

ENERGY AUDIT REPORT
of
Sinhgad Technical Education Society's
SINHGAD ACADEMY OF ENGINEERING
Kondhwa, Pune 411048



Sinhgad Institutes

Year: 2020-21

Prepared by

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MAHARASHTRA ENERGY DEVELOPMENT AGENCY

AN ISO 9001:2000 Reg. No. REG 91/2002



Maharashtra Energy Development Agency

(Government of Maharashtra Institution)

Aundh Road, Opposite Spicer College Road, Near Commissionerate of Animal Husbandary,

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FCN/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 Muktagan 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 (FC)



Enrich Consultants

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Tel: 09890444795 Email: enrichcons@gmail.com

Ref: EC/STESSAOE /01

Date: 8/9/2021

CERTIFICATE

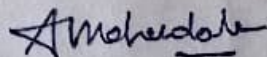
This is to certify that we have conducted Energy Audit at Sinhgad Technical Education Society's, Sinhgad Academy of Engineering, Kondhwa, Pune 411048, in the Academic year 2020-21.

The College has adopted following Energy Efficient Practices:

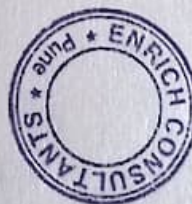
- Maximum usage of Day Lighting
- Installation of 2.5 kWp Roof Top Solar PV Plant
- Installation of 12000 LPD Solar Thermal Water Heating System at Hostel blocks.
- Usage of BEE STAR Rated Equipment

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



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ACKNOWLEDGEMENT

We at Enrich Consultants, Pune, express our sincere gratitude to the management of Sinhgad Technical Education Society's Sinhgad Academy of Engineering, Kondhwa, Pune 411048, for awarding us the assignment of Energy Audit of their Kondhwa Campus, for the Year 2020-21

We are thankful to all the Head of Departments & staff members for helping us during the field study.



EXECUTIVE SUMMARY

1. Sinhgad Technical Education Society's Sinhgad Academy of Engineering, Kondhwa, Pune consumes Energy in the form of Electrical Energy used for various gadgets, Office & other facilities.

2. Present Energy Consumption:

No	Parameter/ Value	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Total	82333	74.10
2	Maximum	9241	8.32
3	Minimum	4619	4.16
4	Average	6861.10	6.17

3. Various measures adopted for Energy Conservation:

- Usage of LED Lights
- Installation of 10 kWp Roof Top Solar PV Plant
- Installation of 12000 LPD Solar Thermal Water Heating System.

4. Usage of Alternate Energy Source:

- Energy purchased from MSEDCL is 82333 kWh
- The College has installed Roof Top Solar PV Plant of Capacity 2.5 kWp.
- Energy generated by Roof Top Solar PV Plant is 3000 kWh.
- The percentage of Usage of Alternate Energy to Annual Energy Demand is 3.51 %.

5. Usage of LED Lighting:

- The Total Lighting Load of the College is 107.81 kW.
- The Total LED Lighting Load is 2.65 kW.
- The percentage of Annual LED Lighting to Annual Lighting Demand is 2.46 %.

6. Notes & Assumptions:

1. 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere
2. Annual Solar Energy Generation Days: 300 Nos.

7. References:

- For CO₂ Emissions: www.tatapower.com
- For Roof Top Solar PV Plant Energy generation: www.solarroftop.gov.in

ABBREVIATIONS

STES	:	Sinhgad Technical Education Society
AC	:	Air conditioner
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
LPD	:	Liters Per Day

CHAPTER-I INTRODUCTION

1.1 Objectives:

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

1.2 Table No 1: General Details of College:

No	Head	Particulars
1	Name of Institution	Sinhgad Technical Education Society's Sinhgad Academy of Engineering
2	Address	Danny Mehta Nagar, Kondhwa, Pune 411 048
3	Affiliation	Savitribai Phule Pune University

CHAPTER-II STUDY OF CONNECTED LOAD

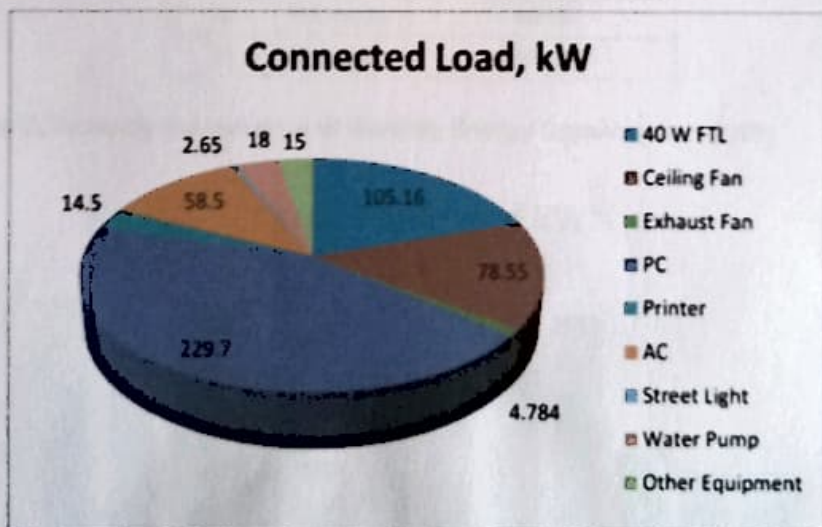
In this chapter, we present the details of various Electrical loads as under

Table No 2: Details of Electrical Equipment:

No	Equipment	Qty	Load, W/Unit	Load, kW
1	40 W FTL	2629	40	105.16
2	Ceiling Fan	1091	72	78.55
3	Exhaust Fan	92	52	4.784
4	PC	1531	150	229.7
5	Printer	83	175	14.5
6	AC	30	1950	58.5
7	Street Light	53	50	2.65
8	Water Pump	8	2238	18
9	Other Equipment	100	150	15
10	Total			527

We present the same in a PIE Chart as under:

Chart No-1: Overall Connected Load:



CHAPTER-III STUDY OF PRESENT ENERGY CONSUMPTION

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

Table No 3: Electrical Bill Analysis- 2020-21:

No	Month	Energy Purchased, kWh
1	Jul-20	9241
2	Aug-20	8306
3	Sep-20	8803
4	Oct-20	7029
5	Nov-20	4803
6	Dec-20	5578
7	Jan-21	6924
8	Feb-21	8319
9	Mar-21	8827
10	Apr-21	5263
11	May-21	4619
12	Jun-21	4621
13	Total	82333
14	Maximum	9241
15	Minimum	4619
16	Average	6861.10

Chart No 2: To study the variation of Monthly Energy Consumption, kWh:

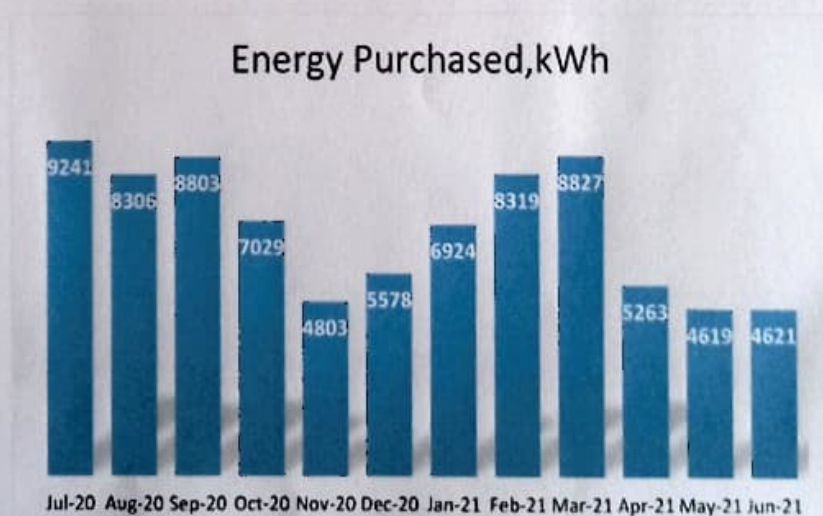


Table No 4: Various Important Parameters:

No	Parameter/ Value	Energy Purchased, kWh
1	Total	82333
2	Maximum	9241
3	Minimum	4619
4	Average	6861.10

Table No. 5: Monthly CO₂ Emissions

No	Month	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Jan-20	4281	837
2	Feb-20	1980	390
3	Mar-20	1153	228
4	Apr-20	719	141
5	May-20	430	84
6	Jun-20	475	93
7	Jul-20	90	18
8	Aug-20	218	43
9	Sep-20	385	75
10	Oct-20	710	139
11	Nov-20	478	93
12	Dec-20	713	139
13	Maximum	9241	182
14	Minimum	4619	90
15	Average	6861.10	135



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 0.9 Kg of CO₂ into atmosphere

Table No 5: Month wise CO₂ Emissions:

No	Month	Energy Purchased, kWh	CO ₂ Emissions, MT
1	Jul-20	9241	8.32
2	Aug-20	8306	7.48
3	Sep-20	8803	7.92
4	Oct-20	7029	6.33
5	Nov-20	4803	4.32
6	Dec-20	5578	5.02
7	Jan-21	6924	6.23
8	Feb-21	8319	7.49
9	Mar-21	8827	7.94
10	Apr-21	5263	4.74
11	May-21	4619	4.16
12	Jun-21	4621	4.16
13	Total	82333	74.10
14	Maximum	9241	8.32
15	Minimum	4619	4.16
16	Average	6861.10	6.17

Chart No 3: Representation of Month wise CO₂ Emissions:

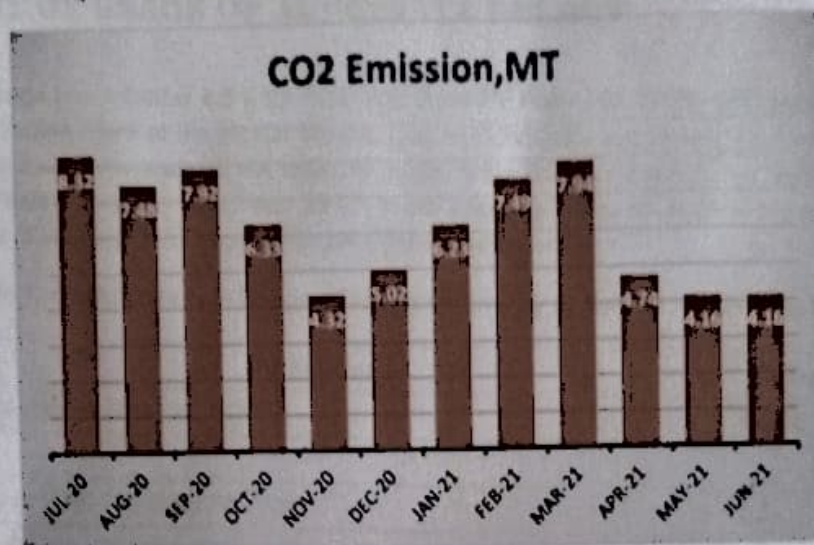


Table No 6: Various Important Parameters:

No	Parameter/ Value	Energy Consumed, kWh	CO ₂ Emissions, MT
1	Total	82333	74.10
2	Maximum	9241	8.32
3	Minimum	4619	4.16
4	Average	6861.10	6.17

CHAPTER-V STUDY OF USAGE OF ALTERNATE ENERGY

The College has installed 2.5 kWp Roof Top Solar PV Plant and 12000 LPD Solar Thermal Water Heating Plant at the Hostel Blocks. Due to COVID-19, Lockdown, the Hostel blocks were not used, hence we do not take into account the Energy saved by the Solar Thermal Water Heating System in the Year: 20-21. In the following Table, we present the percentage of usage of Renewable Energy to Annual Power requirement.

Table No 7: Computation of Usage of Alternate Energy to Annual Power requirement:

No	Particulars	Value	Unit
1	Energy purchased from MSEDCL	82333	kWh/Annum
2	Capacity of Roof Top Solar PV Plant	2.5	kWp
3	Average Energy Generated per kWp per Day	4	kWh/kWp
4	Annual Generation Days	300	Nos
5	Annual Solar Energy Generated = (2)*(3)*(4)	3000	kWh/Annum
6	Total Energy Requirement = (1) + (5)	85333	kWh/Annum
7	Percent of Alternate Energy to Annual Energy Requirement = (5)*100/(6)	3.51	%

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 % of Annual LED Lighting Load:

No	Particulars	Value	Unit
1	No of 40 W FTL Tubes	2629	Nos
2	Electrical Load of 40 W FTL Tube	40	W/Unit
3	Total Load of 40 W FTL Tubes	105.16	kW
4	No of 50 W LED Tubes	53	Nos
5	Electrical Load of 50 W LED Tube	50	W/Unit
6	Total Load of 20 W LED Tubes	2.65	kW
7	Total Lighting Load = (3)+(6)	107.81	kW
8	Total LED Lighting Load = (6)	2.65	kW
9	% of LED Lighting to Annual Lighting Load = (8)*100/(7)	2.46	%