Nutan Urja Solutions

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Date: 11/08/2024

CERTIFICATE

This is to certify that we have conducted Green Audit at Arts & Commerce College Warwat Bakal, Buldana for the year 2023–24.

The college is zero energy building.

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

- Installation of Rain Water Harvesting system
- Installation of Bio composting pit
- Usage of Energy Efficient LED
- Usage of Energy Efficient BEE STAR Rated equipment
- College has installed 12kW Solar PV system

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

Arts & Commerce College warwat Bakal, Buldana.

(Year 2023-24)

Prepared by

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Acknowledgement

We at Nutan Urja Solutions, Pune, express our sincere gratitude to the management of Arts & Commerce College warwat Bakal, Buldana 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 Arts & Commerce College warwat Bakal, Buldana is conducted by Nutan Urja Solutions, Pune. Based On the audit field study, following important points can be presented.

1. Present Energy Consumption

Arts & Commerce College warwat Bakal, Buldana 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	0	0
2	Minimum	0	0
3	Average	0	0
4	Total	0	0

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.
4. The college is zero energy building

3. Usage of Renewable Energy

The collage has installed **12 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 hence 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

The mission undertaken by Arts & Commerce College warwat Bakal, Buldana is to strive and provide Education to those poor, downtrodden and exploited communities of the area. It will accelerate the development of this region and establish confidence among the youth.

1.1 Objectives

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

1.2 Audit methodology

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

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	Jun-24	0	512
2	May-24	0	512
3	Apr-24	0	512
4	Mar-24	0	512
5	Feb-24	0	512
6	Jan-24	0	512
7	Dec-23	0	512
8	Nov-23	0	512
9	Oct-23	0	512
10	Sep-23	0	440
11	Aug-23	0	440
12	Jul-23	0	440
	Total	**0**	**5,928**

Variation in energy consumption is as follows,

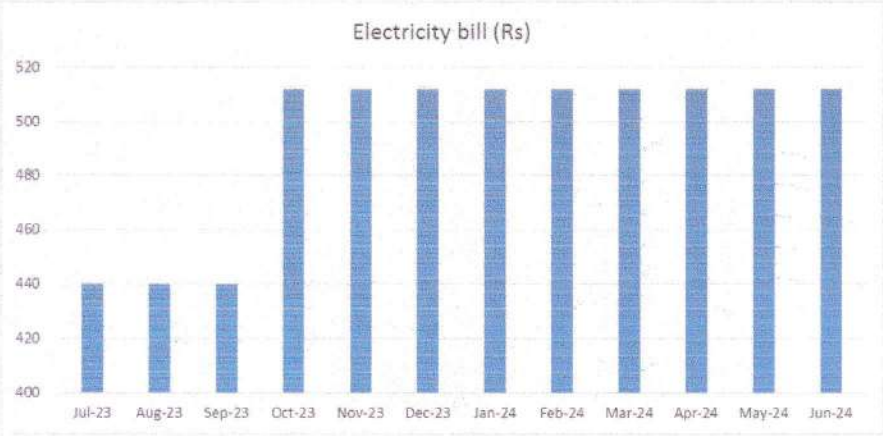

Figure 2.1: Month wise electricity bill

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	0	0
2	Minimum	0	0
3	Average	0	0
4	Total	0	0

3. 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 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_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 3.1: Month wise Consumption of Electrical Energy & CO2 Emissions

No	Month	Energy Consumed, kWh	CO2 Emissions, MT
1	Jun-24	0	0
2	May-24	0	0
3	Apr-24	0	0
4	Mar-24	0	0
5	Feb-24	0	0
6	Jan-24	0	0
7	Dec-23	0	0
8	Nov-23	0	0
9	Oct-23	0	0
10	Sep-23	0	0
11	Aug-23	0	0
12	Jul-23	0	0
	Total	**0**	**0**

It can be seen from above figures and tables that, the total energy imported by college from MSEB is zero. The college buildings can be called as zero energy building.

Definition of zero energy building is as follows.

Zero Energy Building

An energy-efficient building where, on a source energy basis, the actual annual delivered energy is less than or equal to the on-site renewable exported energy

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 Roof Top Solar PV System. The Installed Capacity of Solar PV Plant is **10 kWp**.

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

No	Particulars	Value	Unit
1	Annual Energy Purchased from MSEDCL	0	kWh/Annum
2	Energy Generated by Roof Top Solar PV System	18,000	kWh/Annum
3	Total Energy Requirement of College	18,000	kWh/Annum
4	% of Usage of Alternate Energy to Annual Energy Requirement	100	%

Photograph of Solar PV plant

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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.

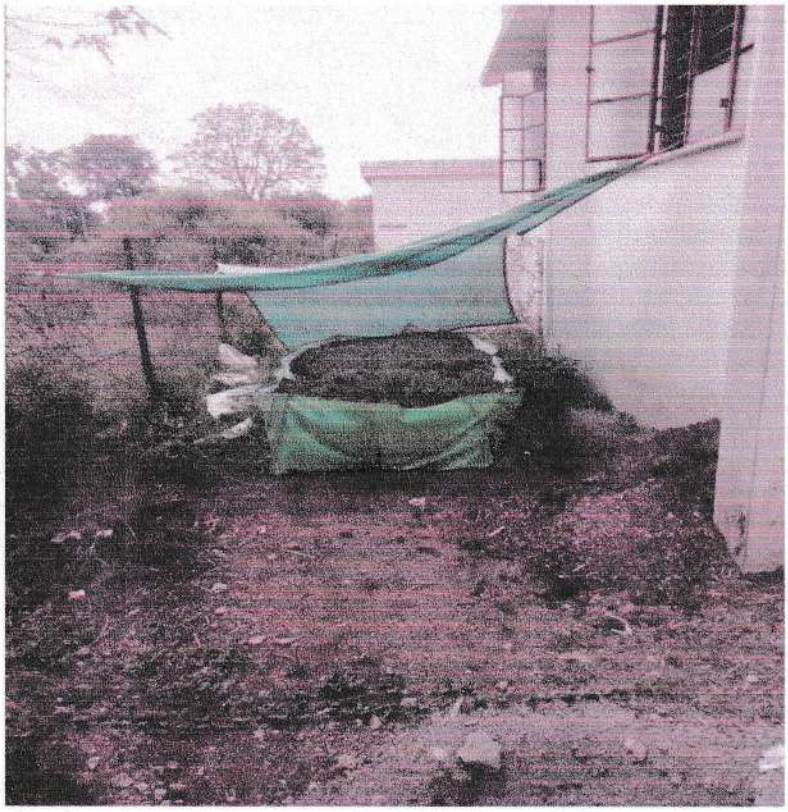
Photograph of Rain Water Harvesting

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 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.

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.

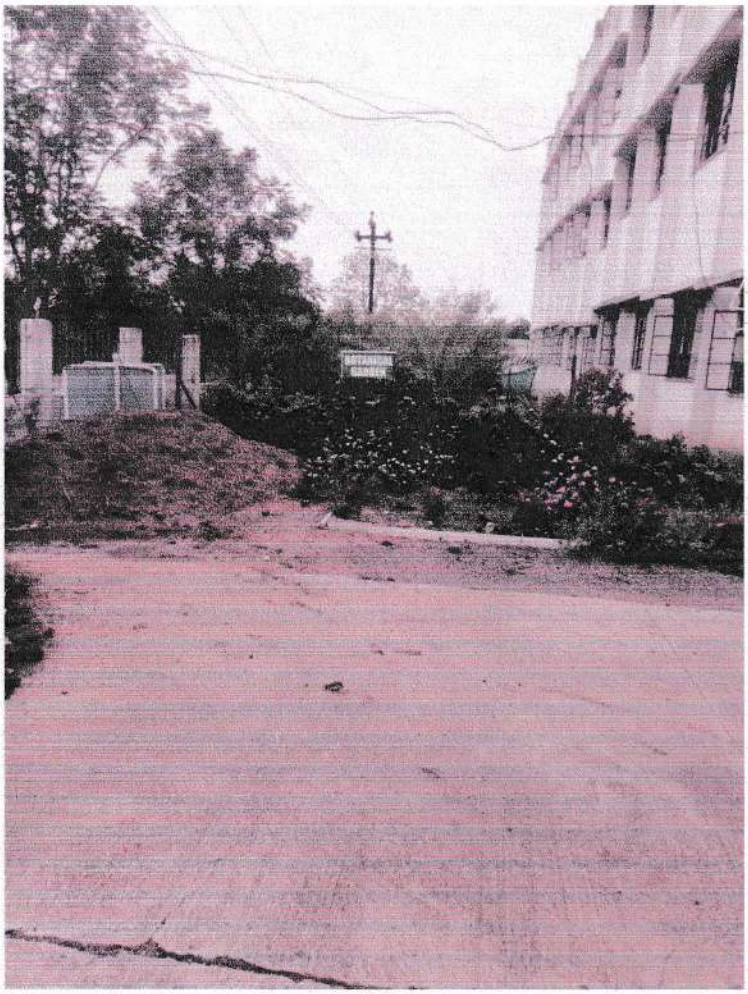


Figure 7.1: Beautiful maintained Garden of college