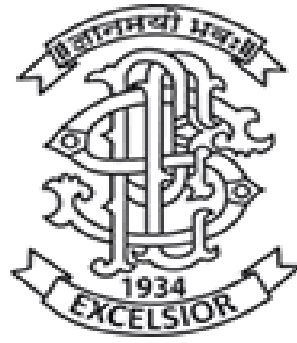


**Report
on
Environmental Audit
at
Progressive Education Society's
Modern College of Arts, Science & Commerce
Ganeshkhind, Pune 411 016**



Year: 2019-20

Prepared by

Enrich Consultants,

Yashashree, Plot No 26, Nirmal Bag Society,
Near Mukhtangan English School, Pune 411 009
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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 Muktagan 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.


(Smita Kudarikar)
General Manager (EC)

Enrich Consultants

Yashashree, 26, Nirmal Bag Society,

Environmental Audit Report: PES Modern College of Arts, Science & Commerce, Ganeshkhind,
Pune: 19-20

Near Mukhtangan English School, Parvati, Pune 411 009
Tel: 09890444795 Email: enrichcons@gmail.com

Ref: EC/PESMCASC/03

Date: 20/8/2020

CERTIFICATE

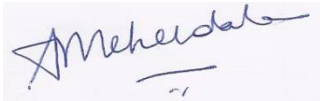
This is to certify that we have conducted **Environmental Audit** at P.E.S. Modern College of Arts, Science & Commerce, Ganeshkhind, Pune in the year 2019-20.

The College has already adopted following projects for making the campus **Energy Efficient Efficient and Green:**

- Installation of Bio Composting Pit
- Installation of Rain Water Harvesting System
- Installation of **21 kW** Hybrid Roof Top Solar PV/Wind Power 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 wish to express our sincere gratitude to the management of P.E.S. Modern College of Arts, Science & Commerce, Ganeshkhind, Pune for assigning the work of Environmental Audit of Ganeshkhind campus for the Year: 2018-19.

We appreciate the co-operation and support extended to our team members during the entire tenure of field study.

We express our sincere thanks to

1. Prof. Dr. G. R. Ekbote, Chairman, Progressive Education Society
2. Prof. Dr. Sanjay S. Kharat, Principal
3. Prof. Dr. Mrs. Pallawi Bulakh, Faculty Member
4. Prof Dr. Sanjay Patil, Head, Geology Department

We are also thankful to all other staff members who helped us during the Measurements at the field and for giving us the necessary inputs to carry out this vital exercise of Energy Audit.

EXECUTIVE SUMMARY

After the Field measurements & analysis, we present herewith important observations made and various measures to reduce the dependency on Natural resources & reduce the pollution.

1. PES Modern College of Arts, Science and Commerce, Ganeshkhind, Pune consumes various resources for day to day operations, namely: Air, Water, Electrical Energy & LPG.

2. Various Pollution due to College Activities:

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

3. Present Level of CO₂ Emissions:

No	Parameter /Value	Energy, kWh	CO₂ Emissions, MT
1	Total	150377	120.30
2	Maximum	19006	15.20
3	Minimum	6711	5.37
4	Average	12531.42	10.03

4. The various projects already implemented for Environmental Conservation:

- Usage of Energy Efficient BEE STAR Rated ACs
- Usage of Natural Day light in corridors
- Implementation of Bio Composting pit for disposal of Bio degradable waste
- Implementation of Rain Water Harvesting
- Installation of --- kW Capacity Roof top Solar PV/Wind hybrid Power Plant.

5. Recommendations:

1. Installation of Bio Gas Generator Plant instead of Bio composting Plant.
2. Installation of Sewage treatment Plant to make campus a Zero Discharge campus

6. Notes & Assumptions:

1. **1 kWh** of Electrical Energy releases **0.8 Kg of CO₂** into atmosphere
2. **1 kWp** Solar PV plant generates **4 kWh/day** Electrical Energy

ABBREVIATIONS

AC	: Air conditioner
PES	: Progressive Education Society
CFL	: Compact Fluorescent Lamp
FTL	: Fluorescent Tube Light
LED	: Light Emitting Diode
kWh	: kilo-Watt Hour
Qty	: Quantity
W	: Watt
kW	: Kilo Watt
PF	: Power Factor
M D	: Maximum Demand
PC	: Personal Computer
MSEDCL	: Maharashtra State Electricity Distribution Company Ltd

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 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 present usage of Natural resources the College is consuming
2. To Study the present pollution sources
3. To study various measures to make the campus Self sustainable in respect of Natural resources
4. To suggest the various measures to reduce the pollution: Air, Water, Noise

1.3 Audit Methodology:

1. Study of College as System
2. Study of Electrical Energy Consumption
3. Study of CO2 emissions
4. Suggestions on usage of Renewable Energy

1.4 General Details of AISSMS's College of Hotel Management & Catering Technology:

No	Head	Particulars
1	Name of Institution	PES Modern College of Arts, Commerce & Science
2	Address	Ganeshkhind, Pune
3	Year of Establishment	To be inserted
4	Affiliation	Savitribai Phule Pune University

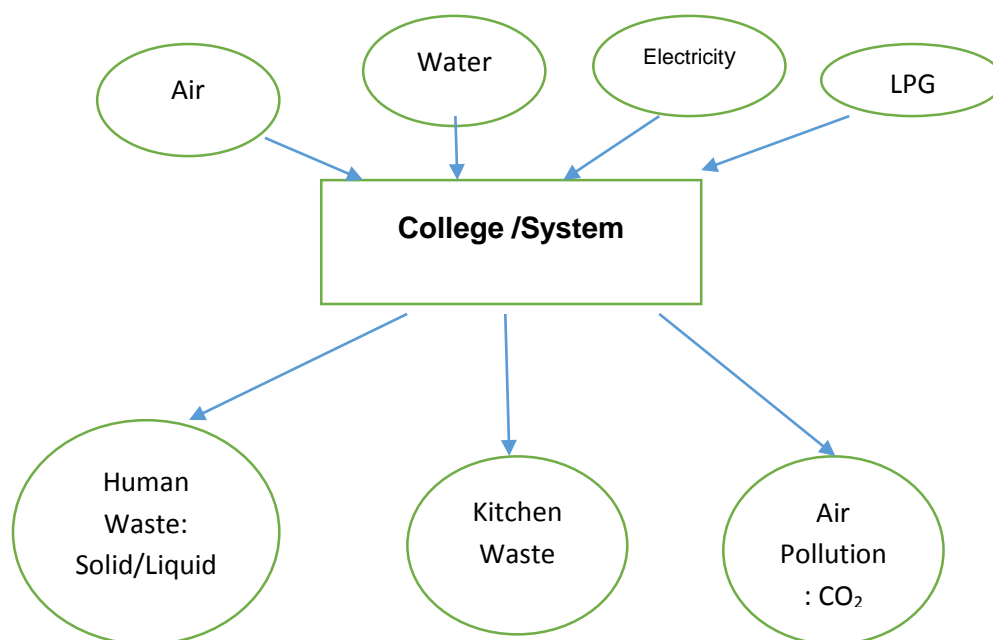
CHAPTER-II

STUDY OF CONSUMPTION OF VARIOUS RESOURCES

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.



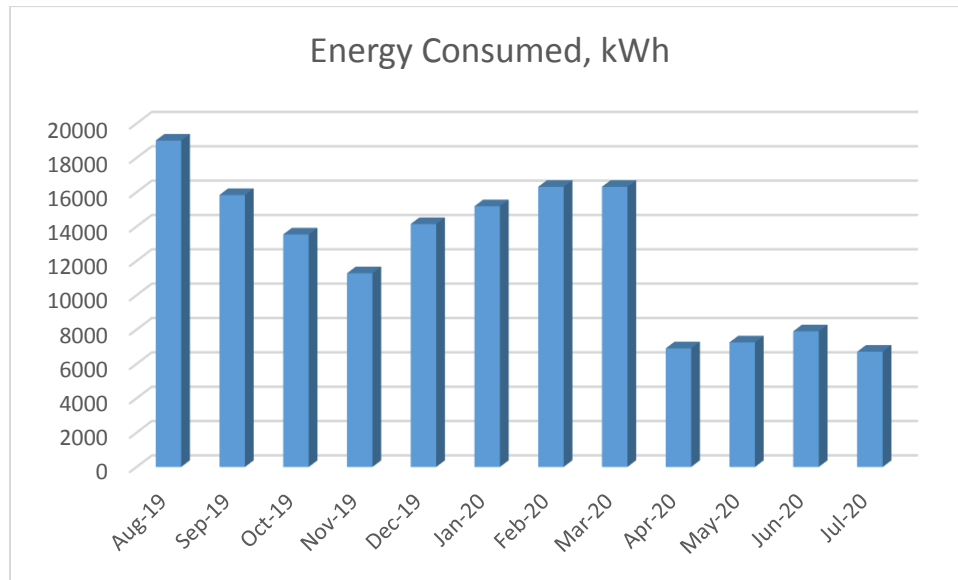
Now we compute the Generation of CO₂ on account of consumption of Electrical Energy & LPG as under.

Table No-5: Electrical Energy Consumption: 2019-20:

No	Month	Energy Consumed, kWh
1	Aug-19	19006
2	Sep-19	15836
3	Oct-19	13538
4	Nov-19	11277
5	Dec-19	14145
6	Jan-20	15181
7	Feb-20	16313
8	Mar-20	16313
9	Apr-20	6907
10	May-20	7251
11	Jun-20	7899
12	Jul-20	6711

13	Total	150377
14	Maximum	19006
15	Minimum	6711
16	Average	12531.41667

2.1 To study the variation of Monthly Electrical Energy Consumption, kWh:



2.3 Key Inference drawn:

From the above analysis, we present following important parameters:

Table No-6: Variation in Important Parameters:

No	Parameter/ Value	Energy Consumed, kWh
1	Total	150377
2	Maximum	19006
3	Minimum	6711
4	Average	12531.42

CHAPTER-III

STUDY OF ENVIRONMENTAL POLLUTION

In this Chapter, we present the various types of Pollution as under:

3.1 Air Pollution:

The College is using two forms of Energies, namely: Thermal in the form of LPG and Electrical Energy used for day to day operations of the College. The major pollutant on account of above Energy forms is the Carbon Di Oxide.

- 1 unit (kWh) of Electrical Energy emits 0.8 Kg of CO₂ in the atmosphere
- 1 Kg of LPG emits 3 Kg of CO₂ in the atmosphere

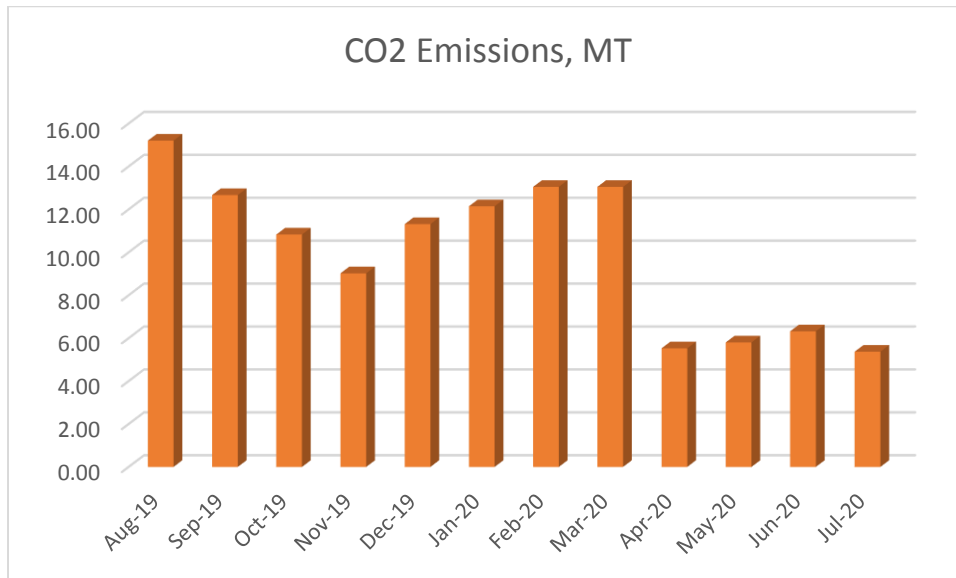
In the following Table, we present the CO₂ emissions.

Table No-5: Month wise Consumption of Electrical Energy & CO₂ Emissions:

No	Month	Energy Consumed, kWh	CO ₂ Emissions, MT
1	Aug-19	19006	15.20
2	Sep-19	15836	12.67
3	Oct-19	13538	10.83
4	Nov-19	11277	9.02
5	Dec-19	14145	11.32
6	Jan-20	15181	12.14
7	Feb-20	16313	13.05
8	Mar-20	16313	13.05
9	Apr-20	6907	5.53
10	May-20	7251	5.80
11	Jun-20	7899	6.32
12	Jul-20	6711	5.37
13	Total	150377	120.30
14	Maximum	19006	15.20
15	Minimum	6711	5.37
16	Average	12531.41667	10.03

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

4.3 Representation of Month wise CO₂ emissions: Chart No-5:



3.3 Study of Solid Waste Generation:

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

3.3.1 Photograph of Bio Composting Processing Tanks:



3.4 Study of Liquid Waste Generation:

At present the Liquid Waste generated due to day to day operations is drained off to the Pune municipal Corporation through a pipe.

3.5 Study of e-Waste Management:

The internal communication is through emails and hence there is hardly any generation of e-Waste in the premises.

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. This stored water is then reused for domestic purpose.

Photograph of Rain Water Harvesting Pipe:



CHAPTER-V

RECOMMENDATIONS

In order to reduce the dependency on Natural resources and also in order to reduce the various pollutions arising due to the day to day operations of the College we herewith recommend following recommendations.

- Installation of Bio Gas Generator Plant instead of Bio composting Plant.
- Installation of Sewage treatment Plant to make campus a Zero Discharge campus