

ENERGY AUDIT REPORT
of
SAPTHAGIRI COLLEGE OF ENGINEERING
#14/5, Chikkasandra, Hesarghatta Main Road, Bangalore 560057



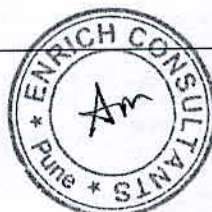
Year: 2020-21

Principal
Sapthagiri College of Engineering
14/5, Chikkasandra, Hesarghatta Main Road
Bangalore - 560 057

Prepared by:

Enrich Consultants

Yashashree, 26, Nirmal Bag Society,
Near Muktagan English School, Parvati, Pune 411009
Phone: 09890444795 Email: enrichcons@gmail.com



MAHARASHTRA ENERGY DEVELOPMENT AGENCY

An ISO 9001 : 2000 Reg. no. : RQ 91 / 2462



Maharashtra Energy Development Agency

(Government of Maharashtra Institution)

Aundh Road, Opposite Spicer College Road, Near Commissionerate of Animal Husbandary,
Aundh, Pune, Maharashtra 411067

Ph No: 020-35000450

Email: eee@mahaurja.com, Web: www.mahaurja.com

ECN/2021-22/CR-14/1577

22nd April, 2021

**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 : M/s Enrich Consultants
Yashashree, Plot No. 26, Nirmal Bag Society,
Near Mukhtangan English School, Parvati,
Pune - 411009.

Registration Category : Empanelled Consultant for Energy Conservation
Programme for Class 'A'

Registration Number : MEDA/ECN/2021-22/Class A/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 at any time without giving prior information to verify quarterly activities performed by the firm and canceling the registration, if the information is found incorrect.
- This empanelment is valid till 21st April, 2023 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.

General Manager (EC)

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Enrich Consultants

Yashashree, 26, Nirmal Bag Society,
Near Mukhtangan English School, Parvati, Pune 411 009
Tel: 09890444795 Email: enrichcons@gmail.com

Ref: EC/SCOE/20-21/01

Date: 10/8/2021

CERTIFICATE

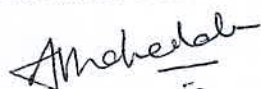
This is to certify that we have conducted Energy Audit at Sapthagiri College of Engineering, Bangalore in the Academic year 2020-21

The College has adopted following Energy Efficient practices:

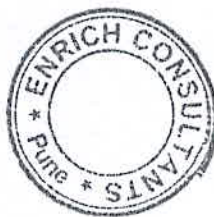
- Usage of Energy Efficient LED Fittings
- Usage of Energy Efficient BEE STAR Rated equipment
- Maximum usage of Day Lighting
- Installation of 40 kWp Roof Top Solar PV Plant

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



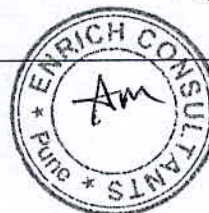
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ACKNOWLEDGEMENT

We Enrich Consultants, Pune, express our sincere gratitude to the management of Sapthagiri College of Engineering, Bangalore, for awarding us the assignment of Energy Audit of their Campus for the Academic Year: 2020-21.

We are thankful to:

- Dr. H. Ramakrishna, Principal

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



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EXECUTIVE SUMMARY

1. Sapthagiri College of Engineering, Bangalore consumes Energy in the form of Electrical Energy and Diesel used for various day to day activities.

2. Present Consumption of Electrical Energy, Diesel & CO₂ Emission:

No	Parameter/ Value	Energy Consumed, kWh	Diesel Consumed, Liters	CO ₂ Emissions, MT
1	Total	322211	2115	295.55
2	Maximum	40645	265	36.58
3	Minimum	12062	0	11.17
4	Average	26851	176.25	24.63

3. Energy Conservation projects already installed:

- Usage of Energy Efficient LED fittings
- Usage of BEE STAR Rated Equipment
- Maximum Usage of Day Lighting
- Installation of 40 kWp Roof Top Solar PV Plant

4. Usage of Alternate Energy:

- The College has installed 40 kWp Capacity Solar Roof Top Solar Plant.
- Energy generated by Solar PV Plant 48000 kWh.
- Energy purchased is 322211 kWh.
- The percentage of Usage of Alternate Energy to Annual Energy Demand is 13 %.

5. Usage of LED Lighting:

- The Total Annual Lighting Demand of the College is 60048 kWh.
- The Total Annual LED Lighting Demand is 24480 kWh.
- The percentage of Annual LED Lighting to Annual Lighting Demand is 41 %.

6. Assumptions:

1. 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere
2. 1 Kg of Diesel releases 2.63 Kg of CO₂ into atmosphere.
3. Daily working hours-6 Nos (For Lighting Calculations)
4. Annual working Days-200 Nos (For Lighting Calculations)

7. References:

- For CO₂ Emissions: www.tatapower.com
- For Energy generated by Roof Top Solar PV Plant: www.solarrooftop.gov.in


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ABBREVIATIONS

LED	: Light Emitting Diode
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
LPD	: Liters per Day



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CHAPTER-I INTRODUCTION

1.1 Objectives:

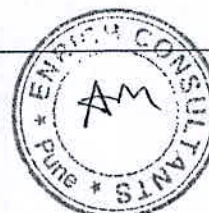
1. To study present Energy Consumption
2. To Study the present CO₂ emissions
3. To study usage of Renewable Energy
4. To study usage of LED Lighting

1.2 Table No 1: General Details of the College:

No	Head	Particulars
1	Name of Institution	Sapthagiri College of Engineering
2	Address	#14/5, Chikkasandra, Hesarghatta Main Road, Bangalore 560057
3	Year of Establishment	2001



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CHAPTER-II

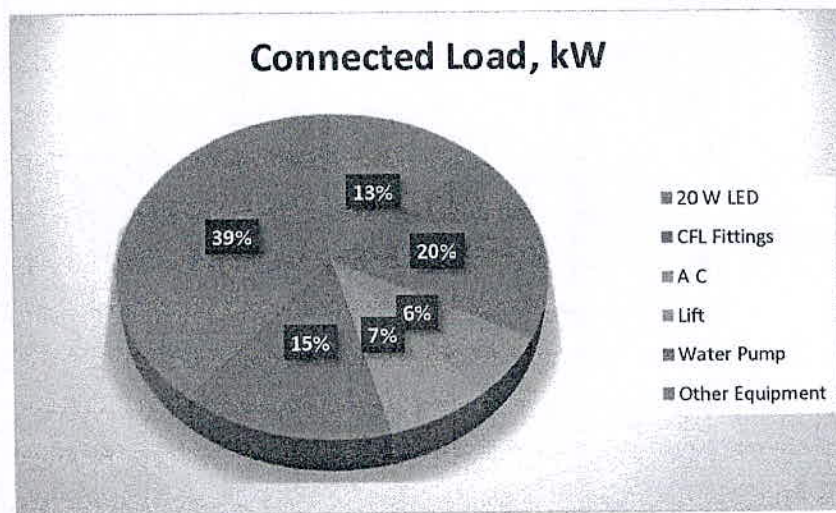
STUDY OF CONNECTED LOAD


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

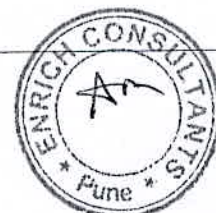
Table No 2: Study of Equipment wise Connected Load:

No	Equipment	Qty	Load, W/Unit	Load, kW
1	20 W LED	1020	20	20.4
2	CFL Fittings	741	40	29.64
3	A C	5	1875	9.375
4	Lift	2	5595	11.19
5	Water Pump	1	22380	22.38
6	Other Equipment	400	150	60
7	Total			153

Chart No 1: Study of Connected Load:




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CHAPTER-III

STUDY OF PRESENT ENERGY CONSUMPTION

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

Table No 3: Consumption of Electrical Energy & Diesel: 2020-21:

No	Month	Energy Consumed, kWh	Diesel Consumed, Liters
1	Aug-20	32770	210
2	Sep-20	33908	225
3	Oct-20	31618	250
4	Nov-20	22330	0
5	Dec-20	26968	220
6	Jan-21	35538	180
7	Feb-21	26969	265
8	Mar-21	40645	0
9	Apr-21	21787	240
10	May-21	22412	230
11	Jun-21	12062	120
12	Jul-21	15206	175
13	Total	322211	2115
14	Maximum	40645	265
15	Minimum	12062	0
16	Average	26851	176.25

Chart No 2: Variation in Monthly Energy Consumption:

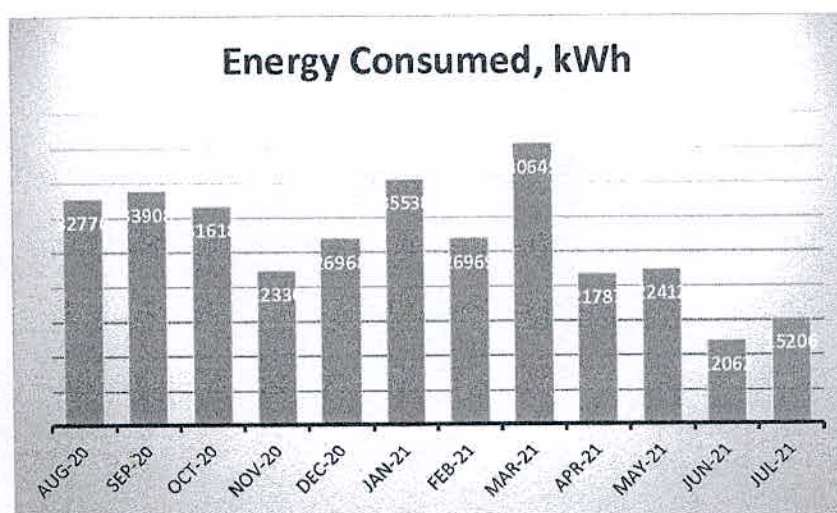
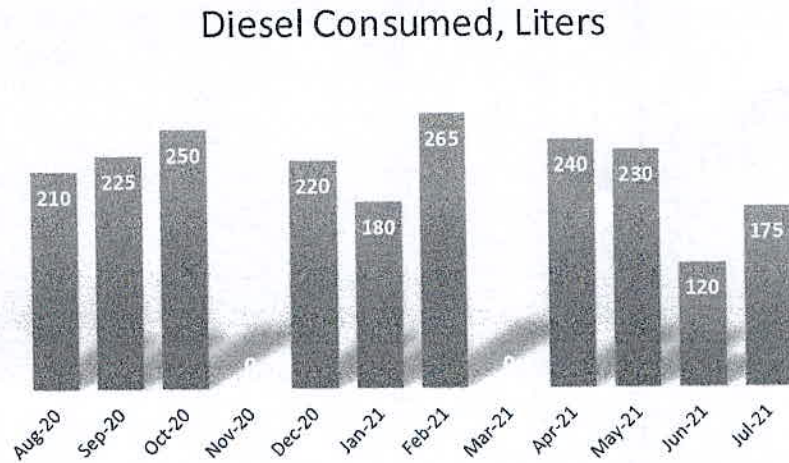


Chart No 3: Variation in Monthly Diesel Consumption:

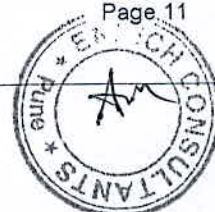


3.4 Key Parameters:

Table No 4: Variation in Important Parameters:

No	Parameter/ Variation	Energy Consumed, kWh	Diesel Consumed, Liters
1	Total	322211	2115
2	Maximum	40645	265
3	Minimum	12062	0
4	Average	26851	176.25

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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 & Diesel for vehicles.

Basis for computation of CO₂ Emissions:

- 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere
- 1 Liter of Diesel releases 2.63 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: Computation of Month wise CO₂ Emissions:

No	Month	Energy Consumed, kWh	Diesel Consumed, Liters	CO2 Emissions, MT
1	Aug-20	32770	210	30.05
2	Sep-20	33908	225	31.11
3	Oct-20	31618	250	29.11
4	Nov-20	22330	0	20.10
5	Dec-20	26968	220	24.85
6	Jan-21	35538	180	32.46
7	Feb-21	26969	265	24.97
8	Mar-21	40645	0	36.58
9	Apr-21	21787	240	20.24
10	May-21	22412	230	20.78
11	Jun-21	12062	120	11.17
12	Jul-21	15206	175	14.15
13	Total	322211	2115	295.55
14	Maximum	40645	265	36.58
15	Minimum	12062	0	11.17
16	Average	26851	176.25	24.63

Chart No 4: Month wise CO₂ Emissions:

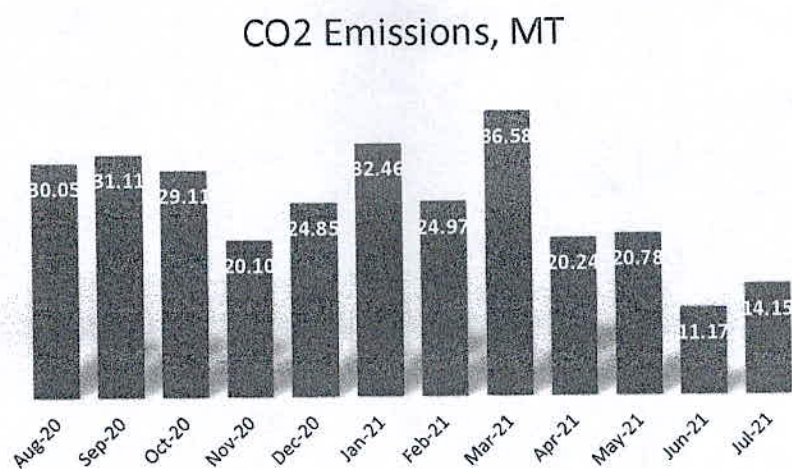


Table No 6: Variation in Important Parameters:

No	Parameter/ Variation	Energy Consumed, kWh	Diesel Consumed, Liters	CO ₂ Emissions, MT
1	Total	322211	2115	295.55
2	Maximum	40645	265	36.58
3	Minimum	12062	0	11.17
4	Average	26851	176.25	24.63

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CHAPTER-V STUDY OF USAGE OF ALTERNATE ENERGY

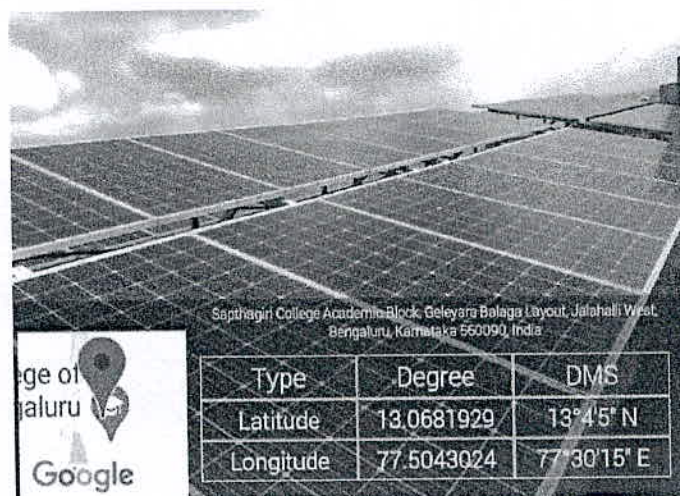
The College has installed Roof Top Solar PV Plant of Capacity 40 kWp.

In the following Table, we compute the Electrical Energy generated by Solar PV Plant and the percentage of Alternate Energy to Annual Energy Demand.

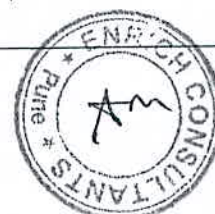
Table No 7: Computation of % Annual Energy Demand met by Alternate Energy:

No	Particulars	Value	Unit
1	Capacity of Roof Top Solar PV Plant	40	kWp
2	Energy generated per kWp by Rooftop Solar PV Plant	4	kWh/kWp
3	Generation Days in 20-21	300	Nos
4	Solar Energy generated in 20-21= 1*2*3	48000	kWh
5	Electrical Energy purchased from Electricity Board	322211	kWh
6	Total Annual Electrical Energy Demand = 4 + 5	370211	kWh
7	% Annual Energy Demand met by Alternate Energy= 4*100/6	13	%

Photograph of Roof Top Solar PV Plant:



[Signature]
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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	2004	Nos
2	Demand of 20 W LED Tube Light	20	W/Unit
3	Total Electrical Load of 20 W LED Fittings	20.04	kW
4	No of CFL Fittings	741	Nos
5	Demand of CFL Fitting	40	W/Unit
6	Total Electrical Load of CFL Fittings	29.64	kW
7	Total Lighting Load=3+6	50.04	kW
8	Total LED Lighting Load= 3	20.4	kW
9	Average Daily Usage Period	6	Hours
10	Annual Working Days	200	Nos
11	Annual Total Lighting Load = $7*9*10$	60048	kWh
12	Annual LED Lighting Load = $8*9*10$	24480	kWh
13	Annual Lighting Requirement met by LED= $12*100/11$	41	%



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