GREEN AUDIT REPORT

CONSULTATION REPORT

Gandhi Memorial National College
Ambala Cantt. -133001

PREPARED BY

EMPIRICAL EXERGY PRIVATE LIMITED

Flat No. 201, Om Apartment, 214 Indrapuri Colony,
Bhawarkuwa, Indore – 452 001 (M. P.), India
0731-4948831, 7869327256
Email ID:eempirical18@gmail.com
www.eeplgroups.com

(2020-21)

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ACKNOWLEDGEMENT

Empirical Exergy Private Limited (EEPL), Indore takes this opportunity to appreciate & thank the management of **Gandhi Memorial National College Ambala Cantt Haryana for** giving us an opportunity to conduct Green audit for the college.

We are indeed touched by the helpful attitude and co-operation of all faculties and technical staff, who rendered their valuable assistance and co-operation the course of study.

Rajesh Kumar Singadiya

(Director)

M.Tech (Energy Management), PhD (Research Scholar)
Accredited Energy Auditor [AEA-0284]
Certified Energy Auditor [CEA-7271]
(BEE, Ministry of Power, Govt. of India)
Empanelled Energy Auditor with MPUVN, Bhopal M.P.
Lead Auditor ISO50001:2011 [EnMS) from FICCI, Delhi
Certified Water Auditor (NPC, Govt of India)
Charted Engineer [M-1699118], The Institution of Engineers (India)
Member of ISHRAE [58150]

EXECUTIVE SUMMARY

Green Initiative Taken by College

- **CAMPAIGN OF PLANTATION AND GREEN CAMPUS:**
  - College has around **500** trees in the campus. Its good initiative taken by management for green campus under the campaign of plantation. **It's APPRECIABLE.**

- **30 KWp SOLAR PHOTOVOLTAIC ROOFTOP INSTALLATION:**
  - College has 30 KWp solar photovoltaic roof top grid connected system installed on college building in Jul-2017. Total unit generation from july-2017 to june-2021 is **1, 18,953 units**. The solar unit generated 26,163 from July-2020-Jun-2021. **It is 34 % of total unit consumption of the year 2020-21.**
  - There is good potential to increase solar installation capacity in college campus up to 20 KW. As per Net Metering policies of State Government and MNRE.
  - **The total CO_2 reduction is 114.55-ton CO2e/year** as up to Jun-2021.It is big contribution for toward CO_2 emission reduction. (Reference: Central Electricity Authority (CEA) Baseline Carbon Dioxide Emission database http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/database_11.zip) Electricity Purchased from the grid.

- **Vehicle pooling:**

  Vehicle pooling use of bicycles has been promoted among students and faculty as a green policy of college. **It's APPRECIABLE.**

- **5 DUST BIN WASTE MANAGEMENT SYSTEM:**
  - It was observe that college has applied 5 dust bin system for waste management in campus. Waste management system help to implement 3R concept (Recovery, Reuse and Recycling) of different type of waste generated in the college campus.
  - During the audit, it was find out management has single **"Vermi compost Unit"** for treatment of waste generated from plants and garden to convert biodegradable organic waste into useful manure. **It is appreciable.**

AREAS FOR IMPROVEMENT

- **QR Code System on Tree:**
  - While the world seems to be going digital, people lack the time to read books and process the information they contain. Hence, college can be provided QR codes on the trees for its information and to exploit the rapidly growing platform for a unique purpose.

- **Eco-restoration programmes**
  - Frame aholistic campus development plan with long-term eco-restoration programmes for replacing exotic acacia plantations with indigenous trees.

CHAPTER-1
INTRODUCTION

1.1 About College

Through seven eventful decades of its history, Gandhi Memorial National College, Ambala Cantt has celebrated the quest for expanding landscapes of learning and critical thinking. Today, this college is recognised as a premier institution of higher learning that nurtures intellectual and academic striving, vibrant curricular activities, outreach initiatives and civic engagement. The college offers a unique combination of resources where community of inspired faculty and talented students learn and grow together to share the dynamic energy field. It is a place not only of teaching but collaborated scholarship reinforcing a very special interaction between students and faculty.

After partition, a great visionary and philanthropist Sh. Jaswant Rai with other eminent associates planted the seeds of D.A.V. College, Rawalpindi at Ambala which flourished into G.M.N. College in 1948. Having had a modest beginning in a building with thatched roofs, today the college has a whole range of infrastructural facilities such as high-tech seminar rooms, Smart Class Rooms, Arts, Science and Commerce block, well-equipped laboratories, departmental rooms equipped with computers and internet facilities, gymnasium, fully automated library, E-library, sprawling sports fields.

Figure 1.1: - Image of Gandhi Memorial National College from Google map

The college has become a byword for academic and extra-curricular achievements. The dynamic, enlightened and supportive Managing Committee comprising of members from industry, medicine, academic and administration is constantly engaged in taking the college to newer heights of excellence. Its alumni occupy distinguished positions in almost all spheres of society – Government, Banking, Finance, Academics, Sports, Armed Forces, Business and Media. The college believes in the motto "Be the First and be with the First".

Institutional Strength

- Highly qualified and experienced teaching staff
- Blend of traditional and modern pedagogical methods
- Pioneers in offering post-graduation in English and Political Science
- Pioneer in installing solar grid in educational institution
- Facilitation of research activities
- Automated library and administrative block
- Well-equipped laboratories
- Well-maintained infrastructure
- Vast and well-managed sports ground and gymnasium
- Clean and green campus
- Eco-friendly premises
- Achievements in sports and cultural activities
- Co-educational institution
- Locational advantage

Vision:

- To impart qualitative value-based education and to reinvent itself constantly in the context of ever-changing scenario so as to create a happier and growth-oriented society.

Mission:

- To pursue and disseminate knowledge with commitment to all the sections of society.
- To create and provide opportunity for the overall development of students that can transform the society too.
- To evolve skilled human resource of higher calibre.
- To revive high ideal of student-teacher relationship so as to inspire the youth to have yearning for acquiring knowledge and professional skills.
- To imbibe the ideals of Gandhian Philosophy amongst the youth in order to instill in their minds high moral values, instinct for social justice, awareness and equality.
- To uplift the mind, body and soul of the new generation of the society.

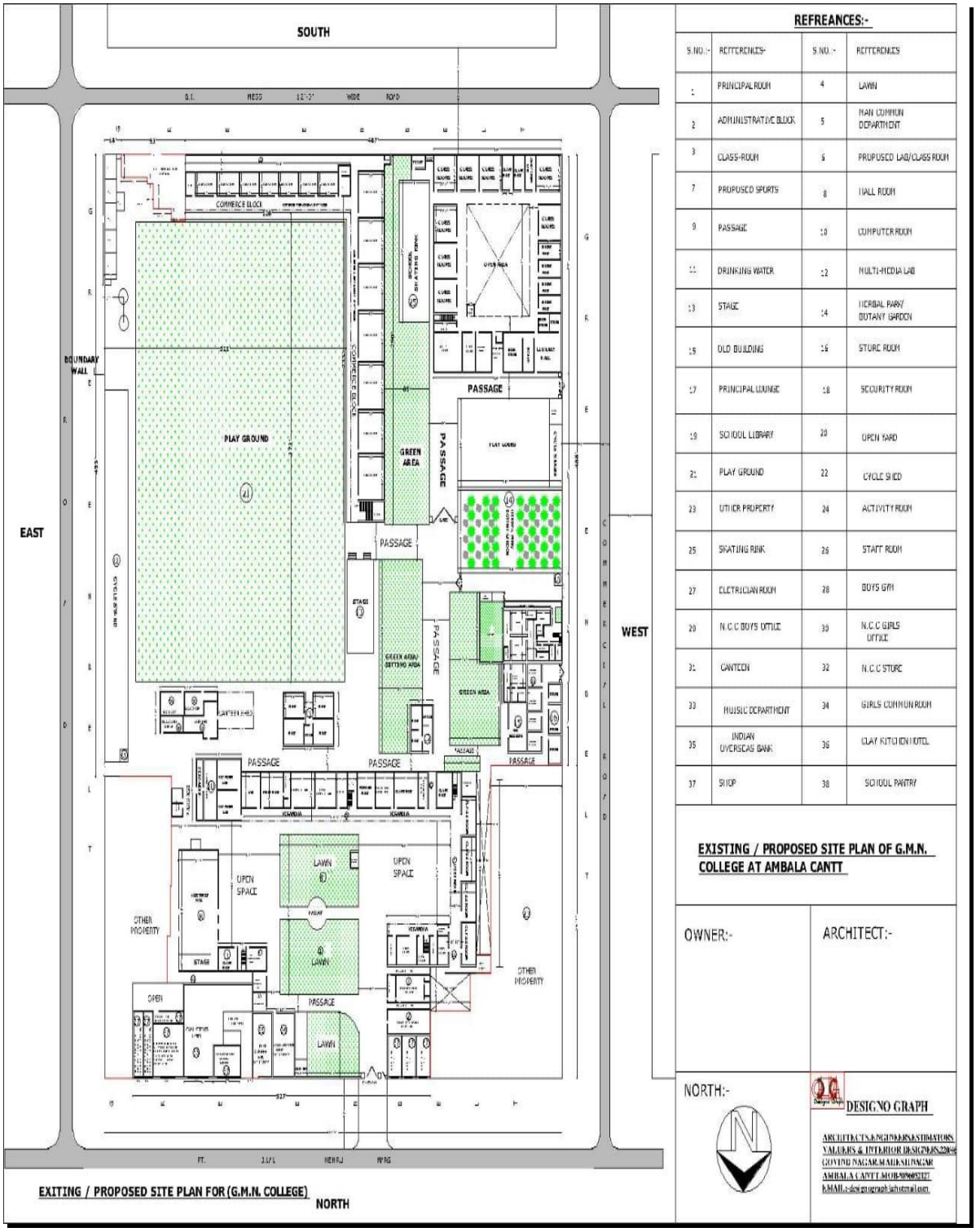
1.2 About College Campus:

The college is spread over 405979.2 (sq. ft) beautiful land with plenty of open space and sports area interspersed within academic buildings. The details of various department and building are given below:

Table1.1 Name of the various Building and area in Gandhi Memorial National College

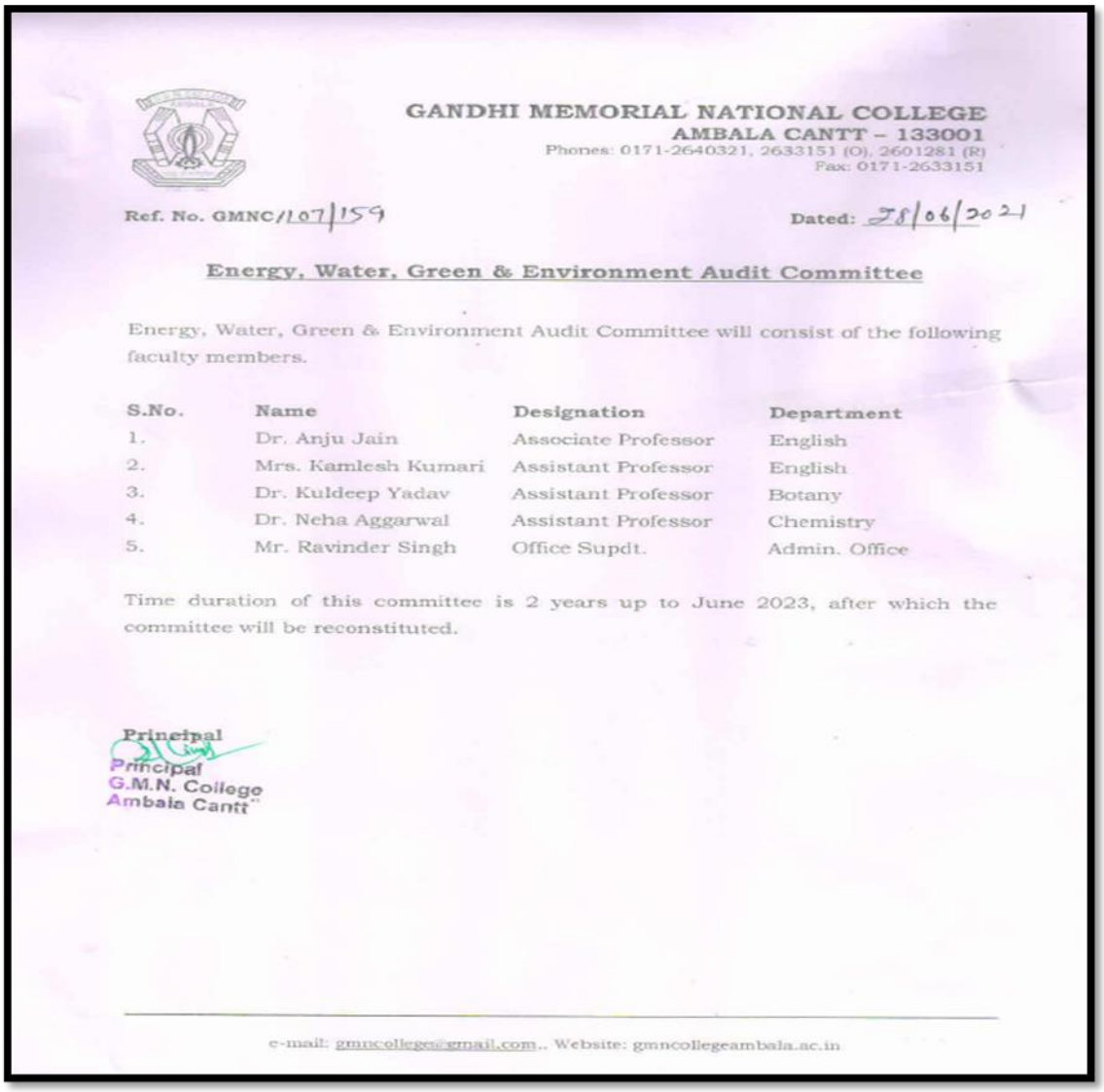
Sr.no	Department Name	Length	Width	Area (sq. ft)
1	Commerce Block	40	204	8160
2	Commerce Block	26	219	5694
3	Stage	45	29.5	1327.5
4	PG block	35.4	53	1876.2
5	Canteen Shed	86.4	33	2851.2
6	Canteen Phy. Edu & Other	74	33	2442
7	Principal Residence	72	54	3888
8	Music room	32	49	1568
9	Sanskrit Department	21	25	525
10	Cycle Stand Shed	300	35	10500
11	Servant and water pump room	110	20	2200
12	Servant House	59	16	944
13	Stores	120	25	3000
14	Auditorium Hall	48	75	3600
15	Room No -26	36	24	864
16	Mass communication to maths Eng.	28	68	1904
17	Girls Common room	28	35	980
18	Main power Supply room	17	13	221
19	Comp. lab to Phys. Lab	358.8	42.8	15356.64
20	Room no - 6 to 9	123	19.4	2386.2
21	Room no - 1 to 5	82	36.9	3025.8
22	Principal Office	59	30.3	1787.7
23	Clerical room	56	34	1904
24	Shops Area			4138
	Total Build Up Area			**81143.24**
	Total Open Area			**324836.00**
	Total Area			**405979.20**

Gandhi Memorial National College Layout of Various Buildings



S.NO.:-	REFFERENCES-	S.NO.:-	REFFERENCES
1	PRINCIPAL ROOM	4	LAWN
2	ADMINISTRATIVE BLOCK	5	MAIN COMMON DEPARTMENT
3	CLASS-ROOM	6	PROPOSED LAB/CLASS ROOM
7	PROPOSED SPORTS	8	HALL ROOM
9	PASSAGE	10	COMPUTER ROOM
11	DRINKING WATER	12	MULTI-MEDIA LAB
13	STAGE	14	HERBAL PARK/ BOTANY GARDEN
15	OLD BUILDING	16	STORE ROOM
17	PRINCIPAL LOUNGE	18	SECURITY ROOM
19	SCHOOL LIBRARY	20	OPEN YARD
21	PLAY GROUND	22	CYCLE SHED
23	OTHER PROPERTY	24	ACTIVITY ROOM
25	SKATING RINK	26	STAFF ROOM
27	ELECTRICIAN ROOM	28	BOYS GYM
29	N.C.C BOYS OFFICE	30	N.C.C GIRLS OFFICE
31	CANTEEN	32	N.C.C STORE
33	MUSIC DEPARTMENT	34	GIRLS COMMON ROOM
35	INDIAN OVERSEAS BANK	36	CLAY KITCHEN HOTEL
37	SHOP	38	SCHOOL PANTRY

1.3 Green Monitoring Committee



GANDHI MEMORIAL NATIONAL COLLEGE
AMBALA CANTT – 133001
Phones: 0171-2640321, 2633151 (O), 2601281 (R)
Fax: 0171-2633151

Ref. No. GMNC/107/159 Dated: 28/06/2021

Energy, Water, Green & Environment Audit Committee

Energy, Water, Green & Environment Audit Committee will consist of the following faculty members.

S.No.	Name	Designation	Department
1.	Dr. Anju Jain	Associate Professor	English
2.	Mrs. Kamlesh Kumari	Assistant Professor	English
3.	Dr. Kuldeep Yadav	Assistant Professor	Botany
4.	Dr. Neha Aggarwal	Assistant Professor	Chemistry
5.	Mr. Ravinder Singh	Office Supdt.	Admin. Office

Time duration of this committee is 2 years up to June 2023, after which the committee will be reconstituted.

Principal
Principal
G.M.N. College
Ambala Cantt

e-mail: gmncollege@gmail.com.. Website: gmncollegeambala.ac.in

1. 4 Green Audit Team

The study team constituted of the following senior technical executives from **Empirical Exergy Private Limited,**

- **Rajesh Kumar Singadiya**,[Director &Accredited Energy Auditor ,AEA-0284]
- **Mr. Rakesh Pathak**, [Director & Reviewer]
- **Mrs. Laxmi Raikwar Singadiya**,[Energy Engineer]
- **Mr. Sachin Kumawat** [Project Engineer]
- **Mr. Ajay Nahra,** [Site Engineer]

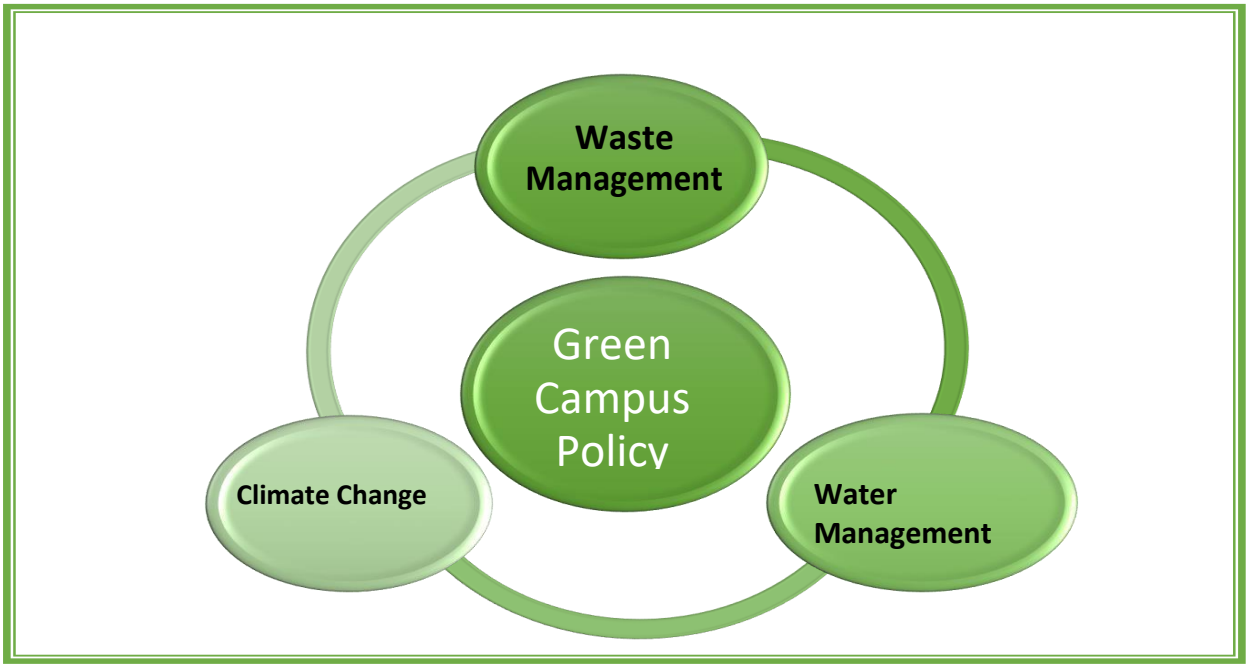
1.5 Green Campus Policy

A Green Campus is a place where environmentally friendly practices and education combine to promote sustainable and eco-friendly practices in the campus. The green campus concept offers an institution the opportunity to take the lead in redefining its environmental culture and developing new paradigms by creating sustainable solutions to environmental, social and economic needs of the mankind.

College Environmental Aims and Objectives

The college is striving to develop its institution on a self – sustainable basis in the areas of power, water and cleanliness.

- The faculty, staff and students have to contribute collectively to develop an eco–friendly sustainable campus and disseminate the concept of e – friendly culture to the nearby community and wherever possible.
- Awareness creations about environmental issues among students.



Green protocol of the college:

As part of its initiatives for environmental sustainability, the following instructions and guidelines are implemented by the college:

- Spread the importance of Energy Conservation.
- Reduce the use of disposable items in all functions and meetings
- Promote the use of e-copies and e-documents
- Print on both sides of paper
- Promote vegetable cultivation.
- Plant trees on important days of celebrations
- Promote the usage of LED bulbs
- Avoid the usage of plastic made pens/bags/files/folders and banners
- Promote the use of electronic display boards, cloth banner etc.

Waste Management

- To increase the green cover in and around the campus.
- To adopt methods for waste segregation
- Take appropriate actions to reduce or recycle multiple waste inside the campus.
- To manage, collect and dispose e-waste appropriately
- Actions taken to reduce consumption of plastic in the campus.
- To encourage paperless work culture and recycling/ reuse of paper.
- Display waste management instructions/alerts at prominent/relevant locations in the campus.

Liquid Waste Management:

- RO rejected water is reused in canteen to wash dishes and in washrooms
- E-Waste water generated from different areas collected and treated in ETP Plant. Treated waste water reused for gardening or other plants.
- Change of taps which are either more water efficient or sensor based taps

E-Waste Management:

- E-waste exchange programmed has been devised by the Department of Computer Science which entails an understanding with the local/Regional vendor that offers services for the sale as well as purchase of e-waste generated from electrical waste.
- E-waste is managed in the best possible available manner which protects health and environment against any adverse effect.

Waste Recycling Management:

- Vermi Compost Pits/ Organic Pits are there in which fallen leaves and other organic waste like vegetable peels etc. from college canteen are collected for decomposition and later act as suitable manure for plants.
- Compost Roller Drums are also installed in the college which convert biodegradable waste into compost.
- Students of Eco Club make the community members aware of the importance of waste management.
- NSS units of the college also takes out various drives and campaigns in order to promote and spread an understanding of cleanliness through lectures, rallies, seminars etc.
- Rain Water Harvesting System works at different places in the college to manage liquid waste.

Hazardous chemicals and radioactive waste management:

- The undergraduate course in chemistry does not include any practical where hazardous chemicals/ radioactive substances are used. So such materials are neither purchased nor used in the chemistry laboratory of the college.

Note: Green Campus Policy of the college is in annexure-I

1.6 About Green Auditing

Eco campus is concepts implemented in many educational institutions, all over the worldto make them sustainable because of their mass resource utilization and waste discharge in to the environment.

Green audit means to identify opportunities to sustainable development practices, enhance environmental quality, improve health, hygiene and safety, reduce liabilities achieve values of virtue. Green audit also provides a basis for calculating the economic benefits of resource conservation projects by establishing the current rates of resource use and their associated costs.

Green auditing of **"GMN College"** enables to assess the life style, action and its impact on the environment. This green audit was mainly focused on greening indicators like utilisation of green energy (solar energy)and optimum use of secondary energy sources (petrol and diesel) in the college campus, vegetation, and carbon foot print of the campus etc. The aim of green auditing is to help the institution to apply sustainable development practices and to set examples before the community and young learners.

1.7 Objectives of Green Auditing

The general objective of green audit is to prepare a baseline report on "Biodiversity" and alternative energy sources (solar energy), measures to mitigate resource wastage and improve sustainable practices.

The specific objectives are:

- To suggest measures to make the college campus biodiversity rich
- To demarcate areas within the institute campus which have potential for restoration of biodiversity
- To make recommendations for the conservation, protection and rejuvenation of the natural vegetation and animal life by involving students and faculty members
- To inculcate values of sustainable development practices through green audit mechanism.
- Providing a database for corrective actions and future plans.
- To identify the gap areas and suggest recommendations to improve the green campus status of the college.

1.8 Target Areas of Green Auditing

Green audit forms part of a resource management process. Although they are individual events, the real value of green audit is the fact that they are carried out, at defined intervals, and their results can illustrate improvement or change over time.

Eco-campus concept mainly focuses on the efficient use of energy and water; minimize waste generation or pollution and also economic efficiency. Target areas included in this green auditing is biodiversity, green energy and carbon foot print.

1.9 Audit for Biodiversity

India is mega-biodiversity hottest hot-spot in the world with tremendous diversity in plants and animals. Such biotic forms are endemic to the different bio-geographic habitats in urban and in forest areas of the country as well. Biodiversity is defined as genetic, species and ecosystem diversity, which offers variability and therefore added values to bio-resources.

The most serious and rapidly accelerating of all the global environmental problems is the loss of biodiversity through deforestation and biodiversity cover depletion. Over the past 300 years, many species of organisms, including mammals, birds, butterflies and plants, have been lost due to many anthropogenic activities. In one year, a single mature tree will absorb up to 48 pounds of carbon dioxide from the atmosphere, and release it as oxygen.

1.10 Audit of Green Energy:

According to the **Environmental Protection Agency (EPA)**, green energy provides the highest environmental benefit and includes power produced by solar, wind, geothermal, biogas, low-impact hydroelectric, and certain eligible biomass sources. Green energy can also reduce your carbon footprint and achieve a sustainable lifestyle.

CHAPTER- 2
GREEN CAMPUS AND BIODIVERSITY

2.1 Biodiversity Audit

In the survey, focus has been given on assessment of present status of diversity in form of plants, in college campus and efforts made by the college authorities for nature conservation. Campus is located in the vicinity of approximately more than 500 trees/ medicinal herbs/ ornamental plants. The detail is given below:

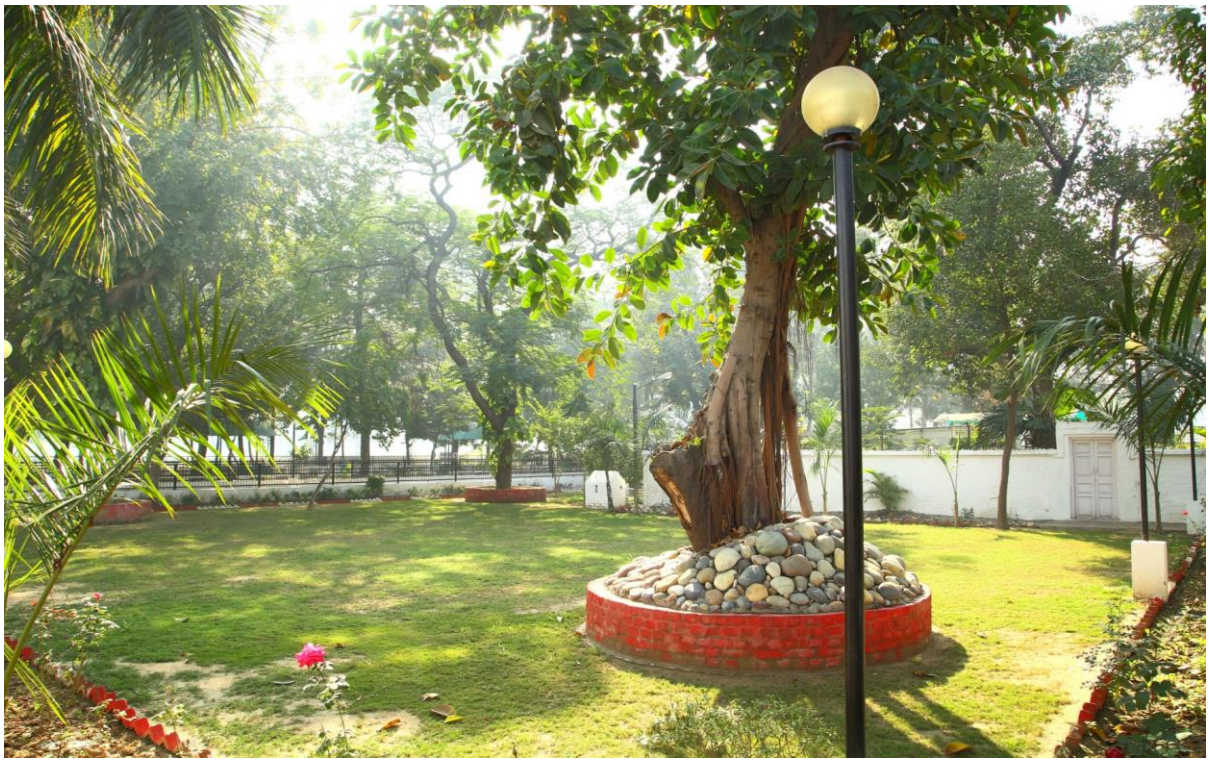


Fig.2.1 Green Campus

HERBAL PLANTS

Table: 2.1 List of plants in college campus

Sr. No	Name of Tree	Botanical Name
1	Ashwagandha	(Withania somnifera)
2	Jungli pyaz	(Kalanchoe lossfeldiana)
3	Kalanchoe	(Urgenia indica)
4	Damabuti	(Tylophora indica)
5	Aloe vera	(Aloe barbadensis miller)
6	Marwa	(Origanum majorana)
7	Rama Tulsi	(Ocimum sanctum)
8	Shyama-Tulsi	("dark Tulsi") (Ocimum tenuiflorum)
9	Badri Tulsi	(Ocimum tenuiflorum)
10	Amla	(Phyllanthus emblica)
11	Asparagus	(Asparagus officinalis)
12	Red silk cotton tree	(Bombax ceiba)
13	Sarpagandha	(Rauvolfia serpentina)
14	Giloy	(Tinospora Cordifolia)
15	Stevia	(Stevia rebaudiana)
16	Lemon grass	(Cymbopogon citratus)
17	Cardamom	(Elettaria cardamomum)
18	Nagdoon	(Euphorbia tithymaloides)
19	Rudraksha	(Elaeocarpus ganitrus)
20	Babylon	(Salix babilonica)
21	Aparajita	(Clitoria ternatea)
22	Kachnar	(Bauhinia variegata)
23	Hibiscus	(Hibiscus rosa-sinensis)
24	Mud plant	(Hydrocotyle vulgaris)
25	Anjeer	(Ficus carica)
26	Behra	(Terminalia bellirica)
27	Harad	(Terminalia chebula)
28	Nagfani	(Opuntia ficus-indica)
29	Ginkga	(Ginkgo biloba)
30	Aak	(Calotropis gigantea)
31	Kalanchoe lecimata	(Kalanchoe blossfeldiana)
32	Curry patta	(Murraya koenigii)
33	Kalabansa	(Barleria prionitis L.)
34	Peela bansa	(Barleria prionitis)
35	Masala patta	(Murraya koenigii (L.) Sprengel)
36	Allspice	(Pimenta dioica)
37	Sharifa	(Annona squamosa)

38	Marwa tulsi	(Ocimum basilicum)
39	Kaali musli	(Curculigo orchioides)
40	Safed musli	(Chlorophytum borivilianum)
41	Sanjeevni	(Selaginella bryopteris)
42	Chhoti elaichi	(Elettaria cardamomum)
43	Mentha longifolia	(Mentha longifolia (L.) Huds)
44	Badi elaichi	(Amomum subulatum Roxb)
45	Arusa	(Justicia adhatoda)
46	Patharchatta	(Bryophyllum pinnatum)
47	Thor	(Euphorbia royleana)
48	Euphorbia	(Euphorbia milii)
49	Motia	(Jasminum sambac)
50	Chakotra	(Citrus maxima)
51	Chandan	(Santalum album)
52	Ajwain	(Trachyspermum ammi)
53	Mint	(Mentha arvensis)
54	Arjun	(Terminalia arjuna)
55	Coconut	(Cocos nucifera)
56	Long pepper	(Piper longum)
57	Kaner	(Cascabela thevetia)
58	Putkanda	(Achyranthes aspera)
59	Dalchinni	(Cinnamomum verum)
60	mexican grass tree	(Nolina parviflora)

Fig.2.1 Botanical Garden & Herbal Park

FRUIT PLANTS

Sr. No	Name of Tree	Botanical Name
1	Kinnow	(Citrus reticulata)
2	Jamun	(Syzygium cumini)
3	Guava	(Psidium guajava)
4	Chikoo	(Manilkara zapota)
5	Lemon	(Citrus × limon)
6	Mousambi	(Citrus limetta)
7	Banana	(Musa acuminate)
8	Mango	(Mangifera indica)
9	Pomogranate	(Punica granatum)
10	China orange	(Citrus X sinensis)
11	Imli	(Tamarindus indica)

Fig.2.3 Ayurved Park

ECONOMICAL PLANTS/ TREES

Sr. No	Name of Tree	Botanical Name
1	Neem	(Azadirachta indica)
2	Kadamba	(Neolamarckia cadamba)
3	Dhak	(Butea monosperma)
4	Chir pine	(Pinus roxburghii)
5	Pipal	(Ficus religiosa)
6	Bargad	(Ficus benghalensis)
7	Amaltas	(Cassia sp.)
8	Babool	(Acacia sp.)
9	Haar Shingar	(Nyctanthes sp.)
10	Kanakchampa	(Pterospermum acerifolium)
11	Sheesam	(Dalbergia sissoo)
12	Gulmohar	(Delonix regia)
13	Shehjan	(Moringa oleifera)
14	Balamkheera	(Kigelia pinnata)

Fig.2.4: Economical Plants/ Trees

ORNAMENTAL PLANTS

Sr. No	Name of Tree	Botanical Name
1	Rubber fig	(Ficus elastic)
2	Silver oak	(Gravillea robusta)
3	Bottle brush	(Callistemon sp.)
4	Travellers Palm	(Ravenala madagascariensis)
5	Fan Palm	(Borassus flabellifer)
6	Fish Tail Palm	(Caryota urens)
7	Bottle palm	(Roystonea regia)
8	Pine tree	(Pinus sp.)
9	False Ashoka	(Polyalthia longifolia)
10	Money plant	(Epipremnum aureum)
11	Satparni	(Alstonia sp.)
12	Christmas tree	(Araucaria sp.)
13	China rosa	(Hibiscus rosa-sinensis)
14	Chandani	(Tabernaemontana divaricata)
15	Yellow bells	(Tecoma sp.)
16	Cycas	(Cycas revolute)
17	Ficus	(Ficus benjamina)

Fig.2.5 Ornamental Plants

College has **500** trees in the campus. This is good initiative taken by management for green campus under the campaign of plantation. **It's APPRECIABLE.**

2.2 ORGANIC VERMI COMPOST

Fig.2.6: Organic Vermi Compost Unit in college campus

CHAPTER- 3

GREEN ENERGY AND SUSTAINABLE DEVELOPMENT

3.1 Grid Connected Solar Photovoltaic System (30 Kwp)

There is 30 KWp solar photovoltaic roof top grid connected systems installed on Science building in July-2017.Detailed of the system is given below:

Table 3.1 Solar plant detailed

Sr. No	Description	Technical Specification
1	**Plant Information**	
1.1	Plant capacity	30 KWp
1.2	Location	Science Block, Gandhi Memorial National College
2	**PV Panel Details**	
2.1	Make	Vikram Solar
2.2	Modal	ELDORA VSP.72.315.03.04
2.3	Panel Wattage	315 Watt
2.4	No of PV Panels	96
2.5	Panel Tilt Angle	23º
3.	**Inverter Information**	
3.1	Make/ Modal Name	Delta (RPI M30A_121)
3.2	Modal No	RPI303FA0E1100
3.3	Capacity of Inverter	33000 Watt
3.4	No of Inverter	1

Figure 3.1 Solar Plant 30 KWp and Inverter System

Table 3.2 Detailed of solar unit generation from July-2017 to Jun-2021

Sr. No	Years	Unit Generation (kWh)
1	2017-18	28,959
2	2018-19	31,878
3	2019-20	31,953
4	2020-21	26,163
	Total Units	**1,18,953**

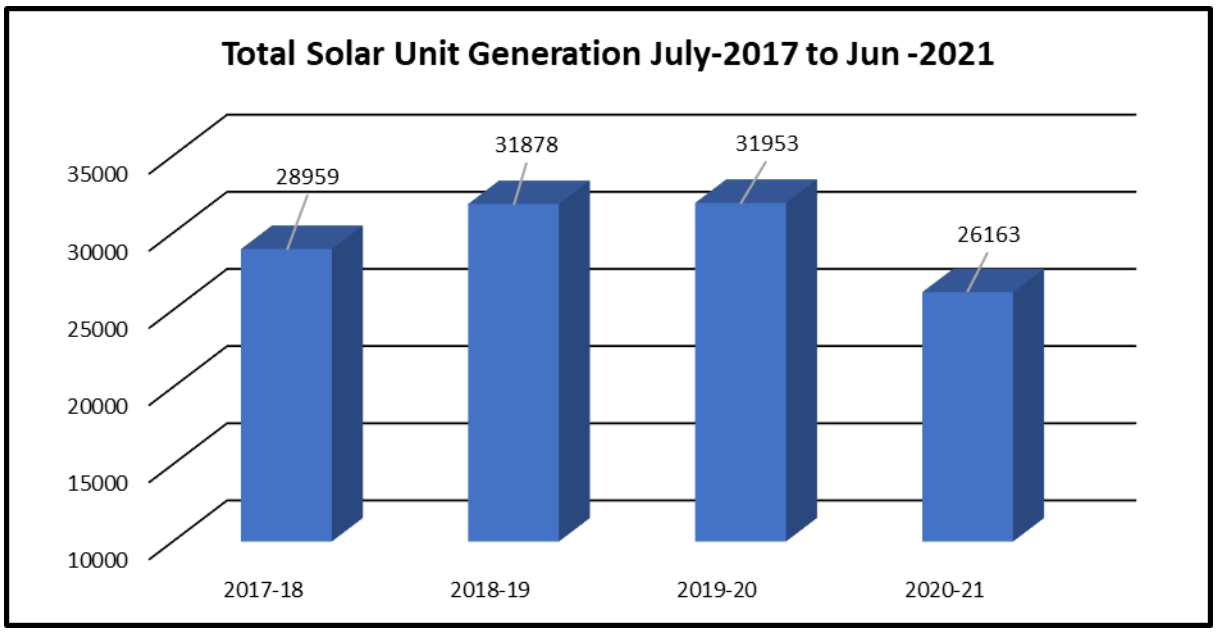


Figure 3.2 Solar Unit Generation July-2017 to Jun -2021

Observation:

During the energy audit it was observed that plant is working, **however external glasses of Dirty panels are found. They should be clean immediately.** Total unit generation from July-2017 to June-2021 is 1, 18,953 units.

3.3 Solar unit Generation in year -2020-21

Sr. no	Month & Year	Unit Generation
1	Jul-20	3262
2	Aug-20	2640
3	Sep-20	3319
4	Oct-20	0
5	Nov-20	0
6	Dec-20	0
7	Jan-21	323
8	Feb-21	1933
9	Mar-21	3455
10	Apr-21	4031
11	May-21	3454
12	Jun-21	3746
	Total	26163

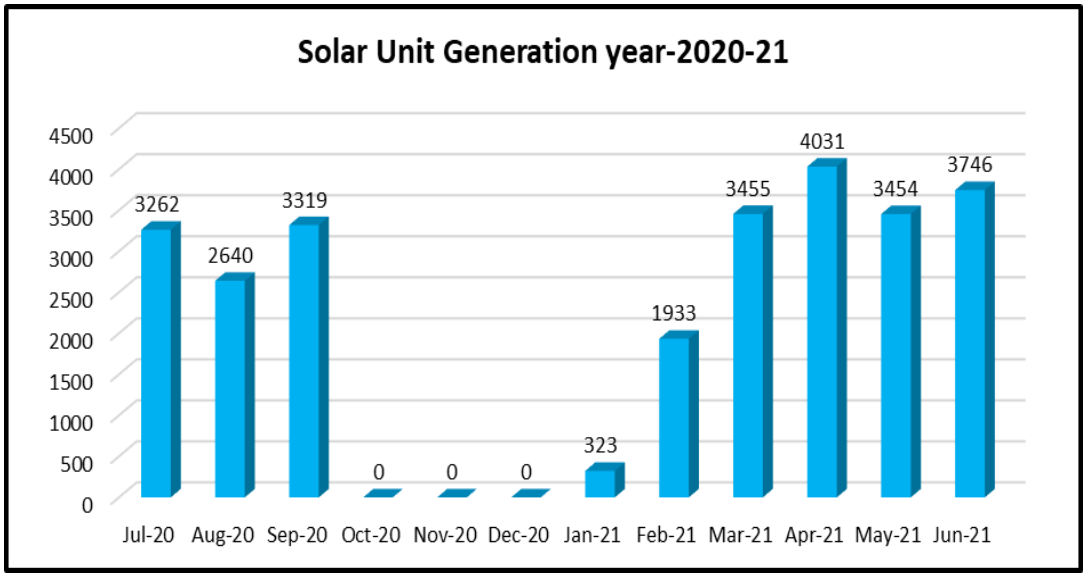


Figure 3.3 :- Total Solar Unit Generation in year-2020-21

Observation:

During the energy audit it was observed that plant is working, Total unit generation from July-2020 to June-2021 is 26,163 units. It is 34 % of total unit consumption of the year 2020-21.

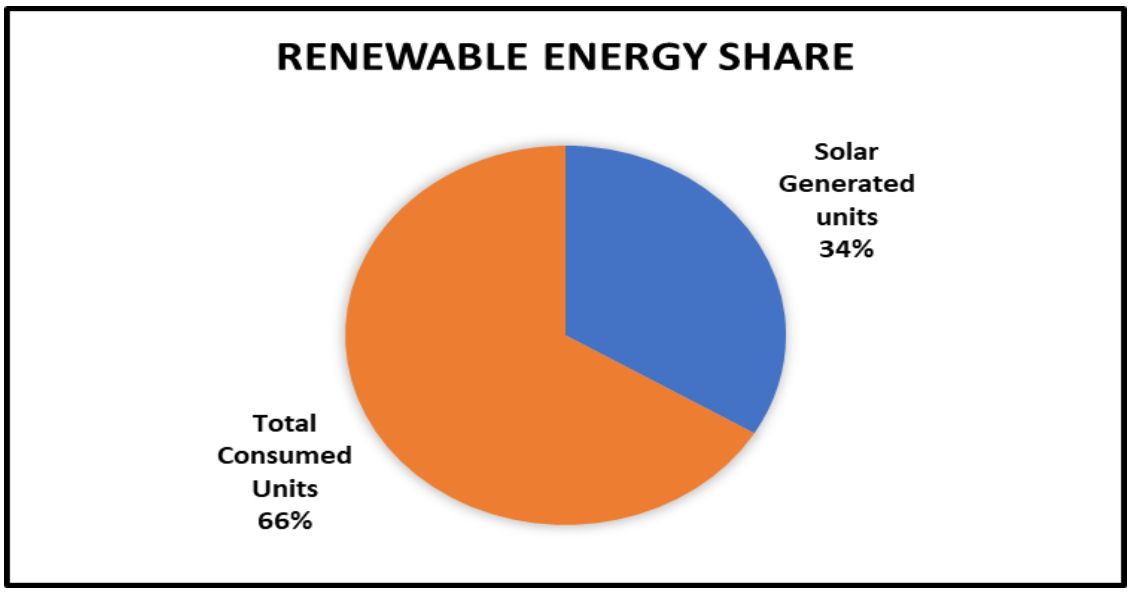


Figure 3.4: - Graphical presentation of Renewable energy share

- **The total CO_2 reduction is 114.55-ton CO2e/year** as up to Jun-2021.It is big contribution for toward CO_2 emission reduction. (Reference: Central Electricity Authority (CEA) Baseline Carbon Dioxide Emission database http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/database_11.zip) Electricity Purchased from the grid.

Chapter-04
Carbon Foot print

4.1 About carbon foot print.

Climate change is one of the greatest challenges facing nations, governments, institutions, business and mankind today.

Carbon footprint is a measure of the impact your activities have on the amount of carbon dioxide (CO_2) produced through the burning of fossil fuels and is expressed as a weight of CO_2emissions produced in tonnes.

We focus on consumption in each of our five major categories: housing, travel, food, products and services. In addition to these we also estimate the share of national emissions over which we have little control, government purchases and capital investment.

For simplicity and clarity all our calculations follow one basic method. We multiply a use input by an emissions factor to calculate each footprint. All use inputs are per individual and include things like fuel use, distance, calorie consumption and expenditure. Working out your inputs is a matter of estimating them from your home, travel, diet and spending behaviour.

Although working out you inputs can take some investigation on your part the much more challenging aspect of carbon calculations is estimating the appropriate emissions factor to use in your calculation. Where possible you want this emissions factor to account for as much of the relevant life cycle as possible.

We all have a carbon footprint…

4.2 Methodology and Scope

The carbon footprint gives a general overview of the GMN College greenhouse gas emissions, converted into CO_2 -equivalents and it is based on reported data from internal and external systems. The purposes of the carbon indicators are to measure the carbon intensity per unit of product, in addition to showing environmental transparency towards external stakeholders. The carbon footprint reporting approach undertaken in this study follows the guidelines and principles set out in the "Greenhouse Gas Protocol Corporate Accounting and Reporting Standard" (hereafter referred to as the GHG Protocol) developed by the Greenhouse Gas Protocol Initiative and international standard for the quantification and reporting of greenhouse gas emissions -ISO 14064. This is the most widely used and accepted methodology for conducting corporate carbon footprints. The study has assessed carbon emissions from the GMN College Campus. This involves accounting for, and reporting on, the GHG emissions from all those activities for which the company is directly responsible. The items quantified in this study are as classified under the ISO 14064 standards: The report calculates the greenhouse gas emissions from the GMN College. This includes electricity, as well as emission associated with diesel consumption in the institute vehicle. The emission associated with air travel, waste generation, administration, and marketing related activities has been excluded from the current study. Emissions from business activities are generally classified as scope 1, 2 or 3 areas classified under the ISO 14064 standards.

4.3 Carbon emission from Electricity

Direct emissions factors are widely published and show the amount of emissions produced by power stations in order to produce an average kilowatt-hour within that grid region

Unlike with other energy sources the carbon intensity of electricity varies greatly depending on how it is produced and transmitted. For most of us, the electricity we use comes from the grid and is produced from a wide variety of sources. Although working out the carbon intensity of this mix is difficult, most of the work is generally done for us.

Electricity used in the site is the significant contributors towards GHGs emission from the unit. Electricity used onsite is the most direct, and typically the most significant, a contributor to a unit's carbon footprint. The electricity is being sourced from the Uttar Haryana Bijli Vitran Nigam Limited (UHBVNL) which is in turn connected to the national grid. Thus,

using an average fuel mix of generating electricity, carbon dioxide intensity of electricity for national grid is assumed to be 0.9613 KgCO2/Kwh

(Reference: Central Electricity Authority (CEA) Baseline Carbon Dioxide Emission database http://cea.nic.in/reports/others/thermal/tpece/cdm_co2/database_11.zip) Electricity Purchased from the grid

Table:- 4.1 Electricity Purchased from the grid and Emissions from the electricity Import

Sr. No	Parameter	Unit	Value	Emission Factor kg CO2e/kWh	Emission ton CO2e/year
1	Electricity	57,622	kWh	0.9613	55.39
2	Diesel Consumption	655	litter		
3	Solar Units	29,208	kWh	0.9613	28.07
3	Total				

4.4 Other Emissions Excluded

This study did not evaluate the carbon sequestration potential of existing plantation activities and emission from the staff commuting, food supply, official flights, paper products, water supply, and waste disposal and recycling due to limited data availability. The current study identifies areas where data monitoring, recording and archiving need to be developed for enlarging the scope of mapping of GHGs emission in the future years. Accordingly, a set of tools and record keeping procedure will be developed for improving the quality of data collection for the next year carbon footprint studies.

CHAPTER- 5
WASTE MANAGEMENT

5.1 About Waste:

Human activities create waste, and it is the way these wastes are handled, stored, collected and disposed of, which can pose risks to the environment and to public health Waste management is important for an eco-friendly campus. In a college different types of wastes are generated, its collection and management are very challenging.

Solid waste can be divided into three categories: bio-degradable, non-biodegradable and hazardous waste. A bio-degradable waste includes food wastes, canteen waste, wastes from toilets etc. Non-biodegradable wastes include what is usually thrown away in homes and schools such as plastic, tins and glass bottles etc. Hazardous waste is waste that is likely to be a threat to health or the environment like cleaning chemicals, acids and petrol.

Unscientific management of these wastes such as dumping in pits or burning them may cause harmful discharge of contaminants into soil and water supplies, and produce greenhouse gases contributing to global climate change respectively. Special attention should be given to the handling and management of hazardous waste generated in the college. Bio-degradable waste can be effectively utilized for energy generation purposes through anaerobic digestion or can be converted to fertilizer by composting technology. Non-biodegradable waste can be utilized through recycling and reuse. Thus the minimization of solid waste is essential to a sustainable college. The auditor diagnoses the prevailing waste disposal policies and suggests the best way to combat the problems.

Table 5.1 Different types of waste generated in the College Campus.

Sr. No.	Types of Waste	Particulars
1	Solid wastes	Damaged furniture, paper waste, paper plates, food wastes etc
2	Plastic waste	Pen, Refill, Plastic water bottles and other plastic containers, wrappers etc
3	E-Waste	Computers, electrical and electronic parts etc
4	Glass waste	Broken glass wares from the labs etc
5	Chemical wastes	Laboratory waste etc
6	Bio-medical Waste	Sanitary Napkin etc

5.2 Waste management Practices adopted by the College

College is implemented **"Single Bin"** waste collection system. Vegetable waste and other leaf litters were used to feed in the **"Vermi-compost pit"** and the resulting vermin-cast is used as manure in the garden. All kind of waste generated from various activity is collected.

Fig 5.1: Dust Bin for waste collection at various Location

Observation :

Adopted 5 Bin Waste Collection System for collect different type of waste generated in college premises.

Fig5.2: 5 Dust Bin waste collection System

5.3 Waste Collection Points:

Audit team also visited various departments, canteen, and residential area, to find out waste generation area and waste collection points for further improvement. Details are given in the table 5.2

Table: 5.2 Detailed of Waste collection Dust bin system

Sr. No	Location	No of Bust Bin
1	Ground	7
2	Canteen back side	3
3	M.A Block	1
4	Stage Back side	1
5	Vatika	4
6	Music Room	1
7	Near phy.sic.	2
8	Room-6	1
9	Gandhi lawn	4
10	Girls common room	1
11	Hall	1
12	Computer lab	1
13	Staff room	1
14	Chemistry	2
15	Library	2
16	Principal Residence	2
	Total	**34**

CHAPTER- 6
RECOMMENDATIONS AND SUGGESTIONS

6.1 QR Code System and Biodiversity:

While the world seems to be going digital, people lack the time to read books and process the information they contain. Hence, College can be provided QR codes on the trees for its information and to exploit the rapidly growing platform for a unique purpose.

Fig: 6.1 QR Code System for plants

These codes can give students all the information they need to know about the tree — from its scientific name to its medicinal value. They only need to put their smart-phones to use. QR codes to them, making it easier for everybody to learn about a plant or a tree at the tip of their fingers," If any app generating a QR code, which is available for free on the online stores, can be used to avail the information of the trees.

- **Eco-restoration programmes**
  - Frame long-term eco-restoration programmes for replacing exotic Acacia plantations with indigenous trees and need of the hour is to frame a holistic campus development plan.

6.2 Other Suggestions

Some of the very important suggestions are:-

- Adopt the proposed Environmentally Responsible Purchasing Policy, and work towards creating and implementing a strategy to reduce the environmental impact of its purchasing decisions.
- Increase recycling education on campus.
- Increase Awareness of Environmentally Sustainable Development in college campus.
- 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.
- Involve All Stakeholders- Encourage involvement of government, foundations, and industry in supporting interdisciplinary research, education, policy formation, and information exchange in environmentally sustainable development.
- Collaborate for Interdisciplinary Approaches- To develop interdisciplinary approaches to curricula, research initiatives, operations, and outreach activities that support an environmentally sustainable future.
- Increase reduce, reuse, and recycle education on campus.
- Develop a butterfly garden that arouses appreciation towards flora and fauna diversity.
- Name all the trees and plants (Plant DNA barcodes) with its common name and scientific name.
- Arrange training programmes on environmental management system and nature conservation.
- Renovation of cooking system in the canteen to save gas by installation solar water heater system with heat pump.
- Establish a procurement policy that is energy saving and eco-friendly.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Phones: 0171-2640321, 2633151 (O), 2601281 (R)
Fax: 0171-2633151
E-MAIL: gmncollege@gmail.com, Website: www.gmncollegeambala.ac.in

POLICY DOCUMENT ON GREEN CAMPUS

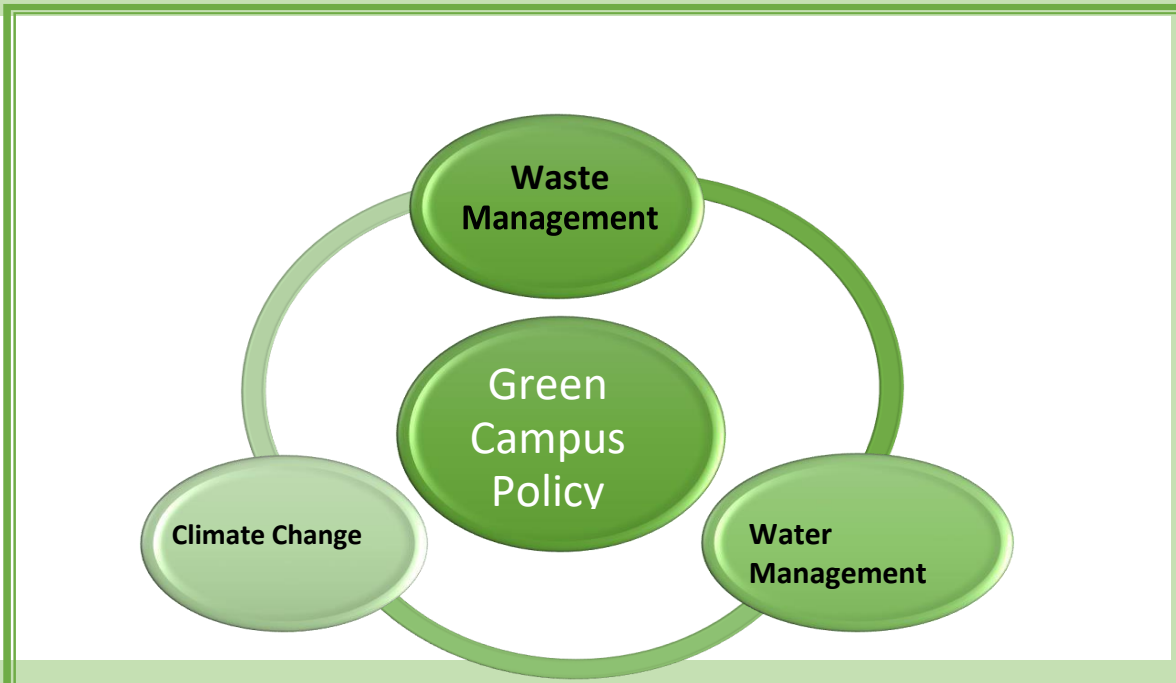
Green Campus Policy

A Green Campus is a place where environmental friendly practices and education combine to promote sustainable and eco-friendly practices in the campus. The green campus concept offers an institution the opportunity to take the lead in redefining its environmental culture and developing new paradigms by creating sustainable solutions to environmental, social and economic needs of the mankind.

College Environmental Aims and Objectives

The college is striving to develop its institution on a self – sustainable basis in the areas of power, water and cleanliness.

- The faculty, staff and students have to contribute collectively to develop an eco–friendly sustainable campus and disseminate the concept of e – friendly culture to the nearby community and wherever possible.
- Awareness creations about environmental issues among students.
-



Green protocol of the college:

As part of its initiatives for environmental sustainability, the following instructions andguidelines are implemented by the college:

- Spread the importance of Energy Conservation.
- Reduce the use of disposable items in all functions and meetings
- Promote the use of e-copies and e-documents
- Print on both sides of paper
- Promote vegetable cultivation.
- Plant trees on important days of celebrations
- Promote the usage of LED bulbs
- Avoid the usage of plastic made pens/bags/files/folders and banners
- Promote the use of electronic display boards, cloth banner etc.

Waste Management

- To increase the green cover in and around the campus.
- To adopt methods for waste segregation
- Take appropriate actions to reduce or recycle municipal waste inside the campus.
- To manage, collect and dispose e-waste appropriately
- To reduce hazardous waste and its management
- Actions taken to reduce consumption of plastic in the campus.
- To encourage paperless work culture and recycling/ reuse of paper.
- Display waste management instructions/alerts at prominent/relevant locations in the campus.

Liquid Waste Management:

1. Rain Water Harvesting System works at different places in the college to manage liquid waste.
2. The collected water is reused for gardening and sanitary purposes.
3. Change of taps which are either more water efficient or sensor based taps

E-Waste Management:

- E-waste exchange programme has been devised by the department of Computer Science which entails an understanding with the local vendor that offers services for the sale as well as purchase of e-waste generated from electrical waste.
- E-waste is managed in the best possible available manner which protects health and environment against any adverse effect.

Waste Recycling Management:

- Vermi compost pits/ Organic Pits are there in which fallen leaves and other organic waste like vegetable peels etc. from college canteen are collected for decomposition and later act as suitable manure for plants.
- Compost Roller Drums are also installed in the college which convert biodegradable waste into compost.
- Students of Eco Club make the community members aware of the importance of waste management.
- NSS units of the college also takes out various drives and campaigns in order to promote and spread an understanding of cleanliness through lectures, rallies, seminars etc.

Hazardous chemicals and radioactive waste management:

1. The biodegradable chemicals are processed for composting and the compost produced is used as manure in gardening.
2. The undergraduate course in chemistry does not include any practical where hazardous chemicals/ radioactive substances are used. So such materials are neither purchased nor used in the chemistry laboratory of the college.

We intend to pursue a programme of continuous improvement in our procedures, practices and review the policy on a regular basis to evaluate continued relevance and to monitor compliance.

Principal