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### 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
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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,

*K. Bhatwadekar*  
Authorized Signatory



#### Bank Details:

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



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## Nutan Urja Solutions

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Phone: 83568 18381. Email: [nutanurja.solutions@gmail.com](mailto: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](http://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



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Phone: 83568 18381. Email: [nutanurja.solutions@gmail.com](mailto: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.

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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



**Report**  
**On**  
**Energy Audit At**  
**The Jamner Taluka Education Society's**  
**Shree Sureshdada Jain Institute of Pharmaceutical Education and Research,**  
**Jamner**  
**(Year 2023-24)**



Prepared by  
**Nutan Urja Solutions**  
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## **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<sub>2</sub> 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)	CO <sub>2</sub> 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
	<b>Total</b>	<b>4,100</b>	<b>45,100</b>	<b>175,982</b>	<b>47</b>

## 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 )	Comput ers (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

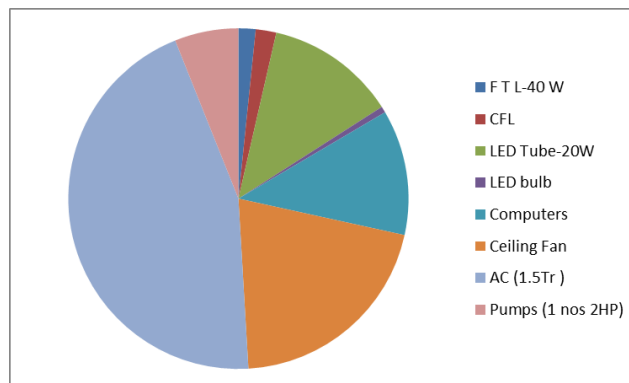
19	All Toiliets Room	0	1	4	0	0	0	0
20	All Coridoors	10	1	10	0	0	0	0
	<b>Total</b>	<b>10</b>	<b>20</b>	<b>152</b>	<b>12</b>	<b>45</b>	<b>78</b>	<b>6</b>

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
	<b>Total</b>			<b>17.6</b>

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



**Figure 2.1: Distribution of connected load.**

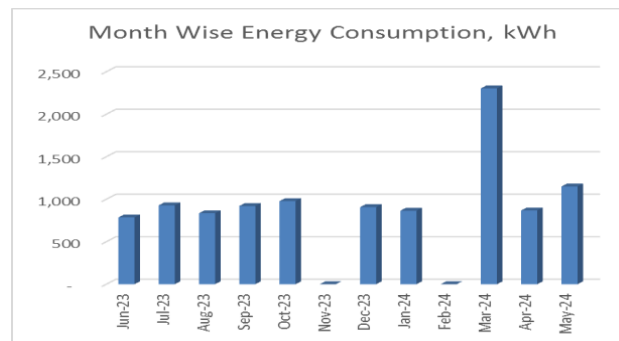
### 3. Study of Electrical Energy Consumption

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

**Table no 3.1: Summary of electricity bills**

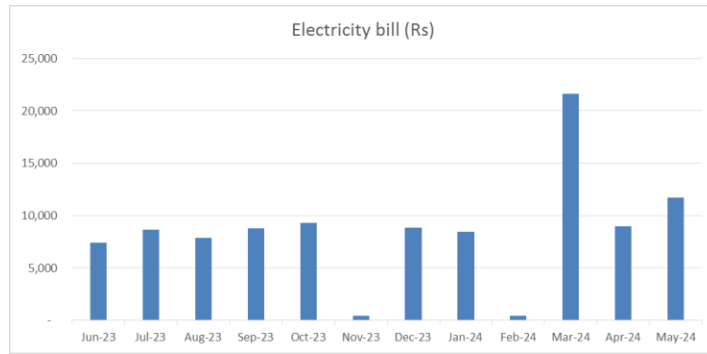
No	Month	Energy (kWh)	Bill Amount (Rs)
1	May-24	1,150	11,700
2	Apr-24	868	8,971
3	Mar-24	2,304	21,607
4	Feb-24	-	422
5	Jan-24	865	8,431
6	Dec-23	907	8,815
7	Nov-23	-	422
8	Oct-23	978	9,288
9	Sep-23	920	8,767
10	Aug-23	835	7,853
11	Jul-23	928	8,670
12	Jun-23	786	7,404
	<b>Total</b>	<b>10,541</b>	<b>102,350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

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<sub>2</sub> emissions), emitted due to various activities. In this we compute the emissions of Carbon-Di-Oxide, by usage of the various form of Electrical Energy used by the College for performing its day to day activities

### 2. Basis for computation of CO<sub>2</sub> Emissions:

The basis of Calculation for CO<sub>2</sub> emissions due to Electrical Energy is as under

- 1 Unit (kWh) of Electrical Energy releases **0.8 Kg of CO<sub>2</sub>** into atmosphere.

Based on the above Data we compute the CO<sub>2</sub> emissions which are being released in to the atmosphere by the College due to its Day to Day operations

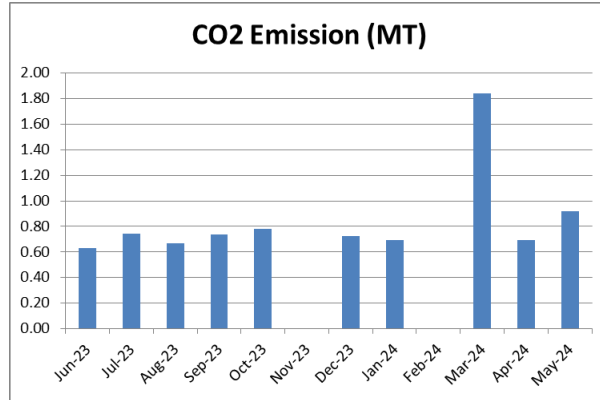
We herewith furnish the details of various forms of Energy consumption as under

**Table 4.1: Month wise Consumption of Electrical Energy & CO<sub>2</sub> Emissions**

No	Month	Energy Consumed, kWh	CO <sub>2</sub> 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
	<b>Total</b>	<b>10,541</b>	<b>8.43</b>



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
	<b>LED lighting load</b>			
1	LED tube	152	20	3.0
2	LED bulbs	12	12	0.1
	<b>Total LED lighting load</b>			<b>3.2</b>
	<b>Total Lighting load</b>			<b>4.1</b>

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
	<b>Total</b>	<b>4,100</b>	<b>45,100</b>	<b>175,982</b>	<b>47</b>

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## **Acknowledgement**

We at Nutan Urja Solutions, Pune wish to 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 assigning the work of Environmental Audit of college campus.

We appreciate the co-operation and support extended to our team members during the entire tenure of field study.

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

We are also thankful to all other staff members who helped us during the Measurements at the field and for giving us the necessary inputs to carry out this vital exercise.

## Executive Summary

After the Field measurements & analysis, we present herewith important observations made and various measures to reduce the dependency on Natural resources & reduce the pollution.

The Jamner Taluka Education Society's Shree Sureshdada Jain Institute of Pharmaceutical Education and Research, Jamner consumes various resources for day to day operations, namely: Air, Water, Electrical Energy & LPG.

### 1. Various Pollution due to College Activities:

- Air pollution: Mainly CO<sub>2</sub> on account of Electricity & LPG Consumption
- Solid Waste: Bio degradable Kitchen Waste, Garden Waste
- Liquid Waste: Human liquid waste

### 2. Present Level of CO<sub>2</sub> Emissions:

Sr no	Parameter	Energy consumed, (Units)	CO <sub>2</sub> Emission (MT)
1	Maximum	2,304	1.8
2	Minimum	-	-
3	Average	878	0.7
4	Total	10,541	8.4

### 3. The various projects already implemented for Environmental Conservation:

- Usage of Natural Day light in corridors
- Implementation of Bio Composting pit for disposal of Bio degradable waste
- Implementation of Rain Water Harvesting
- Installation of **7 kW** Solar PV Power Plant.

### 4. Recommendations:

1. Installation of Bio Gas Generator Plant instead of Bio composting Plant.
2. Installation of Sewage treatment Plant to make campus a Zero Discharge campus

**5. Notes & Assumptions:**

1. **1 kWh** of Electrical Energy releases **0.8 Kg of CO<sub>2</sub>** into atmosphere
2. 1 kWp Solar PV plant generates 5 kWh/day Electrical Energy for 300 days in an year.

## **Abbreviations**

AC	:	Air conditioner
PES	:	Progressive Education Society
CFL	:	Compact Fluorescent Lamp
FTL	:	Fluorescent Tube Light
LED	:	Light Emitting Diode
kWh	:	kilo-Watt Hour
Qty	:	Quantity
W	:	Watt
kW	:	Kilo Watt
PF	:	Power Factor
M D	:	Maximum Demand
PC	:	Personal Computer
MSEDCL	:	Maharashtra State Electricity Distribution Company Ltd

## 1. Introduction

### 1.1 Important Definitions:

#### 1.1.1 Environment: Definition as per environment Protection Act: 1986

Environment includes water, air and land and the inter-relationship which exists among and between Water, Air, Land and Human beings, other living creatures, plants microorganism and property

#### 1.1.2. Environmental Audit: Definition:

An audit which aims at verification and validation to ensure that various environmental laws are complied with and adequate care has been taken towards environmental protection and preservation

*According to UNEP, 1990, "Environmental audit can be defined as a management tool comprising systematic, documented and periodic evaluation of how well environmental organization management and equipment are performing with an aim of helping to regularize the environment"*

**1.1.3. Environmental Pollutant:** means any solid, liquid and gaseous substance present in the concentration as may be, or tend to be, injurious to Environment.

#### 1.1.4. Relevant Environmental Laws in India: Table No-1:

1927	The Indian Forest Act
1972	The Wildlife Protection Act
1974	The Water (Prevention and Control of Pollution) Act
1977	The Water (Prevention & Control of Pollution) Cess Act
1980	The Forest (Conservation) Act
1981	The Air (Prevention and Control of Pollution) Act
1986	The Environment Protection Act
1991	The Public Liability Insurance Act
2002	The Biological Diversity Act
2010	The National Green Tribunal Act

#### 1.1.5. Some Important Environmental Rules in India: Table No-2:

1989	Hazardous Waste (Management and Handling) Rules
1989	Manufacture, Storage and Import of Hazardous Chemical Rules
2000	Municipal Solid Waste (Management and Handling) Rules
1998	The Biomedical Waste (Management and Handling) Rules
1999	The Environment (Siting for Industrial Projects) Rules
2000	Noise Pollution (Regulation and Control) Rules
2000	Ozone Depleting Substances (Regulation and Control) Rules

2011	E-waste (Management and Handling) Rules
2011	National Green Tribunal (Practices and Procedure) Rules
2011	Plastic Waste (Management and Handling) Rules

#### 1.1.6 National Environmental Plans & Policy Documents: Table No-3:

1.	National Forest Policy, 1988
2.	National Water Policy, 2002
3.	National Environment Policy or NEP (2006)
4.	National Conservation Strategy and Policy Statement on Environment and Development, 1992
5.	Policy Statement for Abatement of Pollution (1992)
6.	National Action Plan on Climate Change
7.	Vision Statement on Environment and Human Health
8.	Technology Vision 2030 (The Energy Research Institute)
9.	Addressing Energy Security and Climate Change (MoEF and Bureau of Energy Efficiency)
10.	The Road to Copenhagen; India's Position on Climate Change Issues (MoEF)

#### 1.2 Objectives

1. To study present usage of Natural resources the College is consuming
2. To Study the present pollution sources
3. To study various measures to make the campus Self sustainable in respect of Natural resources
4. To suggest the various measures to reduce the pollution: Air, Water, Noise

#### 1.3 Audit Methodology:

1. Study of College as System
2. Study of Electrical Energy Consumption
3. Study of CO2 emissions
4. Suggestions on usage of Renewable Energy

#### 1.4 General 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 Consumption of Various Resources

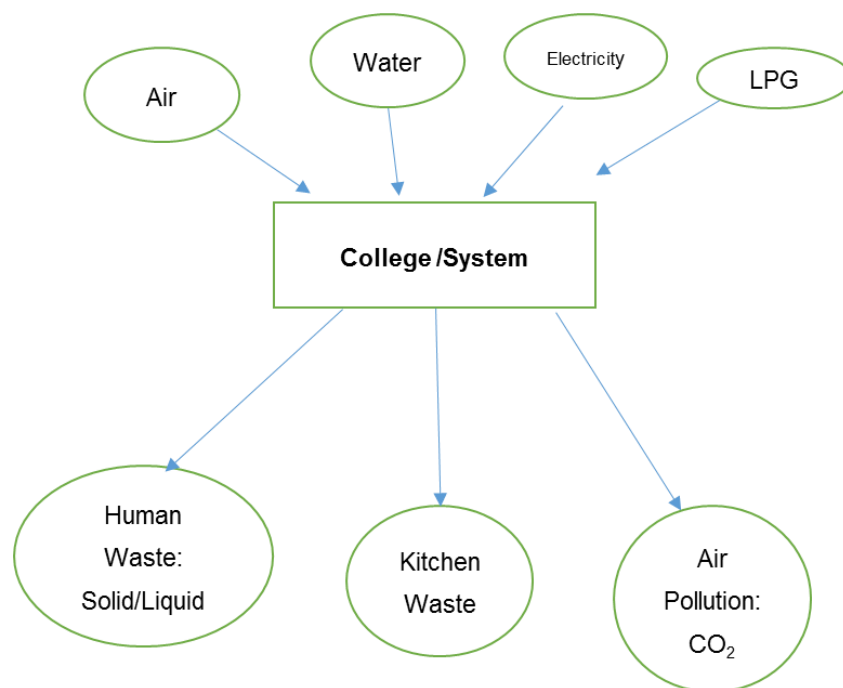
The Institute consumes following basic/derived Resources:

1. Air
2. Water
3. Electrical Energy
4. Liquefied Petroleum Gas

Also, college emits following pollutants to environment

1. Human Waste: Solid/ Liquid
2. Kitchen waste
3. Air pollution

We try to draw a schematic diagram for the College System & Environment as under.



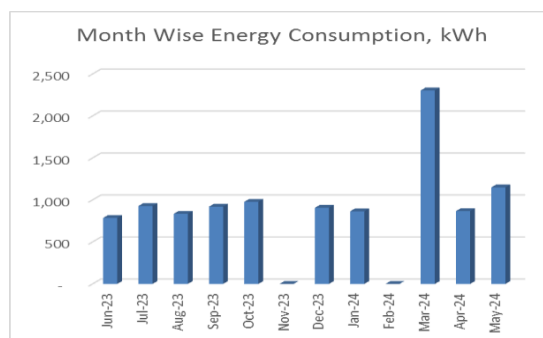
Now we compute the Generation of CO<sub>2</sub> on account of consumption of Electrical Energy & LPG as under.

The calculation of electrical energy consumption by college can be given as,

**Table 2.1: Electrical Energy Consumption**

No	Month	Energy (kWh)
1	May-24	1,150
2	Apr-24	868
3	Mar-24	2,304
4	Feb-24	-
5	Jan-24	865
6	Dec-23	907
7	Nov-23	-
8	Oct-23	978
9	Sep-23	920
10	Aug-23	835
11	Jul-23	928
12	Jun-23	786
	<b>Total</b>	<b>10,541</b>
	Maximum	2,304
	Minimum	-
	Average	878

## 2.1 Variation of Monthly Electrical Energy Consumption



**Figure 2.1 : Monthly Electrical Energy Consumption**

## 2.2 Key Inference drawn

From the above analysis, we present following important parameters:

**Table 2.2: Variation in Important Parameters**

No	Parameter/ Value	Energy Consumed, kWh
1	Total	10,541
2	Maximum	2,304
3	Minimum	-
4	Average	878

### 3. Study of Environmental Pollution

In this Chapter, we present the various types of Pollution as under:

#### 3.1 Air Pollution

The College is using two forms of Energies, namely: Thermal in the form of LPG and Electrical Energy used for day to day operations of the College. The major pollutant on account of above Energy forms is the Carbon Di Oxide.

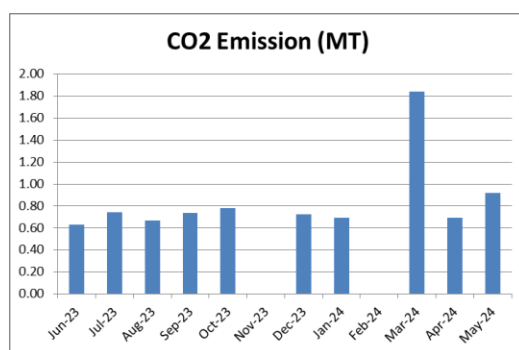
- 1 unit (kWh) of Electrical Energy emits 0.8 Kg of CO<sub>2</sub> in the atmosphere
- 1 Kg of LPG emits 3 Kg of CO<sub>2</sub> in the atmosphere

In the following Table, we present the CO<sub>2</sub> emissions.

Table 3.1: Month wise Consumption of Electrical Energy & CO<sub>2</sub> Emissions:

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
	<b>Total</b>	<b>10,541</b>	<b>102,350</b>
	Maximum	2,304	21,607
	Minimum	-	422
	Average	878	8,529

In the following Chart we present the CO<sub>2</sub> emissions due to usage of Electrical Energy.



**Figure 3.1: CO<sub>2</sub> emission due to usage of electrical energy.**

### **3.2 Study of Solid Waste Generation**

The College has already installed a Bio composting Plant, wherein, the bio-degradable waste is composted & is used as fertilizer for the garden.

### **3.3 Study of Liquid Waste Generation**

At present the Liquid Waste generated due to day to day operations is drained off to the municipal Corporation through a pipe.

### **3.4 Study of e-Waste Management:**

The internal communication is through emails and hence there is hardly any generation of e-Waste in the premises.

#### **4. Study of Rain Water Harvesting**

The College has already installed Rain Water Harvesting project, wherein the rain water falling on the terrace is collected and through pipes it is fed to underground Water Storage tank. This stored water is then reused for domestic purpose.

##### **Photograph of Rain Water Harvesting:**



## **5. Recommendations**

In order to reduce the dependency on Natural resources and also in order to reduce the various pollutions arising due to the day to day operations of the College we herewith recommend following recommendations.

- Installation of Bio Gas Generator Plant instead of Bio composting Plant.
- Installation of Sewage treatment Plant to make campus a Zero Discharge campus

**Report**  
**On**  
**Green Audit At**  
**The Jamner Taluka Education Society's**  
**Shree Sureshdada Jain Institute of Pharmaceutical Education and Research,**  
**Jamner**  
**(Year 2023-24)**



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## **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 Green 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 and green practices. 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

Green Audit of The Jamner Taluka Education Society's Shree Sureshdada Jain Institute of Pharmaceutical Education and Research, Jamner is conducted by Nutan Urja Solutions, Pune. Based On the audit field study, following important points can be presented.

### 1. Present Energy Consumption

The Jamner Taluka Education Society's Shree Sureshdada Jain Institute of Pharmaceutical Education and Research, Jamner uses Electrical Energy as the source of Energy for various equipment in the college campus. In the following Table, we present the details of Energy Consumption.

**Table no 1: Details of energy consumption**

Sr no	Parameter	Energy consumed, (Units)	CO2 Emission (MT)
1	Maximum	2,304	1.8
2	Minimum	-	-
3	Average	878	0.7
4	Total	10,541	8.4

### 2. Various Measures Adopted for Energy Conservation

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. Usage of Renewable Energy

The collage has installed **7 kW** Solar PV Power Plant.

### 4. Rain Water Harvesting

The College has installed the Rainwater harvesting project, to reduce dependency on municipal corporation water supply.

### 5. Waste Management

The College has already installed a Bio composting Plant, wherein, the bio-degradable waste is composted & is used as fertilizer for the garden.

Jamner

The internal communication is through emails and there is hardly any generation of e-Waste in the premises.

## **6. Notes and Assumptions**

1. Daily working hours-10 Nos
2. Annual working Days-250 Nos
3. Average Rate of Electrical Energy : **Rs 11/- per kWh**

Jamner

## **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 the present CO<sub>2</sub> 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

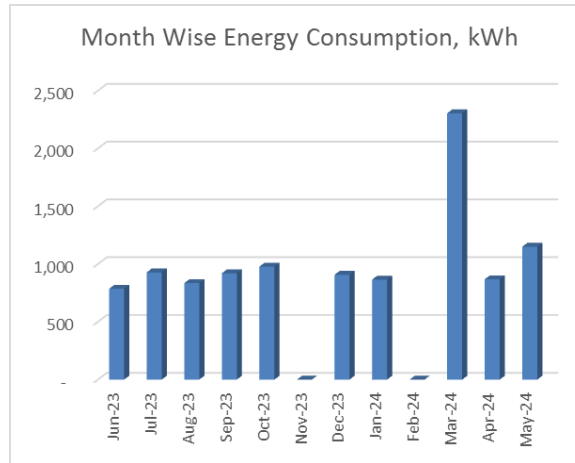
## 2. Study of Electrical Energy Consumption

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

**Table no 2.1: Summary of electricity bills**

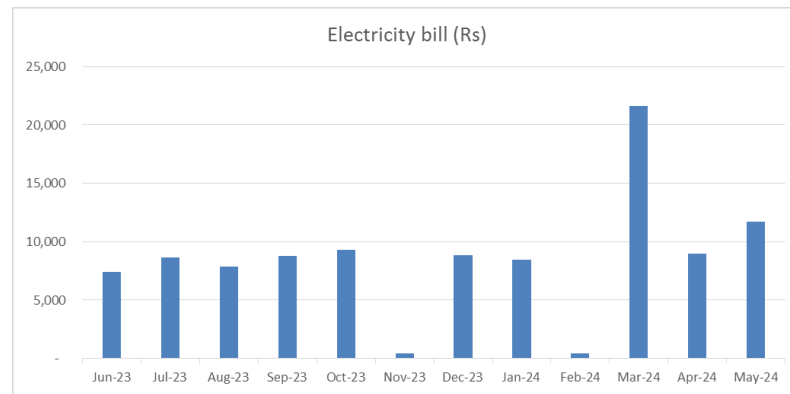
<b>No</b>	<b>Month</b>	<b>Energy (kWh)</b>	<b>Bill Amount (Rs)</b>
1	May-24	1,150	11,700
2	Apr-24	868	8,971
3	Mar-24	2,304	21,607
4	Feb-24	-	422
5	Jan-24	865	8,431
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10	Aug-23	835	7,853
11	Jul-23	928	8,670
12	Jun-23	786	7,404
	<b>Total</b>	<b>10,541</b>	<b>102,350</b>

Variation in energy consumption is as follows,



**Figure 2.1: Month wise energy consumption**

Monthly variation in electricity bill is as follows,



**Figure 2.2: Month wise electricity bill**

Key observations of electricity bill are as follows,

**Table no 2.2: Key observations**

Sr no	Parameter	Energy consumed, (Units)	CO2 Emission (MT)
1	Maximum	2,304	1.8
2	Minimum	-	-
3	Average	878	0.7
4	Total	10,541	8.4



### 3. Carbon Foot printing

1. A **Carbon Foot print** is defined as the Total Greenhouse Gas emissions (CO<sub>2</sub> emissions), emitted due to various activities. In this we compute the emissions of Carbon-Di-Oxide, by usage of the various form of Electrical Energy used by the College for performing its day to day activities

#### 2. Basis for computation of CO<sub>2</sub> Emissions:

The basis of Calculation for CO<sub>2</sub> emissions due to Electrical Energy is as under

- 1 Unit (kWh) of Electrical Energy releases **0.8 Kg of CO<sub>2</sub>** into atmosphere.

Based on the above Data we compute the CO<sub>2</sub> emissions which are being released in to the atmosphere by the College due to its Day to Day operations

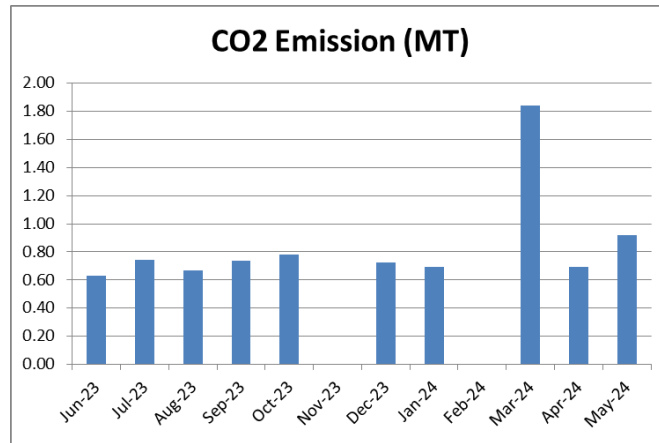
We herewith furnish the details of various forms of Energy consumption as under

**Table 3.1: Month wise Consumption of Electrical Energy & CO<sub>2</sub> Emissions**

No	Month	Energy Consumed, kWh	CO <sub>2</sub> 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
	<b>Total</b>	<b>10,541</b>	<b>8.43</b>

In the following Chart we present the CO<sub>2</sub> emissions due to usage of Electrical Energy.

Jamner



**Figure 3.1: Month wise CO2 Emission**

#### 4. 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 Solar PV System of 7kW capacity.

**Table 4.1: 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



## 5. Study of Rain Water Harvesting

The College has already installed Rain Water Harvesting project, wherein the rain water falling on the terrace is collected and through pipes it is fed to underground Water Storage tank. This stored water is then reused for domestic purpose.

### Photograph of Rain Water Harvesting pipe



## **6. Study of Waste Management**

### **6.1 Solid Waste Management**

The College has already installed a Bio composting Plant, wherein, the bio-degradable waste is composted & is used as fertilizer for the garden.

### **6.2 e-Waste Management**

The internal communication is through emails and hence there is hardly any generation of e-Waste in the premises.

## 7. Study of Green Practices

### 7.1 No of students who don't use own Vehicle for coming to Institute

Out of total students coming to Institute, about 60% students use own Automobile.

### 7.2 Usage of Public Transport

During the Students transport study, it was revealed that the local students who are residing near areas make use of Public Transport like Municipal Transport local buses, local sharing type auto rickshaws. Some students use bicycles. Institute encourages students to not to use automobiles.

### 7.3 Pedestrian Friendly Roads

The Institute has well defined pedestrian foot paths as to facilitate the easy movement of the students within the campus.

#### Photograph of Road within campus



### 7.4 Plastic Free Campus

The Institute is an active participant in the Government of India's most prestigious project of SWATCHH BHART ABHIYAN. The Institute has displayed boards in the Campus, to make the campus plastic free. Various measures adopted for this purpose are as follows

- Installation of Separate waste bins for Dry waste & wet waste
- Usage of paper tea cups in the Institute canteen
- Display of boards in the campus for Plastic Free campus

### **7.5 Paperless Office**

The internal communication of the Institute is through the Internet. There are hardly any day to day operations, where printing is required.

### **7.6 Green Landscaping with Trees and Plants**

The Institute has beautiful maintained Garden.



**Figure 7.1: Beautiful maintained Garden of college**