

ENERGY AUDIT REPORT
of
Samarth Group of Institutions
College of Engineering,
A/P Belhe, Tal: Junnar, Dist: Pune 412 410



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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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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Ref: EC/SGOICOE/19-20/01

Date: 20/8/2020

CERTIFICATE

This is to certify that we have conducted Energy Audit at Samarth Group of Institutions College of Engineering, A/P Belhe, Tal: Junnar, Dist: Pune 412 410, in the Academic year 2019-20

.The College has adopted following Energy Efficient practices:

- Usage of Energy Efficient LED Fittings
- Usage of Energy Efficient BEE STAR Rated equipment
- Maximum usage of Day Lighting
- Installation of 2000 LPD Solar Thermal Water Heating System

We appreciate the support of Management, involvement of faculty members and students in the process of making the Campus Energy Efficient.

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 Samarth Group of Institutions College of Engineering, A/P Belhe, Tal: Junnar, Dist: Pune, for awarding us the assignment of Energy Audit of their Campus for the Year: 2019-20.

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

EXECUTIVE SUMMARY

1. Samarth Group of Institutions College of Engineering & Research, A/P Belhe, Tal; Junnar, Dist: Pune consumes Energy in the form of **Electrical Energy** used for various Electrical Equipment, office & other facilities.

2. Present Energy Consumption & CO₂ Emission:

No	Parameter/ Value	Energy Consumed, kWh	CO ₂ Emissions, MT
1	Total	51894.5	41.52
2	Maximum	6007.5	4.81
3	Minimum	1287	1.03
4	Average	7983.77	6.39

3. Energy Conservation projects already installed:

- Usage of Energy Efficient LED fittings
- Maximum Usage of Day Lighting
- Installation of **2000 LPD** Solar Water Heating System

4. Usage of Alternate Energy:

- The College has installed Solar Thermal Water Heater of Capacity **2000 LPD**.
- Energy purchased from MSEDCL is **51895 kWh**.
- Energy saved by Solar Thermal Heater is **13973 kWh**.
- The percentage of Usage of Alternate Energy to Annual Energy Demand is **21.21 %**.

5. Usage of LED Lighting:

- The Total Annual Lighting Demand of the College is **21780 kWh**.
- The Total Annual LED Lighting Demand is **3780 kWh**.
- The percentage of Annual LED Lighting to Annual Lighting Demand is **17.36 %**.

6. Assumptions:

1. 1 kWh of Electrical Energy releases **0.8 Kg of CO₂** into atmosphere
2. Daily working hours-**6 Nos** (For Lighting Calculations)
3. Annual working Days-**150 Nos** (For Lighting Calculations)

7. References:

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

ABBREVIATIONS

LED	: Light Emitting Diode
MSEDCL	: Maharashtra State Electricity Distribution Company Limited
IQAC	: Internal Quality Assurance Cell
BEE	: Bureau of Energy Efficiency
FTL	: Fluorescent Tube Light
CFL	: Compact Fluorescent Light
PV	: Photo Voltaic
Kg	: Kilo Gram
kWh	: kilo-Watt Hour
CO ₂	: Carbon Di Oxide
MT	: Metric Ton

CHAPTER-I

INTRODUCTION

1.1 Objectives:

1. To study present Energy Consumption
2. To Study the present CO₂ emissions
3. To study usage of Alternate Energy
4. To study usage of LED Lighting

1.2 Table No 1: General Details of the College:

No	Head	Particulars
1	Name of Institution	Samarth Group of Institutions College of Engineering
2	Address	A/P Belhe, Tal: Junnar, Dist: Pune
3	Affiliation	Savitribai Phule Pune University

CHAPTER-II

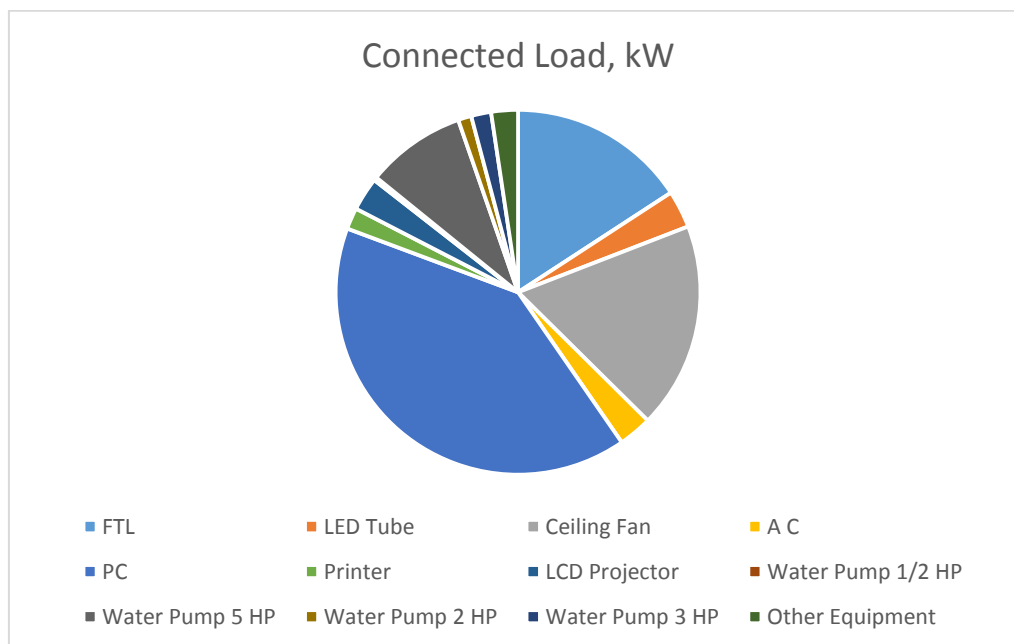
STUDY OF CONNECTED LOAD

The major contributors to the connected load of the College include:

Table No 2: Study of Connected Load:

No	Equipment	Qty	Load, W/Unit	Load, kW
1	FTL	500	40	20
2	LED Tube	210	20	4.2
3	Ceiling Fan	356	65	23.14
4	A C	2	1875	3.75
5	PC	340	150	51
6	Printer	16	150	2.4
7	LCD Projector	15	250	3.75
8	Water Pump 1/2 HP	1	373	0.373
9	Water Pump 5 HP	3	3730	11.19
10	Water Pump 2 HP	1	1492	1.492
11	Water Pump 3 HP	1	2238	2.238
12	Other Equipment	20	150	3
13	Total			127

Chart No 1: Study of Connected Load:



CHAPTER-III

STUDY OF PRESENT ENERGY CONSUMPTION

In this chapter, we present the analysis of Electricity Bills

Table No 3: Electrical Bill Analysis- 2019-20:

No	Month	Energy Consumed, kWh
1	Jul-19	5104
2	Aug-19	4586.5
3	Sep-19	5108.5
4	Oct-19	4904.5
5	Nov-19	4996.5
6	Dec-19	5775
7	Jan-20	6007.5
8	Feb-20	5632.5
9	Mar-20	4259
10	Apr-20	2234
11	May-20	1999.5
12	Jun-20	1287
13	Total	51894.5
14	Maximum	6007.5
15	Minimum	1287
16	Average	7983.77

Chart No 2: Variation in Monthly Energy Consumption:

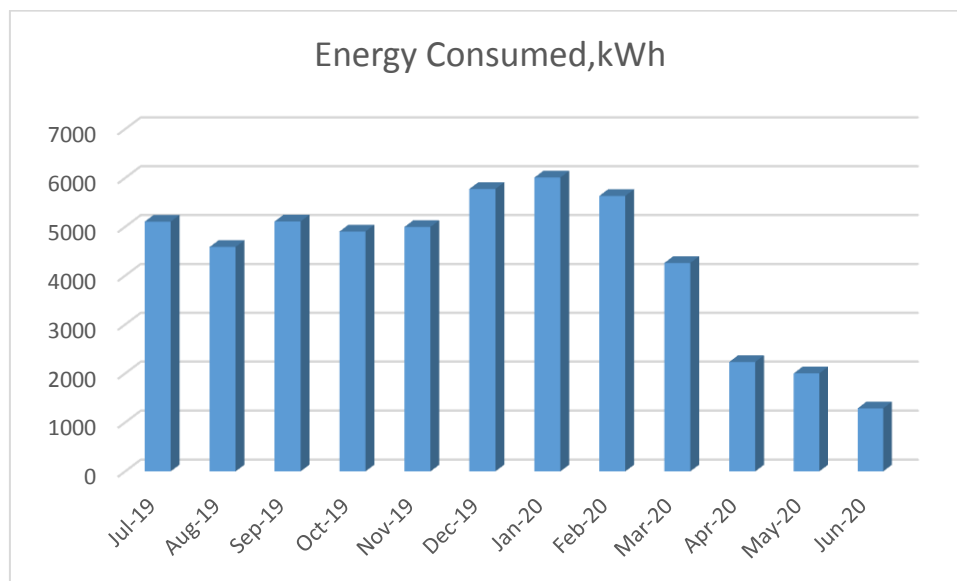


Table No 4: Variation in Important Parameters:

No	Parameter/ Variation	Energy Consumed, kWh
1	Total	51894.5
2	Maximum	6007.5
3	Minimum	1287
4	Average	7983.77

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:

- 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	Jul-19	5104	4.08
2	Aug-19	4586.5	3.67
3	Sep-19	5108.5	4.09
4	Oct-19	4904.5	3.92
5	Nov-19	4996.5	4.00
6	Dec-19	5775	4.62
7	Jan-20	6007.5	4.81
8	Feb-20	5632.5	4.51
9	Mar-20	4259	3.41
10	Apr-20	2234	1.79
11	May-20	1999.5	1.60
12	Jun-20	1287	1.03
13	Total	51894.5	41.52
14	Maximum	6007.5	4.81
15	Minimum	1287	1.03
16	Average	7983.77	6.39

Chart No 3: Month wise CO₂ Emissions:

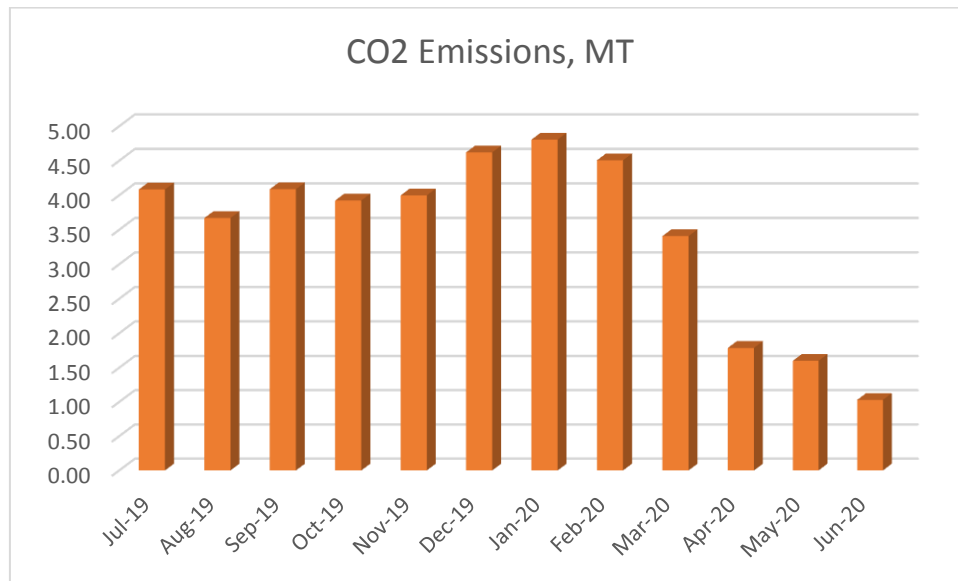


Table No 6: Important Parameters:

No	Parameter/ Variation	Energy Consumed, kWh	CO2 Emissions, MT
1	Total	51894.5	41.52
2	Maximum	6007.5	4.81
3	Minimum	1287	1.03
4	Average	7983.77	6.39

CHAPTER-V

STUDY OF USAGE OF ALTERNATE ENERGY

The College has installed Solar Thermal Water Heating System of Capacity **2000 LPD**.

In the following Table, we compute the percentage of Usage of Alternate Energy to Annual Energy Demand of the College.

Table No 7: Computation of % Annual Energy Demand met by Alternate Energy:

No	Particulars	Value	Unit
1	Annual Energy Purchased from MSEDCL	51895	kWh
2	Total Installed Solar Thermal Capacity	2000	LPD
3	Electrical Energy Saved by 100 LPD System/Annum	1500	kWh
4	Equivalent Electrical Energy Saved by 2000 LPD System/Annum	30000	kWh
5	Actual Usage Period	200	Nos
6	Electrical Energy Saved by Solar Thermal System for 200 Days	16438	kWh
7	Assuming Capacity Utilization Factor	0.85	
8	Electrical Energy Saved by Solar Thermal Water Heating System	13973	kWh
9	Total Annual Energy Requirement = (1) + (8)	65868	kWh
10	% of Alternate Energy to Annual Energy Demand= (8)*100/ (9)	21.21	%

Photograph of Roof Top Solar PV Plant & Solar Thermal Water Heating System:



CHAPTER VI

STUDY OF USAGE OF LED LIGHTING

In this chapter, we compute the percentage of usage of LED Lighting to Annual Lighting power requirement.

Table No 8: Percentage of Usage of LED Lighting to Annual Lighting Load:

No	Particulars	Value	Unit
1	No of 20 W LED Tube Lights	500	Nos
2	Demand of 20 W LED Tube Light	40	W/Unit
3	Total Electrical Load of 20 W LED Fittings	20	kW
4	No of 20 W LED Tube Lights	210	Nos
5	Demand of 20 W LED Fitting	20	W/Unit
6	Total Electrical Load of 20 W LED Fittings	4.2	kW
7	Total Lighting Load= 3 + 6	24.2	kW
8	Daily Working Period	6	Hrs/Day
9	Annual Working Days	150	Nos/Annum
10	Annual Lighting Load = 7*8*9	21780	kWh/Annum
11	Annual LED Lighting Load = 6*8*9	3780	kWh/Annum
12	% of LED Lighting to Annual Lighting Requirement = $(11)*100/(10)$	17.36	%