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This is to certify that

## KYDSCT'S INSTITUTE OF MANAGEMENT AND SCIENCE, SAKEGAON

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Date of Initial Registration: 27th July 2023

Certificate Expiry: 26th July 2026

Date of this Certificate: 27th July 2023

Recertification Due: 26th July 2026

**Certificate Number: 305023072726Q**



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# 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](mailto:nutanurja.solutions@gmail.com)

Date: 28/07/2023

## CERTIFICATE

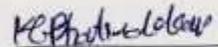
This is to certify that we have conducted Energy Audit at Kai. Yashodabai Dagdu Saraf Charitable Trust's Institute of Management & Science, Sakegaon, Bhusawal as per the guidelines of Maharashtra Energy Development Agency ([www.mahaurja.com](http://www.mahaurja.com)) for the year 2022-23.

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 10kW solar PV panel

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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This is to certify that we have conducted Environmental Audit at Kai. Yashodabai Dagdu Saraf Charitable Trust's Institute of Management & Science, Sakegaon, Bhusawal in the year 2022-23.

The College has already adopted following projects for making the campus **Energy Efficient**.

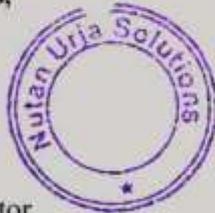
- Installation of Bio Composting Pit
- Installation of Rain Water Harvesting System

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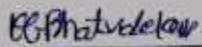
This is to certify that we have conducted Green Audit at Kai. Yashodabai Dagdu Saraf Charitable Trust's Institute of Management & Science, Sakegaon, Bhusawal for the year 2022-23.

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

- Installation of Rain Water Harvesting system
- Installation of Bio composting pit
- Installation of 10kW solar PV panel
- 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.

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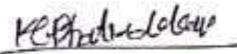
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**Report  
On  
Energy Audit  
At  
Kai.Yashodabai Dagadu Saraf Charitable Trust's Institute Of  
Management & Science, Sakegaon, Bhusawal  
(Year 2022-23)**



Prepared by  
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## Acknowledgement

We at Nutan Urja Solutions, Pune, express our sincere gratitude to the management of Kai, Yashodabai Dagdu Saraf Charitable Trust's Institute of Management & Science, Sakegaon, Bhusawal 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	3,904	3.12
2	Minimum	1,610	1.29
3	Average	2,287	1.83
4	Total	27,443	21.95

### 2. Energy Conservation Projects already installed

1. Usage of LED lights at some indoor locations
2. 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 35 %.

### 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 47 %.



## 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 31 Nos T-8 fittings with 20W LED fittings	620	6,920	19,871	35
2	Replacement of 71 Nos Old Ceiling Fans with STAR rating fans	923	10,153	1,54,354	182
3	Replacement of 2 Nos Old 1.5 TR Acs with STAR rating Acs	2,000	22,000	1,05,750	58
4	Installation of 10kW grid connected PV panel	15,000	1,65,000	5,00,000	36
	<b>Total</b>	<b>18,543</b>	<b>2,04,073</b>	<b>7,79,975</b>	<b>46</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

Kai. Yashodabai Dagdu Saraf Charitable Trust's Institute of Management & Science established in 2010. The institute is affiliated to North Maharashtra University Jalgaon and duly approved by All India Council for Technical Education (AICTE), New Delhi. The college have the privilege of being the modern and sophisticated premier technical institute in Bhusawal imparting professional education. Institute of Management and Science (IMS) reflects quality, which is day-by-day stepping towards perfection. The utilitarian mission is to provide skilled and motivated manpower catering to the burgeoning Industrial needs and also to train students on cutting edge technologies. In a nutshell, IMS has a penchant for excellence and hence produces Business leaders of tomorrow who are ready to face the challenges of this ever-changing and fast moving corporate world.

### 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	Institute of Management & Science
2	Address	Kai. Yashodabai Dagdu Saraf Charitable Trust's Institute of Management & Science, N.H.6, Sakegaon, Bhusawal.
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.

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

No	Location	FTL (40W)	LED tube (20W)	Computers (65W)	Fans	1.5TR old Acs
<b>Ground Floor</b>						
1	Principal (Director) Cabin			1	2	1
2	Board Room		6	1	6	1
3	I.Q.A.C.		1	2	1	
4	Placement Office	1			1	
5	Main Office	4	2	4	4	
6	Women Cell		1		1	
7	Passage		4			
<b>1st Floor</b>						
8	Computer Lab	5	3	30	4	
9	Ladies Wash Room	1				
10	Gents Wash Room		1			
1	Class Room 1	2			3	
11	BBA Class Room		4	1	5	
12	Exam Office		2		1	
13	Guest Room	1			1	
14	Passage	3				
<b>2nd Floor</b>						
15	Library	6	4	2	11	
16	Incubation Center	2			2	
17	Store Room	1			1	
18	Class Room 2	3			5	
19	Gymkhana	1	1		4	
20	Wash Room	1				
<b>3rd Floor</b>						
21	Seminar Hall		8		10	
22	Boy's Common Room		4		5	
23	Girl's Common Room		4		4	
24	Staff Room		3			
25	Passage		2			
	<b>Total</b>	<b>31</b>	<b>50</b>	<b>41</b>	<b>71</b>	<b>2</b>

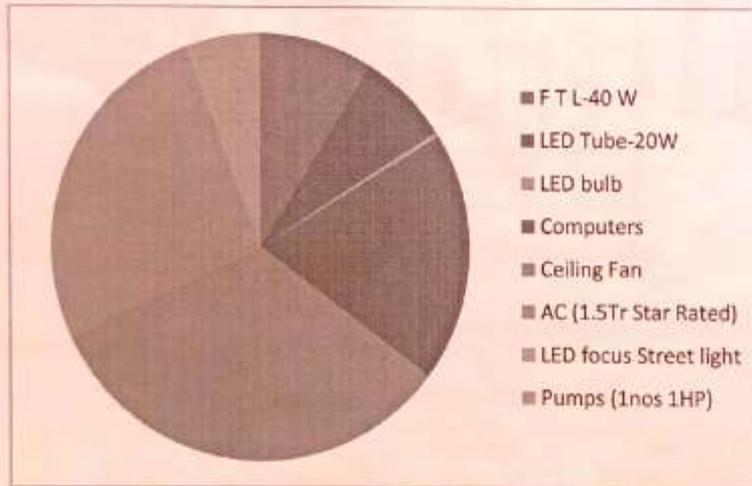


Apart from above load, the college has pumps, street lights. Individual fitting wise load is as under.

**Table No 2.2: Equipment wise Connected Load**

No	Equipment	Qty	Load, W/Unit	Load, kW
1	F T L-40 W	31	40	1.2
2	LED Tube-20W	50	20	1.0
3	LED bulb	4	12	0.0
4	Computers	41	65	2.7
5	Ceiling Fan	71	65	4.6
6	AC (1.5Tr)	2	1838	3.7
7	LED focus Street light	2	35	0.1
8	Pumps (1nos 1HP)	1	1	0.7
	<b>Total</b>			<b>9.1</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

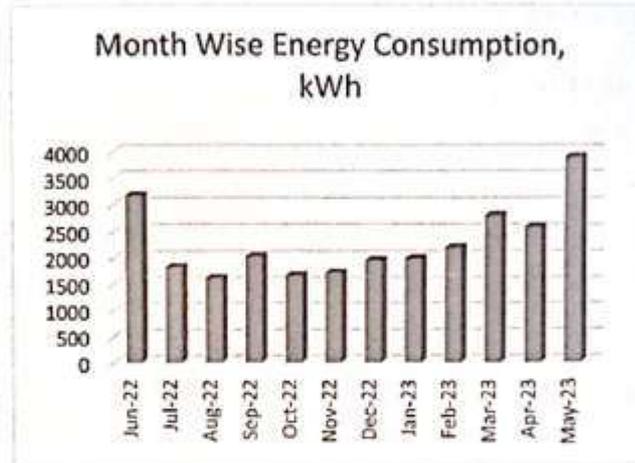
In this chapter, electricity bills are studied for the analysis of electrical energy consumption.

Table no 3.1: Summary of electricity bills

No	Month	Energy (kWh)	Bill Amount (Rs)
1	May-23	3904	73070
2	Apr-23	2586	50568
3	Mar-23	2797	50714
4	Feb-23	2194	37483
5	Jan-23	1984	34394
6	Dec-22	1946	33507
7	Nov-22	1723	31349
8	Oct-22	1664	29698
9	Sep-22	2027	37323
10	Aug-22	1610	29612
11	Jul-22	1824	40471
12	Jun-22	3184	58008
	<b>Total</b>	<b>27,443</b>	<b>5,06,197</b>

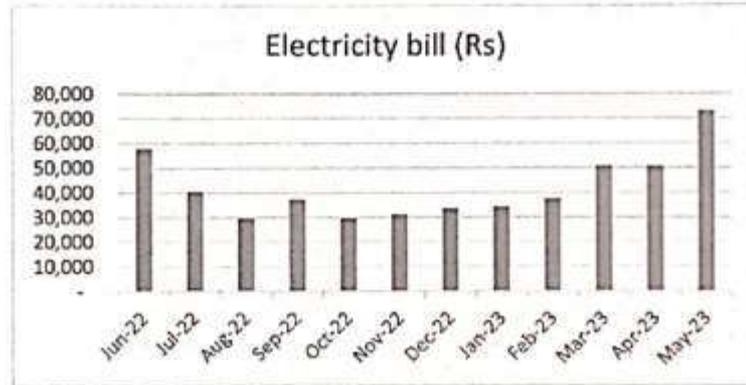
Variation in energy consumption is as follows,





**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, (kWh)	CO2 Emission (MT)
1	Total	27443	21.95
2	Maximum	3,904	3.12
3	Minimum	1,610	1.29
4	Average	2,287	1.83



#### 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-23	3,904	3.12
2	Apr-23	2,586	2.07
3	Mar-23	2,797	2.24
4	Feb-23	2,194	1.76
5	Jan-23	1,984	1.59
6	Dec-22	1,946	1.56
7	Nov-22	1,723	1.38
8	Oct-22	1,664	1.33
9	Sep-22	2,027	1.62
10	Aug-22	1,610	1.29
11	Jul-22	1,824	1.46
12	Jun-22	3,184	2.55
	<b>Total</b>	<b>27,443</b>	<b>21.95</b>

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



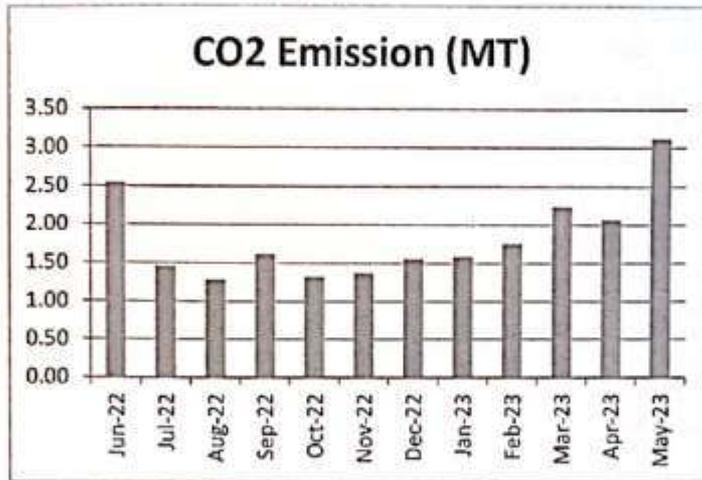


Figure 4.1: Month wise CO2 Emission



## **5. Study of utilities**

### **5.1 APFC Panel**

The Office has already installed the APFC Panel. During the measurements, it was found that the panel is working properly.

### **5.2 Study of Lighting**

In the facility, the lighting system can be divided mainly in to parts, indoor lighting and outdoor lighting. There are 31 FTL fittings with Electronic/ magnetic chokes , 50 nos of LED tubes, It is recommended to install the 20 W LED Tube light fittings in place of these old T-8 fittings. There are 2 No of LED street lights.

### **5.3 Air-conditioners**

In the facility, there are about 02 Nos. of 1.5 Tr old Air-conditioners. It is recommended to replace these old ACs with BEE STAR Rated ACs.

### **5.4 Ceiling Fans**

At building facility, there are about 71 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.

### **5.5 Water Pumps**

There are in total 1 Water pumps with 1HP 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 10 kWp.

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

No	Particulars	Value	Unit
1	Annual Energy Purchased from MSEDCL	27,443	kWh/Annum
2	Energy Generated by Roof Top Solar PV System	15000	kWh/Annum
3	Total Energy Requirement of College	42,443	kWh/Annum
4	% of Usage of Alternate Energy to Annual Energy Requirement	35	%

### 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	31	40	1.24
	<b>LED lighting load</b>			
1	LED tube	50	20	1.00
2	LED bulbs	4	12	0.05
3	LED street lights	2	35	0.07
	<b>Total LED lighting load</b>			<b>1.12</b>
	<b>Total Lighting load</b>			<b>2.36</b>

It can be seen that out of total lighting load 47% 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 31 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	31	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	2.48	kWh/Day
7	Annual Working Days	250	Nos
8	Annual Energy Saving possible	620	kWh/Annum
9	Rate of Electrical Energy	11	Rs/kWh
10	Annual Monetary saving	6820	Rs/Annum
11	Cost of 20 W LED Tube	641	Rs/Unit
12	Investment required	19871	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 142 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	71	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 demand	25	W/Unit
5	Average Daily Usage period	8	Hrs/Day
6	Daily saving in Energy	14.2	kWh/Day
7	Annual Working Days	250	Nos
8	Annual Energy Saving possible	3550	kWh/Annum
9	Rate of Electrical Energy	11	Rs/kWh
10	Annual Monetary saving	39050	Rs/Annum
11	Cost of STAR Rated Ceiling Fan	2174	Rs/unit
12	Investment required	154354	Rs lump sum
13	Simple Payback period	47	Months



### 8.3 Replacement of 1.5 TR Old ACs with STAR Rated ACs

During the Audit, it was observed that there are 2 Nos, of 1.5 TR old ACs. It is recommended to replace these old ACs with STAR Rated ACs.

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

No	Particulars	Value	Unit
1	Present Qty of 1.5 TR Old ACs	2	Nos
2	Energy Demand of Old 1.5 TR AC	2.15	kW/Unit
3	Energy Demand of New AC	1.15	kW/Unit
4	Reduction in demad	1	kW/Unit
5	Average Daily Usage period	4	Hrs/Day
6	Daily saving in Energy	8	kWh/Day
7	Annual Working Days	250	Nos
8	Annual Energy Saving possible	2000	kWh/Annum
9	Rate of Electrical Energy	11	Rs/kWh
10	Annual Monetary saving	22000	Rs/Annum
11	Cost of STAR Rated 1.5 TR AC	52875	Rs/unit
12	Investment required	105750	Rs lump sum
13	Simple Payback period	58	Months



#### 8.4 Installation of Solar PV panel

It is recommended to install 10 kW solar PV panel. In the following Table, we present the savings, investment required & payback analysis.

No	Particulars	Value	Unit
1	Installation of 10kW PV unit	10	kW
2	Energy saving	15000	kWh/Annum
3	Rate of electrical energy	11	Rs
4	Annual monetary savings	165000	Rs/ Annum
5	Investment required	500000	Rs lump sum
6	Simple payback period	36	Months



### 8.5 Summary of Savings

No	Recommendation	Annual Saving potential, kWh/Annum	Annual Monetary Gain, Rs.	Investment Required, Rs.	Payback period, Months
1	Replacement of 31 Nos T-8 fittings with 20W LED fittings	620	6,920	19,871	35
2	Replacement of 71 Nos Old Ceiling Fans with STAR rating fans	923	10,153	1,54,354	182
3	Replacement of 2 Nos Old 1.5 TR Acs with STAR rating Acs	2,000	22,000	1,05,750	58
4	Installation of 10kW grid connected PV panel	15,000	1,65,000	5,00,000	36
	<b>Total</b>	<b>18,543</b>	<b>2,04,073</b>	<b>7,79,975</b>	<b>46</b>



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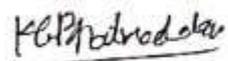
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## Acknowledgement

We at Nutan Urja Solutions, Pune wish to express our sincere gratitude to the management of Kai. Yashodabai Dagdu Saraf Charitable Trust's Institute of Management & Science, Sakegaon, Bhusawal 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.

Kai. Yashodabai Dagdu Saraf Charitable Trust's Institute of Management & Science, Sakegaon, Bhusawal 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:

No	Parameter /Value	Energy, kWh	CO <sub>2</sub> Emissions, MT
1	Maximum	3,904	3.12
2	Minimum	1,610	1.29
3	Average	2,287	1.83
4	Total	27,443	21.95

### 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 10 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
3. Installation of Energy Efficient BEE STAR Rated ACs

### 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	Kai. Yashodabai Dagdu Saraf Charitable Trust's Institute of Management & Science, Sakegaon, Bhusawal
2	Address	Kai. Yashodabai Dagdu Saraf Charitable Trust's Institute of Management & Science, N.H.6, Sakegaon, Bhusawal.
3	Affiliation	Kavayitri Bahinabai Chaudhari North Maharashtra University, Jalgaon.



## 2. Study of Consumption of Various Resources

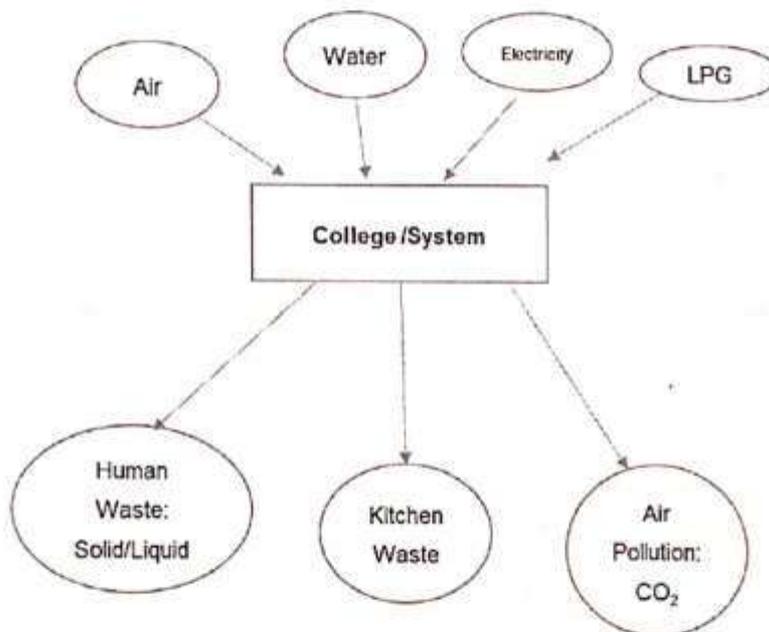
The Institute consumes following basic/derived Resources:

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.



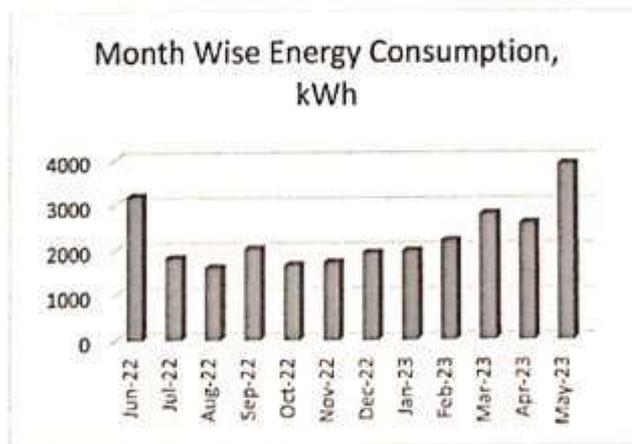
Now we compute the Generation of CO<sub>2</sub> on account of consumption of Electrical Energy & LPG as under.

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

**Table 2.1: Electrical Energy Consumption**

No	Month	Energy Consumed, kWh
1	May-23	3904
2	Apr-23	2586
3	Mar-23	2797
4	Feb-23	2194
5	Jan-23	1984
6	Dec-22	1946
7	Nov-22	1723
8	Oct-22	1664
9	Sep-22	2027
10	Aug-22	1610
11	Jul-22	1824
12	Jun-22	3184
	<b>Total</b>	<b>27,443</b>
	<b>Maximum</b>	<b>3,904</b>
	<b>Minimum</b>	<b>1,610</b>
	<b>Average</b>	<b>2,287</b>

**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	Maximum	3,904
2	Minimum	1,610
3	Average	2,287
4	Total	27,443



### 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.

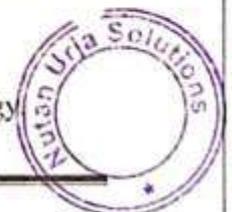
- 1 unit (kWh) of Electrical Energy emits 0.8 Kg of CO<sub>2</sub> in the atmosphere
- 1 Kg of LPG emits 3 Kg of CO<sub>2</sub> in the atmosphere

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 Consumed, kWh	CO <sub>2</sub> Emissions, MT
1	May-23	3,904	3.12
2	Apr-23	2,586	2.07
3	Mar-23	2,797	2.24
4	Feb-23	2,194	1.76
5	Jan-23	1,984	1.59
6	Dec-22	1,946	1.56
7	Nov-22	1,723	1.38
8	Oct-22	1,664	1.33
9	Sep-22	2,027	1.62
10	Aug-22	1,610	1.29
11	Jul-22	1,824	1.46
12	Jun-22	3,184	2.55
	<b>Total</b>	<b>27,443</b>	<b>21.95</b>
	<b>Maximum</b>	<b>3,904</b>	<b>3.12</b>
	<b>Minimum</b>	<b>1,610</b>	<b>1.29</b>
	<b>Average</b>	<b>2,287</b>	<b>1.83</b>

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



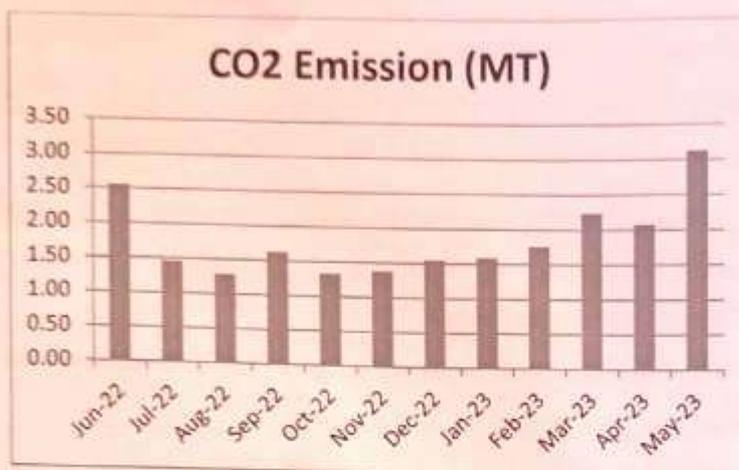


Figure 2.1: CO2 emission due to usage of electrical energy.

### 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.

#### 3.2.1 Photograph of Bio Composting Processing Tanks



### 3.3 Study of Liquid Waste Generation

At present the Liquid Waste generated due to day to day operations is drained off to a Soak Pit 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.

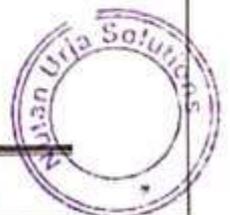
##### Photograph of Rain Water Harvesting Pipe:



## 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



# 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](mailto:nutanurja.solutions@gmail.com)

Date: 28/07/2023

## CERTIFICATE

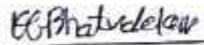
This is to certify that we have conducted Green Audit at Kai. Yashodabai Dagdu Saraf Charitable Trust's Institute of Management & Science, Sakegaon, Bhusawal for the year 2022-23.

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

- Installation of Rain Water Harvesting system
- Installation of Bio composting pit
- Installation of 10kW solar PV panel
- 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  
Green Audit  
At  
Kai.Yashodabai Dagadu Saraf Charitable Trust's Institute Of  
Management & Science, Sakegaon, Bhusawal  
(Year 2022-23)**



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](mailto:nutanurja.solutions@gmail.com)



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## Acknowledgement

We at Nutan Urja Solutions, Pune, express our sincere gratitude to the management of Kai. Yashodabai Dagdu Saraf Charitable Trust's Institute of Management & Science, Sakegaon, Bhusawal 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 Kai. Yashodabai Dagdu Saraf Charitable Trust's Institute of Management & Science, Sakegaon, Bhusawal is conducted by Nutan Urja Solutions, Pune. Based On the audit field study, following important points can be presented.

### 1. Present Energy Consumption

Kai. Yashodabai Dagdu Saraf Charitable Trust's Institute of Management & Science, Sakegaon, Bhusawal 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	3,904	3.12
2	Minimum	1,610	1.29
3	Average	2,287	1.83
4	Total	27,443	21.95

### 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 10 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.

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



## 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

Kai. Yashodabai Dagdu Saraf Charitable Trust's Institute of Management & Science established in 2010. The institute is affiliated to North Maharashtra University Jalgaon and duly approved by All India Council for Technical Education (AICTE), New Delhi. College have the privilege of being the modern and sophisticated premier technical institute in Bhusawal imparting professional education. Institute of Management and Science (IMS) reflects quality, which is day-by-day stepping towards perfection. The utilitarian mission is to provide skilled and motivated manpower catering to the burgeoning Industrial needs and also to train students on cutting edge technologies. In a nutshell, IMS has a penchant for excellence and hence produces Business leaders of tomorrow who are ready to face the challenges of this ever-changing and fast moving corporate world.

### 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

No	Month	Energy (kWh)	Bill Amount (Rs)
1	May-23	3904	73070
2	Apr-23	2586	50568
3	Mar-23	2797	50714
4	Feb-23	2194	37483
5	Jan-23	1984	34394
6	Dec-22	1946	33507
7	Nov-22	1723	31349
8	Oct-22	1664	29698
9	Sep-22	2027	37323
10	Aug-22	1610	29612
11	Jul-22	1824	40471
12	Jun-22	3184	58008
	<b>Total</b>	<b>27,443</b>	<b>5,06,197</b>

Variation in energy consumption is as follows,



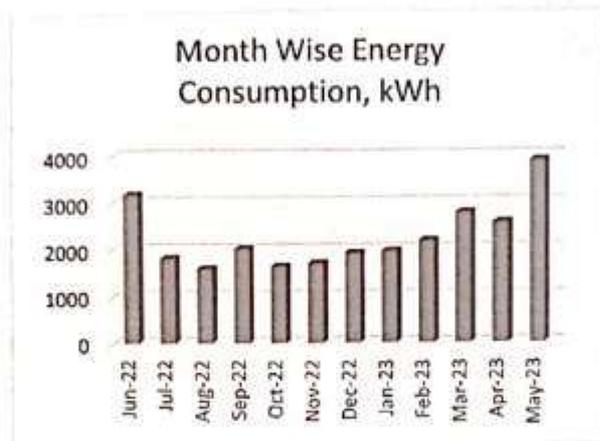


Figure 2.1: Month wise energy consumption

Monthly variation in electricity bill is as follows,

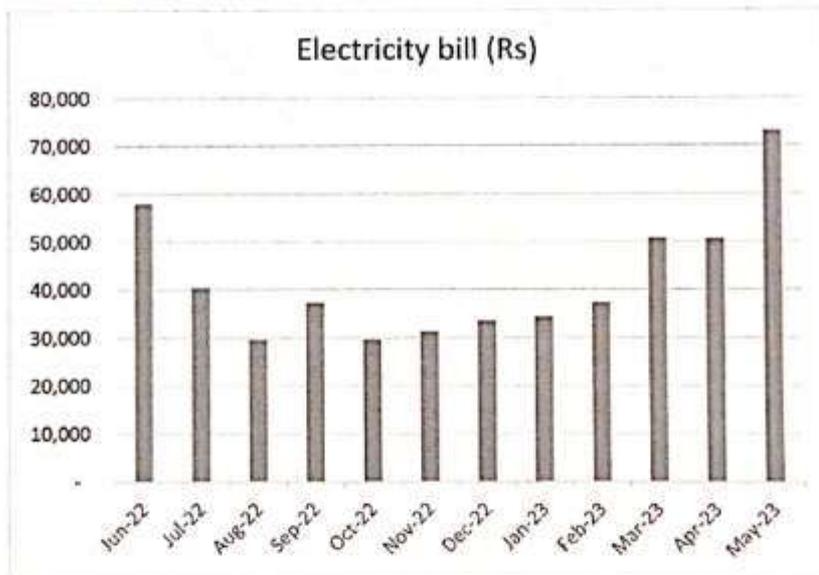
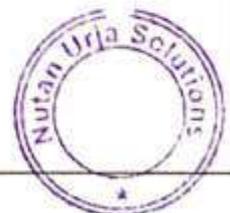


Figure 2.2: Month wise electricity bill

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	3,904	3.12
2	Minimum	1,610	1.29
3	Average	2,287	1.83
4	Total	27,443	21.95



### 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-23	3,904	3.12
2	Apr-23	2,586	2.07
3	Mar-23	2,797	2.24
4	Feb-23	2,194	1.76
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11	Jul-22	1,824	1.46
12	Jun-22	3,184	2.55
	<b>Total</b>	<b>27,443</b>	<b>21.95</b>

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



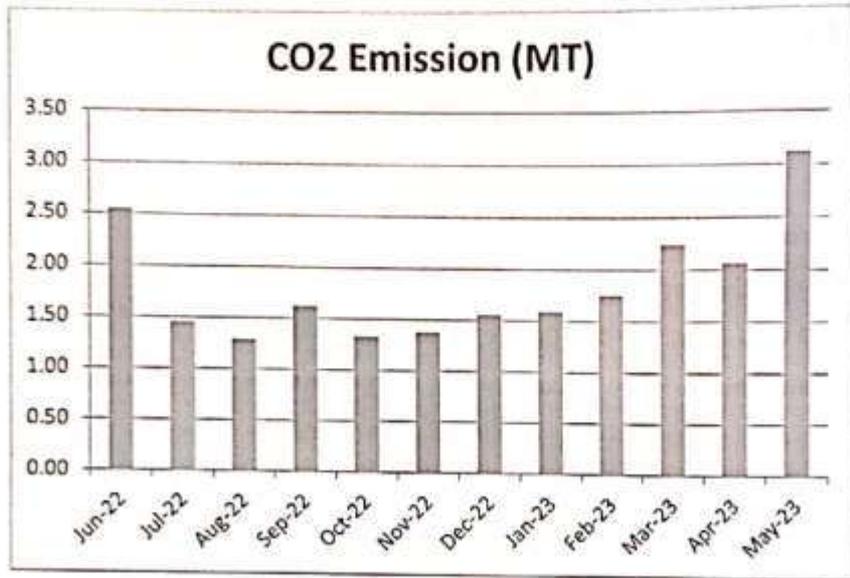


Figure 3.1: Month wise CO2 Emission



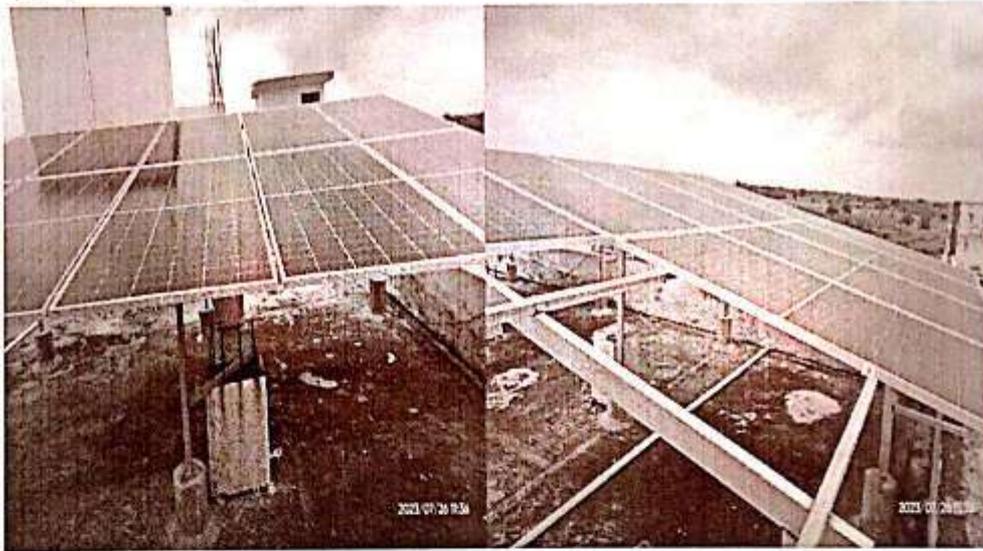
#### 4. Study of Usage of Alternate Energy

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 10kW capacity.

**Table 4.1: Computation of % Usage of Alternate Energy to Annual Energy Requirement**

No	Particulars	Value	Unit
1	Annual Energy Purchased from MSEDCL	27,443	kWh/Annum
2	Energy Generated by Roof Top Solar PV System	15000	kWh/Annum
3	Total Energy Requirement of College	42,443	kWh/Annum
4	% of Usage of Alternate Energy to Annual Energy Requirement	35	%

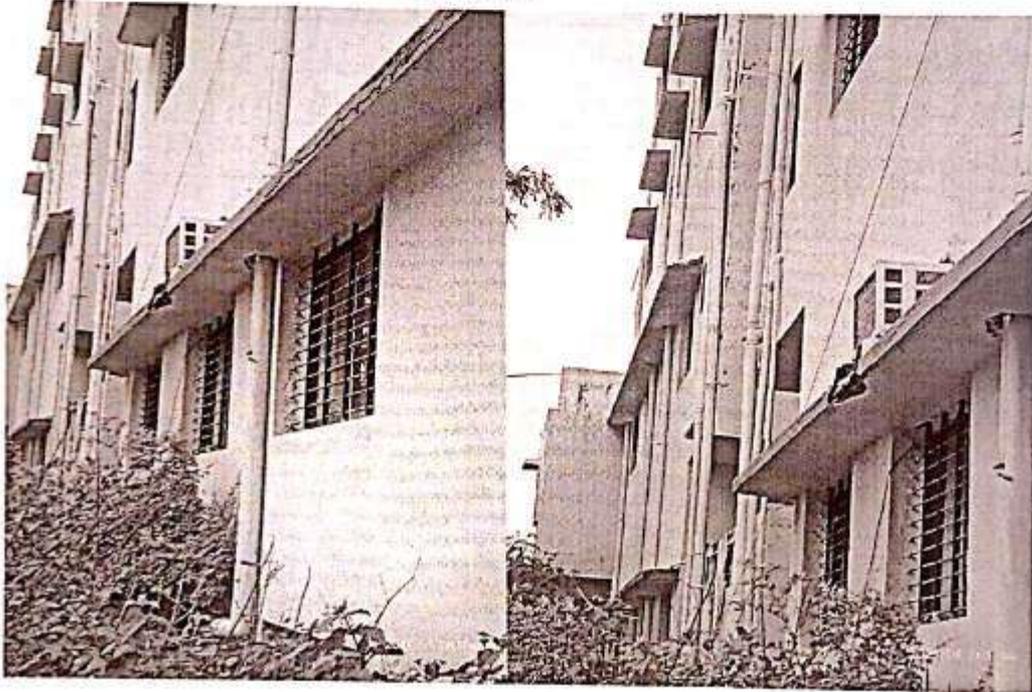
#### Photograph of Solar PV plant



## 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.

#### Photographs of Bio Composting Storage Tanks:



### 6.2 e-Waste Management

The internal communication is through emails and 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 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.

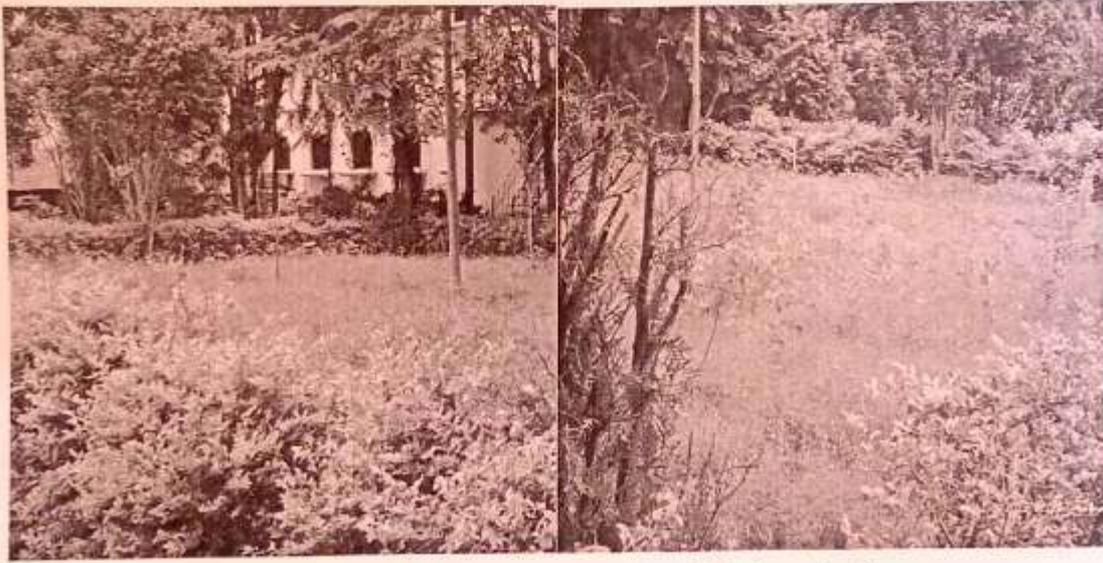


Figure 7.1: Beautiful maintained Garden of college



राष्ट्रीय मूल्यांकन एवं प्रत्यायन परिषद  
विश्वविद्यालय अनुदान आयोग का स्वायत्त संस्थान  
**NATIONAL ASSESSMENT AND ACCREDITATION COUNCIL**  
*An Autonomous Institution of the University Grants Commission*

# *Certificate of Accreditation*

*The Executive Committee of the  
National Assessment and Accreditation Council  
on the recommendation of the duly appointed  
Peer Team is pleased to declare the  
Institute of Management and Science  
Sakegaon, Tal. Bhusawal, Dist. Jalgaon,  
affiliated to North Maharashtra University, Maharashtra as  
Accredited  
with CGPA of 2.04 on seven point scale  
at B grade  
valid up to March 03, 2024*

*Date : March 04, 2019*



*J. C. Dhanu  
Director*