Swami Vivekanand College of Engineering
(Approved by: AICTE, New Delhi • Affiliated to RGPV, Bhopal and DAVV, Indore• Recognised by : DTE Govt. of MP)
Campus : Khandwa Road, Indore-452020 (M.P.) Phone : +91- 07324-405000
• Email : info@svceindore.ac.in • Website : www.svce.vivekanandgroup.com

Declaration

Metric 7.1.3

I declare that all the data, pictures, reports and other information enclosed in the criteria are authentic to the best of my knowledge.

Criteria In-charge

Mr. Vishal Wankhade

Index

Green Audit Report

GREEN AUDIT REPORT

CONSULTATION

Swami Vivekanand College of Engineering

Khandwa Road, Indore
Pin-452009
Madhya Pradesh, India

PREPARED BY

EMPIRICAL EXERGY PRIVATE LIMITED
Flat No. 201, OM Apartment,214 Indrapuri Colony, Bhawarkuan,
Indore – 452 001 (M. P.), India0731-4948831, 7869327256
Email ID:eempirical18@gmail.com
www.eeplgroups.com

(2022-23)

IQAC COORDINATOR
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

PRINCIPAL
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

CONTENTS

IQAC COORDINATOR
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

PRINCIPAL
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

ACKNOWLEDGEMENT

Empirical Exergy Private Limited (EEPL), Indore takes this opportunity to appreciate & thank the **Swami Vivekanand College of Engineering, Indore** for giving us an opportunity to conduct green audit for the Institute.

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 [AEA0284]
Certified Energy Auditor [CEA-7271]
(BEE, Ministry of Power, Govt. of India)
Empanelled Energy Auditor with MPUVN, Bhopal
M.P.LeadAuditorISO50001:2011[EnMS) from FICCI,
Delhi Certified Water Auditor (NPC, Govt of India)
Charted Engineer [M-1699118], The Intuition of Engineers (India)
Member of ISHRAE [5815]

IQAC COORDINATOR
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

PRINCIPAL
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

Green Audit Team

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

- **Mr. Rakesh Pathak**, [Director& Electrical Expert]
- **Mr. Rajesh Kumar Singadiya**[Director & Accredited Energy Auditor AEA-0284]
- **Mrs. Laxmi Raikwar Singadiya** [Energy Engineer]
- **Mr. Charchit Pathak** [Mechanical Engineer]
- **Mr. Mohan Choudhary** [Sr. Technician]
- **Mr. Ajay Nahra**[Sr. Accountant]

Green Monitoring Committee

Swami Vivekanand College of Engineering
(An ISO 9001:2008 Certified Institute)

(Approved by: AICTE, New Delhi • Affiliated to RGPV, Bhopal and DAVV, Indore • Recognised by : DTE Govt. of MP)
Campus : Khandwa Road, Near Old Toll Naka, Indore-452020 (M.P.) Phone : +91- 07324-405000
• Email : info@svceindore.ac.in • Website : www.vivekanandgroup.com

SVCE/Prin./2023-24/85 **Date: 08.05.2023**

Circular

Green Campus Committee

Constitution of Committee for Energy/Environment/Green Audit

In the view of environmental impact assessment & procedures for situation requiring urgent action regarding regular assessment of pollution, soil degradation & waste management following Committees are constituted for Environment preservation in the campus w. e. f. date of issue, for three years.

Name of Committee	Name of the members
1. Green Audit:	Dr. Rahul Joshi (Assist. Prof.) Mr. Mahesh K. Patidar (Assist. Prof.) Mr. Rupesh patel (Lab Assist.)
2. Environment Audit:	Ms. Megha Garg (Assist. Prof.) Mr. Brajesh Upadhyay (Assist. Prof.) Ms. Surekha Rathore (Assist. Prof.)
3. Energy Audit:	Mr. Hemendra Khedekar (Head EX.) Mr. Ravindra Sharma (Assist. Prof.) Mr. Balram Kushwah (Electrician)

08/05/2023

Principal (SVCE)

Copy to:

1. Director, SVGI, for information
2. Committee member, for necessary action
3. All staff member, SVGI

IQAC COORDINATOR
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

PRINCIPAL
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

EXECUTIVE SUMMARY

Green Initiatives Taken by Institute

- **CAMPAIGN OF PLANTATION AND GREEN CAMPUS:**
  Institute has around **345** trees in the campus. It is good initiative taken by management for green campus under the campaign of plantation. **It is Appreciable**
- Institute organized plantation programme every year to keep the environment green & balance- **It's Appreciable**

AREAS FOR IMPROVEMENT

- **5 Dust Bin System**

It is recommended that Institute could adopt 5 dust bin system for collection of different types of waste generated in college campus & place dust bin as per requirements at that location, like green waste, dry waste etc.

- **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, Institute can provide QR codes on the trees for its information and to exploit the rapidly growing platform for a unique purpose.

- **OTHER SUGGESTIONS & RECOMMNEDATION**

Some of the very important suggestions are:-

- Increase recycling education on campus.
- Increase Awareness of Environmentally Sustainable Development in Institute 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.

IQAC COORDINATOR
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

PRINCIPAL
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

- 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.
- Ensure participation of students and teachers in local environmental issues.
- Renovation of cooking system in the canteen to save gas by installation solar water heater system with heat pump.
- Avoid plastic/thermacol plates and cups in the Institute level or department level functions.

IQAC COORDINATOR
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

PRINCIPAL
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

CHAPTER-1
INTRODUCTION

1.1 About Institute

Swami Vivekanand College of Engineering, Indore has glorious history under Swami Vivekanand Group of Institutions. The Swami Vivekanand Group of Colleges is widely known for its commitment to excellence in preparing students to address the current and future needs of society, while performing with Intergrid, compassion, and competence.

SVCE started its journey in the year 2004 with the aim of providing education to students and empowering them so that they can be financially independent, socially conscious, morally upright and emotionally balanced. The Institute is best equipped with excellent infrastructure facilities, combined with the support of academicians, experts from the industry, and other fields to cater to the needs of the student's community. The Institute ensures that you get the best possible support, both academically and socially.

The Institute proudly announces the during past 19 years journey, it has been serving the society by providing excellent environment for education in area of Engineering & Management. It promotes the innovative teaching methodologies to help students gain practical knowledge and better insights about applying the theoretical knowledge. It believes in imparting education along with preparing students for corporate world. With a lush green campus spread over a large areas of located in the heart of the Indore city, the institute is well connected through all means of transport.

Figure:- 1.1 Satellite Image of SVCE , Indore from Google map

IQAC COORDINATOR
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

PRINCIPAL
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

Vision

Swami Vivekanand College of Engineering (SVCE) aspires to create Center of Excellence for continuous learning by providing state-of-art Techno-Management Education to the students and learners, by enhancing the capabilities to be the Techno-Management Thought Leaders.

Mission

The mission of the Swami Vivekanand College of Engineering (SVCE)

1. To import human values and to promote leadership qualities among students.
2. To set up a suitable infrastructure and provide better resources to students and faculties.
3. To encourage academic excellence amongst faculties and students.
4. To impart education based on scientific, moral and value-based foundation to meet the challenges of the technologically advancing global environment.

1.2 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 **"Swami Vivekanand College of Engineering, Indore"** 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 Institute 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.

1.3 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 Institutes

1.4 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.

Fig. 1.2 Green campus model

CHAPTER- 2
GREEN CAMPUS

2.1 Green Audit

In the survey, focus has been given on assessment of present status of diversity in form of plants, in Institute campus and efforts made by the Institute authorities for nature conservation. Campus is located in the vicinity of approximately more than 345 trees medicinal herbs ornamental plants. The detail is given below

2.2 List of plants in Institute campus

Institute has **345 Trees** in the campus. This is good initiative taken by management for green campus under the campaign of plantation. **It's Appreciable**

Sr. no.	Tree Category	Botanical and Family Name	Quantity
1	Herbals	TULSHI , ALOVERA , PIPAL , NEEM , HIBUSCUS , LAGUNDI , FICUSMICROCORPA , ACALYPHA , MANGIFERA	55
2	Fruits	MANGO ,GUAVA , ALMONDS , PAPAYA , ZIZIPHUS , TAMARIND , RUBUS COCK BURNIANUS	40
3	Decorations	CHAMELI , COPPER LEAF , ARABIAN JASMINE , PALM TREE , INDONESIAN BAY , AGONUS , SONG OF INDIA , SAGO PLANT , ROSE , CABBAGE PALMS , HARIPRIYA , LAPORTEA	150
4	Others	CASSIA DIDYMOBOTRYA , TANG -GWA WHITE , FIREBUSH , e FLORA , RHODO DENDRON , BOUGAINVILLEA , PREMNA SERRATIFOLIA , CREEPER , IXORA , MELICOPE RUBRA , CANNA TUERCKHEIMIL , RANGOON CREEPER , SPERRY , SPATHODEA CAMPANULATA , TECOMA , BLACK BOARD TREE , AGAVE , ARBORVITAE , SIDEROXLOY , BOUGAINVILLEA GLABRA	100
	Total		**345**

IQAC COORDINATOR
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

PRINCIPAL
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

Green campus photograph

Fig.- 1.3 Green campus of SVCE

IQAC COORDINATOR
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

PRINCIPAL
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

Fig.- 1.4 Plantation Programme in institute campus

Fig.- 1.5 Green campus of SVCE

IQAC COORDINATOR
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

PRINCIPAL
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

Chapter-03
Carbon Foot print

3.1 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 our 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…

IQAC COORDINATOR
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

PRINCIPAL
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

3.2 Methodology and Scope

The carbon footprint gives a general overview of the Institute 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 Institute 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 Institute.

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.

3.3 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

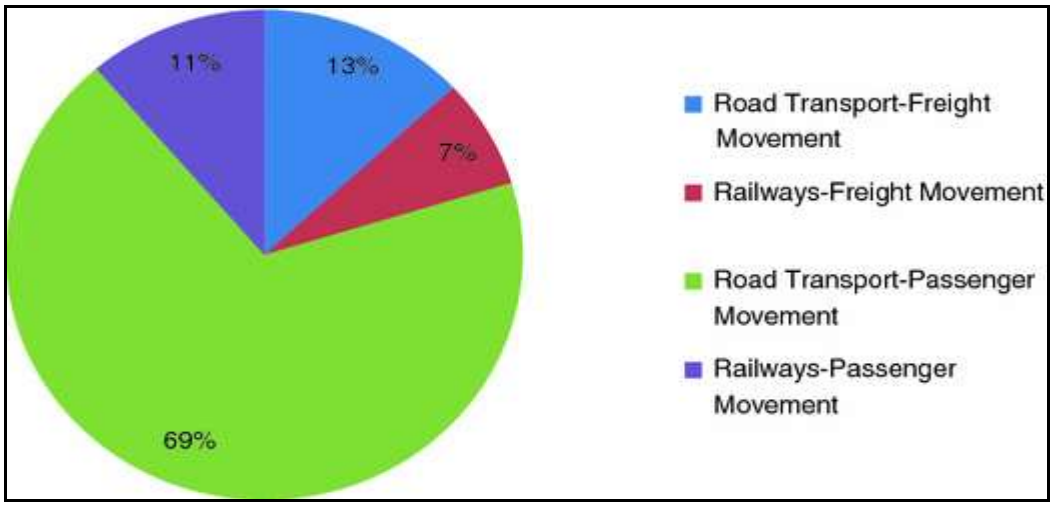
Unlike with other energy sources the carbon intensity of electricity varies greatly depending on how it is produced and transmitted. For most of us, the electricity we use comes from the grid and is produced from a wide variety of sources. Although working out the carbon intensity of this mix is difficult, 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 $KgCO_2/KWh$.

Sr. No.	Year	Total Unit Consumption	Unit	Emission Factor kg CO_2/kWh	Emission Ton CO_2/ year
1	2022-23	57,654	KWh	0.9613	55.42

3.4 Carbon Emission from Vehicles.

In India, it is the third most CO_2 emitting sector, and within the transport sector, road transport contributed more than 90% of total CO_2 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.



IQAC COORDINATOR
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

PRINCIPAL
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

Greenhouse gas emissions from transportation primarily come from burning fossil fuels for our cars, trucks, ships, trains, and planes.

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

Institute has celebrated the No Car day in the month 22 Sept 2023- I**t's appreciable**.

The institute management shared the carbon emission data.

S.No.	Average Kilometre Travelled by each vehicle per day	Total no. of Buses in Institute per day	Average Kms Travelled	Average Carbon emission by Buses (122 gms per km) in gms	Total Carbon Emission in Kg per day
1	60	15	900	1,09,800	110
2	200	2	400	48,800	49
3	150	1	150	18,300	18
4	85	2	170	20,740	21
5	240	1	240	29,280	29
6	20	3	60	7,320	7
	Average Kilometre Travelled by each vehicle per day	**Total no. of Two wheelers in Institute per day**	**Average Kms Travelled**	**Average Carbon emission by two wheeler (10 gms per km) in gms**	**Total Carbon Emission in Kg per day**
7	40	6	240	2400	2.4
Total scope of Carbon emission saved in a day (Kg)					236

When Vehicle traveling in 12 months in a Year

236 x 12 = 2832 kg/year or **2.83 ton/year**

IQAC COORDINATOR
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

PRINCIPAL
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

3.5 Carbon emission from DG sets: -

Institute has One DG sets installed in the campus.

Total diesel consumption in a year in the table: -

Sr. No.	Month & Year	Total Diesel Consumption (Litters)
1	Aug-22	30
2	Sep-22	40
3	Oct-22	30
4	Nov-22	35
5	Dec-22	30
6	Jan-23	40
7	Feb-23	50
8	Mar-23	30
9	Apr-23	40
10	May-23	35
11	Jun-23	40
12	Jul-23	30
Total		**430**

Every litter of diesel fuel contains 720 grams of pure carbon. In an average liquid hydrocarbon burning engine. It can be assumed that about 99 % of the fuel is Oxidized (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 CO_2.

Calculation of Total CO_2 =

- CO_2 Emissions from a Littre of diesel: 2689.56 grams CO_2/ litter.
- Diesel consumption Aug-2022 to July -2023 = 430 Litters
- 430 x 2689 = 11, 56,270 gram. or **1.15 Ton/year**

IQAC COORDINATOR
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

PRINCIPAL
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

3.6 Biomass Calculation and CO_2 Sequestration of the Trees: -

1. Estimation of **A**bove-**G**round **B**iomass (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 **B**elow **G**round **B**iomass (BGB)

$$BGB = AGB \times 0.15$$

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 CO_2 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.

IQAC COORDINATOR
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

PRINCIPAL
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

Biomass Calculation of Tree

Sr. no.	Tree Name	Botanical and Family Name	Average Diameter CM (10 to 100)	AGB	BGB	Total	Carbon Storage	Amount of Co2 Sequestered	Total	Total Amount of Co2 Sequestered	Annually Co2 Sequestered amount (Ton/year)
1	Mango Tree	Mangifera	35	583.8	87.6	671.3	335.7	1230.6	**5**	6153	0.08
2	Banyan	FICUSMICROCORPA	40	798.0	119.7	917.7	458.9	1682.2	**12**	20186	0.28
3	Acalypha	Euphorbiaceae	30	403.5	60.5	464.0	232.0	850.5	**21**	17860	0.24
4	Gudhal	HIBUSCUS	48	1211.4	181.7	1393.2	696.6	2553.7	**4**	10215	0.14
5	Jhahrberi	Ziziphus	18	109.2	16.4	125.6	62.8	230.2	**13**	2993	0.04
6	Alovera	canelabra	20	144.7	21.7	166.4	83.2	305.0	**5**	1525	0.02
7	Guava	Psidiumguajava	36	623.9	93.6	717.5	358.7	1315.2	**2**	2630	0.04
8	Palm Tree	Arecaceae	25	257.1	38.6	295.7	147.8	542.0	**21**	11381	0.16
9	Redraspberry	Rubus	40	798.0	119.7	917.7	458.9	1682.2	**22**	37009	0.50
10	Tararind	Fabaceae	12	35.4	5.3	40.7	20.4	74.7	**14**	1046	0.01
11	INDONESIAN BAY	Myrtaceae	26	283.7	42.5	326.2	163.1	598.0	**12**	7175	0.10
12	Peppermint tree	Agonis flexuosa	16	79.2	11.9	91.1	45.5	166.9	**4**	668	0.01
13	Badam	Terminalia Catappa	24	231.9	34.8	266.7	133.3	488.9	**5**	2444	0.03
14	ARABIAN JASMINE	Jasminum sambac	22	185.6	27.8	213.4	106.7	391.2	**11**	4303	0.06
15	Chameli	Jasminum sambac	10	21.7	3.3	24.9	12.5	45.7	**9**	411	0.01

IQAC COORDINATOR
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

PRINCIPAL
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

16	Neem	Azadirachta indica	12	35.4	5.3	40.7	20.4	74.7	**12**	896	0.01
17	Papaya	Carica papaya	26	283.7	42.5	326.2	163.1	598.0	**5**	2990	0.04
18	Hamelia Patens	Firebush	12	35.4	5.3	40.7	20.4	74.7	**5**	373	0.01
19	Burans	Rhododendron	10	21.7	3.3	24.9	12.5	45.7	**11**	503	0.01
20	Champa	Frangipani	12	35.4	5.3	40.7	20.4	74.7	**14**	1046	0.01
21	Pipal tree	Ficus religiosa	45	1046.2	156.9	1203.2	601.6	2205.4	**15**	33081	0.45
22	Rose	Rosa rubiginosa	20	144.7	21.7	166.4	83.2	305.0	**12**	3660	0.05
23	Satavari	Asparagus racemosus	23	208.1	31.2	239.3	119.6	438.6	**10**	4386	0.06
24	Mulberry	Morus	24	231.9	34.8	266.7	133.3	488.9	**9**	4400	0.06
25	Snakebush	Hemiandra pungens	12	35.4	5.3	40.7	20.4	74.7	**17**	1270	0.02
26	Tecoma	Tecoma stans	15	66.2	9.9	76.2	38.1	139.6	**12**	1675	0.02
27	Lajvanti	Mimosa Pudica	26	283.7	42.5	326.2	163.1	598.0	**10**	5980	0.08
28	White Sandalwood	Santalum album	11	27.9	4.2	32.1	16.0	58.8	**13**	764	0.01
29	Setut	Ficus religiosa	13	44.3	6.6	51.0	25.5	93.5	**7**	654	0.01
30	Karoda	Carissa carandas	10	21.7	3.3	24.9	12.5	45.7	**6**	274	0.00
31	Lemon grass	Cymbopogon	16	79.2	11.9	91.1	45.5	166.9	**5**	835	0.01
32	Tecoma	Tecoma stans	20	144.7	21.7	166.4	83.2	305.0	**8**	2440	0.03
33	Oleander	Nerium oleander	22	185.6	27.8	213.4	106.7	391.2	**4**	1565	0.02
34	Mulberry	Morus	23	208.1	31.2	239.3	119.6	438.6	**3**	1316	0.02
35	Tulsi	Ocimum sanctum	12	35.4	5.3	40.7	20.4	74.7	**7**	523	0.01
									345	**194629**	**2.65**

Institute has **345 trees** in the campus. This is good initiative taken by management for green campus under the campaign of plantation.

It's Appreciable.

There is total CO_2 sequestered **2.65** Tons /Year. There are requirements of more plantations to reduce carbon emission share by Institute.

IQAC COORDINATOR
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

PRINCIPAL
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

Total CO_2 Emission by the Institute

Sr. No.	CO_2 Emission by	Total CO_2 Emission ton/year
1	Electricity	55.42
2	DG sets	1.15
3	Vehicle	2.83
Total CO_2 Emission		59.4
CO_2 Emission Neutralized by		
1	Trees	2.65
Total CO_2 Emission		**56.75**

3.7 Other Emissions Excluded

This study did not evaluate the carbon sequestration potential of existing 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 foot print studies.

IQAC COORDINATOR
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

PRINCIPAL
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

CHAPTER- 4
WASTE MANAGEMENT

4.1 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 Institute 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 Institute. 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 Institute. The auditor diagnoses the prevailing waste disposal policies and suggests the best way to combat the problems.

Table 4.1 Different types of waste generated in the Institute 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.

4.2 Waste management Practices adopted by the Institute

Institute has a different type of waste generated like paper, Plastic, dust and wet waste. The Institute provided dust been near classroom office, laboratories staffroom and collect the waste material at the end of the day. The waste (Especially dry material) is collected in a big dustbin which is provided at every floor and the next day collected Municipal Corporation for further processing.

Fig. 4.1 -Waste collection dust bin in Institute campus

Fig. 4.2- Recommended 5 Dust Bin waste collection System

Recommendation:

It is recommended that adopt the 5 Bin Waste Collection System for collect different type of waste generated in Institute premises & place dust bin as per requirements.

IQAC COORDINATOR
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

PRINCIPAL
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

4.3 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

Table 4.2: Details of Waste collection Dust bin system

Sr.no.	Location	No. of dust bins
1	Engg Block First Floor	1
2	Engg Block Second Floor	1
3	Admin Block	1
4	Canteen	1
5	Exam Control Room	1
6	Library	1
	Total	**6**

4.4 Kitchen waste management

Fig. 4.3– Organic compost formation machine

Observation- College adopt good policy to use kitchen waste material for formation of organic compost- **It's appreciable**

IQAC COORDINATOR
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

PRINCIPAL
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

CHAPTER- 5
Air Quality Measurement

5.1 Air Quality Measurement

Green audit team was conducted air monitoring survey in Institute campus. Details are given in table.

Table 4.3 Details of air quality in institute campus

Sr. No.	Location	PM2.5	PM10	CO_2
1	Principal Office	20	80	1417
2	Vice Principal office	29	75	487
3	Administration office	28	110	622
4	Director's office	27	125	980
3	Admission office	27	68	585
4	Faculty Cabin	26	79	475
5	Class Room	28	82	525
6	Library	29	67	598
7	Exam Control Room	35	86	467
8	Account Dept.	24	87	712
9	Scholarship Dept.	28	69	538
10	MBA Block	25	73	420
11	Admin Reception	26	77	583

Fig.- 5.1 Air quality measurement

Observation:-

- $PM_{2.5}$ value is higher side. The 24-hour concentration of $PM_{2.5}$ is considered unhealthy when it rises above **35.4µg/m^3**
- PM_{10} value is acceptable range. It should below **155µg/m ^{3}**
- CO_2 value is acceptable range. It should be below **1000 ppm**.

IQAC COORDINATOR
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

PRINCIPAL
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

CHAPTER- 6
RECOMMENDATIONS AND SUGGESTIONS

6.1 QR Code Systems

While the world seems to be going digital, people lack the time to read books and process the information they contain. Hence, Institute 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: -

- Increase recycling education on campus.
- Increase Awareness of Environmentally Sustainable Development in Institute campus.

IQAC COORDINATOR
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

PRINCIPAL
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

- 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 reduces, 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.

END OF THE REPORT

THANKS

IQAC COORDINATOR
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE

PRINCIPAL
SWAMI VIVEKANAND
COLLEGE OF ENGINEERING
KHANDWA ROAD, INDORE