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

Year: 2019-20

Prepared by

Enrich Consultants,

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MAHARASHTRA ENERGY DEVELOPMENT AGENCY

Maharashtra Energy Development Agency
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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/PESMCASC/02 Date: 20/8/2019

CERTIFICATE

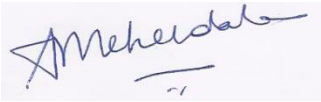
This is to certify that we have conducted **Green Audit** at P.E.S. Modern College of Arts, Science & Commerce, Ganeshkhind, Pune in the year 2019-20.

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.
- Usage of LED Lighting
- Usage of BEE STAR Rated equipment

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

CONTENTS

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 Energy Audit of Ganeshkhind campus for the Year: 2019-20.

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

Green Audit of P.E.S. Modern College of Arts, Science & Commerce, Ganeshkhind, Pune entrusted to M/s. Enrich Consultants, Pune. Based On the audit field study, we present the following important points.

1. P.E.S. Modern College of Arts, Science & Commerce, Ganeshkhind, Pune uses Electrical Energy as the source of Energy for various equipment in the college campus.

2. Present Energy Consumption:

No	Parameter/ Value	Energy Consumed, kWh	CO_2 Emissions, MT
1	Total	150377	120.30
2	Maximum	19006	15.20
3	Minimum	6711	5.37
4	Average	12531.41667	10.03

3. Various measures adopted for Energy Conservation & renewable Energy:

1. Usage of LED tube lights
2. Usage of STAR Rated equipment
3. Maintenance of good power factor
4. Installation of **21 kWp Solar & Wind Hybrid** roof top plant.

4. Usage of Renewable Energy:

In order to reduce the dependency on Grid Power, the College has installed a Roof Top Solar PV/Wind Hybrid Power Plant of Capacity **21 kW**.

5. Rain Water Harvesting:

The College has installed the Rainwater harvesting project, to reduce dependency on municipal corporation water supply.

6. Waste Management:

6.1 Solid Waste Management:

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

6.2 e-Waste Management:

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

7. Notes & Assumptions:

1. **1 kWh** of Electrical Energy releases **0.8 Kg of CO_2** into atmosphere
2. Average Daily usage period: **8 Hours**
3. Annual Working Days: **250 Nos**
4. **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 1
INTRODUCTION

1.1 Objectives:

1. To study present level of Energy Consumption
2. To Study the present CO_2 emissions
3. To assess the various equipment/facilities from Energy efficiency aspect
4. To measure various Electrical parameters
5. To study Scope for usage of Renewable Energy
6. To study various measures to reduce the Energy Consumption

1.2 Audit Methodology:

1. Study of connected load
2. Study of various Electrical parameters
3. To prepare the Report with various Encon measures with payback analysis

1.3 General Details of College: Table No-1:

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 PRESENT ENERGY CONSUMPTION

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

Table No-2: Electrical Bill Analysis: 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

Chart No-2: Monthly Unit Consumption (kWh) Variation:

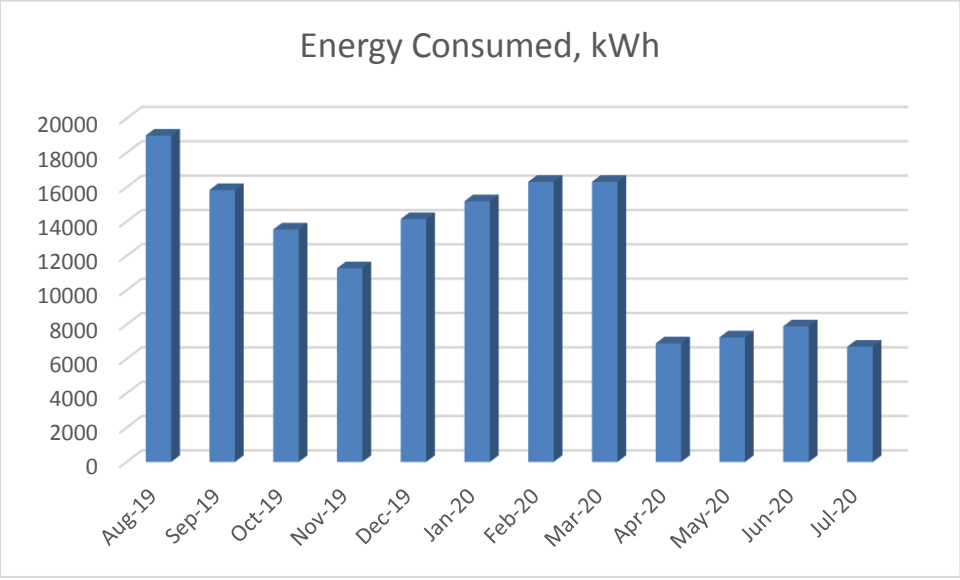


Table No-5: Important Parameters:

No	Parameter/ Value	Energy Consumed, kWh
1	Total	150377
2	Maximum	19006
3	Minimum	6711
4	Average	12531.41667

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

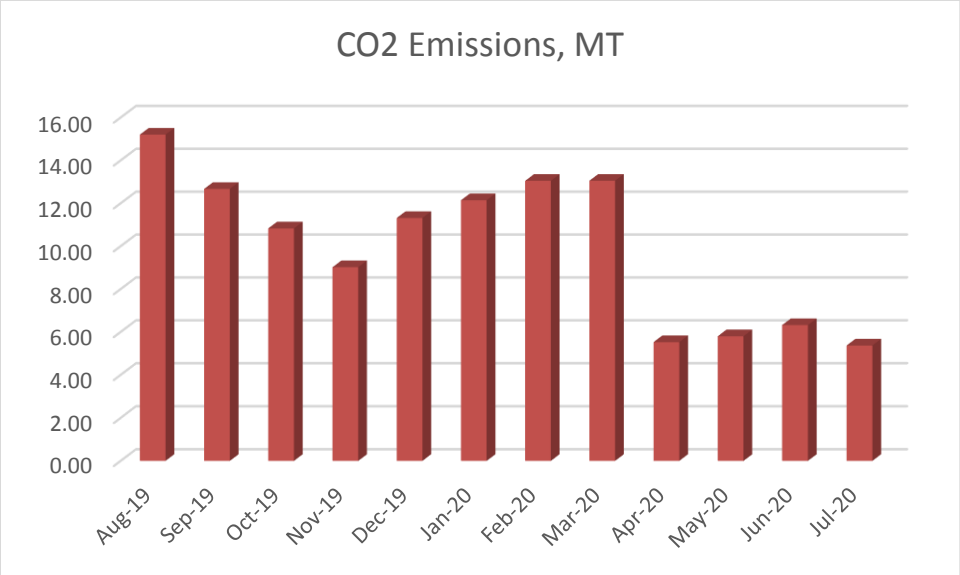
Based on the above Data we compute the CO_2 emissions which are being released in to the atmosphere by the College due to its Day to Day operations
We herewith furnish the details of various forms of Energy consumption as under

Table No-3: Month wise Consumption of Electrical Energy & CO_2 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 CO_2 emissions: Chart No-5:



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
STUDY OF WASTE MANAGEMENT

5.1 Solid Waste Management:

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

Photograph of Bio Composting Storage Tanks:

5.2 e-Waste Management:

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

CHAPTER-VI
STUDY OF GREEN PRACTICES

6.1 No of students who don't use own Vehicle for coming to Institute:

The % of students coming to Institute, without using own Automobile is about **50 %.**

6.2 Usage of Public Transport:

During the Students transport study, it was revealed that the local students who are residing near areas make use of Public Transport like Pune Municipal Transport local buses, local sharing type auto rickshaws. The average number of students is approximately 25 %

6.3 Pedestrian Friendly Roads:

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

6.4 Photograph of Road within campus:

6.5 Plastic Free Campus:

The Institute is an active participant in the Government of India's most prestigious project of **SWATCHH BHART ABHIYAN.** The Institute has displayed boards in the Campus, to make the campus plastic free.

6.6 Various measures adopted for this purpose:

- Installation of Separate waste bins for Dry waste & wet waste
- Usage of paper tea cups in the Institute canteen
- Display of boards in the campus for Plastic Free campus

6.7 Paperless Office:

The internal communication of the Institute is through the Internet. There are hardly any day to day operations, where printing is required.

6.8 Green Landscaping with Trees and Plants:

The Institute has beautiful maintained Garden.

Photograph of Garden/Tree plantation in the campus: