

ENVIRONMENTAL AUDIT REPORT OF VIVEKANAND MAHAVIDYALAYA BHADRAVATI- 442 902



Year: 2021-2022

Prepared by:

Enrich Consultants

Yashashree, 26, Nirmal Bag Society,
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MAHARASHTRA ENERGY DEVELOPMENT AGENCY
As ISO 9001 : 2000 Reg. no. : PQ 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 Mukhtangan 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 Mukhtangan English School, Parvati, Pune 411 009
Tel: 09890444795 Email: enrichcons@gmail.com

Ref: EC/VM/21-22/27

Date: 13/12/2022

CERTIFICATE

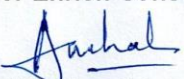
This is to certify that we have conducted Environmental Audit at Vivekanand Mahavidyalaya, Bhadravati in the Academic year 2021-22.

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.

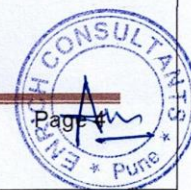
For Enrich Consultants,


A Y Mehendale,
Certified Energy Auditor
EA-8192



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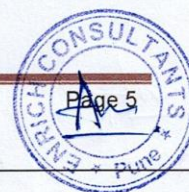
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ACKNOWLEDGEMENT

We Enrich Consultants, Pune, express our sincere gratitude to the management Vivekanand Mahavidyalaya, Bhadravati for awarding us the assignment of Environmental Audit of their Campus for the Academic Year: 2021-22.

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



EXECUTIVE SUMMARY

1. **Vivekanand Mahavidyalaya, Bhadravati** consumes Energy in the form of **Electrical Energy** used for various Electrical Equipment, office & other facilities.

2. Various Pollution due to College Activities:

- **Air pollution:** Mainly CO₂ on account of Electricity Consumption
- **Solid Waste:** Bio degradable Garden Waste
- **Liquid Waste:** Human liquid waste

3. Present Energy Consumption & CO₂ Emission:

No	Parameter/ Value	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Total	10577	9.519
2	Maximum	1276	1.148
3	Minimum	558	0.502
4	Average	881.416	0.793

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	90	93	92
2	Minimum	99	93	92

7. Indoor Comfort Conditions:

No	Parameter/Value	Temperature, °C	Humidity, %	Lux Level	Noise Level, dB
1	Maximum	29	68	285	47
2	Minimum	27	62	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. Notes & Assumptions:

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

12. References:

- For CO₂ Emissions: www.tatapower.com
- For Energy Saved by Solar Thermal Water Heating System: www.mahauria.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
LPD	: Liters 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
ISHRAE	: The Indian Society of Heating & Refrigerating & Air Conditioning Engineers

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

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

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

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

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. Study Resource Consumption & CO₂ Emissions
2. Study of CO₂ Emission Reduction
3. Study of Indoor Air Quality Parameters
4. Study of Indoor Comfort Condition Parameters
5. Study of Waste Management
6. Study of Rain Water Management
7. Study of Environment Friendly Initiatives

1.3 General Details of College: Table No 4:

No	Head	Particulars
1	Name of Institution	Amolakchand Mahavidyalaya
2	Address	Godhani Road, Yavatmal 445 001
3	Affiliation	Sant Gadge Baba Amravati University



CHAPTER-II

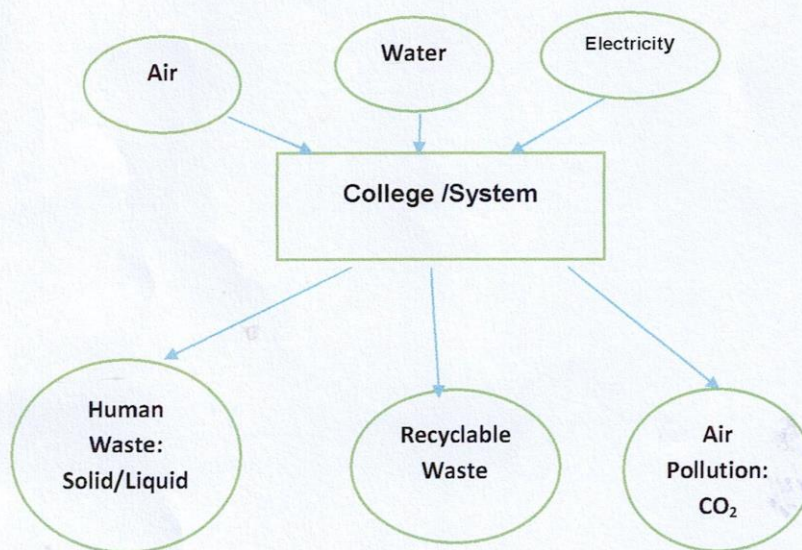
STUDY OF CONSUMPTION OF RECOURCES & CO₂ EMISSION

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.

Chart No 1: Representation of College as System & Study of Resources & Waste



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

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

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

Table No 5: Study of Consumption of Electrical Energy & CO₂ Emissions: 2021-22:

No	Month	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Apr-21	1051	0.9459
2	May-21	1258	1.1322
3	Jun-21	1276	1.1484
4	Jul-21	741	0.6669
5	Aug-21	842	0.7578
6	Sep-21	864	0.7776
7	Oct-21	930	0.837
8	Nov-21	875	0.7875
9	Dec-21	644	0.5796
10	Jan-22	806	0.7254
11	Feb-22	558	0.5022
12	Mar-22	732	0.6588
13	Total	10577	9.5193
14	Maximum	1276	1.1484
15	Minimum	558	0.5022
16	Average	881.416	0.7932

Chart No 2: Month wise CO₂Emissions:

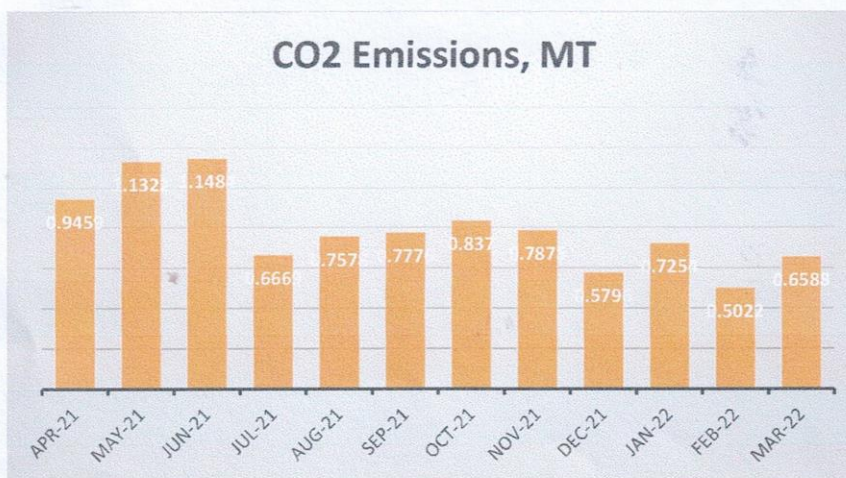


Table No 6: Important Parameters:

No	Parameter/ Value	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Total	10577	9.5193
2	Maximum	1276	1.1484
3	Minimum	558	0.5022
4	Average	881.416	0.7932

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 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.'

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	Locations	AQI	PM2.5	PM10
1	Principal Cabin	92	84	81
2	Admin Office	91	93	92
3	IQAC Room	96	78	81
4	Staff Room	93	76	80
5	NCC Room	92	79	91
6	Common Room	90	81	91
7	Class Room 108	99	93	89
8	Class Room 109	97	92	90
9	Chemistry Lab	95	90	91

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10	Botany Lab	95	91	90
11	Physics Lab	93	90	90
12	Class Room 110	92	91	92
13	Maximum	90	93	92
14	Minimum	99	93	92

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	Principal Cabin	28	62	200	45
2	Admin Office	27	63	210	41
3	IQAC Room	28	67	195	32
4	Staff Room	28	67	194	47
5	NCC Room	28	68	192	41
6	Common Room	28	66	210	33
7	Class Room 108	29	62	210	45
8	Class Room 109	29	67	225	47
9	Chemistry Lab	28	64	241	41
10	Botany Lab	28	63	251	42
11	Physics Lab	28	65	246	40
12	Class Room 110	28	66	285	44
13	Maximum	29	68	285	47
14	Minimum	27	62	192	32

CHAPTER VI STUDY OF WASTE MANAGEMENT

6.1 Segregation of Waste at Source:

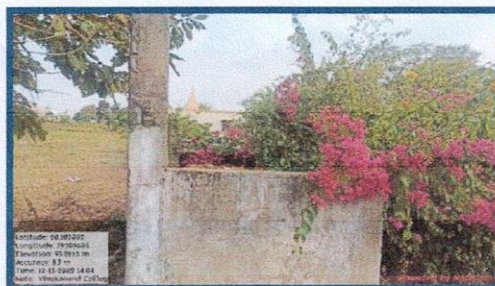
The Waste is segregated at source and the recyclable waste, like paper waste is handed over to authorized waste collecting agent for further recycling.

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 installed Sanitary Waste Incinerator for sanitary waste disposal.

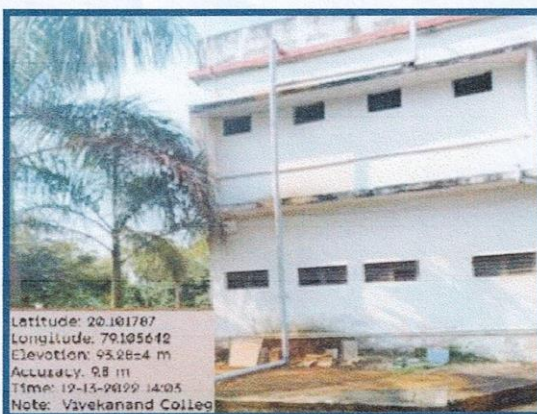
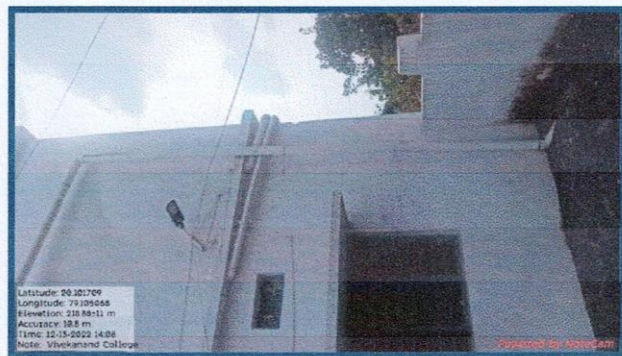
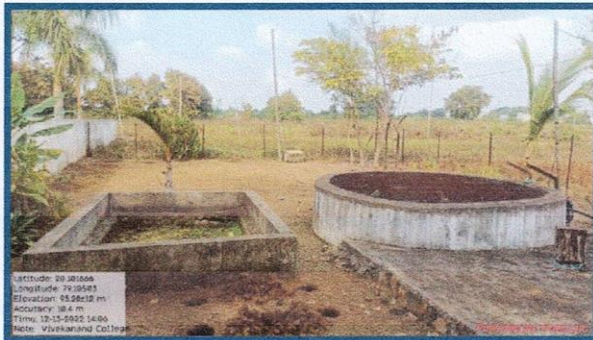


CHAPTER-VI

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:



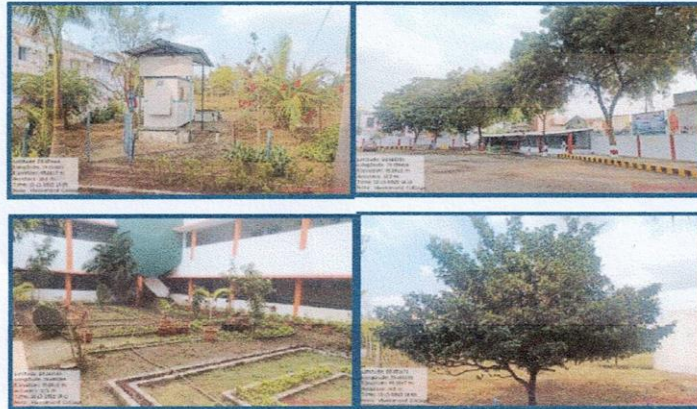
CHAPTER-VIII

STUDY OF ENVIRONMENT FRIENDLY INITIATIVES

8.1 Internal Tree Plantation:

The College has well maintained Tree Plantation in the campus.

Photograph of Tree plantation:



8.2 Creation of Awareness about Energy Conservation:

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

Photograph of Poster on Energy Conservation:



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°C
2	Humidity	Less Than 70%