METRIC NO. 7.1.3

Institutional Values and Social Responsibilities

Shri Sant Gajanan Maharaj College of Engineering, Shegaon

Self-Study Report

Shri Gajanan Shikshan Sanstha's
SHRI SANT GAJANAN MAHARAJ COLLEGE OF ENGINEERING
SHEGAON – 444203, DIST. BULDHANA (MAHARASHTRA STATE), INDIA
"Recognized by A.I.C.T.E., New Delhi" Affiliated to Sant Gadge Baba Amravati University, Amravati
"Approved by the D.T.E., M.S. Mumbai"

Ph : +918669638081/82 Email.principal@ssgmce.ac.in, registrar@ssgmce.ac.in
Website- www.ssgmce.ac.in

7.1.3 Quality audits on environment and energy regularly undertaken by the Institution

Index

SN	Academic Year	Description	Link
1	2022-23	Energy Audit, Green Audit and Environmental Audit Reports	**Click Here**
2	2021-22	Energy Audit, Green Audit and Environmental Audit Reports	**Click Here**
3	2020-21	Energy Audit, Green Audit and Environmental Audit Reports	**Click Here**
4	2019-20	Energy Audit, Green Audit and Environmental Audit Reports	**Click Here**
5	2018-19	Energy Audit and Green Audit Reports	**Click Here**

Shri Sant Gajanan Maharaj College of Engineering SHEGAON 444 203

PRINCIPAL
Shri Sant Gajanan Maharaj
College of Engineering,Shegaon.

SUNIL BHIKAMCHAND SOMANI

Digitally signed by SUNIL BHIKAMCHAND SOMANI
Date: 2024.04.08 10:52:20 +05'30'

ENERGY AUDIT REPORT

of

SHRI SANT GAJANAN MAHARAJ COLLEGE OF ENGINEERING,

Shegaon, Dist: Buldhana

Year: 2022-23

Prepared by:

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411009
Phone: 09890444795, Email: engress123@gmail.com

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society, Near Muktangan English School, Parvati, Pune 411 009
Tel: 09890444795 Email: engress123@gmail.com
MEDA Registration No: ECN/2022-23/CR-43/1709
ISO: 9001-2015 Certified (Cert No: 23EQKC13),
ISO: 14001-2015 Certified (Cert No: 23EEKW20)

ENERGY AUDIT CERTIFICATE

Certificate No: ES/SSGMCOE /22-23/01 **Date: 10/5/2023**

This is to certify that we have conducted Energy Audit at Shri Sant Gajanan Maharaj College of Engineering, Shegaon in the year 2022-23.

The College has adopted following Energy Efficient Practices:

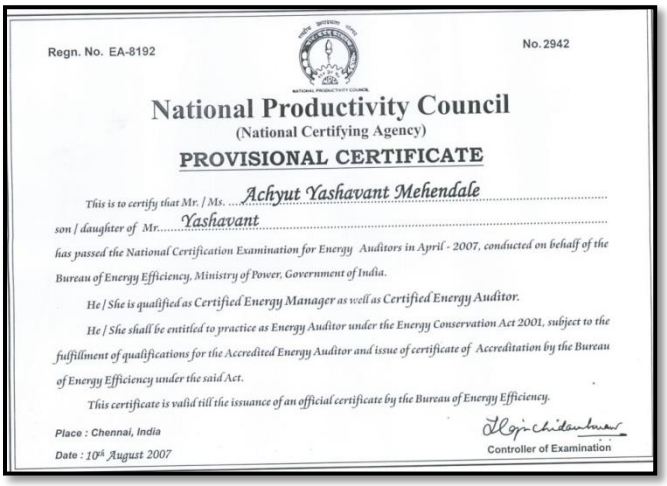
- Usage of Energy Efficient LED Fittings
- Usage of Energy Efficient BEE STAR Rated equipment
- Maximum usage of Day Lighting
- Installation of 310 kWp Roof Top Solar PV Plant

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

For Engress Services,

A Y Mehendale,
B E-Mechanical, M Tech- Energy
BEE Certified Energy Auditor, EA-8192

REGISTRATION CERTIFICATES



Regn. No. EA-8192 No. 2942

National Productivity Council
(National Certifying Agency)

PROVISIONAL CERTIFICATE

This is to certify that Mr. / Ms. Achyut Yashavant Mehendale son / daughter of Mr. Yashavant has passed the National Certification Examination for Energy Auditors in April - 2007, conducted on behalf of the Bureau of Energy Efficiency, Ministry of Power, Government of India.

He / She is qualified as Certified Energy Manager as well as Certified Energy Auditor.

He / She shall be entitled to practice as Energy Auditor under the Energy Conservation Act 2001, subject to the fulfillment of qualifications for the Accredited Energy Auditor and issue of certificate of Accreditation by the Bureau of Energy Efficiency under the said Act.

This certificate is valid till the issuance of an official certificate by the Bureau of Energy Efficiency.

Place : Chennai, India
Date : 10th August 2007

Controller of Examination

AUDITOR CERTIFICATE

MAHARASHTRA ENERGY DEVELOPMENT AGENCY

Maharashtra Energy Development Agency
(Government of Maharashtra Institution)
Aundh Road, Opposite Spicer College Road, Near Commissionerate of Animal Husbandary, Aundh, Pune, Maharashtra 411067
Ph No: 020-35000450
Email: eee@mahaurja.com, Web: www.mahaurja.com

ECN/2022-23/CR-43/1709 10th May, 2022

CERTIFICATE OF REGISTRATION
FOR CLASS 'A'

We hereby certify that, the firm having following particulars is registered with ***MAHARASHTRA ENERGY DEVELOPMENT AGENCY (MEDA)*** under given category as "Energy Planner & Energy Auditor" in Maharashtra for Energy Conservation Programme of MEDA.

Name and Address of the firm : M/s Engress Services
Yashshree, 26, Nirmal Bag Society,
Near Muktangan English School,
Parvati, Pune – 411 009.

Registration Category : *Empanelled Consultant for Energy Conservation Programme for Class 'A'*

Registration Number : ***MEDA/ECN/2022-23/Class A/EA-32.***

- Energy Conservation Programme intends to identify areas where wasteful use of energy occurs and to evaluate the scope for Energy Conservation and take concrete steps to achieve the evaluated energy savings.
- MEDA reserves the right to visit at any time without giving prior information to verify quarterly activities performed by the firm and canceling the registration, if the information is found incorrect.
- This empanelment is valid till **09th May, 2024** from the date of registration, to carry out energy audits under the Energy Conservation Programme
- The Director General, MEDA reserves the right to cancel the registration at any time without assigning any reasons thereof.

General Manager (EC)

MEDA Registration Certificate

Certificate of Registration

This is to Certify that Quality Management System of

ENGRESS SERVICES

26, YASHASHREE, BLOCK 1, LOKMANYA NAGAR, NIRMAL BAUG SOC, PARVATI, PUNE- 411009, 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 & ENVIRONMENTAL AUDIT IN EDUCATIONAL INSTITUTIONS & SUBMISSION OF AUDIT CERTIFICATE AND REPORT.

Certificate No : 23EQKC13
Initial Registration Date : 27/03/2023 Issuance Date : 27/03/2023
Date of Expiry : 26/03/2026
1st Surve. Due : 27/02/2024 2nd Surve. Due : 27/02/2025

Director

Magnitude Management Services Pvt. Ltd.
B-55, Lower Ground Floor, Sector 02, Noida-201301, U.P, India
e-mail: info@mmscertification.com, website: www.mmscertification.com

ISO: 9001-2015 Certificate

Certificate of Registration

This is to Certify that Environmental Management System of

ENGRESS SERVICES

26, YASHASHREE, BLOCK 1, LOKMANYA NAGAR, NIRMAL BAUG SOC, PARVATI, PUNE- 411009, 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 & ENVIRONMENTAL AUDIT IN EDUCATIONAL INSTITUTIONS & SUBMISSION OF AUDIT CERTIFICATE AND REPORT.

Certificate No : 23EEKW20
Initial Registration Date : 29/03/2023 Issuance Date : 29/03/2023
Date of Expiry : 28/03/2026
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Director

Magnitude Management Services Pvt. Ltd.
B-55, Lower Ground Floor, Sector 02, Noida-201301, U.P, India
e-mail: info@mmscertification.com, website: www.mmscertification.com

ISO: 14001-2015 Certificate

INDEX

ACKNOWLEDGEMENT

We at Engress Services, Pune, express our sincere gratitude to the management of Shri Sant Gajanan Maharaj College of Engineering, Shegaon for awarding us the assignment of Energy Audit of their Shegaon Campus for the Year: 2022-23.

We are thankful to all Staff members for helping us during the field study.

EXECUTIVE SUMMARY

1. Shri Sant Gajanan Maharaj College of Engineering, Shegaon consumes Energy in the form of **Electrical Energy;** used for various gadgets, Office & other facilities.

2. Present Connected Load & Energy Consumption:

No	Particulars	Value	Unit
1	Total Connected Load	**518.35**	kW
2	Annual Energy Purchased	**721283**	kWh

3. Energy Performance Index:

No	Particulars	Value	Unit
1	Total Annual Energy Purchased	721283	kWh
2	Annual Energy Generated	413355	kWh
3	Energy Exported	54980	kWh
4	Annual Energy Consumed=1+2-3	**1079658**	kWh
5	Total Built up area of Institute	**28900.09**	m^2
6	Energy Performance Index **=(4) / (5)**	**37.36**	kWh/m^2

4. Study of % Usage of LED Lighting:

No	Particulars	Value	Unit
1	% of Usage of LED Lighting to Total Lighting Load	**24.77**	%

5. Renewable Energy & Energy Efficiency Projects:

- Usage of Energy Efficient LED fittings
- Installation of **310 kWp** Roof Top Solar PV Plant

6. Assumption:

1. **1 kWh** of Electrical Energy releases **0.9 Kg** of **CO_2** into atmosphere

7. References:

- Audit Methodology: www.mahaurja.com
- Energy Conservation Building Code: ECBC-2017: www.beeindia.gov.in
- For CO_2 Emissions: www.tatapower.com

ABBREVIATIONS

CFL	:	Compact Fluorescent Lamp
CO_2	:	Carbon- Di- Oxide
FTL	:	Fluorescent Tube Light
LED	:	Light Emitting Diode
kW	:	Kilo- Watt
kWh	:	kilo-Watt Hour
MT	:	Metric Ton
P V	:	Photo Voltaic

CHAPTER-I
INTRODUCTION

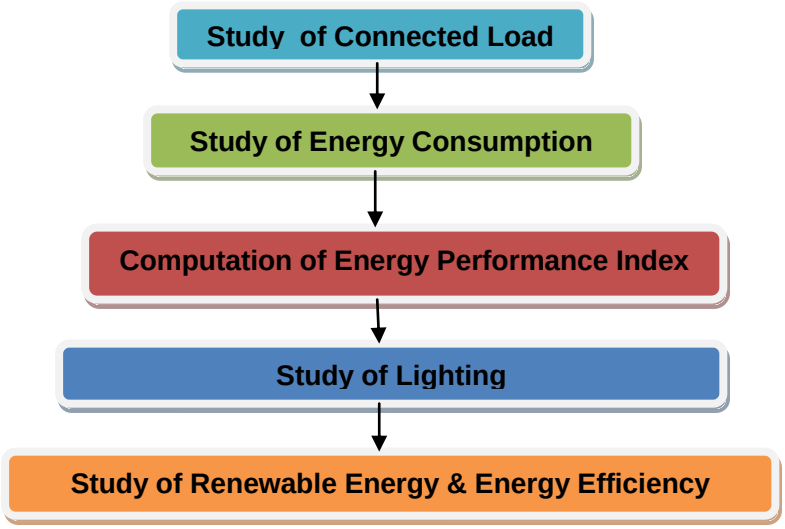
1.1 Introduction:

An Energy Audit is conducted at Shri Sant Gajanan Maharaj College of Engineering, Shegaon.

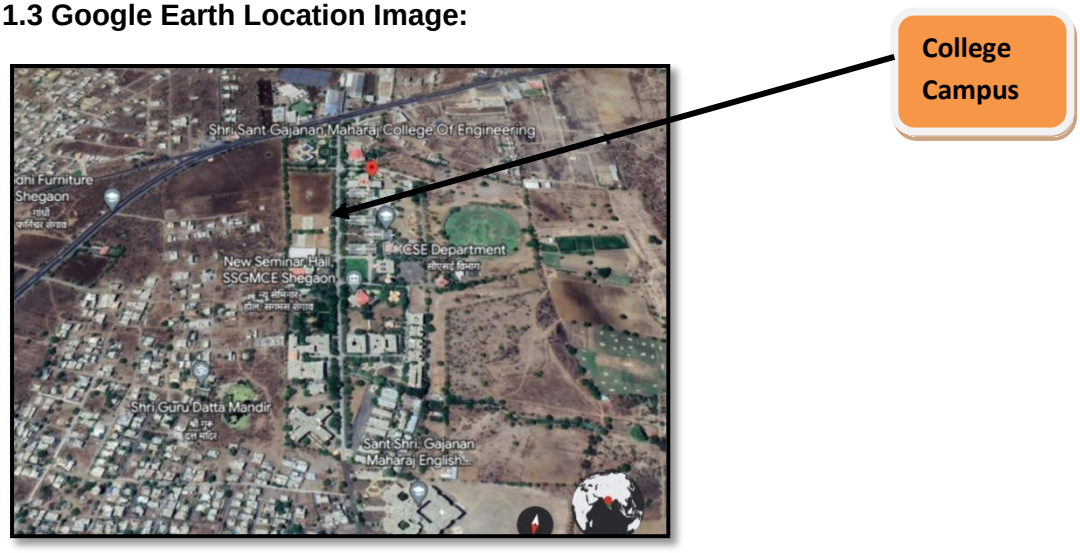
The guidelines followed for conducting the Energy Audit are:

- BEE India's Energy Conservation Building Code: ECBC-2017
- Maharashtra Energy Development Agency (www.mahaurja.com)
- Tata Power: www.tatapower.com

1.2 Audit Procedural Steps:



1.3 Google Earth Location Image:



CHAPTER-II
STUDY OF CONNECTED LOAD

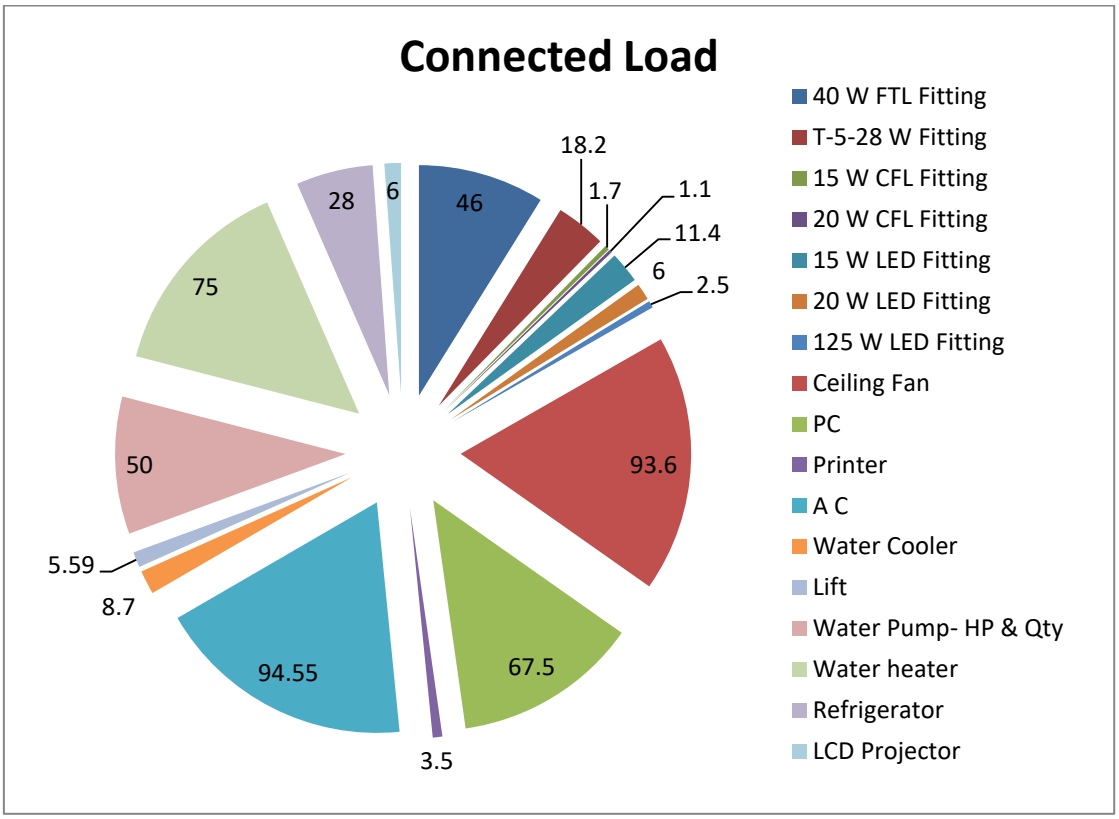
In this chapter, we present the details of various Electrical loads as under

Table No: 2: Study of Equipment wise Connected Load:

No	Equipment	Quantity	Load, W, Unit	Load, kW
1	40 W FTL Fitting	1150	40	46
2	T-5-28 W Fitting	650	28	18.2
3	15 W CFL Fitting	100	17	1.7
4	20 W CFL Fitting	50	22	1.1
5	15 W LED Fitting	760	15	11.4
6	20 W LED Fitting	300	20	6
7	125 W LED Fitting	20	125	2.5
8	Ceiling Fan	1560	60	93.6
9	PC	450	150	67.5
10	Printer	20	175	3.5
11	A C	61	1550	94.55
12	Water Cooler	29	300	8.7
13	Lift	1	5595	5.60
14	Water Pump- HP & Qty	25	2000	50
15	Water heater	50	1500	75
16	Refrigerator	80	350	28
17	LCD Projector	40	150	6
18	**Total**			**518.35**

In the following Table, we present the same in a PIE Chart

Chart No 1: Total Connected Load:



CHAPTER-III
STUDY OF PRESENT ENERGY CONSUMPTION

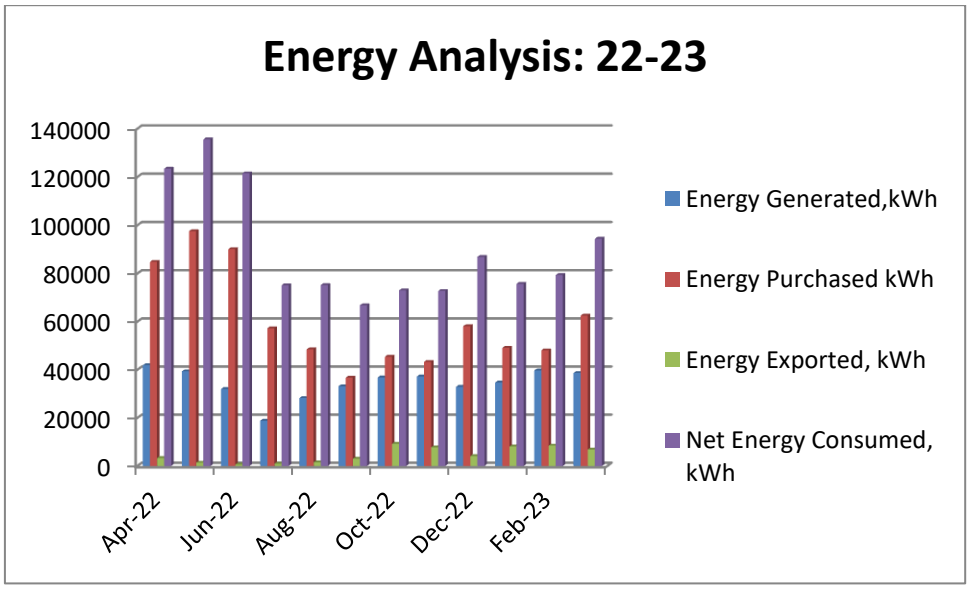
In this chapter, we present the analysis of last year Electricity Bills.

Table No- 3: Electrical Energy Analysis- 2022-23:

No	Month	Energy Generated ,kWh	Energy Purchased kWh	Energy Exported, kWh	Net Energy Consumed, kWh	CO_2 Emissions, MT
1	Apr-22	41888	84810	3305	123393	76.33
2	May-22	39364	97535	1330	135569	87.78
3	Jun-22	31981	90105	605	121481	81.09
4	Jul-22	18806	57235	920	75121	51.51
5	Aug-22	28254	48475	1525	75204	43.63
6	Sep-22	33125	36695	3005	66815	33.03
7	Oct-22	36803	45398	9205	72996	40.86
8	Nov-22	37208	43245	7710	72743	38.92
9	Dec-22	32869	58090	4075	86884	52.28
10	Jan-23	34680	49110	8085	75705	44.20
11	Feb-23	39724	48065	8435	79354	43.26
12	Mar-23	38653	62520	6780	94393	56.27
13	**Total**	**413355**	**721283**	**54980**	**1079658**	**649.15**

In the following Chart we present the above Data of Energy Consumption.

Chart No-2: Month wise Variation in Energy Consumption, kWh:



CHAPTER-IV

STUDY OF ENERGY PERFORMANCE INDEX

Energy Performance Index: Energy Performance Index of a Building is its Annual Energy Consumption in Kilo Watt Hours per square meter of the Building

It is determined by:

$$\textbf{EPI} = \frac{\textbf{(Annual Energy Consumption in kWh)}}{\textbf{(Total Built-up area in m}^2\textbf{)}}$$

Now we compute the EPI for the Institute as under:

Table No 3: Computation of Energy Performance Index:

No	Particulars	Value	Unit
1	Total Annual Energy Purchased	721283	kWh
2	Energy Generated by Solar PV Plant	413355	kWh
3	Energy Exported	54980	kWh
4	Total Energy Consumed= 1+2-3	**1079658**	kWh
5	Total Built up area of Institute	**28900.09**	m^2
6	Energy Performance Index **=(3) / (4)**	**37.36**	kWh/m^2

CHAPTER V

STUDY OF LIGHTING

Terminology:

1. Lumen is a unit of light flow or luminous flux. The lumen rating of a lamp is a measure of the total light output of the lamp. The most common measurement of light output (or luminous flux) is the lumen. Light sources are labeled with an output rating in lumens.

2. Lux is the metric unit of measure for illuminance of a surface. One lux is equal to one lumen per square meter.

3. Circuit Watts is the total power drawn by lamps and ballasts in a lighting circuit under assessment.

4. Installed Load Efficacy is the average maintained illuminance provided on a horizontal working plane per circuit watt with general lighting of an interior. Unit: lux per watt per square metre (lux/W/m²)

5. Lamp Circuit Efficacy is the amount of light (lumens) emitted by a lamp for each watt of power consumed by the lamp circuit, i.e. including control gear losses. This is a more meaningful measure for those lamps that require control gear. Unit: lumens per circuit watt (lm/W)

6. Installed Power Density. The installed power density per 100 lux is the power needed per square metre of floor area to achieve 100 lux of average maintained illuminance on a horizontal working plane with general lighting of an interior. Unit: watts per square metre per 100 lux (W/m²/100 lux) 100 Installed power density (W/m²/100 lux)

7. Lighting Power Density: It is defined as Total Lighting Load in a room divided by the Area of that Room in square meters.

In this Chapter we compute the percentage usage of LED Lighting to total Lighting Load of the Institute.

Table No 4: Percentage Usage of LED Lighting to Total Lighting Load:

No	Particulars	Value	Unit
1	Qty of 40 W FTL Fitting	1100	Nos
2	Load/Unit of 40 W FTL Fitting	40	W
3	Total load of 40 W FTL Fittings	**44**	kW
4	Qty of 28 W T-5 Fitting	650	Nos
5	Load/Unit of 28 W T-5 Fitting	28	W
6	Total load of 28 W T-5 Fittings	**18.2**	kW
7	Qty of 15 W CFL Fitting	100	Nos

8	Load/unit of 15 W CFL Fitting	17	W
9	Total load of 15 W CFL Fittings	**1.7**	kW
10	Qty of 20 W CFL Fitting	50	Nos
11	Load/unit of 20 W CFL Fitting	22	W
12	Total load of 20 W CFL Fittings	**1.1**	kW
13	Qty of 15 W LED Fitting	760	Nos
14	Load/unit of 15 W LED Fitting	15	W
15	Total load of 15 W LED Fittings	**11.4**	kW
16	Qty of 20 W LED Fitting	350	Nos
17	Load/unit of 20 W LED Fitting	20	W
18	Total load of 20 W LED Fittings	**7**	kW
19	Qty of 125 W LED Fitting	20	Nos
20	Load/unit of 125 W LED Fitting	125	W
21	Total load of 125 W LED Fittings	**3**	kW
22	Total LED Lighting Load= 15+18+21	**21.4**	kW
23	Total Lighting Load= 3+6+9+12+ 15+18+21	**86.4**	kW
24	% of Usage of LEDs to Total Lighting Load=**22*100/23**	**24.77**	%

CHAPTER-VI

STUDY OF RENEWABLE ENERGY & ENERGY EFFICIENCY

6.1 Usage of Renewable Energy:

The Institute has installed:

- Roof Top Solar PV Plant of Capacity 310 kWp

Photograph of Roof Top Solar PV Plant:

6.2 Energy Efficiency Measures adopted:

- The Institute has Energy Efficient LED Fittings.
- Usage of BEE STAR Rated Equipment

Photographs of LED Lighting:

GREEN AUDIT REPORT

of

SHRI SANT GAJANAN MAHARAJ COLLEGE OF ENGINEERING,

Shegaon, Dist: Buldhana

Year: 2022-23

Prepared by

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411009
Phone: 09890444795, Email: engress123@gmail.com

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society, Near Muktangan English School,
Parvati, Pune 411 009 Tel: 09890444795 Email: engress123@gmail.com
MEDA Registration No: ECN/2022-23/CR-43/1709
ISO: 9001-2015 Certified (Cert No: 23EQKC13),
ISO: 14001-2015 Certified (Cert No: 23EEKW20)

GREEN AUDIT CERTIFICATE

Certificate No: ES/SSGMCOE /22-23/02 **Date: 10/5/2023**

This is to certify that we have conducted Green Audit at Shri Sant Gajanan Maharaj College of Engineering, Shegaon, in the year 2022-23.

The College has adopted following Green & Sustainable Practices:

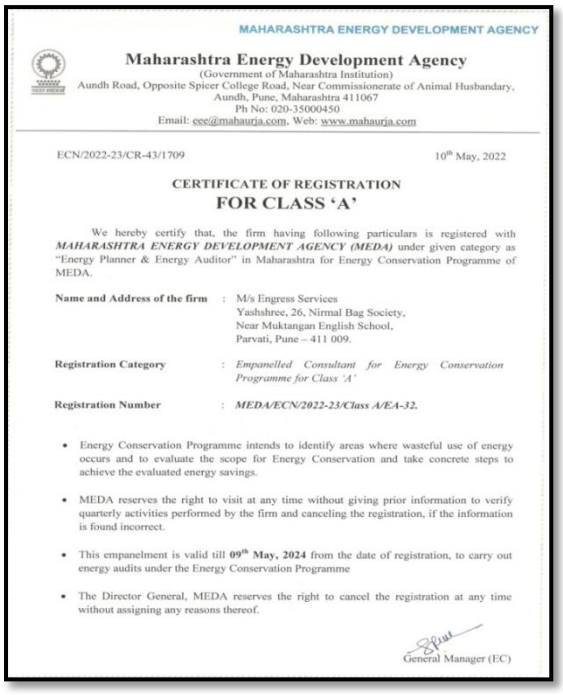
- Usage of Energy Efficient LED Fittings
- Installation of 310 kWp Roof Top Solar PV Plant
- Segregation of Waste at source
- Implementation of Bio Composting Bed Arrangement
- Provision of Sanitary Waste Incinerator, for disposal of Sanitary Waste
- Installation of 200 m^3/Day Sewage Treatment Plant
- Implementation of Rain Water Harvesting Project
- Good Internal Road
- Internal Tree Plantation
- Provision of Ramp for Divyangajan
- Creation of Awareness on Energy Conservation by Display of Posters
- Usage of E Vehicle for internal material transport

We appreciate the support of Management, involvement of faculty members and students in the process of Energy Conservation & making the campus Green.

For Engress Services,

A Y Mehendale,
Certified Energy Auditor, EA-8192
ASSOCHAM GEM Certified Professional: GEM: 22/788

REGISTRATION CERTIFICATES



MAHARASHTRA ENERGY DEVELOPMENT AGENCY

Maharashtra Energy Development Agency
(Government of Maharashtra Institution)
Aundh Road, Opposite Spicer College Road, Near Commissionerate of Animal Husbandary, Aundh, Pune, Maharashtra 411067
Ph No: 020-35000450
Email: eee@mahaurja.com, Web: www.mahaurja.com

ECN/2022-23/CR-43/1709 — 10th May, 2022

CERTIFICATE OF REGISTRATION
FOR CLASS 'A'

We hereby certify that, the firm having following particulars is registered with *MAHARASHTRA ENERGY DEVELOPMENT AGENCY (MEDA)* under given category as "Energy Planner & Energy Auditor" in Maharashtra for Energy Conservation Programme of MEDA.

Name and Address of the firm : M/s Engress Services, Yashshree, 26, Nirmal Bag Society, Near Muktangan English School, Parvati, Pune – 411 009.

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- This empanelment is valid till **09th May, 2024** from the date of registration, to carry out energy audits under the Energy Conservation Programme
- The Director General, MEDA reserves the right to cancel the registration at any time without assigning any reasons thereof.

General Manager (EC)

GEM Certificate

ASSOCHAM hereby certifies that

Mr. A Y Mehendale

has successfully passed the
Green and Eco-friendly Movement Certified Professional Test (GEM CP)
with
"Excellent Performance"
on
06 June, 2022

He/she is now eligible to execute the GEM Sustainability Certification Projects.
ASSOCHAM feels proud to award the GEM Certified Professional title to him/her.

Pankaj R. Dharkar, Chairman, GEM — GEM CP 22/788 — Deepak Sood, Secretary General, ASSOCHAM

MEDA REGISTRATION CERTIFICATE

ASSOCHAM GEM CP CERTIFICATE

Certificate of Registration

This is to Certify that
Quality Management System of

ENGRESS SERVICES

26, YASHASHREE, BLOCK 1, LOKMANYA NAGAR, NIRMAL BAUG SOC, PARVATI, PUNE- 411009, MAHARASHTRA, INDIA

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Director

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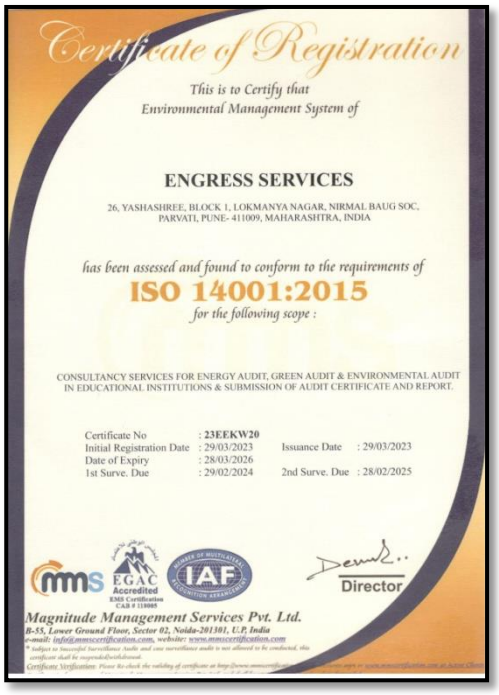

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ISO: 14001-2015 Certificate

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We are thankful to all Staff members for helping us during the field study

EXECUTIVE SUMMARY

1. Shri Sant Gajanan Maharaj College of Engineering, Shegaon consumes Energy in the form of **Electrical Energy; us**ed for various Electrical Equipment.

2. Present Energy Consumption & CO_2 Emission:

No	Particulars	Value	Unit
1	Annual Energy Purchased	**721283**	kWh
2	Annual CO_2 Emissions	**649.15**	MT

3. Usage of Renewable Energy & Reduction in CO_2 Emissions:

- The Institute has installed Roof Top Solar PV Plant of Capacity **310 kWp.**
- The Energy generated by Solar PV Plant in 22-23 is **413355 kWh**.
- Reduction in CO_2 Emissions in 22-23 is **372.02 MT**

4. Waste Management:

No	Head	Particulars
1	Solid Waste	Segregation of Waste at source
2	Organic Waste	Provision of Bio Composting Bed
3	Sanitary Waste	Provision of Sanitary Waste Incinerator
4	Liquid Waste	Provision of Sewage Treatment Plant
5	E Waste	Recommended to dispose of through Authorized Agency

5. Rain Water Harvesting:

The Institute has installed Pipes from the terrace and the Rain water falling on the terrace is stored in an underground Tank and is further used for domestic purpose after treatment.

6. Green & Sustainable Practices:

- Maintenance of good Internal Road
- Tree Plantation in the campus.
- Provision of Ramp for Divyangajan
- Creation of awareness on Energy Conservation Display of Posters

7. Assumption:

1. **1 kWh** of Electrical Energy releases **0.9 Kg** of **CO_2** into atmosphere

8. Reference:

- For CO_2 Emissions: www.tatapower.com

ABBREVIATIONS

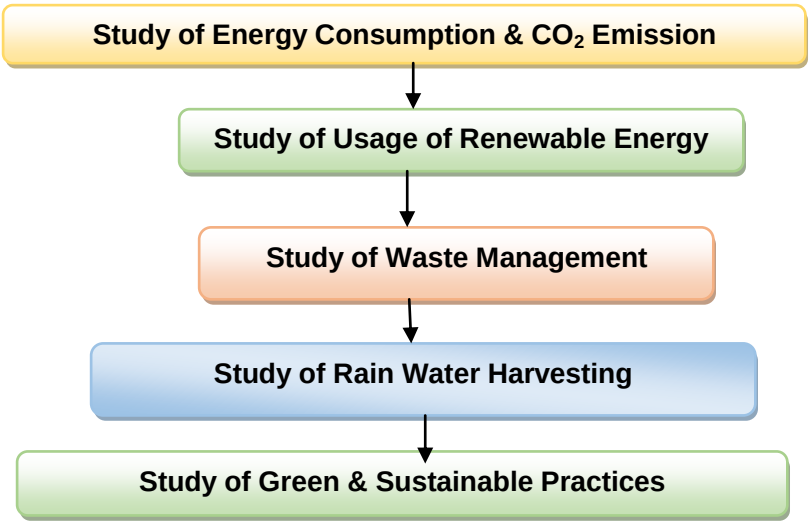
BEE	Bureau of Energy Efficiency
kWh	Kilo Watt Hour
LPD	Liters Per Day
Kg	Kilo Gram
MT	Metric Ton
CO_2	Carbon Di Oxide
Qty	Quantity

CHAPTER-I
INTRODUCTION

1.1 Introduction:

A Green Audit is conducted at Shri Sant Gajanan Maharaj College of Engineering, Shegaon.

1.2 Audit Procedural Steps:



1.3 Google Earth Location Image:

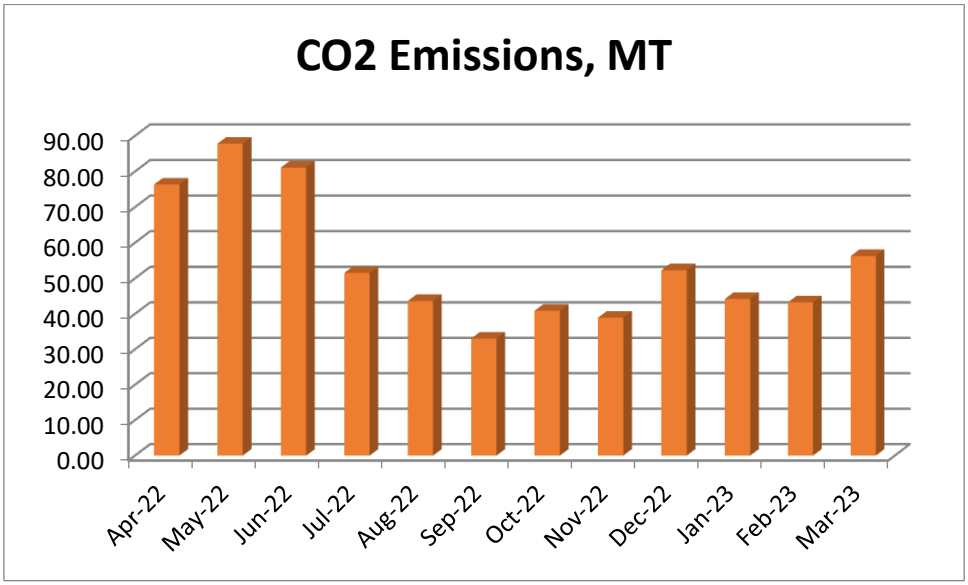
CHAPTER-II
STUDY OF ENERGY CONSUMPTION & CO_2 EMISSION

A Carbon Foot print is defined as the Total Greenhouse Gas emissions, emitted due to various activities. **Basis for computation of CO_2 Emissions: 1 kWh** of Electrical Energy releases **0.9 Kg of CO_2** into atmosphere.

Table No 1: Month wise Energy Consumption & CO_2 Emissions:

No	Month	Energy Generated ,kWh	Energy Purchased kWh	Energy Exported, kWh	Net Energy Consumed, kWh	CO_2 Emissions, MT
1	Apr-22	41888	84810	3305	123393	76.33
2	May-22	39364	97535	1330	135569	87.78
3	Jun-22	31981	90105	605	121481	81.09
4	Jul-22	18806	57235	920	75121	51.51
5	Aug-22	28254	48475	1525	75204	43.63
6	Sep-22	33125	36695	3005	66815	33.03
7	Oct-22	36803	45398	9205	72996	40.86
8	Nov-22	37208	43245	7710	72743	38.92
9	Dec-22	32869	58090	4075	86884	52.28
10	Jan-23	34680	49110	8085	75705	44.20
11	Feb-23	39724	48065	8435	79354	43.26
12	Mar-23	38653	62520	6780	94393	56.27
13	**Total**	**413355**	**721283**	**54980**	**1079658**	**649.15**

Chart No 1: Month wise CO_2 Emissions:



CHAPTER III
STUDY OF USAGE OF RENEWABLE ENERGY

The Institute has installed Roof Top Solar PV Plant of Capacity **310 kWp**
In the following Table, we present the reduction in CO_2 emissions due to Solar Energy:

Table No 2: Computation of Reduction in CO_2 Emissions:

No	Particulars	Value	Unit
1	Installed Capacity of Roof Top Solar PV Plant Capacity	310	kWp
2	Energy generated in 2022-23	413355	kWh
3	1 kWh of Electrical Energy saves	**0.9**	Kg/kWh
4	**Qty of CO_2 Saved by Solar PV Plant =(2)*(3) /1000**	**372.02**	**MT of CO_2**

Photograph of Roof Top Solar PV Plant:

CHAPTER IV
STUDY OF WASTE MANAGEMENT

4.1 Segregation of Waste at Source:

The Institute has good housekeeping practices. The Waste is segregated at source. Waste collection Bins are placed at strategic locations.

Photograph of Waste Collection Bin:

4.2 Organic Waste Management:

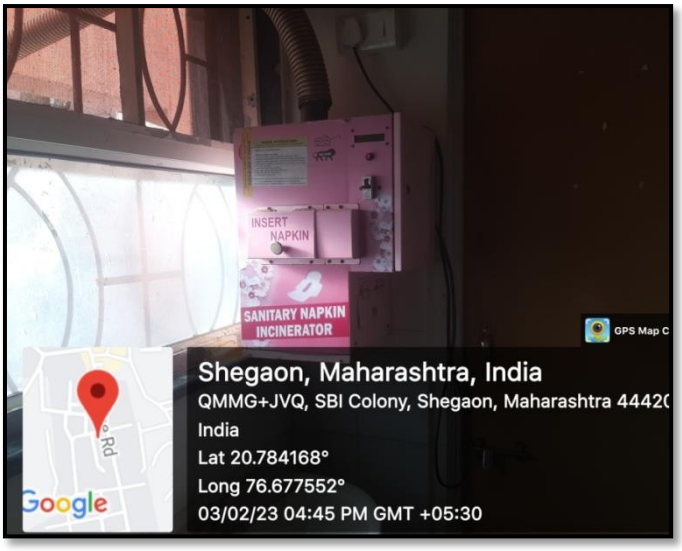
The College has a Bio composting Bed Arrangement, to convert the Bio Degradable Waste, like, Leafy Waste into Bio Compost.

Photograph of Bio Composting Bed Arrangement:

4.3 Sanitary Waste Management:

The Institute has installed a Sanitary Waste Incinerator to dispose of the Sanitary Waste.

Photograph of Sanitary Waste Incinerator:



4.4 Liquid Waste Management:

The College has installed a 200 m^3/Day Capacity Sewage Treatment plant. The treated water is used for Gardening purpose.

Photograph of Sewage Treatment Plant:

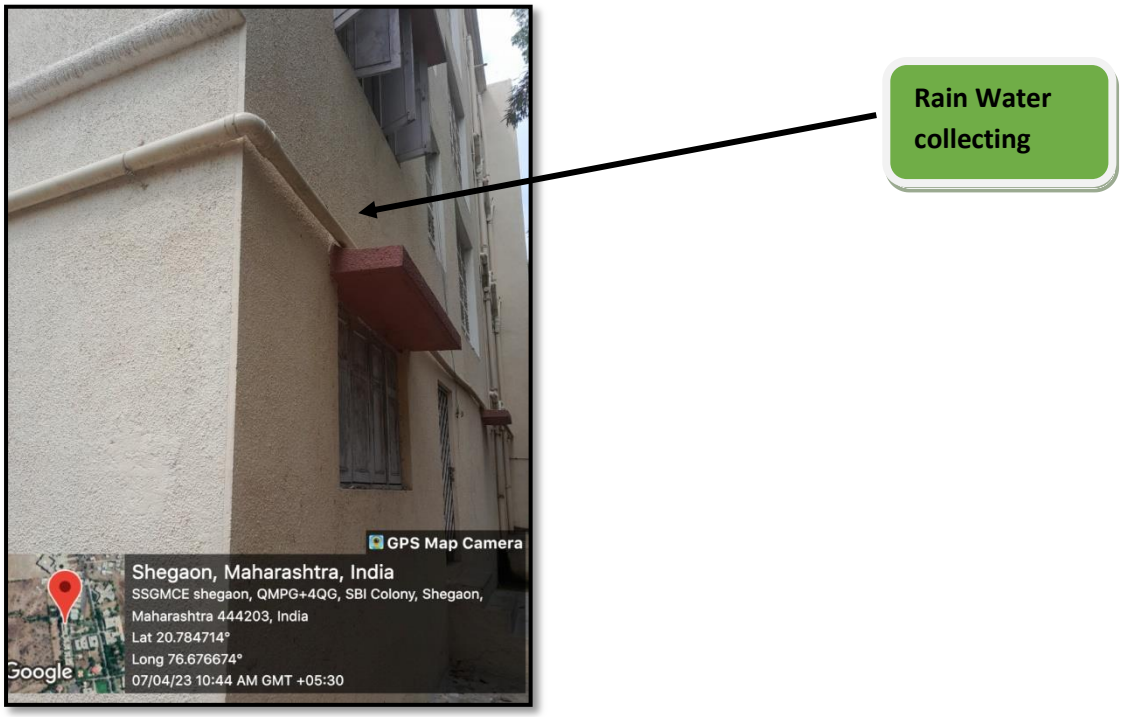
4.5 E Waste Management:

It is recommended to dispose of the E Waste through Authorized Agency

CHAPTER V
STUDY OF RAIN WATER HARVESTING

The College has already installed Rain Water Harvesting project, wherein the rain water falling on the terrace is collected and through pipes it is gathered in an underground Water Storage tank. This water is then treated and further used for domestic purpose.

Photograph of Rain Water Carrying Pipe:

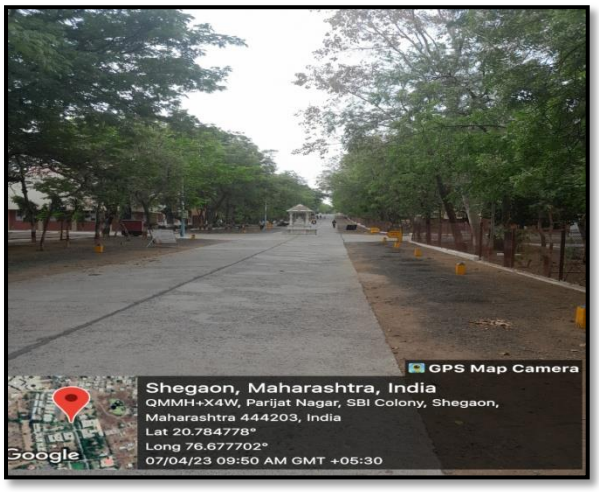


CHAPTER VI
STUDY OF GREEN & SUSTAINABLE PRACTICES

6.1 Pedestrian Friendly Road & Internal Tree Plantation:

The Institute has well maintained internal road to facilitate the easy movement of the students within the campus. The Institute has well maintained landscaped garden in the campus.

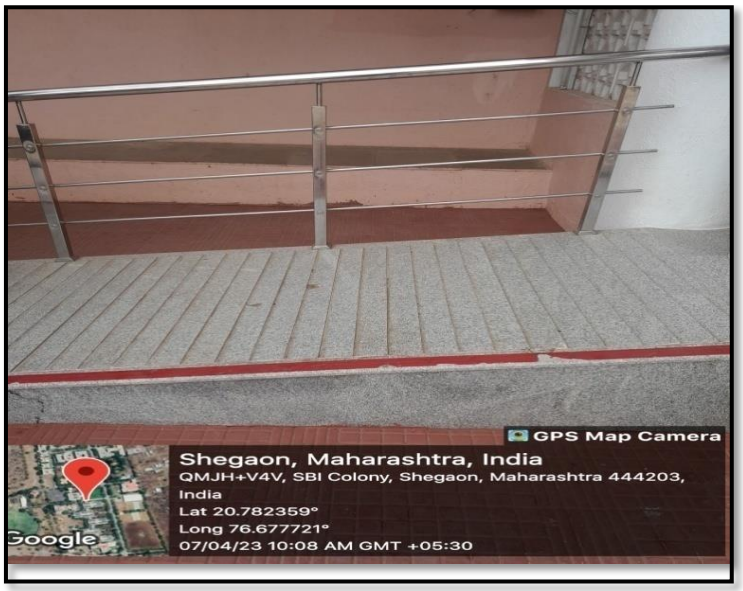
Photograph of Internal Road & Tree plantation:



6.2 Provision of Ramp for Divyangajan:

For easy movement of Divyangajan, the Institute has made provision of Ramp.

Photograph of Ramp:



6.3 Creation of Awareness about Energy Conservation:

The Institute has displayed posters emphasizing on importance of Energy Conservation.

Photograph of Poster on Energy Conservation:

6.4 Provision of E Vehicle:

For internal material transport, E Vehicle is used.

Photograph of E Vehicle:

ANNEXURE-1:
LIST OF TREES & PLANTS:

No	Name of Tree		No	Name of Plant	No	Name of Plant
1	Saptaparni		1	Shatavari	21	Hibiscus Red
2	Fanas		2	Sadafuli	22	Exora
3	Bahunia		3	Coleus	23	Jatropha
4	Bottlebrush		4	Lily	24	Lagestromia
5	Amaltash		5	Jambhali Fule	25	Nikodia
6	Pangra		6	Lipomi	26	Lotus
7	Ghaikama		7	Lantena	27	Kanher
8	Silver Oak		8	Elius	28	Plumbago
9	Buch		9	Salvia	29	Pentas
10	Parijatak		10	Dosentus	30	Pachistachis
11	White Champa		11	Zebrina	31	Rose
12	Champa		12	Epilia	32	Rasulia
13	Spathodia		13	Duranta	33	Tagar
14	Ananta		14	Mogra	34	Dudhmogara
15	Tabibia		15	Erecta	35	Ticoma
16	Pam		16	Ratrani	36	Bigonia
			17	Croton	37	Jai
			18	Drecena	38	chameli
			19	Hemelia	39	Krishnakamal
			20	Hibiscus white		

ENVIRONMENTAL AUDIT REPORT

of

SHRI SANT GAJANAN MAHARAJ COLLEGE OF ENGINEERING,

Shegaon, Dist: Buldhana

Year: 2022-23

Prepared by

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411009
Phone: 09890444795, Email: engress123@gmail.com

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society, Near Muktangan English School,
Parvati, Pune 411 009 Tel: 09890444795 Email: engress123@gmail.com
MEDA Registration No: ECN/2022-23/CR-43/1709
ISO: 9001-2015 Certified (Cert No: 23EQKC13),
ISO: 14001-2015 Certified (Cert No: 23EEKW20)

ENVIRONMENTAL AUDIT CERTIFICATE

Certificate No: ES/SSGMCOE /22-23/03 **Date: 10/5/2023**

This is to certify that we have conducted Environmental Audit at Shri Sant Gajanan Maharaj College of Engineering, Shegaon in the year 2022-23.

The College has adopted following Environmental Friendly Practices:

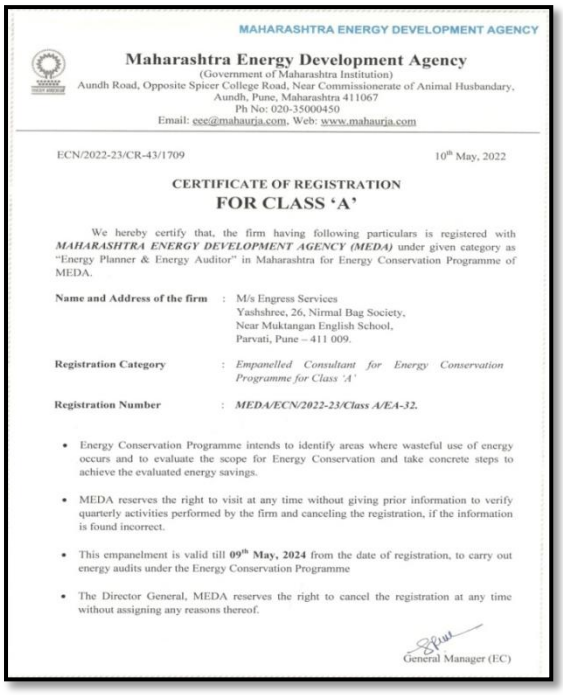
- Usage of Energy Efficient LED Fittings
- Installation of 310 kWp Roof Top Solar PV Plant
- Segregation of Waste at source
- Implementation of Vermi Composting Arrangement
- Provision of Sanitary Waste Incinerator, for disposal of Sanitary Waste
- Installation of 200 m^3/Day Sewage Treatment Plant
- Implementation of Rain Water Harvesting Project
- Internal Tree Plantation
- Creation of Awareness on Energy Conservation by Display of Posters
- Usage of E Vehicle for internal material transport

We appreciate the support of Management, involvement of faculty members and students in the process of Energy Conservation & making the campus Eco Friendly.

For Engress Services,

A Y Mehendale,
B E- Mech, M Tech-Energy, Certified Energy Auditor, EA-8192
ASSOCHAM GEM Certified Professional: GEM: 22/788

REGISTRATION CERTIFICATES



MAHARASHTRA ENERGY DEVELOPMENT AGENCY

Maharashtra Energy Development Agency
(Government of Maharashtra Institution)
Aundh Road, Opposite Spicer College Road, Near Commissionerate of Animal Husbandary, Aundh, Pune, Maharashtra 411067
Ph No: 020-35000450
Email: eee@mahaurja.com, Web: www.mahaurja.com

ECN/2022-23/CR-43/1709 — 10th May, 2022

CERTIFICATE OF REGISTRATION
FOR CLASS 'A'

We hereby certify that, the firm having following particulars is registered with ***MAHARASHTRA ENERGY DEVELOPMENT AGENCY (MEDA)*** under given category as "Energy Planner & Energy Auditor" in Maharashtra for Energy Conservation Programme of MEDA.

Name and Address of the firm : M/s Engress Services, Yashshree, 26, Nirmal Bag Society, Near Muktangan English School, Parvati, Pune – 411 009.

Registration Category : *Empanelled Consultant for Energy Conservation Programme for Class 'A'*

Registration Number : ***MEDA/ECN/2022-23/Class A/EA-32.***

- Energy Conservation Programme intends to identify areas where wasteful use of energy occurs and to evaluate the scope for Energy Conservation and take concrete steps to achieve the evaluated energy savings.
- MEDA reserves the right to visit at any time without giving prior information to verify quarterly activities performed by the firm and canceling the registration, if the information is found incorrect.
- This empanelment is valid till **09th May, 2024** from the date of registration, to carry out energy audits under the Energy Conservation Programme
- The Director General, MEDA reserves the right to cancel the registration at any time without assigning any reasons thereof.

General Manager (EC)

MEDA REGISTRATION CERTIFICATE

GEM Certificate

ASSOCHAM

ASSOCHAM hereby certifies that

Mr. A Y Mehendale

has successfully passed the
Green and Eco-friendly Movement Certified Professional Test (GEM CP)
with
"Excellent Performance"
on
06 June, 2022

He/she is now eligible to execute the GEM Sustainability Certification Projects.
ASSOCHAM feels proud to award the GEM Certified Professional title to him/her.

Pankaj R. Dharkar
Chairman, GEM

GEM CP 22/788

Deepak Sood
Secretary General, ASSOCHAM

ASSOCHAM GEM CP CERTIFICATE

Certificate of Registration

This is to Certify that
Quality Management System of

ENGRESS SERVICES

26, YASHASHREE, BLOCK 1, LOKMANYA NAGAR, NIRMAL BAUG SOC, PARVATI, PUNE- 411009, 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 & ENVIRONMENTAL AUDIT IN EDUCATIONAL INSTITUTIONS & SUBMISSION OF AUDIT CERTIFICATE AND REPORT.

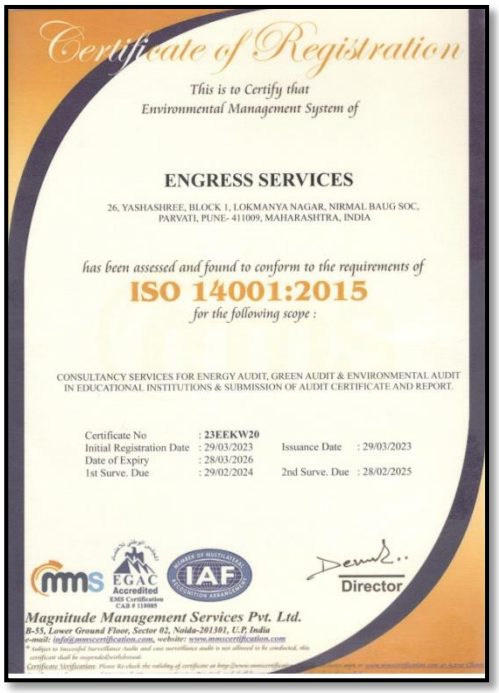
Certificate No : **23EQKC13**
Initial Registration Date : 27/03/2023 — Issuance Date : 27/03/2023
Date of Expiry : 26/03/2026
1st Surve. Due : 27/02/2024 — 2nd Surve. Due : 27/02/2025

mms EGAC Accredited QMS Certification CAB # 118005 — IAF

Director

Magnitude Management Services Pvt. Ltd.
B-55, Lower Ground Floor, Sector 02, Noida-201301, U.P. India

ISO: 9001-2015 CERTIFICATE



Certificate of Registration

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Environmental Management System of

ENGRESS SERVICES

26, YASHASHREE, BLOCK 1, LOKMANYA NAGAR, NIRMAL BAUG SOC, PARVATI, PUNE- 411009, 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 & ENVIRONMENTAL AUDIT IN EDUCATIONAL INSTITUTIONS & SUBMISSION OF AUDIT CERTIFICATE AND REPORT.

Certificate No : **23EEKW20**
Initial Registration Date : 29/03/2023 — Issuance Date : 29/03/2023
Date of Expiry : 28/03/2026
1st Surve. Due : 29/02/2024 — 2nd Surve. Due : 28/02/2025

mms EGAC Accredited EMS Certification CAB # 118005 — IAF

Director

Magnitude Management Services Pvt. Ltd.
B-55, Lower Ground Floor, Sector 02, Noida-201301, U.P. India

ISO: 14001-2015 CERTIFICATE

INDEX

ACKNOWLEDGEMENT

We at Engress Services, Pune, express our sincere gratitude to the management of Shri Sant Gajanan Maharaj College of Engineering, Shegaon for awarding us the assignment of Environmental Audit of their Shegaon campus for the Year: 2022-23.

We are thankful to all Staff members for helping us during the field study

EXECUTIVE SUMMARY

1. Shri Sant Gajanan Maharaj College of engineering, Shegaon consumes various resources for day to day operations, namely: Air, Water, and Electrical Energy.

2. Pollution caused due to Day to Day College Activities:

- **Air pollution:** Mainly CO_2 on account of Electricity & LPG Consumption
- **Solid Waste:** Bio degradable Kitchen Waste, Garden Waste
- **Liquid Waste:** Human liquid waste

3. Present Energy Consumption & CO_2 Emission:

No	Particulars	Value	Unit
1	Annual Energy Purchased	**721283**	kWh
2	Annual CO_2 Emissions	**649.15**	MT

4. Usage of Renewable Energy & Reduction in CO_2 Emission:

- The Institute has installed Roof Top Solar PV Plant of Capacity **310 kWp.**
- The Energy generated by Solar PV Plant in 22-23 is **413355 kWh**.
- Reduction in CO_2 Emissions in 22-23 is **372.02 MT**

5. Indoor Air Quality Parameters:

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	**61**	**37**	**44**
2	Minimum	**51**	**31**	**32**

6. Indoor Comfort Conditions:

No	Parameter/Value	Temperature, ^0C	Humidity, %	Lux Level	Noise Level, dB
1	Maximum	**27.5**	**73**	**123**	**45**
2	Minimum	**27.2**	**71.5**	**103**	**41**

7. Waste Management:

No	Head	Particulars
1	Solid Waste	Segregation of Waste at source
2	Organic Waste	Provision of Bio Composting Bed
3	Sanitary Waste	Provision of Sanitary Waste Incinerator

4	Liquid Waste	Provision of Sewage Treatment Plant
5	E Waste	Recommended to dispose of through Authorized Agency

8. Rain Water Harvesting:

The Institute has installed Pipes from the terrace and the Rain water falling on the terrace is stored in an underground Tank and is further used for domestic purpose after treatment.

9. Environment Friendly Initiatives:

- Tree Plantation in the campus.
- Creation of awareness on Energy Conservation Display of Posters
- Usage of E Vehicle in Campus

10. Assumption:

1. **1 kWh** of Electrical Energy releases **0.9 Kg** of **CO_2** into atmosphere

11. References:

- For CO_2 Emissions: www.tatapower.com
- For Various Indoor Air Parameters: www.ishrae.com
- For AQI Quality Standards: www.cpcb.com

ABBREVIATIONS

Kg	:	Kilo Gram
MSEDCL	:	Maharashtra State Distribution Company Limited
MT	:	Metric Ton
kWh	:	kilo-Watt Hour
LED	:	Light Emitting Diode
AQI	:	Air Quality Index
PM-2.5	:	Particulate Matter of Size 2.5 Micron
PM-10	:	Particulate Matter of Size 10 Micron
CPCB	:	Central Pollution Control Board
ISHRAE	:	The Indian Society of Heating & Refrigerating & Air Conditioning Engineers

CHAPTER-I
INTRODUCTION

1. Important Definitions:

1.1. Environment: Definition as per environment Protection Act: 1986

Environment includes water, air and land and the inter-relationship which exists among and between Water, Air, Land and Human beings, other living creatures, plants microorganism and property

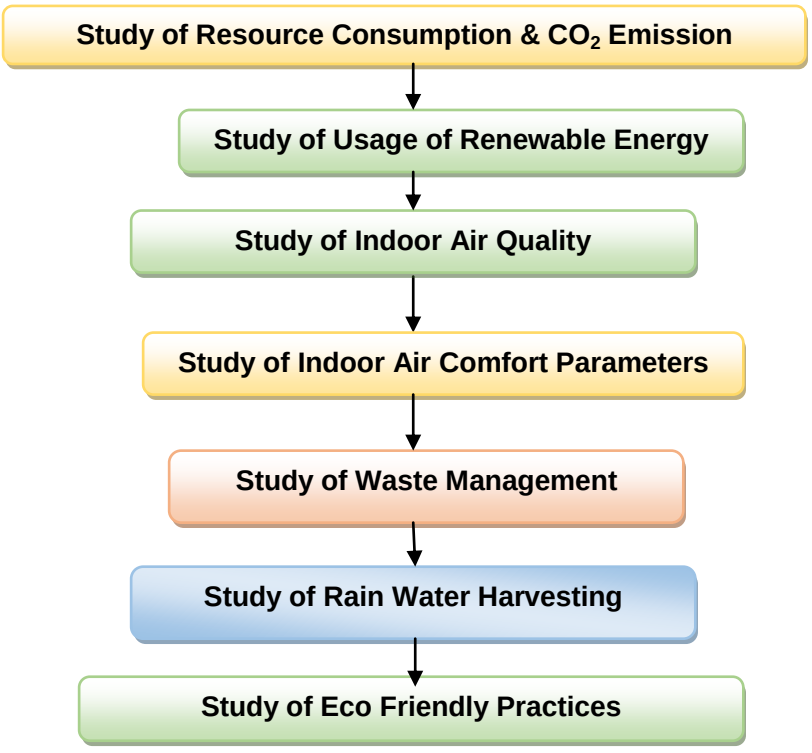
1.2. Environmental Audit: Definition:

An audit which aims at verification and validation to ensure that various environmental laws are compiled with and adequate care has been taken towards environmental protection and preservation

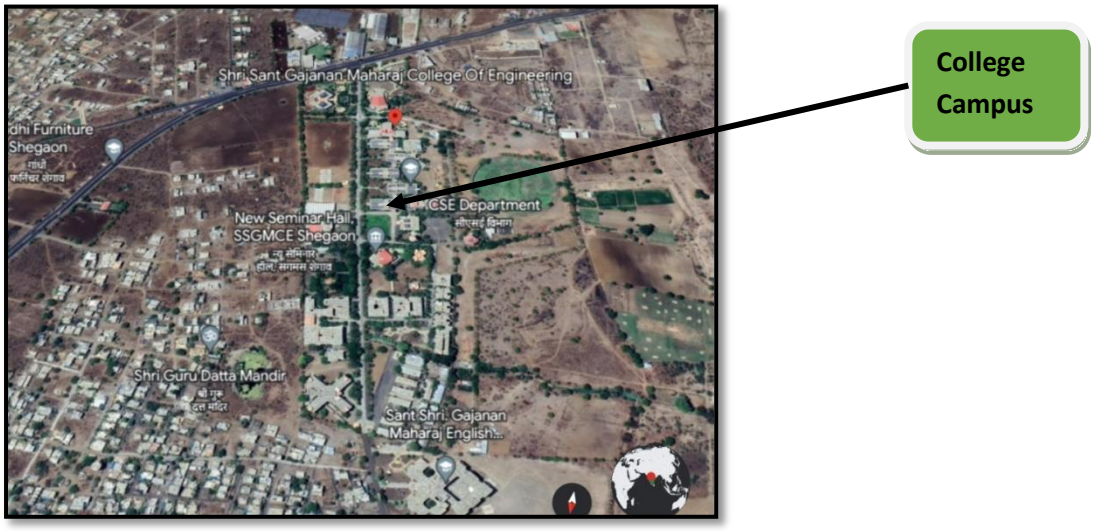
According to UNEP, 1990, "Environmental audit can be defined as a management tool comprising systematic, documented and periodic evaluation of how well environmental organization management and equipment are performing with an aim of helping to regularize the environment

1.3. Environmental Pollutant: means any solid, liquid and gaseous substance present in the concentration as may be, or tend to be, injurious to Environment.

1.4 Audit Procedural Steps:



1.5 Google Earth Image:

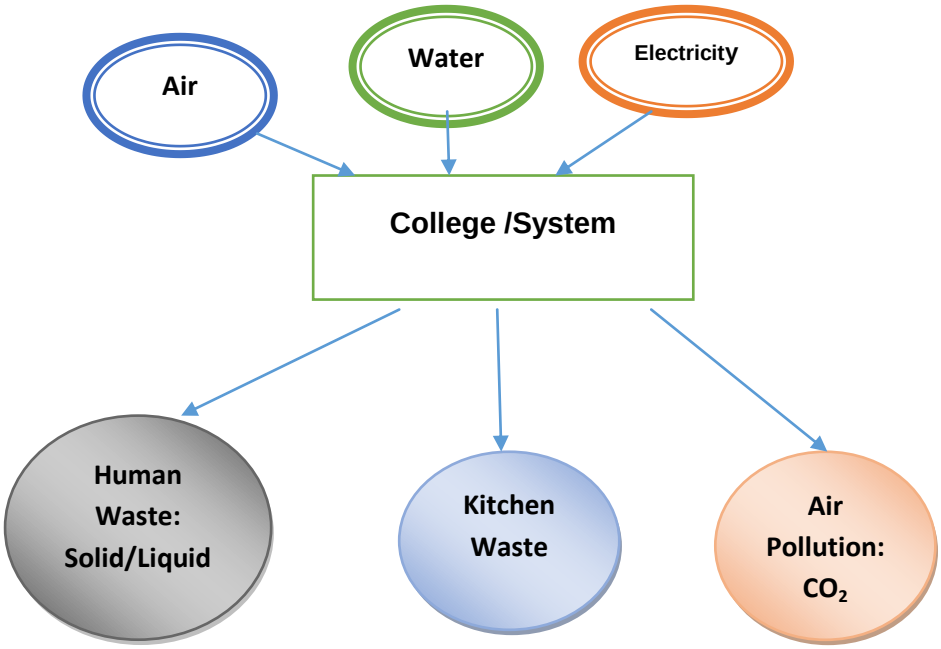


CHAPTER-II
STUDY OF RECOURCE CONSUMPTION & CO_2 EMISSION

The Institute consumes following basic/derived Resources:

1. Air
2. Water
3. Electrical Energy

We try to draw a schematic diagram for the College System & Environment as under.



Now we compute the Generation of CO2 on account of consumption of Electrical Energy as under.

Table No 1: Electrical Energy Consumption & CO_2 Emission: 22-23:

No	Month	Energy Generated ,kWh	Energy Purchased kWh	Energy Exported, kWh	Net Energy Consumed, kWh	CO_2 Emissions, MT
1	Apr-22	41888	84810	3305	123393	76.33
2	May-22	39364	97535	1330	135569	87.78
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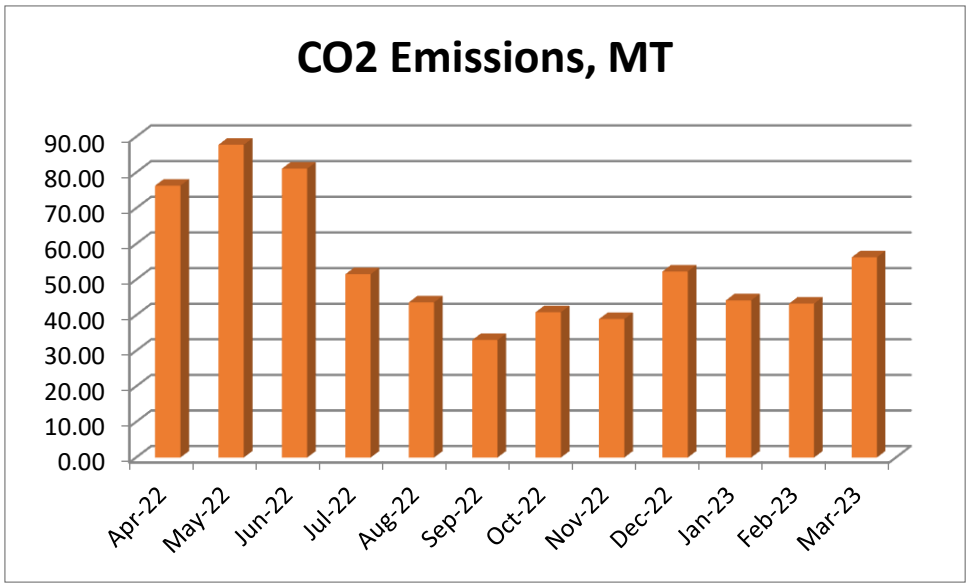
12	Mar-23	38653	62520	6780	94393	56.27
13	**Total**	**413355**	**721283**	**54980**	**1079658**	**649.15**

Chart No 2: To study the variation of Monthly CO_2 Emission:



CHAPTER-III
STUDY OF USAGE OF RENEWABLE ENERGY

In this Chapter, we present the Usage of Renewable Energy.

The College has installed a Roof Top Solar PV Plant of Capacity **310 kWp**.
Now we present the Reduction in CO_2 Emissions due to Solar PV Plant, as under.

Table No 2: Computation of Reduction in Annual CO_2 Emissions, MT:

No	Particulars	Value	Unit
1	Installed Capacity of Roof Top Solar PV Plant Capacity	310	kWp
2	Energy generated in 2022-23	413355	kWh
3	1 kWh of Electrical Energy saves	**0.9**	Kg/kWh
4	**Qty of CO_2 Saved by Solar PV Plant =(2)*(3) /1000**	**372.02**	**MT of CO_2**

Photograph of Solar PV Plant:

CHAPTER IV
STUDY OF INDOOR AIR QUALITY

4.1 Importance of Air Quality:

Air: The common name given to the atmospheric gases used in breathing and photosynthesis.

By volume, Dry Air contains 78.09% Nitrogen, 20.95% Oxygen, 0.93% Argon, 0.039% carbon dioxide, and small amounts of other gases.

On average, a person inhales about **14,000 liters** of air every day. Therefore, poor air quality may affect the quality of life now and for future generations by affecting the health, the environment, the economy and the city's livability.

Air quality is a measure of the suitability of air for breathing by people, plants and animals.

According to Section 2(b) of Air (Prevention and control of pollution) Act, 1981 '**air pollution**' has been defined as **'the presence in the atmosphere of any air pollutant**.'

As per Section 2(a) of Air (Prevention and control of pollution) Act, 1981 '**air pollutant**' has been defined as **'any solid, liquid or gaseous substance [(including noise)] present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment**

4.2 Air Quality Index:

An **Air Quality Index (AQI)** is a number used by government agencies to measure the **air pollution** levels and communicate it to the population.

We present herewith following important Parameters.

1. AQI- Air Quality Index
2. PM 2.5- Particulate Matter of Size 2.5 micron
3. PM 2.5- Particulate Matter of Size 10 micron

Table No 3: Indoor Air Quality Parameters:

No	Location	AQI	PM-2.5	PM-10
1	HOD-E & TC Engg	61	37	44
2	HOD-Electrical Engg	60	36	38
3	HOD-Mech Engg	51	31	32
4	Lecture Hall (Comp.)	55	33	44
5	Central Library	53	32	42
6	Lecture Hall (Mech.)	56	34	38
	Maximum	**61**	**37**	**44**
	Minimum	**51**	**31**	**32**

CHAPTER V
STUDY OF INDOOR COMFORT CONDITION

In this Chapter, we present the various Indoor Comfort Parameters measured during the Audit.
The Parameters include:

1. Temperature
2. Humidity
3. Lux Level
4. Noise Level.

Table No 4: Study of Indoor Comfort Parameters:

No	Location	Temperature, ^{0}C	Humidity, %	Lux Level	Noise Level, dB
1	HOD-E & TC Engg	27.5	72	114	42.9
2	HOD-Electrical Engg	27.2	72.1	103	44
3	HOD-Mech Engg	27.4	72	115	45
4	Lecture Hall (Comp.)	27.3	73	123	41.9
5	Central Library	27.5	71.5	117	41
6	Lecture Hall (Mech.)	27.5	72	120	45
	Maximum	**27.5**	**73**	**123**	**45**
	Minimum	**27.2**	**71.5**	**103**	**41**

CHAPTER VI
STUDY OF WASTE MANAGEMENT

6.1 Segregation of Waste at Source:

The Institute has good housekeeping practices. The Waste is segregated at source. Waste collection Bins are placed at strategic locations.

Photograph of Waste Collection Bin:

6.2 Organic Waste Management:

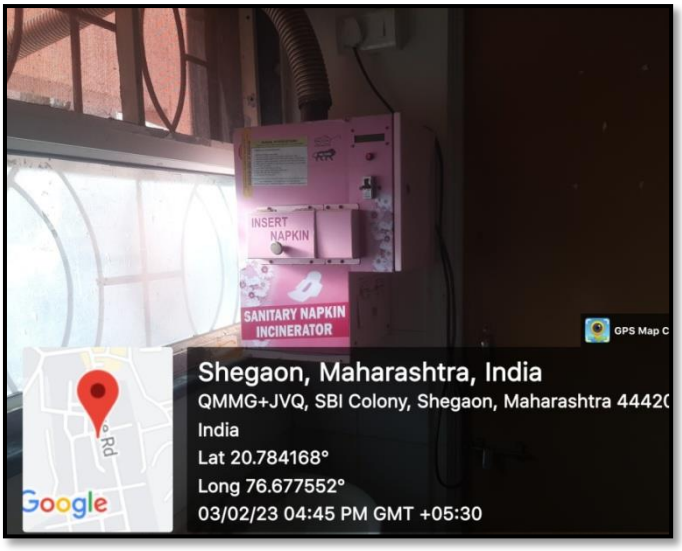
The College has a Bio composting Bed Arrangement, to convert the Bio Degradable Waste, like, Leafy Waste into Bio Compost.

Photograph of Bio Composting Bed Arrangement:

6.3 Sanitary Waste Management:

The Institute has installed a Sanitary Waste Incinerator to dispose of the Sanitary Waste.

Photograph of Sanitary Waste Incinerator:



6.4 Liquid Waste Management:

The College has installed a 200 m^3/Day Capacity Sewage Treatment plant. The treated water is used for Gardening purpose.

Photograph of Sewage Treatment Plant:

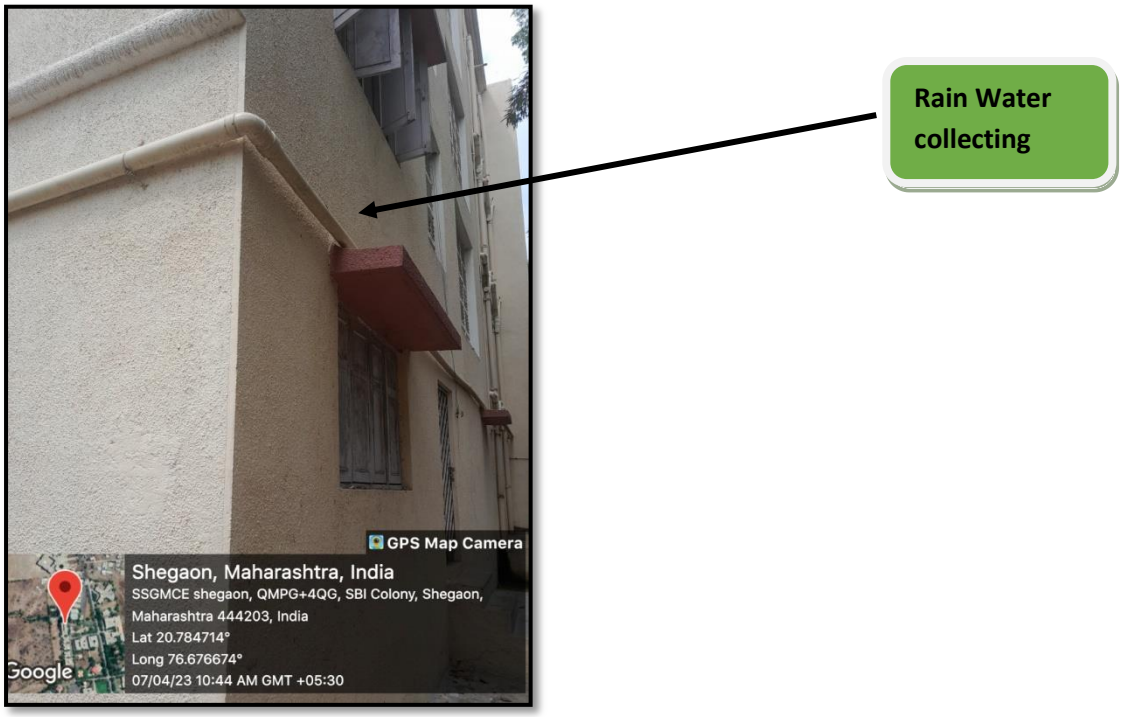
6.5 E Waste Management:

It is recommended to dispose of the E Waste through Authorized Agency

CHAPTER-VII
STUDY OF RAIN WATER HARVESTING

The College has already installed Rain Water Harvesting project, wherein the rain water falling on the terrace is collected and through pipes it is gathered in an underground Water Storage tank. This water is then treated and further used for domestic purpose.

Photograph of Rain Water Carrying Pipe:

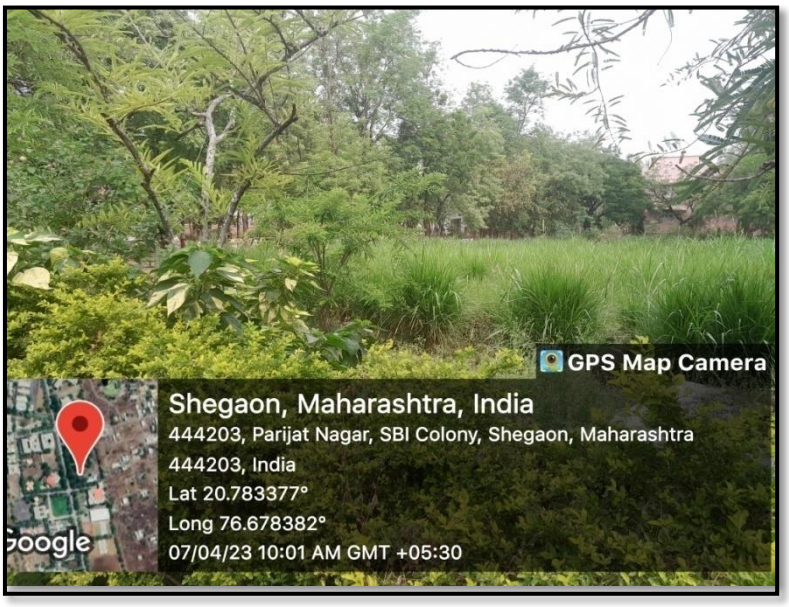


CHAPTER-VIII
STUDY OF ECO FRIENDLY INITIATIVES

8.1 Tree Plantation:

The Institute has well Tree Plantation in the campus.

Photograph of Garden/Tree plantation in the campus:



8.2 Creation of Awareness about Energy Conservation:

The Institute has displayed posters emphasizing on importance of Energy Conservation.

Photograph of Poster on Energy Conservation:

8.3 Provision of E Vehicle:

For internal material transport, E Vehicle is used.

Photograph of E Vehicle:

ANNEXURE-I:
AIR QUALITY, NOISE & INDOOR COMFORT STANDARDS:

1. Category Wise Air Quality Index Values & Concentration of PM 2.5 & PM10:

No	Category	AQI Value	Concentration Range, PM 2.5	Concentration Range, PM 10
1	Good	0 to 50	0 to 30	0 to 50
2	Satisfactory	51 to 100	31 to 60	51 to 100
3	Moderately Polluted	101 to 200	61 to 90	101 to 250
4	Poor	201 to 300	91 to 120	251 to 350
5	Very Poor	301 to 400	121 to 250	351 to 430
6	Severe	401 to 500	250 +	430 +

2. Recommended Noise Level Standards:

No	Location	Noise Level dB
1	Auditoriums	20-25
2	Outdoor Playground	55
3	Occupied Class Room	40-45
4	Un occupied Class Room	35
5	Apartment, Homes	35-40
6	Offices	45-50
7	Libraries	35-40
8	Restaurants	50-55

3. Thermal Comfort Conditions: For Non-conditioned Buildings:

No	Parameter	Value
1	Temperature	Less Than 33^0C
2	Humidity	Less Than 70%

ENERGY AUDIT REPORT

of

SHRI SANT GAJANAN MAHARAJ COLLEGE OF ENGINEERING,

Shegaon, Dist: Buldhana

Year: 2021-22

Prepared by:

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411009
Phone: 09890444795, Email: engress123@gmail.com

MAHARASHTRA ENERGY DEVELOPMENT AGENCY

Maharashtra Energy Development Agency

(Government of Maharashtra Institution)
Aundh Road, Opposite Spicer College Road, Near Commissionerate of Animal Husbandary,
Aundh, Pune, Maharashtra 411067
Ph No: 020-35000450
Email: eee@mahaurja.com, Web: www.mahaurja.com

ECN/2022-23/CR-43/1709 — 10th May, 2022

CERTIFICATE OF REGISTRATION
FOR CLASS 'A'

We hereby certify that, the firm having following particulars is registered with ***MAHARASHTRA ENERGY DEVELOPMENT AGENCY (MEDA)*** under given category as "Energy Planner & Energy Auditor" in Maharashtra for Energy Conservation Programme of MEDA.

Name and Address of the firm : M/s Engress Services
Yashshree, 26, Nirmal Bag Society,
Near Muktangan English School,
Parvati, Pune – 411 009.

Registration Category : *Empanelled Consultant for Energy Conservation Programme for Class 'A'*

Registration Number : ***MEDA/ECN/2022-23/Class A/EA-32.***

- Energy Conservation Programme intends to identify areas where wasteful use of energy occurs and to evaluate the scope for Energy Conservation and take concrete steps to achieve the evaluated energy savings.
- MEDA reserves the right to visit at any time without giving prior information to verify quarterly activities performed by the firm and canceling the registration, if the information is found incorrect.
- This empanelment is valid till **09th May, 2024** from the date of registration, to carry out energy audits under the Energy Conservation Programme
- The Director General, MEDA reserves the right to cancel the registration at any time without assigning any reasons thereof.

General Manager (EC)

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411 009
Tel: 09890444795 Email: engress123@gmail.com

Ref: ES/SSGMCOE/21-22/01 Date: 22/6/2022

CERTIFICATE

The College has adopted following Energy Efficient Practices:

- Usage of Energy Efficient LED Fittings
- Usage of Energy Efficient BEE STAR Rated equipment
- Maximum usage of Day Lighting
- Installation of 310 kWp Roof Top Solar PV Plant

We appreciate the support of Management, involvement of faculty members and students in the process of Energy Conservation & making the campus Green.

For Engress Services,

A Y Mehendale,
Certified Energy Auditor
EA-8192

INDEX

ACKNOWLEDGEMENT

We at Engress Services, Pune, express our sincere gratitude to the management of Shri Sant Gajanan Maharaj College of Engineering, Shegaon for awarding us the assignment of Energy Audit of their Shegaon Campus for the Year: 2021-22.

We are thankful to all Staff members for helping us during the field study.

EXECUTIVE SUMMARY

1. Shri Sant Gajanan Maharaj College of Engineering, Shegaon consumes Energy in the form of **Electrical Energy;** used for various gadgets, Office & other facilities.

2. Present Energy Consumption & CO_2 Emission:

No	Parameter /Value	Energy Generated, kWh=(1)	Energy Purchased, kWh=(2)	Energy Exported, kWh=(3)	Net Energy Consumed, kWh=(1+2-3)	CO_2 Emissions, MT
1	Total	328262	444676	89209	683729	615.36
2	Maximum	38252	71525	11733	105432	94.89
3	Minimum	17511	26603	3203	43149	38.83
4	Average	27355.17	37056.33	7434.08	56977.4	51.28

3. Energy Conservation Projects Already Installed:

1. Installation of 310 kWp Roof Top Solar PV Plant
2. Use of Auto Timers for outdoor lighting
3. Usage of Water Level Controllers

4. Usage of Alternate Energy:

- The College has installed a **310 kWp** Roof Top Solar PV Plant.
- The Energy generated by Solar PV Plant in 21-22 is **328262 kWh**
- The Energy Exported is **89209 kWh**
- Energy purchased from MSEDCL is **444676 kWh**
- The Net Energy Demand in 21-22 is **512180 kWh**
- The percentage of Alternate Energy usage to Annual Energy Demand is **48 %.**

5. Usage of LED Lighting:

- The LED Lighting Load is **21.4 kW**
- The Total Lighting Load is **86.4 kW**
- The percentage of usage of LED lights to Total Lighting Load is **24.77 %.**

6. Assumption:

- **1 kWh** of Electrical Energy releases **0.9 Kg of CO_2** into atmosphere

7. Reference:

- For CO_2 Emissions: www.tatasolar.com

ABBREVIATIONS

CFL	:	Compact Fluorescent Lamp
CO_2	:	Carbon- Di- Oxide
FTL	:	Fluorescent Tube Light
LED	:	Light Emitting Diode
kW	:	Kilo- Watt
kWh	:	kilo-Watt Hour
MT	:	Metric Ton
P V	:	Photo Voltaic

CHAPTER-I
INTRODUCTION

11.1 Objectives:

1. To study present Connected Load
2. To study present Energy Consumption
3. To Study the present CO_2 emissions
4. To study usage of Renewable Energy
5. To study usage of LED Lighting

1.2 General Details of Institute: Table No-1:

No	Head	Particulars
1	Name of Institute	Shri Sant Gajanan Maharaj College of Engineering
2	Address	Shegaon, Dist: Buldhana
3	Year of Establishment	1983

1.3 Google Earth Location Image:

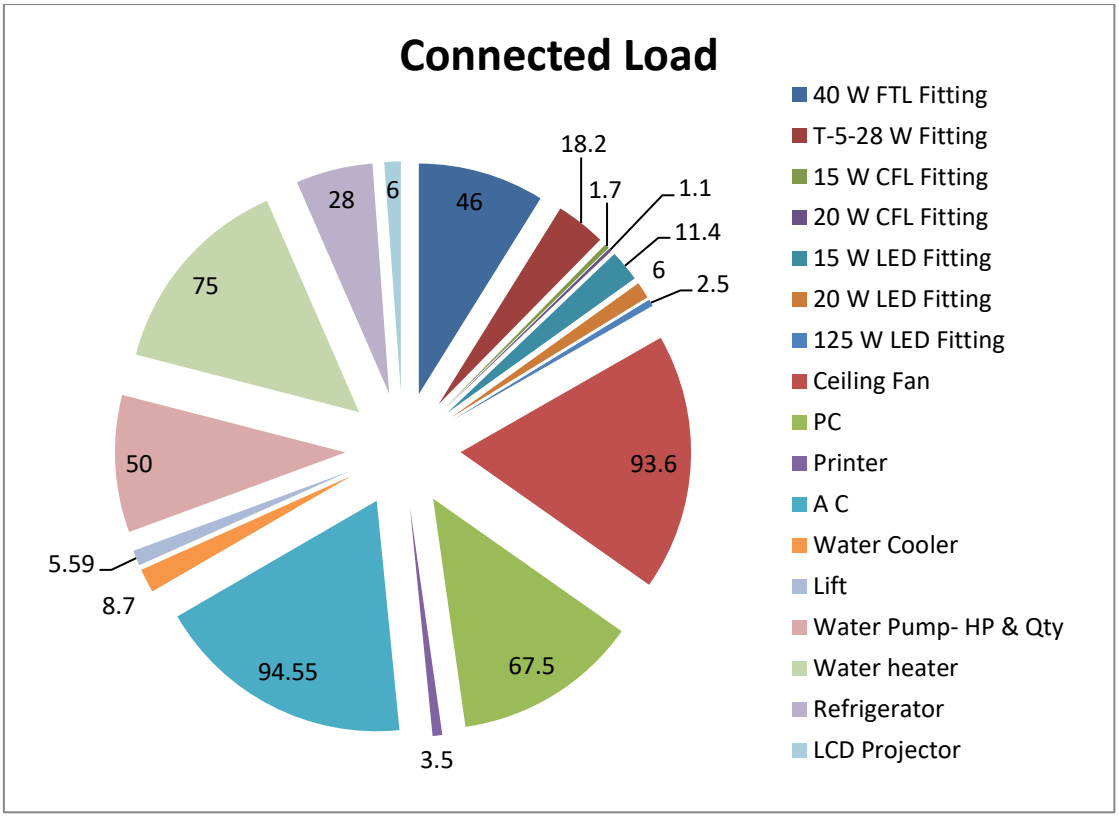
CHAPTER-II
STUDY OF CONNECTED LOAD

In this chapter, we present the details of various Electrical loads as under

Table No: 2: Study of Equipment wise Connected Load:

No	Equipment	Quantity	Load, W, Unit	Load, kW
1	40 W FTL Fitting	1150	40	46
2	T-5-28 W Fitting	650	28	18.2
3	15 W CFL Fitting	100	17	1.7
4	20 W CFL Fitting	50	22	1.1
5	15 W LED Fitting	760	15	11.4
6	20 W LED Fitting	300	20	6
7	125 W LED Fitting	20	125	2.5
8	Ceiling Fan	1560	60	93.6
9	PC	450	150	67.5
10	Printer	20	175	3.5
11	A C	61	1550	94.55
12	Water Cooler	29	300	8.7
13	Lift	1	5595	5.60
14	Water Pump- HP & Qty	25	2000	50
15	Water heater	50	1500	75
16	Refrigerator	80	350	28
17	LCD Projector	40	150	6
18	**Total**			**519.35**

In the following Table, we present the same in a PIE Chart
Chart No 1: Total Connected Load:



CHAPTER-III
STUDY OF PRESENT ENERGY CONSUMPTION

In this chapter, we present the analysis of last year Electricity Bills.

Table No- 3: Electrical Energy Analysis- 2021-22:

No	Month	Energy Generated, kWh=A	Energy Purchased kWh=B	Energy Exported, kWh=C	Net Energy Consumed= A+B-C
1	Apr-21	29522	26603	11733	44392
2	May-21	30313	30185	11478	49020
3	Jun-21	23972	27240	8063	43149
4	Jul-21	24231	29985	6721	47495
5	Aug-21	26546	28633	9333	45846
6	Sep-21	17511	31203	4068	44646
7	Oct-21	28342	29273	9248	48367
8	Nov-21	26011	39135	6016	59130
9	Dec-21	24127	47533	3203	68457
10	Jan-22	29970	36540	9808	56702
11	Feb-22	29465	46821	5193	71093
12	Mar-22	38252	71525	4345	105432
13	Total	328262	444676	89209	683729
14	Maximum	38252	71525	11733	105432
15	Minimum	17511	26603	3203	43149
16	Average	27355.17	37056.33	7434.08	56977.4

In the following Chart we present the above Data of Energy Consumption.

Chart No-2: Month wise Variation in Energy Consumption, kWh:

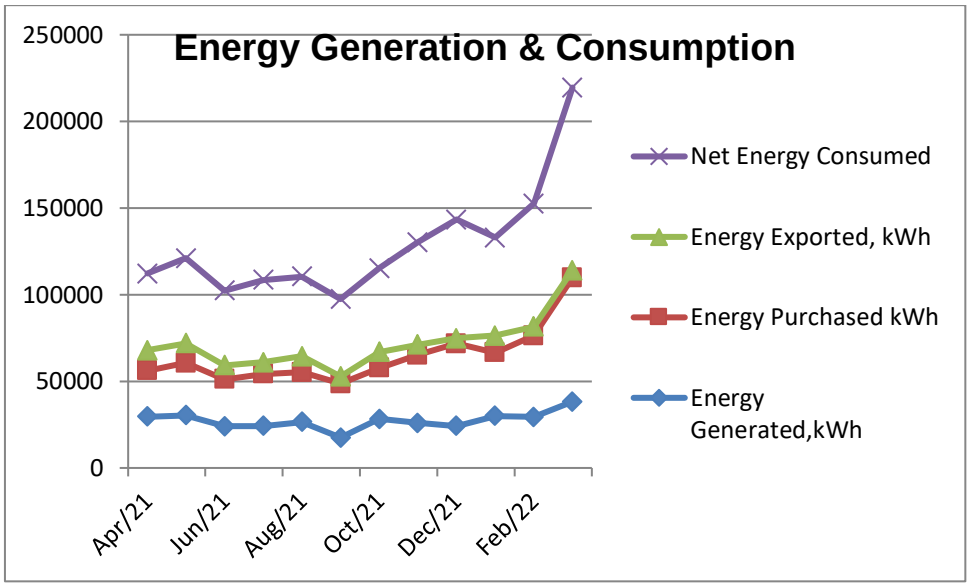


Table No-4: Important Parameters:

No	Parameter /Value	Energy Generated,	Energy Purchased,	Energy Exported,	Net Energy Consumed,

		kWh=(1)	kWh=(2)	kWh=(3)	kWh=(1+2-3)
1	Total	328262	444676	89209	683729
2	Maximum	38252	71525	11733	105432
3	Minimum	17511	26603	3203	43149
4	Average	27355.17	37056.33	7434.08	56977.4

CHAPTER-IV
CARBON FOOT PRINTING

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

Basis for computation of CO_2 Emissions:

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

- 1 Unit (kWh) of Electrical Energy releases **0.9 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

Table No 5 : Month wise CO_2 Emissions:

No	Month	Energy Consumed, kWh	CO_2 Emissions, MT
1	Apr-21	44392	39.95
2	May-21	49020	44.12
3	Jun-21	43149	38.83
4	Jul-21	47495	42.75
5	Aug-21	45846	41.26
6	Sep-21	44646	40.18
7	Oct-21	48367	43.53
8	Nov-21	59130	53.22
9	Dec-21	68457	61.61
10	Jan-22	56702	51.03
11	Feb-22	71093	63.98
12	Mar-22	105432	94.89
13	Total	683729	615.36
14	Maximum	105432	94.89
15	Minimum	43149	38.83
16	Average	56977.4	51.28

Chart No 3: Representation of Month wise CO_2 Emissions:

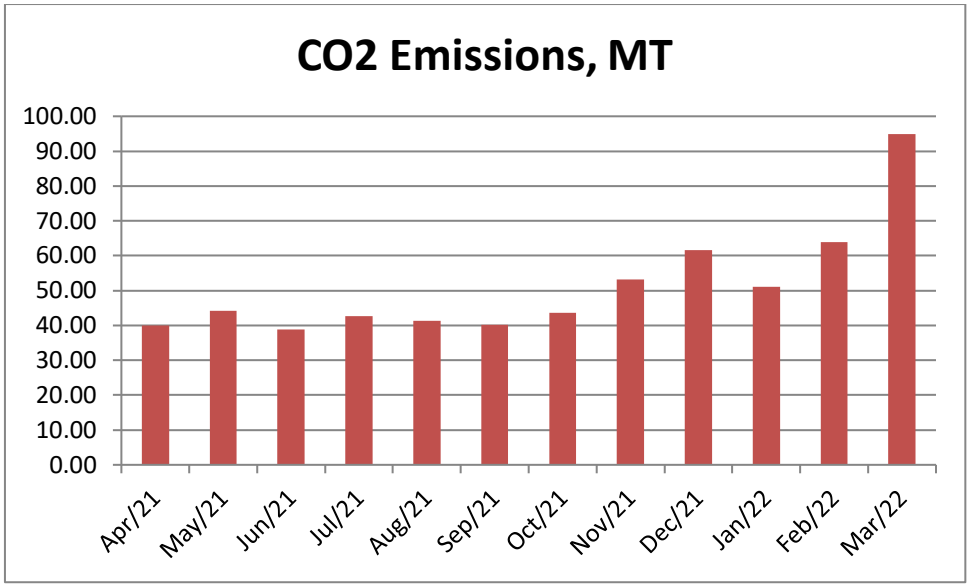


Table No-6: Various Important Parameters:

No	Parameter /Value	Energy Consumed, kWh	CO2 Emissions, MT
1	Total	683729	615.36
2	Maximum	105432	94.89
3	Minimum	43149	38.83
4	Average	56977.4	51.28

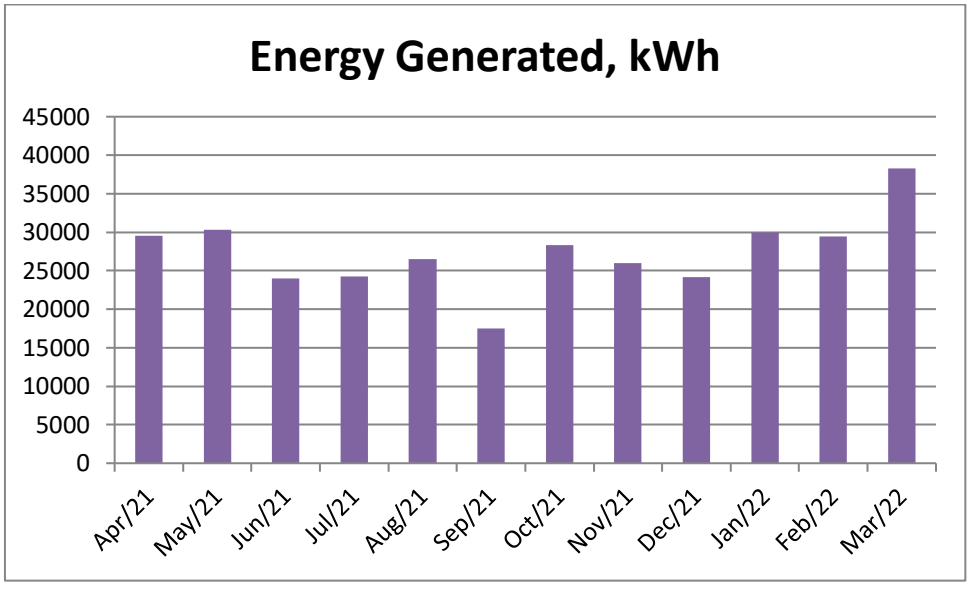
CHAPTER-V
STUDY OF USAGE OF ALTERNATE ENERGY

In this Chapter, we present the Usage of Alternate Energy.
The College has installed a Roof Top Solar PV Plant of Capacity **310 kWp**.
In the following Table, we present the Energy Generation Data.

Table No 7: Study of Month wise Energy Generation by 310 kWp Solar PV Plant:

No	Month	Energy Generated, kWh
1	Apr-21	29522
2	May-21	30313
3	Jun-21	23972
4	Jul-21	24231
5	Aug-21	26546
6	Sep-21	17511
7	Oct-21	28342
8	Nov-21	26011
9	Dec-21	24127
10	Jan-22	29970
11	Feb-22	29465
12	Mar-22	38252
13	Total	328262
14	Maximum	38252
15	Minimum	17511
16	Average	27355.17

Now we present the percentage of Usage of Alternate Energy, as under.
Chart No 4: Mont wise Generation of Solar Energy:



Now we present the percentage of Usage of Alternate Energy, as under.

Table No 8: Computation of Usage of Alternate Energy:

No	Particulars	Value	Unit
1	Total Energy Purchased from MSEDCL	444676	kWh
2	Energy Generated by Solar PV Plant	**328262**	kWh
3	Energy Exported, kWh	89209	kWh
4	Net Energy Consumed =**1+2-3**	**683729**	kWh
4	Percentage of Usage of Alternate Energy =(2)*100/(3)	**48**	%

Photograph of Solar PV Plant:

CHAPTER-VI
STUDY OF USAGE OF LED LIGHTING

In this Chapter we present the percentage of usage of LED Lights.

Table No 9: Computation of % of LEDs to Total Lighting Load:

No	Particulars	Value	Unit
1	Qty of 40 W FTL Fitting	1100	Nos
2	Load/Unit of 40 W FTL Fitting	40	W
3	Total load of 40 W FTL Fittings	**44**	kW
4	Qty of 28 W T-5 Fitting	650	Nos
5	Load/Unit of 28 W T-5 Fitting	28	W
6	Total load of 28 W T-5 Fittings	**18.2**	kW
7	Qty of 15 W CFL Fitting	100	Nos
8	Load/unit of 15 W CFL Fitting	17	W
9	Total load of 15 W CFL Fittings	**1.7**	kW
10	Qty of 20 W CFL Fitting	50	Nos
11	Load/unit of 20 W CFL Fitting	22	W
12	Total load of 20 W CFL Fittings	**1.1**	kW
13	Qty of 15 W LED Fitting	760	Nos
14	Load/unit of 15 W LED Fitting	15	W
15	Total load of 15 W LED Fittings	**11.4**	kW
16	Qty of 20 W LED Fitting	350	Nos
17	Load/unit of 20 W LED Fitting	20	W
18	Total load of 20 W LED Fittings	**7**	kW
19	Qty of 125 W LED Fitting	20	Nos
20	Load/unit of 125 W LED Fitting	125	W
21	Total load of 125 W LED Fittings	**3**	kW
22	Total LED Lighting Load= 15+18+21	**21.4**	kW
23	Total Lighting Load= 3+6+9+12+ 15+18+21	**86.4**	kW
24	% of Usage of LEDs to Total Lighting Load=**22*100/23**	**24.77**	%

GREEN AUDIT REPORT

of

SHRI SANT GAJANAN MAHARAJ COLLEGE OF ENGINEERING,

Shegaon, Dist: Buldhana

Year: 2021-22

Prepared by

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411009
Phone: 09890444795, Email: engress123@gmail.com

MAHARASHTRA ENERGY DEVELOPMENT AGENCY

Maharashtra Energy Development Agency
(Government of Maharashtra Institution)
Aundh Road, Opposite Spicer College Road, Near Commissionerate of Animal Husbandary,
Aundh, Pune, Maharashtra 411067
Ph No: 020-35000450
Email: eee@mahaurja.com, Web: www.mahaurja.com

ECN/2021-22/CR-43/441 — 8th February, 2022

CERTIFICATE OF REGISTRATION
FOR CLASS 'B'

We hereby certify that, the firm having following particulars is registered with ***MAHARASHTRA ENERGY DEVELOPMENT AGENCY (MEDA)*** under given category as "Energy Planner & Energy Auditor" in Maharashtra for Energy Conservation Programme of MEDA.

Name and Address of the firm : M/s Engress Services
Yashshree, 26, Nirmal Bag Society,
Near Muktangan English School,
Parvati, Pune – 411 009.

Registration Category : *Empanelled Consultant for Energy Conservation Programme for Class 'B'*

Registration Number : ***MEDA/ECN/2021-22/Class B/EA-07.***

- Energy Conservation Programme intends to identify areas where wasteful use of energy occurs and to evaluate the scope for Energy Conservation and take concrete steps to achieve the evaluated energy savings.
- MEDA reserves the right to visit at any time without giving prior information to verify quarterly activities performed by the firm and canceling the registration, if the information is found incorrect.
- This empanelment is valid till **7th February, 2024** from the date of registration, to carry out energy audits under the Energy Conservation Programme
- The Director General, MEDA reserves the right to cancel the registration at any time without assigning any reasons thereof.

08/02/22
General Manager (EC)

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411 009
Tel: 09890444795 Email: engress123@gmail.com

Ref: ES/SSGMCOE/02 Date: 22/6/2022

CERTIFICATE

This is to certify that we have conducted Green Audit at Shri Sant Gajanan Maharaj College of Engineering, Shegaon, in the year 2021-22.

The College has adopted following Green Practices:

- Usage of Energy Efficient LED Fittings
- Installation of 310 kWp Roof Top Solar PV Plant
- Segregation of Waste at source
- Implementation of Vermi Composting Arrangement
- Installation of 200 m^3/Day Sewage Treatment Plant
- Provision of Sanitary Waste Incinerator, for disposal of Sanitary Waste
- Implementation of Rain Water Harvesting Project
- Good Internal Road
- Internal Tree Plantation
- Provision of Ramp for Divyangajan
- Usage of E Vehicle for internal material transport

We appreciate the support of Management, involvement of faculty members and students in the process of Energy Conservation & making the campus Green.

For Engress Services,

A Y Mehendale,
Certified Energy Auditor, EA-8192
ASSOCHAM GEM Certified Professional: GEM: 22/788

INDEX

ACKNOWLEDGEMENT

We at Engress Services, Pune, express our sincere gratitude to the management of Shri Sant Gajanan Maharaj College of Engineering, Shegaon for awarding us the assignment of carrying out Green Audit of their Shegaon campus for the Year: 2021-22.

We are thankful to all Staff members for helping us during the field study

EXECUTIVE SUMMARY

2. Present Energy Consumption & CO_2 Emission:

No	Parameter/ Value	Energy Consumed, kWh	CO_2 Emissions, MT
1	Total	683729	615.36
2	Maximum	105432	94.89
3	Minimum	43149	38.83
4	Average	56977.4	51.28

3. Projects already implemented for Energy Conservation:

- Installation of 310 kWp Roof Top Solar PV Plant
- Installation of Rain Water Harvesting System
- Installation of 200 m^3/Day Sewage Treatment Plant

4. Usage of Renewable Energy:

- The College has installed Roof Top Solar PV Plant of Capacity **310 kW.**
- Energy generated in Year: 21-22 is **328262 kWh**
- The Reduction in CO_2 Emissions in 21-22 is **295.44 MT.**

5. Waste Management:

5.1 Segregation of Waste at source:

The waste is segregated at source. At all important locations, waste bins are kept to collect the Waste.

5.2 Organic Waste Management:

The College has a Bio composting Arrangement, to convert the Bio Degradable Waste, like, Leafy Waste into Bio Compost.

5.3 Liquid Waste Management:

The College has installed a 200 m^3/Day Capacity Sewage Treatment plant. The treated water is used for Gardening purpose.

5.4 Sanitary Waste Management:

The College has installed a Sanitary Waste Incinerator, for disposal of Sanitary Waste.

5.5 E Waste Management:

It is recommended to dispose of the E Waste through Authorized Agency

6. Rain Water Harvesting:

The College has installed the Rainwater harvesting project. The Rain Water falling on the terrace at the Hostel block is collected through pipes and is stored in a well. It is further used for gardening purpose.

7. Green & Sustainable Initiatives:

- Good Internal Roads
- Internal Tree Plantation
- Provision of Ramp for Divyangajan
- Provision of E Vehicle for internal Material transport

8. Assumption:

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

9. Reference:

- For CO_2 Emissions: www.tatasolar.com

ABBREVIATIONS

Kg : Kilo Gram

MSEDCL	:	Maharashtra State Distribution Company Limited
MT	:	Metric Ton
kWh	:	kilo-Watt Hour
LED	:	Light Emitting Diode

CHAPTER-I
INTRODUCTION

1.1 Objectives:

1. Study of Electrical Energy Consumption
2. Study of CO2 emissions
3. Study of Waste Management practices
4. Study of Rain Water Harvesting
5. Study of Green Practices

1.2 General Details of College: Table No 1:

No	Head	Particulars
1	Name of Institute	Shri Sant Gajanan Maharaj College of Engineering
2	Address	Shegaon, Dist: Buldhana
3	Year of Establishment	1983

1.3 Google Earth Location Image:

CHAPTER-II
STUDY OF PRESENT ENERGY CONSUMPTION

In this chapter, we present the analysis of last year Electricity Bills

Table No. 2: Energy Consumption Analysis: 21-22:

No	Month	Energy Generated, kWh=A	Energy Purchased kWh=B	Energy Exported, kWh=C	Net Energy Consumed= A+B-C
1	Apr-21	29522	26603	11733	44392
2	May-21	30313	30185	11478	49020
3	Jun-21	23972	27240	8063	43149
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14	Maximum	38252	71525	11733	105432
15	Minimum	17511	26603	3203	43149
16	Average	27355.17	37056.33	7434.08	56977.4

Chart No 1: To study the variation of Monthly Energy Consumption:

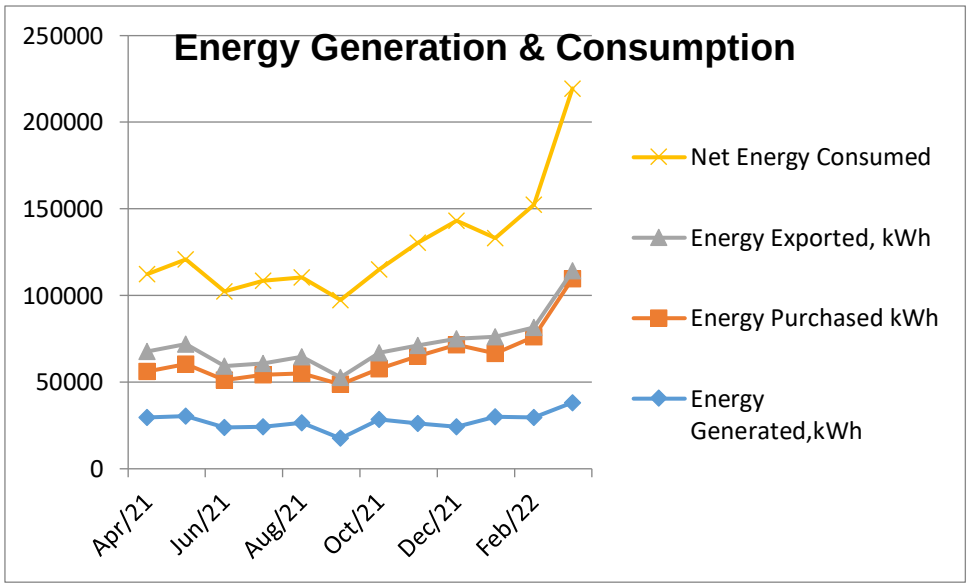


Table No-3: Important Parameters:

No	Parameter /Value	Energy Generated, kWh=(1)	Energy Purchased, kWh=(2)	Energy Exported, kWh=(3)	Net Energy Consumed, kWh=(1+2-3)
1	Total	328262	444676	89209	683729
2	Maximum	38252	71525	11733	105432

3	Minimum	17511	26603	3203	43149
4	Average	27355.17	37056.33	7434.08	56977.4

CHAPTER-III
CARBON FOOTPRINTING

A Carbon Foot print is defined as the Total Greenhouse Gas emissions (CO_2 emissions), emitted due to various activities.

In this we compute the emissions of Carbon-Di-Oxide, by usage of the various form of Electrical Energy used by the College for performing its day to day activities

Basis for computation of CO_2 Emissions:

The basis of Calculation for CO_2 emissions due to Electrical Energy is 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
We herewith furnish the details of various forms of Energy consumption as under

Table No-4: Month wise Consumption of Electrical Energy & CO_2 Emissions:

No	Month	Energy Consumed, kWh	CO_2 Emissions, MT
1	Apr-21	44392	39.95
2	May-21	49020	44.12
3	Jun-21	43149	38.83
4	Jul-21	47495	42.75
5	Aug-21	45846	41.26
6	Sep-21	44646	40.18
7	Oct-21	48367	43.53
8	Nov-21	59130	53.22
9	Dec-21	68457	61.61
10	Jan-22	56702	51.03
11	Feb-22	71093	63.98
12	Mar-22	105432	94.89
13	Total	683729	615.36
14	Maximum	105432	94.89
15	Minimum	43149	38.83
16	Average	56977.4	51.28

In the following Chart we present the CO_2 emissions due to usage of Electrical Energy.

Chart No 2: Representation of Month wise CO_2 emissions:

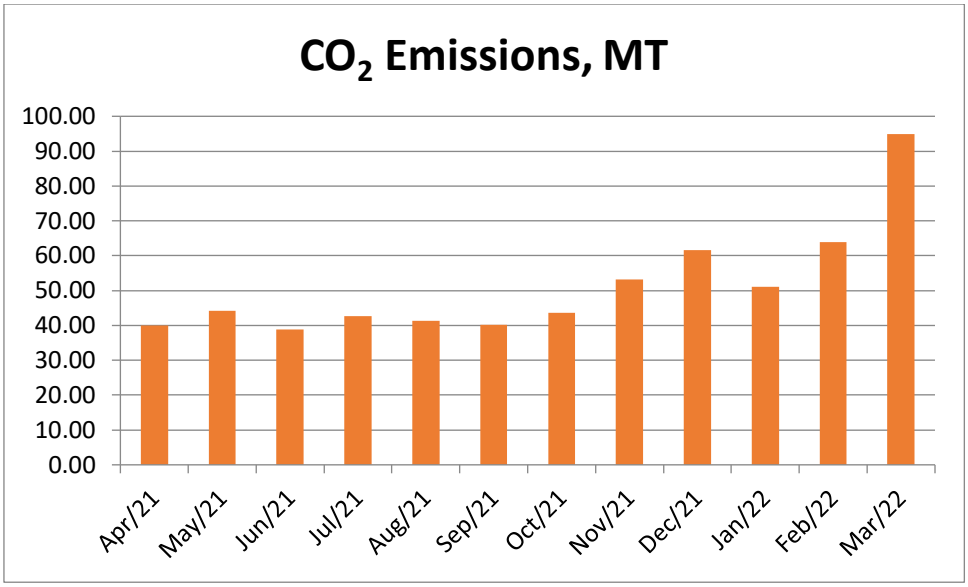


Table No-5: Various Important Parameters:

No	Parameter /Value	Energy Consumed, kWh	CO_2 Emissions, MT
1	Total	683729	615.36
2	Maximum	105432	94.89
3	Minimum	43149	38.83
4	Average	56977.4	51.28

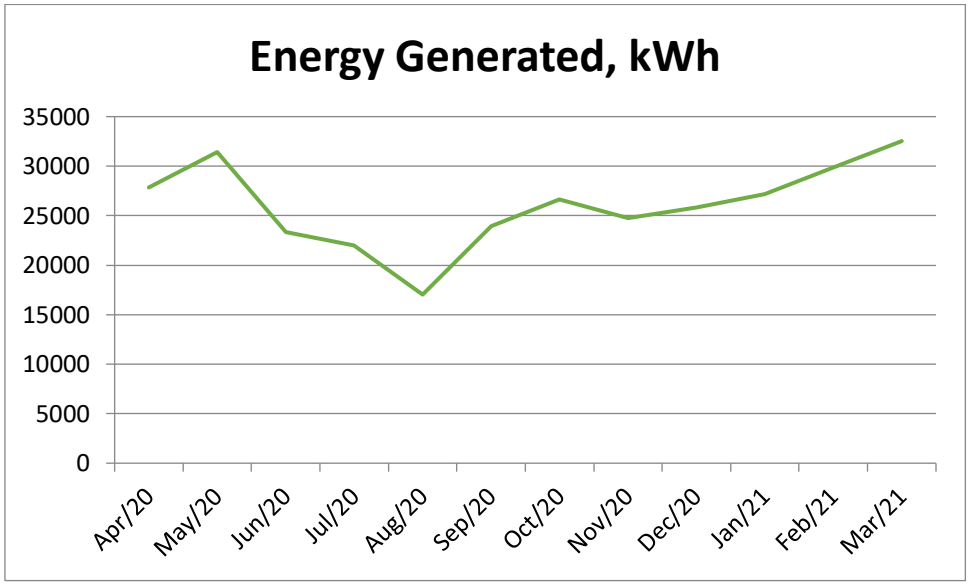
CHAPTER IV
STUDY OF USAGE OF RENEWABLE ENERGY

In this Chapter, we present the Usage of Renewable Energy.
The College has installed a Roof Top Solar PV Plant of Capacity **310 kWp**.
In the following Table, we present the Energy Generation Data.

Table No 6: Study of Month wise Energy Generation by 310 kWp Solar PV Plant:

No	Month	Energy Generated, kWh=(1)
1	Apr-20	27871
2	May-20	31411
3	Jun-20	23307
4	Jul-20	21961
5	Aug-20	17030
6	Sep-20	23938
7	Oct-20	26633
8	Nov-20	24727
9	Dec-20	25849
10	Jan-21	27187
11	Feb-21	29875
12	Mar-21	32531
13	Total	312320
14	Maximum	32531
15	Minimum	17030
16	Average	26026.67

We present the month wise generation in a PIE chart as under.
Chart No 3: Month Wise Solar Energy Generation:



Now we present the Reduction in CO_2 Emissions due to Solar PV Plant, as under.
Table No 7: Computation of Reduction in Annual CO_2 Emissions, MT:

No	Particulars	Value	Unit

1	Energy Generated by Solar PV Plant	**328262**	kWh
2	1 kWh of Electrical Energy is equivalent to	**0.9**	Kg of CO_2
3	Reduction in CO2 Emissions in 20-21 = **(1) *(2)/1000**	**295.44**	MT

Photograph of Solar PV Plant:

CHAPTER V
STUDY OF WASTE MANAGEMENT

5.1 Segregation of Waste at source:

The waste is segregated at source. At all important locations, waste bins are kept to collect the Waste.

Photograph of Waste Collection Bin:

5.2 Organic Waste Management:

The College has a Bio composting Arrangement, to convert the Bio Degradable Waste, like, Leafy Waste into Bio Compost.

Photograph of Bio Composting Arrangement:

5.3 Liquid Waste Management:

The College has installed a 200 m^3/Day Capacity Sewage Treatment plant. The treated water is used for Gardening purpose.

Photograph of Sewage Treatment Plant:

5.4 Sanitary Waste Incinerator:

For disposal of Sanitary Waste, a Sanitary Waste Incinerator is installed in the campus.

Photograph of Sanitary Waste Incinerator:

5.5 E Waste Management:

It is recommended to dispose of the E Waste through Authorized Agency.

CHAPTER-IV
STUDY OF RAIN WATER HARVESTING

The College has already installed Rain Water Harvesting project, wherein the rain water falling on the terrace is collected and through pipes it is fed to underground Water Storage tank. After this the water is treated and then used for reused for domestic purpose.

Photograph of Rain Water Storage Well:

CHAPTER-VII
STUDY OF GREEN & SUSTAINABLE PRACTICES

7.1 Pedestrian Friendly Roads:

The College has well maintained internal road to facilitate the easy movement of the students within the campus.

Photograph of Internal Road:

7.2 Internal Tree Plantation:

The College has well maintained landscaped garden & Tree Plantation in the campus.

Photograph of Tree plantation, Green Landscaping:

7.3 Provision of Ramp for Divyangajan:

For easy movement of Divyangajan, the College has made provision of Ramp at the main entrance.

Photograph of Ramp:

7.4 Provision of E Vehicle:

For internal material transport, E Vehicle is used.

Photograph of E Vehicle:

ANNEXURE-1:
LIST OF TREES & PLANTS:

No	Name of Tree

1	Saptaparni
2	Fanas
3	Bahunia
4	Bottlebrush
5	Amaltash
6	Pangra
7	Ghaikama
8	Silver Oak
9	Buch
10	Parijatak
11	White Champa
12	Champa
13	Spathodia
14	Ananta
15	Tabibia
16	Pam

LIST OF PLANTS:

No	Name of Plant
1	Shatavari
2	Sadafuli
3	Coleus
4	Lily
5	Jambhali Fule
6	Lipomi
7	Lantena
8	Elius
9	Salvia
10	Dosentus
11	Zebrina
12	Epilia
13	Duranta
14	Mogra
15	Erecta
16	Ratrani
17	Croton

18	Drecena
19	Hemelia
20	Hibiscus white
21	Hibiscus Red
22	Exora
23	Jatropha
24	Lagestromia
25	Nikodia
26	Lotus
27	Kanher
28	Plumbago
29	Pentas
30	Pachistachis
31	Rose
32	Rasulia
33	Tagar
34	Dudhmogara
35	Ticoma
36	Bigonia
37	Jai
38	chameli
39	Krishnakamal

ENVIRONMENTAL AUDIT REPORT

at

Shri Sant Gajanan Maharaj
College of Engineering, Shegaon

Year: 2021-22

Prepared by

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411009
Phone: 09890444795, Email: engress123@gmail.com

MAHARASHTRA ENERGY DEVELOPMENT AGENCY

Maharashtra Energy Development Agency
(Government of Maharashtra Institution)
Aundh Road, Opposite Spicer College Road, Near Commissionerate of Animal Husbandary,
Aundh, Pune, Maharashtra 411067
Ph No: 020-35000450
Email: eee@mahaurja.com, Web: www.mahaurja.com

ECN/2021-22/CR-43/441 — 8th February, 2022

CERTIFICATE OF REGISTRATION
FOR CLASS 'B'

We hereby certify that, the firm having following particulars is registered with ***MAHARASHTRA ENERGY DEVELOPMENT AGENCY (MEDA)*** under given category as "Energy Planner & Energy Auditor" in Maharashtra for Energy Conservation Programme of MEDA.

Name and Address of the firm : M/s Engress Services
Yashshree, 26, Nirmal Bag Society,
Near Muktangan English School,
Parvati, Pune – 411 009.

Registration Category : *Empanelled Consultant for Energy Conservation Programme for Class 'B'*

Registration Number : ***MEDA/ECN/2021-22/Class B/EA-07.***

- Energy Conservation Programme intends to identify areas where wasteful use of energy occurs and to evaluate the scope for Energy Conservation and take concrete steps to achieve the evaluated energy savings.
- MEDA reserves the right to visit at any time without giving prior information to verify quarterly activities performed by the firm and canceling the registration, if the information is found incorrect.
- This empanelment is valid till **7th February, 2024** from the date of registration, to carry out energy audits under the Energy Conservation Programme
- The Director General, MEDA reserves the right to cancel the registration at any time without assigning any reasons thereof.

08/02/22
General Manager (EC)

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411 009
Tel: 09890444795 Email: engress123@gmail.com

Ref: ES/SSGMCOE/02 Date: 22/6/2022

CERTIFICATE

This is to certify that we have conducted Environmental Audit at Shri Sant Gajanan Maharaj College of Engineering, Shegaon in the year 2021-22.

The College has adopted following Environmental Friendly Practices:

- Usage of Energy Efficient LED Fittings
- Installation of 310 kWp Roof Top Solar PV Plant
- Segregation of Waste at source
- Implementation of Vermi Composting Arrangement
- Installation of 200 m^3/Day Sewage Treatment Plant
- Provision of Sanitary Waste Incinerator, for disposal of Sanitary Waste
- Implementation of Rain Water Harvesting Project
- Internal Tree Plantation
- Usage of E Vehicle for internal material transport

We appreciate the support of Management, involvement of faculty members and students in the process of Energy Conservation & making the campus Green.

For Engress Services,

A Y Mehendale,
Certified Energy Auditor, EA-8192
ASSOCHAM GEM Certified Professional: GEM: 22/788

INDEX

ACKNOWLEDGEMENT

We at Engress Services, Pune, express our sincere gratitude to the management of Shri Sant Gajanan Maharaj College of Engineering, Shegaon for awarding us the assignment of Environmental Audit of their Shegaon campus for the Year: 2021-22.

We are thankful to all Staff members for helping us during the field study

EXECUTIVE SUMMARY

1. Shri Sant Gajanan Maharaj College of engineering, Shegaon consumes various resources for day to day operations, namely: Air, Water, Electrical Energy & LPG.

2. Pollution caused due to Day to Day College Activities:

- Air pollution: Mainly CO_2 on account of Electricity & LPG Consumption
- Solid Waste: Bio degradable Kitchen Waste, Garden Waste
- Liquid Waste: Human liquid waste

3. Present Energy Consumption & CO_2 Emissions:

No	Parameter/ Value	Energy Consumed, kWh	CO_2 Emissions, MT
1	Total	683729	615.36
2	Maximum	105432	94.89
3	Minimum	43149	38.83
4	Average	56977.4	51.28

4. Projects already implemented for Environmental Conservation:

- Installation of 310 kWp Roof Top Solar PV Plant
- Installation of Rain Water Harvesting Project
- Installation of 200 m^3/Day Sewage Treatment Plant

5. Usage of Renewable Energy & CO2 Emission Reduction:

- The College has installed Roof Top Solar PV Plant of Capacity **310 kW.**
- Energy generated in Year: 21-22 is **328262 kWh**
- The Reduction in CO_2 Emissions in 21-22 is **295.44 MT.**

6. Indoor Air Quality Parameters:

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	79	56	68
2	Minimum	70	48	59

7. Indoor Comfort Conditions:

No	Parameter/Value	Temperature, ^0C	Humidity, %	Lux Level	Noise Level, dB
1	Maximum	79	56	68	79
2	Minimum	70	48	59	70

8. Waste Management:

8.1 Segregation of Waste at source:

The waste is segregated at source. At all important locations, waste bins are kept to collect the Waste.

8.2 Organic Waste Management:

The College has a Bio composting Arrangement, to convert the Bio Degradable Waste, like, Leafy Waste into Bio Compost.

8.3 Liquid Waste Management:

The College has installed a 200 m^3/Day Capacity Sewage Treatment plant. The treated water is used for Gardening purpose.

8.4 Sanitary Waste Management:

The College has installed a Sanitary Waste Incinerator, for disposal of Sanitary Waste.

8.5 E Waste Management:

It is recommended to dispose of the E Waste through Authorized Agency

9. Rain Water Harvesting:

The College has installed the Rainwater harvesting project. The Rain Water falling on the terrace at the Hostel block is collected through pipes and is stored in a well. It is further used for gardening purpose.

10. Green & Sustainable Initiatives:

- Good Internal Roads
- Internal Tree Plantation
- Provision of Ramp for Divyangajan
- Provision of E Vehicle for internal Material transport

11. Assumption:

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

12. References:

- For CO_2 Emissions: www.tatapower.com
- For Various Indoor Air Parameters: www.ishrae.com
- For AQI &Water Quality Standards: www.cpcb.com

ABBREVIATIONS

Kg	:	Kilo Gram
ATSS	:	Audyogik Tantra Shikshan Sanstha
MSEDCL	:	Maharashtra State Distribution Company Limited
MT	:	Metric Ton
kWh	:	kilo-Watt Hour
LED	:	Light Emitting Diode
AQI	:	Air Quality Index
PM-2.5	:	Particulate Matter of Size 2.5 Micron
PM-10	:	Particulate Matter of Size 10 Micron
CPCB	:	Central Pollution Control Board
ISHRAE	:	The Indian Society of Heating & Refrigerating & Air Conditioning Engineers

CHAPTER-I
INTRODUCTION

1.1Important Definitions:

1.1.1Environment: Definition as per environment Protection Act: 1986

Environment includes water, air and land and the inter-relationship which exists among and between Water, Air, Land and Human beings, other living creatures, plants microorganism and property

1.1.2. Environmental Audit: Definition:

An audit which aims at verification and validation to ensure that various environmental laws are compiled with and adequate care has been taken towards environmental protection and preservation

According to UNEP, 1990, "Environmental audit can be defined as a management tool comprising systematic, documented and periodic evaluation of how well environmental organization management and equipment are performing with an aim of helping to regularize the environment

1.1.3. Environmental Pollutant: means any solid, liquid and gaseous substance present in the concentration as may be, or tend to be, injurious to Environment.

1.1.4. Relevant Environmental Laws in India: Table No-1:

1927	The Indian Forest Act
1972	The Wildlife Protection Act
1974	The Water (Prevention and Control of Pollution) Act
1977	The Water (Prevention & Control of Pollution) Cess Act
1980	The Forest (Conservation) Act
1981	The Air (Prevention and Control of Pollution) Act
1986	The Environment Protection Act
1991	The Public Liability Insurance Act
2002	The Biological Diversity Act
2010	The National Green Tribunal Act

1.1.5. Some Important Environmental Rules in India: Table No-2:

1989	Hazardous Waste (Management and Handling) Rules
1989	Manufacture, Storage and Import of Hazardous Chemical Rules
2000	Municipal Solid Waste (Management and Handling) Rules
1998	The Biomedical Waste (Management and Handling) Rules
1999	The Environment (Siting for Industrial Projects) Rules
2000	Noise Pollution (Regulation and Control) Rules
2000	Ozone Depleting Substances (Regulation and Control) Rules
2011	E-waste (Management and Handling) Rules
2011	National Green Tribunal (Practices and Procedure) Rules
2011	Plastic Waste (Management and Handling) Rules

1.1.6 National Environmental Plans & Policy Documents: Table No-3:

1.	National Forest Policy, 1988

2.	National Water Policy, 2002
3.	National Environment Policy or NEP (2006)
4.	National Conservation Strategy and Policy Statement on Environment and Development, 1992
5.	Policy Statement for Abatement of Pollution (1992)
6.	National Action Plan on Climate Change
7.	Vision Statement on Environment and Human Health
8.	Technology Vision 2030 (The Energy Research Institute)
9.	Addressing Energy Security and Climate Change (MoEF and Bureau of Energy Efficiency
10	The Road to Copenhagen; India's Position on Climate Change Issues (MoEF)

1.2 Objectives:

1. To study Resource Consumption & CO_2 Emissions
2. To Study CO_2 Emission Reduction
3. To study Indoor Air Quality Parameters
4. To study Indoor Comfort Condition Parameters
5. To Study of Waste Management
6. To Study of Rain Water Management
7. To Study of Environment Friendly Initiatives

1.3 Google Earth Location Image:

1.4 General Details of College:

No	Head	Particulars
1	Name of Institute	Shri Sant Gajanan Maharaj College of Engineering
2	Address	Shegaon, Dist: Buldhana

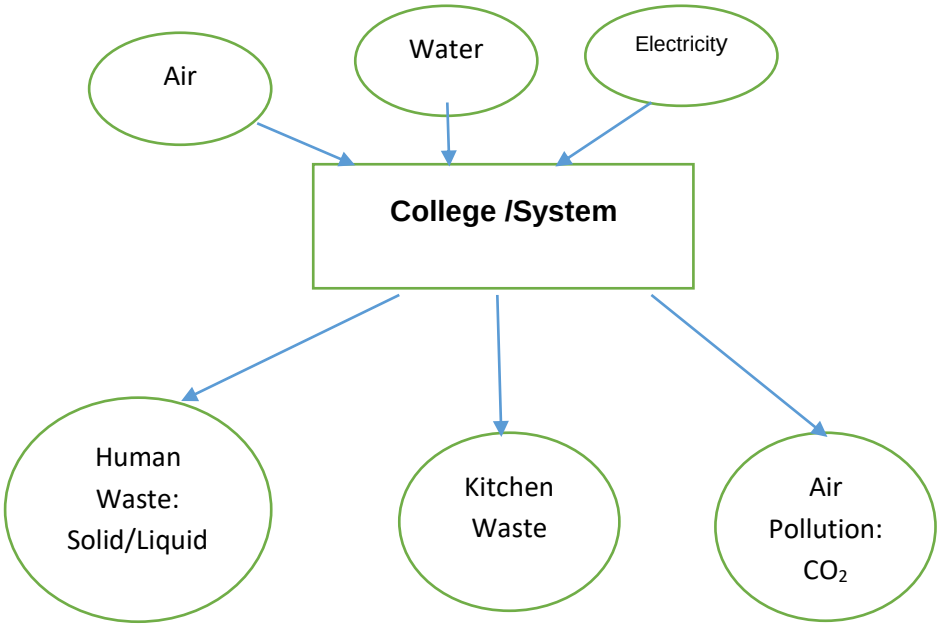
3	Year of Establishment	1983

CHAPTER-II
STUDY OF RECOURCE CONSUMPTION & CO_2 EMISSION

The Institute consumes following basic/derived Resources:

1. Air
2. Water
3. Electrical Energy
4. Liquefied Petroleum Gas

We try to draw a schematic diagram for the College System & Environment as under.



Now we compute the Generation of CO2 on account of consumption of Electrical Energy as under.

Table No-5: Electrical Energy Consumption & CO_2 Emission: 21-22:

No	Month	Energy Consumed, kWh	CO_2 Emissions, MT
1	Apr-21	44392	39.95
2	May-21	49020	44.12
3	Jun-21	43149	38.83
4	Jul-21	47495	42.75
5	Aug-21	45846	41.26
6	Sep-21	44646	40.18
7	Oct-21	48367	43.53
8	Nov-21	59130	53.22
9	Dec-21	68457	61.61
10	Jan-22	56702	51.03
11	Feb-22	71093	63.98
12	Mar-22	105432	94.89
13	Total	683729	615.36

14	Maximum	105432	94.89
15	Minimum	43149	38.83
16	Average	56977.4	51.28

Chart No-2: To study the variation of Monthly CO_2 Emission:

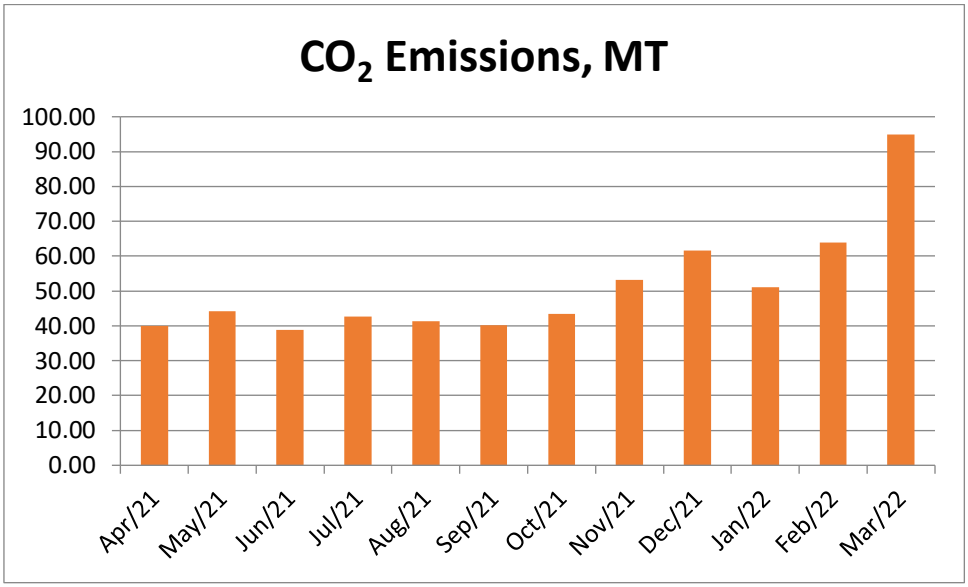


Table No-6: Variation in Important Parameters:

No	Parameter /Value	Energy Consumed, kWh	CO_2 Emissions, MT
1	Total	683729	615.36
2	Maximum	105432	94.89
3	Minimum	43149	38.83
4	Average	56977.4	51.28

CHAPTER-III
STUDY OF CO_2 EMISSION REDUCTION

In this Chapter, we present the Usage of Renewable Energy.
The College has installed a Roof Top Solar PV Plant of Capacity **310 kWp**.
In the following Table, we present the Energy Generation Data.

Table No 7: Study of Month wise Energy Generation & CO2 Emission Reduction by 310 kWp Solar PV Plant:

No	Month	Energy Generated, kWh	CO_2 Emission Reduction, MT
1	Apr-21	29522	26.57
2	May-21	30313	27.28
3	Jun-21	23972	21.57
4	Jul-21	24231	21.81
5	Aug-21	26546	23.89
6	Sep-21	17511	15.76
7	Oct-21	28342	25.51
8	Nov-21	26011	23.41
9	Dec-21	24127	21.71
10	Jan-22	29970	26.97
11	Feb-22	29465	26.52
12	Mar-22	38252	34.43
13	Total	328262	295.44
14	Maximum	38252	34.43
15	Minimum	17511	15.76
16	Average	27355.17	24.62

We present the month wise generation in a PIE chart as under.

Chart No 3: Month Wise Solar Energy Generation:

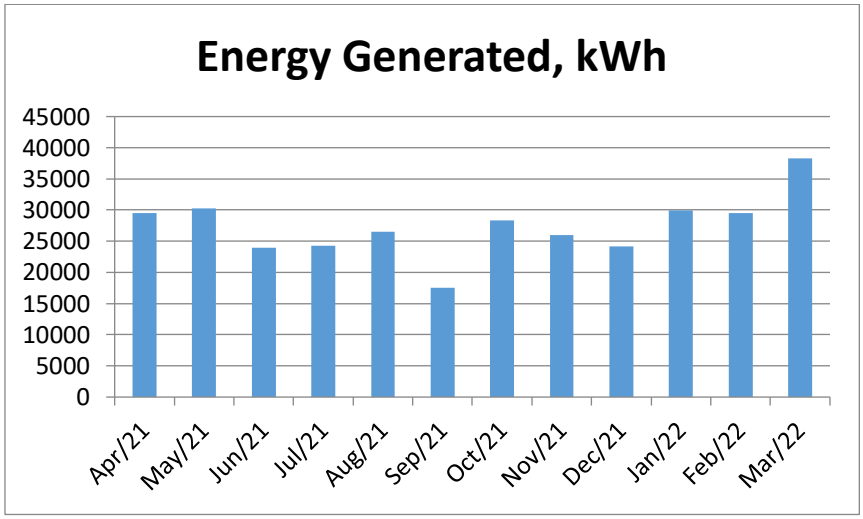
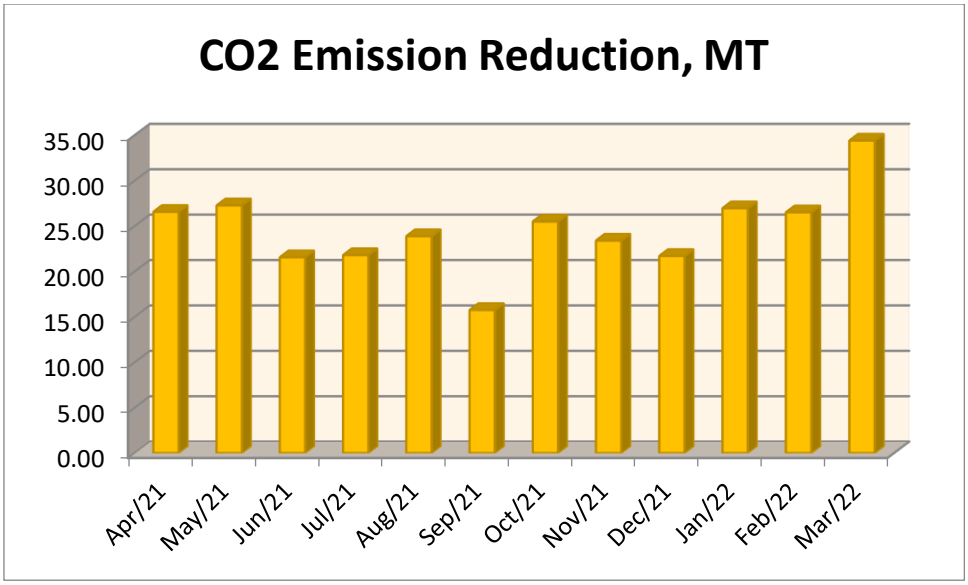


Chart No 4: Month Wise Reduction in CO_2 Emissions:



Now we present the Reduction in CO_2 Emissions due to Solar PV Plant, as under.

Table No 8: Computation of Reduction in Annual CO_2 Emissions, MT:

No	Particulars	Value	Unit
1	Energy Generated by Solar PV Plant	**328262**	kWh
2	1 kWh of Electrical Energy is equivalent to	**0.9**	Kg of CO_2
3	Reduction in CO2 Emissions in 20-21 = **(1) *(2)/1000**	**295.44**	MT

Photograph of Solar PV Plant:

CHAPTER IV
STUDY OF INDOOR AIR QUALITY

4.1 Importance of Air Quality:

Air: The common name given to the atmospheric gases used in breathing and photosynthesis.

By volume, Dry Air contains 78.09% Nitrogen, 20.95% Oxygen, 0.93% Argon, 0.039% carbon dioxide, and small amounts of other gases.

On average, a person inhales about **14,000 liters** of air every day. Therefore, poor air quality may affect the quality of life now and for future generations by affecting the health, the environment, the economy and the city's livability.

Rapid urbanization and industrialization has added other elements/compounds to the pure air and thus caused the increase in pollution. In order to prevent, control and abate air pollution, the Air (Prevention and Control of Pollution) Act was enacted in 1981.

Air quality is a measure of the suitability of air for breathing by people, plants and animals.

According to Section 2(b) of Air (Prevention and control of pollution) Act, 1981 '**air pollution**' has been defined as **'the presence in the atmosphere of any air pollutant**.'

As per Section 2(a) of Air (Prevention and control of pollution) Act, 1981 '**air pollutant**' has been defined as **'any solid, liquid or gaseous substance [(including noise)] present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment**

4.2 Air Quality Index:

An **Air Quality Index (AQI)** is a number used by government agencies to measure the **air pollution** levels and communicate it to the population. As the AQI increases, it means that a large percentage of the population will experience severe adverse health effects. The measurement of the **AQI** requires an **air monitor** and an **air pollutant** concentration over a specified **averaging period**.

We present herewith following important Parameters.

1. AQI- Air Quality Index
2. PM 2.5- Particulate Matter of Size 2.5
3. PM 2.5- Particulate Matter of Size 2.5

Table No 9: Indoor Air Quality Parameters:

No	Location	AQI	PM-2.5	PM-10
	Ground Floor			
1	HOD-E & TC Engg	75	54	67
2	Staff Cabin	74	52	66
3	HOD-Electrical Engg	74	52	66
4	Staff Cabin	71	48	60

5	HOD-Mech Engg	73	49	61
6	Staff Cabin	70	49	59
	First Floor			
7	Lecture Hall (EXTC)	76	55	66
8	Lecture Hall (Elect.)	79	56	68
9	Lecture Hall (Mech.)	78	56	66
10	Lecture Hall (Comp.)	75	53	65
	Second floor			
11	Training & Placement Dept	74	55	65
12	Internet Laboratory	75	54	64
13	Seminar Hall	72	51	60
	Premises			
14	Central Library	70	48	59
15	Administrative Building	72	51	64
16	**Maximum**	**79**	**56**	**68**
17	**Minimum**	**70**	**48**	**59**

CHAPTER V
STUDY OF INDOOR COMFORT CONDITION

In this Chapter, we present the various Indoor Comfort Parameters measured during the Audit.
The Parameters include:

1. Temperature
2. Humidity
3. Lux Level
4. Noise Level.

Table No 10: Study of Indoor Comfort Parameters:

No	Location	Temperature, 0C	Humidity, %	Lux Level	Noise Level, dB
	Ground Floor				
1	HOD-E & TC Engg	34	67	137	41
2	Staff Cabin	33.8	68	396	42.3
3	HOD-Electrical Engg	34	65	74	43.1
4	Staff Cabin	34.2	68	93	40
5	HOD-Mech Engg	35.1	65	394	41
6	Staff Cabin	34.2	70	152	44.4
	First Floor				
7	Lecture Hall (EXTC)	35	71	151	43.6
8	Lecture Hall (Elect.)	34	67	171	40
9	Lecture Hall (Mech.)	34.2	67	198	45
10	Lecture Hall (Comp.)	34.2	66	262	39
	Second floor				
11	Training & Placement Dept	35.2	66	175	39
12	Internet Laboratory	35.1	65	148	44
13	Seminar Hall	35	65	99	43
	Premises				
14	Central Library	29.2	64	192	39
15	Administrative Building	30.1	64	182	37
16	**Maximum**	35.2	71	396	45
17	**Minimum**	29.2	64	74	37

CHAPTER VI
STUDY OF WASTE MANAGEMENT

6.1 Segregation of Waste at source:

The waste is segregated at source. At all important locations, waste bins are kept to collect the Waste.

Photograph of Waste Collection Bin:

6.2 Organic Waste Management:

The College has a Bio composting Arrangement, to convert the Bio Degradable Waste, like, Leafy Waste into Bio Compost.

Photograph of Bio Composting Arrangement:

6.3 Liquid Waste Management:

The College has installed a 200 m^3/Day Capacity Sewage Treatment plant. The treated water is used for Gardening purpose.

Photograph of Sewage Treatment Plant:

6.4 Sanitary Waste Incinerator:

For disposal of Sanitary Waste, a Sanitary Waste Incinerator is installed in the campus.

Photograph of Sanitary Waste Incinerator:

6.5 E Waste Management:

It is recommended to dispose of the E Waste through Authorized Agency.

CHAPTER-VII
STUDY OF RAIN WATER HARVESTING

The College has already installed Rain Water Harvesting project, wherein the rain water falling on the terrace is collected and through pipes it is fed to underground Water Storage tank. After this the water is treated and then used for reused for domestic purpose.

Photograph of Rain Water Storage Well:

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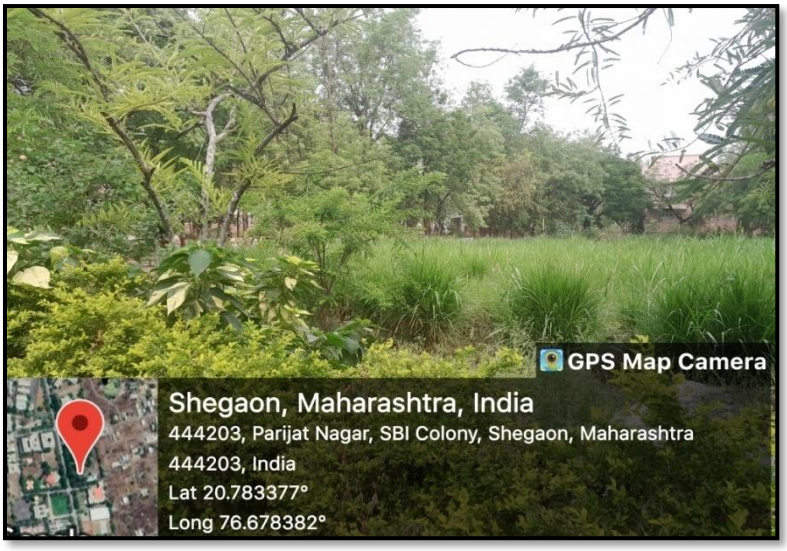
CHAPTER-VIII
STUDY OF ENVIRONMENT FRIENDLY INITIATIVES

8.1 Tree Plantation:

The Institute has well Tree Plantation in the campus.

Photograph of Garden/Tree plantation in the campus:



7.4 Provision of E Vehicle:

For internal material transport, E Vehicle is used.

Photograph of E Vehicle:

ANNEXURE-I:
VARIOUS AIR QUALITY, WATER QUALITY, NOISE & INDOOR COMFORT STANDARDS:

1. Category Wise Air Quality Index Values & Concentration of PM 2.5 & PM10:

No	Category	AQI Value	Concentration Range, PM 2.5	Concentration Range, PM 10
1	Good	0 to 50	0 to 30	0 to 50
2	Satisfactory	51 to 100	31 to 60	51 to 100
3	Moderately Polluted	101 to 200	61 to 90	101 to 250
4	Poor	201 to 300	91 to 120	251 to 350
5	Very Poor	301 to 400	121 to 250	351 to 430
6	Severe	401 to 500	250 +	430 +

2. Recommended Water Quality Standards:

No	Designated Best Use	Criteria
1	Drinking Water Source without conventional Treatment but after disinfection	pH between **6.5 to 8.5** Dissolved Oxygen **6 mg/l or more**
2	Drinking water source after conventional treatment and disinfection	pH between **6 to 9** Dissolved Oxygen **4 mg/l or more**
3	Outdoor Bathing (Organized)	pH between **6.5 to 8.5** Dissolved Oxygen **5 mg/l or more**
4	Controlled Waste Disposal	pH between **6 to 8.5**

3. Recommended Noise Level Standards:

No	Location	Noise Level dB
1	Auditoriums	20-25
2	Outdoor Playground	55

3	Occupied Class Room	40-45
4	Un occupied Class Room	35
5	Apartment, Homes	35-40
6	Offices	45-50
7	Libraries	35-40
8	Restaurants	50-55

4. Thermal Comfort Conditions: For Non-conditioned Buildings:

No	Parameter	Value
1	Temperature	Less Than 33^0C
2	Humidity	Less Than 70%

ENERGY AUDIT REPORT

of

SHRI SANT GAJANAN MAHARAJ COLLEGE OF ENGINEERING,

Shegaon, Dist: Buldhana

Year: 2020-21

Prepared by:

Enrich Consultants

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411009
Phone: 09890444795 Email: enrichcons@gmail.com

MAHARASHTRA ENERGY DEVELOPMENT AGENCY

An ISO 9001 : 2000 Reg. no. : RQ 91 / 2462

Maharashtra Energy Development Agency

(Government of Maharashtra Institution)
Aundh Road, Opposite Spicer College Road, Near Commissionerate of Animal Husbandary,
Aundh, Pune, Maharashtra 411067
Ph No: 020-35000450
Email: eee@mahaurja.com, Web: www.mahaurja.com

ECN/2021-22/CR-14/1577 — 22nd April, 2021

CERTIFICATE OF REGISTRATION
FOR CLASS 'A'

We hereby certify that, the firm having following particulars is registered with ***MAHARASHTRA ENERGY DEVELOPMENT AGENCY (MEDA)*** under given category as "Energy Planner & Energy Auditor" in Maharashtra for Energy Conservation Programme of MEDA.

Name and Address of the firm : **M/s Enrich Consultants**
Yashashree, Plot No. 26, Nirmal Bag Society,
Near Muktangan English School, Parvati,
Pune - 411009.

Registration Category : *Empanelled Consultant for Energy Conservation Programme for Class 'A'*

Registration Number : ***MEDA/ECN/2021-22/Class A/EA-03***

- Energy Conservation Programme intends to identify areas where wasteful use of energy occurs and to evaluate the scope for Energy Conservation and take concrete steps to achieve the evaluated energy savings.
- MEDA reserves the right to visit at any time without giving prior information to verify quarterly activities performed by the firm and canceling the registration, if the information is found incorrect.
- This empanelment is valid till **21st April, 2023** from the date of registration, to carry out energy audits under the Energy Conservation Programme
- The Director General, MEDA reserves the right to cancel the registration at any time without assigning any reasons thereof.

General Manager (EC)

Enrich Consultants

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411 009
Tel: 09890444795 Email: enrichcons@gmail.com

Ref: EC/SSGMCOE/20-21/01 Date: 24/4/2021

CERTIFICATE

This is to certify that we have conducted Energy Audit at Shri Sant Gajanan Maharaj College of Engineering, Shegaon in the year 2020-21.

The College has adopted following Energy Efficient Practices:

- Usage of Energy Efficient LED Fittings
- Usage of Energy Efficient BEE STAR Rated equipment
- Maximum usage of Day Lighting
- Installation of 310 kWp Roof Top Solar PV Plant

We appreciate the support of Management, involvement of faculty members and students in the process of Energy Conservation & making the campus Green.

For Enrich Consultants,

A Y Mehendale,
Certified Energy Auditor
EA-8192

INDEX

ACKNOWLEDGEMENT

We at Enrich Consultants, Pune, express our sincere gratitude to the management of Shri Sant Gajanan Maharaj College of Engineering, Shegaon for awarding us the assignment of Energy Audit of their Shegaon Campus for the Year: 2020-21.

We are thankful to all Staff members for helping us during the field study.

EXECUTIVE SUMMARY

1. Shri Sant Gajanan Maharaj College of Engineering, Shegaon consumes Energy in the form of Electrical Energy used for various gadgets, Office & other facilities.

2. Present Energy Consumption & CO_2 Emission:

No	Parameter /Value	Energy Generated, kWh=(1)	Energy Purchased, kWh=(2)	Energy Exported, kWh=(3)	Net Energy Consumed, kWh=(1+2-3)	CO_2 Emissions, MT
1	Total	312320	320815	120955	512180	460.96
2	Maximum	32531	33888	14463	54398	48.96
3	Minimum	17030	21993	5038	35700	32.13
4	Average	26026.67	26734.58	10079.58	42681.67	38.414

3. Energy Conservation Projects Already Installed:

1. Installation of 310 kWp Roof Top Solar PV Plant
2. Use of Auto Timers for outdoor lighting
3. Usage of Water Level Controllers

4. Usage of Alternate Energy:

- The College has installed a **310 kWp** Roof Top Solar PV Plant.
- The Energy generated by Solar PV Plant in 20-21 is **312320 kWh**
- The Energy Exported is **120955 kWh**
- Energy purchased from MSEDCL is **320815 kWh**
- The Net Energy Demand in 20-21 is **512180 kWh**
- The percentage of Alternate Energy usage to Annual Energy Demand is **61 %.**

5. Usage of LED Lighting:

- The LED Lighting Load is **20.4 kW**
- The Total Lighting Load is **87.4 kW**
- The percentage of usage of LED lights to Total Lighting Load is **23.34 %.**

6. Assumption:

- **1 kWh** of Electrical Energy releases **0.9 Kg of CO_2** into atmosphere

7. Reference:

- For CO_2 Emissions: www.tatasolar.com

ABBREVIATIONS

CFL	:	Compact Fluorescent Lamp
CO_2	:	Carbon- Di- Oxide
FTL	:	Fluorescent Tube Light
LED	:	Light Emitting Diode
kW	:	Kilo- Watt
kWh	:	kilo-Watt Hour
MT	:	Metric Ton
P V	:	Photo Voltaic

CHAPTER-I
INTRODUCTION

1.1 Objectives:

1. To study present Connected Load
2. To study present Energy Consumption
3. To Study the present CO_2 emissions
4. To study usage of Renewable Energy
5. To study usage of LED Lighting

1.2 General Details of Institute: Table No-1:

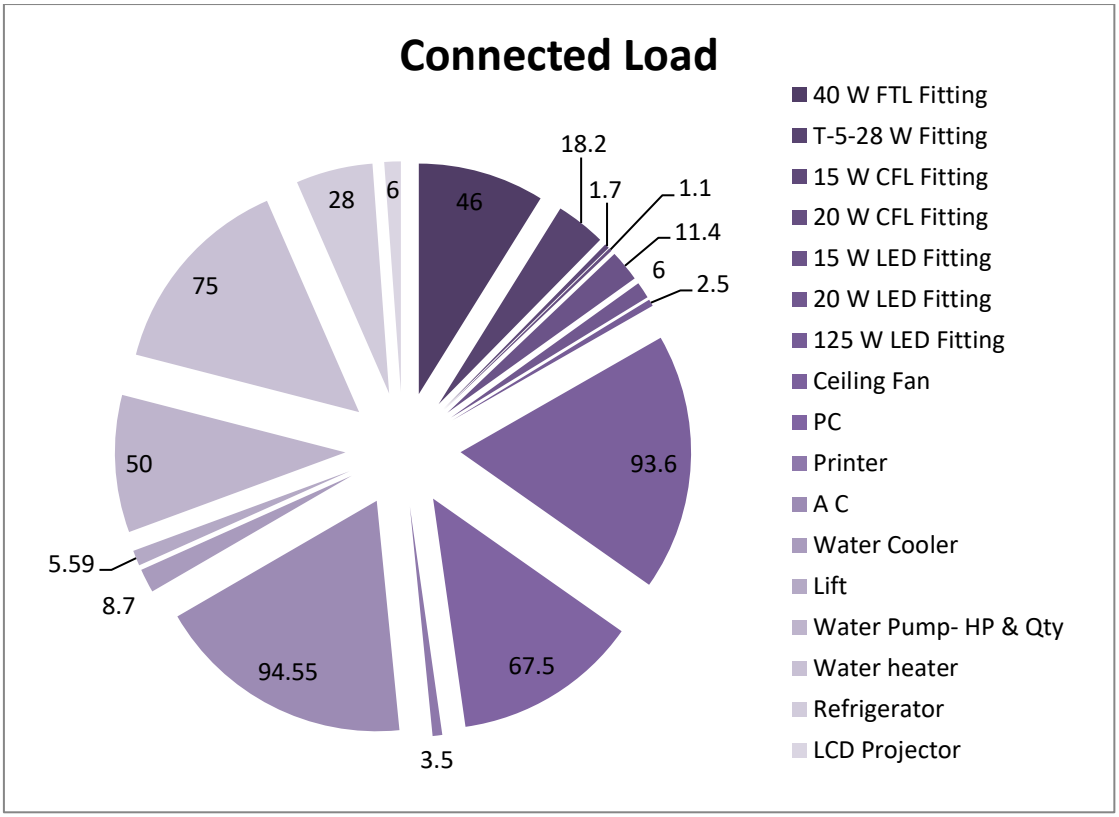
No	Head	Particulars
1	Name of Institute	Shri Sant Gajanan Maharaj College of Engineering
2	Address	Shegaon, Dist: Buldhana
3	Year of Establishment	1983

CHAPTER-II
STUDY OF CONNECTED LOAD

In this chapter, we present the details of various Electrical loads as under
In the following Table, we present the Load from aspect of Location wise.
Table No: 2: Study of Equipment wise Connected Load:

No	Equipment	Quantity	Load, W, Unit	Load, kW
1	40 W FTL Fitting	1150	40	46
2	T-5-28 W Fitting	650	28	18.2
3	15 W CFL Fitting	100	17	1.7
4	20 W CFL Fitting	50	22	1.1
5	15 W LED Fitting	760	15	11.4
6	20 W LED Fitting	300	20	6
7	125 W LED Fitting	20	125	2.5
8	Ceiling Fan	1560	60	93.6
9	PC	450	150	67.5
10	Printer	20	175	3.5
11	A C	61	1550	94.55
12	Water Cooler	29	300	8.7
13	Lift	1	5595	5.60
14	Water Pump- HP & Qty	25	2000	50
15	Water heater	50	1500	75
16	Refrigerator	80	350	28
17	LCD Projector	40	150	6
18	**Total**			**519.35**

In the following Table, we present the same in a PIE Chart
Chart No 1: Total Connected Load:


Connected Load
40 W FTL Fitting
T-5-28 W Fitting
15 W CFL Fitting
20 W CFL Fitting
15 W LED Fitting
20 W LED Fitting
125 W LED Fitting
Ceiling Fan
PC
Printer
A C
Water Cooler
Lift
Water Pump- HP & Qty
Water heater
Refrigerator
LCD Projector
46
18.2
1.7
1.1
11.4
6
2.5
93.6
67.5
3.5
94.55
8.7
5.59
50
75
28
6

CHAPTER-III

STUDY OF PRESENT ENERGY CONSUMPTION

In this chapter, we present the analysis of last year Electricity Bills.

Table No- 3: Electrical Energy Analysis- 2020-21:

No	Month	Energy Generated, kWh=(1)	Energy Purchased, kWh=(2)	Energy Exported, kWh=(3)	Net Energy Consumed, kWh=(1+2-3)
1	Apr-20	27871	27108	13068	41911
2	May-20	31411	33888	10901	54398
3	Jun-20	23307	30363	5945	47725
4	Jul-20	21961	29505	6445	45021
5	Aug-20	17030	25373	5038	37365
6	Sep-20	23938	25933	9028	40843
7	Oct-20	26633	26578	10063	43148
8	Nov-20	24727	22338	11365	35700
9	Dec-20	25849	25778	10938	40689
10	Jan-21	27187	26623	10151	43659
11	Feb-21	29875	21993	13550	38318
12	Mar-21	32531	25335	14463	43403
13	Total	312320	320815	120955	512180
14	Maximum	32531	33888	14463	54398
15	Minimum	17030	21993	5038	35700
16	Average	26026.67	26734.58	10079.58	42681.67

In the following Chart we present the above Data of Energy Consumption.

Chart No-2: Month wise Variation in Energy Consumption, kWh:

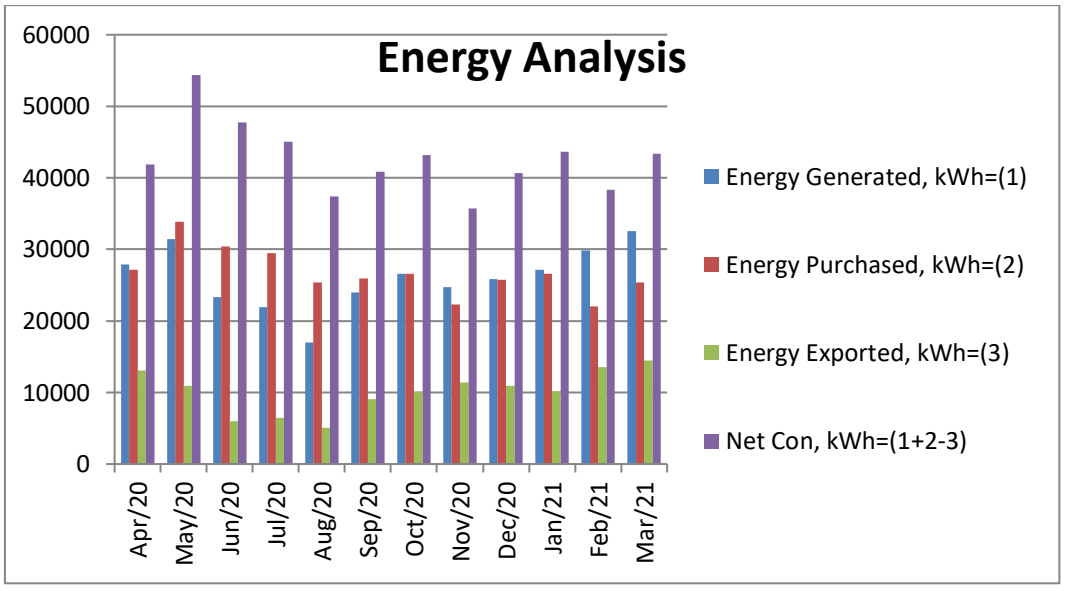


Table No-4: Various Important Parameters:

No	Parameter /Value	Energy Generated, kWh=(1)	Energy Purchased, kWh=(2)	Energy Exported, kWh=(3)	Net Energy Consumed, kWh=(1+2-3)
1	Total	312320	320815	120955	512180
2	Maximum	32531	33888	14463	54398
3	Minimum	17030	21993	5038	35700
4	Average	26026.67	26734.58	10079.58	42681.67

CHAPTER-IV

CARBON FOOTPRINTING

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

Basis for computation of CO_2 Emissions:

The basis of Calculation for CO_2 emissions due to Electrical Energy is 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

Table No-5: Month wise CO_2 Emissions:

No	Month	Energy Consumed, kWh	CO_2 Emissions, MT
1	Apr-20	41911	37.72
2	May-20	54398	48.96
3	Jun-20	47725	42.95
4	Jul-20	45021	40.52
5	Aug-20	37365	33.63
6	Sep-20	40843	36.76
7	Oct-20	43148	38.83
8	Nov-20	35700	32.13
9	Dec-20	40689	36.62
10	Jan-21	43659	39.29
11	Feb-21	38318	34.49
12	Mar-21	43403	39.06
13	Total	512180	460.96
14	Maximum	54398	48.96
15	Minimum	35700	32.13
16	Average	42681.67	38.414

Chart No 3: Representation of Month wise CO_2 Emissions:

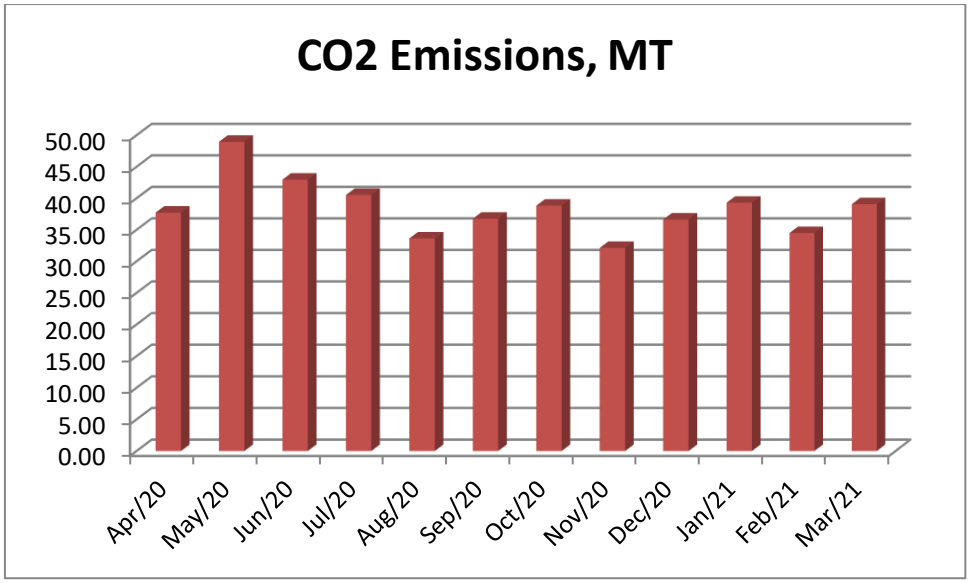


Table No 6: Important Parameters:

No	Parameter /Value	Energy Consumed, kWh	CO_2 Emissions, MT
1	Total	512180	460.96
2	Maximum	54398	48.96
3	Minimum	35700	32.13
4	Average	42681.67	38.414

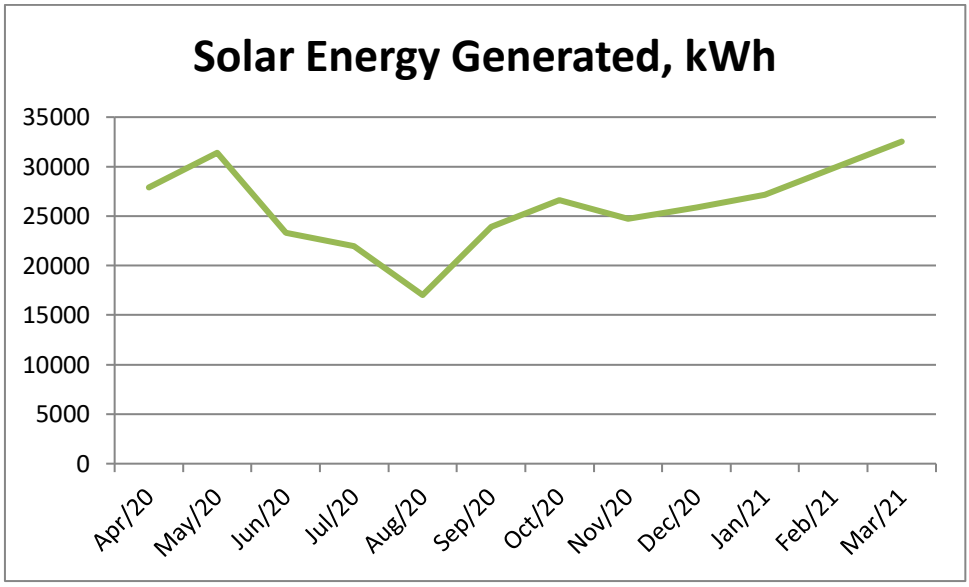
CHAPTER-V
STUDY OF USAGE OF ALTERNATE ENERGY

In this Chapter, we present the Usage of Alternate Energy.
The College has installed a Roof Top Solar PV Plant of Capacity **310 kWp**.
In the following Table, we present the Energy Generation Data.

Table No 7: Study of Month wise Energy Generation by 310 kWp Solar PV Plant:

No	Month	Energy Generated, kWh=(1)
1	Apr-20	27871
2	May-20	31411
3	Jun-20	23307
4	Jul-20	21961
5	Aug-20	17030
6	Sep-20	23938
7	Oct-20	26633
8	Nov-20	24727
9	Dec-20	25849
10	Jan-21	27187
11	Feb-21	29875
12	Mar-21	32531
13	Total	312320
14	Maximum	32531
15	Minimum	17030
16	Average	26026.67

Now we present the percentage of Usage of Alternate Energy, as under.
Chart No 4: Mont wise Generation of Solar Energy:



Now we present the percentage of Usage of Alternate Energy, as under.

Table No 8: Computation of Usage of Alternate Energy:

No	Particulars	Value	Unit
1	Total Energy Purchased from MSEDCL	320815	kWh
2	Energy Generated by Solar PV Plant	**312320**	kWh
3	Energy Exported, kWh	120955	
4	Net Energy Consumed =**1+2-3**	**512180**	kWh
4	Percentage of Usage of Alternate Energy =(2)*100/(3)	**61**	%

Photograph of Solar PV Plant:

CHAPTER-VI
STUDY OF USAGE OF LED LIGHTING

In this Chapter we present the percentage of usage of LED Lights.

Table No 9: Computation of % of LEDs to Total Lighting Load:

No	Particulars	Value	Unit
1	Qty of 40 W FTL Fitting	1150	Nos
2	Load/Unit of 40 W FTL Fitting	40	W
3	Total load of 40 W FTL Fittings	**46**	kW
4	Qty of 28 W T-5 Fitting	650	Nos
5	Load/Unit of 28 W T-5 Fitting	28	W
6	Total load of 28 W T-5 Fittings	**18.2**	kW
7	Qty of 15 W CFL Fitting	100	Nos
8	Load/unit of 15 W CFL Fitting	17	W
9	Total load of 15 W CFL Fittings	**1.7**	kW
10	Qty of 20 W CFL Fitting	50	Nos
11	Load/unit of 20 W CFL Fitting	22	W
12	Total load of 20 W CFL Fittings	**1.1**	kW
13	Qty of 15 W LED Fitting	760	Nos
14	Load/unit of 15 W LED Fitting	15	W
15	Total load of 15 W LED Fittings	**11.4**	kW
16	Qty of 20 W LED Fitting	300	Nos
17	Load/unit of 20 W LED Fitting	20	W
18	Total load of 20 W LED Fittings	**6**	kW
19	Qty of 125 W LED Fitting	20	Nos
20	Load/unit of 125 W LED Fitting	125	W
21	Total load of 125 W LED Fittings	**3**	kW
22	Total LED Lighting Load= 15+18+21	**20.4**	kW
23	Total Lighting Load= 3+6+9+12+ 15+18+21	**87.4**	kW
24	% of Usage of LEDs to Total Lighting Load=**22*100/23**	**23.34**	%

GREEN AUDIT REPORT

of

SHRI SANT GAJANAN MAHARAJ COLLEGE OF ENGINEERING,

Shegaon, Dist: Buldhana

Year: 2020-21

Prepared by

Enrich Consultants

Yashashree, Plot No 26, Nirmal Bag Society,
Near Muktangan English School, Pune 411 009
Phone: 09890444795 Email:enrichcons@gmail.com

MAHARASHTRA ENERGY DEVELOPMENT AGENCY

An ISO 9001 : 2000 Reg. no. : RQ 91 / 2462

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Email: eee@mahaurja.com, Web: www.mahaurja.com

ECN/2021-22/CR-14/1577 — 22nd April, 2021

CERTIFICATE OF REGISTRATION
FOR CLASS 'A'

We hereby certify that, the firm having following particulars is registered with ***MAHARASHTRA ENERGY DEVELOPMENT AGENCY (MEDA)*** under given category as "Energy Planner & Energy Auditor" in Maharashtra for Energy Conservation Programme of MEDA.

Name and Address of the firm : **M/s Enrich Consultants**
Yashashree, Plot No. 26, Nirmal Bag Society,
Near Muktangan English School, Parvati,
Pune - 411009.

Registration Category : *Empanelled Consultant for Energy Conservation Programme for Class 'A'*

Registration Number : ***MEDA/ECN/2021-22/Class A/EA-03***

- Energy Conservation Programme intends to identify areas where wasteful use of energy occurs and to evaluate the scope for Energy Conservation and take concrete steps to achieve the evaluated energy savings.
- MEDA reserves the right to visit at any time without giving prior information to verify quarterly activities performed by the firm and canceling the registration, if the information is found incorrect.
- This empanelment is valid till **21st April, 2023** from the date of registration, to carry out energy audits under the Energy Conservation Programme
- The Director General, MEDA reserves the right to cancel the registration at any time without assigning any reasons thereof.

General Manager (EC)

Enrich Consultants

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411 009
Tel: 09890444795 Email: enrichcons@gmail.com

Ref: EC/SSGMCOE/20-21/02 Date: 24/4/2021

CERTIFICATE

This is to certify that we have conducted Green Audit at Shri Sant Gajanan Maharaj College of Engineering, Shegaon, in the year 2020-21.

The College has adopted following Green Practices:

- Usage of Energy Efficient LED Fittings
- Installation of 310 kWp Roof Top Solar PV Plant
- Segregation of Waste at source
- Implementation of Vermi Composting Arrangement
- Installation of 200 m^3/Day Sewage Treatment Plant
- Provision of Sanitary Waste Incinerator, for disposal of Sanitary Waste
- Implementation of Rain Water Harvesting Project
- Good Internal Road
- Internal Tree Plantation
- Provision of Ramp for Divyangajan

We appreciate the support of Management, involvement of faculty members and students in the process of Energy Conservation & making the campus Green.

For Enrich Consultants,

A Y Mehendale,
Certified Energy Auditor
EA-8192

INDEX

ACKNOWLEDGEMENT

We at Enrich Consultants, Pune, express our sincere gratitude to the management of Shri Sant Gajanan Maharaj College of Engineering, Shegaon for awarding us the assignment of carrying out Green Audit of their Shegaon campus for the Year: 2020-21.

We are thankful to all Staff members for helping us during the field study

EXECUTIVE SUMMARY

1. Shri Sant Gajanan Maharaj College of Engineering, Shegaon consumes Electrical Energy used for various gadgets & office equipment

2. Present Energy Consumption & CO_2 Emission:

No	Parameter/ Value	Energy Consumed, kWh	CO_2 Emissions, MT
1	Total	512180	460.96
2	Maximum	54398	48.96
3	Minimum	35700	32.13
4	Average	42681.67	38.414

3. Projects already implemented for Energy Conservation:

- Installation of 310 kWp Roof Top Solar PV Plant
- Installation of Rain Water Harvesting System
- Installation of 200 m^3/Day Sewage Treatment Plant

4. Usage of Renewable Energy:

- The College has installed Roof Top Solar PV Plant of Capacity **310 kW.**
- Energy generated in Year: 20-21 is **312320 kWh**
- The Reduction in CO_2 Emissions in 20-21 is **281 MT.**

5. Waste Management:

5.1 Segregation of Waste at source:

The waste is segregated at source. At all important locations, waste bins are kept to collect the Waste.

5.2 Organic Waste Management:

The College has a Bio composting Arrangement, to convert the Bio Degradable Waste, like, Leafy Waste into Bio Compost.

5.3 Liquid Waste Management:

The College has installed a 200 m^3/Day Capacity Sewage Treatment plant. The treated water is used for Gardening purpose.

5.4 Sanitary Waste Management:

The College has installed a Sanitary Waste Incinerator, for disposal of Sanitary Waste.

6. Rain Water Harvesting:

The College has installed the Rainwater harvesting project. The Rain Water falling on the terrace at the Hostel block is collected through pipes and is stored in a well. It is further used for gardening purpose.

7. Green & Sustainable Initiatives:

- Good Internal Roads
- Internal Tree Plantation
- Provision of Ramp for Divyangajan

8. Assumption:

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

9. Reference:

- For CO_2 Emissions: www.tatasolar.com

ABBREVIATIONS

Kg	:	Kilo Gram
MSEDCL	:	Maharashtra State Distribution Company Limited
MT	:	Metric Ton
kWh	:	kilo-Watt Hour
LED	:	Light Emitting Diode

CHAPTER-I
INTRODUCTION

1.1 Objectives:

1. Study of Present Energy Consumption
2. Study of Usage of Renewable Energy
3. Study of Waste Management practices
4. Study of Rain Water Harvesting
5. Study of Green & Sustainable Practices

1.2 Table No 1: General Details of College:

No	Head	Particulars
1	Name of Institute	Shri Sant Gajanan Maharaj College of Engineering
2	Address	Shegaon, Dist: Buldhana
3	Year of Establishment	1983

CHAPTER-II
STUDY OF PRESENT ENERGY CONSUMPTION

In this chapter, we present the analysis of last year Electricity Bills

Table No. 2: Energy Consumption- 20-21:

No	Month	Energy Generated, kWh=(1)	Energy Purchased, kWh=(2)	Energy Exported, kWh=(3)	Net Energy Consumed, kWh=(1+2-3)
1	Apr-20	27871	27108	13068	41911
2	May-20	31411	33888	10901	54398
3	Jun-20	23307	30363	5945	47725
4	Jul-20	21961	29505	6445	45021
5	Aug-20	17030	25373	5038	37365
6	Sep-20	23938	25933	9028	40843
7	Oct-20	26633	26578	10063	43148
8	Nov-20	24727	22338	11365	35700
9	Dec-20	25849	25778	10938	40689
10	Jan-21	27187	26623	10151	43659
11	Feb-21	29875	21993	13550	38318
12	Mar-21	32531	25335	14463	43403
13	Total	312320	320815	120955	512180
14	Maximum	32531	33888	14463	54398
15	Minimum	17030	21993	5038	35700
16	Average	26026.67	26734.58	10079.58	42681.67

Chart No 1: To study the variation of Monthly Energy Consumption:

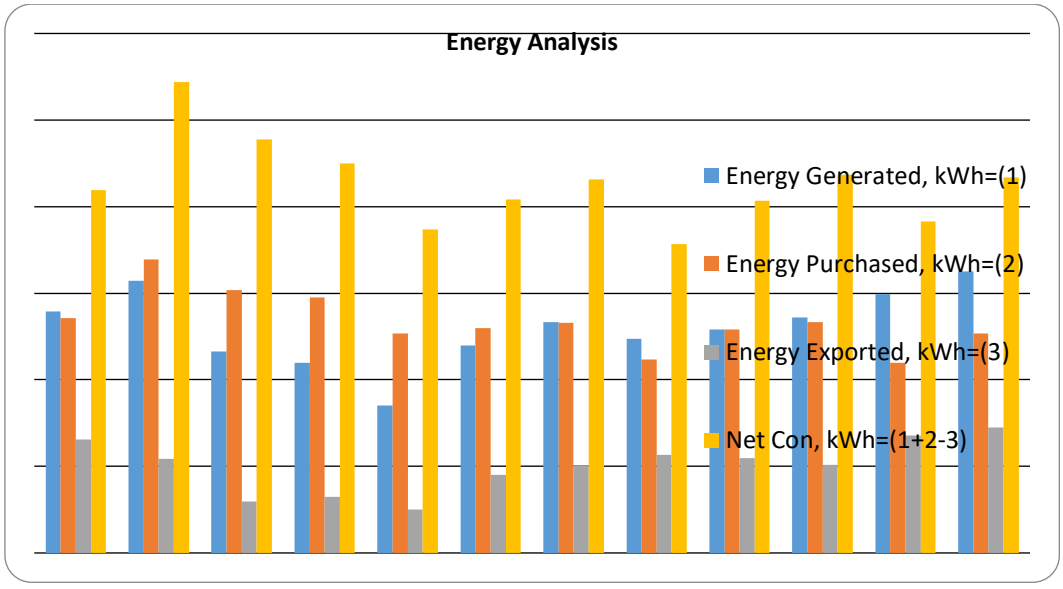


Table No-3: Variation in Important Parameters:

No	Parameter /Value	Energy Generated, kWh=(1)	Energy Purchased, kWh=(2)	Energy Exported, kWh=(3)	Net Energy Consumed, kWh=(1+2-3)
1	Total	312320	320815	120955	512180
2	Maximum	32531	33888	14463	54398
3	Minimum	17030	21993	5038	35700
4	Average	26026.67	26734.58	10079.58	42681.67

CHAPTER-III
CARBON FOOT PRINTING

A Carbon Foot print is defined as the Total Greenhouse Gas emissions (CO_2 emissions), emitted due to various activities.

In this we compute the emissions of Carbon-Di-Oxide, by usage of the various form of Electrical Energy used by the College for performing its day to day activities

Basis for computation of CO_2 Emissions:

The basis of Calculation for CO_2 emissions due to Electrical Energy is 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
We herewith furnish the details of various forms of Energy consumption as under

Table No-4: Month wise Consumption of Electrical Energy & CO_2 Emissions:

No	Month	Energy Consumed, kWh	CO_2 Emissions, MT
1	Apr-20	41911	37.72
2	May-20	54398	48.96
3	Jun-20	47725	42.95
4	Jul-20	45021	40.52
5	Aug-20	37365	33.63
6	Sep-20	40843	36.76
7	Oct-20	43148	38.83
8	Nov-20	35700	32.13
9	Dec-20	40689	36.62
10	Jan-21	43659	39.29
11	Feb-21	38318	34.49
12	Mar-21	43403	39.06
13	Total	512180	460.96
14	Maximum	54398	48.96
15	Minimum	35700	32.13
16	Average	42681.67	38.414

In the following Chart we present the CO2 emissions due to usage of Electrical Energy.

Chart No 2: Representation of Month wise CO_2 emissions:

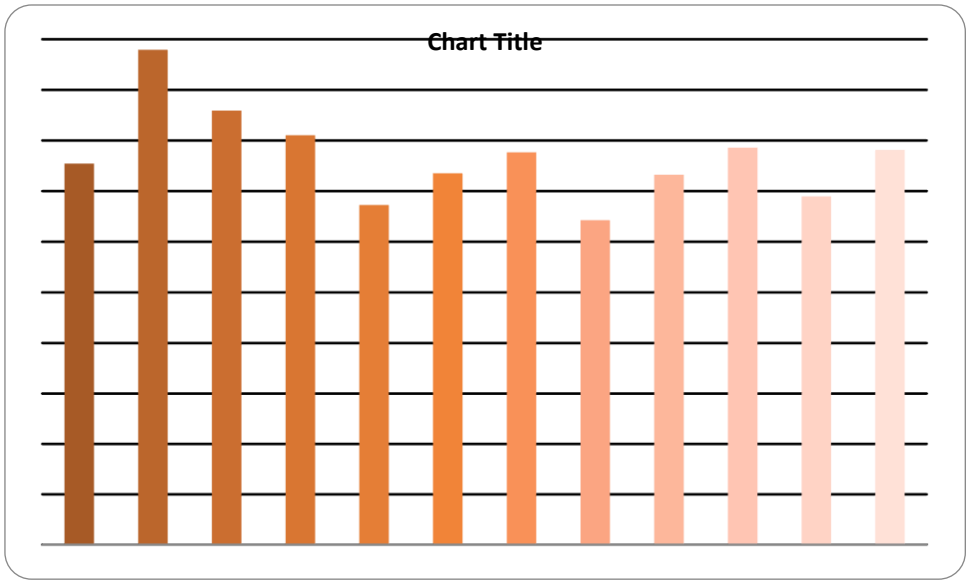


Table No 5: Important Parameters:

No	Parameter /Value	Energy Consumed, kWh	CO_2 Emissions, MT
1	Total	512180	460.96
2	Maximum	54398	48.96
3	Minimum	35700	32.13
4	Average	42681.67	38.414

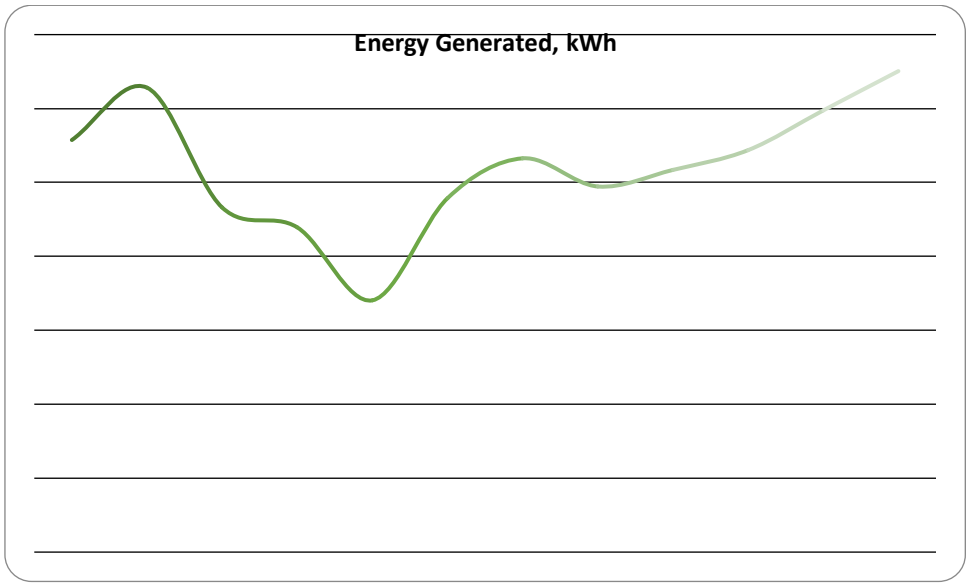
CHAPTER IV
STUDY OF USAGE OF RENEWABLE ENERGY

In this Chapter, we present the Usage of Renewable Energy.
The College has installed a Roof Top Solar PV Plant of Capacity **310 kWp**.
In the following Table, we present the Energy Generation Data.

Table No 6: Study of Month wise Energy Generation by 310 kWp Solar PV Plant:

No	Month	Energy Generated, kWh=(1)
1	Apr-20	27871
2	May-20	31411
3	Jun-20	23307
4	Jul-20	21961
5	Aug-20	17030
6	Sep-20	23938
7	Oct-20	26633
8	Nov-20	24727
9	Dec-20	25849
10	Jan-21	27187
11	Feb-21	29875
12	Mar-21	32531
13	Total	312320
14	Maximum	32531
15	Minimum	17030
16	Average	26026.67

We present the month wise generation in a PIE chart as under.
Chart No 3: Month Wise Solar Energy Generation:



Now we present the Reduction in CO_2 Emissions due to Solar PV Plant, as under.

Table No 7: Computation of Reduction in Annual CO_2 Emissions, MT:

No	Particulars	Value	Unit
1	Energy Generated by Solar PV Plant	**312320**	kWh
2	1 kWh of Electrical Energy is equivalent to	**0.9**	Kg of CO_2
3	Reduction in CO2 Emissions in 20-21 = **(1) *(2)/1000**	**281**	MT

Photograph of Solar PV Plant:

CHAPTER V
STUDY OF WASTE MANAGEMENT

5.1 Segregation of Waste at source:

The waste is segregated at source. At all important locations, waste bins are kept to collect the Waste.

Photograph of Waste Collection Bin:

5.2 Organic Waste Management:

The College has a Bio composting Arrangement, to convert the Bio Degradable Waste, like, Leafy Waste into Bio Compost.

Photograph of Bio Composting Arrangement:

5.3 Liquid Waste Management:

The College has installed a 200 m^3/Day Capacity Sewage Treatment plant. The treated water is used for Gardening purpose.

Photograph of Waste Water Treatment Plant:

5.4 Sanitary Waste Incinerator:

For disposal of Sanitary Waste, a Sanitary Waste Incinerator is installed in the campus.

Photograph of Sanitary Waste Incinerator:

CHAPTER-VI
STUDY OF RAIN WATER HARVESTING

The College has installed the Rainwater harvesting project. The Rain Water falling on the terrace at the Hostel block is collected through pipes and is stored in a well. It is further used for gardening purpose.

Photograph of Rain Water Carrying Pipe:

CHAPTER-VII
STUDY OF GREEN & SUSTAINABLE PRACTICES

7.1 Pedestrian Friendly Road:

The College has well maintained internal road to facilitate the easy movement of the students within the campus.

Photograph of Internal Road:

7.2 Internal Tree Plantation:

The College has well maintained landscaped garden in the campus.

Photograph of Tree plantation, Green Landscaping:

7.3 Provision of Ramp for Divyangajan:

For easy movement of Divyangajan, the College has made provision of Ramp.

Photograph of Ramp:

ENVIRONMENTAL AUDIT REPORT

of

SHRI SANT GAJANAN MAHARAJ COLLEGE OF ENGINEERING,

Shegaon, Dist: Buldhana

Year: 2020-21

Prepared by

Enrich Consultants

Yashashree, Plot No 26, Nirmal Bag Society,
Near Muktangan English School, Pune 411 009
Phone: 09890444795 Email:enrichcons@gmail.com

MAHARASHTRA ENERGY DEVELOPMENT AGENCY

An ISO 9001 : 2000 Reg. no. : RQ 91 / 2462

Maharashtra Energy Development Agency

(Government of Maharashtra Institution)

Aundh Road, Opposite Spicer College Road, Near Commissionerate of Animal Husbandary, Aundh, Pune, Maharashtra 411067

Ph No: 020-35000450

Email: eee@mahaurja.com, Web: www.mahaurja.com

ECN/2021-22/CR-14/1577 — 22nd April, 2021

CERTIFICATE OF REGISTRATION
FOR CLASS 'A'

We hereby certify that, the firm having following particulars is registered with ***MAHARASHTRA ENERGY DEVELOPMENT AGENCY (MEDA)*** under given category as "Energy Planner & Energy Auditor" in Maharashtra for Energy Conservation Programme of MEDA.

Name and Address of the firm : **M/s Enrich Consultants**
Yashashree, Plot No. 26, Nirmal Bag Society,
Near Muktangan English School, Parvati,
Pune - 411009.

Registration Category : *Empanelled Consultant for Energy Conservation Programme for Class 'A'*

Registration Number : ***MEDA/ECN/2021-22/Class A/EA-03***

- Energy Conservation Programme intends to identify areas where wasteful use of energy occurs and to evaluate the scope for Energy Conservation and take concrete steps to achieve the evaluated energy savings.
- MEDA reserves the right to visit at any time without giving prior information to verify quarterly activities performed by the firm and canceling the registration, if the information is found incorrect.
- This empanelment is valid till **21st April, 2023** from the date of registration, to carry out energy audits under the Energy Conservation Programme
- The Director General, MEDA reserves the right to cancel the registration at any time without assigning any reasons thereof.

General Manager (EC)

Enrich Consultants

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411 009
Tel: 09890444795 Email: enrichcons@gmail.com

Ref: EC/SSGMCOE/20-21/02 Date: 24/4/2022

CERTIFICATE

This is to certify that we have conducted Environmental Audit at Shri Sant Gajanan Maharaj College of Engineering, Shegaon in the year 2020-21.

The College has adopted following Environmental Friendly Practices:

- Usage of Energy Efficient LED Fittings
- Installation of 310 kWp Roof Top Solar PV Plant
- Segregation of Waste at source
- Implementation of Vermi Composting Arrangement
- Installation of 200 m^3/Day Sewage Treatment Plant
- Provision of Sanitary Waste Incinerator, for disposal of Sanitary Waste
- Implementation of Rain Water Harvesting Project
- Internal Tree Plantation

We appreciate the support of Management, involvement of faculty members and students in the process of Energy Conservation & making the campus Eco Friendly.

For Enrich Consultants,

A Y Mehendale,
Certified Energy Auditor
EA-8192

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ACKNOWLEDGEMENT

We at Enrich Consultants, Pune, express our sincere gratitude to the management of Shri Sant Gajanan Maharaj College of Engineering, Shegaon for awarding us the assignment of Environmental Audit of their Shegaon campus for the Year: 2020-21.

We are thankful to all Staff members for helping us during the field study.

EXECUTIVE SUMMARY

1. Shri Sant Gajanan Maharaj College of engineering, Shegaon consumes various resources for day to day operations, namely: Air, Water, Electrical Energy & LPG.

2. Pollution caused due to Day to Day College Activities:

- Air pollution: Mainly CO_2 on account of Electricity & LPG Consumption
- Solid Waste: Bio degradable Kitchen Waste, Garden Waste
- Liquid Waste: Human liquid waste

3. Present Energy Consumption & CO_2 Emission:

No	Parameter/ Value	Energy Consumed, kWh	CO_2 Emissions, MT
1	Total	512180	460.96
2	Maximum	54398	48.96
3	Minimum	35700	32.13
4	Average	42681.67	38.414

4. Projects already implemented for Environmental Conservation:

- Installation of 310 kWp Roof Top Solar PV Plant
- Installation of Rain Water Harvesting Project
- Installation of 200 m^3/Day Sewage Treatment Plant

5. Indoor Air Quality Parameters:

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	122	66	85
2	Minimum	110	63	79

6. Waste Management:

6.1 Segregation of Waste at source:

The waste is segregated at source. At all important locations, waste bins are kept to collect the Waste.

6.2 Organic Waste Management:

The College has a Bio composting Arrangement, to convert the Bio Degradable Waste, like, Leafy Waste into Bio Compost.

6.3 Liquid Waste Management:

The College has installed a 200 m^3/Day Capacity Sewage Treatment plant. The treated water is used for Gardening purpose.

6.4 Sanitary Waste Management:

The College has installed a Sanitary Waste Incinerator, for disposal of Sanitary Waste.

7. Rain Water Harvesting:

The College has installed the Rainwater harvesting project. The Rain Water falling on the terrace at the Hostel block is collected through pipes and is stored in a well. It is further used for gardening purpose.

8. Eco Friendly Initiatives:

- Internal Tree Plantation

9. Assumption:

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

10. References:

- For CO_2 Emissions: www.tatapower.com
- For Various Indoor Air Parameters: www.ishrae.com
- For AQI &Water Quality Standards: www.cpcb.com

ABBREVIATIONS

Kg	:	Kilo Gram
MSEDCL	:	Maharashtra State Distribution Company Limited
MT	:	Metric Ton
kWh	:	kilo-Watt Hour
LED	:	Light Emitting Diode
AQI	:	Air Quality Index
PM-2.5	:	Particulate Matter of Size 2.5 Micron
PM-10	:	Particulate Matter of Size 10 Micron
CPCB	:	Central Pollution Control Board

CHAPTER-I

INTRODUCTION

1.1Important Definitions:

1.1.1Environment: Definition as per environment Protection Act: 1986

Environment includes water, air and land and the inter-relationship which exists among and between Water, Air, Land and Human beings, other living creatures, plants microorganism and property

1.1.2. Environmental Audit: Definition:

An audit which aims at verification and validation to ensure that various environmental laws are compiled with and adequate care has been taken towards environmental protection and preservation

According to UNEP, 1990, "Environmental audit can be defined as a management tool comprising systematic, documented and periodic evaluation of how well environmental organization management and equipment are performing with an aim of helping to regularize the environment

1.1.3. Environmental Pollutant: means any solid, liquid and gaseous substance present in the concentration as may be, or tend to be, injurious to Environment.

1.1.4. Relevant Environmental Laws in India: Table No-1:

1927	The Indian Forest Act
1972	The Wildlife Protection Act
1974	The Water (Prevention and Control of Pollution) Act
1977	The Water (Prevention & Control of Pollution) Cess Act
1980	The Forest (Conservation) Act
1981	The Air (Prevention and Control of Pollution) Act
1986	The Environment Protection Act
1991	The Public Liability Insurance Act
2002	The Biological Diversity Act
2010	The National Green Tribunal Act

1.1.5. Some Important Environmental Rules in India: Table No-2:

1989	Hazardous Waste (Management and Handling) Rules
1989	Manufacture, Storage and Import of Hazardous Chemical Rules
2000	Municipal Solid Waste (Management and Handling) Rules
1998	The Biomedical Waste (Management and Handling) Rules
1999	The Environment (Siting for Industrial Projects) Rules
2000	Noise Pollution (Regulation and Control) Rules
2000	Ozone Depleting Substances (Regulation and Control) Rules
2011	E-waste (Management and Handling) Rules
2011	National Green Tribunal (Practices and Procedure) Rules
2011	Plastic Waste (Management and Handling) Rules

1.1.6 National Environmental Plans & Policy Documents: Table No-3:

1.	National Forest Policy, 1988
2.	National Water Policy, 2002
3.	National Environment Policy or NEP (2006)
4.	National Conservation Strategy and Policy Statement on Environment and Development, 1992
5.	Policy Statement for Abatement of Pollution (1992)
6.	National Action Plan on Climate Change
7.	Vision Statement on Environment and Human Health
8.	Technology Vision 2030 (The Energy Research Institute)
9.	Addressing Energy Security and Climate Change (MoEF and Bureau of Energy Efficiency
10	The Road to Copenhagen; India's Position on Climate Change Issues (MoEF)

1.2 Objectives:

1. To study Resource Consumption & CO_2 Emissions
2. To Study CO_2 Emission Reduction
3. To study Indoor Air Quality Parameters
4. To Study of Waste Management
5. To Study of Rain Water Management
6. To Study of Environment Friendly Initiatives

1.4 Table No-4: General Details of College:

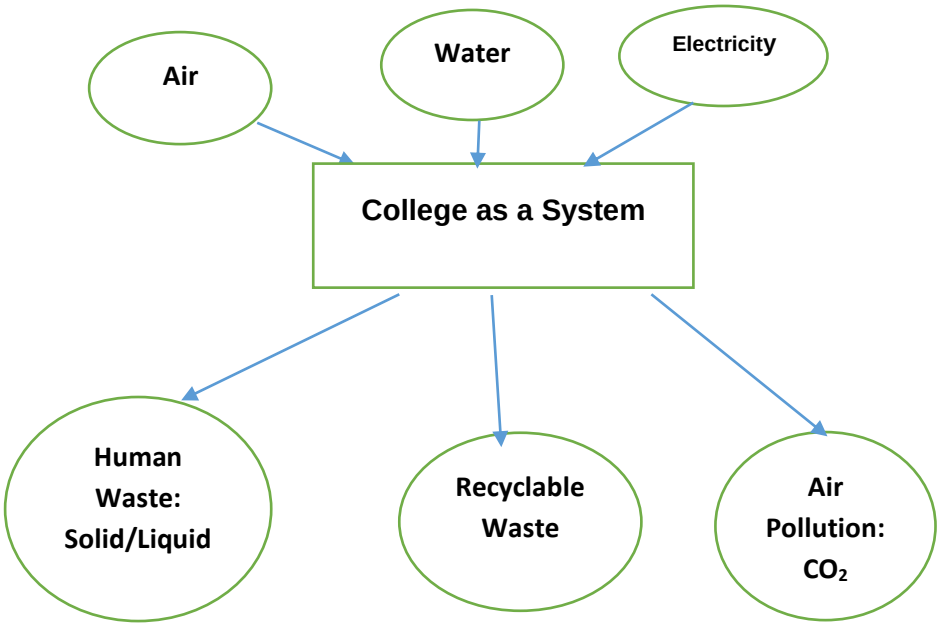
No	Head	Particulars
1	Name of Institute	Shri Sant Gajanan Maharaj College of Engineering
2	Address	Shegaon, Dist: Buldhana
3	Year of Establishment	1983

CHAPTER-II
STUDY OF RECOURCE CONSUMPTION & CO_2 EMISSION

The College consumes following basic/derived Resources:

1. Air
2. Water
3. Electrical Energy

We try to draw a schematic diagram for the College System & Environment as under.
Chart No 1: Representation of College as System & Study of Resources & Waste



Now we compute the Generation of CO_2 on account of consumption of Electrical Energy. The basis of Calculation for CO_2 emissions due to Electrical Energy is as under

- **1 kWh** of Electrical Energy releases **0.9 Kg of CO_2** into atmosphere

Table No 5: Study of Consumption of Electrical Energy & CO_2 Emissions: 20-21:

No	Month	Energy Consumed, kWh	CO_2 Emissions, MT
1	Apr-20	41911	37.72
2	May-20	54398	48.96
3	Jun-20	47725	42.95
4	Jul-20	45021	40.52
5	Aug-20	37365	33.63
6	Sep-20	40843	36.76
7	Oct-20	43148	38.83
8	Nov-20	35700	32.13
9	Dec-20	40689	36.62
10	Jan-21	43659	39.29

11	Feb-21	38318	34.49
12	Mar-21	43403	39.06
13	Total	512180	460.96
14	Maximum	54398	48.96
15	Minimum	35700	32.13
16	Average	42681.67	38.414

Chart No-2: To study the variation of Monthly Electrical Energy Consumption, kWh:

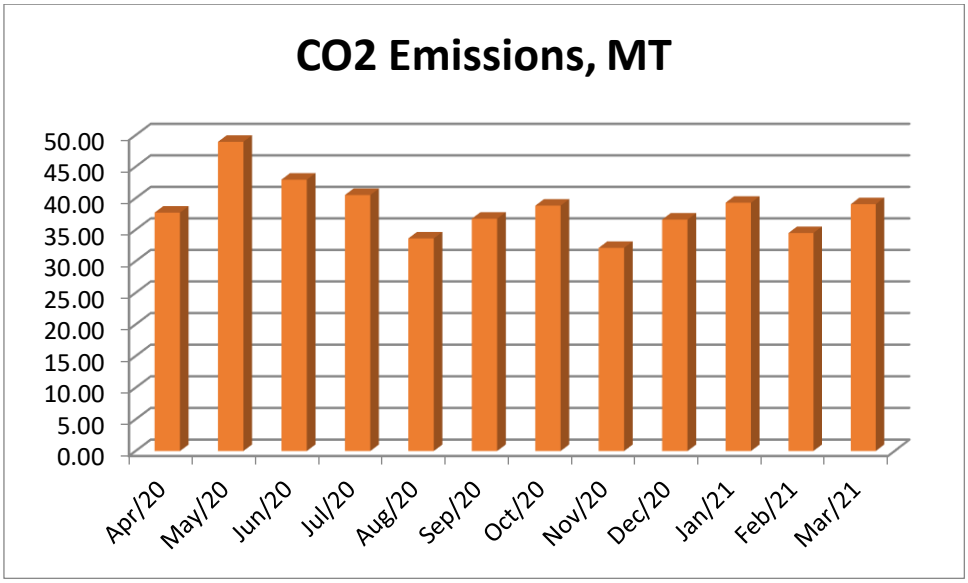


Table No-6: Variation in Important Parameters:

No	Parameter /Value	Energy Consumed, kWh	CO_2 Emissions, MT
1	Total	512180	460.96
2	Maximum	54398	48.96
3	Minimum	35700	32.13
4	Average	42681.67	38.414

CHAPTER III
STUDY OF CO_2 EMISSION REDUCTION

The College has installed Roof Top Solar PV Plant of Capacity **310 kWp**.

Table No 7: Details of Energy Generated by Roof Top Solar PV Plant & Reduction in CO_2 Emissions, MT:

No	Month	Energy Generated, kWh	CO_2 Emission Reduction. MT
1	Apr-20	27871	25.08
2	May-20	31411	28.26
3	Jun-20	23307	20.97
4	Jul-20	21961	19.76
5	Aug-20	17030	15.32
6	Sep-20	23938	21.54
7	Oct-20	26633	23.96
8	Nov-20	24727	22.25
9	Dec-20	25849	23.26
10	Jan-21	27187	24.46
11	Feb-21	29875	26.88
12	Mar-21	32531	29.27
13	Total	312320	281.08
14	Maximum	32531	29.27
15	Minimum	17030	15.32
16	Average	26026.67	23.42

Chart No 3: Month wise Solar Energy Generation, kWh:

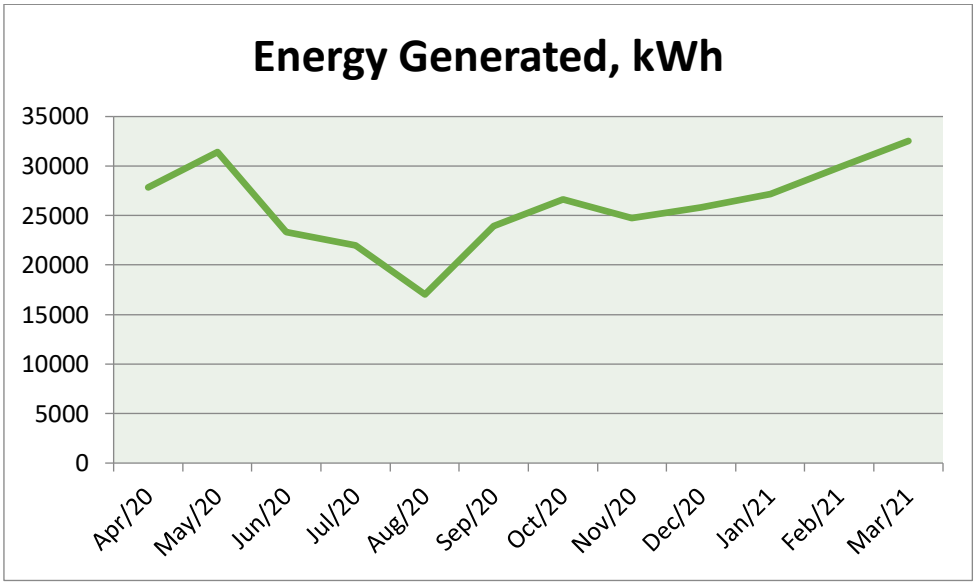
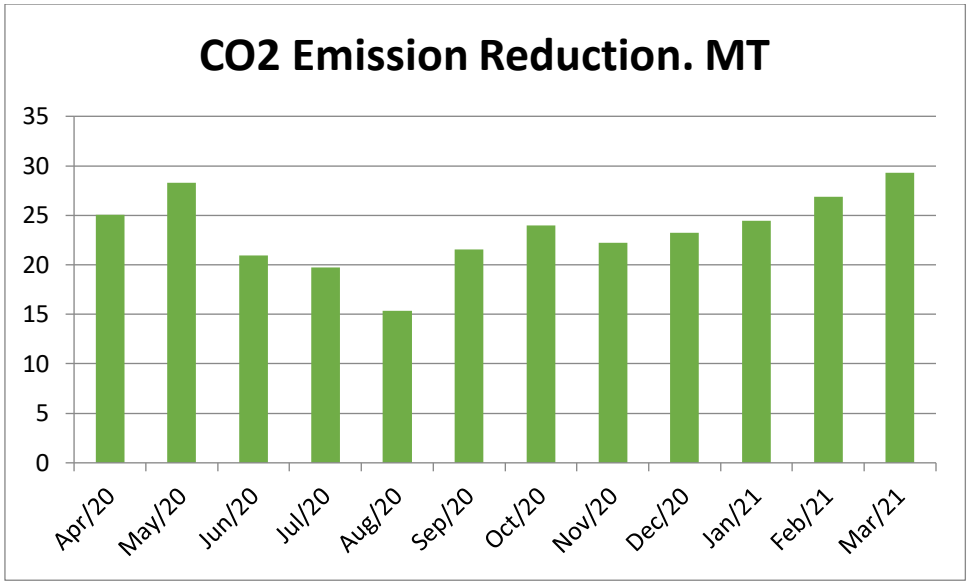


Chart No 4: Month wise Reduction in CO_2 Emissions, MT:



In the following Table, we compute the reduction in CO2 Emissions due to usage of Solar PV Energy.

Table No 8: Computation of % Annual Energy Demand met by Alternate Energy:

No	Particulars	Value	Unit
1	Energy Generated by Solar PV Plant	**312320**	kWh
2	1 kWh of Electrical Energy is equivalent to	**0.9**	Kg of CO_2
3	Reduction in CO2 Emissions in 20-21 = **(1) *(2)/1000**	**281**	MT

Photograph of Roof Top Solar PV Plant:

CHAPTER IV

STUDY OF INDOOR AIR QUALITY

4.1 Importance of Air Quality:

Air: The common name given to the atmospheric gases used in breathing and photosynthesis.

By volume, Dry Air contains 78.09% Nitrogen, 20.95% Oxygen, 0.93% Argon, 0.039% carbon dioxide, and small amounts of other gases.

On average, a person inhales about **14,000 liters** of air every day. Therefore, poor air quality may affect the quality of life now and for future generations by affecting the health, the environment, the economy and the city's livability.

Rapid urbanization and industrialization has added other elements/compounds to the pure air and thus caused the increase in pollution. In order to prevent, control and abate air pollution, the Air (Prevention and Control of Pollution) Act was enacted in 1981.

Air quality is a measure of the suitability of air for breathing by people, plants and animals.

According to Section 2(b) of Air (Prevention and control of pollution) Act, 1981 '**air pollution**' has been defined as **'the presence in the atmosphere of any air pollutant**.'

As per Section 2(a) of Air (Prevention and control of pollution) Act, 1981 '**air pollutant**' has been defined as **'any solid, liquid or gaseous substance [(including noise)] present in the atmosphere in such concentration as may be or tend to be injurious to human beings or other living creatures or plants or property or environment**

4.2 Air Quality Index:

An **Air Quality Index (AQI)** is a number used by government agencies to measure the **air pollution** levels and communicate it to the population. As the AQI increases, it means that a large percentage of the population will experience severe adverse health effects. The measurement of the **AQI** requires an **air monitor** and an **air pollutant** concentration over a specified **averaging period**.

We present herewith following important Parameters.

1. AQI- Air Quality Index
2. PM 2.5- Particulate Matter of Size 2.5
3. PM 2.5- Particulate Matter of Size 2.5

Table No 9: Indoor Air Quality Parameters:

No	Location	AQI	PM-2.5	PM-10
1	Administrative office	113	64	79
2	Principal Office	120	64	82
3	Library	126	66	83
4	Classroom	110	63	79

5	Girls Hostel	112	65	80
6	Boys Hostel	114	65	81
7	Sports Complex	122	66	85
	Maximum	122	66	85
	Minimum	110	63	79

CHAPTER V
STUDY OF WASTE MANAGEMENT

5.1 Segregation of Waste at source:

The waste is segregated at source. At all important locations, waste bins are kept to collect the Waste.

Photograph of Waste Collection Bin:

5.2 Organic Waste Management:

The College has a Bio composting Arrangement, to convert the Bio Degradable Waste, like, Leafy Waste into Bio Compost.

Photograph of Bio Composting Arrangement:

5.3 Liquid Waste Management:

The College has installed a 200 m^3/Day Capacity Sewage Treatment plant. The treated water is used for Gardening purpose.

Photograph of Waste Water Treatment Plant:

5.4 Sanitary Waste Incinerator:

For disposal of Sanitary Waste, a Sanitary Waste Incinerator is installed in the campus.

Photograph of Sanitary Waste Incinerator:

CHAPTER-VI
STUDY OF RAIN WATER HARVESTING

The College has installed the Rainwater harvesting project. The Rain Water falling on the terrace at the Hostel block is collected through pipes and is stored in a well. It is further used for gardening purpose.

Photograph of Rain Water Carrying Pipe:

.

CHAPTER-VII
STUDY OF ENVIRONMENT FRIENDLY INITIATIVES

7.1 Tree Plantation:

The Institute has well maintained Tree Plantation in the campus.

Photograph of Garden/Tree plantation in the campus:

ANNEXURE-I:
AIR & WATER QUALITY STANDARDS:

1. Category Wise Air Quality Index Values & Concentration of PM 2.5 & PM10:

No	Category	AQI Value	Concentration Range, PM 2.5	Concentration Range, PM 10
1	Good	0 to 50	0 to 30	0 to 50
2	Satisfactory	51 to 100	31 to 60	51 to 100
3	Moderately Polluted	101 to 200	61 to 90	101 to 250
4	Poor	201 to 300	91 to 120	251 to 350
5	Very Poor	301 to 400	121 to 250	351 to 430
6	Severe	401 to 500	250 +	430 +

2. Recommended Water Quality Standards:

No	Designated Best Use	Criteria
1	Drinking Water Source without conventional Treatment but after disinfection	pH between **6.5 to 8.5** Dissolved Oxygen **6 mg/l or more**
2	Drinking water source after conventional treatment and disinfection	pH between **6 to 9** Dissolved Oxygen **4 mg/l or more**
3	Outdoor Bathing (Organized)	pH between **6.5 to 8.5** Dissolved Oxygen **5 mg/l or more**
4	Controlled Waste Disposal	pH between **6 to 8.5**

ENERGY AUDIT REPORT

of

SHRI SANT GAJANAN MAHARAJ COLLEGE OF ENGINEERING,

Shegaon, Dist: Buldhana

Year: 2019-20

Prepared by:

Enrich Consultants

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411009
Phone: 09890444795 Email: enrichcons@gmail.com

MAHARASHTRA ENERGY DEVELOPMENT AGENC

Maharashtra Energy Development Agency

(A Government of Maharashtra undertaking)
2nd Floor, MHADA Commercial Complex, Opp. Tridal Nagar, Yerwada, Pune 411 006
Ph No: 020-26614393/266144403, Fax No: 020-26615031
Email: econ@mahaurja.com , Web: www.mahaurja.com

ECN/2017-18/CR-01/5726 — 30th November 2017

CERTIFICATE OF REGISTRATION
FOR CLASS 'A'

We hereby certify that, the firm having following particulars is registered with ***MAHARASHTRA ENERGY DEVELOPMENT AGENCY (MEDA)*** under given category as "Energy Planner & Energy Auditor in Maharashtra under Save Energy Programme of MEDA.

Name and Address of the firm	:	Enrich Consultants Yashashree, Plot No. 26,Nirmal Baug Society,Parvati, Pune - 411009.
Registration Category	:	Empanelled *Consultant for Save Energy Programme.*
Registration Number	:	***MEDA/ECN/CR-01/2017-18/EA-37***

- The Save Energy Programme intends to identify areas where wasteful use of energy occurs and to evaluate the scope for Energy Conservation and take concrete steps to achieve the evaluated energy savings.
- MEDA reserves the right to visit the firm at any time without giving any prior information and canceling the registration, if the information is found incorrect.
- This empanelment is valid upto **3 year** from the date of registration, to carry out energy audits under the Save Energy Programme of MEDA.
- The Director General, MEDA reserves the right to cancel the registration at any time without assigning any reasons thereof.

30/11

(Smita Kudarikar)
Manager (EC)

Enrich Consultants

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411 009
Tel: 09890444795 Email: enrichcons@gmail.com

Ref: EC/SSGMCOE/19-20/01 Date: 22/8/2020

CERTIFICATE

This is to certify that we have conducted Energy Audit at Shri Sant Gajanan Maharaj College of Engineering, Shegaon in the year 2019-20.

The College has adopted following Energy Efficient Practices:

- Usage of Energy Efficient LED Fittings
- Usage of Energy Efficient BEE STAR Rated equipment
- Maximum usage of Day Lighting
- Installation of **210 kWp** Roof Top Solar PV Plant

We appreciate the support of Management, involvement of faculty members and students in the process of Energy Conservation & making the campus Green.

For Enrich Consultants,

A Y Mehendale,
Certified Energy Auditor
EA-8192

INDEX

ACKNOWLEDGEMENT

We at Enrich Consultants, Pune, express our sincere gratitude to the management of Shri Sant Gajanan Maharaj College of Engineering, Shegaon for awarding us the assignment of Energy Audit of their Shegaon Campus for the Year: 2019-20.

We are thankful to all Staff members for helping us during the field measurements.

EXECUTIVE SUMMARY

1. Shri Sant Gajanan Maharaj College of Engineering, Shegaon consumes Energy in the form of **Electrical Energy;** used for various gadgets, Office & other facilities.

2. Present Energy Consumption: In the following Table, we present the details of Energy Consumption & CO_2 emissions.

No	Parameter	Net Energy Consumed, kWh	CO_2 Emissions, MT
1	Total	10,23,320	921
2	Maximum	1,31,492	118
3	Minimum	63,909	58
4	Average	85,277	77

3. Energy Conservation Projects Installed:

1. Use of Auto Timers for outdoor lighting
2. Usage of Water Level Controllers
3. Usage of Energy Efficient LED Fittings

4. Usage of Alternate Energy:

- The College has installed a **210 kWp** Roof Top Solar PV Plant.
- The Energy generated by Solar PV Plant in 19-20 is **278705 kWh**
- The Energy Exported is **29347 kWh**
- Energy purchased from MSEDCL is **773962 kWh**
- The Net Energy Demand in 19-20 is **1023320 kWh**
- The percentage of Alternate Energy usage to Annual Energy Demand is **27.23 %.**

5. Usage of LED Lighting:

- The LED Lighting Load is **17.96 kW**
- The Total Lighting Load is **43.26 kW**
- The percentage of usage of LED lights to Total Lighting Load is **41.52 %.**

6. Assumption:

- **1 kWh** of Electrical Energy releases **0.9 Kg of CO_2** into atmosphere

7. Reference:

- For CO_2 Emissions: www.tatasolar.com

ABBREVIATIONS

CFL	:	Compact Fluorescent Lamp
CO_2	:	Carbon- Di- Oxide
FTL	:	Fluorescent Tube Light
LED	:	Light Emitting Diode
V	:	Voltage
I	:	Current
kW	:	Kilo- Watt
kWh	:	kilo-Watt Hour
kVA	:	Active Power
MT	:	Metric Ton
P V	:	Photo Voltaic

CHAPTER-I
INTRODUCTION

1.1 Objectives:

1. To study present Connected Load
2. To study present Energy Consumption
3. To Study the present CO_2 emissions
4. To study usage of Renewable Energy
5. To study usage of LED Lighting

1.2 General Details of College: Table No-1:

No	Head	Particulars
1	Name of College	Shri Sant Gajanan Maharaj College of Engineering
2	Address	Shegaon, Dist: Buldhana
3	Year of Establishment	1983

CHAPTER-II
STUDY OF CONNECTED LOAD

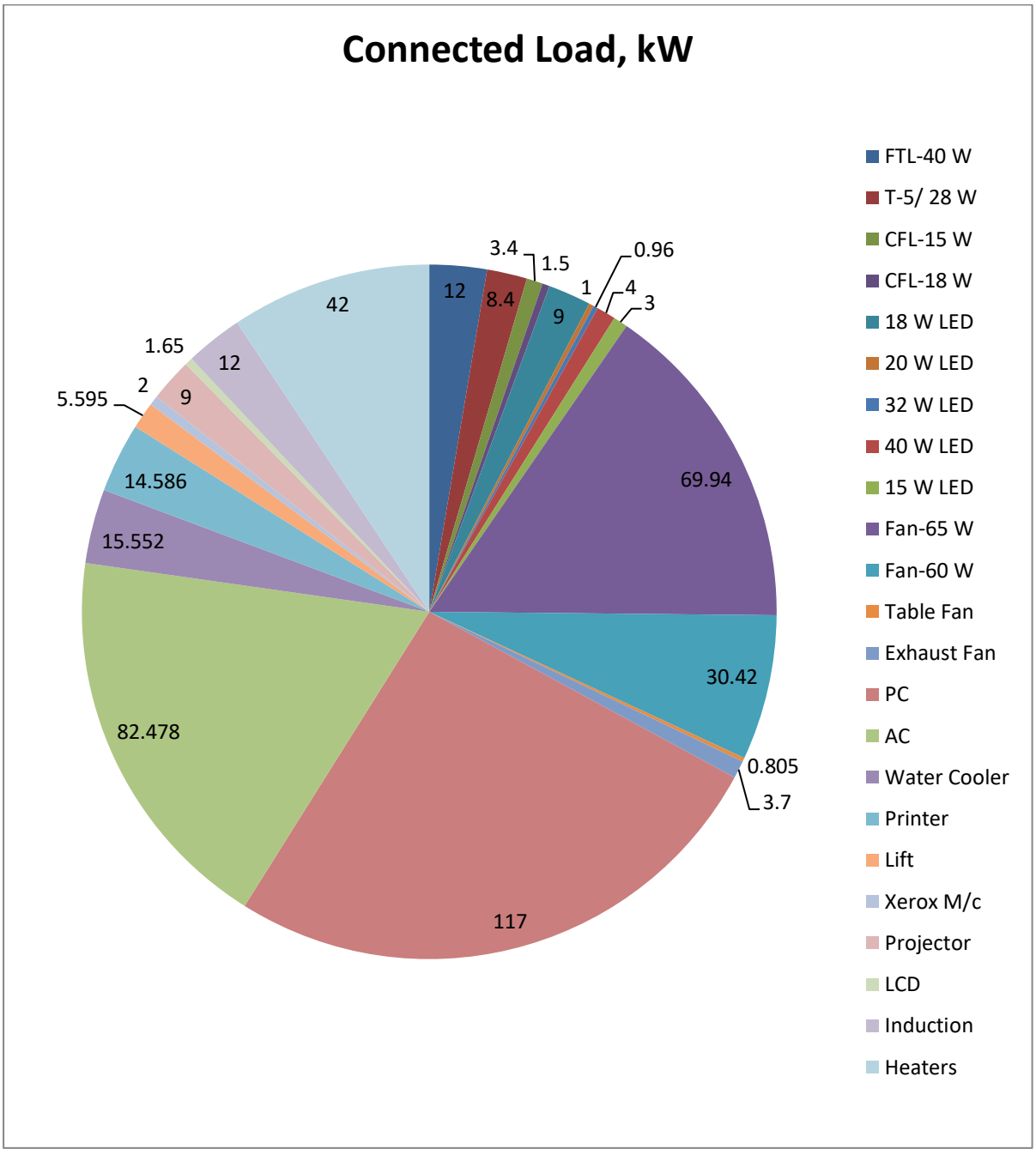
In this chapter, we present the details of various Electrical loads as under

Table No: 2: Study of Equipment wise Connected Load:

No	Equipment	Quantity	Load, W/unit	Load, kW
1	FTL-40 W	300	40	12
2	T-5/ 28 W	300	28	8.4
3	CFL-15 W	200	17	3.4
4	CFL-18 W	75	20	1.5
5	18 W LED	500	18	9
6	20 W LED	50	20	1
7	32 W LED	30	32	0.96
8	40 W LED	100	40	4
9	15 W LED	200	15	3
10	Fan-65 W	1076	65	69.94
11	Fan-60 W	507	60	30.42
12	Table Fan	23	35	0.805
13	Exhaust Fan	37	100	3.7
14	PC	468	250	117
15	AC	46	1793	82.478
16	Water Cooler	18	864	15.552
17	Printer	39	374	14.586
18	Lift	1	5595	5.595
19	Xerox M/c	4	500	2
20	Projector	30	300	9
21	LCD	3	550	1.65
22	Induction	4	3000	12
23	Heaters	14	3000	42
24	**Total**			**450.0**

In the following Table, we present the same in a PIE Chart

Chart No 1: Total Connected Load:



CHAPTER-III
STUDY OF PRESENT ENERGY CONSUMPTION

In this chapter, we present the analysis of last year Electricity Bills.

Table No- 3: Electrical Energy Analysis- 2019-20:

No	Month	Energy Purchased, kWh = (1)	Energy Generated, kWh =(2)	Energy Exported, kWh= (3)	Net Energy Consumed, kWh = (1+2-3)
1	Apr-19	98,533	26,736	510	1,24,759
2	May-19	1,02,277	29,447	232	1,31,492
3	Jun-19	47,270	22,714	1,670	68,314
4	Jul-19	69,937	8,496	228	78,205
5	Aug-19	71,422	18,444	809	89,057
6	Sep-19	76,462	19,362	563	95,261
7	Oct-19	66,153	23,261	2,125	87,289
8	Nov-19	53,325	24,722	1,458	76,589
9	Dec-19	49,402	21,811	1,738	69,475
10	Jan-20	44,724	25,303	3,476	66,551
11	Feb-20	51,715	28,264	7,560	72,419
12	Mar-20	42,742	30,145	8,978	63,909
13	Total	7,73,962	2,78,705	29,347	10,23,320
14	Maximum	1,02,277	30,145	8,978	1,31,492
15	Minimum	42,742	8,496	228	63,909
16	Average	64,497	23,225	2,446	85,277

Chart No-2: Month wise Variation in Energy Consumption, kWh;

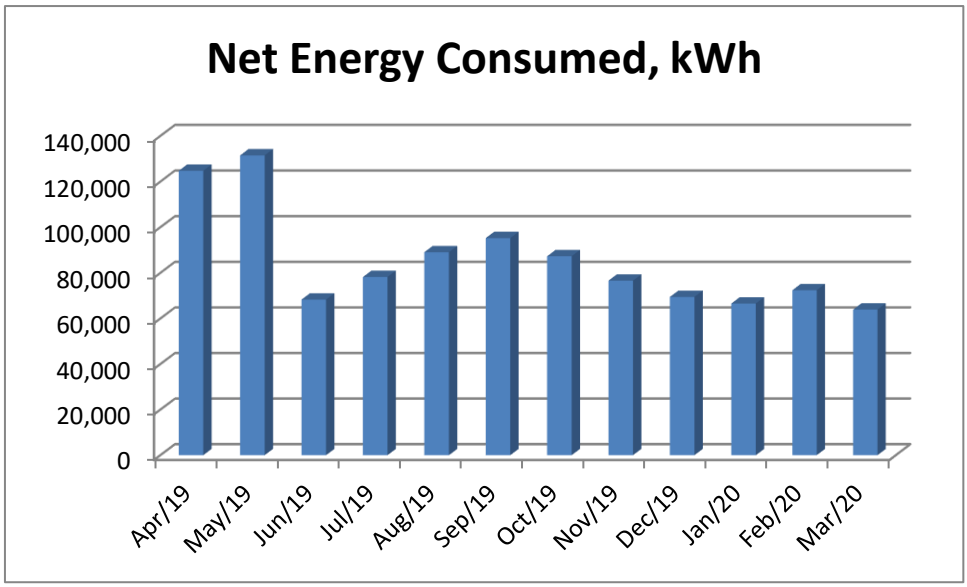


Table No-4: Various Important Parameters:

No	Parameter /Value	Energy Purchased, kWh = (1)	Energy Generated, kWh =(2)	Energy Exported, kWh= (3)	Net Energy Consumed, kWh = (1+2-3)
1	Total	7,73,962	2,78,705	29,347	10,23,320
2	Maximum	1,02,277	30,145	8,978	1,31,492
3	Minimum	42,742	8,496	228	63,909
4	Average	64,497	23,225	2,446	85,277

CHAPTER-IV
CARBON FOOTPRINTING

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

Basis for computation of CO_2 Emissions:

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

- 1 Unit (kWh) of Electrical Energy releases **0.9 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

Table No-5: Month wise CO_2 Emissions:

No	Month	Net Energy Consumed, kWh	CO_2 Emissions, MT
1	Apr-19	1,24,759	112.28
2	May-19	1,31,492	118.34
3	Jun-19	68,314	61.48
4	Jul-19	78,205	70.38
5	Aug-19	89,057	80.15
6	Sep-19	95,261	85.73
7	Oct-19	87,289	78.56
8	Nov-19	76,589	68.93
9	Dec-19	69,475	62.53
10	Jan-20	66,551	59.90
11	Feb-20	72,419	65.18
12	Mar-20	63,909	57.52
13	Total	10,23,320	921
14	Maximum	1,31,492	118
15	Minimum	63,909	58
16	Average	85,277	77

Chart No 3: Representation of Month wise CO_2 Emissions:

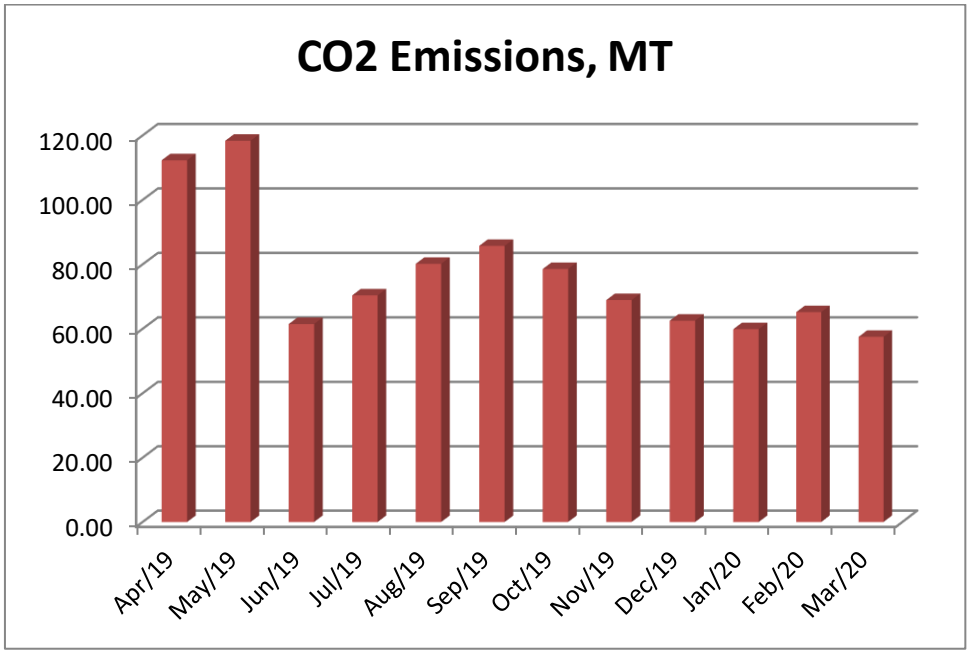


Table No 6: Important Parameters:

No	Parameter /Value	Net Energy Consumed, kWh	CO_2 Emissions, MT
1	Total	10,23,320	921
2	Maximum	1,31,492	118
3	Minimum	63,909	58
4	Average	85,277	77

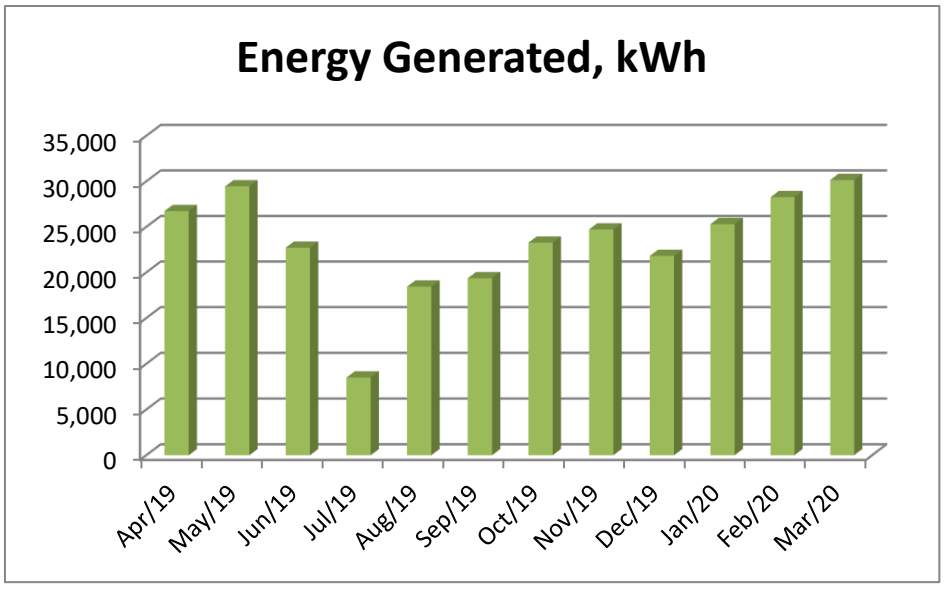
CHAPTER-V
STUDY OF USAGE OF ALTERNATE ENERGY

In this Chapter, we present the Usage of Alternate Energy.
The College has installed a Roof Top Solar PV Plant of Capacity **210 kWp**.
In the following Table, we present the Energy Generation Data.

Table No 7: Study of Month wise Energy Generation by 210 kWp Solar PV Plant:

No	Month	Energy Generated by Solar Plant, kWh
1	Apr-19	26,736
2	May-19	29,447
3	Jun-19	22,714
4	Jul-19	8,496
5	Aug-19	18,444
6	Sep-19	19,362
7	Oct-19	23,261
8	Nov-19	24,722
9	Dec-19	21,811
10	Jan-20	25,303
11	Feb-20	28,264
12	Mar-20	30,145
13	Total	2,78,705
14	Maximum	30,145
15	Minimum	8,496
16	Average	23,225

We present the month wise generation in a PIE chart as under.
Chart No 4 : Month Wise Solar Energy Generation:



Now we present the percentage of Usage of Alternate Energy, as under.

Table No 8: Computation of Usage of Alternate Energy:

No	Particulars	Value	Unit
1	Total Energy Purchased from MSEDCL	7,73,962	kWh
2	Energy Generated by Solar PV Plant	**2,78,705**	kWh
2	Energy Exported to Grid	29347	kWh
3	Net Energy Demand = 1+2-3	**1023320**	kWh
5	Percentage of Usage of Alternate Energy **= (2)*100/(4)**	**27.23**	%

Photograph of Solar PV Plant:

CHAPTER-VI
STUDY OF USAGE OF LED LIGHTING

In this Chapter we present the percentage of usage of LED Lights.

Table No 9: Computation of % of LEDs to Total Lighting Load:

No	Particulars	Value	Unit
1	Qty of 40 W FTL Fitting	300	Nos
2	Load/Unit of 40 W FTL Fitting	40	W
3	Total load of 40 W FTL Fittings	**12**	kW
4	Qty of 28 W T-5 Fitting	300	Nos
5	Load/Unit of 28 W T-5 Fitting	28	W
6	Total load of 28 W T-5 Fittings	**8.4**	kW
7	Qty of 15 W CFL Fitting	200	Nos
8	Load/unit of 15 W CFL Fitting	17	W
9	Total load of 15 W CFL Fittings	**3.4**	kW
10	Qty of 18 W CFL Fitting	75	Nos
11	Load/unit of 18 W CFL Fitting	20	W
12	Total load of 18 W CFL Fittings	**1.5**	kW
13	Qty of 18 W LED Fitting	500	Nos
14	Load/unit of 18 W LED Fitting	18	W
15	Total load of 18 W LED Fittings	**9**	kW
16	Qty of 20 W LED Fitting	50	Nos
17	Load/unit of 20 W LED Fitting	20	W
18	Total load of 20 W LED Fittings	**1**	kW
19	Qty of 32 W LED Fitting	30	Nos
20	Load/unit of 32 W LED Fitting	32	W
21	Total load of 32 W LED Fittings	**0.96**	kW
22	Qty of 40 W LED Fitting	100	Nos

23	Load/unit of 40 W LED Fitting	40	W
24	Total load of 40 W LED Fittings	**4**	kW
25	Qty of 15 W LED Fitting	200	Nos
26	Load/unit of 15 W LED Fitting	15	W
27	Total load of 15 W LED Fittings	**3**	kW
28	Total LED Lighting Load= 15+18+21+24+27	**17.96**	kW
29	Total Lighting Load= 3+6+9+12+ 15+18+21+24+27	**43.26**	kW
30	% of Usage of LEDs to Total Lighting Load=28*100/29	**41.52**	%

GREEN AUDIT REPORT

of

SHRI SANT GAJANAN MAHARAJ COLLEGE OF ENGINEERING,

Shegaon, Dist: Buldhana

Year: 2019-20

Prepared by

Enrich Consultants

Yashashree, Plot No 26, Nirmal Bag Society,
Near Muktangan English School, Pune 411 009
Phone: 09890444795 Email:enrichcons@gmail.com

MAHARASHTRA ENERGY DEVELOPMENT AGENC

Maharashtra Energy Development Agency
(A Government of Maharashtra undertaking)
2nd Floor, MHADA Commercial Complex, Opp. Tridal Nagar, Yerwada, Pune 411 006
Ph No: 020-26614393/266144403, Fax No: 020-26615031
Email: econ@mahaurja.com , Web: www.mahaurja.com

ECN/2017-18/CR-01/5726 30th November 2017

CERTIFICATE OF REGISTRATION
FOR CLASS 'A'

We hereby certify that, the firm having following particulars is registered with ***MAHARASHTRA ENERGY DEVELOPMENT AGENCY (MEDA)*** under given category as "Energy Planner & Energy Auditor in Maharashtra under Save Energy Programme of MEDA.

Name and Address of the firm	:	Enrich Consultants Yashashree, Plot No. 26,Nirmal Baug Society,Parvati, Pune - 411009.
Registration Category	:	Empanelled *Consultant for Save Energy Programme.*
Registration Number	:	***MEDA/ECN/CR-01/2017-18/EA-37***

- The Save Energy Programme intends to identify areas where wasteful use of energy occurs and to evaluate the scope for Energy Conservation and take concrete steps to achieve the evaluated energy savings.
- MEDA reserves the right to visit the firm at any time without giving any prior information and canceling the registration, if the information is found incorrect.
- This empanelment is valid upto **3 year** from the date of registration, to carry out energy audits under the Save Energy Programme of MEDA.
- The Director General, MEDA reserves the right to cancel the registration at any time without assigning any reasons thereof.

30/11

(Smita Kudarikar)
Manager (EC)

Enrich Consultants

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411 009
Tel: 09890444795 Email: enrichcons@gmail.com

Ref: EC/SSGMCOE/19-20/02 Date: 22/8/2020

CERTIFICATE

This is to certify that we have conducted Green Audit at Shri Sant Gajanan Maharaj College of Engineering, Shegaon, in the year 2019-20.

The College has adopted following Energy Efficient & Green Practices:

- Usage of Energy Efficient LED Fittings
- Installation of 210 kWp Roof Top Solar PV Plant
- Segregation of Waste at source
- Implementation of Vermi Composting Arrangement
- Installation of 200 m^3/Day Sewage Treatment Plant
- Implementation of Rain Water Harvesting Project
- Good Internal Road
- Internal Tree Plantation
- Provision of Ramp for Divyangajan

We appreciate the support of Management, involvement of faculty members and students in the process of Energy Conservation & making the campus Green.

For Enrich Consultants,

A Y Mehendale,
Certified Energy Auditor
EA-8192

INDEX

ACKNOWLEDGEMENT

We at Enrich Consultants, Pune, express our sincere gratitude to the management of Shri Sant Gajanan Maharaj College of Engineering, Shegaon for awarding us the assignment of carrying out Green Audit of their Shegaon campus for the Year: 2019-20.

We are thankful to all the Staff members for helping us during the field study.

EXECUTIVE SUMMARY

1. Shri Sant Gajanan Maharaj College of Engineering, Shegaon consumes **Electrical Energy**; used for various gadgets & office equipment

2. Present Energy Consumption & CO2 Emission:

No	Parameter/ Value	Energy Consumed, kWh	CO_2 Emissions, MT
1	Total	10,52,667	842
2	Maximum	1,31,724	105
3	Minimum	69,984	56
4	Average	87,722	70

3. Projects already implemented for Energy Conservation:

- Installation of 210 kWp Roof Top Solar PV Plant
- Installation of Rain Water Harvesting System
- Installation of 200 m^3/Day Sewage Treatment Plant

4. Usage of Renewable Energy:

- The College has installed Roof Top Solar PV Plant of Capacity **210 kW.**
- Energy generated in Year: 19-20 is **278705 kWh**
- The Reduction in CO_2 Emissions in 19-20 is **250.83 MT.**

5. Waste Management:

5.1 Segregation of Waste at source:

The waste is segregated at source. At all important locations, waste bins are kept to collect the Waste.

5.2 Organic Waste Management:

The College has a Bio composting Arrangement, to convert the Bio Degradable Waste, like, Leafy Waste into Bio Compost.

5.3 Liquid Waste Management:

The College has installed a 200 m^3/Day Capacity Sewage Treatment plant. The treated water is used for Gardening purpose.

6. Rain Water Harvesting:

The College has installed the Rainwater harvesting project. The Rain Water falling on the terrace at the Hostel block is collected through pipes and is stored in a well. It is further used for gardening purpose.

7. Green & Sustainable Initiatives:

- Good Internal Roads
- Internal Tree Plantation
- Provision of Ramp for Divyangajan

8. Assumption:

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

9. Reference:

- For CO_2 Emissions: www.tatasolar.com

ABBREVIATIONS

CO_2	:	Carbon- Di- Oxide
LED	:	Light Emitting Diode
kW	:	Kilo- Watt
kWh	:	kilo-Watt Hour
MT	:	Metric Ton
P V	:	Photo Voltaic

CHAPTER-I
INTRODUCTION

1.1 Objectives:

1. Study of Present Energy Consumption
2. Study of CO_2 emissions
3. Study of Waste Management practices
4. Study of Rain Water Harvesting
5. Study of Green & Sustainable Practices

1.2 General Details of College: Table No 1:

No	Head	Particulars
1	Name of College	Shri Sant Gajanan Maharaj College of Engineering
2	Address	Shegaon, Dist: Buldhana
3	Year of Establishment	1983

CHAPTER-II
STUDY OF PRESENT ENERGY CONSUMPTION

In this chapter, we present the analysis of last year Electricity Bills

Table No. 2: Electrical Energy Analysis: 2019-20:

No	Month	Energy Purchased, kWh = (1)	Energy Generated, kWh =(2)	Energy Exported, kWh= (3)	Net Energy Consumed, kWh = (1+2-3)
1	Apr-19	98,533	26,736	510	1,24,759
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13	Total	7,73,962	2,78,705	29,347	10,23,320
14	Maximum	1,02,277	30,145	8,978	1,31,492
15	Minimum	42,742	8,496	228	63,909
16	Average	64,497	23,225	2,446	85,277

Chart No 1: To study the variation of Monthly Energy Consumption:

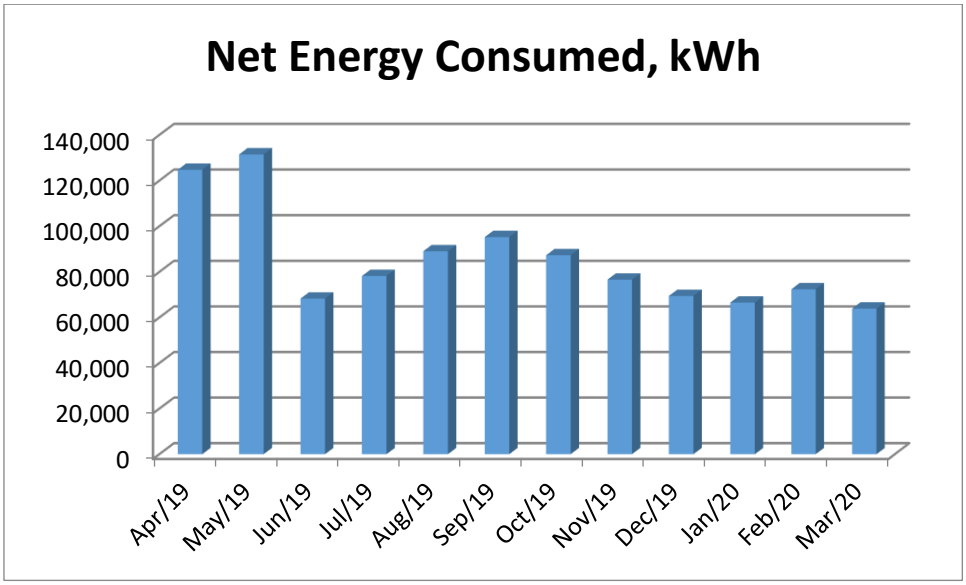

Table No-3: Important Parameters:

No	Parameter /Value	Energy Purchased, kWh = (1)	Energy Generated, kWh =(2)	Energy Exported, kWh= (3)	Net Energy Consumed, kWh = (1+2-3)
1	Total	7,73,962	2,78,705	29,347	10,23,320
2	Maximum	1,02,277	30,145	8,978	1,31,492
3	Minimum	42,742	8,496	228	63,909
4	Average	64,497	23,225	2,446	85,277

CHAPTER-III
CARBON FOOTPRINTING

A Carbon Foot print is defined as the Total Greenhouse Gas emissions (CO_2 emissions), emitted due to various activities.

In this we compute the emissions of Carbon-Di-Oxide, by usage of the various form of Electrical Energy used by the College for performing its day to day activities

Basis for computation of CO_2 Emissions:

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

- 1 Unit (kWh) of Electrical Energy releases **0.9 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
We herewith furnish the details of various forms of Energy consumption as under

Table No-4: Month wise Consumption of Electrical Energy & CO_2 Emissions:

No	Month	Net Energy Consumed, kWh	CO_2 Emissions, MT
1	Apr-19	1,24,759	112.28
2	May-19	1,31,492	118.34
3	Jun-19	68,314	61.48
4	Jul-19	78,205	70.38
5	Aug-19	89,057	80.15
6	Sep-19	95,261	85.73
7	Oct-19	87,289	78.56
8	Nov-19	76,589	68.93
9	Dec-19	69,475	62.53
10	Jan-20	66,551	59.90
11	Feb-20	72,419	65.18
12	Mar-20	63,909	57.52
13	Total	10,23,320	921
14	Maximum	1,31,492	118
15	Minimum	63,909	58
16	Average	85,277	77

In the following Chart we present the CO2 emissions due to usage of Electrical Energy.

Chart No 2: Representation of Month wise CO_2 emissions:

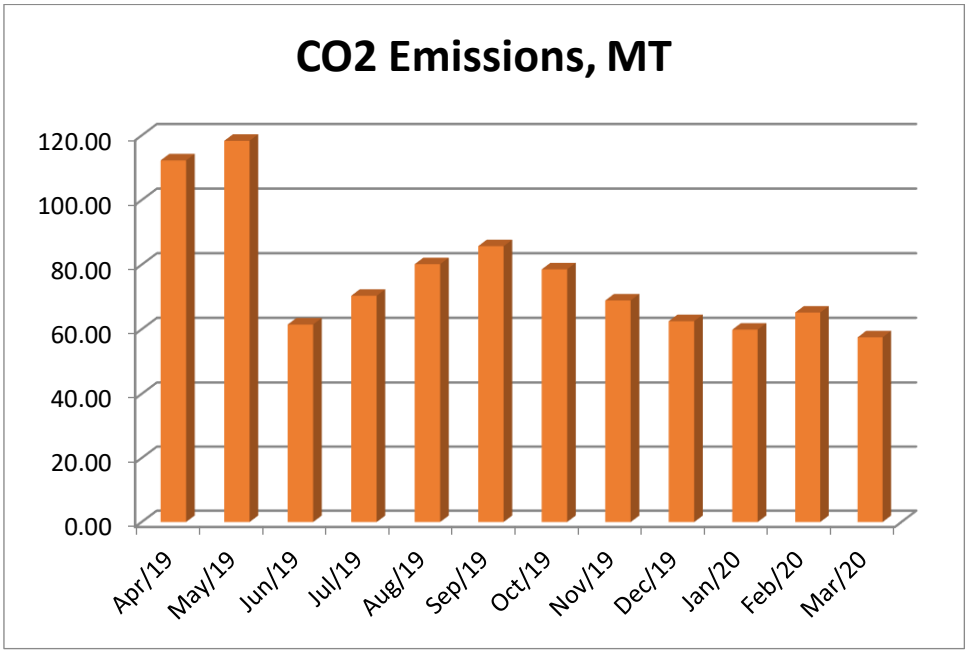

Table No 5: Important Parameters:

No	Parameter /Value	Net Energy Consumed, kWh	CO_2 Emissions, MT
1	Total	10,23,320	921
2	Maximum	1,31,492	118
3	Minimum	63,909	58
4	Average	85,277	77

CHAPTER-IV
STUDY OF USAGE OF RENEWABLE ENERGY

In this Chapter, we present the Usage of Renewable Energy.
The College has installed a Roof Top Solar PV Plant of Capacity **210 kWp**.
In the following Table, we present the Energy Generation Data.

Table No 6: Study of Month wise Energy Generation by 210 kWp Solar PV Plant:

No	Month	Energy Generated by Solar Plant, kWh
1	Apr-19	26,736
2	May-19	29,447
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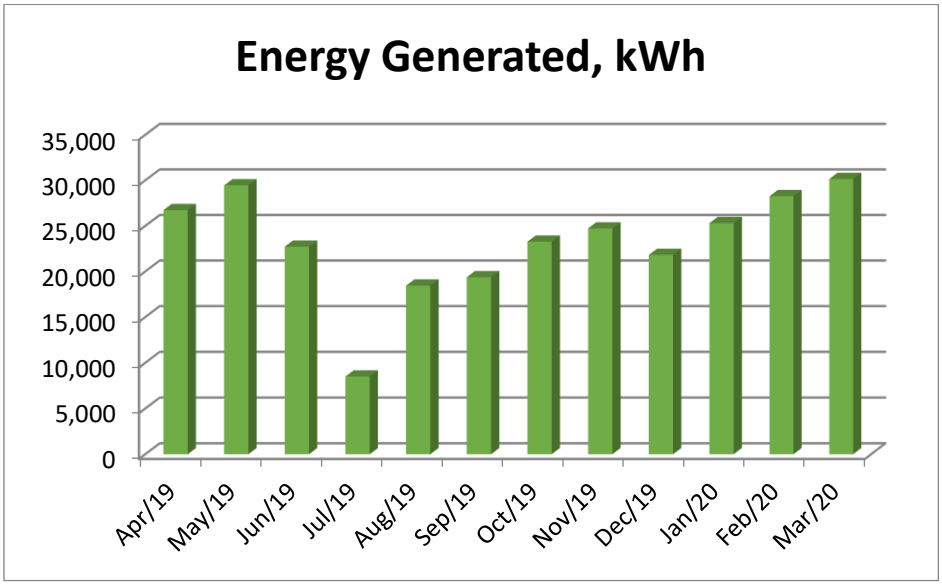
11	Feb-20	28,264
12	Mar-20	30,145
13	Total	2,78,705
14	Maximum	30,145
15	Minimum	8,496
16	Average	23,225

We present the month wise generation in a PIE chart as under.
Chart No 3 : Month Wise Solar Energy Generation:



Now we present the Reduction in CO_2 Emissions due to Solar PV Plant, as under.

Table No 7: Computation of Reduction in Annual CO2 Emissions, MT:

No	Particulars	Value	Unit
1	Energy Generated by Solar PV Plant	**2,78,705**	kWh
2	1 kWh of Electrical Energy is equivalent to	**0.9**	Kg of CO_2
3	Reduction in CO2 Emissions in 19-10 = **(1) *(2)/1000**	**250.83**	MT

Photograph of Solar PV Plant:

CHAPTER-V
STUDY OF WASTE MANAGEMENT

5.1 Segregation of Waste at source:

The waste is segregated at source. At all important locations, waste bins are kept to collect the Waste.

Photograph of Waste Collection Bin:

5.2 Organic Waste Management:

The College has a Bio composting Arrangement, to convert the Bio Degradable Waste, like, Leafy Waste into Bio Compost.

Photograph of Bio Composting Arrangement:

5.3 Liquid Waste Management:

The College has installed a 200 m^3/Day Capacity Sewage Treatment plant. The treated water is used for Gardening purpose.

Photograph of Waste Water Treatment Plant:

CHAPTER-VI

STUDY OF RAIN WATER HARVESTING

The College has installed the Rainwater harvesting project. The Rain Water falling on the terrace at the Hostel block is collected through pipes and is stored in a well. It is further used for gardening purpose.

Photograph of Rain Water Collection Well:

CHAPTER-VII

STUDY OF GREEN & SUSTAINABLE PRACTICES

7.1 Pedestrian Friendly Road:

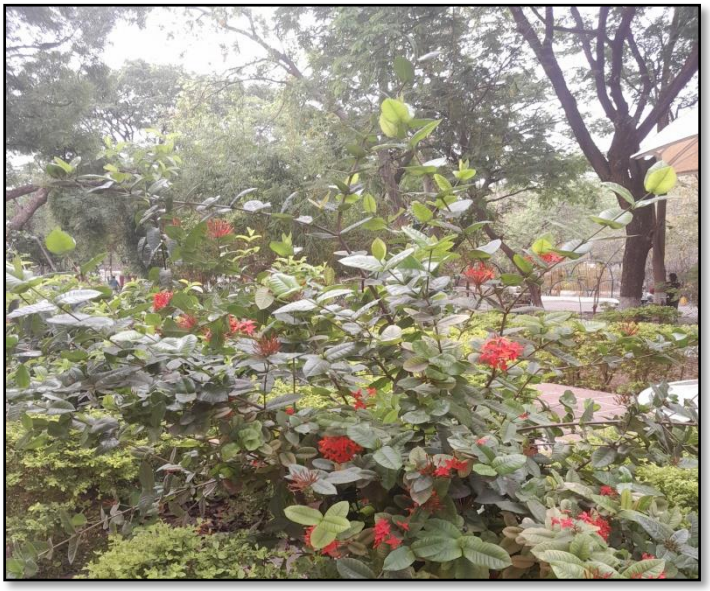
The College has well defined pedestrian foot paths as to facilitate the easy movement of the students within the campus.

Photograph of Road within campus:

7.2 Internal Tree Plantation:

The College has well maintained Tree Plantation in the Campus.

Photograph of Garden/Tree plantation in the campus:



7.3 Provision of Ramp for Divyangajan:

The College has made provision of a Ramp for Divyangajan.

Photograph of Ramp:

ENVIRONMENTAL AUDIT REPORT

of

SHRI SANT GAJANAN MAHARAJ COLLEGE OF ENGINEERING,

Shegaon, Dist: Buldhana

Year: 2019-20

Prepared by

Enrich Consultants

Yashashree, Plot No 26, Nirmal Bag Society,
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MAHARASHTRA ENERGY DEVELOPMENT AGENC

Maharashtra Energy Development Agency

(A Government of Maharashtra undertaking)
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Email: econ@mahaurja.com , Web: www.mahaurja.com

ECN/2017-18/CR-01/5726 — 30th November 2017

CERTIFICATE OF REGISTRATION
FOR CLASS 'A'

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30/11

(Smita Kudarikar)
Manager (EC)

Enrich Consultants

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411 009
Tel: 09890444795 Email: enrichcons@gmail.com

Ref: EC/SSGMCOE/19-20/03 Date: 22/8/2020

CERTIFICATE

This is to certify that we have conducted Environmental Audit at Shri Sant Gajanan Maharaj College of Engineering, Shegaon in the year 2019-20.

The College has adopted following Environmental Friendly Initiatives:

- Usage of Energy Efficient LED Fittings
- Installation of 210 kWp Roof Top Solar PV Plant
- Segregation of Waste at source
- Implementation of Vermi Composting Arrangement
- Installation of 200 m^3/Day Sewage Treatment Plant
- Implementation of Rain Water Harvesting Project
- Internal Tree Plantation

We appreciate the support of Management, involvement of faculty members and students in the process of Energy Conservation & making the campus Green.

For Enrich Consultants,

A Y Mehendale,
Certified Energy Auditor
EA-8192

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ACKNOWLEDGEMENT

We at Enrich Consultants, Pune, express our sincere gratitude to the management of Shri Sant Gajanan Maharaj College of Engineering, Shegaon for awarding us the assignment of Environmental Audit of their Shegaon campus for the Year: 2019-20.

We are thankful to all the Staff members for helping us during the field study.

EXECUTIVE SUMMARY

1. Shri Sant Gajanan Maharaj College of engineering, Shegaon consumes various resources for day to day operations, namely: Air, Water, and Electrical Energy.

2. Pollution caused due to Day to Day College Activities:

- Air pollution: Mainly CO_2 on account of Electricity & LPG Consumption
- Solid Waste: Bio degradable Kitchen Waste, Garden Waste
- Liquid Waste: Human liquid waste

3. Present Energy Consumption of CO_2 Emissions:

No	Parameter/ Value	Energy Consumed, kWh	CO_2 Emissions, MT
1	Total	10,52,667	842
2	Maximum	1,31,724	105
3	Minimum	69,984	56
4	Average	87,722	70

4. Projects implemented for Environmental Conservation:

- Installation of 210 kWp Roof Top Solar PV Plant
- Implementation of Bio Composting pit for disposal of Bio degradable waste
- Implementation of Rain Water Harvesting
- Installation of 200 m^3/Day Waste Water treatment Plant.

5. Usage of Renewable Energy:

- The College has installed Roof Top Solar PV Plant of Capacity **210 kW.**
- Energy generated in Year: 19-20 is **278705 kWh**
- The Reduction in CO_2 Emissions in 19-20 is **250.83 MT.**

6. Waste Management:

6.1 Segregation of Waste at source:

The waste is segregated at source. At all important locations, waste bins are kept to collect the Waste.

6.2 Organic Waste Management:

The College has a Bio composting Arrangement, to convert the Bio Degradable Waste, like, Leafy Waste into Bio Compost.

6.3 Liquid Waste Management:

The College has installed a 200 m^3/Day Capacity Sewage Treatment plant. The treated water is used for Gardening purpose.

7. Rain Water Harvesting:

The College has installed the Rainwater harvesting project. The Rain Water falling on the terrace at the Hostel block is collected through pipes and is stored in a well. It is further used for gardening purpose.

8. Eco Friendly Initiatives:

- Internal Tree Plantation

9. Assumption:

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

10. Reference:

- For CO_2 Emissions: www.tatasolar.com

ABBREVIATIONS

CO_2	:	Carbon- Di- Oxide
LED	:	Light Emitting Diode
kW	:	Kilo- Watt
kWh	:	kilo-Watt Hour
MT	:	Metric Ton
P V	:	Photo Voltaic

CHAPTER-I
INTRODUCTION

1.1Important Definitions:

1.1.1Environment: Definition as per environment Protection Act: 1986

Environment includes water, air and land and the inter-relationship which exists among and between Water, Air, Land and Human beings, other living creatures, plants microorganism and property

1.1.2. Environmental Audit: Definition:

An audit which aims at verification and validation to ensure that various environmental laws are compiled with and adequate care has been taken towards environmental protection and preservation

According to UNEP, 1990, "Environmental audit can be defined as a management tool comprising systematic, documented and periodic evaluation of how well environmental organization management and equipment are performing with an aim of helping to regularize the environment

1.1.3. Environmental Pollutant: means any solid, liquid and gaseous substance present in the concentration as may be, or tend to be, injurious to Environment.

1.1.4. Relevant Environmental Laws in India: Table No-1:

1927	The Indian Forest Act
1972	The Wildlife Protection Act
1974	The Water (Prevention and Control of Pollution) Act
1977	The Water (Prevention & Control of Pollution) Cess Act
1980	The Forest (Conservation) Act
1981	The Air (Prevention and Control of Pollution) Act
1986	The Environment Protection Act
1991	The Public Liability Insurance Act
2002	The Biological Diversity Act
2010	The National Green Tribunal Act

1.1.5. Some Important Environmental Rules in India: Table No-2:

1989	Hazardous Waste (Management and Handling) Rules
1989	Manufacture, Storage and Import of Hazardous Chemical Rules
2000	Municipal Solid Waste (Management and Handling) Rules
1998	The Biomedical Waste (Management and Handling) Rules
1999	The Environment (Siting for Industrial Projects) Rules
2000	Noise Pollution (Regulation and Control) Rules
2000	Ozone Depleting Substances (Regulation and Control) Rules
2011	E-waste (Management and Handling) Rules

2011	National Green Tribunal (Practices and Procedure) Rules
2011	Plastic Waste (Management and Handling) Rules

1.1.6 National Environmental Plans & Policy Documents: Table No-3:

1.	National Forest Policy, 1988
2.	National Water Policy, 2002
3.	National Environment Policy or NEP (2006)
4.	National Conservation Strategy and Policy Statement on Environment and Development, 1992
5.	Policy Statement for Abatement of Pollution (1992)
6.	National Action Plan on Climate Change
7.	Vision Statement on Environment and Human Health
8.	Technology Vision 2030 (The Energy Research College)
9.	Addressing Energy Security and Climate Change (MoEF and Bureau of Energy Efficiency
10	The Road to Copenhagen; India's Position on Climate Change Issues (MoEF)

1.2 Objectives:

1. To study Recourse Consumption and CO_2 Emission
2. To Study CO_2 Emission Reduction
3. To Study Waste Management Practices
4. To Study Rain Water Harvesting
5. To study Environment Friendly Practices

1.3 General Details of College:

No	Head	Particulars
1	Name of College	Shri Sant Gajanan Maharaj College of Engineering
2	Address	Shegaon, Dist: Buldhana
3	Year of Establishment	1983

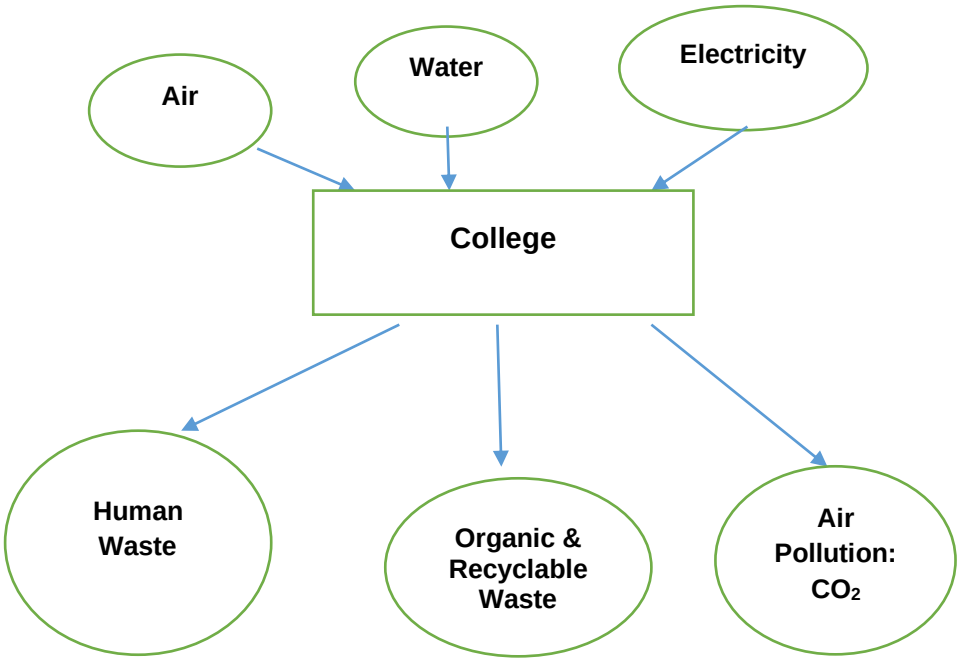
CHAPTER-II
STUDY OF RESOURCE CONSUMPTION & CO_2 EMISSION

The College consumes following Natural/derived Resources:

1. Air
2. Water
3. Electrical Energy

We try to draw a schematic diagram for the College System & Environment as under.

Chart No: 1: Representation of College as System:



We compute the Generation of CO_2 on account of consumption of Electrical Energy as under. The basis of Calculation for CO_2 emissions due to Electrical Energy are: 1 Unit (kWh) of Electrical Energy releases **0.9 Kg of CO_2** into atmosphere.

Table No 5: Electrical Energy Consumption & CO_2 Emission: 19-20:

No	Month	Net Energy Consumed, kWh	CO_2 Emissions, MT
1	Apr-19	1,24,759	112.28
2	May-19	1,31,492	118.34
3	Jun-19	68,314	61.48
4	Jul-19	78,205	70.38
5	Aug-19	89,057	80.15

6	Sep-19	95,261	85.73
7	Oct-19	87,289	78.56
8	Nov-19	76,589	68.93
9	Dec-19	69,475	62.53
10	Jan-20	66,551	59.90
11	Feb-20	72,419	65.18
12	Mar-20	63,909	57.52
13	Total	10,23,320	921
14	Maximum	1,31,492	118
15	Minimum	63,909	58
16	Average	85,277	77

Chart No 2: To study the variation of Monthly Electrical Energy Consumption, kWh:

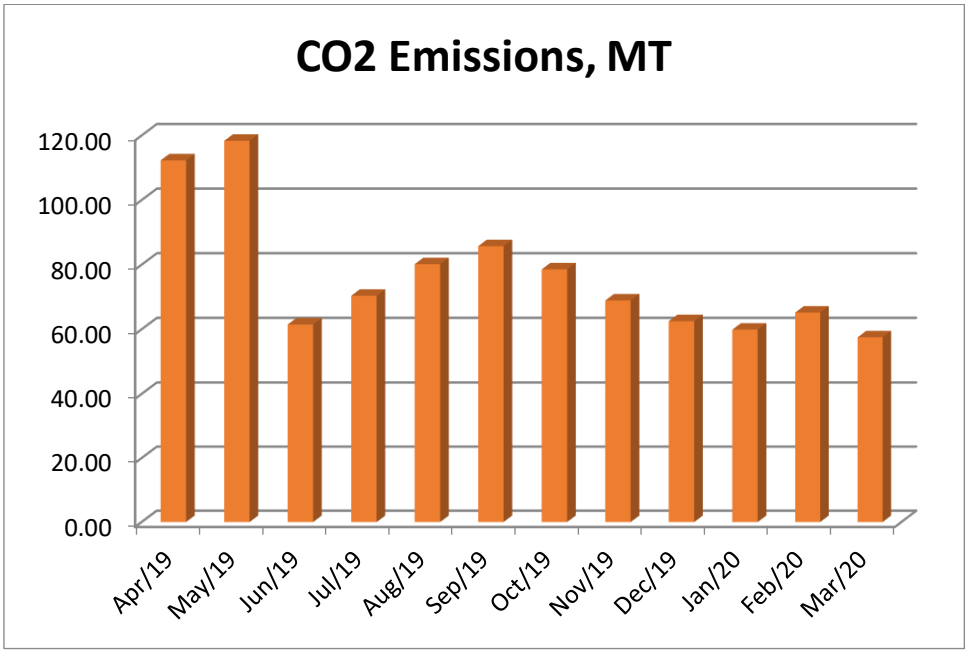


Table No-6: Variation in Important Parameters:

No	Parameter /Value	Net Energy Consumed, kWh	CO_2 Emissions, MT
1	Total	10,23,320	921
2	Maximum	1,31,492	118
3	Minimum	63,909	58
4	Average	85,277	77

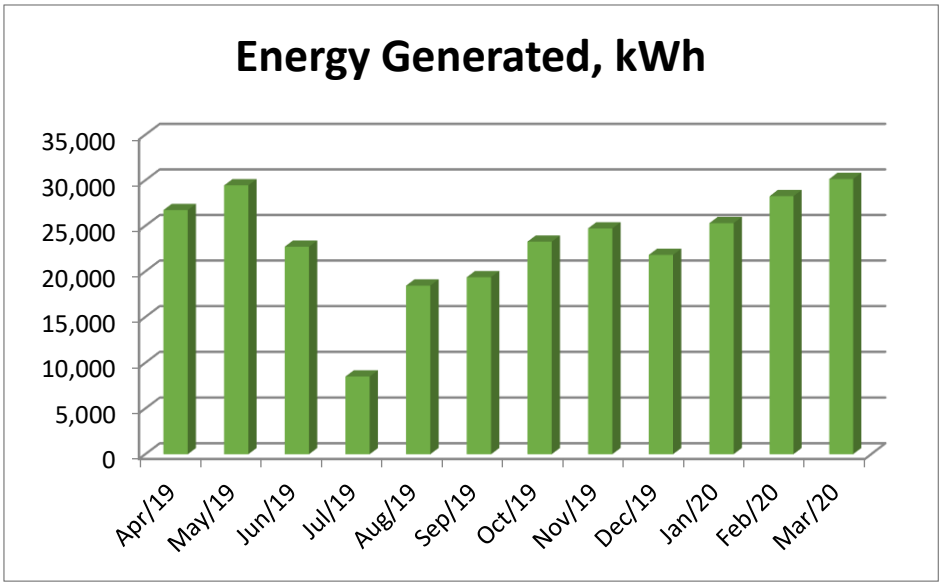
CHAPTER-III
STUDY OF CO_2 EMISSION REDUCTION

In this Chapter, we present the Usage of Renewable Energy.
The College has installed a Roof Top Solar PV Plant of Capacity **210 kWp**.
In the following Table, we present the Energy Generation Data.

Table No 6: Study of Month wise Energy Generation by 210 kWp Solar PV Plant:

No	Month	Energy Generated by Solar Plant, kWh
1	Apr-19	26,736
2	May-19	29,447
3	Jun-19	22,714
4	Jul-19	8,496
5	Aug-19	18,444
6	Sep-19	19,362
7	Oct-19	23,261
8	Nov-19	24,722
9	Dec-19	21,811
10	Jan-20	25,303
11	Feb-20	28,264
12	Mar-20	30,145
13	Total	2,78,705
14	Maximum	30,145
15	Minimum	8,496
16	Average	23,225

We present the month wise generation in a PIE chart as under.
Chart No 3: Month Wise Solar Energy Generation:



Now we present the Reduction in CO_2 Emissions due to Solar PV Plant, as under.

Table No 7: Computation of Reduction in Annual CO2 Emissions, MT:

No	Particulars	Value	Unit
1	Energy Generated by Solar PV Plant	**2,78,705**	kWh
2	1 kWh of Electrical Energy is equivalent to	**0.9**	Kg of CO_2
3	Reduction in CO2 Emissions in 19-10 = **(1) *(2)/1000**	**250.83**	MT

Photograph of Solar PV Plant:

CHAPTER-IV
STUDY OF WASTE MANAGEMENT

4.1 Segregation of Waste at source:

The waste is segregated at source. At all important locations, waste bins are kept to collect the Waste.

Photograph of Waste Collection Bin:

4.2 Organic Waste Management:

The College has a Bio composting Arrangement, to convert the Bio Degradable Waste, like, Leafy Waste into Bio Compost.

Photograph of Bio Composting Arrangement:

4.3 Liquid Waste Management:

The College has installed a **12000 LPH** Capacity Waste Water Treatment plant. The treated water is used for Gardening purpose.

Photograph of Waste Water Treatment Plant:

CHAPTER-V
STUDY OF RAIN WATER HARVESTING

The College has installed the Rainwater harvesting project. The Rain Water falling on the terrace at the Hostel block is collected through pipes and is stored in a well. It is further used for gardening purpose.

Photograph of Rain Water Collection Well:

CHAPTER-VI
STUDY OF GREEN & SUSTAINABLE PRACTICES

6.1 Internal Tree Plantation:

The College has well maintained Tree Plantation in the Campus.

Photograph of Garden/Tree plantation in the campus:

Energy Audit Report

of

SHRI SANT GAJANAN MAHARAJ COLLEGE OF ENGINEERING,

Shegaon, Dist: Buldhana

Year: 2018-19

Prepared by:

Enrich Consultants

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411009
Phone: 09890444795 Email: enrichcons@gmail.com

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(A Government of Maharashtra undertaking)
2nd Floor, MHADA Commercial Complex, Opp. Tridal Nagar, Yerwada, Pune 411 006
Ph No: 020-26614393/266144403, Fax No: 020-26615031
Email: econ@mahaurja.com , Web: www.mahaurja.com

ECN/2017-18/CR-01/5726 — 30th November 2017

CERTIFICATE OF REGISTRATION
FOR CLASS 'A'

We hereby certify that, the firm having following particulars is registered with ***MAHARASHTRA ENERGY DEVELOPMENT AGENCY (MEDA)*** under given category as "Energy Planner & Energy Auditor in Maharashtra under Save Energy Programme of MEDA.

Name and Address of the firm	:	Enrich Consultants Yashashree, Plot No. 26,Nirmal Baug Society,Parvati, Pune - 411009.
Registration Category	:	Empanelled *Consultant for Save Energy Programme.*
Registration Number	:	***MEDA/ECN/CR-01/2017-18/EA-37***

- The Save Energy Programme intends to identify areas where wasteful use of energy occurs and to evaluate the scope for Energy Conservation and take concrete steps to achieve the evaluated energy savings.
- MEDA reserves the right to visit the firm at any time without giving any prior information and canceling the registration, if the information is found incorrect.
- This empanelment is valid upto **3 year** from the date of registration, to carry out energy audits under the Save Energy Programme of MEDA.
- The Director General, MEDA reserves the right to cancel the registration at any time without assigning any reasons thereof.

30/11

(Smita Kudarikar)
Manager (EC)

Enrich Consultants

Yashashree, 26, Nirmal Bag Society,
Near Muktangan English School, Parvati, Pune 411 009
Tel: 09890444795 Email: enrichcons@gmail.com

Ref: EC/SSGMCOE/18-19/01 Date: 12/5/2019

CERTIFICATE

This is to certify that we have conducted Energy Audit at Shri Sant Gajanan Maharaj College of Engineering, Shegaon as per the guidelines of Maharashtra Energy Development Agency (www.mahaurja.com) in the year 2018-19.

The College has adopted Energy Efficient practices like:

- Usage of Energy Efficient LED Fittings
- Usage of Energy Efficient BEE STAR Rated equipment
- Maximum usage of Day Lighting
- Installation of 100 kWp Roof Top Solar PV Plant

We appreciate the support of Management, involvement of faculty members and students in the process of Energy Conservation & making the campus Green.

For Enrich Consultants,

A Y Mehendale,
Certified Energy Auditor
EA-8192

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ACKNOWLEDGEMENT

We at Enrich Consultants, Pune, express our sincere gratitude to the management of Shri Sant Gajanan Maharaj College of Engineering, Shegaon for awarding us the assignment of Energy Audit of their Shegaon Campus for the Year: 2018-19.

We are thankful to all staff members for helping us during the field study.

EXECUTIVE SUMMARY

1. Shri Sant Gajanan Maharaj College of Engineering, Shegaon consumes Energy in the form of **Electrical Energy**; used for various gadgets, Office & other facilities.

2. Present Energy Consumption:

No	Parameter/ Value	Energy Generated, kWh (1)	Energy Purchased, kWh (2)	Energy Exported, kWh(3)	Net Energy Consumed, kWh=1+2-3
1	Total	164076	907983	2844	1069215
2	Maximum	23846	110335	1543	122878
3	Minimum	7908	45985	0	58349
4	Average	13673	75665.25	237	89101.25

3. Energy Conservation Projects Already Installed:

1. Usage of LED Fittings
2. Usage of Maximum Day Lighting
3. Installation of **100 kWp** Capacity Roof Top Solar PV Plant

4. Usage of Alternate Energy:

- The College has installed a **100 kWp** Roof Top Solar PV Plant.
- The Energy generated by the Roof Top Solar PV Plant in 18-19 is **164076 kWh**
- The Net Energy requirement of the College is 18-19 **1023230 kWh**
- The percentage of usage of Alternate Energy to Annual Energy Demand is **15.35 %.**

5. Usage of LED Lighting:

- The LED Lighting Load is: **2.44 kW**
- The Total Lighting Load is: **70.59 kW**
- The percentage f usage of LED Lighting to Total Lighting Load is **3.46 %**

6. Assumption:

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

ABBREVIATIONS

CFL	:	Compact Fluorescent Lamp
CO_2	:	Carbon- Di- Oxide
FTL	:	Fluorescent Tube Light
LED	:	Light Emitting Diode
V	:	Voltage
I	:	Current
kW	:	Kilo- Watt
kWh	:	kilo-Watt Hour
kVA	:	Active Power
MT	:	Metric Ton
P V	:	Photo Voltaic

CHAPTER-I
INTRODUCTION

1.1 Objectives:

1. To study connected Load
2. To study present level of Energy Consumption
3. To Study the present CO_2 emissions
4. To study usage of Renewable Energy
5. To study Lighting

Table No-1: General Details of Institute:

No	Head	Particulars
1	Name of Institute	Shri Sant Gajanan Maharaj College of Engineering
2	Address	Shegaon, Dist: Buldhana
3	Year of Establishment	1983

CHAPTER-II
STUDY OF CONNECTED LOAD

In this chapter, we present the details of various Electrical loads as under

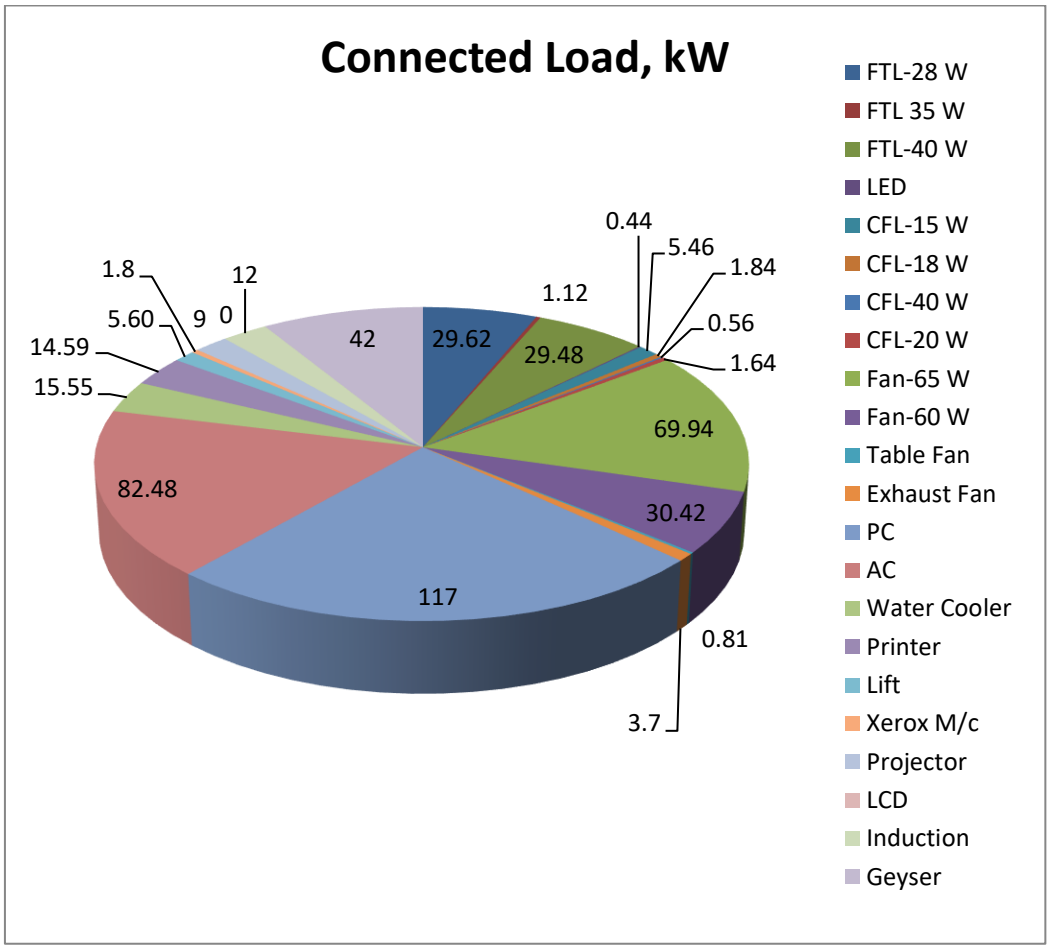
In the following Table, we present the Load from aspect of Location wise.

Table No: 2: Study of Equipment wise Connected Load:

No	Equipment	Quantity	Load, W/unit	Load, kW
1	FTL-28 W	1002	28	28.06
2	FTL 35 W	32	35	1.12
3	FTL-40 W	737	40	29.48
4	20 W LED	122	20	2.44
5	CFL-15 W	364	15	5.46
6	CFL-18 W	102	18	1.84
7	CFL-40 W	14	40	0.56
8	CFL-20 W	82	20	1.64
9	Fan-65 W	1076	65	69.94
10	Fan-60 W	507	60	30.42
11	Table Fan	23	35	0.81
12	Exhaust Fan	37	100	3.7
13	PC	468	250	117
14	AC	46	1793	82.48
15	Water Cooler	18	864	15.55
16	Printer	39	374	14.59
17	Lift	1	5595	5.60
18	Xerox M/c	4	450	1.8
19	Projector	30	300	9
20	LCD	3		0
21	Induction	4	3000	12
22	Geyser	14	3000	42
23	**Total**			**475**

In the following Table, we present the same in a PIE Chart

Chart No 1: Total Connected Load:



CHAPTER-III
STUDY OF PRESENT ENERGY CONSUMPTION

In this chapter, we present the analysis of last year Electricity Bills.

Table No- 3: Electrical Bill Analysis- 2018-19:

No	Month	Energy Generated, kWh (1)	Energy Purchased, kWh (2)	Energy Exported, kWh(3)	Net Energy Consumed, kWh=1+2-3
1	Apr-18	12323	97985	200	110108
2	May-18	12543	110335	0	122878
3	Jun-18	12364	45985	0	58349
4	Jul-18	12149	60055	30	72174
5	Aug-18	7931	88670	40	96561
6	Sep-18	7908	88220	25	96103
7	Oct-18	12864	94085	0	106949
8	Nov-18	14338	95148	15	109471
9	Dec-18	13383	66035	103	79315
10	Jan-19	12620	55570	95	68095
11	Feb-19	21807	52980	793	73994
12	Mar-19	23846	52915	1543	75218
13	Total	164076	907983	2844	1069215
14	Maximum	23846	110335	1543	122878
15	Minimum	7908	45985	0	58349
16	Average	13673	75665.25	237	89101.25

In the following Chart we present the above Data of Energy Consumption.

Chart No-2: Month wise Variation in Energy Consumption, kWh:

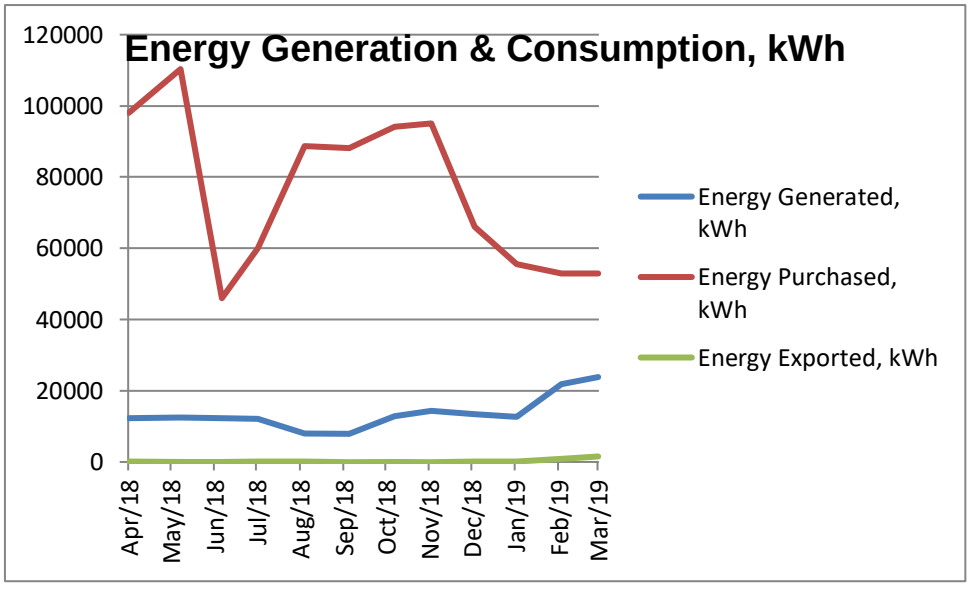


Table No-4: Important Parameters:

No	Parameter/ Value	Energy Generated, kWh (1)	Energy Purchased, kWh (2)	Energy Exported, kWh(3)	Net Energy Consumed, kWh=1+2-3
1	Total	164076	907983	2844	1069215
2	Maximum	23846	110335	1543	122878
3	Minimum	7908	45985	0	58349
4	Average	13673	75665.25	237	89101.25

CHAPTER-IV
CARBON FOOTPRINTING

4.1 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

4.2 Basis for computation of CO_2 Emissions:

The basis of Calculation for CO_2 emissions due to Electrical Energy is 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

Table No-5: Month wise CO_2 Emissions:

No	Month	Net Energy Consumed, kWh	CO_2 Emissions, MT
1	Apr-18	110108	88.09
2	May-18	122878	98.30
3	Jun-18	58349	46.68
4	Jul-18	72174	57.74
5	Aug-18	96561	77.25
6	Sep-18	96103	76.88
7	Oct-18	106949	85.56
8	Nov-18	109471	87.58
9	Dec-18	79315	63.45
10	Jan-19	68095	54.48
11	Feb-19	73994	59.20
12	Mar-19	75218	60.17
13	Total	1069215	855.37
14	Maximum	122878	98.30
15	Minimum	58349	46.68
16	Average	89101.25	71.28

4.3 Chart No 3: Representation of Month wise CO_2 Emissions:

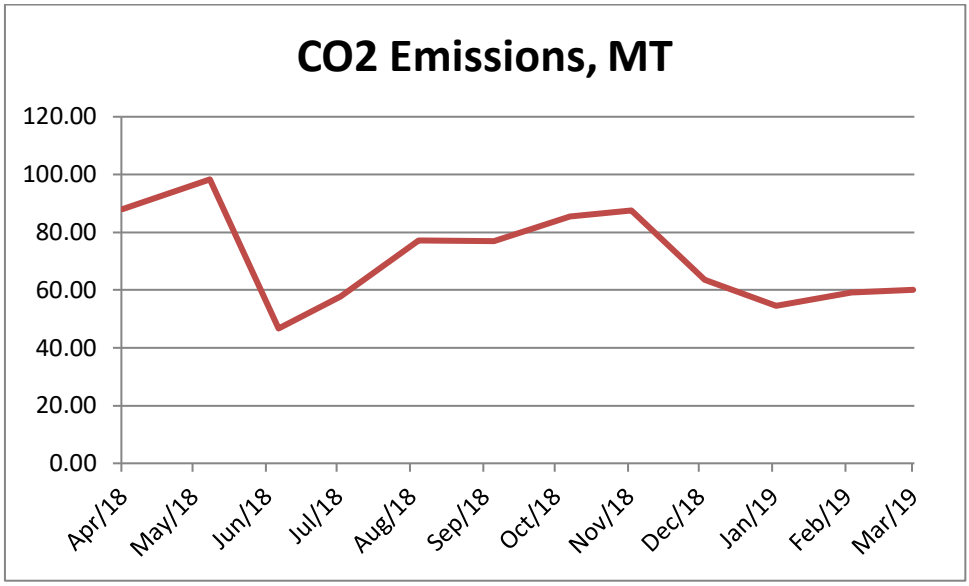


Table No 6: Various Important Parameters:

No	Parameter	Net Energy Consumed, kWh	CO2 emissions, MT
1	Total	1069215	855.37
2	Maximum	122878	98.30
3	Minimum	58349	46.68
4	Average	89101.25	71.28

CHAPTER-V
STUDY OF USAGE OF ALTERNATE ENERGY

In this Chapter, we present the Usage of Alternate Energy. The College has installed a Roof Top Solar PV Plant of Capacity **100 kWp**.
In the following Table, we present the Energy Generation Data.

Table No 7: Study of Month wise Energy Generation by 100 kWp Solar PV Plant:

No	Month	Energy Generated, kWh
1	Apr-18	12323
2	May-18	12543
3	Jun-18	12364
4	Jul-18	12149
5	Aug-18	7931
6	Sep-18	7908
7	Oct-18	12864
8	Nov-18	14338
9	Dec-18	13383
10	Jan-19	12620
11	Feb-19	21807
12	Mar-19	23846
13	Total	164076
14	Maximum	23846
15	Minimum	7908
16	Average	13673

Now we present the percentage of Usage of Alternate Energy, as under.
Table No 8: Computation of Usage of Alternate Energy:

No	Particulars	Value	Unit
1	Total Energy Purchased from MSEDCL	907983	kWh
2	Energy Generated by Solar PV Plant	164076	kWh
3	Energy Exported	2844	kWh
4	Net Energy Demand = 1+2-3	1069215	kWh
5	Percentage of Usage of Alternate Energy =(2)*100/(4)	**15.35**	%

Photograph of Solar PV Plant:

CHAPTER-VI
STUDY OF USAGE OF LED LIGHTING

In this Chapter we present the percentage of usage of LED Lights.

Table No 9: Computation of Overall Lighting Load:

No	Equipment	Quantity	Load, W/unit	Load, kW
1	FTL-28 W	1002	28	28.06
2	FTL 35 W	32	35	1.12
3	FTL-40 W	737	40	29.48
4	20 W LED	122	20	2.44
5	CFL-15 W	364	15	5.46
6	CFL-18 W	102	18	1.84
7	CFL-40 W	14	40	0.56
8	CFL-20 W	82	20	1.64
9	Total LED Lighting Load **=4**			**2.44**
10	Total Lighting Load= **1+2+3+4+5+6+7+8**			**70.59**
11	**% of LED to Total Lighting Load =9*100/10**		**3.46**	**%**

Green Audit Report
of
SHRI SANT GAJANAN MAHARAJ COLLEGE OF ENGINEERING,
Shegaon, Dist: Buldhana

Year: 2018-19

Prepared by

Enrich Consultants

Yashashree, Plot No 26, Nirmal Bag Society,
Near Muktangan English School, Pune 411 009
Phone: 09890444795 Email:enrichcons@gmail.com

MAHARASHTRA ENERGY DEVELOPMENT AGENCY

Maharashtra Energy Development Agency
(A Government of Maharashtra undertaking)
2nd Floor, MHADA Commercial Complex, Opp. Tridal Nagar, Yerwada, Pune 411 006,
Ph No: 020-26614393/266144403
Email: eee@mahaurja.com, Web: www.mahaurja.com

ECN/2018-19/CR-05/4174 19th September , 2018

CERTIFICATE OF REGISTRATION
FOR CLASS 'A'

We hereby certify that, the firm having following particulars is registered with ***MAHARASHTRA ENERGY DEVELOPMENT AGENCY (MEDA)*** under given category as "Energy Planner & Energy Auditor" in Maharashtra for Energy Conservation Programme of MEDA.

Name and Address of the firm	:	**Enrich Consultants** Yashashree, Plot No. 26, Nirmal Bag Society, Near Muktangan English School, Parvati, Pune - 411009.
Registration Category	:	Empanelled *Consultant for Energy Conservation Programme*
Registration Number	:	***MEDA/ECN/CR-05/2018-19/EA-03***

- Energy Conservation Programme intends to identify areas where wasteful use of energy occurs and to evaluate the scope for Energy Conservation and take concrete steps to achieve the evaluated energy savings.
- MEDA reserves the right to visit the firm at any time without giving any prior information and canceling the registration, if the information is found incorrect.
- This empanelment is valid till **31st March 2021** from the date of registration, to carry out energy audits under the Energy Conservation Programme
- The Director General, MEDA reserves the right to cancel the registration at any time without assigning any reasons thereof.

19/9/18
(Smita Kudarikar)
General Manager (EC)

Enrich Consultants

Yashashree, 26, Nirmal Bag Society,
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Tel: 09890444795 Email: enrichcons@gmail.com

Ref: EC/SSGMCOE/18-19/02 Date: 12/5/2019

CERTIFICATE

This is to certify that we have conducted Green Audit at Shri Sant Gajanan Maharaj College of Engineering, Shegaon, in the year 2018-19.

The College has adopted Green Initiatives like:

- Installation of 100 kWp Roof Top Solar PV Plant
- Usage of Energy Efficient LED Lights
- Segregation of Waste at source
- Bio composting Pit for Organic Waste
- Installation of 200 m^3/Day Capacity Sewage Waste Water Treatment Plant
- Implementation of Rain Water Harvesting
- Good Internal Roads
- Tree Plantation

We appreciate the support of Management, involvement of faculty members and students in the process of Energy Conservation & making the campus Green.

For Enrich Consultants,

A Y Mehendale,
Certified Energy Auditor
EA-8192

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ACKNOWLEDGEMENT

We at Enrich Consultants, Pune, express our sincere gratitude to the management of Shri Sant Gajanan Maharaj College of Engineering, Shegaon for awarding us the assignment of carrying out Green Audit of their Shegaon campus for the Year: 2018-19.

We are thankful to all Staff members for helping us during the field study

EXECUTIVE SUMMARY

1. Shri Sant Gajanan Maharaj College of Engineering, Shegaon consumes Electrical Energy used for various gadgets & office equipment

2. 3. Present Energy Consumption:

No	Parameter/ Value	Energy Generated, kWh (1)	Energy Purchased, kWh (2)	Energy Exported, kWh(3)	Net Energy Consumed, kWh=1+2-3
1	Total	164076	907983	2844	1069215
2	Maximum	23846	110335	1543	122878
3	Minimum	7908	45985	0	58349
4	Average	13673	75665.25	237	89101.25

3. Various projects implemented for Energy Conservation & Green Initiatives:

- Installation of 100 kWp Roof Top Solar PV Plant
- Usage of LED Lighting
- Installation of Rain Water Harvesting System
- Installation of 200 m^3/Day Waste Water Treatment Plant

4. Usage of Renewable Energy:

- The Institute has already installed a Solar PV Plant of Capacity, 100 kWp.
- Energy Generated by Solar PV Plant in 18-19 is kWh
- Reduction in CO2 Emissions in 18-19 is MT

5. Waste Management:

6.1 Segregation of Waste at Source:

The Waste is segregated at source. Waste Bins are kept at all important locations in the campus.

6.2 Bio Composting Arrangement:

The College has installed a Bio composting Unit, wherein, the bio-degradable waste is composted & is used as fertilizer for the garden.

6.2 Liquid Waste Management:

The College has already installed a 200m^3/Day Capacity Waste Water Treatment plant. The treated water is used for Gardening purpose.

Rain Water Harvesting:

The Institute has installed the Rainwater harvesting project. The Rain Water is collected through Pipes and is stored in a Storage Well. The Water is further used for gardening purpose.

7. Green Practices:

- Good internal Road
- Internal Tree Plantation

8. Assumption:

1. **1 kWh** of Electrical Energy releases **0.8 Kg of CO_2** into atmosphere

CHAPTER-I
INTRODUCTION

1.1 Objectives:

1. Study of Electrical Energy Consumption
2. Study of CO2 emissions
3. Study of Waste Management practices
4. Study of Rain Water Harvesting
5. Study of Green Practices

1.2 General Details of College: Table No 1:

No	Head	Particulars
1	Name of Institute	Shri Sant Gajanan Maharaj College of Engineering
2	Address	Shegaon, Dist: Buldhana
3	Year of Establishment	1983

CHAPTER-II
STUDY OF PRESENT ENERGY CONSUMPTION

In this chapter, we present the analysis of last year Electricity Bills

Table No. 2: Energy Consumption Analysis: 2018-19:

No	Month	Energy Generated, kWh (1)	Energy Purchased, kWh (2)	Energy Exported, kWh(3)	Net Energy Consumed, kWh=1+2-3
1	Apr-18	12323	97985	200	110108
2	May-18	12543	110335	0	122878
3	Jun-18	12364	45985	0	58349
4	Jul-18	12149	60055	30	72174
5	Aug-18	7931	88670	40	96561
6	Sep-18	7908	88220	25	96103
7	Oct-18	12864	94085	0	106949
8	Nov-18	14338	95148	15	109471
9	Dec-18	13383	66035	103	79315
10	Jan-19	12620	55570	95	68095
11	Feb-19	21807	52980	793	73994
12	Mar-19	23846	52915	1543	75218
13	Total	164076	907983	2844	1069215
14	Maximum	23846	110335	1543	122878
15	Minimum	7908	45985	0	58349
16	Average	13673	75665.25	237	89101.25

Chart No 1: To study the variation of Monthly Energy Consumption:

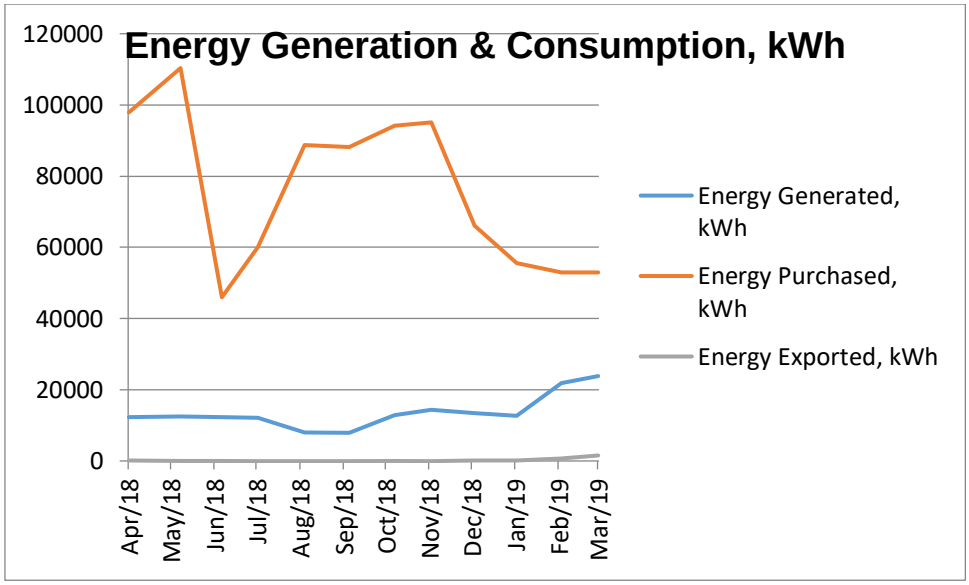

Table No-3: Variation in Important Parameters:

No	Parameter/ Value	Energy Generated, kWh (1)	Energy Purchased, kWh (2)	Energy Exported, kWh(3)	Net Energy Consumed, kWh=1+2-3
1	Total	164076	907983	2844	1069215
2	Maximum	23846	110335	1543	122878
3	Minimum	7908	45985	0	58349
4	Average	13673	75665.25	237	89101.25

CHAPTER-III

CARBON FOOTPRINTING

3.1 A Carbon Foot print is defined as the Total Greenhouse Gas emissions (CO_2 emissions), emitted due to various activities.

In this we compute the emissions of Carbon-Di-Oxide, by usage of the various form of Electrical Energy used by the College for performing its day to day activities

3.2 Basis for computation of CO_2 Emissions:

The basis of Calculation for CO_2 emissions due to Electrical Energy is 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
We herewith furnish the details of various forms of Energy consumption as under

Table No-4: Month wise Consumption of Electrical Energy & CO_2 Emissions:

No	Month	Net Energy Consumed, kWh	CO_2 Emissions, MT
1	Apr-18	110108	88.09
2	May-18	122878	98.30
3	Jun-18	58349	46.68
4	Jul-18	72174	57.74
5	Aug-18	96561	77.25
6	Sep-18	96103	76.88
7	Oct-18	106949	85.56
8	Nov-18	109471	87.58
9	Dec-18	79315	63.45
10	Jan-19	68095	54.48
11	Feb-19	73994	59.20
12	Mar-19	75218	60.17
13	Total	1069215	855.37
14	Maximum	122878	98.30
15	Minimum	58349	46.68
16	Average	89101.25	71.28

In the following Chart we present the CO2 emissions due to usage of Electrical Energy.

Chart No 2: Representation of Month wise CO_2 emissions:

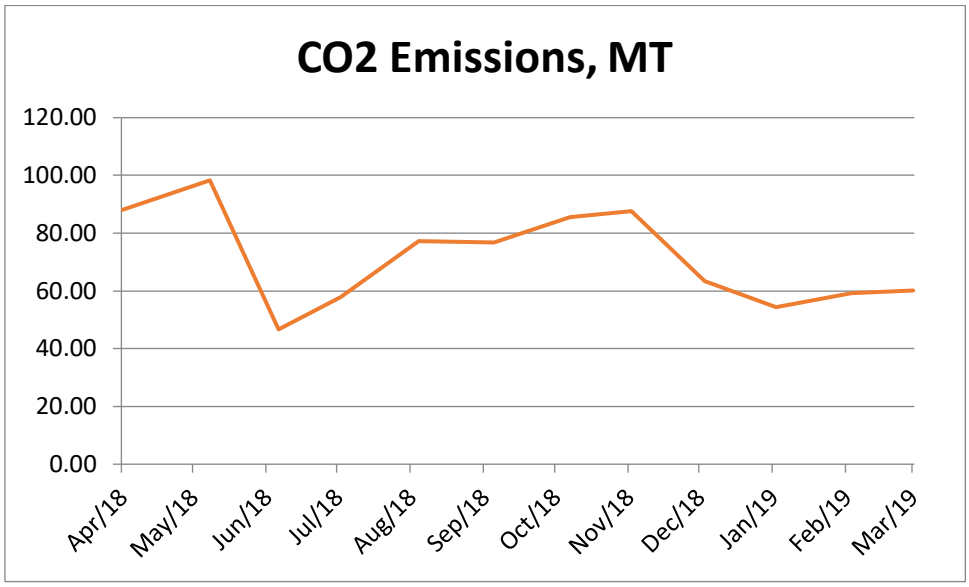

Table No 6: Various Important Parameters:

No	Parameter	Net Energy Consumed, kWh	CO2 emissions, MT
1	Total	1069215	855.37
2	Maximum	122878	98.30
3	Minimum	58349	46.68
4	Average	89101.25	71.28

CHAPTER-IV

STUDY OF USAGE OF ALTERNATE ENERGY

In this Chapter, we present the Usage of Alternate Energy. The College has installed a Roof Top Solar PV Plant of Capacity **100 kWp**.
In the following Table, we present the Energy Generation Data.

Table No 7: Study of Month wise Energy Generation by 100 kWp Solar PV Plant:

No	Month	Energy Generated, kWh
1	Apr-18	12323
2	May-18	12543
3	Jun-18	12364
4	Jul-18	12149
5	Aug-18	7931
6	Sep-18	7908
7	Oct-18	12864
8	Nov-18	14338
9	Dec-18	13383
10	Jan-19	12620
11	Feb-19	21807
12	Mar-19	23846
13	Total	164076
14	Maximum	23846
15	Minimum	7908
16	Average	13673

Now we present the percentage of Usage of Alternate Energy, as under.
Table No 8: Computation of Usage of Alternate Energy:

No	Particulars	Value	Unit
1	Total Energy Purchased from MSEDCL	907983	kWh
2	Energy Generated by Solar PV Plant	164076	kWh
3	Energy Exported	2844	kWh
4	Net Energy Demand = 1+2-3	1069215	kWh
5	Percentage of Usage of Alternate Energy =(2)*100/(4)	**15.35**	%

Photograph of Solar PV Plant:

CHAPTER-V
STUDY OF WASTE MANAGEMENT

5.1 Segregation of Waste at Source:

The Waste is segregated at source. Waste Bins are kept at all important locations in the campus.

Photograph of Waste Collection Bin:

5.2 Bio Composting Arrangement:

The College has installed a Bio composting Unit, wherein, the bio-degradable waste is composted & is used as fertilizer for the garden.

Photograph of Bio Composting Storage Pit:

5.3 Liquid Waste Management:

The College has already installed a 200m^3/Day Capacity Waste Water Treatment plant. The treated water is used for Gardening purpose.

Photograph of Sewage Waste Water Treatment Plant:

CHAPTER-IV

STUDY OF RAIN WATER HARVESTING

The Institute has installed the Rainwater harvesting project. The Rain Water is collected through Pipes and is stored in a Storage Well. The Water is further used for gardening purpose.

Photograph of Rain Water Storage Well:

CHAPTER-VII
STUDY OF GREEN PRACTICES

6.1 Pedestrian Friendly Road:

The College has well maintained internal road to facilitate the easy movement of the students within the campus.

Photograph of Internal Road:

6.2 Internal Tree Plantation:

The College has well maintained landscaped garden in the campus.

Photograph of Tree plantation, Green Landscaping: