C. A. Y. M. E. Trust's
Siddhant College of Engineering.
(Approved by AICTE, Recognized by Govt. of Maharashtra and Affiliated to S.P. Pune University & MSBTE)
At. Post - Sudumbare, Tal. - Maval, Dist. - Pune, PIN - 412 109. ☎ 02114-661904.

Shri. Rajendra Singh Yadav.
President.

Dr.Rahul Khandagale
Principal.

Date-06/12/2022

NOTICE

All the teaching, non-teaching staff and students of Siddhant College Of Engineering are hereby informed that we are going to organise the **Environmental Awareness Rally at Sudumbare** on the 8th December 2022 .

All are requested to gather at main entrance of engineering building sharp 9.00 am

Siddhant College of Engineering • Sudumbare,Pune-412109 • SEAL

Dr.R.L.Khandagale
Principal

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President.

Dr. L. V. Kamble
Principal.

"Environmental Awareness"

Event Name: "**Environmental Awareness**"

Event Venue: Sudumbare.

Address: Sudumbare, Talegaon-Chakan Road, Maval, Pune.

Contact person details: Prof. Nanda Kulkarni (NSS Coordinator) 9823385621

Event Date: 08/12/2022

Number of Participants: Staff: 6 Boys: 31 Girls: 9 Total Beneficiaries: 46

Objective: To Create awareness about Environment.

Event Description:

Siddhant College of Engineering, Sudumbare, organized the event of Environmental Awareness rally at Sudumbare. To create consciousness about the depletion of environmental resources. And environmental rally was plan and executed for village sudumbare. Students prepared more than 15 posters, having awareness slogans on it. The importance of cleanness, water uses , Gender equity , use of plastic and other environmental issue where addressed.

Siddhant College of Engineering • Sudumbare, Pune-412109 • SEAL

Photograph of Environmental Awareness Rally:

Siddhant College of Engineering
SEAL
Sudumbare, Pune- 412109

Dr.R.L.Khandagale
Principal

Duties of Staff for NSS activities.

SR. NO	Date	Activity	Staff Name (Responsible)
1.	8/12/22	Rally.	Mr. Sagar Deshpande Mr. Nilesh Kad Mr. Sharad Jadhav Mr. Datta Gade Mr. Tambekar Mr. Kaamesh Mr. Mayur Kadam
2	9/12/22	NDRF Visit.	Mr. Sharad Jadav Mr. Kaamesh. Mr. Snehal Mr Datta. Gade
3.	10/12/22	Hospital Bus	Mr-Sharad Jadhav Mr. Kamesh. Mr. Nilesh Kad Mr. Shilpa. Mr Snehal Mr Datta Gade Mr Ramesh.

7/12/22.

N.S.S. Programme Officer

SN. No	Name of Student	Mobile No	Sign
1	Amit Dnyaneshwar Raut	7378322035	Raut.
2	Vaijnath Shivaji Golen	8779868217	
3	Vaibhav Santosh Bankde	9529895277	
4	Sawabh Sundarao Jadhav	9766555084	
5	Rutik Goraksh Gare	9529911897	
6	Prathamesh Pattabhay Gurav	7385511961	
7	Suraj Dnyanoba Babar	7822882650	
8	Snehal Raju Tawade	9049152224	
9	Rutik Kalyan Darade	7249709334	
10	Yash Prakash Mane	8421515520	
11	Lokesh Sandeep Chandaliya	9175182003	
12	Anuj Vishwas Matekar	7585150857	
13	Vaishnavi Pandharinath Kakad	7743863313	
14	Shruti Sahebrao Jambukar	9922542915	
15	Bhagyashree Prakash Jakate	8530463527	Jakate
16	Rupesh Suresh Pange	8767664324	
17	~~Anjali A. Kamble~~		
17	Anjali Ankush Kamble	8208710059	
18	Bhakti Suhas Deshpande	7448192158	Bhakti
19	Vilasi Pandurang Bharat	9881401443	Vilasi
20	Mansi Sanjay Gore	7498739497	
21	Adesh Madhukar Bhise	9922-167632	
22	Bhushan Gajanan Wadurj	7387197984	
23.	JATHAR MAYUR DNYANDEV	7447501308	
24.	SHINDE OMKAR SUNIL	7666850622	
25.	KARNE ASHWINI SAMBHAJI	9007186674	
26.	SURWASE PAWAN DNYANDEO	9307072783	
27.	MORE SUMIT.NABHADAS	7028467208	
28	YADAV ABHISHEK PREMKISHOR	9284467538	
29	Tejas Dattapant Madival	9421943294	
30)	om gole	7910159965	
31)	komal jadhav	7620053711	
32)	Sachet Tawade	9049152224	
33)	Harshal Gaikwad	7744098664	
34)	ANIRUDDHA DILIP KHOND.	7887696602	

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Principal.

ALTERNATE SOURCES OF ENERGY AND ENERGY CONSERVATION MEASURES

Renewable energy is good for the planet and for people. Renewable energy is energy derived from natural resources that replenish themselves in less than a human lifetime without depleting the planet's resources. These resources - such as sunlight, wind, tides, waves and biomass - have the benefit of being available in one form or another nearly everywhere. They are virtually inexhaustible. And, what is even more important, they cause little climate or environmental damage. The alternative Energy Sources of Siddhant College of Engineering is made for proper implementation and efficient utilization of renewable Energy Sources.

- The college management has taken following measures for conserving the energy.
- To install and use Solar Energy in the college campus to save energy.
- To install and use Biogas plant in the college campus to save energy.
- To install and use geothermal plant in the college campus to save energy.
- To install and use LED bulbs in the college campus.
- To invest in power efficient equipments.
- To create awareness that small actions matter- Save Energy labels/posters are put up at various location in the institution.
- Use of natural lighting and ventilation is encouraged as and when possible.
- To take additional measure to continuously improve our energy consumption.
- To ensure the availability of necessary resources to achieve the objectives.

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MANAGEMENT OF THE VARIOUS TYPES OF DEGRADABLE AND NON-DEGRADABLE WASTE

E-WASTE

- E-Waste is short for Electronic-Waste and the term is used to describe old, end-of-life or discarded electronic appliances. It includes their components, consumables, parts and spares.
- It is categorised into 21 types under two broad categories:
    1. Information technology and communication equipment.
    2. Consumer electrical and electronics.

- Laws to manage e-waste have been in place in India since 2011, mandating that only authorised dismantlers and recyclers collect e-waste. E-waste (Management) Rules, 2016 was enacted in 2017.
- India's first e-waste clinic for segregating, processing and disposal of waste from household and commercial units has been be set-up in Bhopal, Madhyapradesh

PLASTIC WASTE MANAGEMENT

Reduce: First step in reducing plastic waste is to minimize single use plastics by supporting a tax on plastic bags, restraint on manufacturing of plastics, and using alternatives of plastic or biodegradable plastic.

- For example **Project REPLAN** (stands for REducing PLastic in Nature) launched by **Khadi and Village Industries Commission (KVIC)** aims to reduce consumption of plastic bags by providing a more sustainable alternative.

- **Reuse:** Reusing plastics can reduce the demand for new plastics, hence it can act as the natural restrain on plastic manufacturing.
- **Recycle:** Plastic recycling is the process of recovering waste or scrap plastic and reprocessing it into useful products. It offers several benefits like:
    - Economic benefits due to value addition
    - Generates employment
    - Reduces depletion of fossil fuel reserves.

Siddhant College of Engineering SEAL Sudumbare

- Reduces landfill problems
- Recycling of plastics requires less energy

- **Recovery:** It is the process of converting non-recyclable plastics into a range of useful forms of energy and chemicals for industry. Since plastics contain mainly carbon and hydrogen, with similar energy content to conventional fuels such as diesel, they can be used as a potential source of fuel.

MANAGEMENT OF SOLID WASTE

- Solid waste management can be divided into **four key components: Generation Storage and Collection Transportation Disposal**

1. **Generation**
   - Generation of solid waste is the stage at which materials become of no use to the owner and they wish to get rid of them.
2. **Storage and Collection**
   - Storage takes place after the materials have been discarded. Key here is to not discard items directly into family pits and poorly defined heaps close to dwelling areas, but an effective storage system must be at place, like the Government of India has directed municipal corporations to undertake **Door to Door collection of Solid wastes under Jawaharlal Nehru National Urban Renewal Mission (JNNURM).**
   - Whereas under **Swacch Bharat Abhiyan, two different dustbins have been provided (Blue and Green Dustbins)** which are used to segregate two different kinds of wastes, the green is meant for wet wastes while the blue one is for Solid dry waste.
3. **Transportation**
   - This is the stage when solid waste is transported to the final disposal site. There are various modes and methods which may be adopted depending upon availability and the volume of waste to be transported.
   - In India, Solid wastes are generally transported first by small municipal vehicles to a dumping site, then big municipal vehicles carry them for final disposal, be it to landfills or to recycling plants.
4. **Disposal**

The final stage of solid waste management is safe disposal where associated risks are minimised. **There are six main methods for the disposal of solid waste:**

-

- **Land application:** Open dumps or landfilling, Open dumps and landfills are uncovered/covered areas that are used to dump solid waste of all kinds. The waste is not treated nor it is segregated and thus it is also a place where a lot of insects and other disease causing organisms breed. They are generally located in urban areas. For landfills, a pit is dug where garbage is dumped and the pit is covered with soil everyday thus preventing the breeding of flies and rats. Open dumps are more harmful than landfills as landfills after they are full can be used as a park/parking lot after covering it, but open dumps cannot be treated as such.
- **Composting:** Composting is a biological process in which micro-organisms such as fungi or bacteria decompose in the presence of oxygen the degradable organic wastes. The finished product is very rich in carbon and nitrogen thus acting as a great medium for plant cultivation.
- **Burning or incineration:** The process of burning solid wastes in a large furnace at a very high temperature whereby producing ash is called Incineration. It is only used as a last resort because it also produces a lot of toxic gases resulting in Air Pollution.
- **Pyrolysis:** The process of burning solid wastes, but in the absence of oxygen in a large furnace at a very high temperature whereby producing charcoal, tar, methyl alcohol, acetic acid, acetone which can be used as fuels is called Pyrolysis.
- **Vermiculture:** It is also known as Earthworm farming. In this method, Earthworms are added to the compost. These worms break the solid waste and along with the earthworms' excreta, the compost becomes rich in nutrients.
- **Recycling:** Solid wastes are also recycled, where the solid wastes are first taken to compost plants which are either set up by Government or by Private companies (under Corporate Social Responsibility), then they are either converted to fertilizers or they are recycled to produce various other items such as Plastics bottles, electronic instruments, building materials etc.

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WATER CONSERVATION

Water conservation is essential and can be done by everyone. We can all contribute to saving water. Very small-scale changes can be made to preserve water. Even the people who aren't facing water shortages should find ways to save water at home.

Several techniques can be implemented for the conservation of water that has been discussed below:-

- **Careful Use of Water:** Keep the taps turned off when not in use. Usage of efficient home appliances like washing machines and dishwashers can save a lot of water. Even without the appliances, make sure you don't overuse water while washing dishes or clothes.
- **Don't Wash Down Garbage:** Make sure to not wash down small bits of trash that use a large amount of water to flush down the drain. Always put them in the bin.
- **Don't Run the Faucet to Clean Vegetables:** Fill a container with water to wash fruits and vegetables. Keeping them under the faucet while water runs down will lead to unnecessary wastage of water.
- **Check for Leaks:** Leaks can cause a significant amount of water loss if left unchecked. So, check the faucet, taps, and pipes for leaks regularly. While turning the tap off make sure to turn it all the way or it may keep dripping.
- **Water the Plants Smartly:** While watering your plants keep in mind the temperature and time of the day, so water doesn't evaporate quickly. Reuse water from cleaning and laundry to water the plants.
- **Reduce Bathing Water Amount:** While bathing or taking a shower make sure to not let the water run down for a longer period or unnecessarily.
- The best way to conserve water is to recycle and reuse it.
- Try limiting your shower time to 10 to 15 minutes because humans carelessly consume gallons of water for luxuriously long showers. So Reducing the shower time would prevent excessive wastage of water.

SEAL

- Rusting pipes Leaky faucets dripping water from shower heads Earth science of unnecessary water wastage that needs to be fixed immediately to avoid wasting water.
- Try using a compost Bin instead of in-sink garbage disposal. Compost bins are environmentally friendly and reduce water wastage.
- Maintenance of appliances can prevent potential leaks and wastage of energy.
- We can save gallons of water by turning off the water while brushing our teeth, shaving, showering, and washing dishes as these daily routine activities have resulted in excessive consumption of water.
- Promote plantation of drought-resistant trees and plants as these can thrive even without irrigation.
- Trees and plants with a layer of mulch around them slow down the evaporation of moisture.

These are some of the many ways to save water. Moreover, people need to be educated and made aware of the ways of saving water. Make an effort to educate the people around you on why you think saving water is important.

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GREEN CAMPUS INITIATIVE

1. Grow a Campus Garden

Campus gardens are becoming more popular at universities and colleges everywhere. Students can come together to plant produce or even raise livestock that can be used in the dining halls or provide free fresh food for the surrounding community. It's a great way to reduce emissions from food transportation. Plus, students can learn about growing food in an urban setting, preparing them for life after college.

2. Encourage Reusable Water Bottles

There are too many single-use plastic water bottles to count that end up in landfills and in the environment through pollution. Many schools have been trying to counteract this by adding more water fountains and refill stations. This encourages students to use reusable water bottles instead of purchasing single-use plastic bottles of water. Having multiple refill stations makes it easy for people on campus to rehydrate sustainably.

3. Set out Distinct Receptacles for Trash and Recycling

Another simple green initiative for college campuses is to set out various receptacles for trash and recycling. Campuses can encourage recycling by providing recycling bins for different materials, like paper, plastic, aluminium and glass. When students have a place to put their recyclables, they'll be more likely to participate in this sustainable act. Students can also compost food scraps if the campus installs a compost bin to eliminate waste.

4. Opt for Low-Emission Transportation

College kids love their freedom, which means many bring their vehicles to campus so they can go anywhere they want whenever they want. However, having thousands of cars on campus increases emissions, and on larger campuses, students may opt to drive to their classes. Instead, colleges can encourage students to carpool, walk or bike around campus. Additionally, students can use public transportation or participate in a car sharing or bike-sharing program.

Siddhant College of Engineering SEAL 412109

5. Offer Environmental Degrees and Organizations

Colleges need to teach subjects that can help the students on campus understand the importance of environmental issues and possibly enter a career path that promotes conservation and sustainability. These can either be in the form of individual courses for a degree or electives. If this isn't an option for colleges, then the students can take the initiative to start clubs or organizations to teach others about sustainability on campus.

6. Limit Food Waste

College campuses are notorious for food waste. Thousands of people on campus can lead to thousands of pounds of food waste every week. Dining halls often have to produce enough food for a certain percentage of the campus population. If students don't show up or don't like what's being served, most of that food ends up in the trash. Campuses can provide containers for students to take leftovers or start a composting program through the dining hall.

7. Invest in Clean Energy

Investing in clean energy is an excellent way for college campuses to go green. Although clean energy such as solar power and wind power have been becoming more popular, many buildings on college campuses still rely on non-renewable energy sources for heating and cooling, electricity and other power needs. Colleges can easily invest in solar energy and can place solar panels on the rooftops of buildings or even create a solar field off-campus as an energy source.

8. Choose Electronics over Paper

The world has adopted digital communication, learning and other applications. Many colleges are equipped with online versions of once-paper material. Professors opt to use electronic textbooks over paper ones, and students take notes digitally via laptops or tablets. As long as college students and faculty continue choosing electronic learning instead of traditional paper products, they're becoming greener. Colleges that still opt for paper can participate in recycling and textbook buy-back programs to limit paper waste.

Environmental and Green Audit Report

of

CHAUDHARI ATTARSINGH YADAV MEMORIAL EDUCATION TRUST'S

SIDDHANT COLLEGE OF ENGINEERING

Chakan-Talegaon Road, Near Chakan Auto Hub, Sudumbare,
Dist.Pune – 412109

Auditing Agency –
Prathamesh Energy Solution,
A-302, Shiv Unnati Residency,
Kalepadal, Hadapsar
Pune- 411 028

Prathamesh Energy Solution
A-302, Shiv Unnati residency, Kalepadal, Hadapsar, Pune-411028

Ref: PES/SCoE/2022-23/19

Date:

To,

The Principal
Siddhant College of Engineering
Chakan-Talegaon Road,
Sudumbare, Dist.Pune – 412109

Sub: Submission of Report on Environmental and Green Audit of College Campus

Respected Sir,

Please find enclosed herewith the report

Thanking you
Yours faithfully

For Prathamesh Energy Solution

Authorized Signatory

Prathamesh Energy Solution

A-302, Shiv Unnati Residency, Kalepadal, Hadapsar, Pune 411028

Ref: EC/SCoE /22-23/15

CERTIFICATE

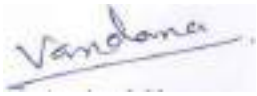
This is to certify that we have conducted Environmental and Green Audit at **Siddhant College of Engineering, Chakan-Talegaon Road, Sudumbare, Dist. Pune,** in the Academic year 2022-23

. The College has adopted following Energy Efficient practices:

- Usage of Energy Efficient LED Fittings
- Maximum usage of Day Lighting
- Installation of Roof Top Solar PV Plant.
- Green Campus
- Rain water Harvesting system

We appreciate the support of Management, involvement of faculty members and students in the process of making the Campus Energy Efficient.

For,



Prathamesh Energy Solution,

Certificate of Registration

This is to Certify that
Environmental Management System of

PRATHAMESH ENERGY SOLUTION

A-302, SHIV UNNATI RESIDENCY, KALEPADAL, HADAPSAR, PUNE-411028, MAHARASHTRA, INDIA.

has been assessed and found to conform to the requirements of

ISO 14001:2015

for the following scope :

CONSULTANCY SERVICES FOR ENERGY AUDIT, GREEN AUDIT AND ENVIRONMENTAL AUDIT IN EDUCATIONAL INSTITUTIONS AND OTHER ORGANIZATIONS & SUBMISSION OF AUDIT CERTIFICATE AND REPORT.

Certificate No	: **23EELA98**		
Initial Registration Date	: 09/06/2023	Issuance Date	: 09/06/2023
Date of Expiry	: 08/06/2026		
1st Surve. Due	: 09/05/2024	2nd Surve. Due	: 09/05/2025

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EGAC Accredited
EMS Certification
CAB # 118005
IAF
MEMBER OF MULTILATERAL RECOGNITION ARRANGEMENT

Director

Magnitude Management Services Pvt. Ltd.
Third Floor, A-60, Sector-2, Noida, Gautam Budh Nagar, U.P.-201301, India
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Confederation of Indian Industry

The Indian Green Building Council

hereby certifies that

Vaijanath Narharirao Raibhole

has successfully demonstrated knowledge on the Green Building Design & Construction, Building Standards & Codes, IGBC Resources & Processes and Green Design Strategies & their Impacts, required to be awarded the title of

IGBC Accredited Professional

K S Venkatagiri
Executive Director
CII-Godrej GBC

V Suresh
Chairman
Indian Green Building Council

Gurmit Singh Arora
Vice-Chairman
Indian Green Building Council

200413

05 September 2020

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ACKNOWLEDGEMENT

We at Prathamesh Energy Solution, Pune, express our sincere gratitude to the management and Principal of Siddhant College of Engineering, Pune for awarding us the assignment of Green and Environmenta Audit of their College campus located at Chakan-Talegaon Road, Sudumbare, Dist. Pune

We are very much thankful to

- **Hon'ble Rajendra Singh Yadav, Founder, President, Siddhant Group of Institutes (SGI), Sudumbare, Pune**
- **Hon'ble Siddhant Yadav, Vice President, SGI, Sudumbare, Pune**
- **Hon'ble Mihir Yadav, Vice President, SGI, Sudumbare, Pune**
- **Dr. L.V. Kamble, Principal, Siddhant CoE, Pune**
- **Dr. P. A. Makasare. HOD, Mechanical Engineering Department, Siddhant CoE, Pune**

for giving us opportunity to conduct detailed energy audit of the institute and provide all the required data and information promptly for the smooth conduction of detailed energy and green audit.

We are also thankful to various Heads of Departments, IQAC Coordinator & other Staff members for helping us during the field measurements.

We are also thankful to all the technical staff and office staff for helping during the measurements at the electrical distribution center.

EXECUTIVE SUMMARY

After the Field measurements & analysis, we present herewith important observations made and various measures to reduce the Energy Consumption & mitigate the CO_2 emissions.

1. Siddhant College of Engineering, Pune, consumes electrical Energy in majority used for various gadgets & office operations.

2. The various projects already implemented by the College are

- Installed solar roof top plant of capacity 221kWp on the campus building roof. At present solar roof top is with net metering and it is meeting requirement of electricity demand of college campus buildings in the premises.
- Usage of natural day lights and natural air circulation
- Usage of Natural Day light in corridors specifically
- Usage of LED lighting for Admin & outdoor lighting
- Initiatives for plastic free campus

3. Important Parameters: Electrical Energy:

Electricity is used for different purposes and at different sections in the college campus. The details of electricity distribution as mentioned below.

Sr. No.	Consumer No.	Electrical Meter No.	Location/Purpose	Payee
1	181029037080	055-XE474326	College building/building operation	M/S. CHAUDHARI ATTARSINGH YADAV MEMO.EDU.TRUST

The important parameters of electrical consumption as per Consumer no. in the campus are mentioned as below.

Sr. No	Consumer No.	Parameter	Max	Min	Average
1	181029037080	Units consumed, kWh	21502	2284	5458.5
		Electricity Bill amount	358940	105977	149911.2
		Total average units consumed per month, kVAh			5458.5

4. Important Parameters: CO_2 Emissions (Average, MT/Annum)

No	Consumer No.	Particulars	Value MT
1	181029037080	CO_2- Emissions- Electricity Usage	52.40
		Total	52.40

On the basis of average electricity consumption CO_2 emission is 52.40MT /annum. In addition to this LPG is being consumed for canteen for food preparation. Nearly LPG consumption annually is 300 commercial cylinders i.e. 900 kg/annum. On the basis of average LPG usage CO_2 emission is 0.9MT/annum.

5. Benchmark: In terms of Electrical Energy & CO_2 emissions:

We now present two important benchmarks in respect of Electrical Energy consumption & CO_2 emissions as under.

No	Particulars	Value	Unit
1	Electrical Energy consumed	**0.031**	kVAh/sq. ft.
3	CO_2- Emissions	**0.29**	Kg per annum /sq. ft.

6. Recommendations:

We present herewith various proposals to reduce the Electrical Energy demand and reduce the CO_2 emissions

No	Recommendation	Annual saving potential in kWh /Kg of LPG	Annual Saving Potential in MT of CO_2	Annual monetary gain, Rs.
1	Installation of 50kW Solar PV roof top on college building	84000 kWh	67.2	840000
2	Solar street lights	262.8 kWh	0.21	2628
3	Solar powered light for hoarding	-	-	-
4	Solar charging stations	-	-	-
	Total	**84262.8**	**67.41**	**842628**

Notes & assumptions:

1. 1 Unit of Electrical Energy releases 0.8 Kg of CO_2 into atmosphere
2. 1 Kg of LPG releases 3 Kg of CO_2 into atmosphere

3. Daily working hours-10
4. Annual working Days-280
5. Average Rate of Electrical Energy- Rs 10 per kWh

ABBREVIATIONS

DP	:	Double Pole
CFL	:	Compact Fluorescent Lamp
EESL	:	Energy Efficiency Services Limited
F P	:	Feeder Pillar
MSEDCL	:	Maharashtra State Electricity Distribution Company Ltd.
MEDA	:	Maharashtra Energy Development Agency
MIDC	:	Maharashtra Industrial Development Corporation
V	:	Voltage
I	:	Current
kW	:	kilo-Watt
kVA	:	Apparent Power
kVAr	:	Reactive Power
P F	:	Power Factor
kWp	:	Kilo Watt peak

CHAPTER-I
ENVIRONMENT AND GREEN AUDIT: INTRODUCTION

1.1 Objectives:

1. To Study tree plantation in college campus
2. To Study the present CO_2 emissions
3. To study Scope for usage of Renewable Energy
4. To study various measures for sustainable development

1.2 General Details of Siddhant College of Engineering, Pune:

No	Head	Particulars
1	Name of Institution	Siddhant College of Engineering, Pune
2	Address	Chakan-Talegaon Road, Sudumbare, Dist.Pune – 412109
3	Year of Establishment	2005
4	Salient Features	Affiliated to Savitribai Phule Pune University
4	Courses offered	UG courses in Civil Engineering, Computer Engineering, Information technology, Electronics and Telecommunications, Mechanical Engineering PG Courses in Computer Engineering, Information technology, Electronics and telecommunications-VLSI & Embedded system, Mechanical-Design engineering
5	No of Students	1288
6	Total built up area	177066.33 Sq. ft.

CHAPTER-II
GREEN AUDIT FOR AY-2022-23

Siddhant College of Engineering, Pune is one of the leading higher technical educational Institutions of Pune under Savitribai Phule Pune University, Pune. It has been providing quality technical education to the students in various professional courses. The College is having beautiful green campus and a highly greenery maintenance college in Pune. The college has been accredited by National Assessment and Accreditation Council (NAAC), Bangalore.

We have prepared a green audit report after visiting the college campus by our team. This green audit report is based on the following major points.

1. Plantation in the campus
2. Carbon accounting
3. Use of Renewable energy options for saving the environment
4. Illumination in class rooms
5. Water audit and Rainwater Harvesting
6. Waste disposal

1. Plantation in the campus

Plantation is playing very important role in the green audit and helping to save environment from damage. The campus plantation is very diverse and well maintained.

The different species are cultivated to increase greenery of the campus. The species included Trees, Shrubs, Herbs, Climbers, ornamentals etc.

There are 536 trees and shrubs present inside Siddhant College of Engineering, Pune campus. After a daylong survey and records about the plantation in the campus is prepared which is as per following table.

Sr. No.	Name of Tree	Quantity
1	Areka pam	40
2	Ashok Tree	130
3	MorPhanki	15
4	Botal Pam	40
5	Naral	30
6	Jasvandi	35
7	Gulab	10
8	Dalimb	1
9	Limb	5
10	Krismus	8
11	Kardal	8
12	Mogra	20
13	Hamoliya Petarse	3
14	Yasian Pam	9
15	Ardhisupari	30
16	Welping Fig	4
17	Ratrani	10
18	Fleush	3
19	Pivla Chafa	5
20	Pandra Chafa	2

21	Kadipata	1
22	Chaha Pati	1
23	Tea Plate	1
24	Visual Matches	5
25	Song of India	2
26	Safed Jambul	6
27	Phanas	3
28	Sitaphal	1
29	Ruee	2
30	Amba	5
31	Kaju	2
32	Tibuti	4
33	Idlimbu	6
34	Chiku	4
35	Saru	5
36	Ravlipa	75
37	Garden Quater	5

Photo-1: Garden view of Siddhant College of Engineering, Pune

Photo-2: Front Plantation view of Siddhant College of Engineering, Pune

Photo-3: Tree Plantation at Siddhant College of Engineering, Pune

Photo-4: Lawn at Siddhant College of Engineering, Pune

1.1 Calculation of amount of CO_2 sequestered in trees per year

The carbon sequestration potential of the plant species present in green belt has been estimated and suitable plant with maximum sequestration of CO_2 was recommended. Carbon sequestration is nothing but capturing atmospheric carbon dioxide or anthropogenic CO_2 from large scale stationary sources like cement industry before it is released to the atmosphere. Once captured, the CO_2 gas is put into long term storage. CO_2 sequestration in plants has the potential to significantly reduce the level of carbon that occurs in the atmosphere. Terrestrial or biologic sequestration means using plants to capture CO_2 from the atmosphere and then storing it as carbon in the stems and roots of the plants as well as in the soil. The green belts in industrial area acts as sink for capturing and storing carbon dioxide released from the industries.

Assessment of carbon sequestration ability of trees for adopting in greenbelt of cement industries

The carbon dioxide sequestered in plant species are determined based on following method:

1. Determine the total (green) weight of the tree
2. Determine the dry weight of the tree
3. Determine the weight of carbon in the tree
4. Determine the weight of carbon dioxide sequestered in the tree
5. Determine the weight of CO_2 sequestered in the tree per year

1.2 Determination of Total (Green) Weight of the Tree

The algorithm to calculate the weight of a tree is:

For trees with D < 11: $W = 0.25D^2H$

For trees with D >= 11: $W = 0.15D^2H$

Where, W = Above-ground weight of the tree in pounds

D = Diameter of the trunk in inches

H = Height of the tree in feet

Depending on the species, the coefficient (e.g. 0.25) could change and the variables D^2 and H could be raised to exponents just above or below 1. However, these two equations could be seen as an “average” of all the species’ equations. The root system weighs about 20% as much as the above-ground weight of the tree. Therefore, to determine the total green weight of the tree, multiply the above-ground weight of the tree by 120%.

1.3 Determination of Dry Weight of the Tree

Taking all species in into account, the average tree is 72.5% dry matter and 27.5% moisture.

Therefore, to determine the dry weight of the tree, multiply the weight of the tree by 72.5%.

1.4 Determine the weight of carbon in the tree

The average carbon content is generally 50% of the tree’s total volume. Therefore, to determine the weight of carbon in the tree, multiply the dry weight of the tree by 50%.

Assessment of carbon sequestration ability of trees for adopting in greenbelt of cement industries

Determine the weight of carbon dioxide sequestered in the tree

CO_2 is composed of one molecule of Carbon and 2 molecules of Oxygen.

The atomic weight of Carbon is 12.001115.

The atomic weight of Oxygen is 15.9994.

The weight of CO_2 is C+2*O=43.999915.

The ratio of CO_2 to C is 43.999915/12.001115=3.6663.

Therefore, to determine the weight of carbon dioxide sequestered in the tree, multiply the weight of carbon in the tree by 3.6663
Determine the weight of CO_2 sequestered in the tree per year
Divided the weight of carbon dioxide sequestered in the tree by the age of the tree.

2. Carbon Accounting

A Carbon Foot print is defined as the Total Greenhouse Gas emissions, emitted due to various activities.

In this we compute the emissions of Carbon-Di-Oxide, by usage of the various forms of Energy used by the College for performing its day to day activities. The college uses electrical energy for operating various electrical gadgets.

We herewith furnish the details of electrical Energy consumption consumer number wise as under

4.1 Month wise Consumption of Electrical Energy: 181029037080

Sr. No	Month	kVAh
1	May-23	21502
2	April-23	3805
3	March-23	5313
4	Feb-23	9228
5	Jan-23	4636
6	Dec-22	4816
7	Nov-22	3337
8	Oct-22	2712
9	Sep-22	2576
10	Aug-22	2284
11	July-22	2325
12	June-22	2968
13	Total	65502
14	Average	5458.5
15	Max	21502
16	Min	2284

4.2 Basis for computation of CO_2 Emissions:

The basis of Calculation for CO_2 emissions due to Electrical Energy are as under

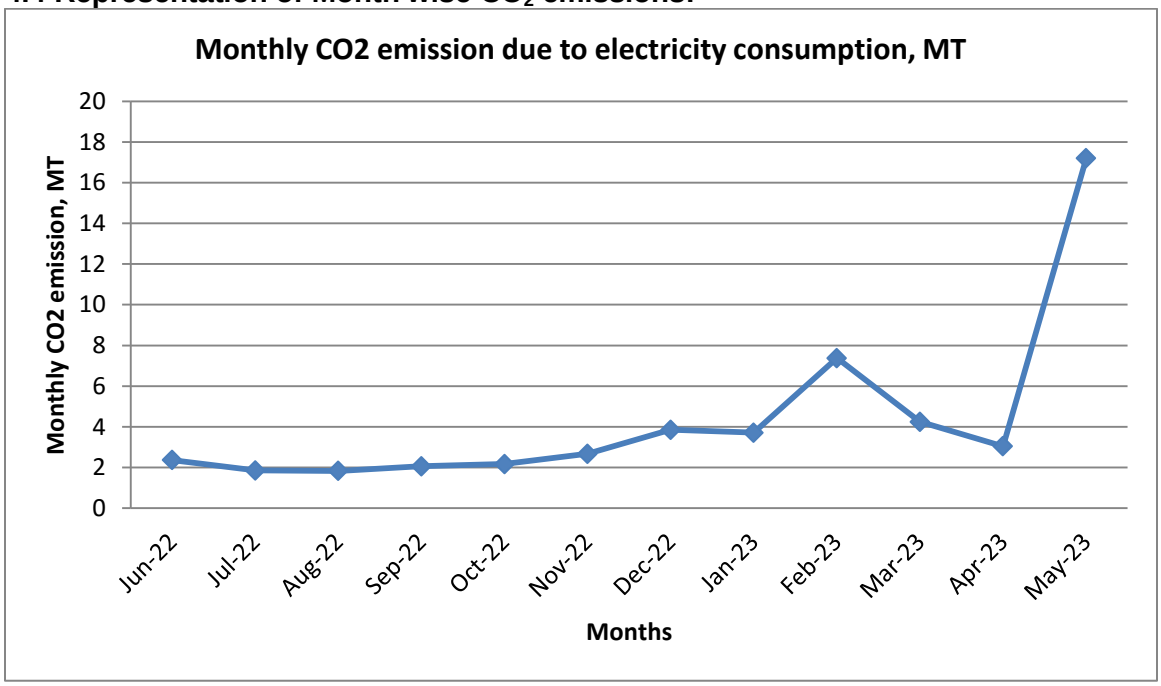
- 1 Unit (kWh) of Electrical Energy releases **0.8 Kg of CO_2** into atmosphere

Based on the above Data we compute the CO_2 emissions which are being released in to the atmosphere by the College due to its Day to Day operations.

4.3 Month wise CO2 Emissions: 181029037080

Sr. No	Month	Electrical Energy Consumed, kVAh	CO2 Emissions due to Electricity, MT
1	May-23	21502	17.20
2	April-23	3805	3.04
3	March-23	5313	4.25
4	Feb-23	9228	7.38
5	Jan-23	4636	3.71
6	Dec-22	4816	3.85
7	Nov-22	3337	2.67
8	Oct-22	2712	2.17
9	Sep-22	2576	2.06
10	Aug-22	2284	1.83
11	July-22	2325	1.86
12	June-22	2968	2.37
13	Total	65502	52.40
14	Average	5458.5	4.37
15	Max	21502	17.20
16	Min	2284	1.83

4.4 Representation of Month wise CO_2 emissions:



4.5 Benchmarking:

Now we compute the CO2 emissions per sq. ft. basis as under:

No	Parameter	Value	Unit
1	CO2 emissions	52.40	MT/annum
2	College area	177066.33	Sq. ft.
3	**CO2 emissions/sq. ft.**	**0.29**	**Kg of CO_2 per annum/sq. ft.**

3. Use of Renewable energy options for saving the environment

3.1 Installation of 221 kWp Solar PV Power Plant:

Solar roof top power plant having capacity 221 kWp is installed on Siddhant Pharmacy College building and Siddhant School building, at college campus which meets the requirement of electricity demand of these buildings. The Solar roof top plant is successfully installed and it is in operation to meet the requirement of electricity of institute campus building. The existing solar roof top installed technical specifications and details are given below.

Technical Specifications:

Siddhant College of Engineering, Pune has installed solar roof top power plant. The brief specifications and details of the plant are mentioned below.

- **System Capacity:** 221 kW
- **PV Module:** Navitas Solar, 325 Wp Polycrystalline – 680 nos.
- **Output:** 5.5 kWh/Sq.m/day (All output is under STC, 25°C)
- **Inverter**: Growatt- 30kWp-6 Inverters

Photo-5: 221 kW solar roof top on Siddhant School building roof.

3.2 Solar powered light for hoarding

Lighting solar systems are the fixed installations designed for domestic as well as small scale commercial application. The component of the solar lighting system includes solar PV module (solar cells), charge

controller, solar battery and lighting system (lamps & fans). Modules are installed in the open on roof/terrace - exposed to sunlight and the charge controller and battery are kept inside a protected place in the house.

Figure-1: Solar powered light for Hoarding

This system comes with multiple benefits such as:

- **Economical:** Since the sun provides energy free of charge, 30% power savings on the electricity bill can be availed with longer back up lighting system at zero running cost.
- **Non-Polluting:** Powered by the sun's renewable energy, the system is energy neutral and an absolutely clean source of illumination. 1kWp solar installation reduces 1⁄2 ton of CO_2 (carbon dioxide) per annum.
- **No Maintenance:** The system has few moveable parts – reducing the risk of breakage. Once installed, it lasts for long time and requires little attention.

This system can be used to power the huge hoardings in the college campus.

Solar powered hoarding lighting system proposed will provide a better, faster, cheaper (and cleaner) alternative with solar. Since this product competes with diesel or conventional fuels, we needed to ensure we beat the cost of a diesel solution. In order to achieve that with solar, we consider the following system:

1. Highly Efficient Solar Panel

2. Charge Controllers with MPPT Technology – increases solar electricity production by up to 30% compared to conventional charge controllers

3. LED Projection Light – consumes 10-times less electricity compared to conventional bulbs, and has a 50,000 hour warranty.

Features:

- Auto on off
- 4 Days Battery Back Up
- Robust housing
- Weather proof

With this entire put together, we ended up with systems that provide 6 hours of lighting each night with 4 -lamp system to light up boards up to 15′x30′, and a 8-lamp system to light larger boards up to 20′x40′.More importantly, with these options, payback of the system will come around 2.5 years. This system provides a way to reduce the lightings costs, get rid of all the operational hassles of owning a diesel generator, plus brand benefits from being “green” with the use of renewable energy like solar powered light hoarding board.

3.3 Solar charging stations

Solar cell phone chargers use solar panels to charge cell phone batteries. They are an alternative to conventional electrical cell phone chargers and in some cases can be plugged into an electrical outlet. Solar mobile charger is a device which can charge mobile phones using solar radiation. Its major component is a compact solar panel. This solar panel traps solar energy and produces an output voltage. But, since the light radiations falling on the solar panel can vary, the output voltage becomes unstable. For charging a mobile phone, stable voltage is required. So, to make the output voltage stable and regulated, voltage regulator circuit along with the solar panel is used.

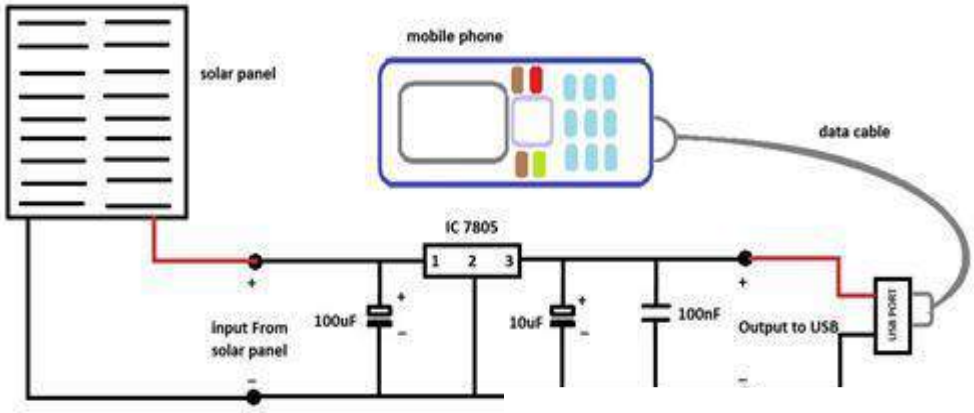


Figure-2: Solar charging Stations

Most of the mobile phones have computer connectivity via USB cable. USB port establishes 4 connection terminals. The connection terminals at the two extreme ends are the supply terminals. In a female USB connector (port via which we plug in USB devices to computer), these terminals carry 5V DC. When a mobile phone is connected to the USB port of a computer, it utilizes this 5V supply to recharge battery. This feature is used in a solar mobile charger. It converts and regulates solar energy to 5V DC and the output will be available through the female USB connector. To this connector, we can easily connect a mobile phone via data cable.

3.4 Installation of 50 kWp Solar PV roof Top on Siddhant College of Engineering, building:

During the Audit, it was revealed that the College has space on the Terrace. It is proposed to install a Solar Photovoltaic roof top with net meter of capacity **50 kWp.** The system will cater the Day load Demand of the College.

We furnish herewith the saving potential as under

No	Particulars	Value	Unit
1	Installed Capacity of Solar PV Pack	50	kWp
2	Daily working period	6	Hrs./Day
3	Daily units generated	300	kWh/Day
4	Annual working days	280	Day/annum
5	Annual saving in Grid Electrical Energy	84000	kWh/annum
6	Annual CO_2 saving potential	67.2	MT/Annum
7	Present Energy Charges	10	Rs/kWh
8	Annual monetary Gain	840000	Rs/Annum
9	Investment required	22,50000	Rs lump sum
10	Payback period	2.67	Years

4. Illumination in class rooms

Lighting puts a huge impact on the visibility and appearance of every space. Sufficient and beautiful lighting can enhance the look of a dull space, whereas improper lighting implementations can make a catchy area look less impressive. Poor lighting at work can lead to eye-strain, fatigue, headaches, stress and accidents. On the other hand, too much light can also cause safety and health problems such as “glare” headaches and stress. Siddhant College of Engineering, Pune is using daylight effectively, specifically at corridors. The typical class room illumination in lux is mentioned as below.

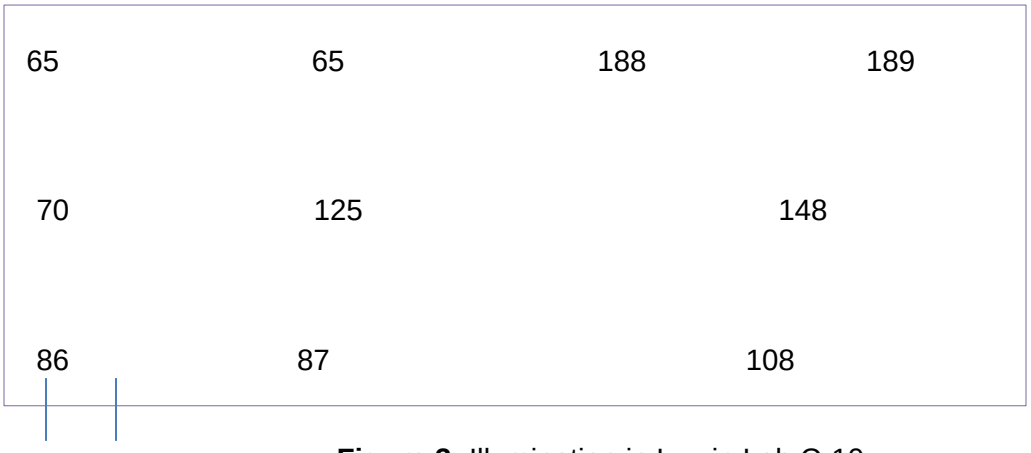


Figure 3: Illumination in Lux in Lab C-10

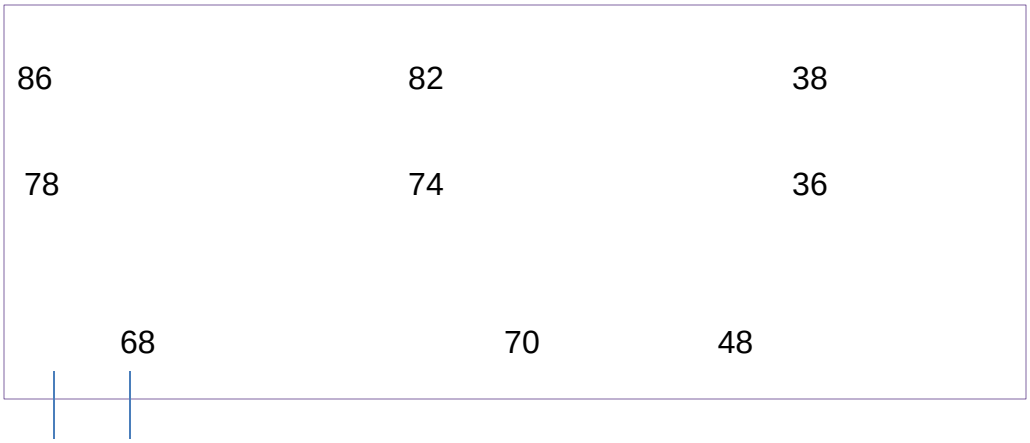


Figure 4: Illumination in Lux in Class room A-13

5. Water Audit and Rain water harvesting

A water crisis is a very sensitive issue these days all over the world. Recently we are facing water crisis in major part of Maharashtra like Marathwada, Khandesh, Pachim Maharashtra and North Maharashtra. Siddhant College of Engineering, Pune has taken a good initiative for maintaining greenery in the campus and less concrete zone, it means that college campus is allowing the rainwater to absorb under the ground and maintain the underground water level. Siddhant college of Engineering, Pune provides drinking water through RO filter and water coolers.

In addition to this as per the survey and site location following activities can be implemented for the conservation of water.

5.1 Water storage and consumption

Siddhant College of Engineering, Pune campus is having water supply through well located in the campus to mitigate the need of requirement water for various activities. The college campus has temporary water storage capacities in terms of overhead tanks on the Institute building. Water is temporarily stored in the campus for various activities. There is a provision of sparkler system to supply the water in garden to maintain greenery. The details of water storage in the campus as mentioned below.

Tank type	For Regular Use (ltr)	Qty	For Fire Use (ltr)
overhead	5000	2	Nil
overhead	500	1	Nil

5.2. Rain water harvesting

The system of rain water harvesting is an integral part of any educational institution. This system helps to conserve the rain water and also to use during the time of its desirable. This system helps the students to understand the basic concepts of rainwater harvesting system and their effective use in the real life.

Already Siddhant College of Engineering, Pune have provisions of collection of gray rain water from all the building taken through some specific path and charged in the ground below building to maintain the ground level water. It is suggested to charge the rain water through ring well in the campus.

Photo-6: View rain water collection from building

Advantages of rain water harvesting

(a) Promotes adequacy of underground water

(b) Mitigates the effect of drought

(c) Reduces soil erosion as surface run-off is reduced

(d) Decreases load on storm water disposal system

(e) Reduces flood hazards

(f) Improves ground water quality / decreases salinity

(by dilution)

(g) Prevents ingress of sea water in subsurface aquifers in coastal areas

(h) Improves ground water table, thus saving energy (to lift water)

(i) The cost of recharging subsurface aquifer is lower than surface reservoirs

(j) The subsurface aquifer also serves as storage and distribution system

(k) No land is wasted for storage purpose and no population displacement is involved

(l) Storing water underground is environment friendly

Rain water harvesting potential

The total amount of water that is received in the form of rainfall over an area is called the rain water endowment of that area. Out of this, the amount that can be effectively harvested is called rain water harvesting potential.

All the water which is falling over an area cannot be effectively harvested, due to various losses on account of evaporation, spillage etc. Because of these factors the quantity of rain water which can effectively be harvested is always less than the rain water endowment. The collection efficiency is mainly dependent on factors like runoff coefficient and first flush wastage etc. Runoff is the term applied to the water that flows away from catchments after falling on its surface in the form of rain.

Runoff depends upon the area and type of catchment over which it falls as well as surface features. Runoff can be generated from both paved and unpaved catchment areas. Paved surfaces have a greater capacity of retaining water on the surface and runoff from unpaved surface is less in comparison to paved surface. In all calculations for runoff estimation, runoff coefficient is used to account for losses due to spillage, leakage, infiltrations catchment surface wetting and evaporation, which will ultimately result into reduced runoff. Runoff coefficient for any catchment is the ratio of the volume of water that run off a surface to the total volume of rainfall on the surface. The runoff coefficient for various surfaces is given in following table.

Sr. No.	Type of catchment	Coefficient
1	**Roof Catchments**	
	Tiles	0.8-0.9
	Corrugated metal sheets	0.7-0.9
2	**Ground surface coverings**	
	Concrete	0.6-0.8
	Brick pavement	0.5-0.6
3	**Untreated ground catchments**	
	Soil on slopes less than 10%	0.0-0.3
	Rocky natural catchments	0.2-0.5

Based on the above factors, the water harvesting potential of site could be estimated using the following equation:

Rain Water harvesting potential = Amount of Rainfall x area of catchment x Runoff coefficient

Rain water harvesting methods

(a) Storing rain water for direct use

(b) Recharging ground water aquifers, from roof top run off

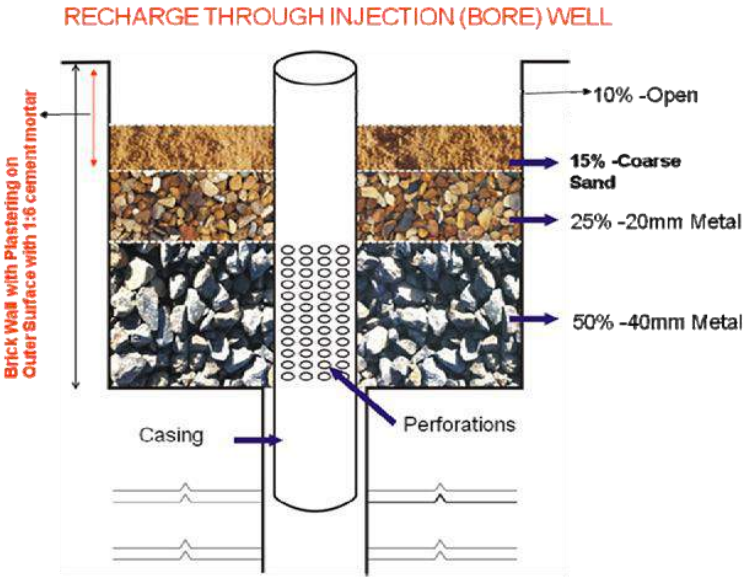
(c) Recharging ground water aquifers with runoff from ground area

According to the site of Siddhant College of Engineering, Pune campus the method of recharging ground water aquifiers from roof top run off may be suitable.

Recharging ground water aquifers from roof top run off

Rain water that is collected on the roof top of the building may be diverted by drain pipes to a filtration tank (for bore well, through settlement tank) from which it flows into

the recharge well, as shown in following Figure. The recharge well should preferably be shallower than the water table. This method of rain water harvesting is preferable in the areas where the rainfall occurs only for a short period in a year and water table is at a shallow depth. The schematic diagram of recharging water aquifers from roof top run off is as follows.



6. Waste disposal

The present Prime Minister of India, Shri Narendra Modiji launched " Swach Bharat Abhiyan" (Clean India Mission), on 2nd October, 2014. In this mission, the proper use of dustbins is one of the major priorities. For the successful implementation of this mission collective mass effort is necessary. The higher education institutions like Siddhant College of Engineering, Pune need to play a major role in this regard to keep their campus neat and clean. Proper use of dustbins is not only the solution for the generating garbage in the college campus. Now a days, its proper treatment should be given a major priority.

Characteristic and Disposal Practices of Solid Wastes Waste Management

Sr. No.	Waste Category	Method of disposal
1	Solid waste from trees droppings and lawn	Vermi Composting Organic Manure
2	Canteen waste	Vermi Composting Organic Manure
3	Plastic waste	Through Authorized recycler after segregation
4	Solid Waste from Lab	Solid Waste from Lab
5	Chemical waste generated in chemistry	The college is need to have a very good practice to use dilute chemicals for the experimentation in these labs. These dilute chemicals can be further diluted and disposed in the pit near the lab.
6	E-waste and defective items from computer and electronics lab	The institution has to decide to contact approved E- waste management and Disposal facility in order to dispose E-waste in scientific manner.

7	Sanitary Napkins	The institution have to take a very good initiative to install sanitary napkin disposal machine at the different location in the college campus. It is suggested to install vending machine along with incinerators at required locations in the college campus.

6.1 Vermiculture Composting Culture

Vermicomposting is basically a managed process of worms digesting organic matter to transform the material into a beneficial soil amendment. The main purpose of this is to reduce disposable waste in the college campus and after complete process of vermi composting it is used as manure for plantation and greenery in the campus. It is also used for the demonstration and awareness in farmers to implement organic farming and its importance.

The main benefits of the process are to reduce the waste in the environment and utilized for some useful purpose and also it is cost savings process.

The earthworms being voracious eaters consume the biodegradable matter and give out a part of the matter as excreta or vermi-castings. The vermi-casting containing nutrients is a rich manure for the plants. Vermicompost, apart from supplying nutrients and growth enhancing hormones to plants, improves the soil structure leading to increase in water and nutrient holding capacities of soil. Fruits, flowers and vegetables and other plant products grown using vermicompost are reported to have better keeping quality. A growing number of individuals and institutions are taking interest in the production of vermicompost utilizing earthworm activity. As the operational cost of production of this compost works out to less than ` Rs. 2.0/Kg., it is quite profitable to sell the compost even at Rs. 4.00 to 4.50/Kg.

Process:

The process of composting crop residues / agri wastes using earthworms comprise spreading the agricultural wastes and cow dung in gradually built up shallow layers. The pits are kept shallow to avoid heat built-up that could kill earthworms. To enable earthworms to transform the material relatively faster a temperature of around 30^0C is maintained. The final product generated by this process is called vermicompost which essentially consist of the casts made by earthworms eating the raw organic materials. The process consists of constructing brick lined beds generally of 0.9 to 1.5 m width and 0.25 to 0.3 m height are constructed inside a shed open from all sides. For commercial production, the beds can be prepared with 15 m length, 1.5 m width and 0.6 m height spread equally below and above the ground. While the length of the beds can be made as per convenience, the width and height cannot be increased as an increased width affects the ease of operation and an increased height on conversion rate due to heat built up.

Cow dung and farm waste can be placed in layers to make a heap of about 0.6 to 0.9 m height. Earthworms are introduced in between the layers @ 350 worms per m3 of bed volume that weighs nearly 1 Kg. The beds are maintained at about 40-50% moisture content and a temperature of 20–30^0 C by sprinkling water over the beds. When the commercial scale production is aimed at, in addition to the cost of production, considerable amount has to be

invested initially on capital items. The capital cost may work out to about Rs. 5000 to 6000 for every tonne of vermicompost production capacity. The high unit capital cost is due to the fact that large units require considerable expenditure on preparation of vermi beds, shed to provide shelter to these beds and machinery. However these expenditures are incurred only once.

Under the operational cost, transportation of raw materials as also the finished product are the key activities. When the source organic wastes and dung are away from the production facility and the finished product requires transportation to far off places before being marketed, the operational cost would increase. However, in most of the cases, the activity is viable and bankable. Following are the items required to be considered while setting up a unit for production of vermi-compost.

Components of a Commercial Unit

Commercial units have to be developed based on availability of cow dung locally. If some big dairy is functioning then such unit will be an associated activity. Commercial units must not be designed based on imported cow dung.

1. Sheds

For a vermi-composting unit, whether small or big, this is an essential item and is required for securing the vermi beds. They could be of attached roof supported by bamboo rafters or steel trusses. Locally available roofing materials or HDPE sheet may also be used in roofing to keep the capital investment at reasonably lower level. If the size is so chosen as to prevent wetting of beds due to rain on a windy day, they could be open sheds. While designing the sheds adequate room/pathways has to be left around the beds for easy movement of the labourers attending to the filling and harvesting the beds.

2. Vermi-beds

Normally the beds have 0.3 to 0.6 m height depending on the provision for drainage of excess water. Care should be taken to make the bed with uniform height over the entire width to avoid low production owing to low bed volumes. The bed width should not be more than 1.5 m to allow easy access to the center of the bed.

3. Fencing and Roads/Paths

The site area needs development for construction of structures and development of roads and pathways for easy movement of hand-drawn trolleys/wheel barrows for conveying the raw material and the finished products to and from the vermi-sheds. The entire area has to be fenced to prevent trespass by animals and other unwanted elements. These could be estimated based on the length of the periphery of the farm and the length and type of roads/paths required. The costs on fencing and formation of roads should be kept low as these investments are essential for a production unit, yet would not lead to increase in production.

4. Water Supply System

As the beds have to be kept moist always with about 50% moisture content, there is a need to plan for a water source, lifting mechanism and a system of conveying and applying the water to the vermi-beds. Drippers with round the clock flow arrangement would be quite handy for continuous supply and saving on water. Such a water supply system requires considerable initial investment. However, it reduces the operational cost on hand watering and proves economical in the long run. The cost of these items would depend on the capacity of the unit and the type of water supply chosen.

5. Transportation

For any vermi-composting unit transport arrangement is a must. When the source of raw material is away from the production unit, an off-site transport becomes major item of investment. A large sized unit with about 1000 tonnes per annum capacity may require a three tonne capacity mini-truck. With small units particularly with the availability of raw material near the site, expending on transport facility may become infructuous. On-site transport facilities like manually drawn trolleys to convey raw material and finished products between the storage point and the vermi-compost sheds could also be included in the project cost.

Design calculations

The size of the bed can selected as per the space available and convenient to the customer. Brick lined beds generally of 0.9 to 1.5 m width and 0.25 to 0.3 m height are constructed inside a shed open from all sides. On the basis of site survey and suitability of operation lets consider following dimensions for the bed. Generally, earthworms are introduced in between the layers @ 350 worms per m3 of bed volume that weighs nearly 1 Kg.

L= 3 m

W = 1.5 m

H = 0.6 m

Volume of the bed = 2.7 m^3

$$Input = \frac{15\,kg\ of\ organic residue}{m3 \times 15\,days} = \frac{1\,kg\ of\ organic residue}{m3 \times 1\,day}$$

It means for 2.7 m^3, 270 kg of organic residue is required. Therefor for a month approximately 8100 kg (8.1 Ton) of organic residue is required.

The financial viability on the basis of available data of the vermicompost system is shown below.

Sr. No.	Particulars	Expenditure Cost (Rs.)
1	Bed construction	Already available 10,000/-
2	Fencing including roof	5000/-
3	Water Dripper	3000/-
4	Electrical connections	1000/-
5	Earthworms	1000/-
6	Salary & wages	20000/-
7	Sale of Vermicompost (@ Rs.100 /kg at 30% conversion)	121500/-
	Net Benefit	**81500/-**

Chapter III
SUGGESTIONS AND RECOMMENDATIONS

Following are the suggestions and actions on the basis of green and environmental audit are suggested to implement in the campus on the basis of funds availability and institute preferences.

Green Audit: Environment conservation opportunities:

- Plants/Trees in the college campus may be designated with botanical name and specific number on the basis of year of plantation. There will be brick arrangement at the bottom to supply water to the plant.
- Water management system must be in place. Reduction in water consumption by addressing leakages of taps and other miscellaneous utilities. Installation of flow meters which will help in reduction of water consumption. TOD can be implemented for pumping application.
- Rainwater harvesting pipe which collects rain water from respective building may have filter and properly charge the ground through ring well. Ring well can constructed near the rain water collection area, the approximate expenditure to construct the ring well will be @ Rs. 30,000/- per ring well.
- Provide firefighting system in the institute buildings. Also firefighting extinguishers at major places like electrical junction box, DG set room and Laboratories etc. required nos. of dustbins at respective locations in the college campus.
- Vermi-culture composting plant should be installed and the organic compost from the same will be either utilized for the plants/trees and maintaining greenery in the college campus or sell for organic farming.
- It is suggested to display Energy conservation slogans boards in the college campus and classroom to make awareness about importance of energy saving.

Prathamesh Energy Solution
A-302, Shiv Unnati residency, Kalepadal, Hadapsar, Pune-411028

Ref: PES/SCoE/2022-23/19

Date:

To,

The Principal
Siddhant College of Engineering
Chakan-Talegaon Road,
Sudumbare, Dist.Pune – 412109

Sub: Submission of Report on Environmental and Green Audit of College Campus

Respected Sir,

Please find enclosed herewith the report

Thanking you
Yours faithfully

For Prathamesh Energy Solution

Authorized Signatory

Prathamesh Energy Solution

A-302, Shiv Unnati Residency, Kalepadal, Hadapsar, Pune 411028

Ref: EC/SCoE /22-23/15

CERTIFICATE

This is to certify that we have conducted Environmental and Green Audit at **Siddhant College of Engineering, Chakan-Talegaon Road, Sudumbare, Dist. Pune,** in the Academic year 2022-23

. The College has adopted following Energy Efficient practices:

- Usage of Energy Efficient LED Fittings
- Maximum usage of Day Lighting
- Installation of Roof Top Solar PV Plant.
- Green Campus
- Rain water Harvesting system

We appreciate the support of Management, involvement of faculty members and students in the process of making the Campus Energy Efficient.

For,

Prathamesh Energy Solution,

Certificate of Registration

This is to Certify that
Environmental Management System of

PRATHAMESH ENERGY SOLUTION

A-302, SHIV UNNATI RESIDENCY, KALEPADAL, HADAPSAR, PUNE-411028, MAHARASHTRA, INDIA.

has been assessed and found to conform to the requirements of

ISO 14001:2015

for the following scope :

CONSULTANCY SERVICES FOR ENERGY AUDIT, GREEN AUDIT AND ENVIRONMENTAL AUDIT IN EDUCATIONAL INSTITUTIONS AND OTHER ORGANIZATIONS & SUBMISSION OF AUDIT CERTIFICATE AND REPORT.

Certificate No	: **23EELA98**		
Initial Registration Date	: 09/06/2023	Issuance Date	: 09/06/2023
Date of Expiry	: 08/06/2026		
1st Surve. Due	: 09/05/2024	2nd Surve. Due	: 09/05/2025

EGAC Accredited EMS Certification CAB # 118005

Director

Magnitude Management Services Pvt. Ltd.
Third Floor, A-60, Sector-2, Noida, Gautam Budh Nagar, U.P.-201301, India
e-mail: info@mmscertification.com, website: www.mmscertification.com

* Subject to Successful Surveillance Audit and one surveillance audit is not allowed to be conducted, this certificate shall be suspended/withdrawal.

Certificate Verification: Please Re-check the validity of certificate at http://www.mmscertification.com or www.mmscertification.com at Some Clients.

Certificate is the property of Magnitude Management Services Pvt. Ltd. and shall be returned immediately when demanded.

IGBC

Confederation of Indian Industry

The Indian Green Building Council

hereby certifies that

Vaijanath Narharirao Raibhole

has successfully demonstrated knowledge on the Green Building Design & Construction, Building Standards & Codes, IGBC Resources & Processes and Green Design Strategies & their Impacts, required to be awarded the title of

IGBC Accredited Professional

K S Venkatagiri
Executive Director
CII-Godrej GBC

V Suresh
Chairman
Indian Green Building Council

Gurmit Singh Arora
Vice-Chairman
Indian Green Building Council

200413

05 September 2020

Prathamesh Energy Solution
A-302, Shiv Unnati residency, Kalepadal, Hadapsar, Pune-411028

Ref: PES/SCoE/2022-23/15

Date:

To,

The Principal
Siddhant College of Engineering
Chakan-Talegaon Road,
Sudumbare, Dist.Pune – 412109

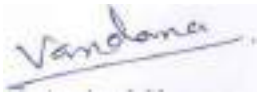
Sub: Submission of Report on Energy Audit of College Campus

Respected Sir,

Please find enclosed herewith the report

Thanking you
Yours faithfully

For Prathamesh Energy Solution



Authorized Signatory

Prathamesh Energy Solution

A-302, Shiv Unnati Residency, Kalepadal, Hadapsar, Pune 411028

Ref: PES/EEP/SCoE /22-23/11

CERTIFICATE

This is to certify that we have conducted Energy Audit at **Siddhant College of Engineering Chakan-Talegaon Road, Sudumbare, Dist. Pune – 412109**, in the Academic year 2022-23

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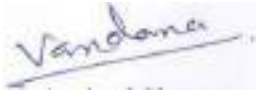
We appreciate the support of Management, involvement of faculty members and students in the process of making the Campus Energy Efficient.

For,



Prathamesh Energy Solution,

Certificate of Registration

This is to Certify that
Quality Management System of

PRATHAMESH ENERGY SOLUTION

A-302, SHIV UNNATI RESIDENCY, KALEPADAL, HADAPSAR, PUNE-411028, MAHARASHTRA, INDIA.

has been assessed and found to conform to the requirements of

ISO 9001:2015

for the following scope :

CONSULTANCY SERVICES FOR ENERGY AUDIT, GREEN AUDIT AND ENVIRONMENTAL AUDIT IN EDUCATIONAL INSTITUTIONS AND OTHER ORGANIZATIONS & SUBMISSION OF AUDIT CERTIFICATE AND REPORT.

Certificate No	: **23EQMD10**		
Initial Registration Date	: 19/06/2023	Issuance Date	: 19/06/2023
Date of Expiry	: 18/06/2026		
1st Surve. Due	: 19/05/2024	2nd Surve. Due	: 19/05/2025

mms EGAC Accredited QMS Certification CAB # 110005 IAF MEMBER OF MULTILATERAL RECOGNITION ARRANGEMENT

Director

Magnitude Management Services Pvt. Ltd.
Third Floor, A-60, Sector-2, Noida, Gautam Budh Nagar, U.P.-201301, India
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