Report

On

Green Audit

At

Shree H.V.P. M's Degree College Of Physical Education, Amravati.

(Year 2022-23)

Prepared by

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Acknowledgement

We at Nutan Urja Solutions, Pune, express our sincere gratitude to the management of Shree H.V.P.M's Degree College Of Physical Education, Amravati 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 Shree H.V.P.M's Degree College Of Physical Education, Amravati is conducted by Nutan Urja Solutions, Pune. Based On the audit field study, following important points can be presented.

1. Present Energy Consumption

Shree H.V.P.M's Degree College Of Physical Education, Amravati 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	86,278	69.0
2	Minimum	33,783	27.0
3	Average	56,583	45.3
4	Total	678,996	543.2

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 **50 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 solid waste treatment plant, wherein, the bio-degradable waste is composted & is used as fertilizer for the garden.

Most of the E-waste generated in college is re-used. Other non usable e-waste is sold out as trash.

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

Shree H.V.P.M's Degree College Of Physical Education, Amravati is runned by world famous institute Shree Hanuman Vyayam Prasarak Mandal. Mandal is established in 1914 and has completed more than 100 years. Mandal started the regular programme of physical education to provide trained and discipline physical education teacher by establishing this training college in the year 1967 with the permission of Government of Maharashtra in urban area at Amravati and affiliated to Nagpur University, Nagpur earlier. This is the only college in Maharashtra which started a three years degree course in physical education on govt. grant basis. This college is now permanently affiliated to Sant Gadge Baba Amravati University, Amravati.

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	May-23	86278	1,064,280
2	Apr-23	69744	947,752
3	Mar-23	57272	756,345
4	Feb-23	45150	613,343
5	Jan-23	45913	604,353
6	Dec-22	48288	634,564
7	Nov-22	33783	473,160
8	Oct-22	37959	515,167
9	Sep-22	55327	716,751
10	Aug-22	56770	740,934
11	Jul-22	64747	848,891
12	Jun-22	77765	989,171
	Total	**678,996**	**8,904,711**

Variation in energy consumption is as follows,

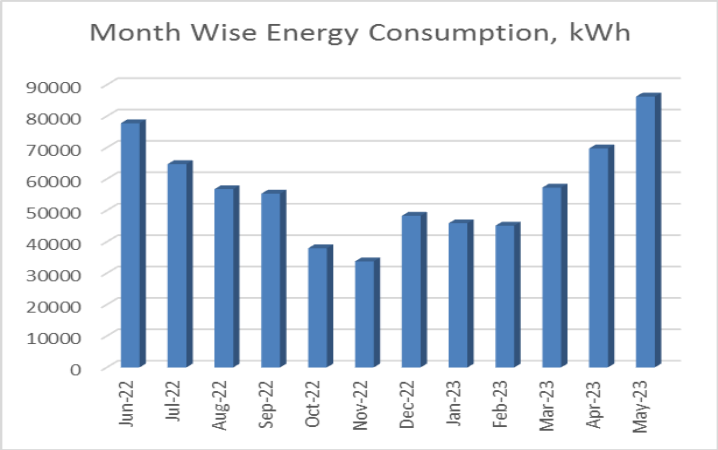


Figure 2.1: Month wise energy consumption

Monthly variation in electricity bill is as follows,

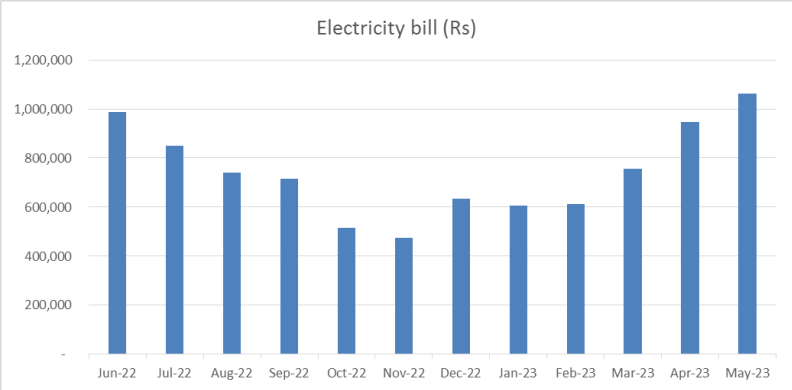


Figure 2.2: Month wise electricity bill

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	86,278	69.0
2	Minimum	33,783	27.0
3	Average	56,583	45.3
4	Total	678,996	543.2

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	May-23	86,278	69.0
2	Apr-23	69,744	55.8
3	Mar-23	57,272	45.8
4	Feb-23	45,150	36.1
5	Jan-23	45,913	36.7
6	Dec-22	48,288	38.6
7	Nov-22	33,783	27.0
8	Oct-22	37,959	30.4
9	Sep-22	55,327	44.3
10	Aug-22	56,770	45.4
11	Jul-22	64,747	51.8
12	Jun-22	77,765	62.2
	Total	**678,996**	**543.2**

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

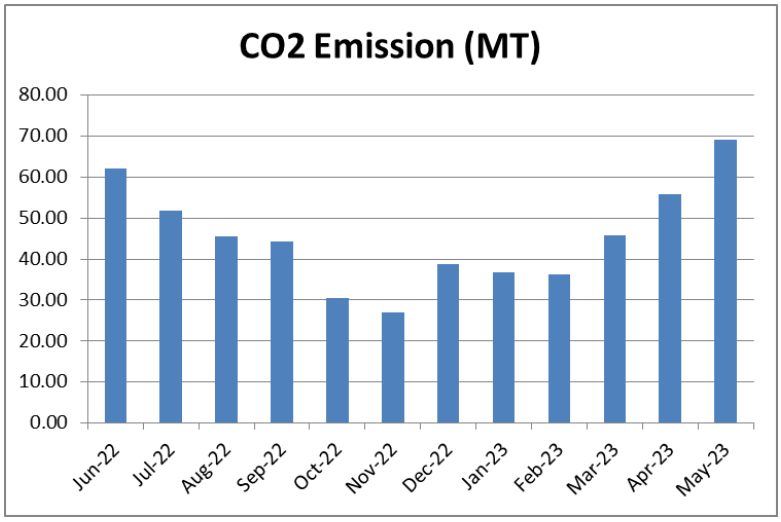


Figure 3.1: Month wise CO2 Emission

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 Roof Top Solar PV System. The Installed Capacity of Solar PV Plant is **50 kWp**.

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

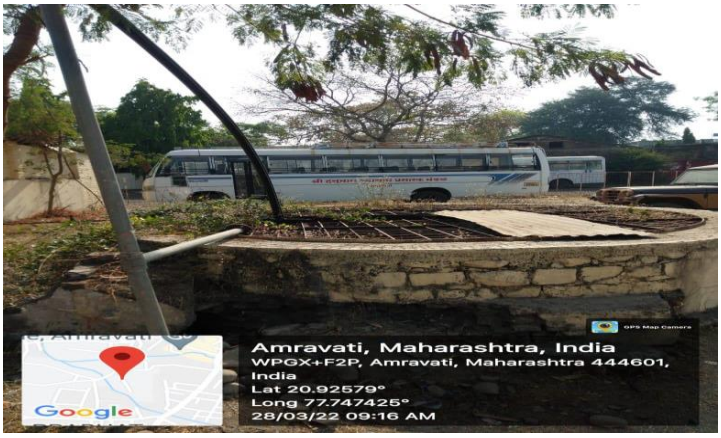
No	Particulars	Value	Unit
1	Annual Energy Purchased from MSEDCL	678,996	kWh/Annum
2	Energy Generated by Roof Top Solar PV System	75000	kWh/Annum
3	Total Energy Requirement of College	753,996	kWh/Annum
4	% of Usage of Alternate Energy to Annual Energy Requirement	10	**%**

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 pipe



6. Study of Waste Management

6.1 Solid Waste Management

The premises of Degree College of Physical Education is spread over 38.17 Acres having number of buildings of class rooms, hostels, mess, store, hospital, and also gardens, landscapes play grounds etc. So every day huge solid waste is collected. If this waste is not controlled properly it will produce big pollution in the premises. To reduce the pollution in building and in premises Degree College of Physical Education is conducting many cleanliness drives.

The college has designed a waste management machine to deal with this big problem of pollution in the premises. All the waste of the institute is collected and with the help of this machine it is processed and converted into fertilizer. This fertilizer is used in the gardens which improve the quality of flowers and also soil in the premises.

The institute has installed dustbins in each building such as in class rooms, libraries, laboratories etc. Everyday wet and dry waste is collected in the main dustbin from these dustbins. Amravati Municipal Co-operation, Amravati takes away this waste and clean the main dustbin.

Leftover blank sheets from evalued answer books are collected and notebooks are prepared by binding it. These notebooks are distributed to needy students of the institute and outside the institute along with writing material, colour box, scale, etc. as a social responsibility.

Photographs of Solid Waste Management System:

6.2 e-Waste Management

The computer laboratories in college are furnished with the latest computer systems and all other necessary peripherals. The laboratories are extensively used by the students for performing practical of their respective courses. Due to heavy use, the computer systems break down or stop working. They continuously need to be repaired and maintained. In some extreme cases they may become out of use. Moreover, the old and out dated computers need to be replaced with new computers with latest configuration to provide exposure to the students to use state of the art technologies.

The old but working computers are donated to schools in small towns to keep the children acquainted with the use of computers. Computers which are totally out of use and non-functional are stored in the store house and after some period sold out as scrap. In this manner, the institute performs e-waste management.

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 20% students use own Automobile. Many students live in hostels in college campus

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.

Every month, on 25th the college observes "Vehicle free day" on which no vehicles are allowed inside the campus except bicycles. It motivates the students and staff to use bicycles and public transport and reduce pollution.

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 College has been promoting the concept of paperless office and striving hard to minimize the use of paper in the office work. The basic objective is to help green India campaign and saving trees.

8. Green Landscaping with Trees and Plants

The Institute has beautiful maintained Garden. List of trees in garden are as follows.

Table 8.1: List of trees

Sr no	Name	Botanical Name	Nos
1	Kadunimb	Azadirachta indica	50
2	Chinch	Tamarindus indica	2
3	Coconut	Cocos nucifera	15
4	Suru	Casuarina equisetifolia	5
5	banyan tree	Ficus benghalensis	1
6	Royal poinciana	Delonix regia	2
7	Jackfruit	Artocarpus heterophyllus	2
8	Oak	Genus Quercus	5
9	Babul	Vachellia nilotica	2
10	Bamboo	Bambusa vulgaris	1
11	Ashoka	Saraca asoca	175
12	Shisam	Dalbergia sissoo,	10
13	pomegranate	Punica granatum	2
14	Nilgiri	Eucalyptus	1
15	Indian jujube	Ziziphus mauritiana	2
16	Custard Fruit	Annona squamosa	5
17	Ramphal	Annona reticulata	2
18	Amla	Phyllanthus emblica	2
19	khair	Acacia catechu	5
20	kavath	Feronia limonia	2
21	Peepal	Ficus religiosa	3
22	Jamun	Syzygium cumini	5
23	Kaner	Cascabela thevetia	10
24	Chafa	Plumeria rubra	1
25	Rose	Rosa rubiginosa	20
26	Hibiscus	Hibiscus rosa-sinensis	2
27	Parkia	Parkia biglobosa	1
28	Mahua	Madhuca longifolia	25
29	Kadam	Neolamarckia cadamba	2
30	Indian Almond	Terminalia catappa	25
31	Cycas	Cycas revoluta	2
32	Ficus	Ficus benjamina	20

33	Naag Chafa	Magnolia champaca	2
34	Blackboard	Alstonia scholaris	10
35	Thuja	Thuja occidentalis	8
36	Gogan vel	Saurauia napaulensis	10
37	Indian bael	Aegle marmelos	10
38	Indian gooseberry	Phyllanthus emblica	1
39	Sadafuli	Catharanthus roseus	
40	Arjun Tree	Terminalia arjuna	3
41	Jasmin	Jasminum sambac	10
42	Palm Tree	Arecaceae	20
43	Devdar Tree	Cedrus deodara	5

Figure 8.1: Beautiful maintained Garden of college