

Quality Audits

2022-23

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SNDT Women's University
Mumbai - 20

ENGRESS SERVICES

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ISO: 9001-2015 Certified (Cert No: 23EQKC13),
ISO: 14001-2015 Certified (Cert No: 23EEKW20)

ENERGY AUDIT CERTIFICATE

Certificate No: ES/SNDT/22-23/01

Date: 10/5/2023

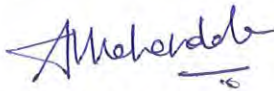
This is to certify that we have conducted Energy Audit at SNDT Women's University Mumbai's Churchgate, Juhu and Pune Campuses in the year 2022-23.

The University has adopted following Energy Efficient Practices:

- Usage of Energy Efficient LED Fittings
- Maximum usage of Day Lighting
- Installation of 500 kWp Roof Top Solar PV Plant
- Installation of 16000 LPD Solar Thermal Water Heating System

We appreciate the support of Management, involvement of faculty members and students in the process of making the Campus Energy Efficient.

For Engress Services,



A Y Mehendale,
B E-Mechanical, M Tech- Energy
BEE Certified Energy Auditor, EA-8192



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ISO: 9001-2015 Certified (Cert No: 23EQKC13),
ISO: 14001-2015 Certified (Cert No: 23EEKW20)

GREEN AUDIT CERTIFICATE

Certificate No: ES/SNDT/22-23/02

Date: 10/5/2023

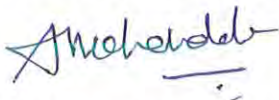
This is to certify that we have conducted Green Audit at SNDT Women's University Mumbai's Churchgate, Juhu and Pune Campuses in the year 2022-23.

The University has adopted following Green & Sustainable Practices:

- Usage of Energy Efficient LED Fittings.
- Installation of 500 kWp Roof Top Solar PV Plant.
- Installation of 16000 LPD Solar Thermal Water Heating System at Hostel blocks.
- Segregation of Waste at source
- Provision of Bio Composting Bed, for conversion of Organic Waste
- Provision of Sanitary Waste Incinerator, for disposal of Sanitary Waste
- Implementation of Rain Water Management Project
- Good internal Road
- Tree Plantation in in the campus
- Provision of Ramp for Divyangajan
- Creation of Awareness on Water Conservation by Display of Poster

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

For Engress Services,



A Y Mehendale,

B E- Mech, M Tech-Energy, Certified Energy Auditor, EA-8192
ASSOCHAM GEM Certified Professional: GEM: 22/788



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ENGRESS SERVICES

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MEDA Registration No: ECN/2022-23/CR-43/1709

ISO: 9001-2015 Certified (Cert No: 23EQKC13),

ISO: 14001-2015 Certified (Cert No: 23EEKW20)

ENVIRONMENTAL AUDIT CERTIFICATE

Certificate No: ES/SNDT/22-23/03

Date: 10/5/2023

This is to certify that we have conducted Environmental Audit at SNDT Women's University Mumbai's Churchgate, Juhu and Pune Campuses in the year 2022-23.

The University has adopted following Environment Friendly Practices:

- Usage of Energy Efficient LED Fittings.
- Installation of 500 kWp Roof Top Solar PV Plant.
- Installation of 16000 LPD Solar Thermal Water Heating System at Hostel blocks.
- Segregation of Waste at source
- Provision of Bio Composting Bed, for conversion of Organic Waste
- Provision of Sanitary Waste Incinerator, for disposal of Sanitary Waste
- Implementation of Rain Water Management Project
- Tree Plantation in in the campus
- Creation of Awareness on Water Conservation, by Display of Poster

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

For Engress Services,



A Y Mehendale,

B E- Mech, M Tech-Energy, Certified Energy Auditor, EA-8192

ASSOCHAM GEM Certified Professional: GEM: 22/788



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S.N.D.T. Women's University
Mumbai - 400 009

ENERGY AUDIT REPORT

of

SNDT WOMEN'S UNIVERSITY

Mumbai 400 020



Year: 2022-23

Prepared by:

ENGRESS SERVICES

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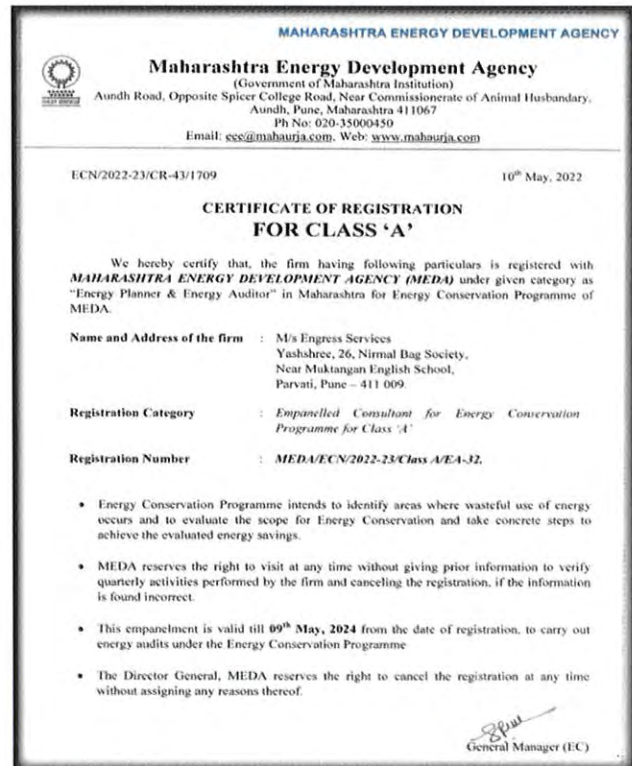
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REGISTRATION CERTIFICATES



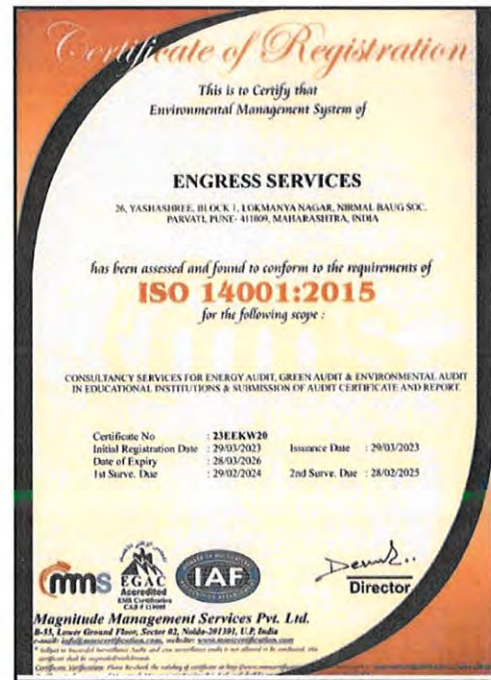
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ISO: 9001-2015 CERTIFICATE



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ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of SNTD Women's University, Mumbai for awarding us the assignment of Energy Audit of their Churchgate, Juhu & Pune Campuses for the Academic Year: 2022-23.

We are thankful to all the concerned Staff Members for helping us during the field study.



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EXECUTIVE SUMMARY

1. SNTD Women's University, Mumbai has three campuses, namely at Churchgate, Juhu, in Mumbai and at Pune. The major form of Energy is the **Electrical Energy**; used for various equipment in the campuses.

2. Present Connected Load & Energy Consumption:

No	Particulars	Value	Unit
1	Total Connected Load	1185.64	kW
2	Annual Energy Purchased	576728	kWh

3. Energy Performance Index:

No	Particulars	Value	Unit
1	Total Annual Energy Purchased	576728	kWh
2	Annual Energy Generated	600348	kWh
3	Annual Energy Consumed=1+2	1177076	kWh
4	Total Built up area of the University	65215.48	m ²
5	Energy Performance Index = (3) / (4)	18.05	kWh/m ²

4. Study of % Usage of LED Lighting:

No	Particulars	Value	Unit
1	% of Usage of LED Lighting to Total Lighting Load	33.66	%

5. Renewable Energy & Energy Efficiency Projects:

- Usage of Energy Efficient LED fittings
- Installation of **500 kWp** Roof Top Solar PV Plant
- Installation of **16000 LPD** Solar Thermal Water Heating System

6. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg of CO₂** into atmosphere
2. **CO₂** Emission is computed based on Electrical Energy purchased

7. References:

- Audit Methodology: www.mahaurja.com
- Energy Conservation Building Code: ECBC-2017: www.beeindia.gov.in
- For CO₂ Emissions: www.tatapower.com



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ABBREVIATIONS

LED	: Light Emitting Diode
SNTD	: Shreemati Nathibai Damodar Thackersey
BEE	: Bureau of Energy Efficiency
ECBC	: Energy Conservation Building Code
MEDA	: Maharashtra Energy Development Agency
PV	: Photo Voltaic
Kg	: Kilo Gram
kWh	: kilo-Watt Hour
CO ₂	: Carbon Di Oxide
MT	: Metric Ton



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CHAPTER-I INTRODUCTION

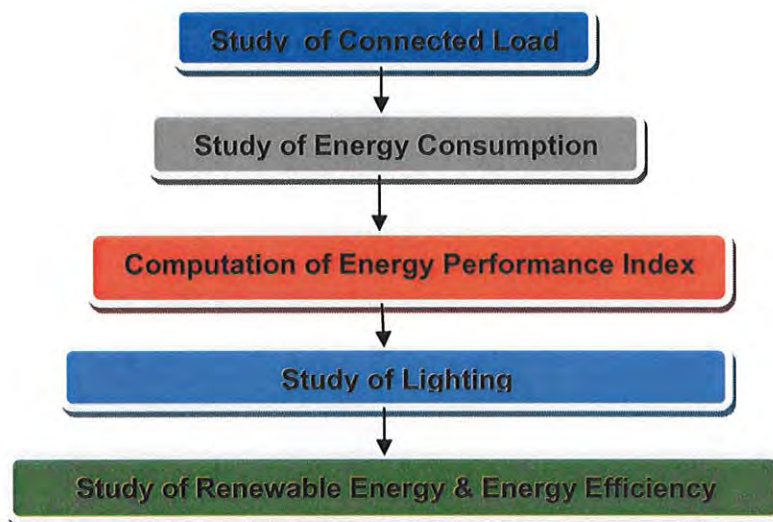
1.1 Introduction:

An Energy Audit is conducted at SNTD Women's University's 3 Campuses, namely: Churchgate & Juhu in Mumbai & Pune.

The guidelines followed for conducting the Energy Audit are:

- BEE India's Energy Conservation Building Code: ECBC-2017
- Maharashtra Energy Development Agency (www.mahaurja.com)
- Tata Power: www.tatapower.com

1.2 Audit Procedural Steps:



1.3 University Location Image:



University
Campus:
Churchgate



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CHAPTER-II

STUDY OF CONNECTED LOAD

The major contributors to the connected load of the University include:

Table No 1: Study of Equipment wise Connected Load: Churchgate Campus:

No	Equipment	Qty	Load, W/Unit	Load, kW
1	40 W FTL Fitting	1394	40	55.76
2	20 W LED Fitting	120	20	2.4
3	Ceiling Fan	856	52	44.51
4	PC	348	150	52.2
5	Printer	101	150	15.15
6	Other Fans	128	52	6.656
7	AC-Old-1.5 TR	3	2025	6.075
8	AC-New-1.5 TR	13	1800	23.4
9	AC-2 TR	20	2700	54
10	LED-7W	19	7	0.133
11	LED 16 W	262	16	4.192
12	LED-50 W	2	50	0.1
13	LED-18 W	45	18	0.81
14	CFL	53	32	1.696
15	Water Pump	4	5595	22.38
16	Lift	5	5595	27.98
17	Other Equipment	50	150	7.5
18	Central A C	1	13500	13.5
19	Total			338.44

Table No 2: Study of Equipment wise Connected Load: Juhu Campus:

No	Equipment	Qty	Load, W/Unit	Load, kW
1	40 W FTL Fitting	1650	40	66
2	20 W LED Fitting	501	20	10.02
3	40 W LED Fitting	30	40	1.2
4	16 W LED Fitting	51	16	0.816
5	18 W LED Fitting	78	18	1.404
6	22 W LED Fitting	1587	22	34.914
7	Ceiling Fan	1848	52	96.096
8	Exhaust Fan	28	52	1.456
9	PC	854	150	128.1
10	Printer	55	150	8.25
11	AC-1.5 TR	34	2025	68.85
12	AC-2 TR	26	2700	70.2
13	AC- New	39	1800	70.2



14	Lift	3	5595	16.78
15	Water Pumps	1	11190	11.19
16	Other Equipment	50	150	7.5
17	Total			592.98

Table No 3: Study of Equipment wise Connected Load: Pune Campus:

No	Equipment	Qty	Load, W/Unit	Load, kW
1	40 W FTL Fitting	420	40	16.8
2	20 W LED Fitting	860	20	17.2
3	40 W LED Fitting	35	40	1.4
4	16 W LED Fitting	50	16	0.8
5	7 W LED Fitting	20	7	0.14
6	Ceiling Fan	632	52	32.864
7	PC	127	150	19.05
8	Printer	86	150	12.9
9	Exhaust Fans	18	52	0.936
10	AC- 1.5 TR New	5	1800	9
11	AC-1.5 TR- Old	6	2025	12.15
12	Water Pump	6	5595	33.57
13	Lift	2	5595	11.19
14	Other Equipment	52	150	7.8
15	Total			176

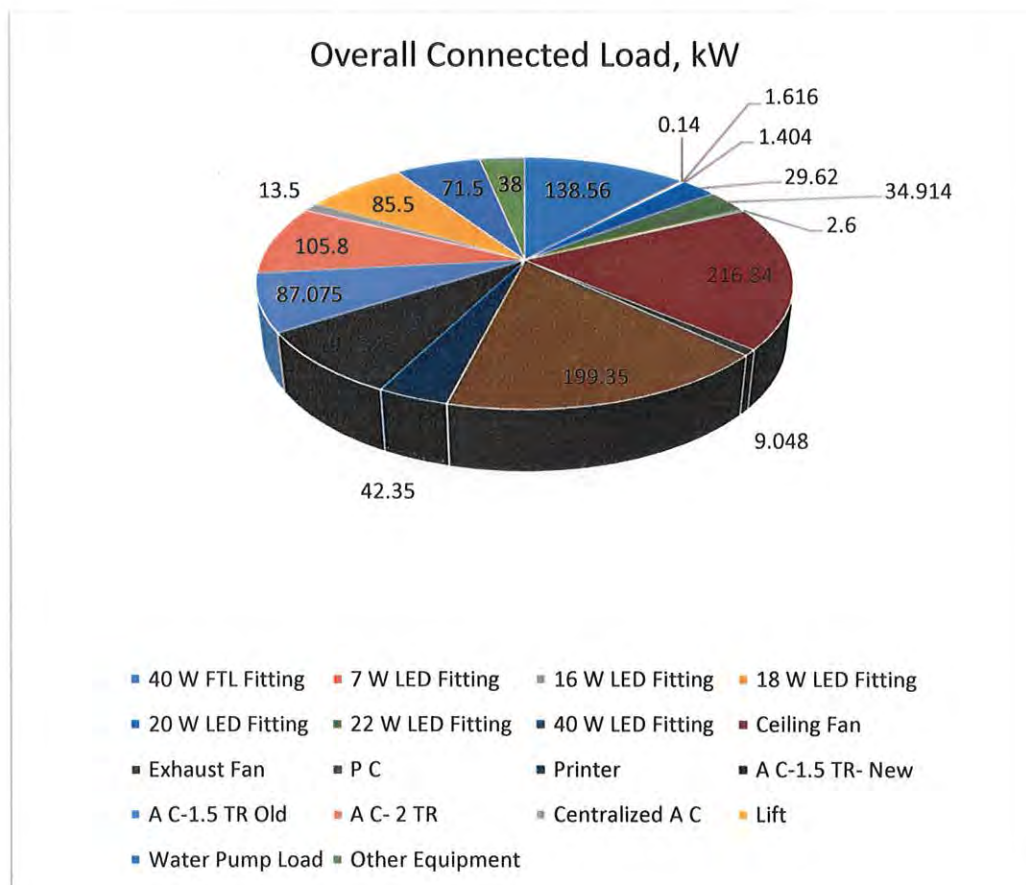
Table No 4: Study of Equipment wise Connected Load: All 3 Campuses:

No	Equipment	Qty	Load, W/unit	Load, kW
1	40 W FTL Fitting	3464	40	138.56
2	7 W LED Fitting	20	7	0.14
3	16 W LED Fitting	101	16	1.616
4	18 W LED Fitting	78	18	1.404
5	20 W LED Fitting	1481	20	29.62
6	22 W LED Fitting	1587	22	34.914
7	40 W LED Fitting	65	40	2.6
8	Ceiling Fan	3336	65	216.84
9	Exhaust Fan	174	52	9.048
10	P C	1329	150	199.35
11	Printer	242	175	42.35
12	A C-1.5 TR- New	57	1725	98.325
13	A C-1.5 TR Old	43	2025	87.075



14	A C- 2 TR	46	2300	105.8
15	Centralized A C	1	13500	13.5
16	Lift	10	9500	95
17	Water Pump Load	11	6500	71.5
18	Other Equipment	152	250	38
19	Total			1185.64

Chart No 1: Study of Connected Load:



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CHAPTER-III

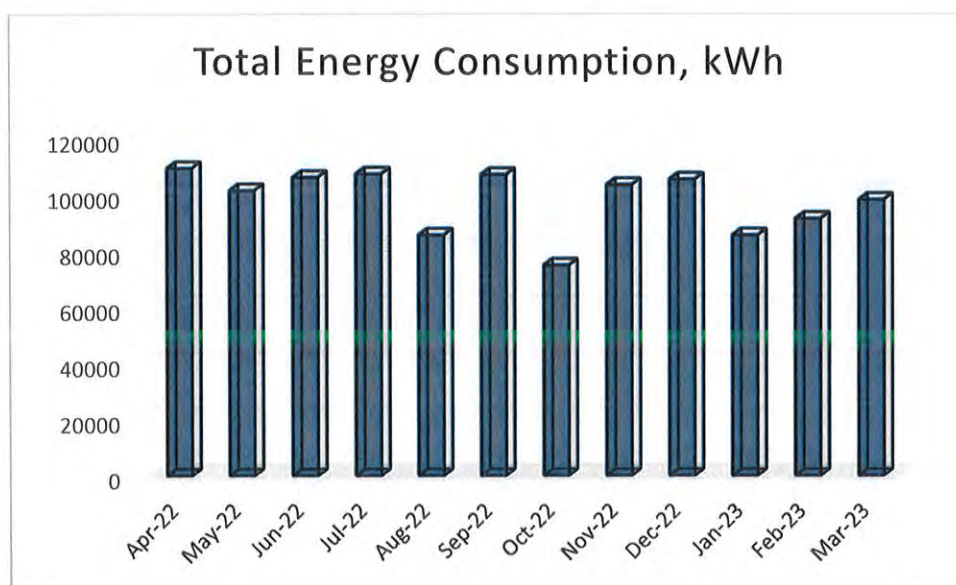
STUDY OF PRESENT ENERGY CONSUMPTION

In this chapter, we present the analysis of Electrical Energy Consumption.

Table No 5: Electrical Energy Consumption Analysis- 2022-23:

No	Month	Churchgate Campus			Pune	Juhu Campus		Total Energy Consumed, kWh	CO ₂ Emission, MT
		M-1	M-2	M-3		M-1	M-2		
1	Apr-22	7372	4498	7722	9944	19962	59985	109483	44.55
2	May-22	7691	5183	8165	8019	12258	60238	101554	37.18
3	Jun-22	6756	5843	6451	8387	20508	58259	106204	43.15
4	Jul-22	7097	5704	7229	8224	32544	46623	107421	54.72
5	Aug-22	7827	4771	6180	8761	24894	33271	85704	47.19
6	Sep-22	7630	5351	6137	9359	37428	41253	107158	59.31
7	Oct-22	8356	4928	6720	8771	8790	37405	74970	33.81
8	Nov-22	7177	4625	6223	7673	22068	55801	103567	42.99
9	Dec-22	7131	4813	6200	8381	28392	50534	105451	49.43
10	Jan-23	7343	5049	6117	8802	11868	46520	85699	35.26
11	Feb-23	5800	3586	5132	8578	11424	57034	91554	31.07
12	Mar-23	6353	3971	5883	10835	17844	53425	98311	40.40
13	Total	86533	58322	78159	105734	247980	600348	1177076	519.055
14	Maximum	8356	5843	8165	10835	37428	60238	109483	59.3145
15	Minimum	5800	3586	5132	7673	8790	33271	74970	31.068
16	Average	7211.08	4860.17	6513.25	8811.17	20665	50029	98089.7	43.2546

Chart No 2: Variation in Monthly Energy Consumed, kWh:



CHAPTER-IV

STUDY OF ENERGY PERFORMANCE INDEX

Energy Performance Index: Energy Performance Index of a Building is its Annual Energy Consumption in Kilo Watt Hours per square meter of the building

It is determined by:

$$\text{EPI} = \frac{\text{(Annual Energy Consumption in kWh)}}{\text{(Total Built-up area in m}^2\text{)}}$$

Now we compute the EPI for the University as under:

Table No 6: Computation of Energy Performance Index:

No	Particulars	Value	Unit
1	Total Annual Energy Purchased	576728	kWh
2	Energy Generated by Solar PV Plant	600348	kWh
3	Total Energy Consumed= 1+2	1177076	kWh
4	Total Built up area of University	65215.48	m ²
5	Energy Performance Index = (3) / (4)	18.05	kWh/m ²



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CHAPTER V

STUDY OF LIGHTING

Terminology:

1. Lumen is a unit of light flow or luminous flux. The lumen rating of a lamp is a measure of the total light output of the lamp. The most common measurement of light output (or luminous flux) is the lumen. Light sources are labeled with an output rating in lumens.

2. Lux is the metric unit of measure for illuminance of a surface. One lux is equal to one lumen per square meter.

3. Circuit Watts is the total power drawn by lamps and ballasts in a lighting circuit under assessment.

4. Installed Load Efficacy is the average maintained illuminance provided on a horizontal working plane per circuit watt with general lighting of an interior. Unit: lux per watt per square metre (lux/W/m²)

5. Lamp Circuit Efficacy is the amount of light (lumens) emitted by a lamp for each watt of power consumed by the lamp circuit, i.e. including control gear losses. This is a more meaningful measure for those lamps that require control gear. Unit: lumens per circuit watt (lm/W)

6. Installed Power Density. The installed power density per 100 lux is the power needed per square metre of floor area to achieve 100 lux of average maintained illuminance on a horizontal working plane with general lighting of an interior. Unit: watts per square metre per 100 lux (W/m²/100 lux) 100 Installed power density (W/m²/100 lux)

7. Lighting Power Density: It is defined as Total Lighting Load in a room divided by the Area of that Room in square meters.

In this Chapter we compute the percentage usage of LED Lighting to total Lighting Load of the University.

Table No 7: Percentage Usage of LED Lighting to Total Lighting Load:

No	Particulars	Value	Unit
1	No of 40 W FTL Fitting	3464	Nos
2	Load/unit of 40 W FTL Fitting	40	W/unit
3	Total Load of 40 W FTL Fittings	138.56	kW
4	No of 7 W LED Fitting	20	Nos
5	Load/unit of 7 W LED Fitting	7	W/unit
6	Total Load of 7 W LED Fittings	0.14	kW



7	No of 16 W LED Fitting	101	Nos
8	Load/unit of 16 W LED Fitting	16	W/unit
9	Total Load of 16 W LED Fittings	1.616	kW
10	No of 18 W LED Fitting	78	Nos
11	Load/unit of 18 W LED Fitting	18	W/unit
12	Total Load of 18 W LED Fittings	1.404	kW
13	No of 20 W LED Fitting	1481	Nos
14	Load/unit of 20 W LED Fitting	20	W/unit
15	Total Load of 20 W LED Fittings	29.62	kW
16	No of 22 W LED Fitting	1587	Nos
17	Load/unit of 22 W LED Fitting	22	W/unit
18	Total Load of 22 W LED Fittings	34.914	kW
19	No of 40 W LED Fitting	65	Nos
20	Load/unit of 40 W LED Fitting	40	W/unit
21	Total Load of 40 W LED Fittings	2.6	kW
22	Total LED Lighting Load=6+9+12+15+18+21	70.29	kW
23	Total Lighting Load=3+6+9+12+15+18+21	208.85	kW
24	% of LED to Total Lighting Load =22*100/23	33.66	%



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GREEN AUDIT REPORT
of
S N D T WOMEN'S UNIVERSITY,
Mumbai 400 020



Year: 2022-23

Prepared by:

ENGRESS SERVICES

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ACKNOWLEDGEMENT

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We are thankful to all staff members for helping us during the field study.



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EXECUTIVE SUMMARY

1. SNTD Women's University, Mumbai has three campuses, namely at Churchgate, Juhu, in Mumbai and at Pune. The major form of Energy is the **Electrical Energy**; used for various equipment in the campuses.

2. Present Energy Consumption & CO₂ Emission:

No	Particulars	Value	Unit
1	Annual Energy Purchased	576728	kWh
2	Annual CO ₂ Emissions	519.06	MT

3. Renewable Energy Usage & Reduction in CO₂ Emissions:

- The Energy generated by **500 kWp** Solar PV Plant in 2022-23 is **600348 kWh**.
- Reduction in CO₂ Emissions in 2022-23 is **540.31 MT**

4. Waste Management:

No	Head	Particulars
1	Solid Waste	Segregation of Waste at source
2	Organic Waste	Provision of Bio Composting Bed & Bio Tumber Unit
3	Sanitary Waste	Provision of Sanitary Waste Incinerator

5. Rain Water Management:

The rain water falling on the terrace is used to increase the Underground Water table.

6. Green & Sustainable Practices:

- Maintenance of good Internal Road
- Tree Plantation in the campus.
- Provision of Ramp for Divyangajan
- Creation of awareness on Water Conservation by Display of Posters

7. Assumptions:

- 1 kWh of Electrical Energy releases **0.9 Kg** of **CO₂** into atmosphere
- CO₂ Emission is computed based on Electrical Energy purchased

8. Reference:

- For CO₂ Emissions: www.tatapower.com



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ABBREVIATIONS

SNDT	Shreemati Nathibai Damodar Thackersey
kWh	Kilo Watt Hour
LPD	Liters Per Day
Kg	Kilo Gram
MT	Metric Ton
CO ₂	Carbon Di Oxide
Qty	Quantity



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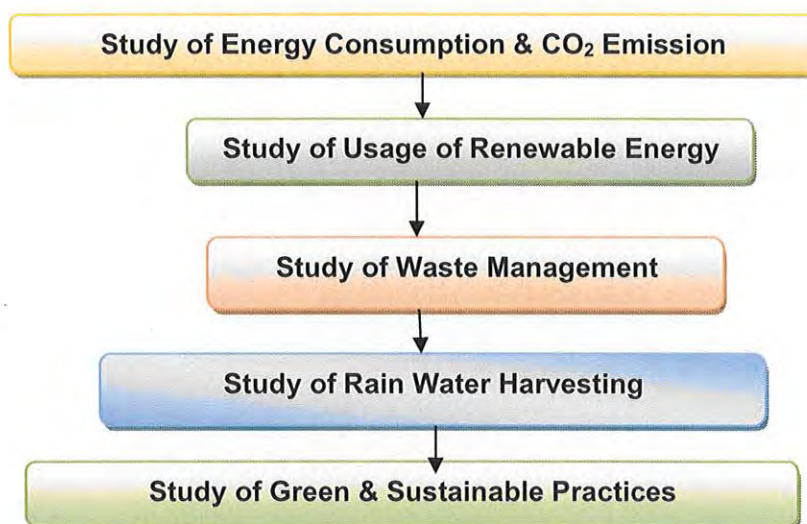
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CHAPTER-I INTRODUCTION

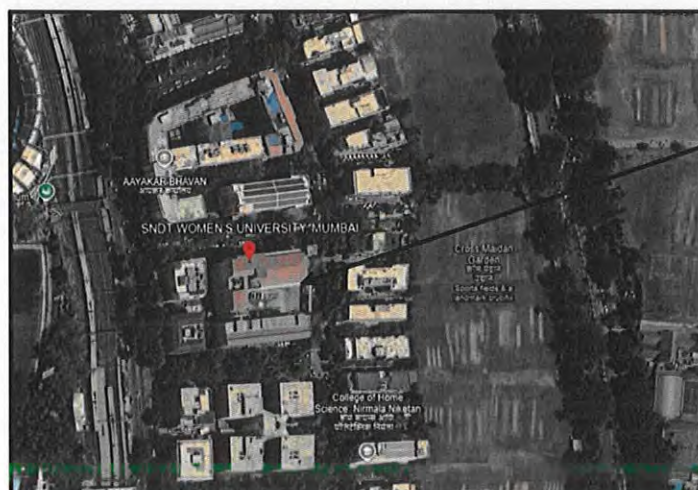
1.1 Introduction:

A Green Audit is conducted at SNTD Women's University's 3 Campuses, namely: Churchgate & Juhu in Mumbai & Pune.

1.2 Audit Procedural Steps:



1.3 University Location Image:



University
Campus



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CHAPTER-II**STUDY OF ENERGY CONSUMPTION & CO₂ EMISSION**

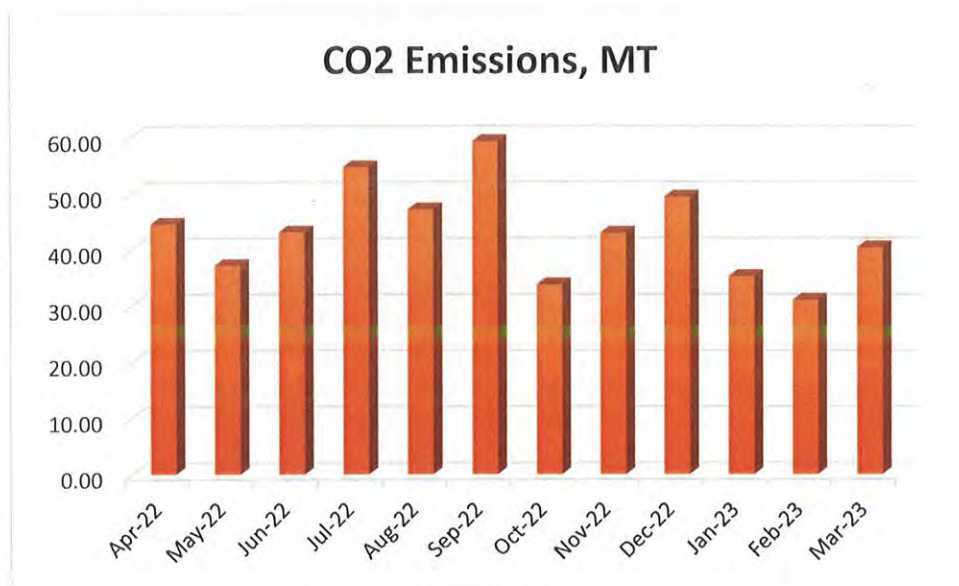
A **Carbon Foot print** is defined as the Total Greenhouse Gas emissions, emitted due to various activities. **Basis for computation of CO₂ Emissions:**

- 1 kWh of Electrical Energy releases **0.9 Kg of CO₂** into atmosphere

Table No 1: Month wise CO₂ Emissions:

No	Month	Total Energy Purchased, kWh	CO ₂ Emissions, MT
1	Apr-22	49498	44.55
2	May-22	41316	37.18
3	Jun-22	47945	43.15
4	Jul-22	60798	54.72
5	Aug-22	52433	47.19
6	Sep-22	65905	59.31
7	Oct-22	37565	33.81
8	Nov-22	47766	42.99
9	Dec-22	54917	49.43
10	Jan-23	39179	35.26
11	Feb-23	34520	31.07
12	Mar-23	44886	40.40
13	Total	576728.00	519.055
14	Maximum	65905	59.3145
15	Minimum	34520	31.068
16	Average	48060.67	43.2546

Chart No 1: Month wise CO₂ Emissions:



CHAPTER III STUDY OF USAGE OF RENEWABLE ENERGY

At Juhu Campus, the University has installed Roof Top Solar PV Plant of Capacity **500 kWp**
In the following Table, we present the reduction in CO₂ emissions due to Solar Energy:

Table No 3: Computation of Reduction in CO₂ Emissions:

No	Particulars	Value	Unit
1	Installed Capacity of Roof Top Solar PV Plant Capacity	500	kWp
2	Energy Generated in the Year: 2022-23	600348	kWh
3	1 kWh of Electrical Energy saves	0.9	Kg of CO ₂ /kWh
4	Qty of CO₂ Saved by Solar Energy = (2)*(3) /1000	540.31	MT of CO₂

Photograph of Roof Top Solar PV Plant:



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CHAPTER IV STUDY OF WASTE MANAGEMENT

4.1 Segregation of Waste at Source:

The Waste is segregated at source. Waste bins are located at various locations.

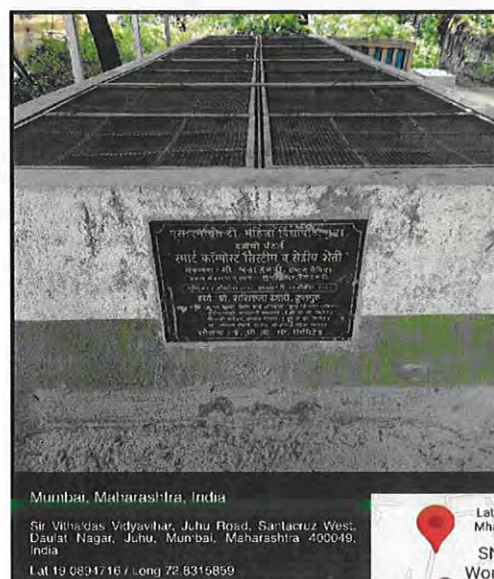
Photograph of Separate Waste Collection Bin:



4.2 Organic Waste Management:

The University has a Bio composting Bed as well as Tumbler Unit, for conversion of Organic Waste.

Photographs of Bio Composting Bed and Tumbler Unit:



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4.3 Sanitary Waste Management:

The University has installed Sanitary Waste Incinerator, for Disposal of Sanitary Waste.

Photograph of Sanitary Waste Incinerator:



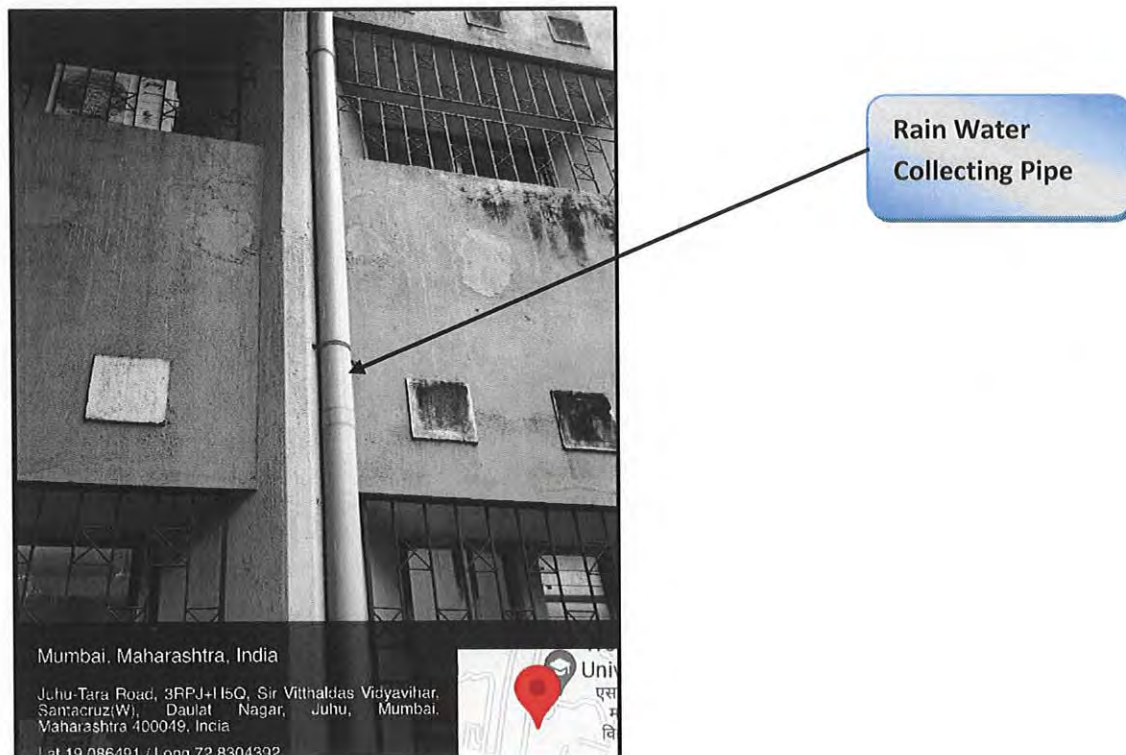
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CHAPTER V

STUDY OF RAIN WATER MANAGEMENT

The rain water falling on the terrace is collected through Pipes and is used to increase the Underground Water Table.

Photograph of Rain Water Collecting Pipe: Juhu Campus:



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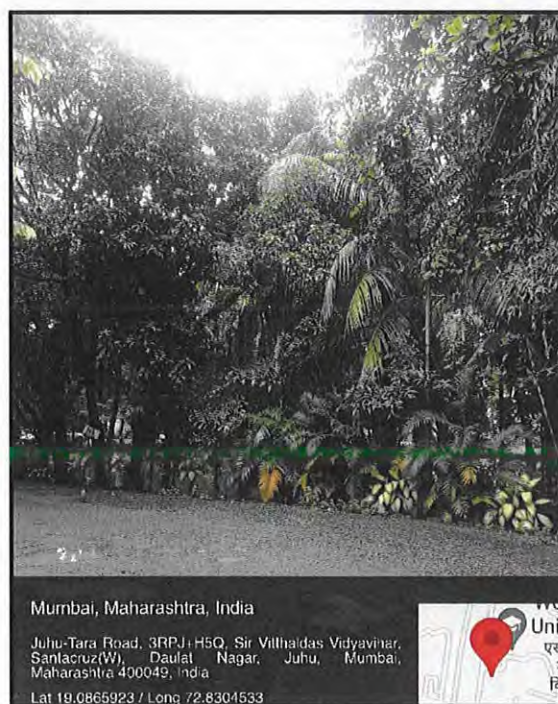
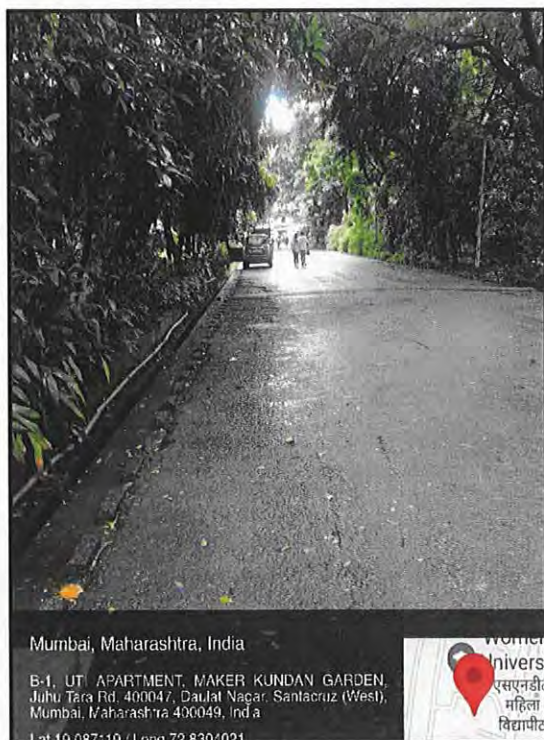
CHAPTER VI

STUDY OF GREEN & SUSTAINABLE PRACTICES

6.1 Pedestrian Friendly Road & Internal Tree Plantation:

The University has well maintained internal road to facilitate the easy movement of the students within the campus. The University has well maintained landscaped garden in the campus.

Photograph of Internal Road & Tree plantation:



6.2 Provision of Ramp for Divyangajan:

For easy movement of Divyangajan, the University has made provision of Ramp.

Photograph of Ramp:



6.3 Creation of Awareness about Resource Conservation:

The University has displayed posters emphasizing on importance of Resource Conservation.

Photograph of Poster on Resource Conservation:



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[Signature]

ENVIRONMENTAL AUDIT REPORT

of

S N D T WOMEN'S UNIVERSITY,

Mumbai 400 020



Year: 2022-23

Prepared by:

ENGRESS SERVICES

Yashashree, 26, Nirmal Bag Society

Near Muktangan English School, Parvati, Pune 411009

Phone: 09890444795 Email: engress123@gmail.com



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Registrar

S.N.D.T. Women's University
Mumbai - 400 020

REGISTRATION CERTIFICATES

MAHARASHTRA ENERGY DEVELOPMENT AGENCY

Maharashtra Energy Development Agency
(Government of Maharashtra Institution)
Aundhi Road, Opposite Spicer College Road, Near Commissionerate of Animal Husbandary,
Aundhi, Pune, Maharashtra-411007
Ph No: 020-35000430
Email: ee@maharaja.com Web: www.maharaja.com

ECN-2022-23/CR-43/1709 10th May, 2022

**CERTIFICATE OF REGISTRATION
FOR CLASS 'A'**

We hereby certify that, the firm having following particulars is registered with
MAHARASHTRA ENERGY DEVELOPMENT AGENCY (MEDA) under given category as
"Energy Planner & Energy Auditor" in Maharashtra for Energy Conservation Programme of
MEDA.

Name and Address of the firm : M's Engress Services
Yashshree, 26, Nirmal Bag Society,
Near Mukangan English School,
Parvat, Pune - 411 009.

Registration Category : Empowered Consultant for Energy Conservation
Programme for Class 'A'

Registration Number : MEDA/ECN-2022-23/Class A/E.1-32.

- Energy Conservation Programme intends to identify areas where wasteful use of energy occurs and to evaluate the scope for Energy Conservation and take concrete steps to achieve the evaluated energy savings.
- MEDA reserves the right to visit at any time without giving prior information to verify quarterly activities performed by the firm and canceling the registration, if the information is found incorrect.
- This empowerment is valid till 09th May, 2024 from the date of registration, to carry out energy audits under the Energy Conservation Programme.
- The Director General, MEDA reserves the right to cancel the registration at any time without assigning any reasons thereof.

General Manager (EC)

GEM Certificate
ASSOCHAM hereby certifies that
Mr. A Y Mehendale
has successfully passed the
Green and Eco-friendly Movement Certified Professional Test (GEM CP)
with
"Excellent Performance"
on
06 June, 2022
He/she is now eligible to execute the GEM Sustainability Certification Projects.
ASSOCHAM feels proud to award the GEM Certified Professional title to him/her.

Pankaj R. Dharkar
Chairman, GEM

Deepak Sood
Secretary General, ASSOCHAM

GEM CP 22/788

MEDA REGISTRATION CERTIFICATE

Certificate of Registration
This is to Certify that
Quality Management System of
ENGRESS SERVICES
26, YASHASHREE, BLOCK 1, LOKMANYA NAGAR, NIRMAL BAUG SOC., PARVATI,
PUNE- 411009, MAHARASHTRA, INDIA
has been assessed and found to conform to the requirements of
ISO 9001:2015
for the following scope:
CONSULTANCY SERVICES FOR ENERGY AUDIT, GREEN AUDIT & ENVIRONMENTAL AUDIT
IN EDUCATIONAL INSTITUTIONS & SUBMISSION OF AUDIT CERTIFICATE AND REPORT

Certificate No : 23EQC13
Initial Registration Date : 27/03/2023 Issuance Date : 27/03/2023
Date of Expiry : 26/03/2026
1st Surve. Due : 27/02/2024 2nd Surve. Due : 27/02/2025

Director

Magnitude Management Services Pvt. Ltd.
B-55, Lower Ground Floor, Sector 82, Noida-201301, U.P. India
Email: info@mmcs.com, website: www.mmcs.com

ISO: 9001-2015 CERTIFICATE

ASSOCHAM GEM CP CERTIFICATE

Certificate of Registration
This is to Certify that
Environmental Management System of
ENGRESS SERVICES
26, YASHASHREE, BLOCK 1, LOKMANYA NAGAR, NIRMAL BAUG SOC.,
PARVATI, PUNE- 411009, MAHARASHTRA, INDIA
has been assessed and found to conform to the requirements of
ISO 14001:2015
for the following scope:
CONSULTANCY SERVICES FOR ENERGY AUDIT, GREEN AUDIT & ENVIRONMENTAL AUDIT
IN EDUCATIONAL INSTITUTIONS & SUBMISSION OF AUDIT CERTIFICATE AND REPORT

Certificate No : 23EFK20
Initial Registration Date : 29/03/2023 Issuance Date : 29/03/2023
Date of Expiry : 28/03/2026
1st Surve. Due : 29/02/2024 2nd Surve. Due : 28/02/2025

Director

Magnitude Management Services Pvt. Ltd.
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ISO: 14001-2015 CERTIFICATE



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ACKNOWLEDGEMENT

We Engress Services, Pune, express our sincere gratitude to the management of SNTD Women's University, Mumbai for awarding us the assignment of Environmental Audit of their Churchgate, Juhu & Pune Campuses for the Year: 2022-23.

We are thankful to all staff members for helping us during the field study.



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A handwritten signature in blue ink, likely of the Registrar, is placed over the 'Certified True Copy' text.

EXECUTIVE SUMMARY

1. **SNTD Women's University, Mumbai** has three campuses, namely at Churchgate, Juhu, in Mumbai and at Pune. The major form of Energy is the **Electrical Energy**; used for various equipment in the campuses.

2. Pollution due to University Activities:

- **Air pollution:** Mainly CO₂ on account of Electricity Consumption
- **Solid Waste:** Bio degradable Garden Waste
- **Liquid Waste:** Human liquid waste

3. Present Energy Consumption & CO₂ Emission:

No	Particulars	Value	Unit
1	Annual Energy Purchased	576728	kWh
2	Annual CO ₂ Emissions	519.06	MT

4. Renewable Energy Usage & Reduction in CO₂ Emissions:

- The University has installed Solar PV Plant of capacity **500 kW**.
- The Energy generated by **500 kWp** Solar PV Plant in 2022-23 is **600348 kWh**.
- Reduction in CO₂ Emissions in 2022-23 is **540.31 MT**

5. Indoor Air Quality Parameters:

No	Parameter/Value	AQI	PM-2.5	PM-10
1	Maximum	63	37	45
2	Minimum	56	34	38

6. Indoor Comfort Conditions:

No	Parameter/Value	Temperature, °C	Humidity, %	Lux Level	Noise Level, dB
1	Maximum	27.2	71	132	45
2	Minimum	27.1	69	105	40

7. Waste Management:

No	Head	Particulars
1	Solid Waste	Segregation of Waste at source
2	Organic Waste	Provision of Bio Composting Bed & tumbler Unit
3	Sanitary Waste	Provision of Sanitary Waste Incinerator



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8. Rain Water Management:

The rain water falling on the terrace is used to increase the Underground Water table.

9. Environment Friendly Initiatives:

- Tree Plantation in the campus.
- Creation of awareness on Water Conservation by Display of Posters

10. Assumptions:

1. **1 kWh** of Electrical Energy releases **0.9 Kg** of **CO₂** into atmosphere
2. **CO₂** Emission is computed based on Electrical Energy purchased

11. References:

- For CO₂ Emissions: www.tatapower.com
- For Various Indoor Air Parameters: www.ishrae.com
- For AQI Quality Standards: www.cpcb.com



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ABBREVIATIONS

Kg	: Kilo Gram
MSEDCL	: Maharashtra State Distribution Company Limited
MT	: Metric Ton
kWh	: kilo-Watt Hour
LPD	: Liters per Day
LED	: Light Emitting Diode
AQI	: Air Quality Index
PM-2.5	: Particulate Matter of Size 2.5 Micron
PM-10	: Particulate Matter of Size 10 Micron
CPCB	: Central Pollution Control Board
ISHRAE	: The Indian Society of Heating & Refrigerating & Air Conditioning Engineers



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CHAPTER-I INTRODUCTION

1. Important Definitions:

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

1.2. 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"

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

1.4 Audit Procedural Steps:



1.5 University Location Image:



University
Campus



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CHAPTER-II

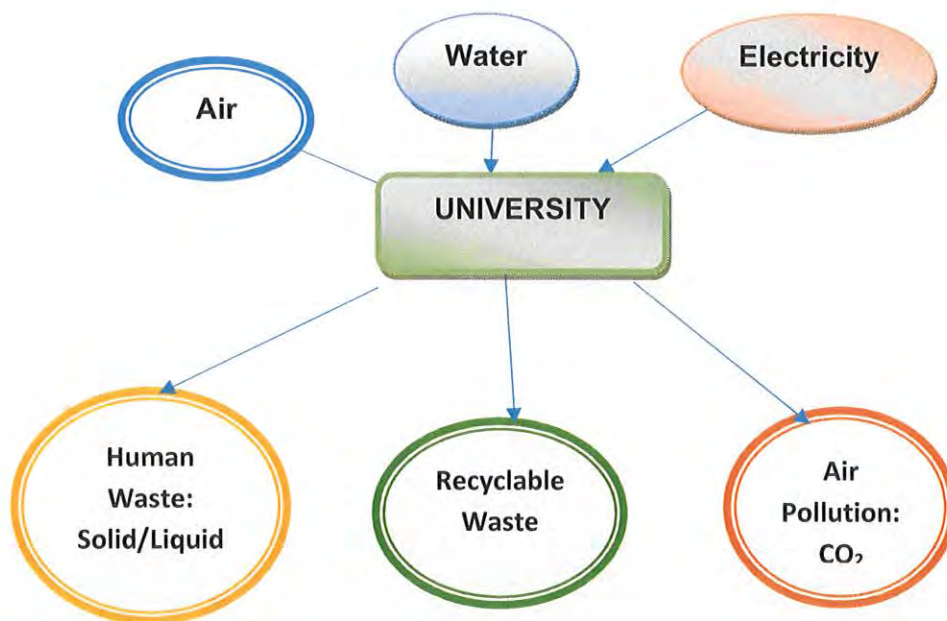
STUDY OF RESOURCE CONSUMPTION & CO₂ EMISSION

The University consumes following basic/derived Resources:

1. Air
2. Water
3. Electrical Energy

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

Chart No 1: Representation of University as System & Study of Resources & Waste



Now we compute the Generation of CO₂ on account of consumption of Electrical Energy. The basis of Calculation for CO₂ emissions due to Electrical Energy is as under.

- 1 kWh of Electrical Energy releases 0.9 Kg of CO₂ into atmosphere

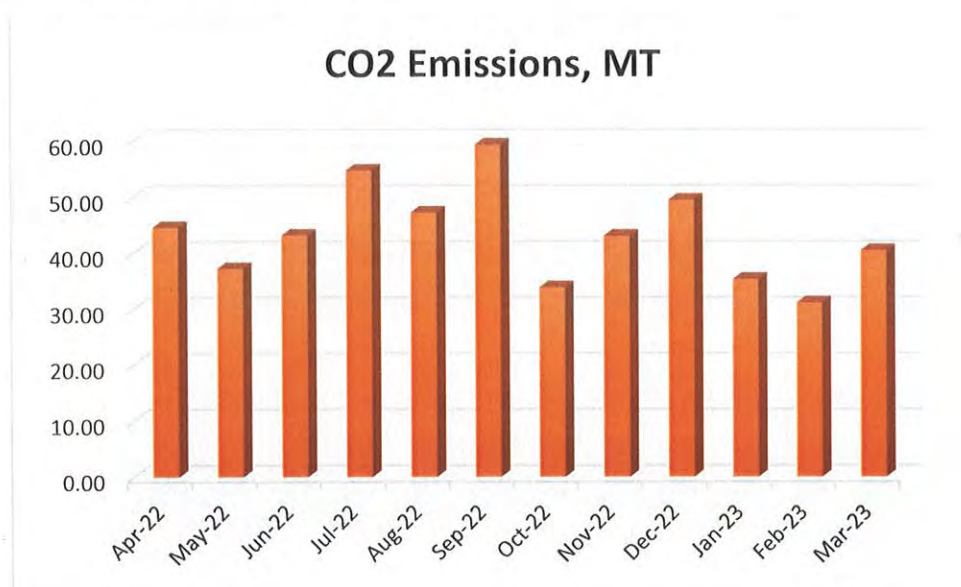
Table No 1: Study of Purchase of Energy & CO₂ Emissions: 22-23:

No	Month	Total Energy Purchased, kWh	CO ₂ Emissions, MT
1	Apr-22	49498	44.55
2	May-22	41316	37.18
3	Jun-22	47945	43.15
4	Jul-22	60798	54.72
5	Aug-22	52433	47.19
6	Sep-22	65905	59.31
7	Oct-22	37565	33.81



8	Nov-22	47766	42.99
9	Dec-22	54917	49.43
10	Jan-23	39179	35.26
11	Feb-23	34520	31.07
12	Mar-23	44886	40.40
13	Total	576728.00	519.055
14	Maximum	65905	59.3145
15	Minimum	34520	31.068
16	Average	48060.67	43.2546

Chart No 2: Month wise CO₂ Emissions:



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CHAPTER III

STUDY OF USAGE OF RENEWABLE ENERGY

At Juhu Campus, the University has installed Roof Top Solar PV Plant of Capacity **500 kWp**. In the following Table, we present the reduction in CO₂ emissions due to Solar Energy:

Table No 2: Computation of Reduction in CO₂ Emissions:

No	Particulars	Value	Unit
1	Installed Capacity of Roof Top Solar PV Plant Capacity	500	kWp
2	Energy Generated in the Year: 2022-23	600348	kWh
3	1 kWh of Electrical Energy saves	0.9	Kg of CO ₂ /kWh
4	Qty of CO₂ Saved by Solar Energy = (2)*(3) /1000	540.31	MT of CO₂

Photograph of Roof Top Solar PV Plant:



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CHAPTER IV

STUDY OF INDOOR AIR QUALITY

4.1 Importance of 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 now and for future generations by affecting the health, the environment, the economy and the city's livability.

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

4.2 Air Quality Index:

An **Air Quality Index (AQI)** is a number used by government agencies to measure the **air pollution** levels and communicate it to the population. As the AQI increases, it means that a large percentage of the population will experience severe adverse health effects.

We present herewith following important Parameters.

1. AQI- Air Quality Index
2. PM-2.5- Particulate Matter of Size 2.5 micron
3. PM-10- Particulate Matter of Size 10 micron

Table No 3: Indoor Air Quality Parameters:

No	Location	AQI	PM-2.5	PM-10
1	Admin Section	61	37	44
2	Library	60	36	38
3	Usha Mittal College	63	37	45
4	SVT College	60	34	39
5	Law College	56	34	39
	Maximum	63	37	45
	Minimum	56	34	38



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CHAPTER V

STUDY OF INDOOR COMFORT CONDITION PARAMETERS

In this Chapter, we present the various Indoor Comfort Parameters measured during the Audit. The Parameters include:

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

Table No 4: Study of Indoor Comfort Condition Parameters:

No	Location	Temperature, °C	Humidity, %	Lux Level	Noise Level, dB
1	Admin Section	27.1	70	124	44.3
2	Library	27.2	69	105	42
3	Usha Mittal College	27.1	69	132	41.9
4	SVT College	27.1	71	126	45
5	Law College	27.2	69	132	40
	Maximum	27.2	71	132	45
	Minimum	27.1	69	105	40



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CHAPTER VI STUDY OF WASTE MANAGEMENT

6.1 Segregation of Waste at Source:

The Waste is segregated at source. Waste bins are located at various locations.

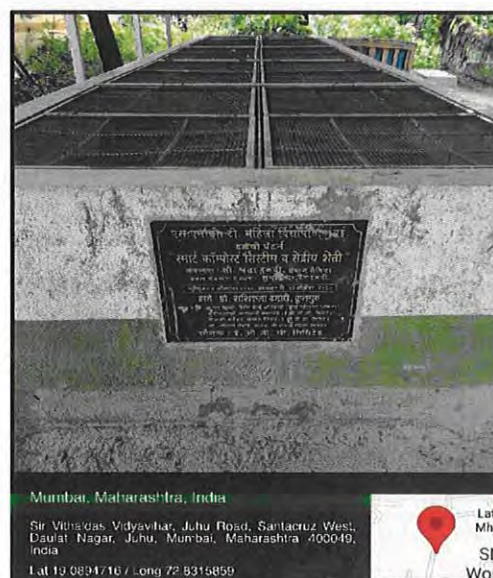
Photograph of Separate Waste Collection Bin:



6.2 Organic Waste Management:

The University has a Bio composting Bed as well as Tumbler Unit, for conversion of Organic Waste.

Photographs of Bio Composting Bed and Tumbler Unit:



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6.3 Sanitary Waste Management:

The University has installed Sanitary Waste Incinerator, for Disposal of Sanitary Waste.

Photograph of Sanitary Waste Incinerator:



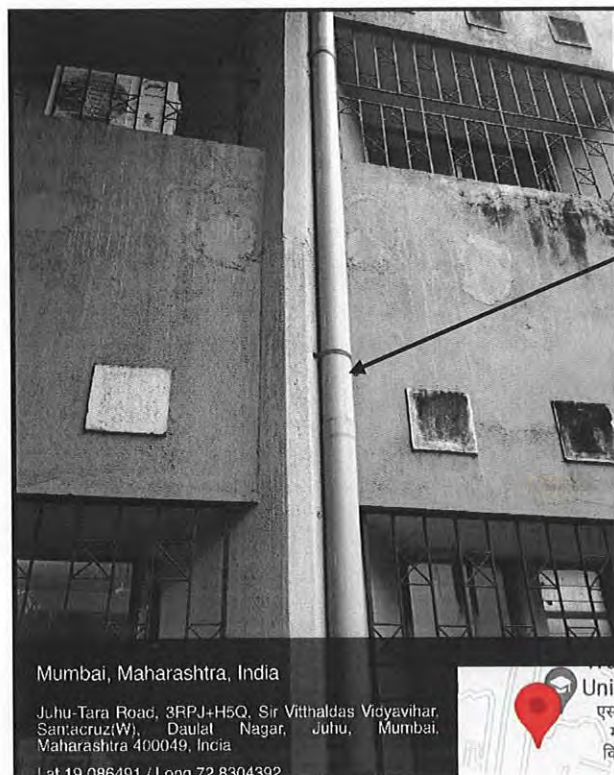
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CHAPTER-VII

STUDY OF RAIN WATER MANAGEMENT

The rain water falling on the terrace is collected through Pipes and is used to increase the Underground Water Table.

Photograph of Rain Water Collecting Pipe:



Rain Water
Collecting Pipe



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CHAPTER-VIII

STUDY OF ECO-FRIENDLY INITIATIVES

8.1 Internal Tree Plantation:

The University has Tree Plantation in the campus.

Photograph of Tree plantation:



8.2 Creation of Awareness about Water Conservation:

The University has displayed posters emphasizing on importance of Water Conservation.

Photograph of Poster on Water Conservation:



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ANNEXURE-I: VARIOUS AIR QUALITY, NOISE & COMFORT STANDARDS:

1. Category Wise Air Quality Index Values & Concentration of PM 2.5 & PM10:

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

2. Recommended Noise Level Standards:

No	Location	Noise Level dB
1	Auditoriums	20-25
2	Outdoor Playground	55
3	Occupied Class Room	40-45
4	Un occupied Class Room	35
5	Apartment, Homes	35-40
6	Offices	45-50
7	Libraries	35-40
8	Restaurants	50-55

3. Thermal Comfort Conditions: For Non-conditioned Buildings:

No	Parameter	Value
1	Temperature	Less Than 33 ⁰ C
2	Humidity	Less Than 70%



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