Energy Audit Report

of

Pune District Education Association's

Seth Govind Raghunath Sable College of Pharmacy

Saswad, Dist. Pune

Auditing Agency –
Prathamesh Energy Solution,
A-302, Shiv Unnati Residency,
Kalepadal, Hadapsar
Pune- 411 028

Prathamesh Energy Solution
A-302, Shiv Unnati residency, Kalepadal, Hadapsar, Pune-411028

Ref: PES/SCoPS/2025-26/08

Date: 20/10/2025

To,

The principal,
Seth Govind Raghunath Sable College of Pharmacy,
Saswad, Dist. Pune

Sub: Submission of Report on Energy Audit of College Campus

Respected Sir,

Please find enclosed herewith the report

Thanking you
Yours faithfully

For Prathamesh Energy Solution

Vandana

Authorized Signatory

M/s. Prathamesh Energy Solution Pune

Prathamesh Energy Solution

A-302, Shiv Unnati Residency, Kalepadal, Hadapsar, Pune 411028

Ref: EC/SCoPS/25-25/09

CERTIFICATE

This is to certify that we have conducted Energy Audit at **Seth Govind Raghunath Sable College of Pharmacy, Saswad, Dist. Pune**, in the Academic year 2025-26

.The College has adopted following Energy Efficient and best practices:

- Usage of Energy Efficient LED Fittings
- Maximum usage of Day Lighting
- Green Campus
- Rain water Harvesting system

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

For,

Vandana

Prathamesh Energy Solution, Pune

M/s. Prathamesh Energy Solution Pune

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ACKNOWLEDGEMENT

We at Prathamesh Energy Solution, Pune, express our sincere gratitude to the management and Principal of Pune District Education Association & Pune District Education Association' Seth Govind Raghunath Sable College of Pharmacy, Saswad, Dist. Pune for awarding us the assignment of Energy Audit of their College campus located at Saswad, Pune.

We are also thankful to various Heads of Departments, IQAC Coordinator & other Staff members for helping us during the survey and field visit.

We are also thankful to all the technical staff and office staff for helping during the field visit and measurements at the college campus.

EXECUTIVE SUMMARY

After the Field measurements & analysis, we present herewith important observations made and various measures to reduce the Energy Consumption & mitigate the CO_2 emissions

1. Seth Govind Raghunath Sable College of Pharmacy, Saswad, Dist. Pune, consumes electrical Energy in majority used for various gadgets & office operations.

2. The various projects already implemented by the College are

- Usage of Natural Day light in corridors specifically
- Usage of LED lighting for Admin & outdoor lighting
- Initiatives for water conservation through STP at the campus

3. Important Parameters: Electrical Energy:

Electricity is used for different purposes and at different sections in the college campus. The details of electricity distribution as mentioned below.

Sr. No.	Consumer No.	Electrical Meter No.	Location/Purpose	Payee
1	187271749433	055-X0635746	College building/building operation	The Principal, Seth Govind Raghunath Sabale College of Pharmacy, Saswad, Near Waghire College

The important parameters of electrical consumption as per Consumer no. in the campus are mentioned as below.

Sr. No	Consumer No.	Parameter	Max	Min	Average
1	187271749433	Units consumed, kWh	1128	157	561.5
		Electricity Bill amount	9307.97	1734.19	4840.122
		Total			4840.122

4. Important Parameters: CO_2 Emissions (Average, MT/Annum)

No	Consumer No.	Particulars	Value MT
1	187271749433	CO_2- Emissions- Electricity Usage	53.9
		Total	53.9

On the basis of annual electricity consumption CO_2 emission is 53.9 MT /annum.

5. Benchmark: In terms of Electrical Energy & CO_2 emissions:

We now present two important benchmarks in respect of Electrical Energy consumption & CO_2 emissions as under.

No	Parameter	Value	Unit
1	CO2 emissions	53.9	MT/annum
2	College area	73592	Sq. ft.
3	CO2 emission/sq. ft	0.73	Kg/Sq. ft

6. Recommendations:

We present herewith various proposals to reduce the Electrical Energy demand and reduce the CO_2 emissions

S. No.	Recommendation	Annual saving potential in kWh /Kg of LPG	Annual Saving Potential in MT of CO_2	Annual monetary gain, Rs.
1	Installation of 20kW Solar PV roof top on college building	33600 kWh	26.88	336000
2	Solar street lights	262.8 kWh	0.21	2628
3	Solar powered light for hoarding	-	-	-
4	Solar charging stations	-	-	-
	Total	**33862.8**	**27.09**	**338628**

Notes & assumptions:

1. 1 Unit of Electrical Energy releases 0.8 Kg of CO_2 into atmosphere
2. 1 Kg of LPG releases 3 Kg of CO_2 into atmosphere
3. Daily working hours-10
4. Annual working Days-280
5. Average Rate of Electrical Energy- Rs 10 per kWh

ABBREVIATIONS

DP	:	Double Pole
CFL	:	Compact Fluorescent Lamp
EESL	:	Energy Efficiency Services Limited
F P	:	Feeder Pillar
MSEDCL	:	Maharashtra State Electricity Distribution Company Ltd.
MEDA	:	Maharashtra Energy Development Agency
MIDC	:	Maharashtra Industrial Development Corporation
V	:	Voltage
I	:	Current
kW	:	kilo-Watt
kVA	:	Apparent Power
kVAr	:	Reactive Power
P F	:	Power Factor
kWp	:	Kilo Watt peak

CHAPTER-I
ENERGY AUDIT: INTRODUCTION

1.1 Objectives:

1. To study present level of Energy Consumption
2. To Study the present CO_2 emissions
3. To assess the various equipment/facilities from Energy efficiency aspect
4. To measure various Electrical parameters
5. To study Scope for usage of Renewable Energy
6. To study various measures to reduce the Energy Consumption

1.2 Audit Methodology:

1. Study of connected load
2. Study of various Electrical parameters
3. To prepare the Report with various ENCON measures with payback analysis

1.3 Energy Audit Instruments:

1. Portable Power Analyzer
2. Lux meter
3. Anemometer
4. Digital Temperature Indicator
5. CO_2 Meter
6. Water TDS meter

1.4 General Details of Seth Govind Raghunath Sable College of Pharmacy, Saswad, Dist. Pune:

No	Head	Particulars
1	Name of Institution	Pune District Education Association & Pune District Education Association' Seth Govind Raghunath Sable College of Pharmacy, Saswad, Dist. Pune
2	Address	Saswad, Dist. Pune
3	Year of Establishment	1993
4	Salient Features	Affiliated to Savitribai Phule Pune University
4	Courses offered	a. D. Pharmacy b. B. Pharmacy c. M. Pharmacy d. Ph. D.
5	No of Students	452
6	Total built up area	73592 Sq. ft.

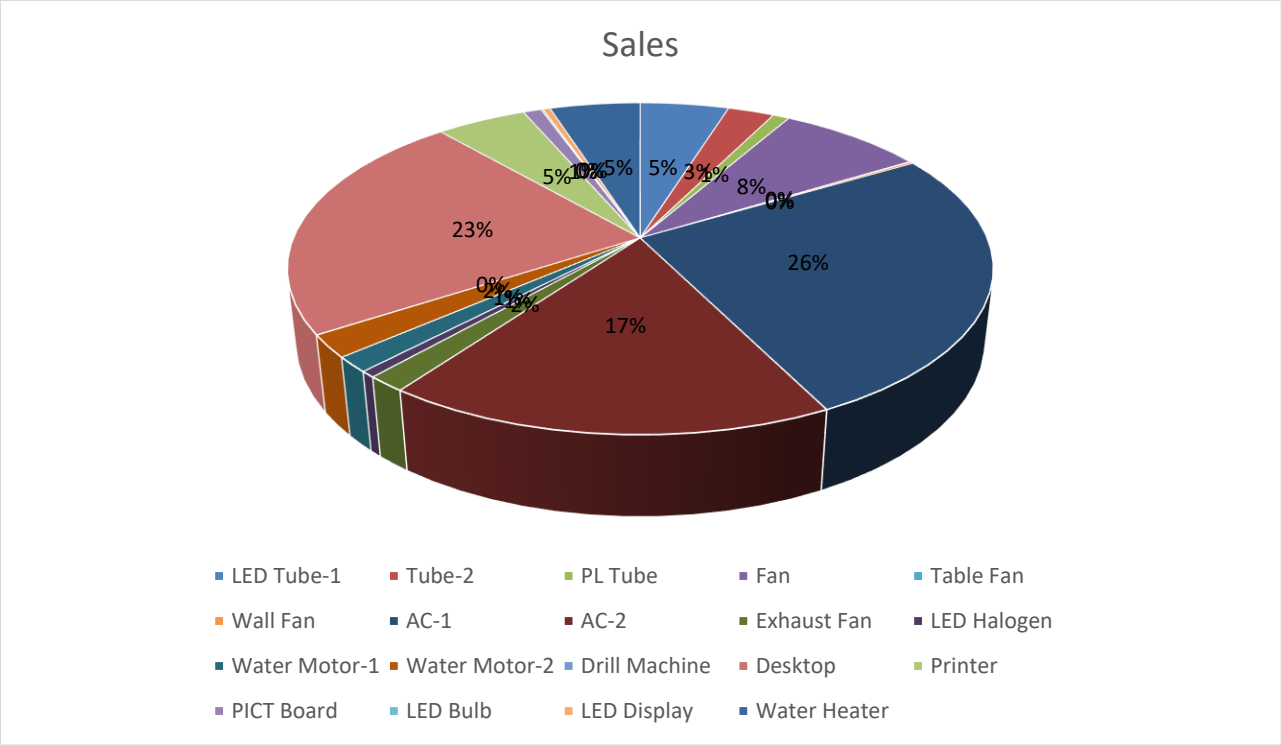
CHAPTER-II
STUDY OF CONNECTED LOAD

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

2.1 Study of Fitting wise Connected Load:

Sr. No.	Name of Appliance	Wattage	Quantity	Total Wattage
1	LED Tube-1	20	245	4.9
2	Tube-2	40	64	2.56
3	PL Tube	11	83	0.91
4	Fan	60	134	8.04
5	Table Fan	60	1	0.06
6	Wall Fan	60	3	0.18
7	AC-1	5275	5	26.37
8	AC-2	3517	5	17.58
9	Exhaust Fan	30	52	1.56
10	LED Halogen	100	6	0.6
11	Water Motor-1	750	2	1.5
12	Water Motor-2	1100	2	2.2
13	Drill Machine	25	1	0.025
14	Desktop	250	92	23
15	Printer	250	20	5
16	PICT Board	250	4	1
17	LED Bulb	15	7	0.105
18	LED Display	200	2	0.4
19	Water Heater	1000	5	5

We present the same in a PIE Chart as under



CHAPTER-III
HISTORICAL DATA ANALYSIS: ELECTRICAL ENERGY

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

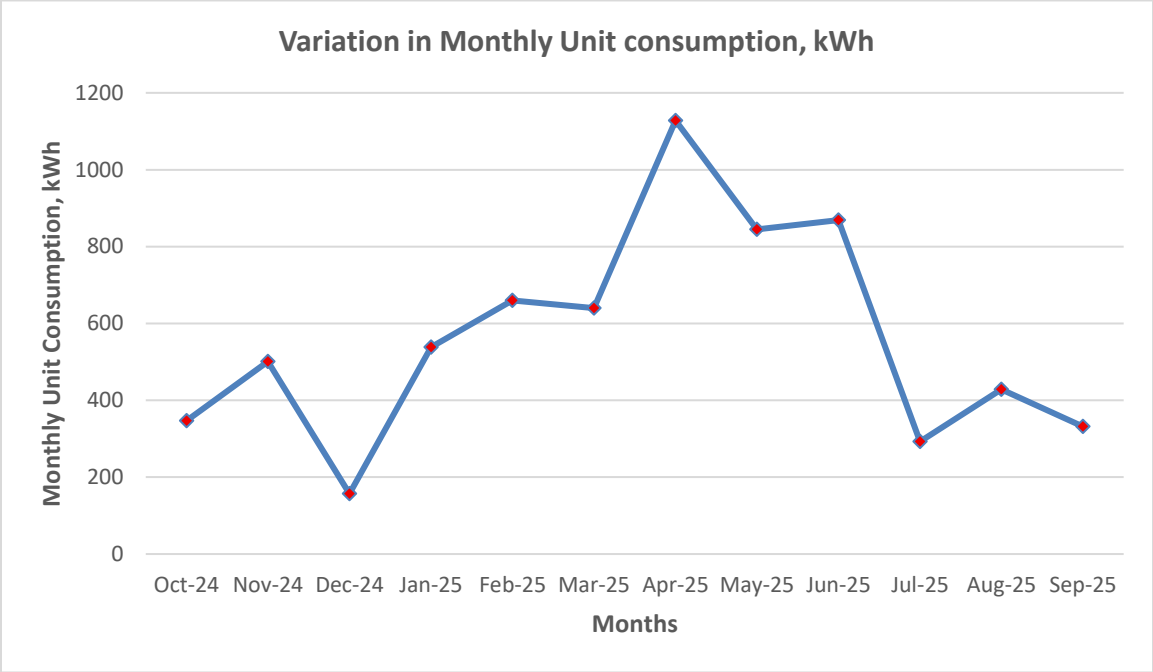
3.1 Consumer No. 187271749433

This consumer is the major contributors for billing in the Seth Govind Raghunath Sable College of Pharmacy, Saswad, Dist. Pune. Monthly consumption for last few months and bill amount is as follows.

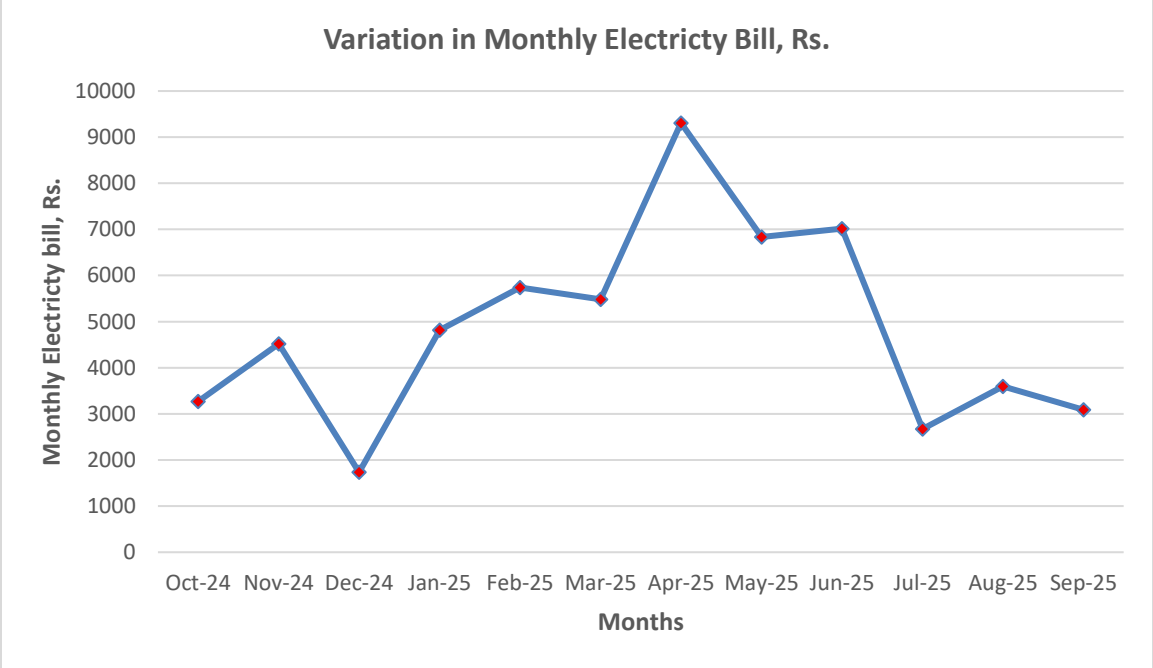
Table No. 1: Electrical Bill Analysis- 2025-26: 187271749433

Sr. No	Month	kWh	Amount
1	Sep-2025	332	3090.0
2	Aug-2025	428	3598.89
3	July-2025	293	2673.34
4	June-2025	869	7016.61
5	May-2025	845	6835.64
6	April-2025	1128	9307.97
7	March-2025	640	5481.86
8	Feb-2025	660	5737.66
9	Jan-2025	538	4816.64
10	Dec-2024	157	1734.19
11	Nov-2024	501	4517.29
12	Oct-2024	347	3271.37
13	Total	6738	58081.46
14	Average	561.5	4840.122
15	Max	1128	9307.97
16	Min	157	1734.19

3.1.1 To study the variation of Monthly Units' Consumption:



3.1.2 To study the variation of Monthly Electricity Bill:



3.2 Summary:

Sr. No.	Consumer No.	Annual Electricity Consumption, kWh	Annual Bill, Rs
1	187271749433	**6738**	**58081.46**

3.3 Key Inference drawn:

From the above analysis, we present following important parameters:

Sr. No	Consumer No.	Parameter	Max	Min	Average
1	187271749433	Units consumed, kWh	1128	157	561.5
		Electricity Bill amount	9307.97	1734.19	4840.122
		Total			4840.122

3.4 Benchmarking: Now we compute the Electrical Energy Consumed per square feet of the College Building as under

No	Parameter	Value	Unit
1	Units consumed, kWh	**6738**	kWh
2	College area	73592	Sq. ft.
3	**Unit consumed/sq. ft.**	**0.09**	**kWh/sq. ft.**

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 operating various electrical gadgets.

We herewith furnish the details of electrical Energy consumption consumer number wise as under

4.1 Month wise Consumption of Electrical Energy: 187271749433

Sr. No	Month	kWh
1	Sep-2025	332
2	Aug-2025	428
3	July-2025	293
4	June-2025	869
5	May-2025	845
6	April-2025	1128
7	March-2025	640
8	Feb-2025	660
9	Jan-2025	538
10	Dec-2024	157
11	Nov-2024	501
12	Oct-2024	347
13	Total	6738
14	Average	561.5
15	Max	1128
16	Min	157

4.2 Basis for computation of CO_2 Emissions:

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

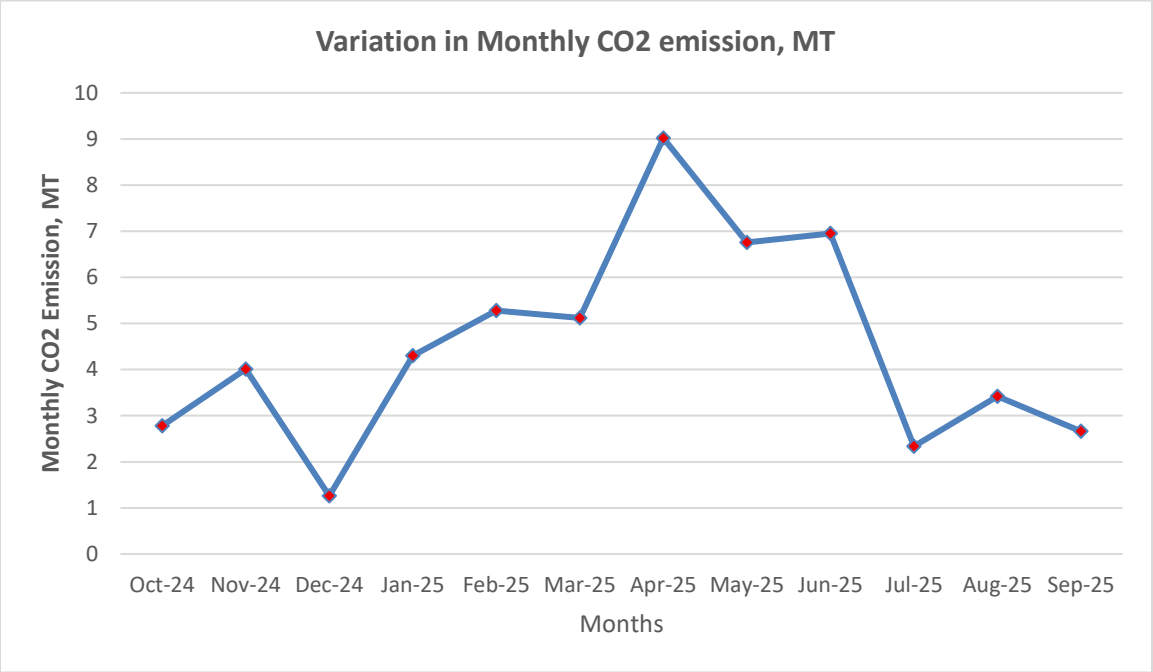
- 1 Unit (kWh) of Electrical Energy releases **0.8 Kg of CO_2** into atmosphere

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.

4.3 Month wise CO2 Emissions: 187271749433

Sr. No	Month	Electrical Energy Consumed, kWh	CO2 Emissions due to Electricity, MT
1	Sep-2025	332	2.66
2	Aug-2025	428	3.42
3	July-2025	293	2.34
4	June-2025	869	6.95
5	May-2025	845	6.76
6	April-2025	1128	9.02
7	March-2025	640	5.12
8	Feb-2025	660	5.28
9	Jan-2025	538	4.30
10	Dec-2024	157	1.26
11	Nov-2024	501	4.01
12	Oct-2024	347	2.78
13	Total	6738	53.90
14	Average	561.5	4.49
15	Max	1128	9.02
16	Min	157	1.26

4.4 Representation of Month wise CO_2 emissions:



4.5 Benchmarking:

Now we compute the CO2 emissions per sq. ft. basis as under:

No	Parameter	Value	Unit
1	CO2 emissions	53.9	MT/annum
2	College area	73592	Sq. ft.
3	CO2 emission/sq. ft	0.73	Kg/Sq. ft

CHAPTER-V
SCOPE OF RENEWABLE ENERGY AND EFFICIENT FACILITY AT COLLEGE CAMPUS

6.1 Installation of 10 kWp Solar PV roof Top on Seth Govind Raghunath Sable College of Pharmacy building:

During the Audit, it was revealed that the College has ample space on the Terrace. Solar roof top of capacity 10kWp is installed on the building terrace. The system caters the Day load demand of the College.

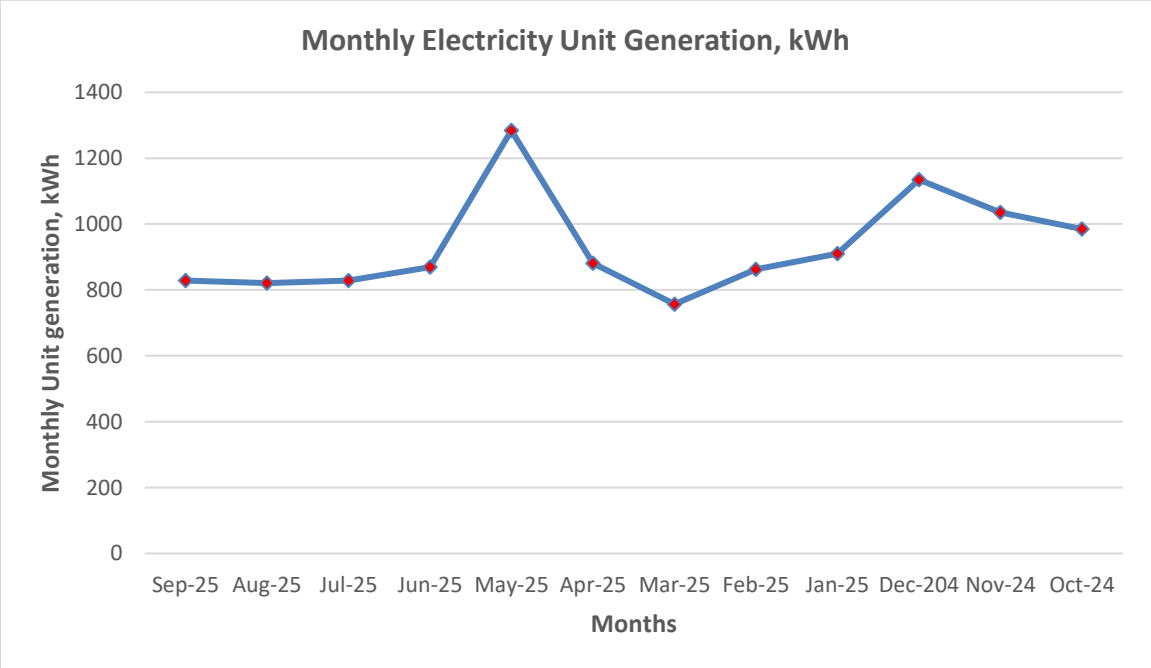
Photo-1: Solar roof top on Seth Govind Raghunath Sable College of Pharmacy building

Photo-2: Inverters on Seth Govind Raghunath Sable College of Pharmacy building

The electricity generation by solar roof top in last 12 months as mentioned below in Table.

Sr. No.	Months	Electricity units generated in kWh
1	Sep-2025	829
2	Aug-2025	821
3	July-2025	829
4	June-2025	869
5	May-2025	1284
6	April-2025	881
7	March-2025	757
8	Feb-2025	863
9	Jan-2025	910
10	Dec-204	1135
11	Nov-2024	1035
12	Oct-2024	985

The graphical representation of electricity unit generation in last 12 months is as shown below.



6.2 Installation of 20 kWp Solar PV roof Top on Seth Govind Raghunath Sable College of Pharmacy building.

During the Audit, it was revealed that the College has ample space on the Terrace. It is proposed once construction completes Solar Photovoltaic roof top with net meter of capacity **50 kWp can be installed.** The system will cater the Day load demand of the College.

We furnish herewith the saving potential as under

No	Particulars	Value	Unit
1	Installed Capacity of Solar PV Pack	20	kWp
2	Daily working period	6	Hrs./Day
3	Daily units generated	120	kWh/Day
4	Annual working days	280	Day/annum
5	Annual saving in Grid Electrical Energy	33600	kWh/annum
6	Annual CO_2 saving potential	26.88	MT/Annum
7	Present Energy Charges	10	Rs/kWh
8	Annual monetary Gain	336000	Rs/Annum
9	Investment required	12,00,000	Rs lump sum
10	Payback period	3.57	Years

6.3 Solar Water heater

Today we are facing the shortage problem between supply and demand of electric energy especially during peak summer and winter seasons. The situation further worsens during early hours of peak winter season when enormous heating load is switched ‘ON’. This has been a consistent problem. If the heating load is switched over to non-conventional source of energy, from conventional energy sources, the gap can be bridged considerably. ‘Solar Energy’ is an unlimited source of non-conventional energy. Solar energy can provide cost-effective solutions to fight climate change and reduce our dependency on expensive and polluting fuels. A solar water heater is an efficient and reliable technology that converts sunlight into heat to produce your hot water. At present Seth Govind Raghunath Sable College of Pharmacy, Saswad campus uses solar water heater of capacity 3000 LPD.

Photo-3: Solar water heaters on Seth Govind Raghunath Sable College of Pharmacy building

6.4 Solar powered light for hoarding

Lighting solar systems are the fixed installations designed for domestic as well as small scale commercial application. The component of the solar lighting system includes solar PV module (solar cells), charge controller, solar battery and lighting system (lamps & fans). Modules are installed in the open on roof/terrace - exposed to sunlight and the charge controller and battery are kept inside a protected place in the house.

Figure-1: Solar powered light for Hoarding

This system comes with multiple benefits such as:

- **Economical:** Since the sun provides energy free of charge, 30% power savings on the electricity bill can be availed with longer back up lighting system at zero running cost.
- **Non-Polluting:** Powered by the sun's renewable energy, the system is energy neutral and an absolutely clean source of illumination. 1kWp solar installation reduces 1⁄2 ton of CO_2 (carbon dioxide) per annum.
- **No Maintenance:** The system has few moveable parts – reducing the risk of breakage. Once installed, it lasts for long time and requires little attention.

This system can be used to power the huge hoardings in the college campus.

Solar powered hoarding lighting system proposed will provide a better, faster, cheaper (and cleaner) alternative with solar. Since this product competes with diesel or conventional fuels, we needed to ensure we beat the cost of a diesel solution. In order to achieve that with solar, we consider the following system:

1. Highly Efficient Solar Panel

2. Charge Controllers with MPPT Technology – increases solar electricity production by up to 30% compared to conventional charge controllers

3. LED Projection Light – consumes 10-times less electricity compared to conventional bulbs, and has a 50,000 hour warranty.

Features:

- Auto on off

- 4 Days Battery Back Up
- Robust housing
- Weather proof

With this entire put together, we ended up with systems that provide 6 hours of lighting each night with 4 -lamp system to light up boards up to 15′x30′, and a 8-lamp system to light larger boards up to 20′x40′.More importantly, with these options, payback of the system will come around 2.5 years. This system provides a way to reduce the lightings costs, get rid of all the operational hassles of owning a diesel generator, plus brand benefits from being “green” with the use of renewable energy like solar powered light hoarding board.

6.5 Solar charging stations

Solar cell phone chargers use solar panels to charge cell phone batteries. They are an alternative to conventional electrical cell phone chargers and in some cases can be plugged into an electrical outlet. Solar mobile charger is a device which can charge mobile phones using solar radiation. Its major component is a compact solar panel. This solar panel traps solar energy and produces an output voltage. But, since the light radiations falling on the solar panel can vary, the output voltage becomes unstable. For charging a mobile phone, stable voltage is required. So, to make the output voltage stable and regulated, voltage regulator circuit along with the solar panel is used.

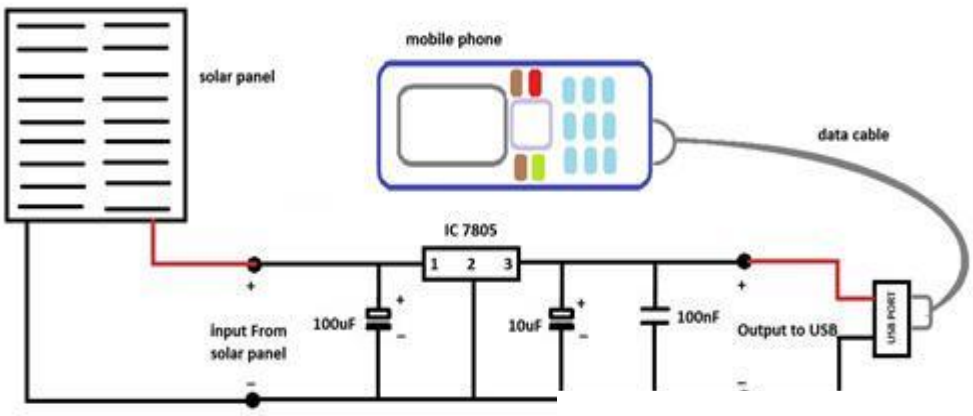


Figure-2: Solar charging Stations

Most of the mobile phones have computer connectivity via USB cable. USB port establishes 4 connection terminals. The connection terminals at the two extreme ends are the supply terminals. In a female USB connector (port via which we plug in USB devices to computer), these terminals carry 5V DC. When a mobile phone is connected to the USB port of a computer, it utilizes this 5V supply to recharge battery. This feature is used in a solar mobile charger. It converts and regulates solar energy to 5V DC and the output will be available through the female USB connector. To this connector, we can easily connect a mobile phone via data cable.

Chapter VI
SUGGESTIONS AND RECOMMENDATIONS

Following Energy Conservation Opportunities and actions on the basis of energy audit are suggested to implement in the campus on the basis of funds availability and institute preferences.

a) Energy Audit: Energy Conservation opportunities:

- Energy efficient tubes and fans can be replaced. Already the phasing out of old tubes has been undertaken during regular maintenance practices.
- Installation of 20 kW solar roof top system as ample space available on the roof of the college building.
- Installation of Solar powered light for hoarding.
- Installation of 02 Nos. solar mobile phone charging stations in the college campus.
- Water management system must be in place. Overhead tanks can be with float control and Time of the day (TOD) can be implemented for water pumping for filling the overhead water tanks.