ENERGY AUDIT REPORT

of

Deccan Education Society's,

BRIHAN MAHARASHTRA COLLEGE OF COMMERCE,

SHIVAJINAGAR, PUNE 411 004

Year: 2017-18

Prepared by

Enrich Consultants

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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, Fax No: 020-26615031
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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.

(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/DESBMCC/17-18/01 Date: 4/5/2018

CERTIFICATE

This is to certify that we have conducted Energy Audit at Deccan Education Society's Brihan Maharashtra College of Commerce, Shivajinagar, Pune 411 004, in the year 17-18.

The College has adopted **Energy Efficient** practices:

- Usage of Energy Efficient LED Fittings
- Usage of Energy Efficient BEE STAR Rated equipment
- Maximum usage of Day Lighting
- Installation of **5500 LPD** Solar Thermal Water Heating System

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 Deccan Education Society's Brihan Maharashtra College of Commerce, Pune, for awarding us the assignment of Energy Audit of their campus for the Year: 2017-18.

We are thankful to various Head of Departments & other Staff members for helping us during the field measurements.

EXECUTIVE SUMMARY

1. Deccan Education Society's, Brihan Maharashtra College of Commerce, Shivajinagar, Pune 411 004, consumes Energy in the form of **Electrical Energy** used for various gadgets, Office & other facilities.

2. Present Energy Consumption:

No	Parameter /Value	Electrical Energy Consumed, kWh	CO_2 Emissions, MT
1	Total	106066	84.85
2	Maximum	13488	10.79
3	Minimum	6780	5.42
4	Average	8838.83	7.07

3. Various Majors Adopted for Energy Conservation:

- Usage of Energy efficient LED fittings
- Usage of BEE STAR Rated Equipment
- Maximum usage of Day Lighting
- Installation of **5500 LPD** Solar Thermal Water Heating System

4. Usage of Alternate / Renewable Energy:

- The College has installed **5500 LPD** Solar Thermal Water Heating System
- The Energy purchased from MSEDCL in 17-18 is **1206066 kWh**
- Equivalent Energy saved by Solar Water Heating System is **53116 kWh**
- Total Energy requirement in 17-18 is **159182 kWh**
- The Usage of Alternate Energy to Annual Energy Demand in the Year is **33.37 %.**

5. Usage of LED Lighting:

- The total Annual Lighting Load is **28.84 kW,**
- The Annual LED Lighting Load is **4.56 kW.**
- The % of Total Lighting Requirement met by LED Lighting is **15.82 %.**

6. Notes & Assumptions:

1. **1 kWh** of Electrical Energy releases **0.8 Kg of CO_2**into atmosphere
2. Energy saved by **100 LPD** Solar Thermal Water Heating System in an year is **1500 kWh**
3. Annual working Days: For Solar Thermal Water Heating System in 17-18: **235 Nos**

7. Reference:

1. For Energy saved by Solar Thermal Water Heating System : www.mahaurja.com

ABBREVIATIONS

AC	:	Air conditioner
DES	:	Deccan Education Society
CFL	:	Compact Fluorescent Lamp
FTL	:	Fluorescent Tube Light
LED	:	Light Emitting Diode
LPD	:	Liters per Day
kWh	:	kilo-Watt Hour
Qty	:	Quantity
W	:	Watt
kW	:	Kilo Watt
PC	:	Personal Computer
MT	:	Metric Ton

CHAPTER-I
INTRODUCTION

1.1 Objectives:

1. To study Connected load and Present Energy Consumption
2. To Study the present CO_2 emissions
3. To study Scope for usage of Alternate Energy
4. To study LED Lighting

1.2 Table No1: General Details of College:

No	Head	Particulars
1	Name	Deccan Education Society's Brihan Maharashtra College of Commerce
2	Address	545, Shivajinagar, Pune 411004
3	Year of Establishment	1943
4	Affiliation	Savitribai Phule Pune University

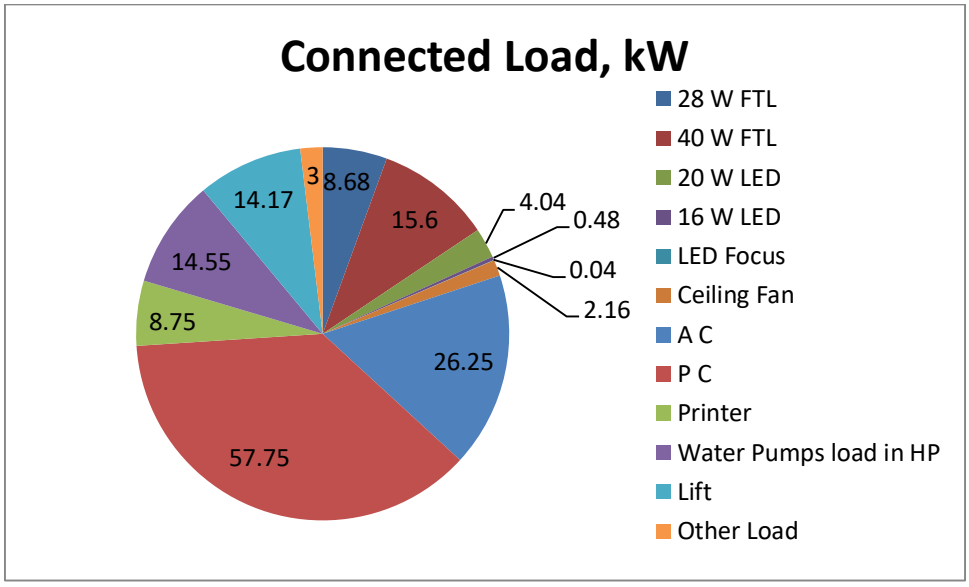
CHAPTER-II
STUDY OF CONNECTED LOAD

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

2.1 Table No-2: Details of Equipment Wise Connected Load:

No	Equipment	Qty	Load, W/Unit	Load, kW
1	28 W FTL	310	28	8.68
2	40 W FTL	390	40	15.6
3	20 W LED	202	20	4.04
4	16 W LED	30	16	0.48
5	LED Focus	6	7	0.04
6	Ceiling Fan	360	6	2.16
7	A C	14	1875	26.25
8	P C	385	150	57.75
9	Printer	50	175	8.75
10	Water Pumps load in HP	19.5	746	14.55
11	Lift	2	7087	14.17
12	Other Load	20	150	3
13	**Total**			**155**

Chart No-1: Details of Connected Load:



CHAPTER-III
STUDY OF ELECTRICAL ENERGY CONSUMPTION

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

Table No 3: Electrical Energy Consumption Analysis- 2017-18:

No	Month	Total Energy Consumed, kWh
1	Apr-17	7202
2	May-17	7398
3	Jun-17	7316
4	Jul-17	7558
5	Aug-17	9910
6	Sep-17	7919
7	Oct-17	9530
8	Nov-17	8325
9	Dec-17	6780
10	Jan-18	13488
11	Feb-18	8048
12	Mar-18	12592
13	Total	106066
14	Maximum	13488
15	Minimum	6780
16	Average	8838.83

Chart No 2: To study Month wise Total Energy Consumption, kWh:

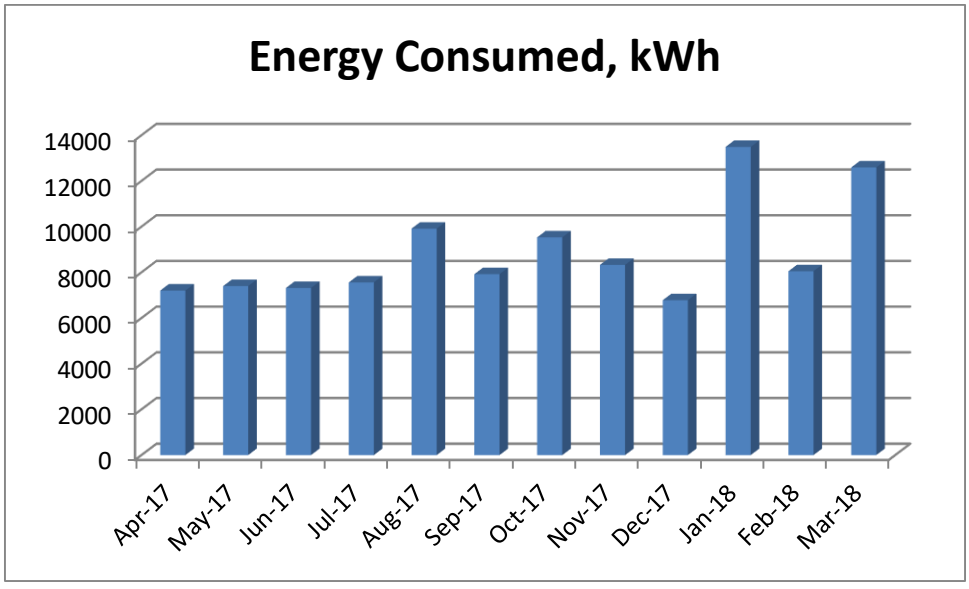


Table No 4: Key Parameters:

No	Parameter	Energy Consumed, kWh
1	Total	106066
2	Maximum	13488
3	Minimum	6780
4	Average	8838.83

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. The College uses Electrical Energy for various Electrical gadgets.

Basis for computation of CO_2 Emissions:

The basis of Calculation for CO_2 emissions due to Electrical Energy are:

1 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	Total Energy Consumed, kWh	CO_2 Emissions, MT
1	Apr-17	7202	5.76
2	May-17	7398	5.92
3	Jun-17	7316	5.85
4	Jul-17	7558	6.05
5	Aug-17	9910	7.93
6	Sep-17	7919	6.34
7	Oct-17	9530	7.62
8	Nov-17	8325	6.66
9	Dec-17	6780	5.42
10	Jan-18	13488	10.79
11	Feb-18	8048	6.44
12	Mar-18	12592	10.07
13	Total	106066	84.85
14	Maximum	13488	10.79
15	Minimum	6780	5.42
16	Average	8838.83	7.07

Chart No 3: Month wise CO_2 Emissions:

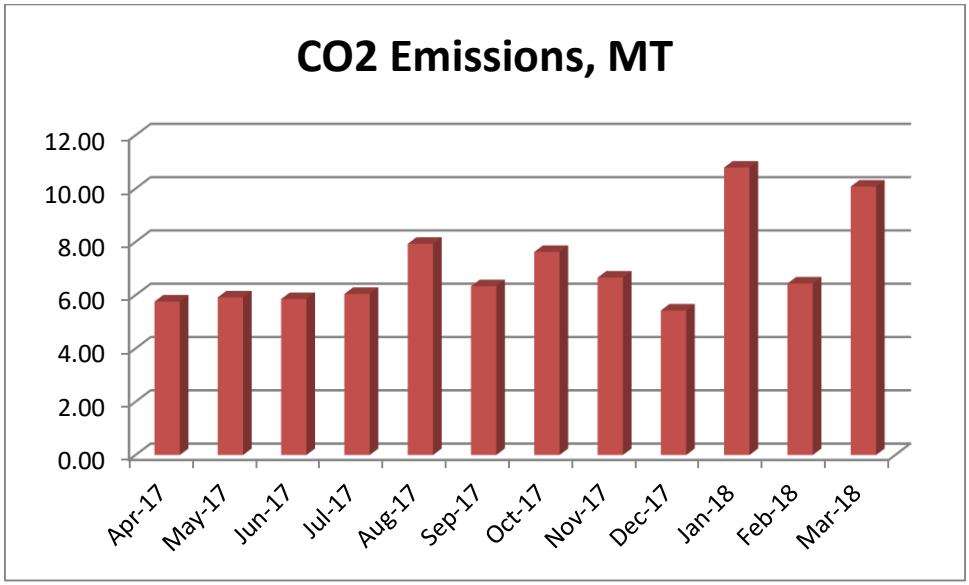


Table No 6: Key Parameters:

No	Parameter/ Value	Energy Purchased, kWh	CO_2 emissions, MT
1	Total	106066	84.85
2	Maximum	13488	10.79
3	Minimum	6780	5.42
4	Average	8838.83	7.07

CHAPTER-V
STUDY OF USAGE OF ALTERNATE ENERGY

The College has installed **5500 LPD Solar Thermal Water heating system at Girls and Boys Hostel blocks.** (Total Installed Capacity)

In this Chapter, we compute the percentage of usage of Alternate / Renewable Energy to Annual Energy Demand of the College.

Table No 7: Computation of % usage of Alternate Energy to Annual Energy Demand:

No	Particulars	Value	Unit
1	Energy purchased from MSEDCL	**106066**	kWh
2	Installed Solar Thermal Water Heating Capacity	5500	LPD
3	Energy saved by 100 LPD System in 1 year	1500	kWh
4	Energy saved by 5500 LPD System=2*3/100	82500	kWh
5	System working days in 18-19	235	Nos
6	Energy saved by System in 19-20 = 82500*200/365	**53116**	kWh
7	Total Annual Energy Demand=1+6	**159182**	kWh
8	% of Usage of Alternate Energy to Total Energy Demand=6*100/7	**33.37**	%

Photograph of Solar Thermal Water Heating System:

CHAPTER VI
STUDY OF USAGE OF LED LIGHTS

In the following Table, we present the percentage of annual Lighting load met by LED lights.

Table No 8: Computation of Percent Usage of Annual LED Usage to Annual Lighting Power Requirement:

No	Particulars	Value	Unit
1	Qty of 28 W FTL Fitting	310	Nos
2	Qty of 40 W FTL Fitting	390	Nos
3	Qty of 20 W LED Fitting	202	Nos
4	Qty 16 W LED Fitting	30	Nos
5	Qty of LED Focus Fitting	6	Nos
6	Demand of 28 W FTL Fitting	28	W/Unit
7	Demand of 40 W FTL Fitting	40	W/Unit
8	Demand of 20 W LED Fitting	20	W/Unit
9	Demand of 16 W LED Fitting	16	W/Unit
10	Demand of LED Focus Fitting	7	W/Unit
11	Load of 28 W FTL Fitting	8.68	kW
12	Load of 40 W FTL Fitting	15.6	kW
13	Load of 20 W LED Fitting	4.04	kW
14	Load of 16 W LED Fitting	0.48	kW
15	Load of LED Focus Fitting	0.042	kW
16	Total Lighting Load =11+12+13+14+15	**28.84**	kW
17	Total LED Lighting Load = 13+14+15	**4.56**	kW
18	% of Usage of LED Lighting Load to Annual Lighting Load = 17*100/16	**15.82**	%