Nutan Urja Solutions

(ISO 9001:2015)

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

Sus Road, Sus, Pune 411 021

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

Date: 27/06/2023

CERTIFICATE

This is to certify that we have conducted Environmental Audit at D Y Patil International University Akurdi, Pune in the year 2022-23.

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

- Installation of Sewage Treatment Plant
- Maximum Usage of Day Lighting.
- Installation of Rain Water Harvesting System
- Installation of **350 kW** Solar PV Power Plant.

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

Nutan Urja Solutions,

Nutan Urja Solutions

K G Bhatwadekar,
Certified Energy Auditor,
EA – 22428

Report

On

Environmental Audit

At

D Y Patil International University

Akurdi,Pune

(Year 2022-23)

D Y PATIL
INTERNATIONAL
UNIVERSITY
AKURDI PUNE

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

Nutan Urja Solutions

Table of Contents

Acknowledgement

We at Nutan Urja Solutions, Pune wish to express our sincere gratitude to the management of D Y Patil International University, Akurdi, Pune for assigning the work of Environmental Audit of university 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 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.

Nutan Urja Solutions

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.

D Y Patil International University Akurdi, Pune consumes various resources for day to day operations, namely: Air, Water, Electrical Energy & LPG.

1. Various Pollution due to university Activities:

- Air pollution: Mainly CO_2 on account of Electricity & LPG Consumption
- Solid Waste: Bio degradable Kitchen Waste, Garden Waste
- Liquid Waste: Human liquid waste

2. Present Level of CO_2 Emissions:

Sr no	Parameter	Energy consumed, (Units)	CO2 Emission (MT)
1	Maximum	55,873	44.70
2	Minimum	30,138	24.11
3	Average	43,230	34.58
4	Total	518,762	415.01

3. The various projects already implemented for Environmental Conservation:

- Usage of Energy Efficient BEE STAR Rated ACs
- Usage of Natural Day light in corridors
- Implementation of Rain Water Harvesting
- Installation of **350 kW** Solar PV Power Plant.
- Installation of Sewage Treatment Plant

4. Recommendations:

1. Installation of Bio Gas Generator Plant
2. Installation of Bio Composting Plant to generate fertilizer from garden waste.

5. Notes & Assumptions:

1. **1 kWh** of Electrical Energy releases **0.8 Kg of CO_2** into atmosphere

Nutan Urja Solutions

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 compiled 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 university 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 university campus as System
2. Study of Electrical Energy Consumption
3. Study of CO2 emissions
4. Suggestions on usage of Renewable Energy

1.4 General Details

No	Head	Particulars
1	Name of Institution	D Y Patil International University Akurdi, Pune
2	Address	Padmashree D. Y. Patil Educational Complex, Sector 29, Nigdi, Akurdi, Maharashtra 411044

2. Study of Consumption of Various Resources

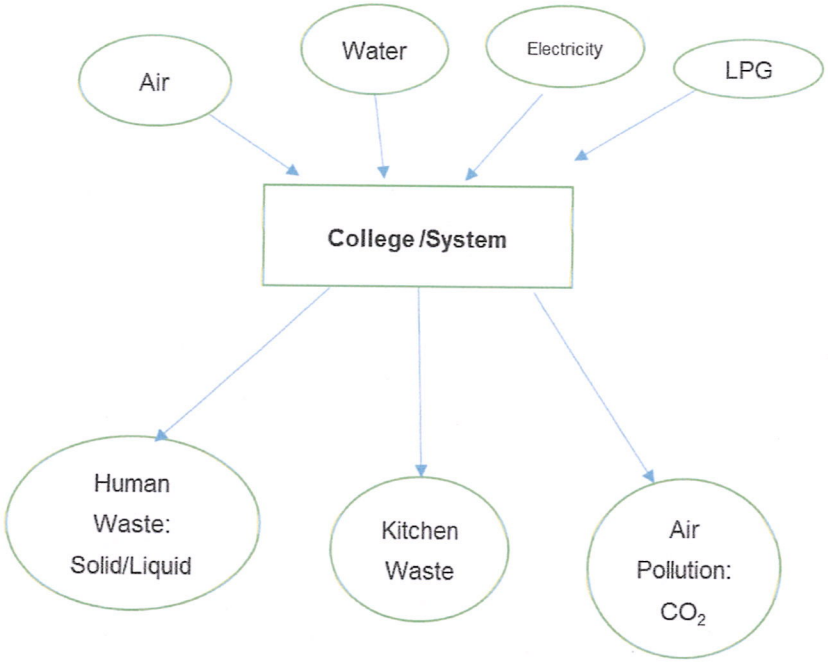
The Institute consumes following basic/derived Resources:

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

Also, institute 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 university System & Environment as under.



Now we compute the Generation of CO2 on account of consumption of Electrical Energy & LPG as under.

D Y Patil International University Akurdi, Pune is situated in Padmashree D. Y. Patil Educational Complex. Entire Educational Complex is having single energy meter for all institutes situated in complex. The bill analysis is carried for electricity bills of entire campus. The calculation of electrical energy consumption by university can be given as,

Nutan Urja Solutions

Table 2.1: Electrical Energy Consumption

No	Month	Energy (kWh)
1	May-23	47,627
2	Apr-23	36,498
3	Mar-23	30,138
4	Feb-23	32,035
5	Jan-23	44,454
6	Dec-22	48,115
7	Nov-22	49,666
8	Oct-22	32,114
9	Sep-22	55,873
10	Aug-22	44,479
11	Jul-22	46,234
12	Jun-22	51,529
	Total	**518,762**
	Maximum	55,873
	Minimum	30,138
	Average	43,230

2.1 Variation of Monthly Electrical Energy Consumption

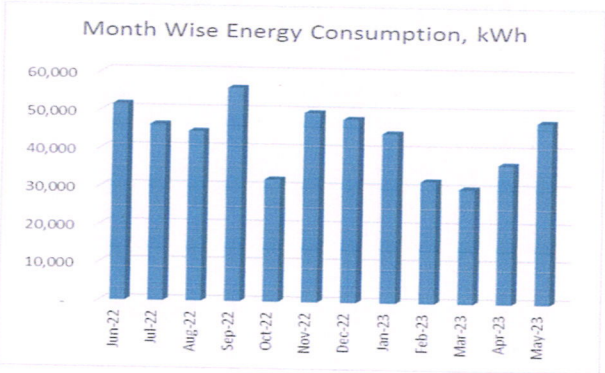


Figure 2.1 : Monthly Electrical Energy Consumption

Nutan Urja Solutions

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**	55,873
2	**Minimum**	30,138
3	**Average**	43,230
4	**Total**	518,762

3. Study of Environmental Pollution

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

3.1 Air Pollution

The university is using two forms of Energies, namely: Thermal in the form of LPG and Electrical Energy used for day to day operations of the university. 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_2 in the atmosphere
- 1 Kg of LPG emits 3 Kg of CO_2 in the atmosphere

In the following Table, we present the CO_2 emissions.

Table 3.1: Month wise Consumption of Electrical Energy & CO_2 Emissions:

No	Month	Energy Consumed, kWh	CO2 Emissions, MT
1	May-23	47,627	38.10
2	Apr-23	36,498	29.20
3	Mar-23	30,138	24.11
4	Feb-23	32,035	25.63
5	Jan-23	44,454	35.56
6	Dec-22	48,115	38.49
7	Nov-22	49,666	39.73
8	Oct-22	32,114	25.69
9	Sep-22	55,873	44.70
10	Aug-22	44,479	35.58
11	Jul-22	46,234	36.99
12	Jun-22	51,529	41.22
	Total	**518,762**	**415.01**
	Maximum	55,873	44.70
	Minimum	30,138	24.11
	Average	43,230	34.58

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

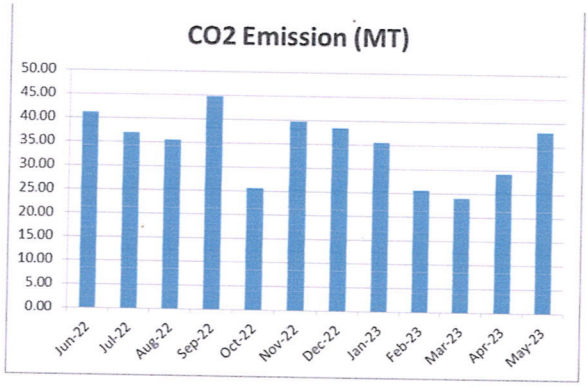


Figure 2.1: CO2 emission due to usage of electrical energy.

3.2 Study of Solid Waste Generation

The garbage collected in university is segregated into wet and dry centrally in campus. Waste bins are placed in university campus for collection of waste.

3.3 Canteen food wastage

The students and canteen staff are encouraged to have minimal food wastage. Canteen contractor have food license and shop act certificate. The canteen is encouraged for usage of paper tea cups.

3.4 Study of Liquid Waste Generation

The waste water generated in university campus is treated in Sewage Water Treatment Plant. This plant aims to remove contaminants from sewage to produce an effluent that is suitable for reuse application. The sewage water treatment plant is operating with 250 KLD water capacity.

Photograph of Sewage Treatment Plant

3.5 Study of e-Waste Management:

E-waste generated in university is disposed time to time through proper vendor.

Nuttan Urja Solutions

4. Study of CO2 Emission reduction

The D Y Patil International University Akurdi, Pune is situated in Padmashree D. Y. Patil Educational Complex. Entire Complex is having single energy meter for all institutes situated in complex. The institute have installed Roof Top Solar PV System to cater energy requirement of all institutes of entire campus. The Installed Capacity of Solar PV Plant is **350 kWp**.

Table 6.1: CO2 emission reduction through usage of Alternate Energy

No	Particulars	Value	Unit
1	Energy Generated by Roof Top Solar PV System	525,000	kWh/Annum
2	CO2 emission reduction through usage of Alternate Energy	420	MT

Photograph of Solar PV plant

Sutan Urja Solutions

5. Study of Rain Water Harvesting

The university 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 Environment Friendly Initiatives

6.1 Internal Tree Plantation

The university has beautifully developed garden.

Photographs of Tree Plantation

6.2 Provision of Sanitary Waste Incinerator

For disposal of sanitary waste , sanitary waste incinerators are installed.

6.3 Creation of Awareness about Energy Conservation

The university has displayed posters emphasizing on importance of Energy Conservation.

Nutan Urja Solutions

7. Study of Indoor Air Quality

7.1 Importance of Indoor Air Quality

Air: The common name given to the atmospheric gases used in breathing and photosynthesis.

By volume, Dry air contains 78.09% Nitrogen, 20.95% Oxygen, 0.93% Argon, 0.039% Carbon Dioxide and small amounts of other gases.

On average, a person inhales about 14,000 liters of air every day. Therefore, poor air quality may affect the quality of life no and for future generations by affecting the health, the environment, the economy and the city's livability.

Rapid urbanization and industrialization has added other elements/ compounds to the pure air and thus caused the increase in pollution. In order to prevent, control and debate air pollution. In order to prevent, control and abate air pollution, the Air (Presentation and Control of Pollution) Act as enacted in 1981.

Air quality is a measure of the suitability of air for breathing by people, plants and animals

According to section 2(b) of air (Prevention and control of pollution) Act. 1981 **'Air pollution' has been defined as 'the presence in the atmosphere of any air pollutant'**

As per section 2(a) o air (Prevention and control of pollution) Act, 1981 has been defined as **'any solid, liquid or gaseous substance present in the atosphere in such concentration as ay be or tend to be injurious to huan beings or other living creatures or plants or property or envirnent'**

7.2 Air Quality Index:

An Air Quality Index (AQI) is a number used by government agencies to measure the air pollution levels and commuicate it to the population. As the AQI increases, it means that a large percentage of the population will experience severe adverse health effects. The measurement of the AQI requires an air monitor and an air pollutant concentration over a specified averaging period.

We present following important parameters

1. (AQI) Air Quality Index
2. PM-2.5 - Particular Matter of Size 2.5 Micron
3. PM-10 - Particular Matter of Size 10 Micron

Table no 7.1: Air Quality Values

No	Category	AQI Value	Concentration Range PM 2.5	Concentration Range PM 10
1	Good	0-50	0-30	0-50
2	satisfactory	51-100	31-60	50-100
3	Moderately Polluted	101-200	61-90	101-250
4	Poor	201-300	91-120	251-350
5	Very Poor	301-400	121-250	351-430
6	Severe	401-500	250+	430+

After measurement, it is found that, air quality values of in all places of institutes and classrooms are found good and satisfactory.

Nutan Urja Solutions

8. Study of Indoor Comfort Condition Parameters

In this chapter, we presents the various Indoor Comfort Parameters measured during the Audit. The parameters include

1. Temperature
2. Humidity
3. Lux Level
4. Noise Level

Table no 8.1: Thermal Comfort Conditions: non conditioned buildings

Temperature	Less than 33 °C
Humidity	Less than 70%

All offices and classrooms of institute are having comfortable air temperature and humidity conditions.

Table no 8.2: Recommended Noise Level Standards

No.	Location	Noise Level dB
1	Auditoriums	20-25
2	Outdoor Playgrounds	55
3	Occupied Class Rooms	40-45
4	Un Occupied Class Rooms	5
5	Apartments	35-40
6	Offices	45-50
7	Libraries	35-40
8	Restaurants	50-55

Noise levels at all places in institute are found below recommended standard noise level.