

ENERGY AUDIT REPORT
of
**Deccan Education Society's,
BRIHAN MAHARASHTRA COLLEGE OF COMMERCE,
SHIVAJINAGAR, PUNE 411 004**



Year: 2019-20

Prepared by

Enrich Consultants

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MAHARASHTRA ENERGY DEVELOPMENT AGENCY



Maharashtra Energy Development Agency

(A Government of Maharashtra undertaking)

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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 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.


(Smita Kudarikar)
General Manager (EC)

Enrich Consultants

Yashashree, 26, Nirmal Bag Society,
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Tel: 09890444795 Email: enrichcons@gmail.com

Ref: EC/DESBMCC/19-20/01

Date: 12/7/2020

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 19-20.

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: 2019-20.

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	124765	99.81
2	Maximum	11283	9.03
3	Minimum	9634	7.71
4	Average	10397.08	8.32

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 19-20 is **124765 kWh**
- Equivalent Energy saved by Solar Water Heating System is **45205 kWh**
- Total Energy requirement in 19-20 is **169970 kWh**
- The Usage of Alternate Energy to Annual Energy Demand in the Year is **26.60 %**.

5. Usage of LED Lighting:

- The total Annual Lighting Load is **27.81 kW**,
- The Annual LED Lighting Load is **6.53 kW**.
- The % of Total Lighting Requirement met by LED Lighting is **23.48 %**.

6. Notes & Assumptions:

1. **1 kWh** of Electrical Energy releases **0.8 Kg of CO₂** 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 19-20: **200 Nos**

7. Reference:

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

ABBREVIATIONS

AC	:	Air conditioner
LPD	:	Liters per Day
DES	:	Deccan 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
PC	:	Personal Computer
MT	:	Metric Ton

CHAPTER-I INTRODUCTION

1.1 Objectives:

1. To study Connected Load
2. To study present Energy Consumption
3. To Study the present CO₂ emissions
4. To study Scope for usage of Alternate Energy
5. 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

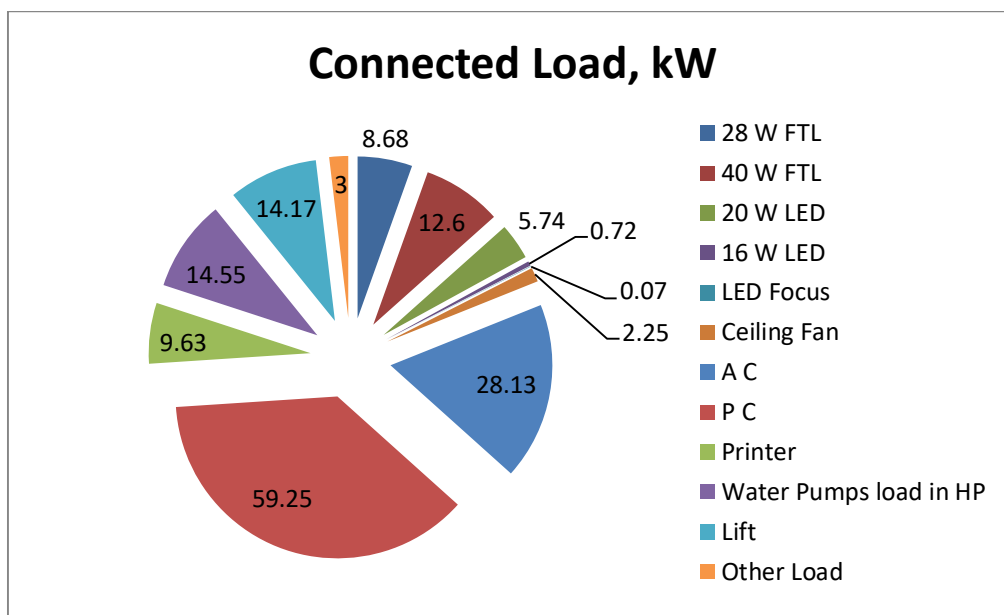
CHAPTER-II STUDY OF CONNECTED LOAD

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	315	40	12.6
3	20 W LED	287	20	5.74
4	16 W LED	45	16	0.72
5	LED Focus	10	7	0.07
6	Ceiling Fan	375	6	2.25
7	A C	15	1875	28.13
8	P C	395	150	59.25
9	Printer	55	175	9.63
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			159

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- 2019-20:

No	Month	Total Energy Consumed, kWh
1	Apr-19	11147
2	May-19	9752
3	Jun-19	9968
4	Jul-19	11215
5	Aug-19	11283
6	Sep-19	10611
7	Oct-19	9741
8	Nov-19	9634
9	Dec-19	10828
10	Jan-20	9979
11	Feb-20	10476
12	Mar-20	10131
13	Total	124765
14	Maximum	11283
15	Minimum	9634
16	Average	10397.08

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

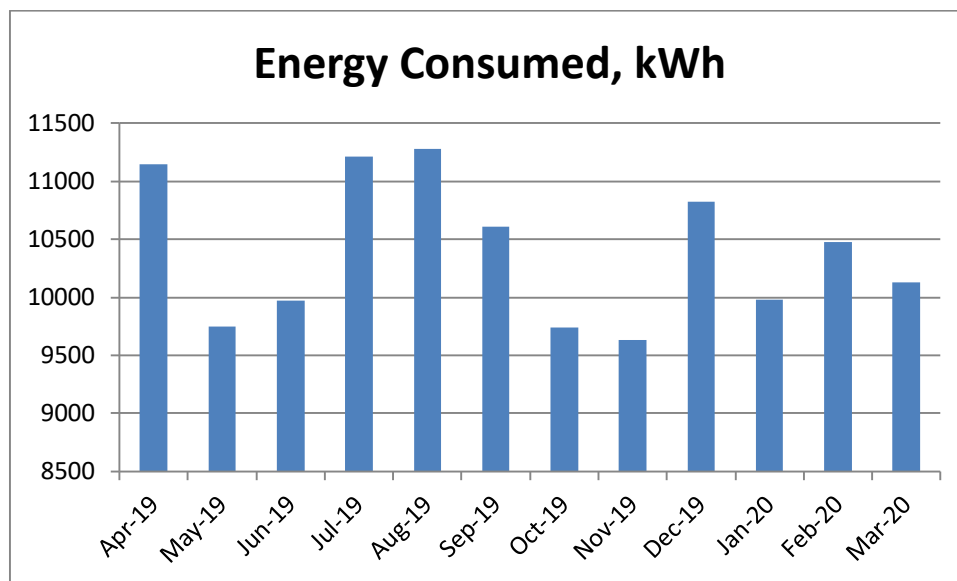


Table No 4: Key Parameters:

No	Parameter	Energy Consumed, kWh
1	Total	124765
2	Maximum	11283
3	Minimum	9634
4	Average	10397.08

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 CO₂ Emissions:

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

1 kWh of Electrical Energy releases **0.8 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 Consumed, kWh	CO ₂ Emissions, MT
1	Apr-19	11147	8.92
2	May-19	9752	7.80
3	Jun-19	9968	7.97
4	Jul-19	11215	8.97
5	Aug-19	11283	9.03
6	Sep-19	10611	8.49
7	Oct-19	9741	7.79
8	Nov-19	9634	7.71
9	Dec-19	10828	8.66
10	Jan-20	9979	7.98
11	Feb-20	10476	8.38
12	Mar-20	10131	8.10
13	Total	124765	99.81
14	Maximum	11283	9.03
15	Minimum	9634	7.71
16	Average	10397.08	8.32

Chart No 3: Month wise CO₂Emissions:

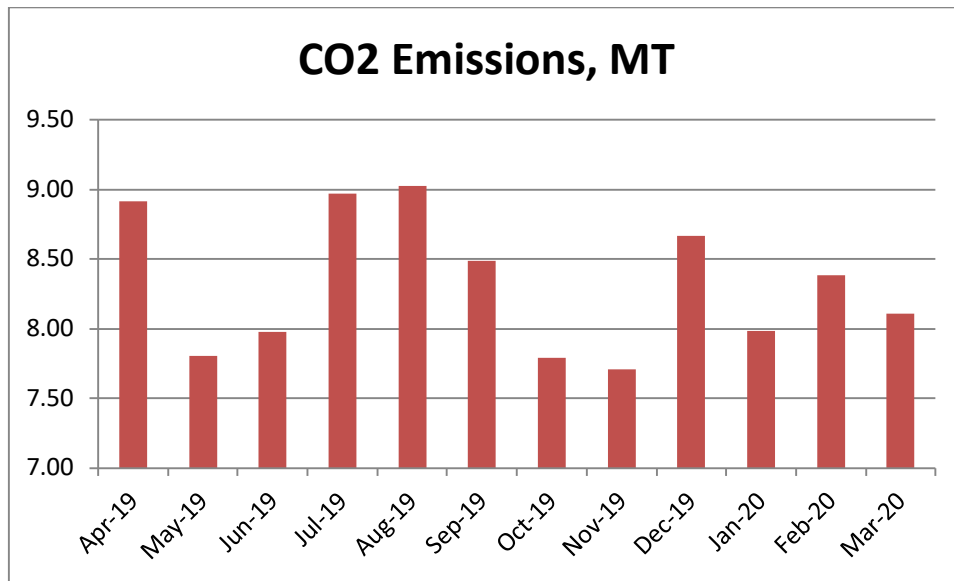


Table No 6: Key Parameters:

No	Parameter/ Value	Energy Consumed, kWh	CO ₂ emissions, MT
1	Total	124765	99.81
2	Maximum	11283	9.03
3	Minimum	9634	7.71
4	Average	10397.08	8.32

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	124765	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= $1*2/100$	82500	kWh
5	System working days in 19-20	200	Nos
6	Energy saved by System in 19-20 = $82500*200/365$	45205	kWh
7	Total Annual Energy Demand= $1+6$	169970	kWh
8	% of Usage of Alternate Energy to Total Energy Demand= $6*100/7$	26.60	%

Photograph of Roof Top Solar Water 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	315	Nos
3	Qty of 20 W LED Fitting	287	Nos
4	Qty 16 W LED Fitting	45	Nos
5	Qty of LED Focus Fitting	10	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	12.6	kW
13	Load of 20 W LED Fitting	5.74	kW
14	Load of 16 W LED Fitting	0.72	kW
15	Load of LED Focus Fitting	0.07	kW
16	Total Lighting Load =11+12+13+14+15	27.81	kW
17	Total LED Lighting Load = 13+14+15	6.53	kW
18	% of Usage of LED Lighting Load to Annual Lighting Load = $17*100/16$	23.48	%