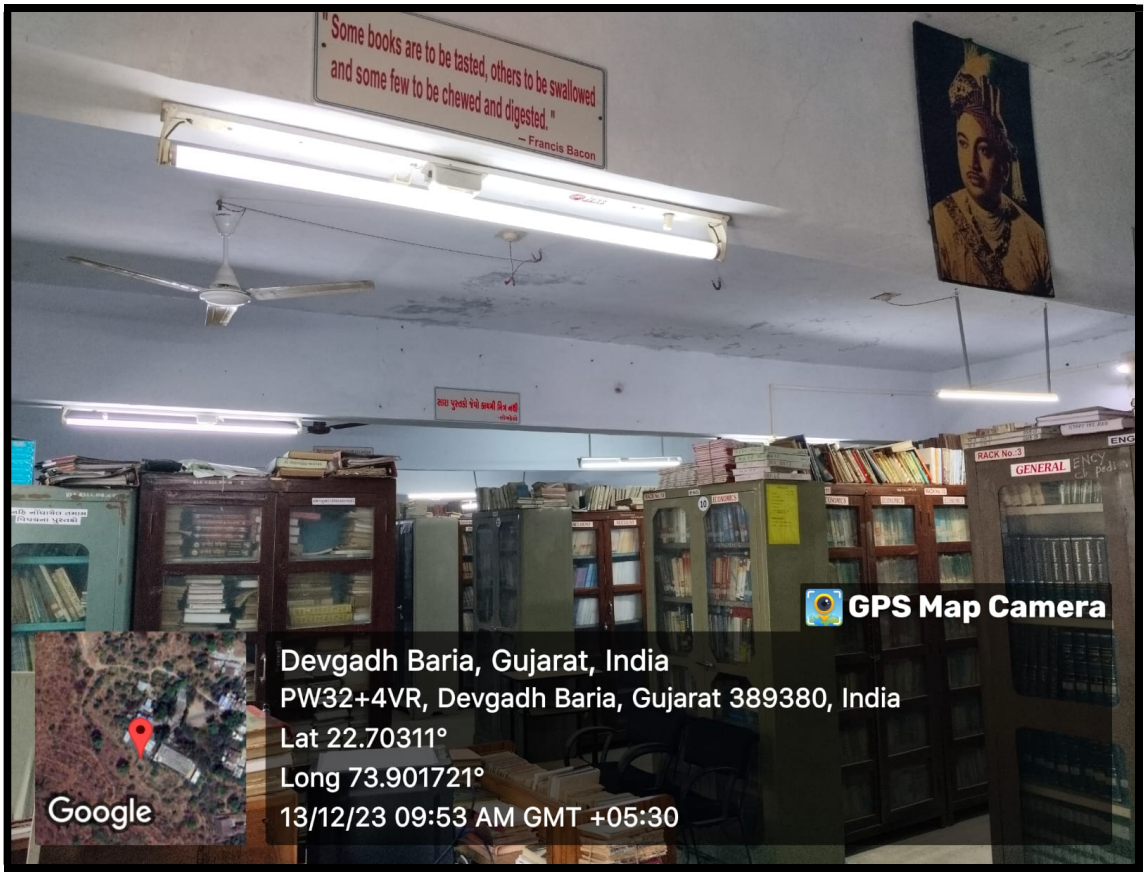
College building has air-conditioners, which confirms and considers unitary air-conditioners with BEE 3-star rating.

College verifies and ensure that the building's equipment & systems are commissioned to achieve performance as envisaged during the design stage. College is also proposing to submit measurement & verification plan for yearly reporting.

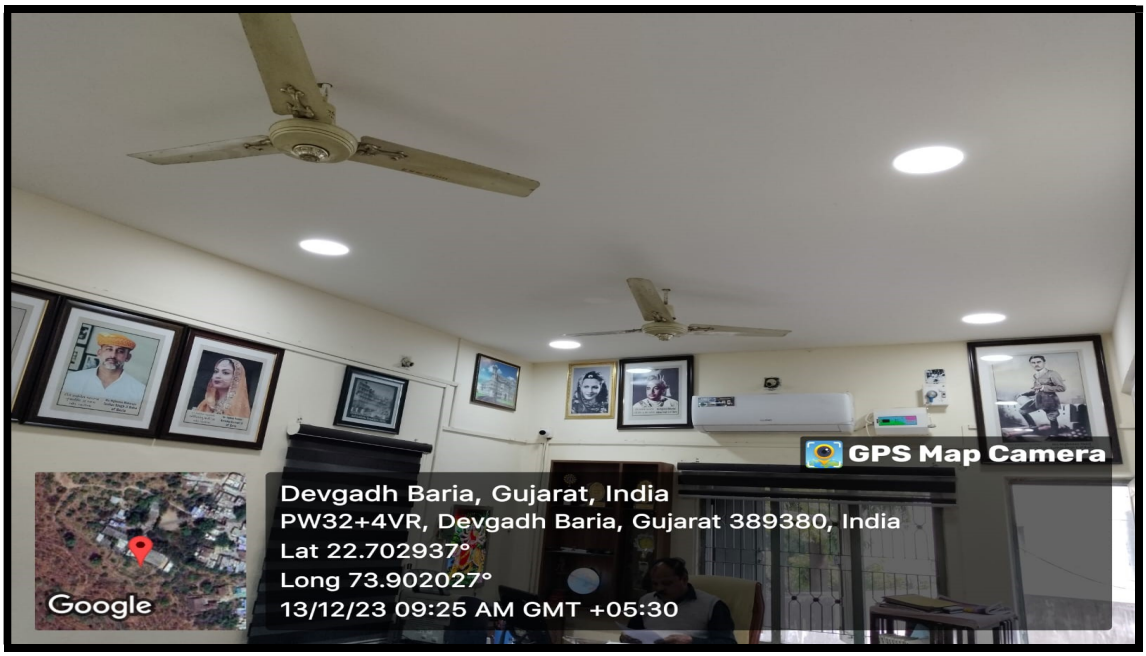
Permanent signages are not placed of Save Energy and Put Off lights when not in use.

The College has installed energy efficient pumps. The building design is such so as to attract maximum daylighting, which reduces artificial lighting load during daytime.

The College must place permanent signages to ***"Save Energy"*** and other similar kind of signages at all class rooms and wash rooms to motivate and create awareness amongst students and staff to save water.



ENERGY EFFICIENT LED LIGHTING FIXTURES & FAN MUST BE PLACED

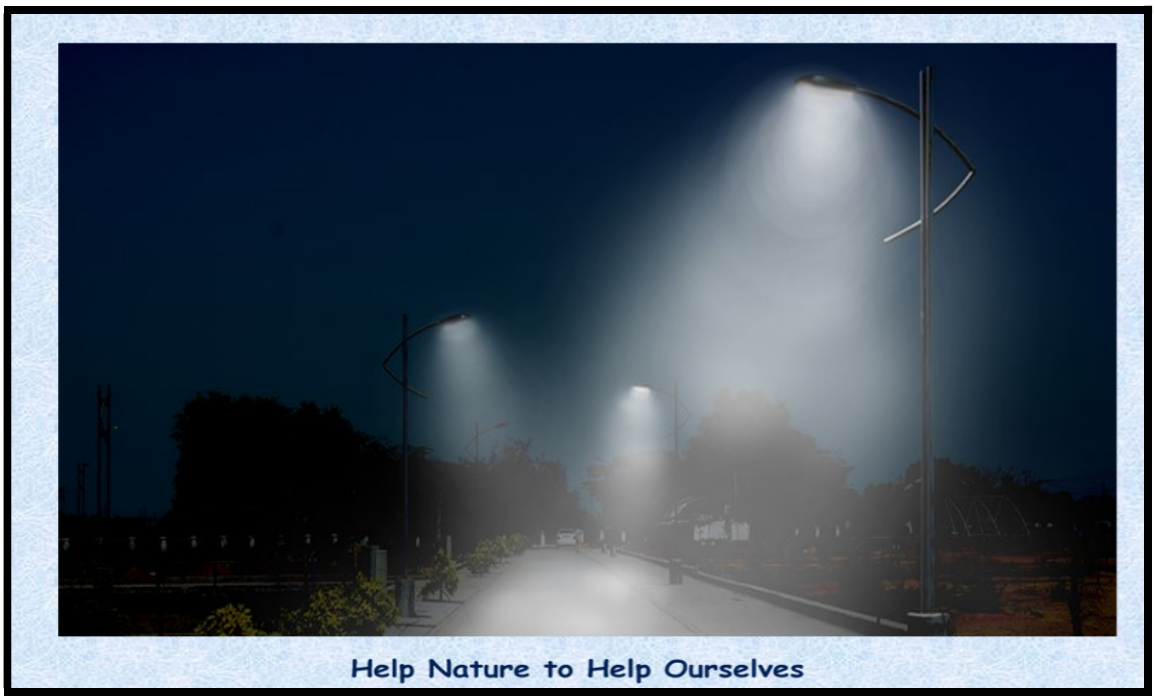


ENERGY EFFICIENT SPLIT AC

7.5 Outdoor Light Pollution Reduction

Light pollution on the campus is reduced to increase night sky access and enhance the nocturnal environment. Exterior lighting are designed 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 (straight down). LED lights are not used for exterior lighting system, which is the improper way of energy efficient steps.

The center-to-center distance between exterior lighting electric poles and their height is calculated so as to avoid any overlap of night light and also to lit only drive way. The bracket and the angle of bracket also play an important role for the same. Finally, the lighting fixture is selected so as to illuminate only drive way.



REDUCE NIGHT LIGHT POLLUTION BY PLACING LED

7.6 Energy Performance Index

Energy performance index (EPI) is total energy consumed in a building over a year divided by total built up area in kWh/sq m/year and is considered as the simplest and most relevant indicator for qualifying a building as energy efficient or not.

EPC ratings are given to properties and are represented on a scale from A (most efficient) to E (least efficient). The EPC contains information about a property's energy use and typical energy costs, as well as recommendations about what you can do to save energy at home and make your property cheaper to run.

Enhance energy efficiency of the building to reduce environmental impacts from excessive energy use

EPI range for buildings having less than 50% occupied area as air conditioned (kWh/m2/year) IS 75-65 for Hot & Dry climate zone. This value is applicable only for day use office buildings which operate for 260 to 300 days in a year.

Electricity consumption details including utility power, captive generation and renewable energy of preceding 1 year

The total annual energy consumption is 42,000 kW

The total Built up area is 4318 sq.mt.

Hence EPI = 42,000/4318 = 9.7 kWh/m2/year, which is far below the given limit.

8. Eco-friendly Commuting Practices

Eco-friendly commuting practices can also be termed as Green Transportation.

Emission of CO_2 through transport system – both public and private – is very high in India as India is credited with the third rank in carbon emission in this regard. It is estimated that in India, 9% of the total carbon is emitted by the transport system.

The College Management has taken a principle stand right from the beginning to encourage students to use the public transport system or walking or use bicycle to reduce carbon emissions.

Unfortunately, after globalization, there has been a continuous increase in the income of the 100 million plus middle class families along with the automobile boom. As a result, the student community and teaching faculty members of the College are using two wheelers and four wheelers in large numbers and the trend has been on the increase. This is inspite of creating awareness to use public transportation or bicycle or walking. Hence it is appropriate, in this context, to analyze the carbon dioxide emissions from the fleet of four wheelers and two wheelers owned by the individuals even though the College does not pollute the atmosphere directly.

The College Management has been successful to convince students and staff to commute in public transportation and hence it is a great achievement for the College that not more than about 30 numbers of two wheelers and not more than 5 numbers of four wheelers reach College daily and this figure includes vehicles used by teachers and administrative staff along with the visitors.

8.1 Vehicles on the campus & it's carbon emission

The following data indicate the quality of diesel consumed by the vehicles during the last year. There are 5 numbers of four wheelers, and 30 two wheelers used by students and staff. It is appropriate to calculate the petrol consumption separately for four wheelers and two wheelers. The survey conducted among students / staff who own two wheelers reveals that they use the vehicles not only for visiting the College, but for moving after college hours and holidays. It is estimated that the average mileage covered by each staff / student is about 30 km/day. The total mileage covered by the 30 two wheelers per year (30 x 30 x 365) = **3,28,500 km.**

Apart from that 5 numbers of four wheelers are used by the students / faculty members and the average mileage covered is also the same, 30 km per day. Hence the total mileage covered by 5 numbers of four wheelers per year is (5 x 30 x 365) = **54,750 km.**

The total mileage covered by two and four wheelers per year (3,28,500 + 54,750) = **3,83,250 km**.

The fuel consumption by vehicle is determined by the type of vehicle, year of manufacturing, maintenance status, traffic system of the particular area, etc. High-end and medium- range bikes consume different quantities of petrol. However, for the sake of convenience, 35 km per litre is taken as the standard to calculate the carbon emission of two wheelers. Based on this, the total quantity of petrol consumed for covering 3,28,500 km is (3,28,500/35) = **9,385.71 litres say 9,386 litres**

A medium-range four wheelers covers 16 km per litre of diesel. Based on this the total quantity of diesel consumed by 5 four wheelers per year (54,750/16) = **3,421.87 litres say 3,422 litres**

Thus, the total fuel consumption per year (9,386 + 3,422) = 12,808 litres (both petrol and diesel).

Conversion table to calculate carbon emission by vehicle per litre is very complicated in view of the local variable to be taken for calculation.

Instead, a simple but universally accepted calculation calendar for various types of fuels and their CO_2 conversion rate was adopted.

As per this calculation calendar, combustion of 1 litre of diesel/petrol leads to the emission of 2.68 kg of CO_2. At this rate, the total quantity of CO_2 emitted by 12,808 litres of fuel (12,808 x 2.68) = **34,325.44 kg = 34.32 tonnes.**

The carbon emission into the atmosphere is 34.32 tons because of vehicles moving on the campus and for education purpose out side the campus.

Considering this emission of the CO_2, the Institution has intensified green awareness among the students and through green education on the one hand and plans to mitigate carbon emission from vehicles on the other.

The College management has motivated and encouraged all students and staff is to use public transportation, cycle, walking, and further discard use of personal vehicle in order to reduce CO2 emission and fuel consumption and convert the campus into ***Zero Carbon Campus.***

The College has also encouraged green transportation i.e. encourage students and staff to pool car and two wheelers. Discard use of even public transportation and reach walking if the college premise is within 2 to 3 Km radius.

8.2 Parking Facility & Regulations

The College campus must have limited preferred parking area with shed for vehicles. This is in order to discourage bringing vehicles on the campus. The parking shed adds to heat island effect roof. The trees are used as shading devise to park vehicles. This also saves the cost of parking shade and further reduce heat island effect roof. The trees act as evaporative type of cooling system for the campus.

Green Transportation is also the need of the hour considering rapidly depleting oil reservoirs and India is dependent on overseas to meet with its oil demand and in return lose valuable foreign currency reservoir.

Implementation of Green Transportation on the campus can reduce number of vehicles on the campus and also eased down parking issues. The College proposes to prevent movement of vehicles on the campus and erect bicycle stand. Students /staff may visit campus on their vehicle and park it on entry / exit point, pick up the bicycle and move on the campus.

9. Sustainable Development

9.1 Green Policy

The Green Policy on campus is in existence. Actions are taken to encourage and motivate students and staff to adopt eco-friendly approach and save electricity, save or conserve water, save paper and use dust bins. Students and staff are informed and warned against smoking and chewing tobacco. The best way of doing it is through signages and official circular/notification to be done by College by issuing official notification.

College Management has not placed proper signages in this regard but more proper signages are to be placed to make the policy more effective and convey the message to each and every student at each and every corner of the College campus.

College must implement the policy of Green Building norms by retrofitting all existing buildings as Green / Energy Efficient buildings. Constructing all buildings with green building norms incorporated in its design.

College Management has informed all concerned to act accordingly and implement Green Policy on campus.

9.2 Best Practices & Initiatives

The College Administration & Management always believes in taking proactive steps and initiatives not only from Green & Environment Audit point of view but also in view of sustainable development and also imparting ease, comfort and healthier environment for the staff and students.

The College Administration must issued circulars/notifications to ban use of “Single Use Plastic” and another circular/notification

to use Water and Energy Efficiently, Ban Chewing Tobacco and Smoking on campus and many more.

9.3 Heat Island Reduction---Roof & Non-Roof

The elevated temperature in urban areas as compared to rural, less developed areas is referred to as the urban heat island effect. As cities grow and develop, more buildings and people are added. The process of urban development leads to this phenomenon. Heat Island Effect is the ***"Thermal Gradient Between Developed & Undeveloped Spaces"***

When urban and suburban areas lose land surface and naturally occurring vegetation, heat can no longer easily escape. Tall buildings, concrete, and asphalt trap heat and contribute to the warming effect. Waste heat from energy use is another source of additional heat. Other contributing factors include local weather, seasonal changes, time of day, and geographic location.

There are three basic types of heat islands: canopy layer, boundary layer, and surface. Both canopy layer and boundary layer heat islands refer to atmospheric heating (warmer air temperatures). Surface heat islands refer to the actual temperature of surfaces in a specific heat island. Although the timing and intensity of these types may vary, they can all be harmful to urban and suburban environments.

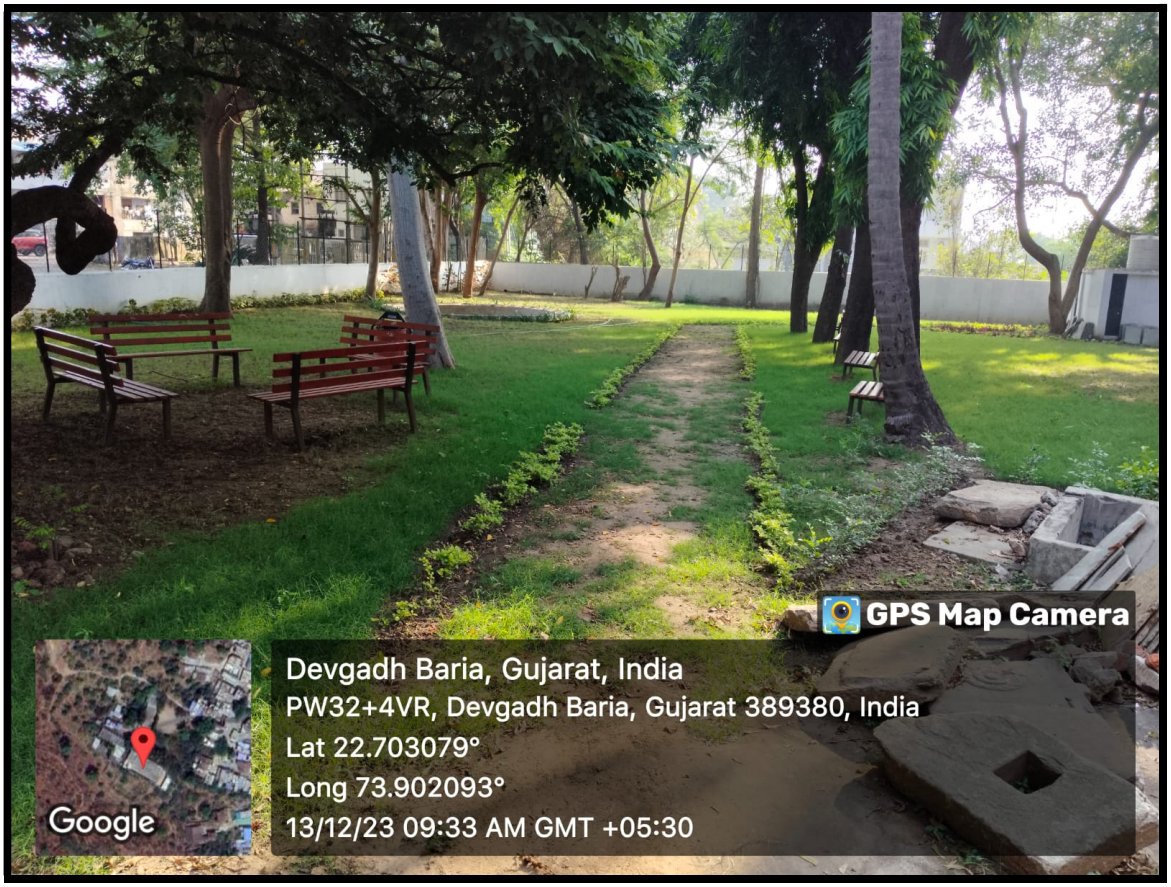
Roof top is the major source of solar heat ingress inside the building. About more than 45% to total solar heat ingress inside the building is through roof top. Hence College has approach to minimize heat island effect so as to reduce negative impact on micro-climate. College makes use of material with a high solar reflective index or china mosaic on roof top to cover exposed roof area, including parking under the shading of trees.

College must lay only china mosaic tiles on the roof top. This has also reduced Heat Island Effect-Roof.

Heat Island Reduction—Non-roof

All attempts are made to minimize heat island non-roof effect so as to reduce negative impact on micro-climate. College has building footprint of less than 10% and a small area is paved for road, walkways and parking. Hence more than 70% of plot area is retained undisturbed and a large part is with thick vegetation and more than 80 numbers of trees, bushes, creepers etc. assisting to create comfortable micro climate.

The surrounding open space around the College buildings has been laid with open jointed paver block/ stone tiles. Even well grown trees are preserved or saplings planted surrounding the building to act as shading device.



HEAT ISLAND EFFECT NON-ROOF------
SHADED BY TREES

9.4 Building Operation & Maintenance

The College undertakes regular maintenance of building and also cleanliness with the cleanliness drive.

The College Authority has entered into Annual Maintenance Contract for Air Conditioners, Water coolers, ceiling fans, printers, water pumps, water fixtures, energy equipment, DG set etc. This is required to keep these electric equipments to operate efficiently consuming optimum energy for which they are designed and prevent leaking water supply fixtures and cocks.

This also falls under the Maintenance Policy of the College

9.5 Designed for Differently Abled

The College must ensured that the building/ campus design caters to differently abled people.

College must follows design manual for a barrier free built environment i.e Universal design Design for differently abled people in accordance with the guidelines of National Building Code (NBC) of India and "Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act, 1996 enacted by the Government of India on January 1, 1996 to create barrier free environment for persons with disabilities and to make special provisions for the integration of persons with disabilities into the social mainstream.

College must identified all probable facilities required to cater to differently abled people. College must also ensured that certain basic minimum provisions for differently abled people are *PROPOSED* which are as below.

- Easy access to the main entrance of the building.
- Non-slippery ramps with hand rails on at least one side.

- Main entrance door with adequate width.
- Uniformity in floor level for hindrance-free movement.
- Preferred parking for differently abled persons
- Lift
- Wash rooms for Divyangs

College must follow NBC Guidelines

9.6 SUSTAINABLE DEVELOPMENT AWARDS & APPRECIATION

The College is recently established and has already started working on various following subject matters pertaining to Sustainable Development.

- Net Zero Building
- Zero Emission Campus
- Zero Discharge campus
- Green Building Certification from IGBC or GRIHA
- Green Transportation
- Improving microclimate of the campus
- Improving Energy Performance of the Buildings
- Strengthening facilities for Divyangjan
- Improving Indoor Environmental Quality

After achieving desired results on the above said development, College will apply for the Awards & appreciation alongwith Reorganization so that the students and staff of the college get motivated to do still better in the field of Sustainable Development.

10. Water Efficiency

10.1 PRESENT SCENERIO

The College campus meets with its water supply requirement through existing ground water bore and municipal water supply.

The bore water is used through RO system for potable purpose.

The College consumes 5000 litres daily for potable and landscape purpose.

10.2 WATER EFFICIENT FIXTURES

The plumbing fixtures installed are not water efficient. Water efficient plumbing fixtures need to be installed to enhance water use efficiency and minimise the use of potable water on campus. No leakages are observed in installed fixtures. No wastage of water is observed. No leaking conduits are observed. No wastage of water in landscape is observed.

The College must placed permanent signages to ***"Save Water"***. College need to install at more places to motivate and create awareness amongst students and staff to save water.

Saving of water also leads to saving of energy because the less water we use, lesser energy is required to pump lesser water. Ground water table do not deplete fast and hence we require lesser HP motor to pump water requiring lesser energy.

10.3 RAIN WATER HARVESTING & GROUND WATER RECHARGE

College has a large campus with open grounds, gardens and rooftop area. Following methods are adopted by the college for ground water recharge;

- The large open space of the college campus acts as

percolation tank and most of the rain water gets percolated through this open spaces.

10.4 Landscape Design & Management of Irrigation System

The College campus has not installed any water efficient irrigation system. Conventional type of stand posts exists which lead to wastage of water and un-necessary flooding. The water efficient irrigation system in form of sprinklers, drip irrigation, root zone treatment, moisture sensor, each type of bedding areas are segregated into independent zones based on watering needs etc can reduce potable water demand on the campus.

10.5 Water metering

The College has not installed any water meter at any place. The water meters are to be installed soon to measure consumption of water at various locations such as irrigation, potable, flushing etc.

10.6 Water Audit

The word Audit is a term related to accounting system. Off late Energy got scarce and costlier commodity. Hence Energy Audit was introduced. The water was in abundant and one never thought it to be scarce but then we have reached to a stage where auditing of water is also required.

Water Audit----Objectives & Benefits

Water Audit is Qualitative & quantitative analysis of water consumption to identify means for Reducing, Reusing & recycling of Water. It provides the information of water wasted and offers ways to conserve it.

"WHAT GETS MEASURED GETS MANAGED!"

A water audit is an accounting procedure. The purpose of water audit is to accurately determine the amount of unaccounted-for water (UAW) in a water distribution system. UAW is calculated from verified supply and consumption records, factoring in various estimated usage figures. Water audits helps us to identify usage habits, as well as pinpointing leaks and other waste so that one can conserve and save. It helps us to know about detail profile of distribution system & water users. It also works on for the implementation of water loss reduction plans and important steps towards water conservation. There are various types of water audit and the present water audit falls under the category of Institutional and Domestic type.

(a) Objectives of water Audit

(i) To utilize water resources more effectively and efficiently.

(ii) To keep check on unwanted excess usage of water.

(iii) Helpful in planning develop a water storage structures like ESR, sumps, dams, ponds, bunds, etc.

(iv) For cost-benefit study for optimum recovery of water loss.

(v) To identify thefts, meter inaccuracies, record inaccuracies and unauthorized water use.

(vi) To determine losses both physical & non-physical.

(vii) To identify priorities area which need immediate attention for control & maintenance

(viii) Estimation of waste water generated

(ix) Estimation of water pollution load

(b) Benefits

(i) Reduced water losses

(ii) Improved financial performance

(iii) Improved reliability of supply system

(iv) Enhanced knowledge of the distribution system

(v) Efficient use of existing supplies

(vi) Better safeguard to public health and property

(vii) Improved public relations

(viii) Reduced legal liability

(ix) Reduced disruption, thereby improving level of service to users.

11. Post Occupancy Waste Management System

People think trash goes away when they get it out of their house---out of sight, out of mind. But they don't realise that it's adding to the load of Earth by going into landfills. Management of solid waste is an important driver in Green Audit. Solid waste not properly managed leads to the degradation of the environment which, in turn, affects the flora and fauna. Keeping this in mind, the college must strictly implement scientific solid waste management to maintain the green status of the campus.

Segregate building waste at source and facilitate proper disposal for recycling, thereby avoiding such waste being sent to landfills. It was observed that Post occupancy waste Management system still needs lot of improvement. Proper dustbins are need to be placed at various places on the campus but effective steps are required for the segregation of waste.

Solid Waste Management

Institute emphasis on paperless office and reduce the use of plastic on campus. Each classroom, hall, lobby, office, canteen, library must be provided with dustbin which is regularly emptied. Then, Waste must be segregated as biodegradable and non-biodegradable at different collection points by the housekeeping staff and accumulated at a central collection point. Segregated wastes must be dumped into the particular dustbins of green, blue and red. Green coloured dustbin are meant for liquid and biodegradable waste. Red dustbins are meant for disposal of non-biodegradable waste. Blue dustbins are used for papers and glass materials.

The College possesses a vibrant and ecologically conscious campus community as a result of which the campus is deemed as a Zero Waste generator campus. The modus operandi consists of a systematic segregation of waste owing to its characteristic feature of bio degradable and non-degradable. Further the campus must plans to install Bio-composting machine and also

undertakes vermicomposting for waste management. A major contribution in ensuring a waste free campus is of the house keeping staff which regularly engages in the cleaning of the campus and as part of ***Swachh Bharat Abhiyan***, the campus community must conduct cleanliness drive for the campus.

1. **Segregation of waste and Dustbins:** The waste generated in the college is segregated in biodegradable and non-biodegradable waste in the waste pits. The biodegradable waste in converted into fertilizer and used in the campus garden.

2. Waste disposal sites & Bio-composting

Waste collection and Segregation:

Segregation of waste and Dustbins: The College building corridor must place 3 different dustbins at several places. The campus has a dedicated area for waste disposal and segregation. Waste is collected from college complex by the cleaning staff and transferred to waste segregation centre. The waste generated in the college is segregated in biodegradable and non-biodegradable waste in the waste pits. The biodegradable waste in converted into fertilizer and used in the campus garden. The non-biodegradable waste is sent to recyclable industry.

Collection of Paper Waste

Reduction of waste at point:

Adopting Digital mechanism: The College is in line with green initiatives has moved to digital governance. Use of emails and website for student and staff notices and correspondence are promoted to ensure low use of papers.

E Waste:

The consumption of electronic goods and equipment are put to optimum use by proper upgradation and regular maintenance. For the professional and regular maintenance and disposal of e-waste, college has collaborated with local service provider. Periodic checking ensures that nonworking and defective equipment are disposed-off properly as per the directives of Government.

Hence the College has not properly segregated the waste and sending this waste to recyclable industry instead of sending it to landfill sites.

12. Indoor Environmental Quality, Health & Comfort

12.1 Tobacco Smoke Control

It is proposed to minimize exposure of non-smokers to the adverse health impacts arising due to passive smoking in the building.

Well, the smoking is prohibited in educational institutions even then College must placed signage at some places on the campus to convey that Smoking / tobacco chewing is prohibited and injurious to health. Well, there is Government ban on Smoking in public places but this has to be displayed at various places.

12.2 Fresh Air Ventilation & Daylighting

The College building is designed to provide adequate outdoor air ventilation so as to avoid pollutants affecting indoor air quality. The building is constructed with a view point of ratio of openable area to the carpet area which is at least 6% in each regularly occupied zone. It is observed that window to wall ratio is more than 40% and entire one side of passage is open. The class rooms are designed to have adequate ventilation and cross ventilation and even enhanced ventilation.

The rows of window in class room gives abundant ventilation and cross ventilation and the occupants feel more comfortable, which is extremely important feature of Indoor Environmental quality.

It is also advised to all concerned to keep all the windows open during conducting class to have ventilation, cross ventilation and even enhanced cross ventilation. This will improve Indoor Environmental Quality of the building. This will lead to more comfort and increase efficiency of teacher to deliver the best and students to accept the most with an ease.

Building design ensures connectivity between the interior and the exterior environment, by providing adequate daylighting.

The buildings are designed to achieve minimum glazing factors as below in at least 50% of the regularly occupied spaces.

It is ensured that daylighting is considered at the design stage only by appropriate orientation. The orientation of the buildings is kept such that maximum daylighting to all the spaces is achieved during most part of the day.

While designing for daylight, care is taken to control glare which causes discomfort. Strategies include building orientation towards the north, appropriately designed windows to ensure adequate daylighting, double height roof, etc. The College has ample of open space and hence the college can afford to orient new proposed buildings in desired side easily.

Daylight in Corridor Area

College is advised to keep window shutters open and this will allow good amount of daylighting inside the room Good amount of daylight will prevent active lighting during day time and we can also save upon energy part.

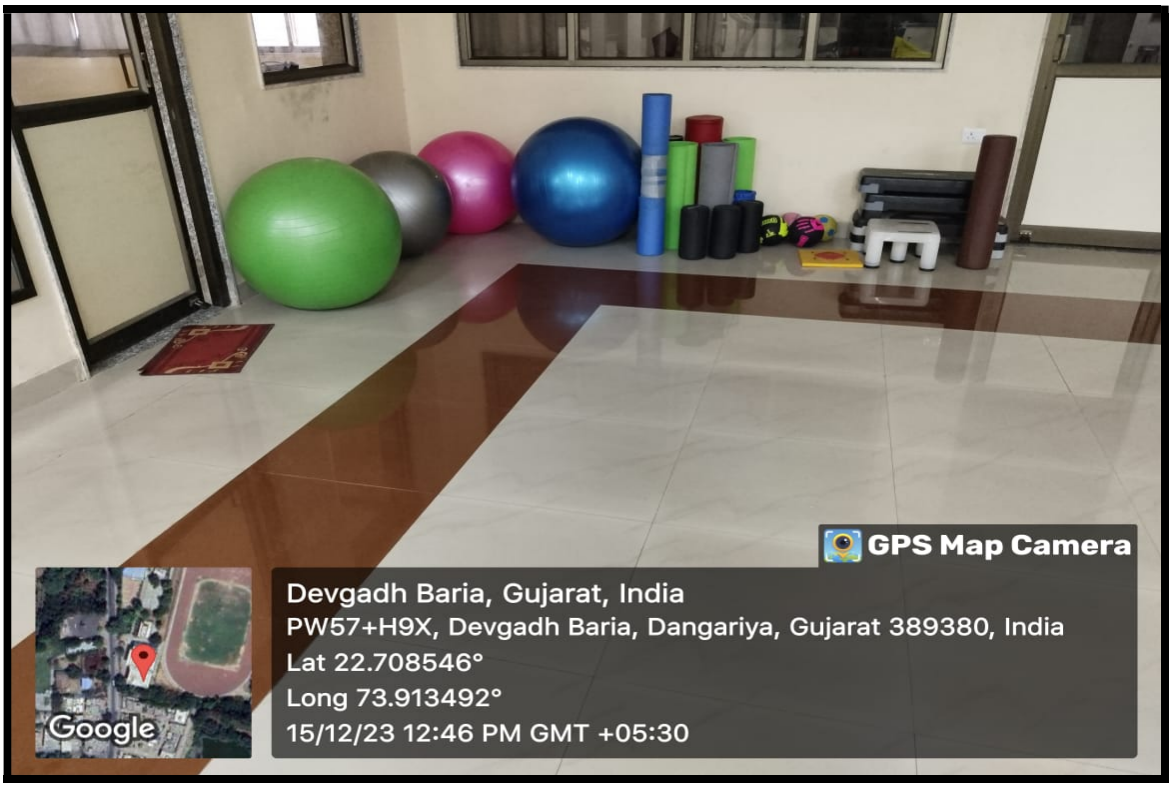
12.3 Well-being facilities / Health & Comfort

Facilities are to be provided so as to enhance physical, emotional & spiritual wellbeing of building occupants. Common room for ladies and gents is provided

Indoor games facilities are also provided along with out-door games facilities.

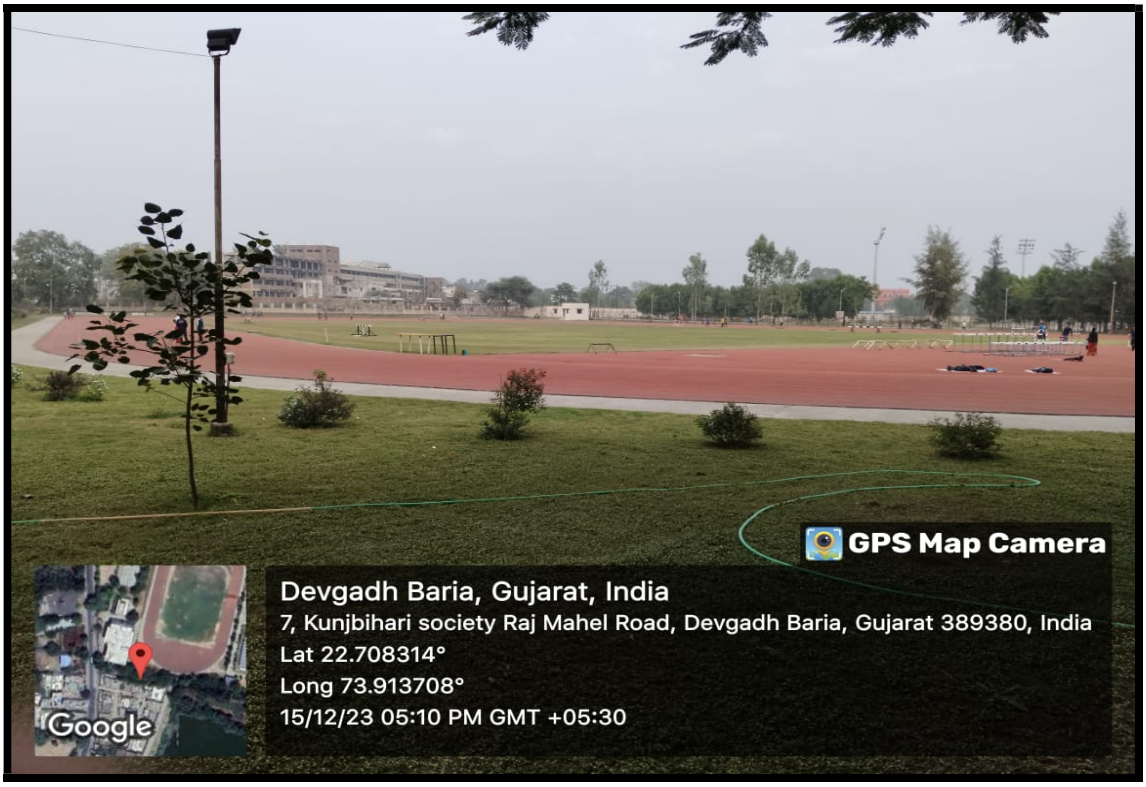
Such activities will divert students to waste their time in other unfruitful activities during leisure time.

Meditation / Prayer is mandatory at start of the day in many Corporate Offices. Employees go for mediation to ease down their stress and pressure of work.



Physical Well-being

Outdoor Games



Outdoor Games

Swimming Pool

Gym Facility

STUDENTS WELL-BEING

At College, student care and well being is the core focus. College has a non-compromising outlook towards their security and health that is evident through on-campus clinic, intensive security measures and comfortable accommodation facilities.

MEDICAL FACILITY

The College invites consulting doctors at regular interval for any health-related problems. The doctors are available on the campus during given time and also online consultation can be availed.

Medical Room

SECURITY

The College has a very vigilant and professional security arrangement and all students and staff feel to be in safe hands.

Tree Plantation

Cleanliness Drive

The College needs still regulate and strengthen NSS & promote NCC activities on the campus. Most of the NSS activities are part and parcel of Green Initiatives and Criterion VII of NAAC.

12.4 Community Friendly campus

As a Academic community responsibility college tries to make the campus more vibrant and a healthy place for surrounding community

Facilities which College Campus includes;

- Eco-friendly green campus
- Walking track and ground for walkers and trainers
- Space for students preparing for physical training of competitive exams

12.5 Material Resources & Green Material

The College takes strict actions to minimize ***construction waste*** being sent to landfills, whenever any construction or renovation activities takes place on campus. College has avoided at least 20% of the waste generated (by either weight or volume) during construction from being sent to landfills. Provision is made to collect all construction debris generated on-site. This waste is segregated based on their utility. Means are examined of sending such waste to manufacturing units which would use them as raw materials. Typical construction debris include broken bricks, steel bars, broken tiles, glass, wood waste, paint cans, cement bags, packing materials, etc., even paper waste generated in office buildings and paper waste generated in form of exam supplementary is sent to recyclable industry through vendor.

The college encourages to use material with ***Recycled content*** i.e. ***Material with recycled content*** such as PPC

cement, tiles with recycled content and high performance glazing whenever undertake addition alteration and special repairs to college building. Use of materials which contain recycled content helps to reduce environmental impacts associated with the use of virgin materials. It is planned to use materials with recycled content such that the total recycled content constitutes at least 15% of the total cost of the materials used in the building(s)/ campus

Market survey is carried out for the materials with recycled content and locate such local suppliers. Materials with recycled content include Fly ash blocks, Tiles, Steel, Glass, Cement, False Ceiling, Aluminum and Composite Wood.

College has released building material during routine maintenance / addition and alterations. It is encouraged the use of salvaged building materials and products to reduce the demand for virgin materials thereby, minimizing the impacts associated with extraction and processing of virgin materials. It is ensured that at least 2.5% (or) 1% of the total building materials (by cost), used in the building(s)/ campus, are salvaged, refurbished and reused.

Opportunities are identified to incorporate salvaged materials into building design and provide opportunity for research potential material suppliers. Consider using salvaged materials such as flooring, paneling, doors, frames, furniture, brick, etc.

The College emphasis on use of building materials available locally thereby minimizing the associated environmental impacts resulting from transportation. This also helps to boost local economy and provide employment to local labours and personals. It is ensured that at least 50% of the total building materials (by cost), used in the building(s)/ campus, are manufactured within a distance of 400 km. Survey is conducted to identify building materials which are in the specified radius, in early stages of project design. While selecting local materials, it is

ensured that they perform better in terms of strength, maintenance and durability.

Last but not the least, College has made an attempt to minimize use of virgin wood thereby encouraging responsible forest management and maximize use of materials which are rapidly renewable. A survey is undertaken to identify all wood based applications in the building. Then the types of products needed (e.g., doors, windows, furniture, flooring etc.,) is determined. The possibility is explored of using FSC (Forest Stewardship Council) / Forest Department certified wood (and/ or) rapidly renewable materials for all such wood based applications. Local dealers are identified who supply FSC/ local forest department certified wood/ rapidly renewable materials. Also while sourcing wood for various applications, the quality or grade of wood required is specified. Survey different types of rapidly renewable materials those are available in the market is done. Local suppliers are located so as to reduce additional costs and environmental impacts caused during transportation.

The College always prefers to use low VOC paints and varnishes with following limits, during painting works in College.

VOC Limits for Materials

Type of material	**VOC Limit(g/L less water)**
Paints:	
Non-flat (Glossy) paints	150
Flat (Mat) paints	50
Anti-corrosive/ anti-rust paints	250
Varnish	350
Adhesives:	
Glazing adhesive	100
Tile adhesives	65
Wood adhesive	30
Wood flooring adhesive	100

13. Environment Consciousness & Institutional Distinctiveness

Environment has become a popular subject in the last three decades. Some of the problems faced by humankind directly or indirectly are due to ozone depletion, greenhouse effect, acid rain, global warming, air – water pollution and fossil fuel combustion. Chemicals and allied processes are the most important among theses. Noticing the bad effects of chemicals and traditional energy sources on environment and human life, the College has been trying to find solutions for a better life. For this, creating awareness about environmental issues and conservation of the ecosystem have become increasingly important in the life skill education in the College.

The rationale behind the environmental education is based on three factors:

a) If people are aware of the need and the ways of protecting the environment, they will act to preserve it,
b) The student community should assume responsibility for educating others about the need for environmental protection and
c) Environmental education can be effective as part of a college curriculum. Hence the College should prioritise it.

It is now mandatory for all the Educational Institutions to conduct Green Auditing not only to discharge their Corporate Social Responsibility but also to retain their registration Certificate. However, in India, not many Green Auditors are available to green audit all the educational Institutions.

Hence, it is felt that it is the need of the hour to train at least 6 Green Auditors a year through a Diploma Course on Green Auditing / Green Buildings.

The duration of the course shall be 6 months and in one course 30 students of the Institution shall be enrolled and trained in all aspects of environment protection which includes biodiversity promotions, carbon reduction measures, energy

auditing, water auditing and individual responsibility to reduce carbon Footprint.

The Diploma course will be affiliated to the MSME of the Govt. of India and the students who completed the course shall get government certificates that will help them to be professional Green Auditors.

14. Suggestions & Recommendations

There exists vast scope to improve upon the above said for the College with respect to Green campus, Green Initiatives, and Green & Environment Audit of the campus.

1. ***It is recommended to organize Seminars, Conferences and Workshops in the College to make all stakeholders of College aware of the Criterion VII of NAAC regarding Institutional Values & Best Practices, focussing on Green Buildings, Water Audit, Energy Audit, Energy & Water Efficiency, Post Occupancy Waste Management System, Rain Water Harvesting, Indoor Environmental Quality, Green Energy, Carbon Footprint & Handprint, Zero Emission, Net Zero Campus, Water Positive Campus and other Environmental related topics to create awareness amongst the students, staff and people of Gandhinagar City and adjoining areas regarding above said topics. This will help to successfully implement Green Policy on campus. College Administration is also advised to take actions to pass on this message to Students Elected Wing and campaign for the same during the College functions and programmes.***
2. ***It is recommended to form Green & Environment Audit Assessment Team.***
3. ***The college must install Solar Panels on Roof Top and China Mosaic to reduce the Heat Island effect Roof***
4. ***It is recommended to Circulate Circular regarding Single Use Plastic, Green Initiative, Ban on Smoking and Chewing Tobacoo***
5. ***The entire exercise of Green & Environment Audit is not only for Academic purpose but it has to be implemented in Letter and Spirit.***

6. ***It is also recommended to place permanent signages in each class rooms and wash rooms requesting to put off lights, fans and exhaust fans when not in use. Signage to Save energy, Save Water, Waste collection, No Smoking, Anti-Ragging, No Tobacco, etc. has also to be placed in more numbers. College Management must place more signages to make the policy more effective and convey the message to each and every student at each and every corner of the College campus.***

7. ***There can be one master switch in all class rooms connecting all lights and fans so as to have proper control over the operation of all lighting fixtures and fans.***

8. ***Motion sensors can be installed in wash room areas and lobbies to prevent wastage of energy.***

9. ***The college must place 3 different colour dustbins in the campus.***

10. ***College must install Composting in the College Campus to convert organic waste into the fertilizer which can be further used in landscape area.***

11. ***College must install rain water harvesting to harvest rain water which can be used further in different areas***

12. ***College also to prepare post-occupancy survey to verify occupant comfort (lighting levels, temperature, relative humidity, noise levels, etc.,). Report on building performance of the equipment & systems listed. The report for each of the equipment & systems covers the following:***

    - ***Equipment specifications***
    - ***Test results with specific comments.***
    - ***Key monitoring aspects to sustain performance***
    - ***Estimated energy & water consumption***

- ***Scope for performance enhancing in future, and savings thereof***

13. ***It is suggested to arrange a talk on Green Transportation wherein students and staff are educated for adopting Green Transportation and also save money and preserve their health. The figures clearly show that the bicycles are hardly used by students and staff. The college need to encourage and motivate students and staff to use bicycles or walk down if the distance is small.***

14. ***Students and staff are to be further informed and motivated to use battery operated two wheelers, which will reduce CO2 emission and also save fossil fuel. It is further recommended to provide battery charging facility i.e electric plug points in parking place.***

15. ***College to provide preferred parking for two and 4 wheelers if they enter in pooling or using E-vehicle.***

16. ***College must provide ramps with railing for the Divyang People***

17. ***The College has to install water efficient plumbing fixtures to enhance water use efficiency and minimise the use of potable water on campus. The plumbing fixtures must meet the baseline criteria, individually or in aggregate. The total annual water consumption of the campus can be controlled and not to exceed the total base case water consumption computed. The base case is considered as per NBC/IGBC/GRIHA***

Baseline Flow Rates / Capacity as per Uniform Plumbing Code of India (UPCI)

Fixture Type	Maximum Flow Rate / Capacity	Duration	Daily Uses per Person/ Day
Water Closets	6 LPF (High flush)	1 Flush	1
	3 LPF (Low flush)	1 Flush	1
Health Faucet/ Bidet, Hand-held spray*	6 LPM	15 Seconds	1
Faucet/ taps*	6 LPM	15 Seconds	8
Kitchen Sink*	6 LPM	15 Seconds	6
Urinal*	4 LPF	1 flush	2
Showerhead* / Hand-held Spray*	10 LPM	8 Minutes	1

Source: Uniform Plumbing Code – India, 2016 ** At a design pressure of 4 bar*

18. It is suggested to undertake landscape design to ensure minimum water consumption. College has a large open space but not properly developed. A detailed landscape plan has to be prepared with Green mapping. Landscape area to be planted with drought tolerant/native/adaptive species. The landscape here refers to soft landscaping, which includes only pervious vegetation and landscape shall not be designed with monoculture plant species, since such species would not promote habitat and biodiversity.

19. When college is undergoing Green & Environment Audit then the management must install proper water efficient irrigation facility in form of sprinklers, shut off valves, moisture sensors, drip irrigation, root zone system etc. Use of organic manure will lead to mucus and increase in void ratio with increase in water carrying capacity of soil

20. The college may undertake Green Mapping so that College is able to know the exact quantum of Green treasure within in form of trees, bushes, creepers and landscape. College can also plan for future planting of saplings so that the open space can be properly utilized.

21. ***It is further suggested to install water meter to improve water performance of the building, and thereby save potable water. Presently there is no water meter installed to calculate the consumption of water for irrigation, flushing, potable and other usages. Hence it is proposed to install water meter to know the actual consumption of water in a building. It is proposed to ensure continuous monitoring of water consumption, both on supply and demand side, to identify improvement opportunities in potable water efficiency.***

22. ***The TDS in ground water can be improved by careful Ground water recharge strategies. Let this entire system be a Case Study not only for college but this region. Let students and teachers from various colleges/schools and public at large visit this rain water recharge system and implement at their places. We need to market our expertise.***

23. ***College is advised to undertake detailed Water audit exercise. National water policy has also insisted to undertake water audit, which is the first step towards water efficiency and water conservation so that concrete and perfect measures can be taken for water conservation and efficiency. Even Reduce, Recharge and Reuse strategies in field of water can be further strengthen on campus and better implemented and the College campus can move towards zero discharge campus from stormwater point of view.***

24. ***College to undertake detailed Energy Audit so that perfect measures can be taken for energy conservation and efficiency. College to implement ECBC and ASHRAE norms strictly and even install movement sensors and daylighting sensors for better energy efficiency. Even College may undertake exercise daylighting simulation for designing weather sheds, projections, pargolas etc.***

25. College is must improve Post occupancy waste management system. Dustbins to be placed in college building corridors to collect various kind of waste such as paper water, glass waste, organic waste etc. Then mark a place on campus to collect all this waste separately and then send it to recyclable industry.

26. College may Retrofit existing building into Green Building. It will be desirable to get Green Building Certification from IGBC/GRIHA or USGBC under Existing Green Building Certification. The certification process will make sure that all the buildings of the College buildings under takes all eoc-friendly measures strictly as per the guidelines of Green Buildings and let the building become model where others may visit the building to study the measures adopted to make it a Green/ Energy Efficient Building

27. The College also needs to have separate preferred parking space near ramp at main entrance for Divyangs.

28. Environment Education may be imparted to all the students thorough 1-hr life-skill classes once a week. This will create wide-level environment consciousness among the student community. They will be sensitized to encourage pillion riding with their peers or use public transport instead of two wheelers. Moreover, they will also motivate their parents, colleagues and relatives for water and energy efficiency approach.

29. College may Prepare questionnaire related to the environment and then place it before the staff and students to assess their understanding of environment – related issues.

The questions can be focused on four concerns:

- Whether they consider themselves eco-conscious?
- Do they consider the Institution to be eco-friendly?

- ***What do they think are the top priorities that should be tackled to improve the green campus status of the College?***
- ***Whether the students and teachers who own vehicles are aware of the quantity of CO2 emission by their vehicles?***
- ***What do they think to save water and electricity on campus?***

30. Students who own two wheelers / four wheelers are to be sensitized of the carbon emission by their vehicles and educate them on this regard. They are also to be motivated to share their vehicles on alternative days with their peers. For example, 50 % of the students who own two wheelers are to be advised to share their ride with their fellow students/neighbours. Thus, the carbon emission can be reduced by 50 % in the coming years. Students to be use bicycle or walk down if the house is nearby.

31. Finally, College may form a Cell to facilitate Other Colleges / Universities for Green & Environment Audit. This would help College to know strength and innovative ideas of other Colleges and would also make it popular for extending this helping hand.

32. The college has to involve students more in NSS & NCC activities and most of the activities of NSS are part and parcel of of Green Initiatives and Eco-friendly development

ABOUT COLLEGE VISION & MISSION

Vision-

- Empower disadvantaged youth through quality education.
- Foster academic excellence and lifelong learning.
- Bridge the education gap and promote social equality.
- Become a center of academic excellence with social impact.
- Transform lives and unlock potential.

Mission-

- Impart holistic education with emphasis on character, culture and value.
- Determine priorities for academic planning policies and programs based on the learner needs rather than institutional preferences.
- Update academic and management practices towards total quality management and promote quality in all spheres.
- Maintain educational excellence through a shared vision and team effort.
- Use educational technology to enrich the teaching and learning process by regularly improving infrastructural resources and employ the best technology.
- Provide opportunities for personal growth and development of the individual students.
- Promote overall development of students through co-curricular activities and sports.
- Evolve into a role model for other institutions of higher education in backward or tribal areas.