

ENERGY AUDIT REPORT
of
Shri Saibaba Lok Prabodhan Kala
Mahavidyalaya, Wadner
Tah.Hinganghat
Dist.Wardha- 442 307



Year: 2021-22

Prepared by:

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society,
Near Muktang 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 Husbandry,
Aundh, Pune, Maharashtra 411067

Ph No: 020-35000450

Email: eee@mahaerda.com, Web: www.mahaerda.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
Yashwantrao, 26, Nirmal Bag Society,
Near Mukangan 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-12.*

- 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: Makhanagan English School, Parvati, Pune 411 009
Tel: 020261444793 Email: engress163@gmail.com

Ref: ES/SBL/PNM21-22/17

Date: 10/06/2022

CERTIFICATE

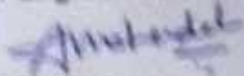
This is to certify that we have conducted Energy Audit at Shri Saibaba Lok Prabodhan Kala Mahavidyalaya, Wadner in the Year 2021-22.

The College has adopted following Energy Efficient practices:

- Maximum usage of Day Lighting
- Usage of Energy Efficient LED fittings

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 Mahendale,
Certified Energy Auditor
EA-8192



INDEX

Sr. No	Particulars	Page No
I	Acknowledgement	5
II	Executive Summary	6
III	Abbreviations	7
1	Introduction	8
2	Study of Connected Load	9
3	Study of Present Energy Consumption	10
4	Study of CO ₂ Emission	12
5	Study of Usage of Alternate Energy	14
6	Study of Usage Of LED Lighting	15



ACKNOWLEDGEMENT

We at Engress Services, Pune, express our sincere gratitude to the management of Shri Saibaba Lok Prabodhan Kala Mahavidyalaya, Wadner, for awarding us the assignment of Energy Audit of their Wadner campus for the Year: 2021-22.

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



EXECUTIVE SUMMARY

1. Shri Saibaba Lok Prabodhan Kala Mahavidyalaya, Wadner, consumes Energy in the form of Electrical Energy; used for various gadgets, office & other facilities

2. Present Energy Consumption & CO₂ Emission:

No	Parameter/ Value	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Total	3932	3.538
2	Maximum	871	0.783
3	Minimum	103	0.092
4	Average	327.66	0.294

3. Energy Conservation projects already installed:

- Usage of Energy Efficient LED fittings

4. Usage of Alternate Energy:

- As on today College has not installed solar rooftop power plant. It is recommended to install solar rooftop system on the college building as per availability of funds.

5. Usage of LED Lighting:

- The Total Lighting load of College is 1.5 kW.
- The LED Lighting Load is 0.38 kW.
- The % of LED Lighting to Total Lighting Load is 25.33 %.

6. Assumptions:

1. 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere
2. Average Energy generated by 1 kWp Solar PV Plant : 4 kWh/Day
3. Annual Solar Energy Generation Days: 300 Nos

7. References:

- For CO₂ Emissions: www.tatapower.com
- For Roof Top Solar Energy generation: www.solarrooftop.gov.in



ABBREVIATIONS

BEE	Bureau of Energy Efficiency
MSEDCL	Maharashtra Electricity Distribution Company Limited
kWh	Kilo Watt Hour
kWp	Kilo Watt Peak
Kg	Kilo Gram
MT	Metric Ton
CO ₂	Carbon Di Oxide
LED	Light Emitting Diode



CHAPTER-I INTRODUCTION

1.1 Objectives:

1. To study Connected Load
2. To study Present Energy Consumption
3. To compute the CO₂ emissions
4. To study usage of Alternate Energy
5. To study usage of LED Lighting

1.2 Table No 1: General Details of the College:

No	Head	Particulars
1	Name of the Institution	Shri Saibaba Lok Prabodhan Kala Mahavidyalaya,
2	Address	S.No.452/2 Pipri Road,Wadner,Hinganghat Dist:Wardha
3	Latitude	20.25° N
4	Longitude	78.44° E
5	Affiliation	Rashtra Sant Tukodoji Maharaj University, Nagpur



CHAPTER-II STUDY OF CONNECTED LOAD

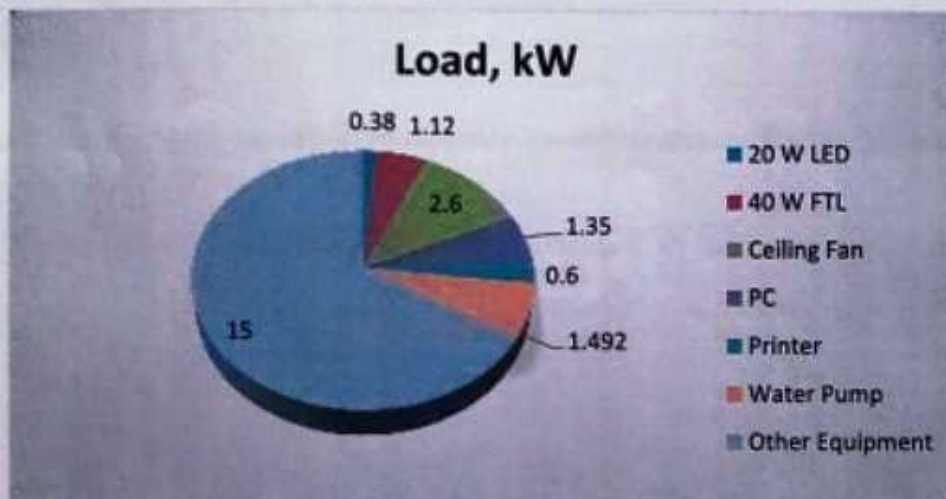
The major contributors to the connected load of the College are as under.

Table No 2: Equipment wise Connected Load:

No	Equipment	Qty	Load, W/Unit	Load, kW
1	20 W LED	19	20	0.38
2	40 W FTL	28	40	1.12
3	Ceiling Fan	40	65	2.6
4	PC	9	150	1.35
5	Printer	4	150	0.6
6	Water Pump	2	746	1.492
7	Other Equipment	100	150	15
8	Total			23

We present the above Data in a PIE Chart as under.

Chart No1: Connected Load:



CHAPTER-III

STUDY OF PRESENT ENERGY CONSUMPTION

In this chapter, we present the analysis of Energy Consumption
Table No. 3: Study of Electrical Energy Consumption: 21-22:

No	Month	Energy Purchased, kWh
1	Apr-21	871
2	May-21	333
3	Jun-21	214
4	Jul-21	181
5	Aug-21	253
6	Sep-21	258
7	Oct-21	235
8	Nov-21	186
9	Dec-21	103
10	Jan-22	223
11	Feb-22	714
12	Mar-22	361
13	Total	3932
14	Maximum	871
15	Minimum	103
16	Average	327.66

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

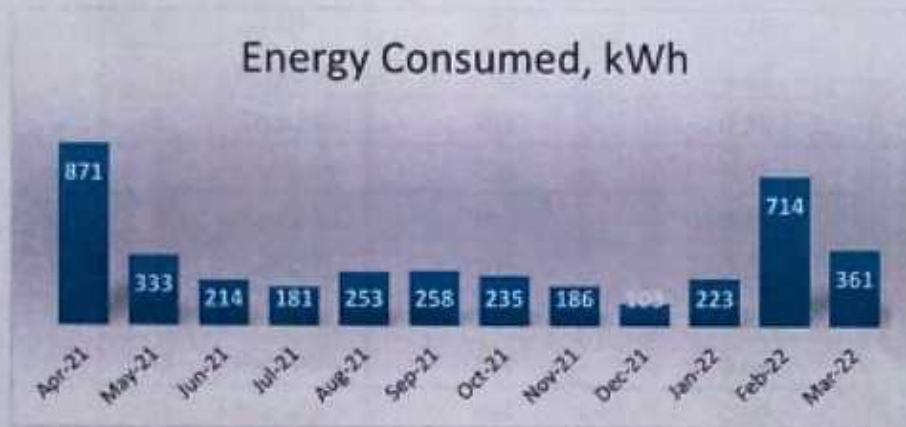


Table No 4: Important Parameters:

No	Parameter/ Variation	Energy Purchased, kWh
1	Total	3932
2	Maximum	871
3	Minimum	103
4	Average	327.66

CHAPTER-IV STUDY OF CO₂ EMISSION

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

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

The College uses Electrical Energy for various Electrical gadgets.

Basis for computation of CO₂ Emissions:

The basis of Calculation for CO₂ emissions due to Electrical Energy is as under

- 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere

Based on the above Data we compute the CO₂ emissions which are being released in to the atmosphere by the College due to its Day to Day operations

Table No 5: Month wise CO₂ Emissions:

No	Month	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Apr-21	871	0.78
2	May-21	333	0.29
3	Jun-21	214	0.19
4	Jul-21	181	0.16
5	Aug-21	253	0.22
6	Sep-21	258	0.23
7	Oct-21	235	0.21
8	Nov-21	186	0.16
9	Dec-21	103	0.09
10	Jan-22	223	0.20
11	Feb-22	714	0.64
12	Mar-22	361	0.32
13	Total	3932	3.53
14	Maximum	871	0.78
15	Minimum	103	0.09
16	Average	327.66	0.29



Table 11.1: Representative of World energy use, 2000-2010

No.	Representative Year	Energy Production, Mt	% Renewable, %
1	2000	100	15
2	2005	110	15
3	2010	120	15
4	2010	120	15



CHAPTER-V

STUDY OF USAGE OF ALTERNATE ENERGY

As on today College has not install solar roof-top PV plant, solar thermal water heating plant; the percentages of uses of alternate energy to the annual energy demand work to be zero percent.

CHAPTER VI STUDY OF USAGE OF LED LIGHTING

In this chapter, we compute the percentage of usage of LED Lighting to Total Lighting Load, as under.

Table No 8: Percentage of Usage of LED Lighting to Total Lighting Load:

No	Particulars	Value	Unit
1	No of 40 W FTL Fittings	28	Nos
2	Demand of 40 W FTL Fitting	40	W/Unit
3	Total Electrical Load of 40 W FTL Fittings	1.12	kW
4	No of 20 W LED Tube Lights	19	Nos
5	Demand of 20 W LED Tube Light	20	W/Unit
6	Total Electrical Load of 20 W LED Fittings	0.38	kW
7	Annual Total Lighting Load = 3+6	1.5	kWh
8	Annual LED Lighting Load = 6	0.38	kWh
9	Annual Lighting Requirement met by LED= $8 \times 100 / 7$	25.33	%

GREEN AUDIT REPORT
of
Shri Saibaba Lok Prabodhan Kala
Mahavidyalaya, Wadner
Tah.Hinganghat
Dist.Wardha- 442 307



Year: 2021-22

Prepared by:

ENGRESS SERVICES

Yashashree, 28, Nirmai Bag Society,
Near: Mukangan English School, Parvati, Pune-411009
Phone: 020660444795, Email: engress123@gmail.com



MAHARASHTRA ENERGY DEVELOPMENT AGENCY

Maharashtra Energy Development Agency
(Ministry of Maharashtra Industries)
Asaf Ali Road, Opposite Sree Krishna Road, Near Government of Assam Mahabadi,
Pune, Maharashtra 411007
Ph No: 020-2702430
Email: meda@maharashtra.gov.in Web: www.maharashtra.gov.in

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 green category as "Energy Planner & Energy Auditor" in Maharashtra for Energy Conservation Programme of MEDA.

Name and Address of the Firm : M/s Engress Services
Yashwantrao Chavan Marg, Near Durgam Chaudhary,
Near Muktangan English School,
Pune, Pune - 411 009

Registration Category : Empowered Consultant for Energy Conservation Programme for Class 'A'

Registration Number : **MEDA/EN/2022-23/Class A-ER-11**

- 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 cancelling the registration, if the information is found incorrect.
- This empowerment is valid till **09th May, 2024** from the date of registration, or until any 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)



Green Audit Report- Shri Saibaba Lok Prabodhan Kala Mahavidyalaya, Wadner- 21-22

ENGRESS SERVICES

Yashashree, 26, Nirmai Bag Society,

Near Mukangan English School, Parvati, Pune 411 009

Tel: 9890444785 Email: engress123@gmail.com

Ref: ES/SSLPKM/21-22/19

Date: 10/06/2022

CERTIFICATE

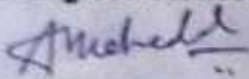
This is to certify that we have conducted Green Audit at Shri Saibaba Lok Prabodhan Kala Mahavidyalaya, Wadner in the Year 2021-22.

The College has adopted following Energy Efficient and Green Practices:

- Usage of Energy Efficient LED Light Fitting
- Maximum Usage of Day Lighting
- Provision of Separate bins for Dry & Wet Waste
- The College has installed Septic Tank and is cleaned periodically.
- Implementation of Rain Water Management Project
- Maintenance of good Internal Road
- Tree Plantation in the campus
- Creation of awareness by Display of Posters on Resource Conservation

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

Sr. No	Particulars	Page No
I	Acknowledgement	
II	Executive Summary	5
III	Abbreviations	6
		8
1	Introduction	
2	Study of Present Energy Consumption	9
3	Study of CO ₂ Emission	10
4	Study of Usage of Renewable Energy	12
5	Study of Waste Management	14
6	Study of Rain Water Management	15
7	Study of Green & Sustainable Practices	17
	Annexure	18
I	List of various Trees & Plants in the College campus	20



ACKNOWLEDGEMENT

We at Engress Services, Pune, express our sincere gratitude to the management of Shri Saibaba Lok Prabodhan Kala Mahavidyalaya, Wadner for awarding us the assignment of Green Audit of their Wadner Campus for the Academic Year: 2021-22.

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



EXECUTIVE SUMMARY

1. Shri Saibaba Lok Prabodhan Kala Mahavidyalaya, Wadner, consumes Energy in the form of Electrical Energy; used for various gadgets, office & other facilities
2. Present Energy Consumption & CO₂ Emission:

No	Parameter/ Value	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Total		
2	Maximum	3932	3.538
3	Minimum	871	0.783
4	Average	103	0.092
		327.66	0.294

3. Energy Conservation projects already installed:

- Usage of Energy Efficient LED fittings

4. Usage of Renewable Energy:

- It is recommended to install roof-top solar PV Plant on college building.

5. Waste Management:

5.1 Segregation of Waste at Source:

The Waste is segregated at source and the recyclable waste, like paper, plastic waste is handed over to Authorized waste collecting agent for further recycling.

5.2 Organic Waste Management:

The College has installed bio-composting pit, to convert bio-degradable waste into bio-fertilizer.

5.3 Liquid Waste Management:

The College has installed Septic and is cleaned periodically.

5.4 E-Waste Management:

The E-Waste is disposed of through Authorized E-Waste collecting agency.

5.5 Sanitary Waste Incinerator:

The College has not installed Sanitary Waste Incinerator. It is recommended to install the sanitary waste disposal.

6. Rain Water Management:

The College has installed the Rainwater management project, the rain water falling on the terrace is collected and is used for increasing the under the underground water level.

7. Green & Sustainable Practices:

- Good Internal Road
- Medicinal Plant Garden
- Provision of Ramp & Wheel Chair for Divyangajan
- Creation of Awareness on Resource Conservation, by Display of Posters

8. Assumptions:

- 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere
- Average Energy generated by 1 kWp Solar PV Plant : 4 kWh/Day
- Annual Solar Energy Generation Days: 300 Nos

9. References:

- For CO₂ Emissions: www.tatapower.com
- For Roof Top Solar Energy Generation: www.solarrooftop.gov.in

ABBREVIATIONS

80%	System Energy Efficiency
1.2%	1st Year Fuel
1.5%	1st Year Fuel
1%	1st Year Fuel
1%	1st Year Fuel
1%	1st Year Fuel
1%	1st Year Fuel
1%	1st Year Fuel



CHAPTER-I INTRODUCTION

1.1 Objectives:

1. To study present Energy Consumption
2. To Study CO₂ emissions
3. To study usage of Renewable Energy
4. Study of Waste Management
5. Study of Rain Water Management
6. Study of Green & Sustainable Practices

1.2 Table No 1: General Details of the College:

No	Head	Particulars
1	Name of the Institution	Shri Saibaba Lok Prabodhan Kala Mahavidyalaya,
2	Address	S.No.452/2 Pipri Road,Wadner,Hinganghat Dist:Wardha
3	Latitude	20.25° N
4	Longitude	78.44° E
5	Affiliation	Rashtra Sant Tukodoji Maharaj University, Nagpur



CHAPTER-II

STUDY OF PRESENT ENERGY CONSUMPTION

In this chapter, we present the analysis of Energy Consumption.

Table No 2: Study of Electrical Energy Consumption: 21-22:

No	Month	Energy Purchased, kWh
1	Apr-21	871
2	May-21	333
3	Jun-21	214
4	Jul-21	181
5	Aug-21	253
6	Sep-21	258
7	Oct-21	235
8	Nov-21	186
9	Dec-21	103
10	Jan-22	223
11	Feb-22	714
12	Mar-22	361
13	Total	3932
14	Maximum	871
15	Minimum	103
16	Average	327.66

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

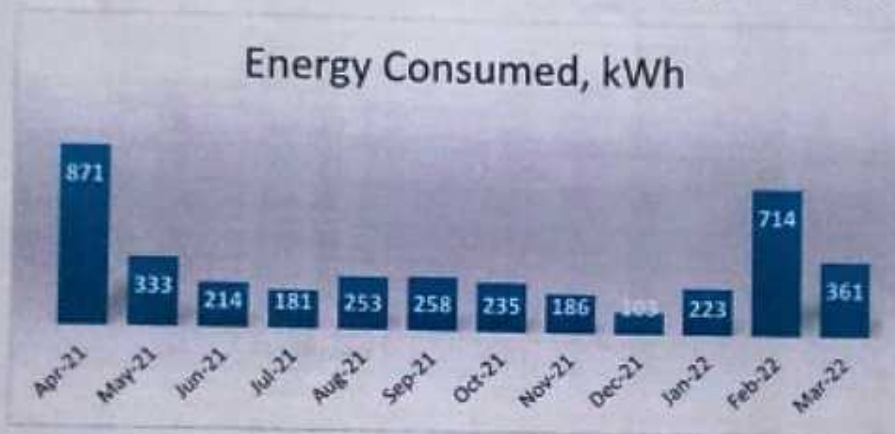


Table No 3: Important Parameters:

No	Parameter/ Variation	Energy Purchased, kWh
1	Total	3932
2	Maximum	871
3	Minimum	103
4	Average	327.66

CHAPTER-III

STUDY OF CO₂ EMISSION

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

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

The College uses Electrical Energy for various Electrical gadgets.

Basis for computation of CO₂ Emissions:

The basis of Calculation for CO₂ emissions due to Electrical Energy is as under

- 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere

Based on the above Data we compute the CO₂ emissions which are being released in to the atmosphere by the College due to its Day to Day operations

Table No 4: Month wise CO₂ Emissions:

No	Month	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Apr-21	871	0.78
2	May-21	333	0.29
3	Jun-21	214	0.19
4	Jul-21	181	0.16
5	Aug-21	253	0.22
6	Sep-21	258	0.23
7	Oct-21	235	0.21
8	Nov-21	186	0.16
9	Dec-21	103	0.09
10	Jan-22	223	0.20
11	Feb-22	714	0.64
12	Mar-22	361	0.32
13	Total	3932	3.53
14	Maximum	871	0.78
15	Minimum	103	0.09
16	Average	327.66	0.29



Chart No. 2: Representation of Month wise CO₂ Emissions.

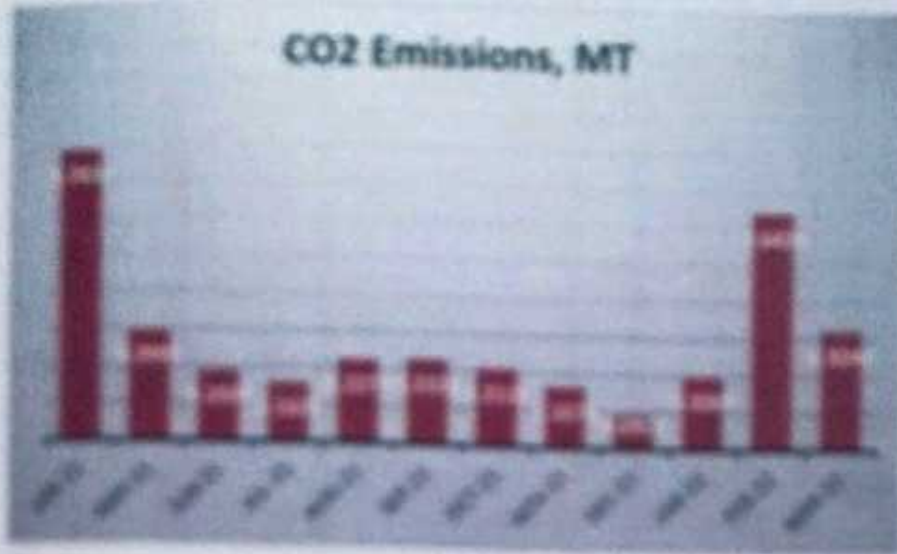


Table No. 3: Important Parameters.

No	Parameter Value	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Total	3632	3.52
2	Maximum	871	1.78
3	Minimum	182	0.88
4	Average	307.66	0.88



CHAPTER-IV STUDY OF USAGE OF RENEWABLE ENERGY

As on today College has not installed solar roof-top PV plant, solar thermal water heating plant, it is recommend to install solar rooftop plant on the College building



CHAPTER V STUDY OF WASTE MANAGEMENT

5.1 Segregation of Waste at Source:

The solid waste is segregated at source. There are separate bins for collection at various points and is disposed of for further action.

Photograph of Waste Collection Bins:



5.2 Organic Waste Management:

The College has installed bio-composting pit, to convert bio-degradable waste into bio-fertilizer.



5.3 Liquid Waste Management:

The College has installed Septic tank and is cleaned periodically.

5.4 E-Waste Management:

The E-Waste is disposed of through Authorized Agency.

5.5 Sanitary Waste Incinerator:

The College has not installed Sanitary Waste Incinerator. It is recommended to installed sanitary waste disposal.

CHAPTER-VI

STUDY OF RAIN WATER MANAGEMENT

The College has implemented the Rain Water Management Project. The College has installed Pipes from the terrace and the Rain water falling on the terrace is gathered and is used to increase the underground water table.

Photograph of Rain Water Management Pipe & Bore-Well Charging:



7.3 Provision of Ramp for Divyangajan:

The College has made provision for Ramp for easy movement of Divyangajan. Also dedicated wash room and wheel chair are made available.

Photograph of Ramp:



7.3 Creation of Awareness on Save Energy:

The College has displayed Poster emphasizing on the Save Energy.

Photograph of Poster on Save Energy:



7.4 Best Practices and Initiative for Social Awareness:

The College has taken initiative for different social awareness program, about water and forest conservation, trees plantations, society cleanness etc under National Service Scheme.

Photograph of Best Practices and Initiative:



ANNEXURE-I

LIST OF TREES & PLANTS IN THE CAMPUS

No	Name of Trees	Number of Trees
1	Azadirachta indica (Neem)	30
2	Cestrum nocturnum (Ratrani)	02
3	Betea monosperma (Palas)	05
4	Tectona Grandis (Sagwan)	02
5	Thuja (Vidya)	25
6	Delonix Regia (Guimohar)	02
7	Madhuca longifolia (Mahau)	05
8	Millettia pinnata (Karanj)	8
9	Lawsonia inermis (Mehendi)	100
10	Santalum album (sandalwood)	23
11	Citrus limon (Lemon)	02
12	Citrus limetta (Mausambi)	02
13	Terminalia catappa (Almond)	01
14	Nyctanthes arbor-tristis (Parijat)	02
15	Murraya koenigii (Curry Leaves)	02
16	Ficus benghalensis (Banyan)	01
17	Aegle marmelos (Indian bael)	01

ENVIRONMENTAL AUDIT REPORT
Shri Saibaba Lok Prabodhan Kala
Mahavidyalaya, Wadner
Tah.Hinganghat
Dist.Wardha- 442 307



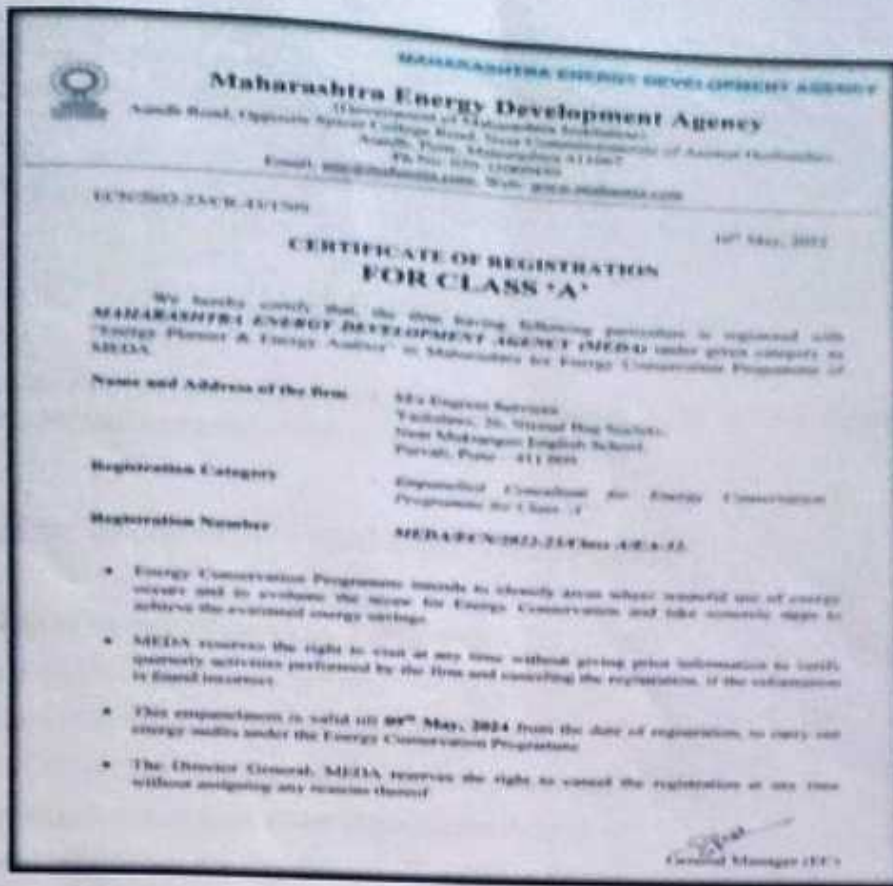
Year: 2021-22

Prepared by

ENGRESS SERVICES

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





ENGRESS SERVICES

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

Ref. ES/SSLPKM/21-22/18

Date: 10/09/2022

CERTIFICATE

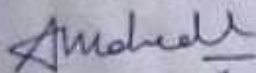
This is to certify that we have conducted Environmental Audit at Shri Saibaba Lok Prabodhan Kala Mahavidyalaya, Wadner in the Year 2021-22.

The College has adopted following Environment Friendly Practices:

- Usage of Energy Efficient LED Light Fitting
- Maximum Usage of Day Lighting
- Provision of Separate bins for Dry & Wet Waste
- The College has installed septic tanks and cleans periodically.
- Implementation of Rain Water Management Project
- Tree Plantation in the campus
- Creation of awareness by Display of Posters on Resource Conservation

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

Sr. No	Particulars	Page No
I	Acknowledgement	5
II	Executive Summary	6
III	Abbreviations	8
1	Introduction	9
2	Study of Resource Consumption & CO ₂ Emission	11
3	Study of CO ₂ Emission Reduction	13
4	Study of Indoor Air Quality	14
5	Study of Waste Management	16
6	Study of Rain Water Management	18
7	Study of Environment Friendly Practices	19
	Annexure	
I	Indoor Air Quality & Water Standards	20



ACKNOWLEDGEMENT

We at Engress Services, Pune, express our sincere gratitude to the management of Shri Saibaba Lok Prabodhan Kala Mahavidyalaya, Wadner, for awarding us the assignment of Environmental Audit of their Wadner campus for the Year: 2021-22.
We are thankful to all Staff members for helping us during the field study.



EXECUTIVE SUMMARY

1. Shri Saibaba Lok Prabodhan Kala Mahavidyalaya, Wadner, consumes Energy in the form of Electrical Energy; used for various gadgets, office & other facilities

2. Pollution caused due to College Activities:

- > Air pollution: Mainly CO₂ on account of Electricity & LPG Consumption.
- > Solid Waste: Bio degradable Waste, Garden Waste, Recyclable Waste and Human Waste.
- > Liquid Waste: Human liquid Waste.

3. Present Energy Consumption & CO₂ Emission:

No	Parameter/ Value	Electrical Energy Purchased, kWh	CO ₂ Emissions, MT
1	Total	3932	3.538
2	Maximum	871	0.783
3	Minimum	103	0.092
4	Average	327.66	0.294

4. Various initiatives taken for Energy Conservation:

- > Usage of Energy Efficient LED Lighting
- > Maximum Usage of Day Lighting

5. Usage of Renewable Energy & Reduction in CO₂ Emission:

- It is recommended to install roof-top solar PV Plant on college building as per availability of funds.

6. Indoor Air Quality Parameters:

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	100	67	78
2	Minimum	80	49	60

7. Indoor Comfort Conditions:

No	Parameter/Value	Temperature, °C	Humidity, %	Lux Level	Noise Level, dB
1	Maximum	34	44	285	47
2	Minimum	33	41	192	32

8. Waste Management:

8.1 Segregation of Waste at Source:

The Waste is segregated at source and the recyclable waste, like paper, plastic waste is handed over to Authorized waste collecting agent for further recycling.

8.2 Organic Waste Management:

The College has installed bio-composting pit, to convert bio-degradable waste into bio-fertilizer.

8.3 Liquid Waste Management:

The College has installed Septic and is cleaned periodically.

8.4 E-Waste Management:

The E-Waste is disposed of through Authorized E-Waste collecting agency.

9. Rain Water Management:

The College has installed the Rainwater management project, the rain water falling on the terrace is collected and is used for increasing the under the underground water level.

10. Environment Friendly Initiatives:

- Tree Plantation in the campus.
- Display of Posters on Resource Conservation

11. Assumptions:

- 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere
- Average Energy generated by 1 kWp Solar PV Plant : 4 kWh/Day
- Annual Solar Energy Generation Days: 300 Nos

12. References:

- For CO₂ Emissions: www.tatapower.com
- For Roof Top Solar Energy Generation: www.solarrooftop.gov.in
- For Various Indoor Air Parameters: www.ishrae.com
- For AQI & Water Quality Standards: www.cpcb.com

ABBREVIATIONS

MSEDCL	: Maharashtra State Distribution Company Limited
MT	: Metric Ton
kWh	: kilo-Watt Hour
KLPD	: Kilo Litres per Day
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

1.1 Important Definitions:

1.1.1 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

1.1.2. Environmental Audit: Definition:

An audit which aims at verification and validation to ensure that various environmental laws are complied 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 Audit Methodology:

1. To study Resource Consumption & CO₂ Emissions
2. To Study CO₂ Emission Reduction
3. To study Indoor Air Quality Parameters
4. To Study Waste Management
5. To Study Rain Water Harvesting
6. To Study Environment Friendly Initiatives

1.3 General Details of College: Table No: 4

No	Head	Particulars
1	Name of the Institution	Shri Saibaba Lok Prabodhan Kala Mahavidyalaya,
2	Address	S.No 452/2 Pipri Road,Wadner,Hinganghat Dist.Wardha
3	Latitude	20.25° N
4	Longitude	78.44° E
5	Affiliation	Rashtra Sant Tukodoji Maharaj University, Nagpur



CHAPTER 01

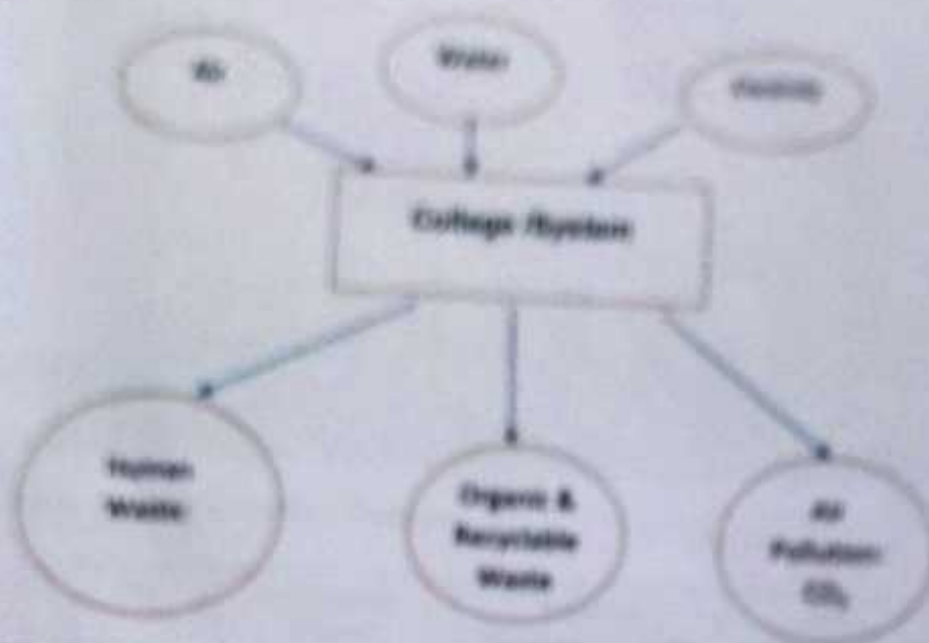
STUDY OF RESOURCE CONSUMPTION & CO₂ EMISSIONS

The College consumes following Environmental Resources:

1. Air
2. Water
3. Electrical Energy

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

Diagram No. 1: Representation of College as System:



Now we compute the Generation of CO₂ on account of consumption of Electrical Energy. The basis of Calculation for CO₂ emissions due to Electrical Energy is as under

- 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere

Table No 6: Study of Consumption of Energy & CO₂ Emissions: 21-22

No	Month	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Apr-21	271	0.78
2	May-21	333	0.29
3	Jun-21	214	0.18
4	Jul-21	161	0.16
5	Aug-21	263	0.22
6	Sep-21	258	0.23
7	Oct-21	235	0.21
8	Nov-21	188	0.16
9	Dec-21	103	0.09



10	Jan-22	223	0.20
11	Feb-22	714	0.64
12	Mar-22	361	0.32
13	Total	3932	3.53
14	Maximum	871	0.78
15	Minimum	103	0.09
16	Average	327.66	0.29

Chart No 2: Study of CO₂ Emission:

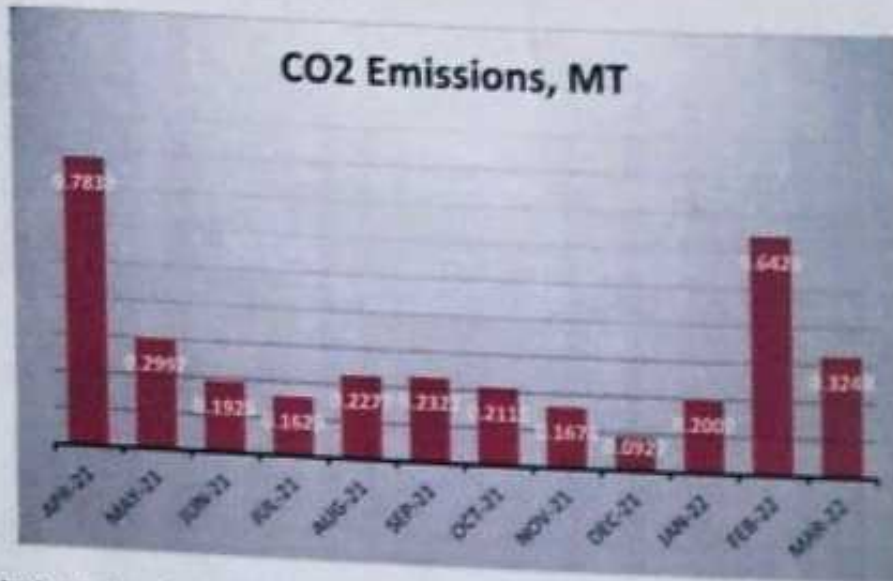


Table No 6: Various Important Parameters:

No	Parameter/ Value	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Total	3932	3.53
2	Maximum	871	0.78
3	Minimum	103	0.09
4	Average	327.66	0.29

CHAPTER III STUDY OF CO₂ EMISSION REDUCTION

As on today College has not installed solar roof-top PV plant, solar thermal water heating plant, it is recommend to install solar rooftop plant on the College building.



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 litres** 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 liveability.

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 micron
3. PM-10- Particulate Matter of Size 10micron

Table No 8: Indoor Air Quality Parameters:

No	Location	AQI	PM-2.5	PM-10
1	Office	93	55	68
2	Principal Cabin	80	49	60
3	Library	98	58	74
4	Seminar Hall	90	51	63

5	Staff Room	98	80	87
6	Home Economics Dept.	100	87	78
7	Class Room 1	93	53	71
8	Class Room 2	92	54	70
9	Class Room 3	91	55	69
10	Class Room 4	92	58	69
	Maximum	100	87	78
	Minimum	80	49	60



CHAPTER V STUDY OF INDOOR COMFORT CONDITION PARAMETERS

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 No9: Study of Indoor Comfort Condition Parameters:

No	Locations	Temperature (°C)	Humidity (%)	Lux Level	Noise Level (dB)
1	Office	33.5	41	200	45
2	Principal Cabin	33.5	44	210	41
3	Library	34	45	195	32
4	Seminar Hall	34	42	194	47
5	Staff Room	33.8	42	192	41
6	Home Economics Dept.	33.2	41	210	33
7	Class Room 1	33	44	210	45
8	Class Room 2	33	42	225	47
9	Class Room 3	33.5	42	241	41
10	Class Room 4	33	42	251	42
	Maximum	34	44	285	47
	Minimum	33	41	192	32

CHAPTER VI STUDY OF WASTE MANAGEMENT

6.1 Segregation of Waste at Source:

The solid waste is segregated at source. There are separate bins for collection at various points and is disposed of for further action.

photograph of Waste Collection Bins:



6.2 Organic Waste Management:

The College has installed bio-composting pit, to convert bio-degradable waste into bio-fertilizer.



6.3 Liquid Waste Management:

The College has installed Septic tank and is cleaned periodically.

6.4 E-Waste Management:

The E-Waste is disposed of through Authorized Agency.

6.5 Sanitary Waste Incinerator:

The College has not installed Sanitary Waste Incinerator. It is recommended to installed sanitary waste disposal.

CHAPTER-VII STUDY OF RAIN WATER MANAGEMENT

The College has implemented the Rain Water Management Project. The College has installed Pipes from the terrace and the Rain water falling on the terrace is gathered and is used to increase the underground water table.

Photograph of Rain Water Management Pipe & Bore-Well Charging:



CHAPTER-VIII

STUDY OF ENVIRONMENTAL FRIENDLY PRACTICES

7.1 Internal Tree Plantation:

The College has internal Tree Plantation.

Photograph of Internal Tree Plantation:



7.2 Creation of Awareness on Save Energy:

The College has displayed Poster emphasizing on the Save Energy.

Photograph of Poster on Save Energy:



ANNEXURE-I:

INDOOR AIR QUALITY & 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 6 mg/l or more
4	Controlled Waste Disposal	pH between 6 to 8.5

