nutan urja Solutions

+91 83568 18381

kgbhatwadekar@gmail.com

INVOICE

To **Principal,** **The Jamner Taluka Education Society's** **Shree Sureshdada Jain Institute of Pharmaceutical Education and Research, Jamner**	**Invoice No: 2024-25/17** **Date: 30/06/2024**

Work Order No	Verbal
PAN No	AQTPB1025F

No	Particulars	Charges per Unit, Rs.	Quantity Nos.	Amount in Rs.
1	Consultancy Service Charges for Energy Audit, Green Audit and Environmental Audit of college	18,000.00	01	18,000.00
2			**Total Invoice Value**	**18,000.00**
3	**Amount in Words: Rupees Eighteen Thousand only.**			

For Nutan Urja Solutions,

Authorized Signatory

Nutan Urja Solutions

Bank Details:

Name of Bank	IDBI Bank
Branch	Pashan Branch
Name of Account	Nutan Urja Solutions
Current Account Number	0778102000008648
IFSC Code	IBKL0000778

A703, Balaji Whitefield, Sus Road, Pune 411 021, Maharashtra (I)

www.nutanurja.com sales@nutanurja.com

Nutan Urja Solutions

A 703, Balaji Witefield, Near Sunni's World,
Sus Road, Sus, Pune 411 021
Phone: 83568 18381. Email: nutanurja.solutions@gmail.com

Date: 03/07/2024

CERTIFICATE

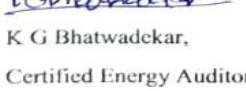
This is to certify that we have conducted Energy Audit at The Jamner Taluka Education Society's Shree Sureshdada Jain Institute of Pharmaceutical Education and Research, Jamner as per the guidelines of Maharashtra Energy Development Agency (www.mahaurja.com) in the year 2023-24.

The College has already adopted **Energy Efficient** practices like:

- Usage of Energy Efficient LED Fittings
- Usage of Energy Efficient BEE STAR Rated equipment
- Installation of **7 kW** Roof Top Solar PV Power Plant.

We appreciate the support of Management, involvement of faculty members and students in the process of Energy Conservation & making the campus Green.

Nutan Urja Solutions,



K G Bhatwadekar,
Certified Energy Auditor,
EA - 22428

Nutan Urja Solutions

A 703, Balaji Witefield, Near Sunni's World,
Sus Road, Sus, Pune 411 021
Phone: 83568 18381. Email: nutanurja.solutions@gmail.com

Date: 03/07/2024

CERTIFICATE

This is to certify that we have conducted Green Audit at The Jamner Taluka Education Society's Shree Sureshdada Jain Institute of Pharmaceutical Education and Research, Jamner for the year 2023–24.

The College has already adopted **Green** practices like:

- Installation of Rain Water Harvesting system
- Installation of Bio composting pit
- Installation of **7 kW** Roof Top Solar PV Power Plant.
- Usage of Energy Efficient LED
- Usage of Energy Efficient BEE STAR Rated equipment

We appreciate the support of Management, involvement of faculty members and students in the process of making the campus Green.

Nutan Urja Solutions,

K G Bhatwadekar,
Certified Energy Auditor,
EA - 22428

Nutan Urja Solutions

A 703, Balaji Witefield, Near Sunni's World,
Sus Road, Sus, Pune 411 021
Phone: 83568 18381. Email: nutanurja.solutions@gmail.com

Date: 03/07/2024

CERTIFICATE

This is to certify that we have conducted Environmental Audit at The Jamner Taluka Education Society's Shree Sureshdada Jain Institute of Pharmaceutical Education and Research, Jamner in the year 2023-24.

The College has already adopted following projects for making the campus Environmental Friendly.

- Installation of Bio Composting Pit
- Installation of Rain Water Harvesting System
- Installation of **7 kW** Solar PV Power Plant.

We appreciate the support of Management, involvement of faculty members and students in the process of Energy Conservation & making the campus Green.

Nutan Urja Solutions,

Nutan Urja Solutions

K G Bhatwadekar,
Certified Energy Auditor,
EA – 22428

Report

On

Energy AuditAt

The Jamner Taluka Education Society's

Shree Sureshdada Jain Institute of Pharmaceutical Education and Research, Jamner

(Year 2023-24)

Prepared by

Nutan Urja Solutions

A 703, Balaji Witefield, Near Sunni's World,

Sus Road, Sus, Pune 411 021

Phone: 83568 18381. Email: nutanurja.solutions@gmail.com

Contents

Acknowledgement

We at Nutan Urja Solutions, Pune, express our sincere gratitude to the management of The Jamner Taluka Education Society's Shree Sureshdada Jain Institute of Pharmaceutical Education and Research, Jamner for awarding us the assignment of Energy Audit of their college premises.

We are also thankful to various Head of Departments & other Staff members for helping us during the field measurements.

We hope that the recommendations stated in this report will be useful and worthy of discussions to take things forward to help implementation of energy conservation measures through energy savings. While we have made every attempt to adhere to high quality standards, in both data collection and analysis through the report, we would welcome your suggestions so as to improve upon this report further.

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. College consumes Energy in the form of Electrical Energy used for various gadgets, Office & other facilities.

1. Present Energy Consumption

In the following Table, we present the details of Energy Consumption.

Table no 2.1: Details of energy consumption

Sr no	Parameter	Energy consumed, (Units)	CO2 Emission (MT)
1	Maximum	2,304	1.84
2	Minimum	-	-
3	Average	878	0.70
4	Total	10,541	8.43

2. Energy Conservation Projects already installed

1. Usage of STAR Rated ACs at new installations
2. Usage of LED lights at some indoor locations
3. Usage of LED Lights for outdoor lighting.

3. Key Observations

1. Usage of LED lights.
2. Usage of star rated equipment.
3. Maintained a good power factor.

4. Percentage of Usage of Alternate Energy

The College has installed a Roof Top Solar PV Plant. The percentage of usage of Alternate Energy to Annual Energy Requirement is 50 %.

5. Percentage of Usage of LED Lighting

The College has various Types of Light fittings. The percentage of Annual LED Lighting Usage to Annual Lighting requirement works out to be 78 %.

6. Recommendations

Table no 1: Recommendations for energy savings

No	Recommendation	Annual Saving potential, kWh/Annum	Annual Monetary Gain, Rs.	Investment Required, Rs.	Payback period, Months
1	Replacement of 10 Nos T-8 fittings with 20W LED fittings	200	2,200	6,410	35
2	Replacement of 78 Nos Old Ceiling Fans with STAR rating fans	3,900	42,900	169,572	47
	Total	**4,100**	**45,100**	**175,982**	**47**

7 Notes & Assumptions

1. Daily working hours-10 Nos
2. Annual working Days-300 Nos
3. Average Rate of Electrical Energy : **Rs 11/- per kWh**

Abbreviations

CFL	:	Compact Fluorescent Lamp
FTL	:	Fluorescent Tube Light
LED	:	Light Emitting Diode
V	:	Voltage
I	:	Current
kW	:	Kilo- Watt
kWh	:	kilo-Watt Hour
kVA	:	Active Power

1. Introduction

Shree Sureshdada Jain Institute of Pharmaceutical Education and Research is located in Jamner. It is An Institute that rests on a strong academic foundation. This institute provides highly qualified, dedicated core teaching faculty blended with a modern approach that seeks to produce next generation Pharmacist.

1.1 Objectives

1. To study present level of Energy Consumption
2. To Study Electrical Consumption
3. To assess the various equipment/facilities from Energy efficiency aspect
4. 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 General Details of College

Table No-1.1: Details of college

No	Head	Particulars
1	Name of Institution	The Jamner Taluka Education Society's Shree Sureshdada Jain Institute of Pharmaceutical Education and Research, Jamner
2	Address	The Jamner Taluka Education Society's Shree Sureshdada Jain Institute of Pharmaceutical Education and Research, Bhusawal Rd, Anand Nagar, Jamner, Maharashtra 424206
3	Affiliation	Kaviyitri Bahinabai Chaudhari North Maharashtra University, Jalgaon.

2. Study of connected load

In this chapter, we present details of various connected electrical equipment and electrical load.

Table No-2.1: Location wise study of Electrical fittings in various buildings

No	Location	FTL (40W)	CFL	LED tube (20W)	LED bulb (12W)	Computers (65W)	Fans	1.5 TR ACs
1	Class Rooms	0	1	20	6	0	18	0
2	Library	0	1	10	2	8	10	0
3	Pharmaceutics Labs	0	1	12	0	0	4	0
4	Pharmaceutical Chemistry Labs	0	1	12	0	0	4	0
5	Pharmacognosy Labs	0	1	8	0	0	4	0
6	Pharmacology Labs	0	1	8	0	0	4	0
7	M.Pharm Labs	0	1	10	3	1	4	1
8	Machine Room	0	1	8	0	0	2	0
9	Central Instrument Room	0	1	8	0	0	2	0
10	Staff Romm	0	1	3	0	0	2	0
11	Computer Lab	0	1	8	0	30	2	0
12	Seminor Hall	0	1	12	0	0	8	4
13	Office	0	1	4	1	5	4	0
14	Principal Cabin	0	1	3	0	1	2	0
15	Management Cabin	0	1	4	0	0	2	1
16	Exam Rooms	0	1	4	0	0	2	0
17	Store Room	0	1	2	0	0	2	0
18	Girls and Boys Common Room	0	1	2	0	0	2	0

19	All Toliets Room	0	1	4	0	0	0	0
20	All Coridoors	10	1	10	0	0	0	0
	Total	**10**	**20**	**152**	**12**	**45**	**78**	**6**

Apart from above load, the college has pumps. Individual fitting wise load is as under.

Table No 2.2: Equipment wise Connected Load

No	Equipment	Qty	Load, W/Unit	Load, kW
1	F T L-40 W	10	40	0.4
2	CFL	20	24	0.5
3	LED Tube-20W	152	20	3.0
4	LED bulb	12	12	0.1
5	Computers	45	65	2.9
6	Ceiling Fan	78	65	5.1
7	AC (1.5Tr)	6	1838	11.0
8	Pumps (1 nos 2HP)			1.5
	Total			**17.6**

Data can be represented in terms of PIE chart as under,

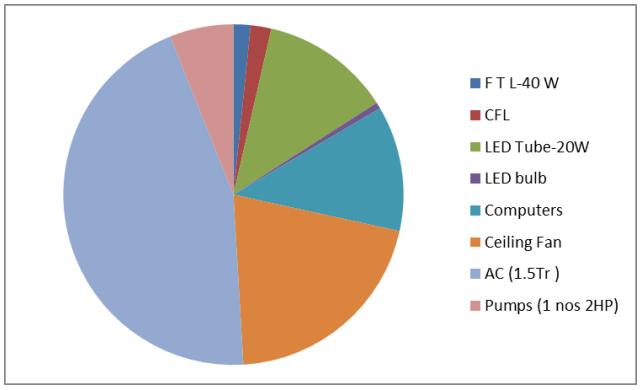


Figure 2.1: Distribution of connected load.

3. Study of Electrical Energy Consumption

In this chapter, electricity bills are studied for the analysis of electrical energy consumption.

Table no 3.1: Summary of electricity bills

No	Month	Energy (kWh)	Bill Amount (Rs)
1	May-24	1,150	11,700
2	Apr-24	868	8,971
3	Mar-24	2,304	21,607
4	Feb-24	-	422
5	Jan-24	865	8,431
6	Dec-23	907	8,815
7	Nov-23	-	422
8	Oct-23	978	9,288
9	Sep-23	920	8,767
10	Aug-23	835	7,853
11	Jul-23	928	8,670
12	Jun-23	786	7,404
	Total	**10,541**	**102,350**

Variation in energy consumption is as follows,

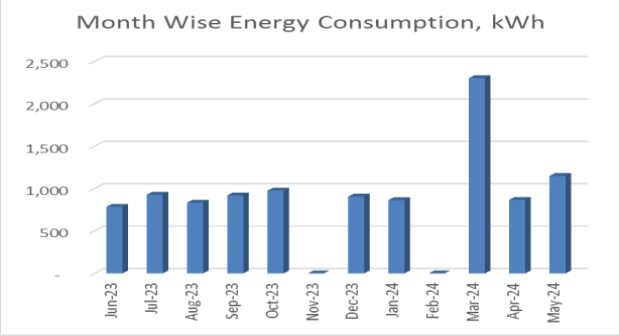


Figure 3.1: Month wise energy consumption

Monthly variation in electricity bill is as follows,

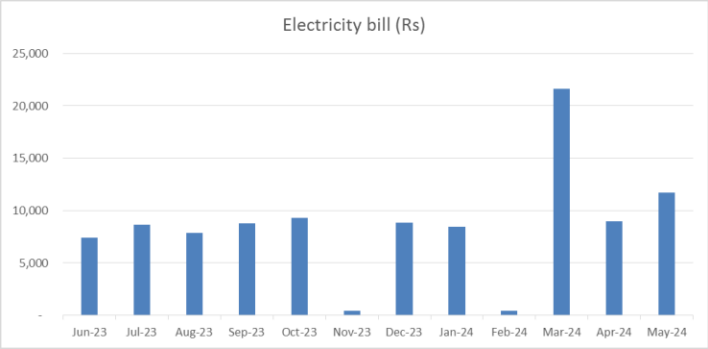


Figure 3.2: Month wise electricity bill

Key observations of electricity bill are as follows,

Table no 3.2: Key observations

Sr no	Parameter	Energy consumed, (Units)	CO2 Emission (MT)
1	Maximum	2,304	1.84
2	Minimum	-	-
3	Average	878	0.70
4	Total	10,541	8.43

4. Carbon Foot printing

1. A Carbon Foot print is defined as the Total Greenhouse Gas emissions (CO_2 emissions), emitted due to various activities. In this we compute the emissions of Carbon-Di-Oxide, by usageof the various form of Electrical Energy used by the College for performing its day to day activities

2. Basis for computation of CO_2 Emissions:

The basis of Calculation for CO_2 emissions due to Electrical Energy is 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

We herewith furnish the details of various forms of Energy consumption as under

Table 4.1: Month wise Consumption of Electrical Energy & CO2 Emissions

No	Month	Energy Consumed, kWh	CO2 Emissions, MT
1	May-24	1,150	0.92
2	Apr-24	868	0.69
3	Mar-24	2,304	1.84
4	Feb-24	-	0.00
5	Jan-24	865	0.69
6	Dec-23	907	0.73
7	Nov-23	-	0.00
8	Oct-23	978	0.78
9	Sep-23	920	0.74
10	Aug-23	835	0.67
11	Jul-23	928	0.74
12	Jun-23	786	0.63
	Total	**10,541**	**8.43**

In the following Chart we present the CO2 emissions due to usage of Electrical Energy.

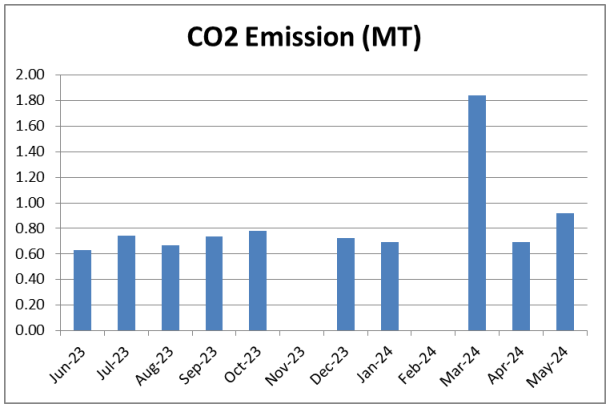


Figure 4.1: Month wise CO2 Emission

5. Study of utilities

5.1 Study of Lighting

In the facility, the lighting system can be divided mainly in to parts, indoor lighting and outdoor lighting. There are 10 FTL fittings with Electronic/ magnetic chokes , 20 nos of CFLs, 152 nos of LED tubes. It is recommended to install the 20 W LED Tube light fittings in place of these old T-8 fittings.

5.2 Air-conditioners

In the facility, there are about 6 Nos. of 1.5 Tr Air-conditioners.

5.3 Ceiling Fans

At building facility, there are about 78 Nos Old Ceiling Fans, which consumed about 65 W of Electrical Energy. It is recommended to replace these old Fans with BEE STAR Rated Ceiling Fans.

5.4 Water Pumps

There are in total 1 Water pump with 2HP capacity.

6. Study of usage of alternate energy

In this Chapter, we compute the percentage of Usage of Alternate/Renewable Energy to Annual Energy Requirement of the College. The College has installed Roof Top Solar PV System. The Installed Capacity of Solar PV Plant is **7 kWp**.

Table 6.1: Computation of % Usage of Alternate Energy to Annual Energy Requirement

No	Particulars	Value	Unit
1	Annual Energy Purchased from MSEDCL	10,541	kWh/Annum
2	Energy Generated by Roof Top Solar PV System	10500	kWh/Annum
3	Total Energy Requirement of College	21,041	kWh/Annum
4	% of Usage of Alternate Energy to Annual Energy Requirement	50	**%**

Photograph of Solar PV plant

7. Study of usage of LED lighting

In this chapter we study the lighting system of college and compute the percentage of total load catered by LED lighting.

Table 7.1: Total lighting load

No	Particulars	Qty	Load, W/Unit	Load, kW
1	F T L-40 W	10	40	0.4
2	CFL	20	24	0.5
	LED lighting load			
1	LED tube	152	20	3.0
2	LED bulbs	12	12	0.1
	Total LED lighting load			**3.2**
	Total Lighting load			**4.1**

It can be seen that out of total lighting load 49% load is LED lighting load.

8. Energy conservation proposals

8.1 Replacement of Old T-8 FTLs with 20 W LED fittings

In the facility, there are about 10 Nos, T-8, FTL fittings with Electronic/magnetic chokes. It is recommended to install the 20 W LED Tube light fittings in place of these old T-8 fittings. In the following Table, we present the savings, investment required & payback analysis.

No	Particulars	Value	Unit
1	Present Qty of T-8 fittings	10	Nos
2	Energy Demand of T-8 fitting	40	W/Unit
3	Energy Demand of 20 W LED fittin	20	W/Unit
4	Reduction in demad	20	W/Unit
5	Average Daily Usage period	4	Hrs/Day
6	Daily saving in Energy	0.8	kWh/Day
7	Annual Working Days	250	Nos
8	Annual Energy Saving possible	200	kWh/Annum
9	Rate of Electrical Energy	11	Rs/kWh
10	Annual Monetary saving	2200	Rs/Annum
11	Cost of 20 W LED Tube	641	Rs/Unit
12	Investment required	6410	Rs lump sum
13	Simple Payback period	35	Months

8.2 Replacement of old fans with STAR Rated fans

During the Audit, it was observed that there are 78 no of fans. It is recommended to replace these old fans with STAR Rated fans.

In the following Table, we present the savings, investment required & payback analysis.

No	Particulars	Value	Unit
1	Present Qty of Old Ceiling Fan fittings	78	Nos
2	Energy Demand of Old Ceiling Fan fitting	65	W/Unit
3	Energy Demand of STAR Rated Fan	40	W/Unit
4	Reduction in demad	25	W/Unit
5	Average Daily Usage period	8	Hrs/Day
6	Daily saving in Energy	15.6	kWh/Day
7	Annual Working Days	250	Nos
8	Annual Energy Saving possible	3900	kWh/Annum
9	Rate of Electrical Energy	11	Rs/kWh
10	Annual Monetary saving	42900	Rs/Annum
11	Cost of STAR Rated Ceiling Fan	2174	Rs/unit
12	Investment required	169572	Rs lump sum
13	Simple Payback period	47	Months

8.3 Summary of Savings

No	Recommendation	Annual Saving potential, kWh/Annum	Annual Monetary Gain, Rs.	Investment Required, Rs.	Payback period, Months
1	Replacement of 10 Nos T-8 fittings with 20W LED fittings	200	2,200	6,410	35
2	Replacement of 78 Nos Old Ceiling Fans with STAR rating fans	3,900	42,900	169,572	47
	Total	**4,100**	**45,100**	**175,982**	**47**