



**Green Audit Report
Chandrakanti Ramawati Devi Arya
Mahila P.G. College, Gorakhpur U.P
Year-2021-22**



GREEN AUDIT REPORT



**Chandrakanti Ramawati Devi Arya
Mahila PG College,
Diwan Bazar,
Gorakhpur, Uttar Pradesh 273001**

PREPARED BY

EMPIRICAL EXERGY PRIVATE LIMITED

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(2021-22)



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ACKNOWLEDGEMENT

Empirical Exergy Private Limited (EEPL), Indore (M.P) takes this opportunity to appreciate & thank the management of **Chandrakanti Ramawati Devi Arya Mahila P.G. College, Gorakhpur** 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)
Chartered Engineer [M-1699118], The Institution of Engineers (India)
Member of ISHRAE [58150]



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BUREAU OF ENERGY EFFICIENCY

Examination Registration No.: **EA-7271**

Accreditation Registration No.: **AEA-284**



Certificate of Accreditation

This is to certify that Mr./Ms. **Shri. Rajesh Kumar Singadiya** having its trade/registered office at has been given accreditation as accredited energy auditor. The certificate shall be effective from **9th** day of **May, 2018**


The certificate is subject to the provisions of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

This certificate shall be valid until it is cancelled under regulation 9 of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

On cancellation, the certificate of accreditation shall be surrendered to the Bureau within fifteen days from the date of receipt of order of cancellation.

Your name has been entered at AEA No. **284** in the register of list of accredited energy auditors. Your name shall be liable to be struck out on the grounds specified in regulation 8 of the Bureau of Energy Efficiency (Qualifications for Accredited Energy Auditors and Maintenance of their List) Regulations, 2010.

Given under the seal of the Bureau of Energy Efficiency, Ministry of Power, this **5th** day of **October, 2018**


Secretary,
Bureau of Energy Efficiency
New Delhi



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Green Monitoring Committee.

Estb. Year 1990

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Gorakhpur, U.P.
NAAC ACCREDITED
Website-www.crdpccollege.edu.in
Mob : 7275618230

(Affiliated to D.D.U. Gorakhpur University, Gkp. U.P.)


Ref. 2284/C.R.D/2022 Date 07/07/2022

**Energy, Water, Green & Environmental Audit
Committee**

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

S.No.	Name	Designation	Department
01	Mr. Anant Kumar Patilak	Assistant Professor	B.Ed.
02	Dr. Rekha Srivastava	Assistant Professor	M.Ed.
03	Dr. Aparna Mishra	Assistant Professor	B.Ed.
04	Dr. Virendra Kumar Gupta	Assistant Professor	M.Ed.
05	Dr. Sarika Jaiswal	Assistant Professor	Home Science
06	Miss Ankita Upadhyay	Assistant Professor	Commerce
07	Miss Priya Kumari	Assistant Professor	Sociology
08	Dr. Rekha Rani Sharma	Assistant Professor	Fine Art
09	Mr. Narendra Singh Rawat	Office Superintendent	Administration Office

Time duration of this committee is 03 years up to June 2025, after which the committee will be reconstituted.


Principal

सं-सचिव
लक्ष्मीकान्त रामावती देवी आर्य महिला महाविद्यालय
क-डी-डी-सालेन गोरखपुर



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The Audit Team

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

- ✚ **Mr. Rajesh Kumar Singadiya** [Director & Accredited Energy Auditor AEA-0284]
- ✚ **Mr. Rakesh Pathak,** [Director & Electrical Expert]
- ✚ **Mr. Sachin Kumawat** [Sr. Project Engineer]
- ✚ **Mr. Charchit Pathak** [Ass. Project Engineer]
- ✚ **Mr. Mohit Malviya** [Fire safety Engineer]
- ✚ **Mr. Aakash Kumawat** [Site Engineer]
- ✚ **Mr. Ajay Nahra,** [Sr. Accountant & admin]



EXECUTIVE SUMMARY

Green Initiative Taken by College

+ CAMPAIGN OF PLANTATION AND GREEN CAMPUS:

College has around **667** trees in the campus. with 97 Medical plants Its good initiative taken by management for green campus under the campaign of plantation.

It's APPRECIABLE.

+ 10 KWp SOLAR PHOTOVOLTAIC ROOFTOP INSTALLATION:

College has installed 10 KWp solar photovoltaic roof top grid connected system on College building. Total unit generation from May-2022 to Oct- 2022 is **2148 units**. Solar unit generated for year May-2022 to Oct- 2022 is 2148 units. The total CO₂ reduction is 3.91 -ton CO₂e as up year May-2022 to Oct- 2022 **it's APPRECIABLE.** (CO₂e data are consider in solar system)

+ VERMICOMPOST UNIT:

College has installed 01 no of varmi compost pit. All type of agriculture waste decomposes in the pit and prepares good quality environmentally friendly manure is formed from the compost and it is to be used for agricultural purposes in the college campus. **It's APPRECIABLE.**

+ QR CODE SYSTEM ON TREE: -

College has adopted QR code system on trees for identification and nature of the tree. **It's APPRECIABLE.**

+ 5 DUST BIN SYSTEM

College has adopted 5 Dust bin System for various type of waste generated in college campus **It's APPRECIABLE.**



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RECOMMENDATION: -

✚ SOLID WASTE MANAGEMENT:

- ❖ The basic principle of good waste management practice is based on the concept of 3Rs, namely, reduce, recycle, and reuse. All the degradable and non-degradable waste material are collected and processed in environmentally friendly way in the College campus.
- ❖ **Organic converter:** - There are good potential of installation of organic converter in the college for all type of kitchen and vegetable waste generated from Hostels mess.



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CHAPTER-1
INTRODUCTION

1.1 About College

Chandrakanti Ramawati Devi Arya Mahila P.G. College, Gorakhpur in the holy land of Guru Gorakhnath, located in diwan bajar in Gorakhpur city was, established by Smt. Chandrakanti Devi Arya Mahila Sansthan on the day of Kartik Shukla Navami in 1990. The aim of this institution is to promote conserve and encourage the Arya culture, science and literature language, civilization while working for the multi faceted development of the students along with the educational, social and economical revival of women in which the organization is constantly engaged. On graduation level B.A., B.Sc. (Home Science), and B.Com. and on Post-Graduation level Home Science, Visual Art, Education and Political Science under M.A. are being run by this college. B.Ed. and M.Ed. program are also being run for teacher-training by the faculty of Education. A study center has also been approved by the Uttar Pradesh Rajarshi Tandon University Prayagraj which is to be operated from session 2019-20. Since the beginning, this college is continuously working for the all round development of women- students. Co-curricular activities and cultural programs are run in regular form for the spiritual and intellectual development of women-students. The college students have so far received the highest marks in the university examination and have received gold medal at the university level. Various students have been selected for the National Camp and Pre RD Parade by the units of NCC and NSS, run in the college which is a milestone in fulfilling the purpose of the establishment of this college. The college is fully active for the promotion of Arya culture and the goal of women education and multifaceted development which was set at the time of the establishment of this college.



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MISSION :-

- ❖ To provide women a wider access towards education of excellence, Excellence of Education, knowledge, Skill, through our wider access of Exposure. Empowerment of Human Values and Indian Culture by Self Responsibility. Enhancing Potential through the way of Curricular Actions.

VISION :-

- ❖ To Promote the Efficiency of Society by Women Education Creation of Security and Ability on Student. Provision of Positive Energy and Self dependency for the Progress of the Nation



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1.2 About Campus: - Chandrakanti Ramawati Devi Arya Mahila P.G. College, Gorakhpur total campus area is 7159.85 Sq.

Table 1.1 Details are total build up area given in the table:-

Name of Buildings in campus & Built-up area of Buildings	
Floor wise Built-up area in Sq.	
Floor	Proposed
Ground floor	918.9708
First floor	918.9736
Second floor	918.9717
Third floor	918.9717
Total Built-up Area	3675.8878

Satellite Image of College campus from Google map



Figure 1.1: - Satellite Image of College from Google map

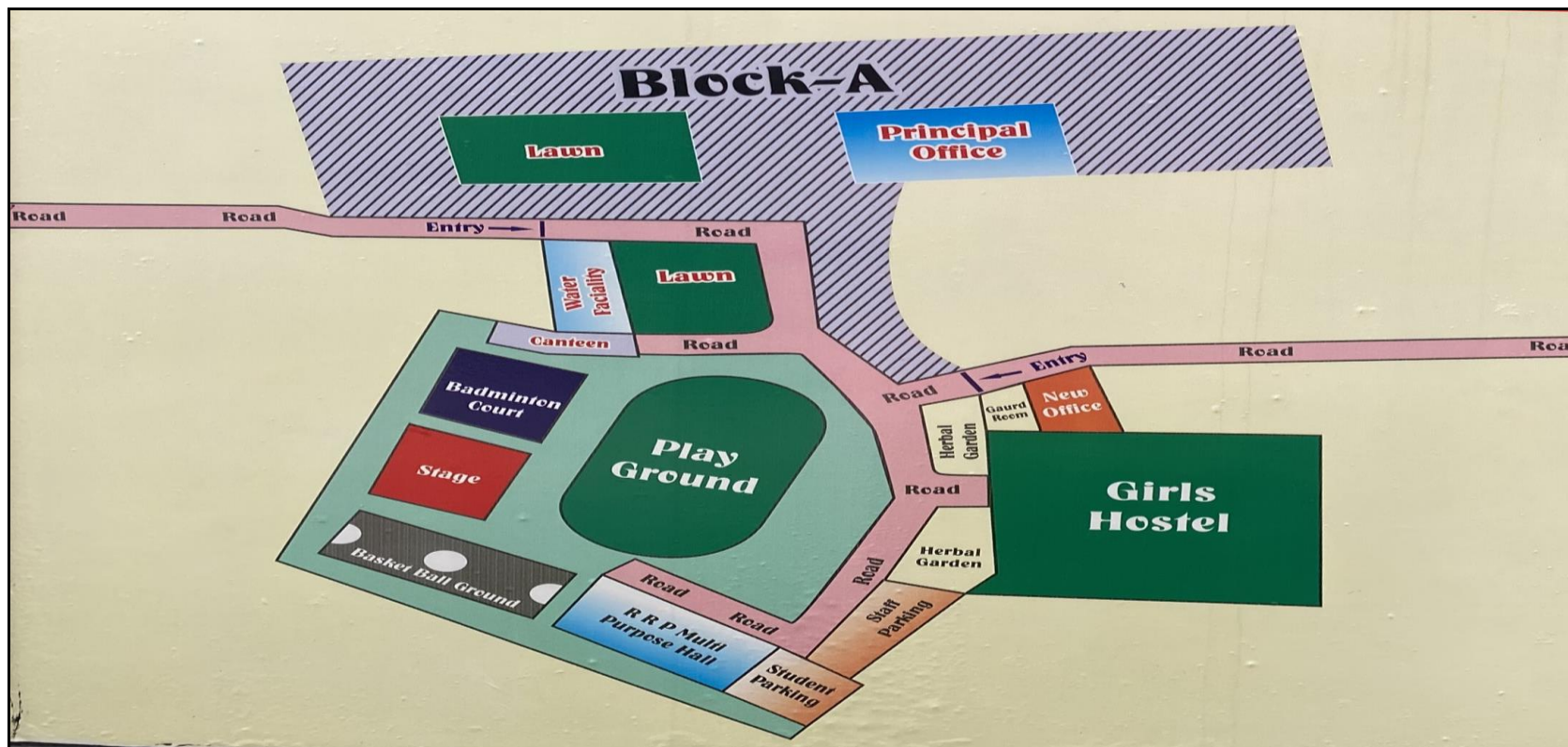


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1.3 COLLEGE LAYOUT OF VARIOUS BUILDINGS

Layout map of College





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1.4 About Green Auditing

Eco campus is concepts implemented in many educational institutions, all over the world to 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 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.

1.5 Objectives of Green Auditing

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

The specific objectives are:

-  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.



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CHAPTER- 2

GREEN CAMPUS & SUSTAINABLE DEVELOPMENT

2.0 Green Audit

In the survey, focus has been given on assessment of present status of plants and tree in the college campus and efforts made by the college authorities for nature conservation. Campus is in the vicinity of approximately more than 667 trees/ medicinal herbs/ ornamental plants. The detail is given below:



Figure .2.1 Green Campus



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2.1 List of plants in college camps

Sr.No.	Name of Tree	Quantity
1	Ashoka Tree	30
2	Moses in the cradle	3
3	Arabian Jasmine	1
4	Mimosa	1
5	Persian Liliac	1
6	Leechee	2
7	Shami	3
8	Chinese fan palm	1
9	Jonauba	1
10	Yellow bells	1
11	Red frangipani	1
12	Lemon Grass	2
13	Veriegated Croton	6
14	Indian laurel	3
15	West Indian Jasmine	1
16	Dumb Cane	11
17	Bich Spierlili	1
18	Sadabahar	5
19	Arrow head vine	13
20	China Rose	7
21	Karoo cycad	13
22	Paper flower	6
23	Yellow Kaner	8
24	Rose	3
25	Siberian Dog wood	1
26	sliper flower	1
27	Areca palm	16
28	Neem	4
29	Meetha Neem	1
30	Spider Plant	2
31	Mimosa	2
32	Guava	4
33	Mango	7
34	Mogra	4
35	Teak wood	29
36	Amla	3
37	cycas	2
38	Red Casiya	2
39	Peepal	1
40	Aloe Vera	14



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41	Tora siekle Pod	1
42	Gulmohar	3
43	Iron Wood Cassia	1
44	Pin wheel Flower	7
45	Cuban oregano	7
46	Coleus	5
47	Balsam	64
48	Snake plant	3
49	White Orchid tree	1
50	Dwarf Umbrella tree	1
51	Norfolk island Pine	1
52	Zephyr lili	13
53	Song of india	1
54	Ladder fern	1
55	Butterfly pea	3
56	White Water Lili	1
57	Canna lili	4
58	American Wishteria	1
59	Harsingar	4
60	Gurmar	2
61	Insulin	1
62	Kalmegh	2
63	Sharifa	1
64	Sarpgandha	2
65	Brahmi	4
66	Ashvgandha	3
67	Black Pepper	2
68	Gladiolus	25
69	Straberry	4
70	Lilium	5
71	Lucky bamboo	1
72	Supari	2
73	Guldaudi	80
74	Arjun	4
75	Cactus	2
76	Jamun	2
77	Araucaria	5
78	Brodleaf Palm Lili	3
79	Cordyline Fruticosa	17
80	Peace lili	6
81	Borassus	9
82	Dhatura	1
83	Marigold	102



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84	Yucca	2
85	Bauhini	2
86	Banana	2
87	Colocasia	6
88	Garam Masala	2
89	Cinnaman	2
90	Pomegranate	2
91	Lemon	2
92	Cardamom	2
93	Kapoor	2
94	Harjod	2
95	Karonda	1
96	Shreefal	1
97	Rudraksh	2
98	Tejpatta	2
99	Satavar	2
100	Aprajita	2
101	Ajwain	3
102	Paan	2
103	Giloyi	2
	Total	667



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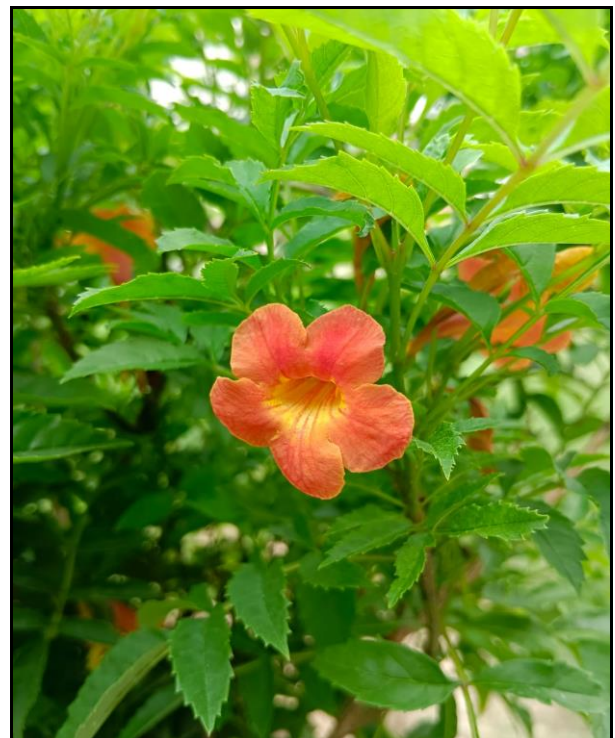
Green Campus Photograph:-



Fig.2.2 – Tree plantation and Biodiversity in the campus



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College has **667 trees** in the campus. This is good initiative taken by management for green campus under the campaign of plantation. **It's APPRECIABLE.**



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2.2 Medical Garden in College Campus :-

Sr. No	Plant Name	Quantity
1	Garam masala	2
2	Cinnaman	2
3	Pomegranate	2
4	lemon	2
5	Cardamom	2
6	Kapoor	2
7	Harjod	2
8	Karonda	1
9	Shreefal	1
10	Rudraksh	2
11	Tejpatta	2
12	Satavar	2
13	Aprajita	2
14	Ajwain	3
15	Paan	2
16	ALOEVERA	7
17	Lichi	1
18	Harsingar	4
19	Gurmar	2
20	Insulin	1
21	Kalmegh	2
22	Sharifa	1
23	Sarpgandha	2
24	Brahmi	4
25	Ashvgandha	3
26	Black pepper	2
27	Gladiolus	25
28	Strawberry	4
29	Lilium	5
30	Supari	2
	Total	94

Observation :-

- College has plantation a medical garden in campus. Total 94 plants are available in the garden. **Its Appreciable.**



Plantation In college campus





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CHAPTER- 3

RENEWABLE ENERGY AND SUSTAINABLE DEVELOPMENT

3.0 Grid Connected Solar Photovoltaic System (10 Kwp)

There is 10 KWp solar photovoltaic roof top grid connected systems installed on main building. System details are given below:

Table: -3.1 solar plants detailed

Sr.No.	Description	Technical Specification
1	Plant Information	
1.1	Brand Name	NEOSOL
1.2	Plant Capacity	10KW
1.3	Location	Main Building
2	PV Panel Details	
2.1	Modal	NS72P6-420
2.2	Panel Wattage	420WATT
2.3	No. Of PV Panel	24
2.4	Panel Tilt Angle	23 DEGREE
3	Inverter Information	
3.1	Model Name	POLYCAB
3.2	Model Number	PSIT-10K
3.3	Capacity	11000 WATT
3.4	No. Of Inverter	1





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Total Solar unit generation:-

Table 3.2:- Total Solar Unit generation May-2022 to Oct-2022

Sr. No	Month & Year	Unit Generation (kWh)
1	May-22	322
2	Jun-22	596
3	Jul-22	344
4	Aug-22	296
5	Sep-22	312
6	Oct-22	278
	Total	2148

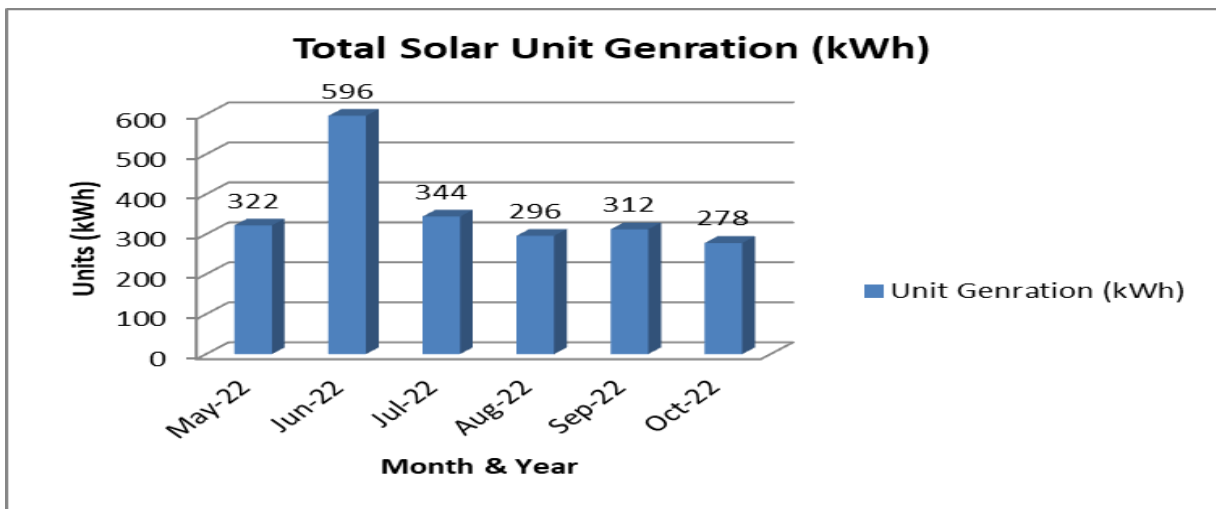


Figure: - 3.1 Graphical presentation of solar unit generation

Observation: -

Total unit generation from installation from solar system is 2148 unit.



Chapter-04

Carbon Foot print

4.1 About carbon foot print.

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

Carbon footprint is a measure of the impact of your activities have on the amount of carbon dioxide (CO₂) produced through the burning of fossil fuels and is expressed as a weight of CO₂ emissions 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...





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4.2 Methodology and Scope



The carbon footprint gives a general overview of the college greenhouse gas emissions, converted into CO₂ -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 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 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. 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

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

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

Sr. no	Year	Total unit Consumption by AVVNL	Unit	Emission Factor kg CO ² e/kWh	Emission ton CO ² e/year
1	2020-21	33003	kWh	0.9613	31.72
	Total			Total	31.72

Observation:-

Total Co2 Emission by indirectly from electricity is 31.72 Ton CO2e/year in 2021-22

4.4 Carbon emission from DG sets: -

College has 02 no DG sets installed in the campus one is College feeder and second is for hostel feeder. Total diesel consumption is 240 Litter.in year-2021-22.

Every litter of diesel fuel contain 10180 grams of pure carbon. In an average liquid hydrocarbon burning engine. It can be assumed that about 99 % of the fuel be Oxidize (It is assumed that somewhat less than 01 % will fail to fully oxidize and will be emitted as a particulate of unburned hydrocarbons instead of Co2.

Calculation of Total Co2 =

- ❖ CO² Emissions from a Litter of diesel: 2689.56 grams CO²/ litter.
- ❖ Diesel consumption Jun -2021 to july-2022 = 240 Litter
- ❖ 240 x 2689 = 6, 45,360 gram. or **0.645 Ton/year**

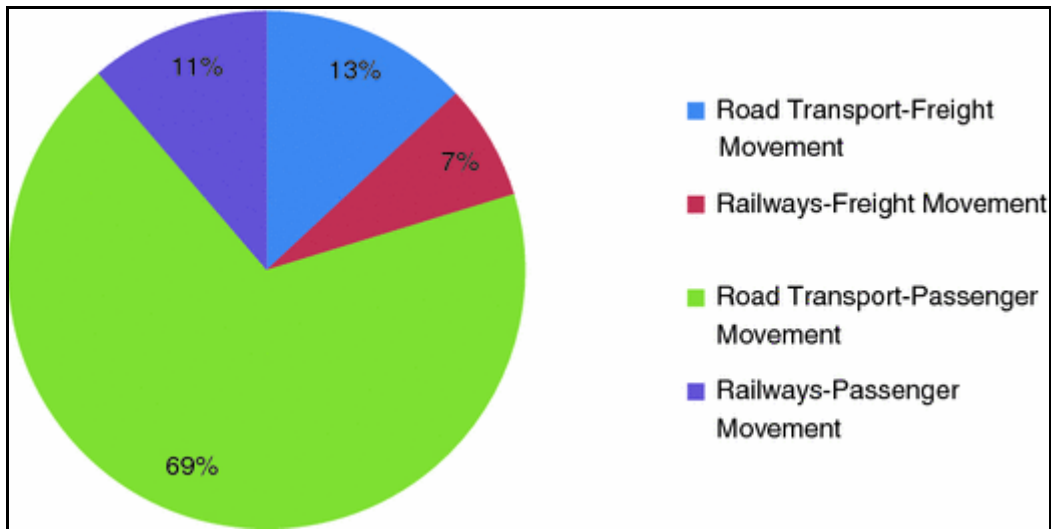


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4.5 Carbon emission from vehicles.

In India, it is the third most CO² emitting sector, and within the transport sector, road transport contributed more than 90% of total CO² emissions (IEA, 2020; Ministry of Environment Forest and Climate Change, 2018)



Transportation (29 percent of 2019 greenhouse gas emissions) – The transportation sector generates the largest share of greenhouse gas emissions. Greenhouse gas emissions from transportation primarily come from burning fossil fuel for our cars, trucks, ships, trains, and planes.

we have also considered the total GHGs emission done by transportation facilities available in campus like Cars, Ambulance, Buses etc. We consider the different type of vehicles which are operated on petrol and diesel fuels

Energy team was analysed following vehicles are movement for Campus.

Table 4.2 :- Total Two wheeler Vehicle in College campus .

Calculation of Carbon foot print analysis: -

As per above calculation total two-wheeler vehicles traveling is 340 Km /day and Four-wheeler vehicle traveling is 15 Km/day

Following details are given in table: -

Sr. No	Vehicle Type	Fuel type	Average Mileage (Per Litter)	Total (Km /day)
1	Two-Wheeler	Petrol	40	340
2	Four-Wheeler	Diesel	15	15



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- ❖ CO² Emissions from a gallon of gasoline: 8,887 grams CO²/ gallon
- ❖ CO² Emissions from a gallon of diesel: 10,180 grams CO²/ gallon
(1 US Gallon = 3.7854 liters)
- ❖ CO² Emissions from a Litter of gasoline: 2347.95 grams CO²/ Litter.
- ❖ CO² Emissions from a Litter of diesel: 2689.56 grams CO²/ litter.

Calculation CO² Emissions from Two-Wheeler.

$$\text{Total CO}_2 \text{ Emissions} = \frac{\text{Co}_2 \text{ Per litter}}{\text{Average Mileage (Km/Litre)}} \times \text{Distance (in km)}$$

$$\text{Total CO}_2 \text{ Emissions} = \frac{2347.95}{40} \times 340 = \mathbf{19957.5 \text{ gram or } 19.95 \text{ Kg/day}}$$

When Vehicle traveling in 275 Days in Year =

$$82.35 \times 275 = 22,646 \text{ Kg/year or } \mathbf{5.488 \text{ ton/year}}$$

Total CO² Emissions from Four -Wheeler.

$$\text{Total CO}_2 \text{ Emissions} = \frac{\text{Co}_2 \text{ Per litter}}{\text{Average Mileage (Km/Litre)}} \times \text{Distance (in km)}$$

$$\text{Total CO}_2 \text{ Emissions} = \frac{2689.56}{20} \times 15 = \mathbf{2017 \text{ gram or } 2.01 \text{ Kg/day}}$$

When Four Vehicle traveling in 275 Days in Year =

$$2.01 \times 275 = 554.7 \text{ Kg/year or } \mathbf{0.55 \text{ ton/year}}$$



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4.6 Biomass Calculation and CO² Sequestration of the Trees: -

1. Estimation of above ground biomass (AGB)

$$K = 34.4703 - 8.0671D + 0.6589 D^2$$

Where = K is above ground biomass.

D is Breast height diameter in (cm)

- 1 Estimation of below ground biomass (BGD)

$$BGB = AGB \times 0.15$$

- 2 Total Biomass (TB)

$$TB = AGB + BGB$$

- 3 Calculation of carbon dioxide Weight sequestered in the tree in kg.

$$C = W \times 0.50$$

- 4 Calculate the weight of Co₂ Sequestered in the tree per year in kg.

$$Co_2 = C \times 3.666$$

Where: -

AGB = above ground biomass.

D = Diameter of tree breast height.

BGB = Below Ground Biomass.

C = Carbon

TB = Total Biomass.



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Biomass calculation of the tree

Sr. no	Common Name	Average Diameter CM (25 to 100)	AGB	BGB	Total	Carbon Storage	Amount of Co2 Sequestered	No of Tree	Total Amount of Co2 Sequestered	Annually Co2 Sequestered amount
1	Ashoka Tree	75	3248	487	3735	1868	6847	30	205415	2.80
2	Moses in the cradle	60	1994	299	2294	1147	4204	3	12613	0.17
3	Arabian Jasmine	50	1328	199	1528	764	2800	1	2800	0.04
4	Mimosa	50	1328	199	1528	764	2800	1	2800	0.04
5	Persian Liliac	40	798	120	918	459	1682	1	1682	0.02
6	Leechee	55	1644	247	1891	946	3466	2	6933	0.09
7	Shami	40	798	120	918	459	1682	3	5047	0.07
8	Chinese fan palm	65	2378	357	2735	1368	5014	1	5014	0.07
9	Jonauba	30	403	61	464	232	850	1	850	0.01
10	Yellow bells	30	403	61	464	232	850	1	850	0.01
11	Red frangipani	30	403	61	464	232	850	1	850	0.01
12	Lemon Grass	35	584	88	671	336	1231	2	2461	0.03
13	Veriegated Croton	45	1046	157	1203	602	2205	6	13232	0.18
14	Indian laurel	50	1328	199	1528	764	2800	3	8400	0.11
15	West Indian Jasmine	36	624	94	717	359	1315	1	1315	0.02
16	Dumb Cane	35	584	88	671	336	1231	11	13536	0.18
17	Bich Spierlili	45	1046	157	1203	602	2205	1	2205	0.03
18	Sadabahar	60	1994	299	2294	1147	4204	5	21021	0.29
19	Arrow head vine	45	1046	157	1203	602	2205	13	28670	0.39
20	China Rose	40	798	120	918	459	1682	7	11775	0.16



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21	Karoo cycad	30	403	61	464	232	850	13	11056	0.15
22	Paper flower	65	2378	357	2735	1368	5014	6	30082	0.41
23	Yellow Kaner	65	2378	357	2735	1368	5014	8	40110	0.55
24	Rose	25	257	39	296	148	542	3	1626	0.02
25	Siberian Dog wood	35	584	88	671	336	1231	1	1231	0.02
26	sliper flower	36	624	94	717	359	1315	1	1315	0.02
27	Areca palm	30	403	61	464	232	850	16	13608	0.19
28	Neem	27	312	47	358	179	657	4	2627	0.04
29	Meetha Neem	28	341	51	392	196	718	1	718	0.01
30	Spider Plant	30	403	61	464	232	850	2	1701	0.02
31	Mimosa	54	1579	237	1815	908	3327	2	6655	0.09
32	Guava	35	584	88	671	336	1231	4	4922	0.07
33	Mango	37	665	100	765	383	1403	7	9818	0.13
34	Mogra	45	1046	157	1203	602	2205	4	8822	0.12
35	Teak wood	85	4254	638	4892	2446	8967	29	260039	3.55
36	Amla	26	284	43	326	163	598	3	1794	0.02
37	cycas	75	3248	487	3735	1868	6847	2	13694	0.19
38	Red Casiya	45	1046	157	1203	602	2205	2	4411	0.06
39	Peepal	30	403	61	464	232	850	1	850	0.01
40	Aloe Vera	30	403	61	464	232	850	14	11907	0.16
41	Tora siekle Pod	25	257	39	296	148	542	1	542	0.01
42	Gulmohar	46	1100	165	1265	632	2319	3	6956	0.09
43	Iron Wood Cassia	54	1579	237	1815	908	3327	1	3327	0.05
44	Pin wheel Flower	28	341	51	392	196	718	7	5029	0.07
45	Cuban oregano	50	1328	199	1528	764	2800	7	19601	0.27



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46	Coleus	36	624	94	717	359	1315	5	6576	0.09
47	Balsam	39	752	113	865	433	1586	64	101514	1.38
48	Snake plant	36	624	94	717	359	1315	3	3946	0.05
49	White Orchid tree	45	1046	157	1203	602	2205	1	2205	0.03
50	Dwarf Umbrella tree	46	1100	165	1265	632	2319	1	2319	0.03
51	Norfolk island Pine	35	584	88	671	336	1231	1	1231	0.02
52	Zephyr lili	26	284	43	326	163	598	13	7773	0.11
53	Song of india	80	3734	560	4294	2147	7871	1	7871	0.11
54	Ladder fern	75	3248	487	3735	1868	6847	1	6847	0.09
55	Butterfly pea	36	624	94	717	359	1315	3	3946	0.05
56	White Water Lili	37	665	100	765	383	1403	1	1403	0.02
57	Canna lili	57	1780	267	2047	1024	3753	4	15012	0.20
58	American Wishteria	50	1328	199	1528	764	2800	1	2800	0.04
59	Harsingar	46	1100	165	1265	632	2319	4	9274	0.13
60	Gurmar	37	665	100	765	383	1403	2	2805	0.04
61	Insulin	30	403	61	464	232	850	1	850	0.01
62	Kalmegh	28	341	51	392	196	718	2	1437	0.02
63	Sharifa	32	472	71	542	271	994	1	994	0.01
64	Sarpgandha	35	584	88	671	336	1231	2	2461	0.03
65	Brahmi	30	403	61	464	232	850	4	3402	0.05
66	Ashvgandha	28	341	51	392	196	718	3	2155	0.03
67	Black Pepper	30	403	61	464	232	850	2	1701	0.02
68	Gladiolus	23	208	31	239	120	439	25	10965	0.15
69	Straberry	46	1100	165	1265	632	2319	4	9274	0.13
70	Lilium	25	257	39	296	148	542	5	2710	0.04



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71	Lucky bamboo	35	584	88	671	336	1231	1	1231	0.02
72	Supari	30	403	61	464	232	850	2	1701	0.02
73	Guldaudi	35	584	88	671	336	1231	80	98446	1.34
74	Arjun	45	1046	157	1203	602	2205	4	8822	0.12
75	Cactus	67	2542	381	2923	1461	5357	2	10715	0.15
76	Jamun	45	1046	157	1203	602	2205	2	4411	0.06
77	Araucaria	40	798	120	918	459	1682	5	8411	0.11
78	Brodleaf Palm Lili	32	472	71	542	271	994	3	2982	0.04
79	Cordyline Fruticosa	64	2299	345	2644	1322	4846	17	82383	1.12
80	Peace lili	25	257	39	296	148	542	6	3252	0.04
81	Borassus	29	371	56	427	214	783	9	7048	0.10
82	Dhatura	25	257	39	296	148	542	1	542	0.01
83	Marigold	60	1994	299	2294	1147	4204	102	428837	5.85
84	Yucca	26	284	43	326	163	598	2	1196	0.02
85	Bauhini	24	232	35	267	133	489	2	978	0.01
86	Banana	30	403	61	464	232	850	2	1701	0.02
87	Colocasia	30	403	61	464	232	850	6	5103	0.07
88	Garam Masala	32	472	71	542	271	994	2	1988	0.03
89	Cinnaman	26	284	43	326	163	598	2	1196	0.02
90	Pomegranate	43	943	141	1084	542	1988	2	3975	0.05
91	Lemon	45	1046	157	1203	602	2205	2	4411	0.06
92	Cardamom	35	584	88	671	336	1231	2	2461	0.03
93	Kapoor	32	472	71	542	271	994	2	1988	0.03
94	Harjod	45	1046	157	1203	602	2205	2	4411	0.06
95	Karonda	54	1579	237	1815	908	3327	1	3327	0.05



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96	Shreefal	33	508	76	584	292	1070	1	1070	0.01
97	Rudraksh	36	624	94	717	359	1315	2	2630	0.04
98	Tejpatta	46	1100	165	1265	632	2319	2	4637	0.06
99	Satavar	34	545	82	627	313	1149	2	2298	0.03
100	Aprajita	54	1579	237	1815	908	3327	2	6655	0.09
101	Ajwain	45	1046	157	1203	602	2205	3	6616	0.09
102	Paan	33	508	76	584	292	1070	2	2140	0.03
103	Giloyi	54	1579	237	1815	908	3327	2	6655	0.09
Total								667	1745602	23.808

College has **667 trees** in the campus. This is good initiative taken by management for green campus under the campaign of plantation. **It's APPRECIABLE.**

There are total CO² sequestered **23808 Kg /year or 23.80 Tons /Year.**

Calculation of CO² Emission of College Campus.

Sr.no	CO2 Emission by	Annually Co2 Sequestered amount (Ton /Year)
1	Electricity	31.3
2	DG sets	0.64
3	Two Wheelers	5.44
4	Four Wheelers	0.55
	Total	37.93
Sr.no	CO2 Neutralized by	Annually Co2 Sequestered amount (Ton /Year)
1	Solar	3.91
2	Trees	23.08
	Total	26.99
Total CO2 Emission by college		10.04

Observation:- Total yearly College Co2 Emission is 10.04 (Ton/year). It is acceptable

Recommendation: -

There are required for more plantation and installation of solar energy to reduce carbon emission share by college.

4.7 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.



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CHAPTER- 5
AIR MONITORING SURVEY

Energy audit team was conducted air monitoring survey in college campus. Following details are given in table.

Sr.No.	Location/ Room No.	PM2.5	PM10	CO2	Temp.	RH %
1	Guest House	83.5	134.8	860	26	79
2	2	71.5	112.3	651	27	78
3	3	76.3	120	678	7	77
4	5	81.6	132.1	757	27	76
5	6	80.2	126.3	848	27	76
6	7	76	120.6	832	27	76
7	8	78.2	128.4	767	27	75
8	9	80.2	125.7	684	27	78
9	10	79.1	128.5	910	27	76
10	11	84.8	133.1	927	27	75
11	12	96.5	151.2	649	27	75
12	13	55.8	89	605	27	75
13	14	92	143	610	27	74
14	15 Principal Room	50.3	78.4	639	27	72
15	16	70.3	111	645	28	77
16	17	76.6	123.1	665	28	75
17	19	90.4	144	706	27	73
18	20	89	144.5	674	27	74
19	21	174	282	616	27	77
20	22	83.7	129.2	652	27	75
21	104	90	138	683	29	68
22	103	88.6	138.2	684	29	69
23	102	82.7	134.4	667	29	69
24	105	83.4	134	636	29	68
25	106	87.1	139	627	29	68
26	108	84	132.4	639	29	70
27	109	88.3	140	667	29	69
28	110	93.8	148.8	672	29	69
29	111	93.8	140	639	28	31
30	112	76	122	666	28	21



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31	113	82.5	130	619	28	72
32	114	80.6	126.9	622	28	71
33	115	86.6	137.5	674	28	71
34	202	72.1	116.1	658	28	72
35	203	90	142.1	709	29	71
36	204	74.6	121	719	29	69
37	205	84	133	610	29	70



Observation:-

✚ It is observed that PM2.5 and PM10 and CO2 Value are in the range.



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CHAPTER-06
WASTE MANAGEMENT

6.1 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 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 6.1 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	Bio-medical Waste	Sanitary Napkin etc.



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6.2 Waste management Practices adopted by the College

College is implemented “**Five dust bin**” waste collection system. **It’s appreciable.** 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.



Figure: - 6.1 Dust bin in college campus



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6.3 Waste Collection Points:

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

Table: 5.2 Detailed of Waste collection Dust bin system

Sr. no.	Rooms / Area	No. of Dustbin / Size	Types of Garbage
1	Store Room-01 (Ground Floor)	1 Small	Dry
2	Computer Lab-02	1 Small	Dry
3	Lecture Room-03	1 Small	Dry
4	Lecture Room-04	1 Small	Dry
5	Lecture Room-05	1 Small	Dry
6	Smart Room-06	1 Small	Dry
7	ICT Lab-07	1 Small	Dry
8	Health Care Room	1 Small	Dry
9	Staff Room Basement-8	2 Small	Dry, wet
10	Server Room-9	1 Small	Dry
11	Home Science Room	2 Small	Dry, wet
12	Home Science Lab	1 Medium	General, Dry, wet
13	B.Ed. Staff Room	2 Small	Dry, wet
14	I.Q.A.C.	3 Small	General, Dry, wet
15	Principal Office	1 Medium	General, Dry
16	Principal washroom	1 Small	Dry, wet
17	EDP Office-016	1 Small	General, Dry
18	Office-017	1 Small	General
19	Reception	1 Small	General
20	Vice-Principal	1 Small	Dry
21	NCC Office	1 Small	Dry
22	Founder Room-21	1 Small	Dry
23	Specially Abled Room-22	1 Small	General
24	Rovers & Rangers-23	1 Small	General



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25	Ladies washroom (Ground Floor)	1 Medium	General
26	Gents washroom	1 Medium	Dry, wet
<u>1st Floor</u>			
27	Store Room-101	1 Small	Dry
28	Music Room-102	1 Small	Dry
29	Lecture Room-103	1 Small	Dry
30	Fine Art Lab-104	1 Medium	Dry, wet
31	Fine Art Lab-105	1 Medium	Dry, wet
32	Lecture Room-6	1 Small	Dry
33	Lecture Room-7	1 Small	Dry
34	Lecture Room-8	1 Small	Dry
35	Lecture Room-9	1 Small	Dry
36	Lecture Room-10	1 Small	Dry
37	Lecture Room-11	1 Small	Dry
38	Science Lab (Home Science)-112	1 Medium	Dry
39	Lecture Room-113	1 Small	Dry
40	Lecture Room-114	1 Small	Dry
41	Lecture Room-115	1 Small	Dry
<u>2nd Floor</u>			
42	Store Room-201	1 Small	Dry
43	Textile Lab (Fashion Designing)-202	1 Medium	Dry
44	Lecture Room-203	1 Small	Dry
45	Lecture Room-204	1 Small	Dry
46	Lecture Room-205	1 Small	Dry
47	Lecture Room-206	1 Small	Dry
48	Common Hall-207	1 Medium	Dry
49	Library-208	1 Medium	Dry
50	Library Central-209	1 Small	Dry
51	Lecture Room-210	1 Medium	Dry
52	Lecture Room-211	1 Small	Dry
53	Lecture Room-212	1 Small	Dry



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54	Psychological Room-213	1 Small	Dry
55	Dr. R.R.P. Memorial Hall	2 Medium	Dry
56	Manager Room	1 Medium	Dry
57	M.Ed. Staff Room	6 Small	Dry
58	M.Ed. Office	1 Small	Dry
59	M.Ed. Corridor	1 Small	Dry
60	M.Ed. Lecture Room-101, 102	2 small	Dry
61	M.Ed. washroom	2 Small	Dry, wet
62	Ground floor Corridor	1 Big	Dry
63	First floor Corridor	1 Big	Dry
64	Second Floor Corridor	1 Big	Dry
65	Main Ground	2 Big	Dry, wet
66	Garden	2 Medium	Dry, wet
67	Canteen	2 Big	Dry, wet
68	Parking Area	2 Medium	Dry, wet



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6.4 Varmi Compost pit:-

College has installed varmi compost pit for all type of agriculture waste and generated manure are utilized in College garden. **It's Appreciable**





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6.5 Organic Waste Generation in College: -

- ✚ Audit Team also visited in hostel mess and discussion with concern officer about the waste collection process. College has approx. 10 Kg per day waste generated.

Recommended: - Install Organic waste composting Machine in college

An organic waste composting machine is an independent unit that facilitates the composting process and provides better composts. It takes waste as its input and provides manure as its output. Composting without an organic waste composting machine will take a considerable amount of time.





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About Composting Process: -

Highly compact composting machine, which uses special microorganisms to break down and decompose all kinds of organic waste into compost within 24 hrs with a volume reduction of 85-90%. When organic waste is added to it, moisture is sensed by the humidity sensor, heater, mixing blades and an exhaust system.



Recommendation: -

College has a good potential to install organic converter.



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END OF THE REPORT

THANKS